Textile Machinery Relating to Weaving

by

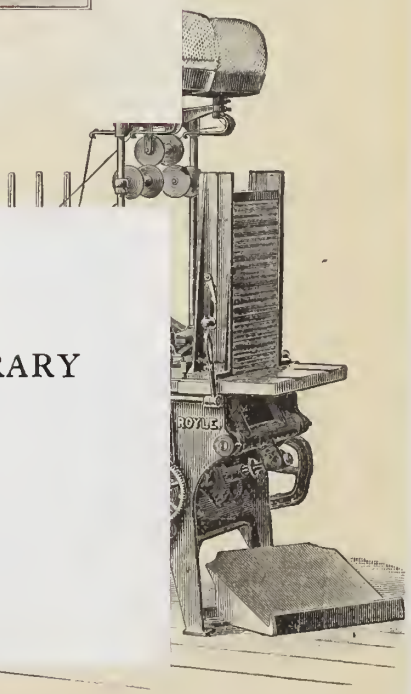
E. A. Posselt

The Most Notable....

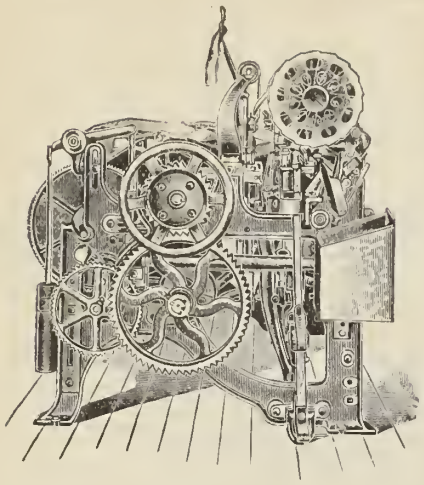
of recent additions to the machinery used for cutting Jacquard Cards, is the Automatic Lacer built by John Royle & Sons, of Paterson, N. J., U. S. A. The distinctive feature of this machine is that it unites the two operations of punching and lacing cards, operations heretofore separate and distinct, and requiring separate care and attention.

The reduction of these two operations to one has long been a subject of consideration to both machinists and textile manufacturers, but it has remained for th st thoroughly practical ma r, considered merely from ork, not alone because of th on of the very high grade c the minutest detail. Ever the result is a machine that and certainty, at about tw erform either operation sin sidered as the greatest time al of the card-cutter since t Royles, some years ago; a been identifie

There is the Repeater; any doubts that might exist on this score having been finally laid to rest a great many years ago, ar Lacer would



Althoug experimenta continuous number of where it is easy to han superior to does not dro be depended ties in a machine of this sort.



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BY

E. A POSSELT,

Consulting Expert on Textile Designing and Manufacturing. Author and Publisher of "Technology of Textile Design;" "The Jacquard Machine Analyzed and Explained;" "Structure of Fibres, Yarns and Fabrics;" "Textile Calculations;" "Posselt's Textile Library;" Editor of "The Textile Record;" Editor of Textile Terms in "Standard Dictionary" and "Iconographic Encyclopædia of the Arts and Sciences;" Principal of "Posselt's Private School of Textile Design;" formerly Headmaster of the Textile Department of the Pennsylvania Museum and School of Industrial Art, Philadelphia.

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PREFACE.

THE importance for every Textile Manufacturer, Superintendent, Designer, Overseer and Student to be familiar with the latest and most improved Machinery, Devices and Supplies as needed in the weaving department of an up-to-date mill, is the cause of bringing this book before the public.

Illustrations and reading matter have been most carefully edited so as to bring the varions subjects as plain as possible before the reader.

It would have been impossible to furnish a work dealing with each and every make of machinery or devices at present in use; however, a successful attempt has been made to illustrate the latest and those of the most importance, and it is my intention to publish a second volume, to be issued three years hence, giving a description of such machinery or devices as either escaped notice or were impossible to be obtained for this book, or such as will be invented and put to practical test previously to publishing said volume. The present book will also form a most valuable manual of reference to inventors, it being the most complete work on textile machinery relating to weaving heretofore published.

I have the pleasure in acknowledging my indebtedness to Mr. Geo. W. Kritler, Master Weaver, Philadelphia, for his kindness in examining proofs.

E. A. POSSELT.

Philadelphia, January, '98.

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SHEDDING MECHANISMS.

THE KNOWLES SHEDDING MECHANISM.

This mechanism is shown in the accompanying three illustrations, of which Fig. 1 shows the complete shedding mechanism; Fig. 2 shows the top and bottom cylinders, also the vibrator and jack attachment; Fig. 3 shows the box mechanism for raising and lowering the shuttle boxes.

a, indicates arch of loom frame; *b*, the loom frame; *c*, the bolts for fastening the arch *a*, on to loom frame *b*; *d*, indicates the top cylinder for operating shedding mechanism; *e*, the bottom cylinder for operating shedding mechanism; *d'*, the part of top cylinder for operating shuttle boxes; *e'*, the part of bottom cylinder for operating shuttle-boxes; *f*, the vibrator levers; *g*, the vibrator gears; *h*, the vibrator connectors; *i*, the harness jacks; *i'*, the comb for keeping them in proper position.

Vibrator lever, gear and connector are the same for shedding and box mechanism, with the exception of the long connector *h'*, used for raising single box.

j, arbor of harness jacks, fulcrumed to rod *k*, fastened to the lower extension of arch *a*, of the loom frame. *k'*, is a small rod running across the top of jacks for holding them down on the rod *k*.

l, chain cylinder gear, fastened to the chain cylinder *l'*, by means of a soft set screw (not shown), so that provided any catch occurs no other breakage but the breaking of said soft set screw will result; *l''*, the boxes for holding chain cylinder and which can be raised or lowered by set screws *l'''*.

m, two elliptical gears for transferring the characteristic fast and slow motion to chain cylinder *l'*. To the right of these two elliptical gears *m*, are seen two spur gears, of which the lower situated is a double spur gear. The outside gear of the double spur gear, is smaller and meshes into the teeth of the chain cylinder gear *l*.

n, the reverse key, held in position by casting *n'*, bolted on to loom frame *a*. This reverse key acts as a shaft for all the upper sections of previously referred to three sets of gears. It has a double key set in its shaft. When the loom is in motion and the chain cylinder running forward, one of the lips fastens the top elliptical gear and also the previously referred to outside situated upper gear, which meshes with the chain cylinder gear *l*. If required to reverse the chain cylinder the reverse key *m*, is drawn out, in turn liberating the top elliptical gear and fastening the middle spur

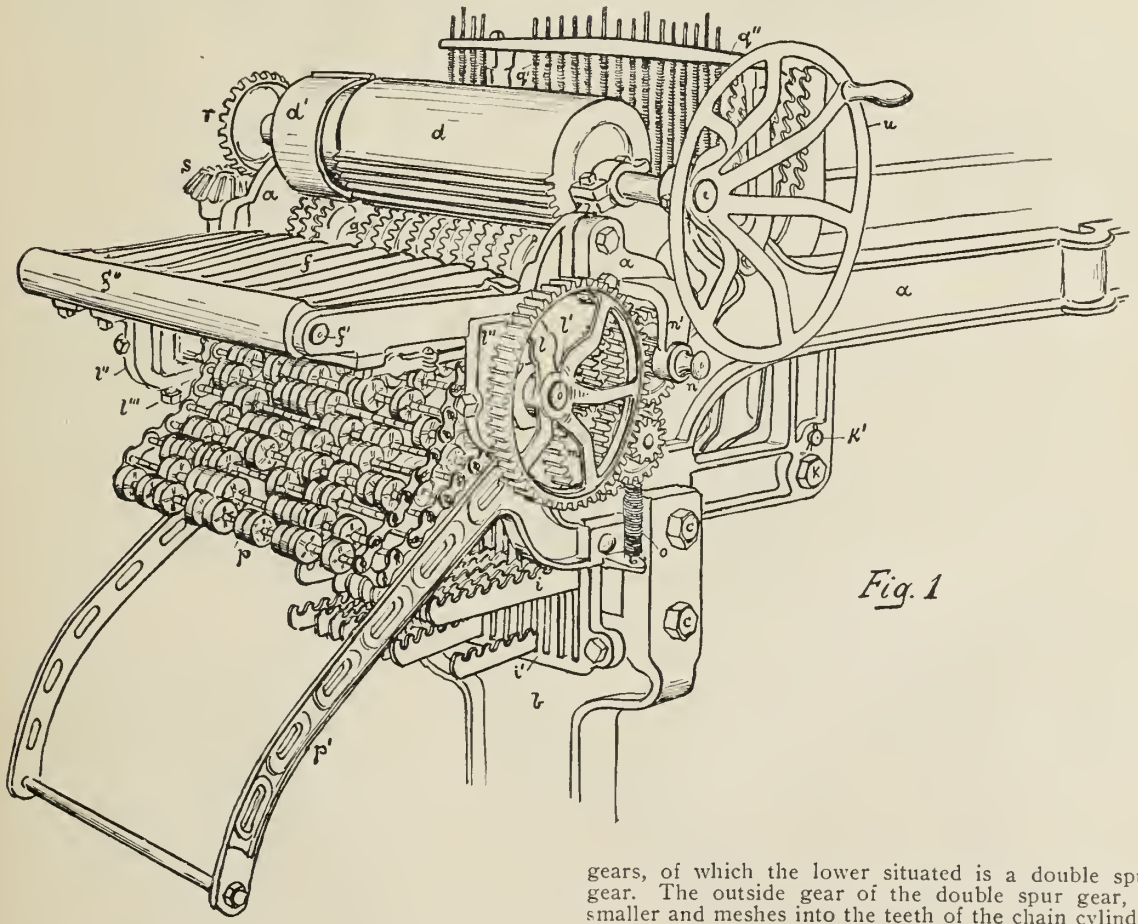


Fig. 1

gear, which meshes with the bottom double spur gear, thus in turn reverses the chain cylinder gear and its cylinder.

Spring o, connects to the lock knife o'. (See Fig. 3.) This lock knife is operated by means of finger o'', fastened to rod o''' by a set screw, and which finger in turn is operated by a cam (not shown) fastened on the bottom cylinder e.

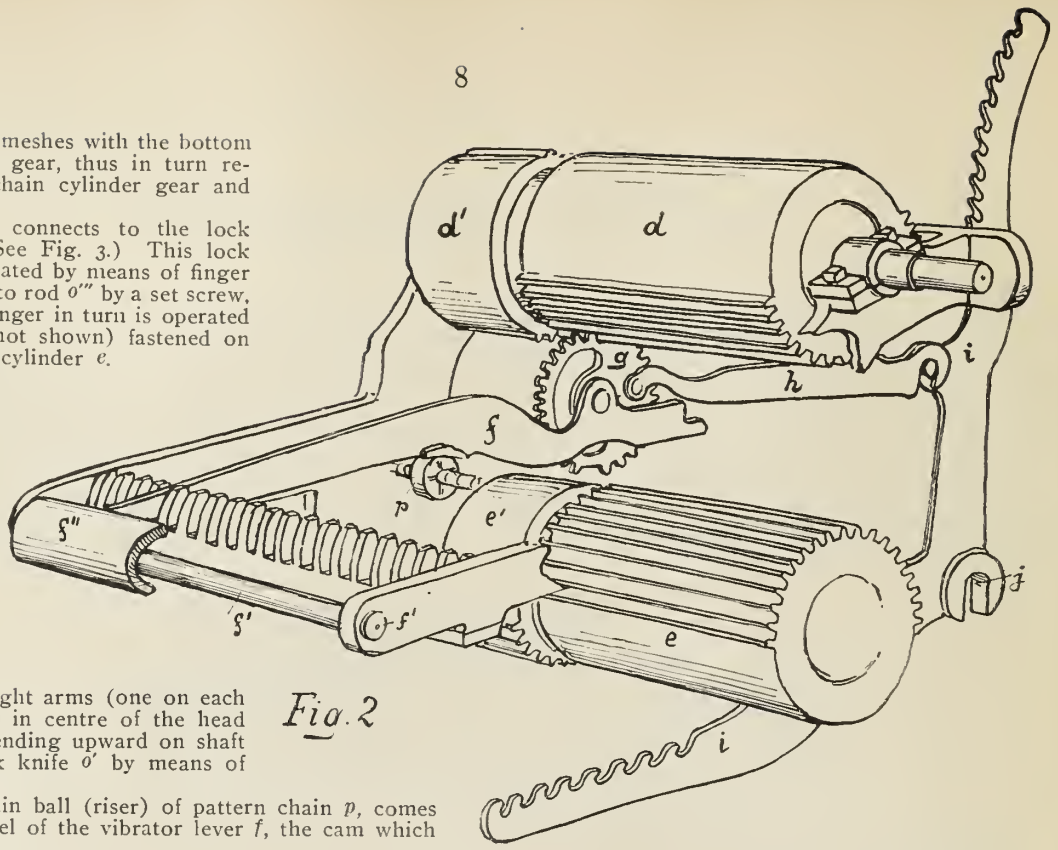


Fig. 2

Three upright arms (one on each end and one in centre of the head motion) extending upward on shaft o''' hold lock knife o' by means of set screws.

As the chain ball (riser) of pattern chain p, comes under the heel of the vibrator lever f, the cam which operates the finger o'' of the lock knife must be on its highest part, which causes the knife to be out, allowing the vibrator lever f, to change according to pattern chain. As the low part of the cam comes around, the spring o will immediately pull the lock knife in between the ends of the vibrator lever f, holding them steady while vibrator gears g, are rotating.

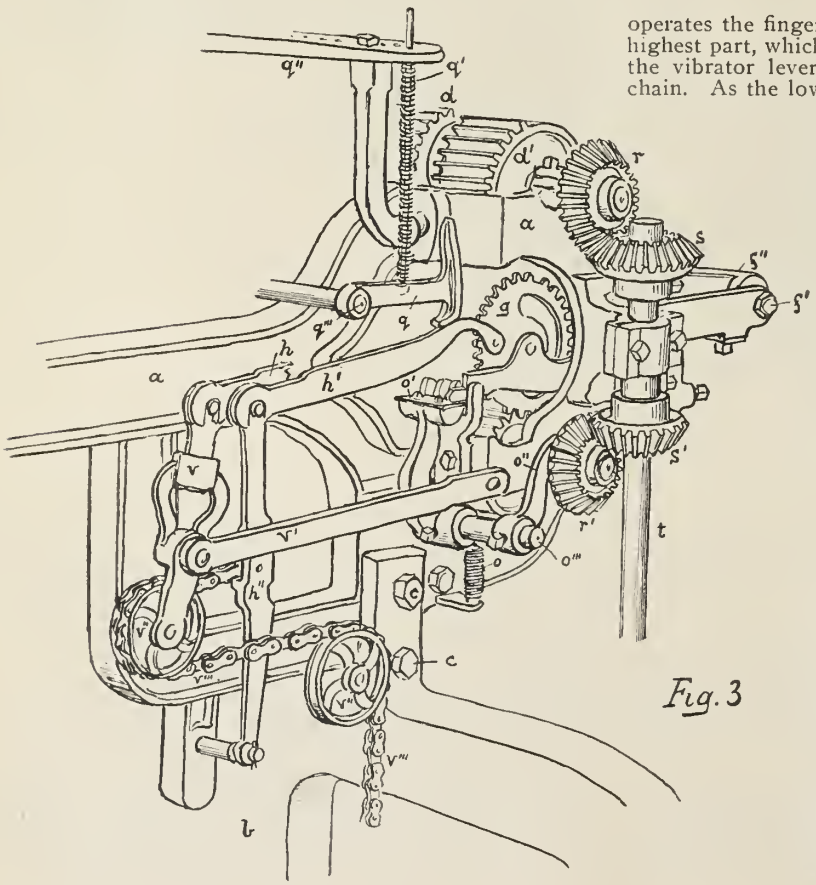


Fig. 3

p' is the chain rack for holding the chain in position and away from the jacks i.

Vibrator levers f, are fulcrumed on rod f', and held in position by shell f''.

Every vibrator connector h, has connected to it a follower-lever q, the object of which is to keep connector h, from flying back when the harness rises. Every follower-lever is pressed down by means of a spring q', held in position by rack q'' and turns on shaft q'''. Cylinders d and e, are driven by bevel gears r and r', which in turn are driven by bevel gears s and s', keyed to upright shaft t, driven either from crank shaft or bottom shaft of the loom as required.

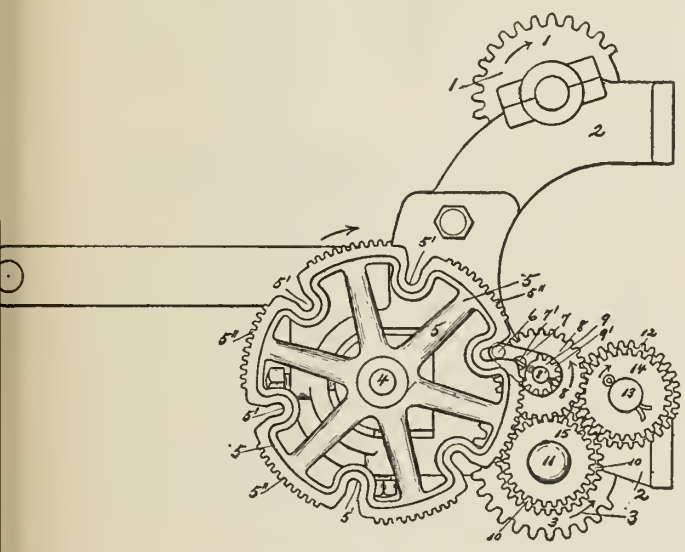
u, is a hand wheel used by the operator for turning harnesses by hand when necessary.

h', is the lever for a single box lift (box No. 2); v, compound lever for raising box 3 and 4; v', brace for holding compound lever in position; v'', the pulleys around which box chain v''', runs for raising the boxes. (*Crompton and Knowles Loom Works.*)

PATTERN MECHANISM OF THE KNOWLES LOOM.

In the accompanying drawing is shown a front elevation of a detached portion of the head of the Knowles loom, sufficient to illustrate the nature of the device.

Numerals of reference indicate thus: 1, is the upper cylinder gear, journaled in the upper portion of the head frame (arch) 2, and 3 is the lower cylinder gear, journaled in the lower portion of the head frame 2. 4, is the pattern cylinder shaft journaled in the frame 2. On the front end of said shaft 4, is fast the pattern cylinder gear 5, which is provided with a series of equidistant notches 5′, in its periphery. In this instance there are 6 notches. The portions of the periphery of the gear 5, between the notches 5′, are provided with gear teeth 5″. For a predetermined distance on each side of the notches 5′, the teeth 5″, are left off, and these portions of the periphery of the gear 5, are plain, as well as the notched portion. The outer ends of the notches 5′, are beveled, or made flaring to allow of the ready admission and withdrawal of the driving pin 6, on the arm or plate 7, secured to the gear 8, in this instance by a screw 7′. Said gear 8, is journaled on a stud 8′.



The plate 7, secured to the gear 8, has a mutilated pinion 9, made integral therewith, or secured thereto. Said pinion 9, is provided with nine teeth, corresponding to the number of spaces between the teeth 5″, on each section of the periphery of the gear 5, and the teeth on the mutilated pinion 9, are adapted to mesh with, and communicate a slow motion to the gear 5, through the revolution of the gear 8, when the pin 6, is free from engagement with the slots 5′, in said gear 5.

Continuous motion is communicated to the gear 8, from the upper or lower cylinder gear, in this instance from the lower cylinder gear, either in a forward or in a backward direction, by the ordinary system of circular gears, as shown in the drawing. Said system of gears consists of a gear 10, connected and adapted to move with the lower cylinder gear 3, by the sliding key 11, in the ordinary way. Said gear 10, meshes with and drives a gear 12, loose on a stud 13, fast in the head frame, and a third gear 14, made integral with the gear 12, or secured thereto, meshes with, and drives the gear 8.

A fourth gear 15, is journaled on the same shaft as the gear 10, and meshes with the gear 8, and runs loose, except when it is desired to reverse the pattern chain mechanism, when by means of the sliding key 11. the gear 15, is connected and made to revolve with the cylinder gear 3, and turn the gear 8, in the reverse direction, leaving the gear 10, loose.

From the description in connection with the drawing, the operation of the pattern mechanism, for communicating a continuous fast and slow motion to the pattern cylinder shaft 4, and to the pattern cylinder, not shown, will be readily understood.

When the loom is running properly the revolution of the cylinder gear 3, will cause the gear 10, connected therewith, to revolve in the direction indicated by the arrow, also the gear 12, and the gear 14, fast thereto, and the gear 8, and through the gear 8, the arm 7, carrying the pin 6, and the mutilated pinion 9. At every revolution of the gear 8, the pin 6, will enter into one of the slots 5′, in the periphery of the gear 5, and communicate to said gear a fast motion for a part of its revolution. As soon as the pin 6, leaves the slot 5′, the teeth 9′, on the mutilated pinion 9, will engage with the teeth 5″, on one section of the periphery of the gear 5, and communicate a slow motion to said gear, for a part of its revolution. This operation is repeated, and a continuous fast and slow motion of the gear 5, and also the pattern cylinder shaft 4, and of the pattern cylinder, not shown, is obtained.

In case it is desired to reverse the motion of the pattern cylinder shaft 4, the slide pin 11, is drawn out, causing the gear 15, to revolve with the cylinder gear 3, and turn the gear 8, in the opposite direction, and also the plate 7, carrying the pin 6, the gears 10, 12, and 14, running loose.

This mechanism does away with the elliptical gears as used in the older style of looms, and which are expensive to make, obtaining a continuous fast and slow motion with the ordinary system of circular gears.

The explanation thus given covers one of the most important, if not the most ingenious, inventions of the Knowles Loom Works. They never left their original idea of operating the harness, but continuously improved the method of driving the chain cylinder. Their object is to have a continuous motion of said chain cylinder without the use of elliptical or eccentric gears and yet have a fast and slow motion of said cylinder.

In the new device they have both; when the chain is moving from one bar to the other the motion is very fast, but as the cylinder gears are changing the harness from one pick to the other the chain cylinder motion is slow, thereby gaining speed of the chain cylinder without the use of elliptical gears, thus removing any possibility of harness skips and reducing the wear and tear on the machinery to the lowest possible amount. (*Crompton and Knowles Loom Works.*)

PATTERN MECHANISM FOR KNOWLES NARROW WARE LOOMS IN WHICH REVERSE GEARS ARE NOT USED.

The object of this mechanism is (also) to communicate a continuous fast and slow motion to the pattern chain cylinder.

By means of this mechanism, is done away with the system of reverse gears, the pattern cylinder gear being driven directly from the shaft of the head motion cylinder gear, by a pinion and pin fast on said shaft. Provision is also made for turning the pattern cylinder and chain in a reverse direction, by mounting the pattern cylinder gear loose on the pattern cylinder shaft, and combining therewith a snap handle, fast on said

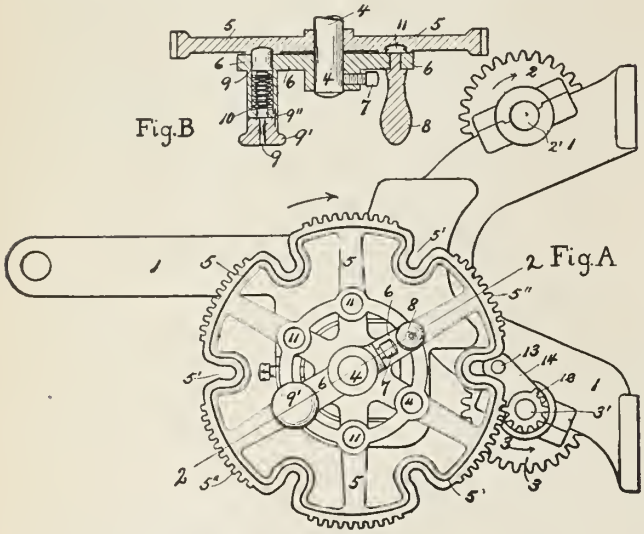
shaft, and provided with a spring actuated pin which engages holes or recesses in the pattern cylinder gear, to cause said gear to revolve with the pattern cylinder shaft.

As mentioned before, this improvement can be used on a Knowles loom, where reverse gears are not needed; it is an excellent motion, the same as is produced by the aid of eccentric or elliptical gears, namely, a fast motion as the chain is passing from one bar to the other and a slow motion when the gears are changing the harness. Reverse gears are not needed on any plain loom where the harness chain is of short repeats.

In the accompanying drawings a detached portion of the head of the Knowles loom is given, sufficient to illustrate the nature of the mechanism.

Referring to the drawings: Figure A is a front elevation of a portion of the head of said Knowles loom, and Fig. B is a sectional detail, through the pattern cylinder gear and the snap handle, taken on line 2, 2, Fig. A.

1, is the head frame; 2, is the upper cylinder gear, and 3, the lower cylinder gear; the shafts 2′, 3′, of which are journaled in boxes on the head frame 1, and 4, is the pattern cylinder shaft, journaled in the frame



1, in the usual way. On the front end of said shaft 4, is loosely mounted the pattern cylinder gear 5, which is provided with a series of equidistant notches 5′, and with gear teeth 5″, on the periphery of the gear, intermediate the notches. The teeth 5″, are left off for a predetermined distance on each side of the notches 5′, and these portions of the periphery of the gear, as well as the notched portions, are plain, and the outer ends of the notches 5′, are beveled or made flaring to allow of the ready admission and withdrawal of the driving pin.

On the end of the cylinder gear shaft 4, outside of the cylinder gear 5, is a snap handle bar 6, secured to said shaft, by a screw 7. The snap handle bar 6, is provided with a handle 8, and also with a spring actuated pin 9, mounted and adapted to move out or in, in a boss 6′, on the bar 6. The pin 9, has an enlarged head 9′, and is actuated by a spiral spring 10, inclosed within a chamber in the boss 6′. The inner end of pin 9, is adapted to extend into holes or recesses 11, in the arms of the pattern cylinder gear 5. The head 9′, is provided with a pin 9″, fast therein, which extends loosely into a hole in the end of the boss 6′, and when the pin 9, is withdrawn, it may be turned so as to cause the end of the pin 9″, to bear against the end of the boss 6′, to hold the pin 9, out of engagement with the holes 11.

It will be seen that by withdrawing the pin 9, so that the inner end thereof will not engage with the holes or recesses 11, in the cylinder gear 5, that the pattern cylinder shaft 4, may be turned by the snap handle bar 6, to turn the pattern cylinder and chain, without turning the cylinder gear 5.

The pattern cylinder gear 5, is driven directly from the shaft 3′, of the lower cylinder gear 3, by a pinion 12, fast thereon, and meshing with the gear teeth 5″, on the pattern cylinder gear 5, to communicate a slow motion thereto, and by a pin 13, on an arm or plate 14, secured to, or made integral with the pinion 12, which pin engages the notches 5′, in the cylinder gear 5, to communicate a fast motion thereto. It will thus be seen that by means of the pin 13, and the pinion 12, a continuous fast and slow motion is communicated to the pattern cylinder gear 5, and in this instance from the shaft of the lower cylinder gear.

When it is desired to disconnect the pattern cylinder gear 5, so that the pattern cylinder shaft 4, and pattern chain may be turned without turning said gear, the spring actuated pin 9, is withdrawn from engagement with the cylinder gear 5, and the pattern cylinder shaft 4, turned by means of the handle 8, on the snap handle bar 6. (*Crompton and Knowles Loom Works.*)

MECHANISM FOR OPERATING SHEDDING AND DROP-BOX PATTERN INDICATORS FOR KNOWLES LOOMS.

On the Knowles fancy loom the box motion and the shedding motion are driven by the same device.

The purpose of this mechanism is to provide means by which certain bars of the box-pattern indicators may be repeated without constructing successive similar bars, and at the same time to so connect the box-pattern mechanism with the harness-pattern mechanism that the two will not be thrown out of time with each other when the harness-pattern mechanism is reversed in the operation of picking out imperfect work or otherwise.

The box-pattern mechanism consists of two sets of indicators—a main and auxiliary set—each driven by a pin-wheel and a star-wheel, and each pin-wheel fitted to be slid into or out of engagement with its respective star-wheel, according to indicators, moved by the opposite star-wheel.

This feature is accomplished by driving the box-mechanism pin-wheel shaft from the harness-pattern-indicator shaft or its driving mechanism, so that when the harness-indicators are reversed, the box-pattern mechanism is reversed.

Referring to the accompanying drawings: Fig. 1 is a side view of the working parts of the mechanism detached. Fig. 2 is an end view of some of the parts shown in Fig. 1, looking in the direction of the arrow *a*, same figure. Fig. 3 is an opposite end view of some of the parts detached, looking in the direction of the arrow *b*, in Fig. 1. Fig. 4 is a section on line *X*, Fig. 3, looking in the direction of arrow *c*, same figure. Fig. 5 is a detail of the reverse key shown in Figs. 3 and 4, and Fig. 6 is a central longitudinal section of the shaft 3, and parts mounted thereon.

Numerals of reference in the accompanying illustrations refer to the following parts: 1, represents the harness-pattern barrel provided with notched flanges 2, to carry indicators (not shown) made up of chain-bars, links and rolls of the ordinary construction. The barrel 1, is fast upon shaft 3, and upon the end of shaft 3, is secured a gear-wheel 4, driven by a set of reverse gears.

Loose on the end of the shaft 5, Figs. 1 and 4, through which power is applied, are a pair of gears

6, and 7, which are splined to receive the end of reverse keys 8, (see Figs. 4 and 5,) seated in a spline in the shaft 5. The stem 9, of the reverse key 8, is fitted flush with the surface of the shaft, the projection 10, being fitted to engage the spline in the gears, either of which may be driven with the shaft 5, according as the key 8, is pushed in to engage gear 7, or pulled out to engage gear 6, the gear which is out of engagement with the key being loose upon the shaft. The gears 6 and 7, are confined upon the shaft 5, laterally by the flange 11,

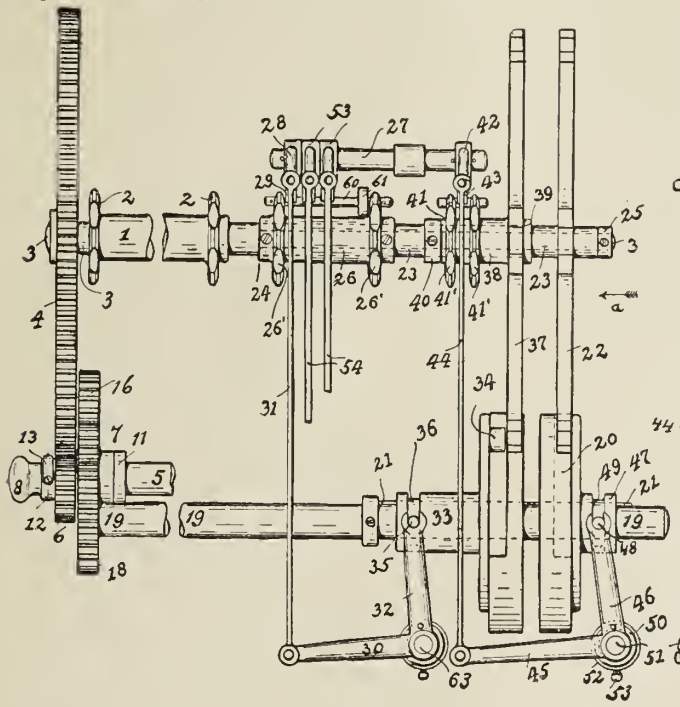


Fig. 1.

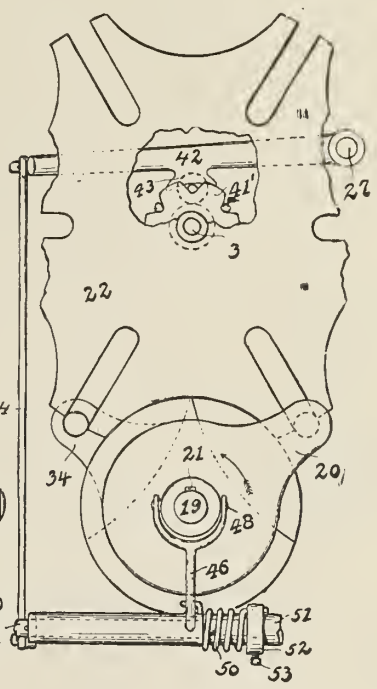


Fig. 2.

integral with the shaft and the collar 12, fast upon the outer end of the shaft (See Fig. 4). Coiled partially

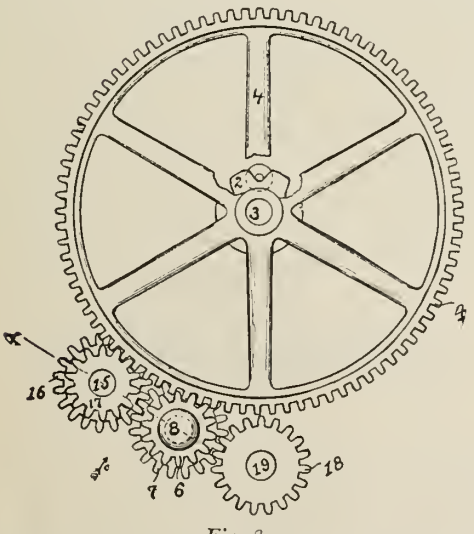


Fig. 3.

around the collar 12, is flat spring 13, fastened to the collar at one end and free at the other. To the free end of the spring 13, is secured a pin 14, which projects through a slot in the collar 12, and is pressed by the tension of the spring 13, into notches 9', in the face of the stem 9, of the key 8. The notches 9', are so placed as to hold the key 8, in proper position for engagement with the respective gears 6 and 7. To avoid the possibility of both gears being engaged at the same time by the key 8, and consequent damage to some of the parts of the mechanism should power be applied, the gears 6 and 7 are chambered to the depth of the spline at their adjoining faces for a length equal to the length of the projection 10, on the stem of key 8, so that in sliding the key 8, it leaves the spline of one gear when it enters that of the other. Mounted upon a stud 15, is a gear 16, which meshes with gear 7, of the driving-shaft 5, and which is fast to the hub of a second gear 17, which is loose upon the stud 15 (See Fig. 4). Gears 7 and 16 are enough larger than 6 and 17, so that the teeth of the latter clear each other when 7 and 16 are properly meshed.

The stud 15 and shaft 5 are so situated with reference to shaft 3 that gears 6 and 17 are both in mesh with gear 4. Gears 7 and 16 are of the same size, and gears 6 and 17 are of the same size, and so proportioned to gear 4, that one complete revolution of gear 6 or gear 17 turns shaft 3 through the angular space between two contiguous notches in the harness-pattern barrel-flanges 2.

When the key 8 is pushed into engagement with gear 7, the harness-pattern barrel 1 is driven through the intermediate gears 16 and 17 in its normal direction, with the loom running forward. When the key 8 is pulled out into engagement with gear 6, the harness-pattern barrel is driven directly through gear 6 in the reverse direction. This construction is used, for the reason that the harness-acting mechanism cannot be turned backward, the object being to reverse the harness-pattern indicators, while the loom or its harness-actuating mechanism is turned in the process of picking out imperfect work, &c.

The box-mechanism pin-wheel shaft is geared to

reverse gear 7, by putting gear 18, of the same size as gear 7, and fast upon the end of pin-wheel shaft 19, in mesh with gear 7. Shaft 19 projects for some distance beyond the harness-pattern barrel 1 (See Fig. 1). Near the opposite end of the shaft 19 from gear 18 is mounted a pin-wheel 20, free to slide upon the shaft, but compelled to rotate in unison with it by means of the feather 21, set in the shaft. Pin-wheel 20, is fitted to engage a star-wheel 22, integral with sleeve 23, which is mounted loosely upon a continuation of harness-indicator shaft 3, and which is confined laterally on the shaft by a shoulder 24 and a collar 25, fastened on the end of the shaft 3 (See Fig. 1). Fast upon the end of sleeve 23, which adjoins shoulder 24, is the main pattern-barrel 26, of the box-mechanism, provided with notched flanges 26' to carry indicators, made up of chain bars 60, rolls 61, and links (not shown) similar to those employed in the harness-pattern indicator, and of ordinary construction. Pivoted on a stud 27, above and at the rear of main box pattern-barrel 26, is a lever 28, provided with a foot 29, adapted to be engaged by the main pattern-indicators. A link 31 connects the outer end of lever 28 with arm 30 of a bell-crank lever 30, 32, pivoted on a stud 63, below shaft 19. Arm 32 of the bell-crank lever 30, 32, is forked about the hub 33 of a pin-wheel 34, which is mounted upon shaft 19, similarly to pin-wheel 20. Resting in the fork of arm 32 is yoke 35, which is fitted loosely in the groove 36 in the pin-wheel hub 33. Pin-wheel 34 is fitted to engage a star-wheel 37, integral with a sleeve 38, which is mounted loosely upon sleeve 23, and which is confined laterally by flange 39 integral with sleeve 23 and a collar 40 fastened upon said sleeve. Sleeve 38 carries the notched flanges 41' of the auxiliary pattern-barrel 41 of the box mechanism, over which, on stud 27, is pivoted a lever 42, similar to lever 28, and provided with a foot 43, adapted to be engaged by auxiliary pattern-indicators. A link 44 connects the outer end of lever 42 with arm 45 of a bell-crank lever 45, 46, pivoted on a stud 51 below shaft 19. Arm 46 of the bell-crank lever 45, 46, is forked about the hub 47 of pin-wheel 20, and carries a yoke 48, fitted loosely in the groove 49 in hub 47. A spring 50 is coiled about the shank of stud 51, one end of which is fast in a collar 52, fastened by a set-screw 53 to stud 51, and the other end of which engages arm 46 of the bell-crank lever 45, 46. The spring 50 is of sufficient strength, and its tension is so adjusted, by turning collar 52 on the stud 51, that when no indicator roll is under the foot 43, the spring 50 slides the pin-wheel 20 on shaft 19, into engagement with star-wheel 22. Pin-wheel 34 is slid on shaft 19 out of engagement with its star-wheel 37 by a similar spring coiled on the stud 63 of bell-crank lever 30, 32, when no indicator-roll is under foot 29 of lever 28. The arms of the bell-crank-levers and the levers 28 and 42 are so proportioned to the distance through which the levers are moved, by lifting the feet 29 and 43 from resting on a bar to resting on a roll, that such motion slides the pin-wheels on their driving-shaft the right distance to be properly in or out of engagement with their star-wheels.

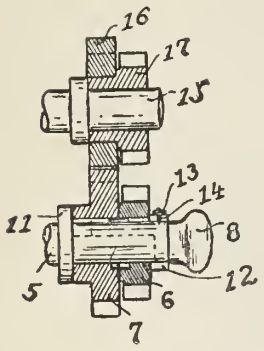


Fig. 4.

The indicators for the box-shifting mechanism are placed on the same bars with the pin-wheel indicators on the main pattern-barrel of the box-mechanism, and the levers 53 for transmitting the indications to the box-shifting mechanism are pivoted on the same stud 27 with lever 28. Depending from levers 53 are links 54 (shown broken off), with which the levers 53 are connected to the box-shifting mechanism. (Not shown and of ordinary construction.)

The pin-wheels 20 and 34 are so set on the feather 21, that the auxiliary pin-wheel 34 has completed the action on its star-wheel 37, when pin-wheel 20, begins to act on its star-wheel 22, both actions occupying something less than a complete revolution of pin-wheel shaft 19.

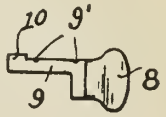


Fig. 5.

The pin-wheels and star-wheels are so proportioned that one movement thereof turns the pattern-barrels through the angular space between two contiguous notches.

The operation of the box-pattern mechanism is as follows: Figs. 1 and 2 represent the main pattern-barrel 26 as in engagement to be actuated and the auxiliary pattern barrel 41 as at rest. Suppose the action of pin-wheel 20, which is just beginning, brings up a pattern-bar which it is desired to repeat. A roll on the bar lifts lever 28, which, through link 31 and bell-crank lever 30, 32 slides pin-wheel 34 into engagement with its star-wheel 37. On the succeeding revolution star-wheel 37 and the auxiliary pattern-barrel 41 will be turned one space, bringing a roll under lever 42, which, through link 44 and bell-crank lever 45, 46, slides pin-wheel 20 out of engagement with its star-wheel 22, so that the revolution is completed without moving the main pattern-barrel 26. The main pattern-barrel 26 will continue to rest and the auxiliary pattern-barrel to run as long as each succeeding action of the auxiliary pattern-surface pin-wheel 34 brings up a roll under lever 42. The desired number of rests having been reached, an empty bar is presented under lever 42, which allows spring 50 to slide the pin-wheel 20 into engagement with its star-wheel 22 in season to turn the main pattern-barrel 26 on the same revolution, when the parts are returned to the position shown in the drawings, and the operation may be repeated.

When it is desired to turn the harness-pattern indicators backward in the operation of picking out imperfect work or of finding the pick, the reverse key 8 is pulled out, reversing the motion of gear 4 on the harness-pattern shaft 3, and also that of gear 18 and pin-wheel shaft 19, so that the box-mechanism indicators, with no attention whatsoever from the operator, are always kept in time with the harness-indicators, no matter which way or for how many picks the harness-pattern mechanism is turned.

If the box-pattern mechanism were driven independently of the harness-pattern mechanism, and it were left to the operator to keep count of the number of pattern-bars reversed, or even to reverse independently the box-pattern mechanism whenever the harness-pattern mechanism was reversed, the operator would easily get confused and get the two pattern-mechanisms out of time with each other, thus putting the wrong filling in the shed.

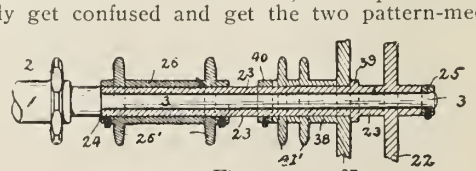


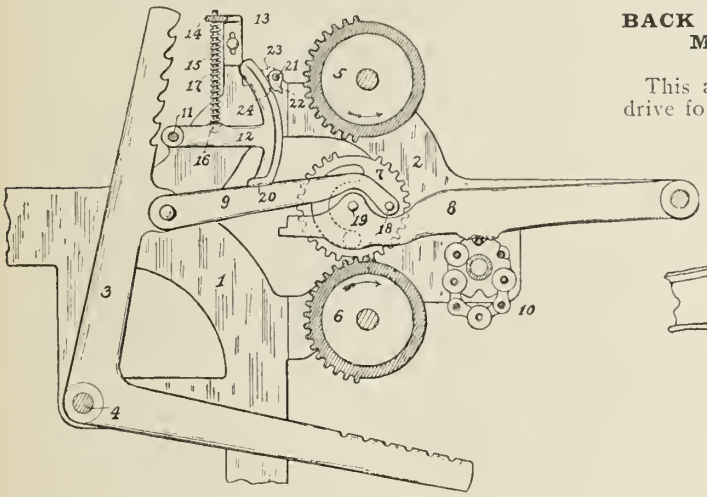
Fig. 6.

Instead of connecting-gears 18 and 7 as shown in Fig. 3, gears 18 and 4 could be connected with equal facility; but sometimes on said loom the gear 4 is replaced with a star-wheel similar to star-wheels 20 and 34, and its pin-wheel is driven by a set of reverse gears. (*Crompton and Knowles Loom Works.*)

ATTACHMENT TO THE SHEDDING MECHANISM OF THE KNOWLES LOOM.

The object of this motion is to keep the vibrator connector (after the cylinder has raised the harness) from falling back.

The accompanying illustration is a sectional view of this motion, taken between and parallel to the arches or elevated part of the loom frame; it also shows the jack and vibrator connected, which is used on all their open shed looms. The method of operation of this motion will be best explained by quoting numerals of references of the various parts shown in the accompanying illustration, and of which 1, represents a portion of the arch of the loom frame, and 2, the head frame. 3, is a harness lever, pivoted on the shaft 4, which extends across the arch space and has a bearing in each arch. 5 and 6, are the cylinder gears; 7, the vibrator-gear; 8, the vibrator-lever; 9, the connector;



and 10, the pattern-chain. 11, is a rod which extends across the arch-space, and on which is pivoted an independent follower 12, for each vibrator-gear connector 9, in the loom. 13, is an arm extending above the arch and carrying across the arch-space a plate 14, through which passes freely the rods 15, the heads 16, of which, rest in sockets on the followers. Confined between the plate 14, and the heads of the rods 16, are coiled springs 17, which act to press the followers downward upon the connectors 9.

The operation is as follows: The harness-levers and the box-motion levers are reciprocated by the partial revolution of the vibrator-gear 7, a roll on the pattern-chain lifting the vibrator-gear into engagement with the top cylinder-gear 5, throwing the vertical arm of the harness-lever outward, and a tube on the pattern-chain letting the vibrator-gear into engagement with the lower cylinder-gear 6, and throwing the harness-lever in the opposite direction.

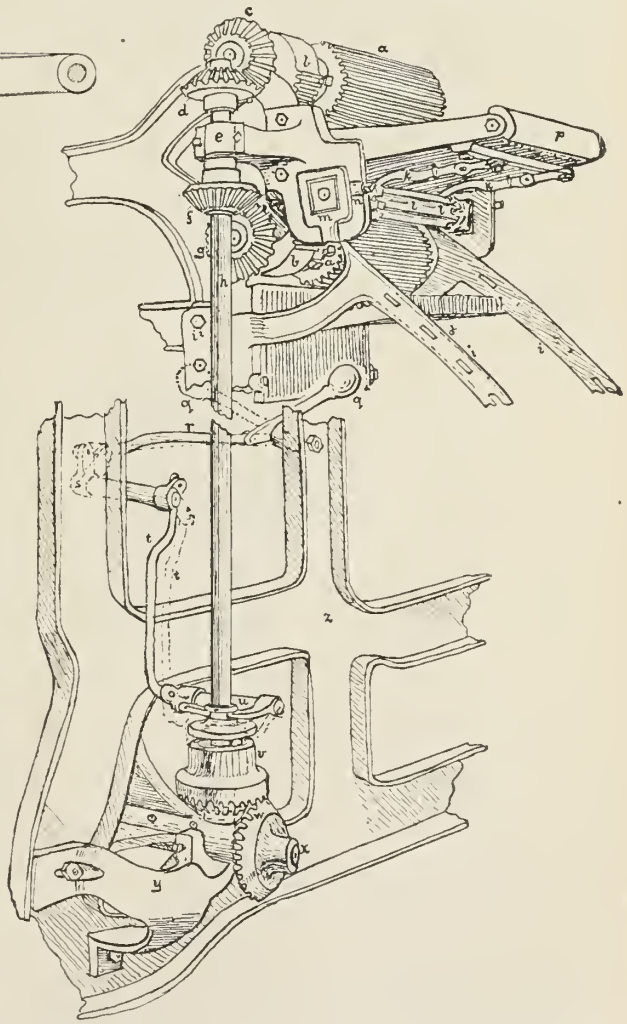
Our illustration represents the lower cylinder-gear just beginning to act on the vibrator-gear. As the vibrator-gear revolves, the end of connector 9, is lifted by the crank-pin 18, a distance equal to the radius of the crank-pin path described about the centre 19, and at the same time the connector is pushed to the left. The coil-spring 17, by its compression allows the rod 15, to rise with the follower and connector, and when the crank-pin 18, passes the centre and the end of connector 9 drops, the force of the spring keeps the follower pressing on the connector. The top of connector 9, is rounded, and the saddle 20, of the follower is correspondingly hollowed to help keep these parts in alignment.

The head of the spring-rod is made to fit a socket in the follower, to facilitate the insertion or removal of the rod and springs for the purpose of renewing worn-out springs, or for other reasons.

When it is desired to take out the vibrator-lever gear and connector from the loom, it is necessary to hold the follower up out of contact with the connector. To accomplish this, the rod 21, is placed in ears on the arches and extended across the arch-space, on which are pivoted individual latches 22, for each follower, which may be raised into the position shown in dotted lines 23, where, in conjunction with notches 24, in the face of the followers, the followers may be held up out of the way, as desired. It is also sometimes desirable to run the loom with part of the vibrators out, in which case the latch prevents the follower from dropping down and letting the spring and rod fall from their positions, or avoiding the necessity of removing the followers to prevent such derangement. (*Crompton and Knowles Loom Works.*)

BACK VIEW OF THE KNOWLES SHEDDING MECHANISM DRIVEN FROM BOTTOM SHAFT.

This accompanying illustration shows bottom shaft drive for head motion, which is generally used on the



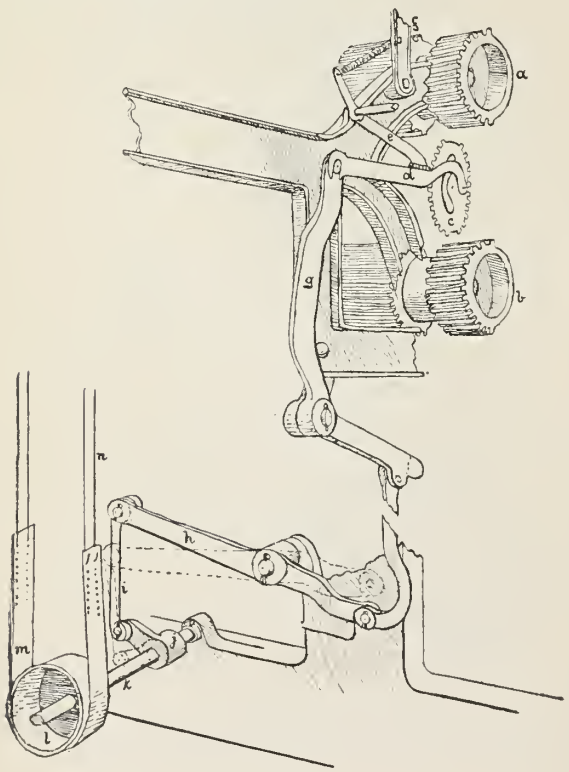
Knowles heavy worsted loom. A description of the mechanism is best given by quoting letters of references, and of which *a*, shows the long driving gears,

commonly called the cylinder gear. They are chilled in casting, and are very hard; they are made with the part that operates the harness adjustable, so that the harness and box may be made to operate at the same time, or the harness a little in advance of the box, in order to change the shed upon the filling, before beating up. They will work perfectly at any point at or between the extremes of the slot in the shaft. Whenever the section of the top cylinder is changed, it is not necessary to make the same change with the bottom cylinder; in fact, for some fabrics it is necessary to set the top and bottom cylinders at different points.

b, indicates the box section of the cylinder gear; *c*, the bevel gear on the top cylinder; *d*, the bevel gear which drives the top cylinder; *e*, the cap which holds the upright shaft in place; *f*, the bevel gear which drives the bottom cylinder; *g*, the bevel gear on the bottom cylinder; *h*, the upright shaft which transmits motion from the bottom shaft to the head motion; *i*, is the chain rack bolted on with i^3; *j*, are the jacks that lift the harness; *k*, is the spring lever to hold the chain in position on the cylinder shaft *l*; *m*, indicates the bearing in which shaft *l*, works in; *n*, is a set screw to hold bearing *m*, in place; *o*, is a set screw to raise or lower cylinder shaft *l*; *p*, is a lock lever to hold vibrators in place; *q*, is a hand lever with which to lock or unlock the clutch gear *v*, on bottom of upright shaft; *r*, is a connector connecting with *s*, a rocking lever connecting with lever *t*, connecting with pin *u*, with which the clutch is locked or unlocked; *w*, is a driving gear to drive cluth gear *v*; *x*, is an intermediate gear which is driven from bottom shaft; *y*, is the stand that holds the intermediate shaft, and *z*, is the loom side. (*Crompton and Knowles Loom Works.*)

THE KNOWLES SELVAGE MOTION.

This selvage motion does the same work that is required of a skeleton harness. It is operated from the fifth vibrator in the box section, which was formerly used for the sliding pick.



a, and *b*, indicate the top and bottom cylinder; *e*, the vibrator gear; *d*, the connector; *e*, a spring drop weight; *g*, is the angle lever which connects with lever *h*; connector *i*, which in turn connects with crank *j*, which operates the selvage shaft *k*; *l*, shows the drum around which listing strap *m*, is carried, and *n*, indicates the lower strip of the selvage heddle strap. (*Crompton and Knowles Loom Works.*)

SHEDDING MECHANISM FOR FABRICS PRODUCED BY TWO WEAVES.

The object of the new device is to provide an automatic two-weave attachment of simple construction and operation, and which is adapted to be combined with the indicator-levers of a dobby mechanism to automatically move one-half of said levers out of engagement with their pattern-surfaces, so that they will become inoperative, and at the same time allow the other indicator-levers to engage their pattern-surfaces and become operative.

In connection with this two-weave attachment, two sets of indicator-levers are used and each indicator-lever is connected by a lifting-wire with an upper and lower hook-latch, and a single lifting-wire serves for two levers, so that if a lever of one set is inoperative to act on the hook-latches the lever of the other set is operative. Double-index pattern-bars, or bars with two sets of pins or pattern-surfaces thereon are used, one set for one set of indicator-levers and the other set for the other set of indicator-levers.

The new mechanism is intended to be used on looms for weaving any class of goods requiring two weaves, as dress-goods, blankets, &c., in which there are two different weaves.

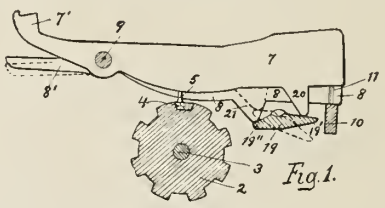


Fig. 1.

Fig. 1 is a side elevation of a portion of the dobby-frame, looking in the direction of arrow *a* Fig. 3, showing two indicator-levers, a lower hook-latch, the lower end of the lifting-wire, the end of a pattern-cylinder, a two-index pattern bar, and the double-weave attachment combined therewith. Fig. 2 is a section taken at a point indicated by line 2-2 Fig. 3, looking in the direction of arrow *a*, same figure. The lifting-wire and hook-latch shown in Figs. 1 and 3 are not shown in this figure. Fig. 3 is a plan view of the parts shown in Fig. 1, and also shows the pattern-surface, which operates the indicator-lever 29. Fig. 4 shows a section of the pattern-cylinder, two indicator-levers, a jack-lever, an upper and lower hook-latch, and a lifting-wire, and in section the upper and lower sliding lifting-bar and the stop bars; and Fig. 5 is a side view of the lifting-wire, looking in the direction of arrow *b*, Fig. 4.

Numerals of references indicate thus: 1, is a portion of one of the upright frames supporting the dobby. 2, indicates the pattern-cylinder, which is fast on shaft 3. In the longitudinal grooves or recesses of the pattern-cylinder extend the pattern-chain bars, only one of which, 4, is shown in the drawings.

On the pattern-bar 4, are two sets of pins 5 and 6, arranged in two alternate rows (See Fig 3). Extending over the pattern-cylinder 2, are two sets of indicator-levers 7 and 8. One set 7, is acted on by the

pins 5 and the other set 8, by the pins 6, in the pattern-chain bars 4. The indicator-levers are loosely mounted on a shaft 9, secured in the frames, and at their outer ends, when in lowered position, rest on the bar 10, which has pins 11, extending up therefrom between the levers 7 and 8, to guide and hold them in position.

Each one of the set of levers 7, is adapted to be engaged and raised by its set of pins 5, in case said levers are in their lowered position, while each one of the set of levers 8 is adapted to be engaged and raised by its set of pins 6, in case said levers are in their lower position, at each partial revolution or movement of the pattern-chain.

The inner ends 8′ of the indicator-lever 8 extend beyond their supporting-shaft 9, and in a substantially horizontal plane, while the inner end 7′ of the levers 7 extend upwardly above the ends 8′ of the levers 8, as shown in the drawings. The inner ends of said levers 7 and 8 extend through slots in the grate 9′.

Arranged over the two sets of levers 7 and 8 are an upper and lower set of hook-latches 12 and 13, which hook over and are operated by the upper and lower slide-bars 14 (See Fig. 4). There is an upper latch 12, and a lower latch 13, for each pair of levers 7 and 8, and each one of the pair of levers is connected with the upper latch 12, and lower latch 13, by a lifting-

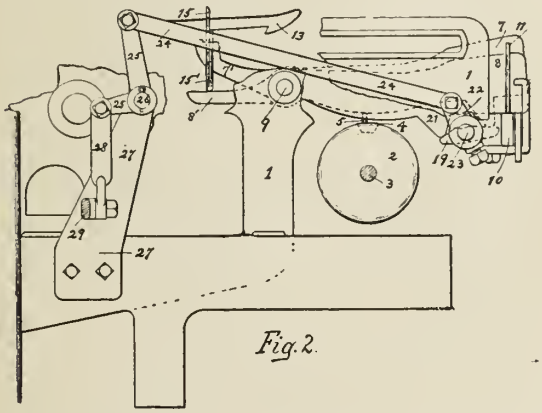


Fig. 2.

wire 15, which is made of the shape shown in Figs. 4 and 5. The lower double end 15′, rests on the top of the inner end of the lever 8, while the side projecting end 15″, rests on the top of the inner end of the lever 7 (See Fig. 4). The side projecting end 15″, also extends under and is adapted to lift the lower latch 13. The upper end of the lifting-wire 15, extends under and engages the upper latch 12 to lift the same when desired. It will thus be seen that either lever 7 and 8, of the two sets of levers, when it is engaged by its pattern-pins, will lower both the upper latch 12, and lower latch 13, simultaneously.

The latches 12 and 13, are pivoted at their inner ends on the connector 16, centrally pivoted on the harness-lever, (not shown) connected with the harness-frame, and adapted to engage at its upper end the stop-bar 17, and at its lower end the stop-bar 18.

The combination of the two-weave attachment with the dobby mechanism is thus: Extending under the outer ends of the two sets of levers 7 and 8, outside of the pattern-cylinder 2, and having projecting ends or journals supported in bearings in the side frames, is a rocking plate 19, the outer edge 19′, of which is adapted to engage downward projections 20, on the lower edge and near the outer end of the levers 7, so that when the plate 19, is rocked in one direction to raise the outer edge 19′ thereof, all the levers 7, will be raised at their outer ends and held up, as shown in Fig. 2, so that the pins 5, on the pattern-bars 4, can pass under the levers 7, without moving said levers. When the plate 19, is rocked in the opposite direction to raise the inner edge 19″, said edge will engage downward projections 21, on the levers 8, and raise said levers (See dotted lines, Fig. 2) and hold them out of engagement with the pins 6, on the pattern-bar 4, as before described in connection with the levers 7. At the same time the set of levers 7, are allowed to drop down on to the pins 5, on the pattern-bar 4, as the pattern-cylinder 2, revolves. It will thus be seen that as the plate 19, is rocked in one direction one set of indicator-levers, as 7, is raised and becomes inoperative and the other set, as 8, is lowered and becomes operative. As the two patterns to be woven are on the same bar and there are two indicator-levers for each upper and lower hook-latch, either indicator-lever may be made to govern the operation of the hook-latches through the lifting-wire 15, as desired, by rocking the plate 19, in one direction or the other, and in this way we can change from one weave to the other.

The lifting-wires 15, are made in such a manner that the dropping of the inner ends of either set of levers by the raising of the outer ends by the plate 19, does not affect the engagement of said lifting-wires 15, with the other set of levers or their operation by said levers.

To communicate a rocking motion to the plate 19, at the desired time to change the weave, a crank-arm 22, is connected fast on the end of the journal 23, on one end of the plate 19, through a connector-rod 24, with an angle-lever 25, pivoted on a stud 26, at the upper end of the bracket or arm 27. The other arm of said angle-lever 25, is connected through link 28, with the inner end of an indicator-lever 29, which is rigidly attached at its inner end to the link 28, to cause the angle-lever 25, to have a rocking motion and through connector 24, communicate a rocking motion to the plate 19.

The indicator-lever 29 extends over a pattern-surface on the pattern-cylinder 31, of ordinary construction

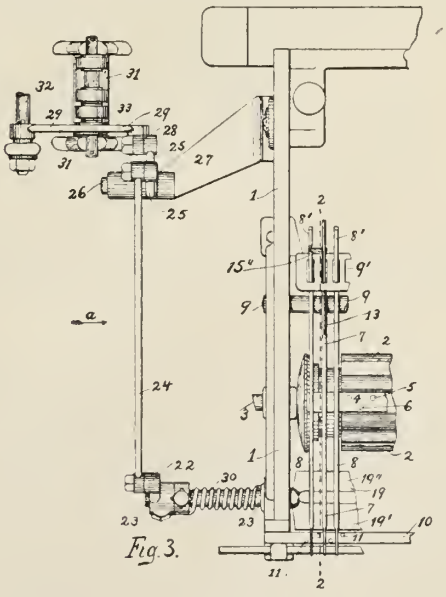


Fig. 3.

and operation, and is pivotally supported at its outer end on the rod 32. As the pattern-cylinder 31 revolves and a roll 33, thereon comes under the lever 29, said lever is raised, and through intermediate connections the plate 19, is operated.

A coiled spring 30, around the journal 23, of the plate 19, (See Fig. 3) is employed to move the angle-lever 25, over to the left, as shown in Fig. 1, when a tube comes under the indicator-lever 29.

The pattern-surface, which controls the movement of the indicator-lever 29, is so built that at the proper time, when it is desired to change the weave, the lever 29, will be raised by a roll 33, coming under it. The plate 19, will then, through intermediate connections, be automatically rocked and raised at its inner edge to raise one set of levers, as 8, at their outer ends, (See dotted lines, Fig. 2) and hold them out of engagement with the pins on the pattern-bars. At the same time the other set of levers, as 7, will be dropped at their outer ends on to the pins on the pattern-bars and through said levers and connections to the harnesses the desired shed will be made.

When a tube comes under the lever 29, the spring 30, will move the angle-lever 25, and lower the lever 29, and a reverse motion will be communicated to the plate 19, to raise the outer edge thereof and raise the outer ends of the other set of levers, as 7, and at the same time lower the outer ends of the levers 8, to change the weave and allow the levers 8, to operate

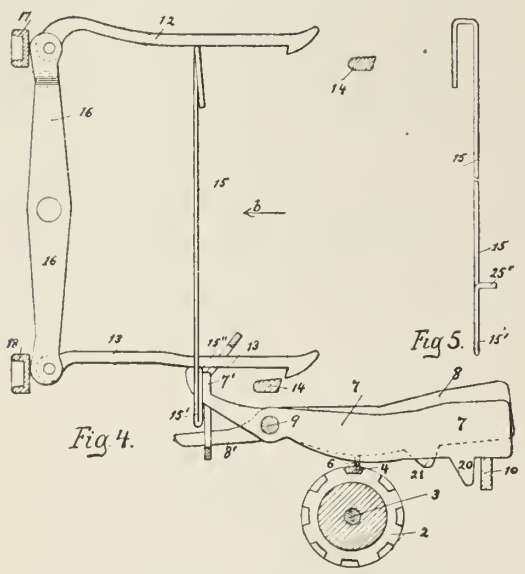


Fig 4.

Fig 5.

to make the required shed for the other weave, and this operation is repeated as desired. (*Crompton and Knowles Loom Works.*)

DEVICE FOR OPEN SHED FANCY LOOMS FOR EVENING THE HARNESSES

when a warp-thread breaks or end requires to be tied in, so as to lay the warp side by side and enable the operative to piece up the warp or tie in the ends required.

In such looms as heretofore constructed the evener-slide had to be drawn out by hand after the lay was brought into the proper position, and then the harnesses had to be brought together by hand. After the ends were tied in, the parts had to be returned to their original positions by hand before the loom was ready to start.

The object of the improvement is to perform all these operations automatically, through setting in motion a simple apparatus connected with a cord ex-

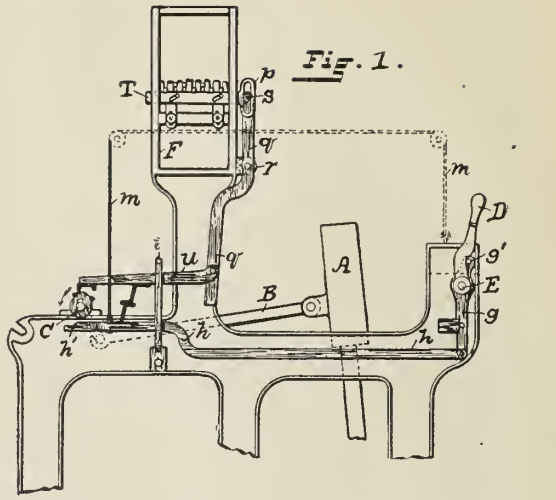


Fig. 1.

tending practically around the loom, by pulling the cord.

For a clear understanding of the improved device the accompanying three illustrations are given, and of which Fig. 1 is a skeleton view of parts of an open-shed fancy loom, showing the improvement connected with co-operating parts. Fig. 2 is a perspective view of the levers connecting with the crank-shaft of the lay of the loom. Fig. 3 is a side view of a modified form of the device.

A, indicates the lay of an open-shed fancy loom; B, the connecting-rod connecting the lay with the crank of the shaft C. The shipper of the stop-lever D, is secured to the shipper or stop-shaft E, and supported in the raised frame F, is the evener-slide T.

These parts are the essential parts of every open-shed fancy loom, and as the present improvement concerns only these parts, the other parts of the loom are omitted, so as to avoid confusion.

The preferred means for accomplishing the previously stated object consist in the lever g, loosely mounted on the shipper-shaft E, close to the shipper-lever D. The upper projection of the lever g, is provided with the pin g', bearing on the shipper-lever D. To the lower end of the lever g, is pivotally connected the arm h, the other end of this arm h, being provided with the shoulder h'. The arm h, is supported in the slotted bracket i, secured to the end frame of the loom. The bracket k, is secured to the arm h, and near this is the eye l, to which the cord m, is

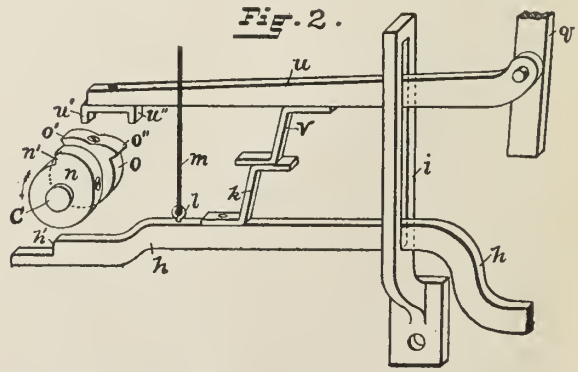


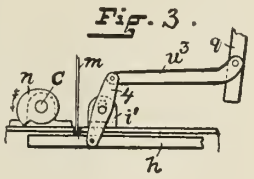
Fig. 2.

fastened. This cord m, is carried over guides along the end around part or the whole of the loom, the end of the cord being secured to any fixed place on

the loom, and at such a height that it does not interfere with the work of the operative or the loom and is within easy reach of the operative.

On the crank-shaft C, the wiper-cam n, is secured so as to rotate with the crank-shaft. The shoulder n' of the wiper-cam n, is designed to engage with the shoulder h', on the end of the arm h, when this arm is raised. Close to the cam n, and also secured to the crank-shaft C, is the cam o, provided with the shoulders o' and o''. The evener-slide T, is provided with the slotted head p. The lever q, pivoted to the bracket r, secured to the frame F, is provided at its upper end with a pin s, which extends through the slot in the head p, on the evener-slide T. To the lower part of the lever q, is connected pivotally the arm u, which extends through the slot in the bracket i, and is provided at its free end with two shoulders u', and u''. To the arm u, on its under side, is secured the bracket v.

Fig. 3.



In the normal condition, when the loom is running the arm h, rests in the slotted bracket i, and supports, by means of the brackets k, and v, the arm u, in the position shown in Fig. 2. The cams n, and o, revolve without interfering with the arms h, and u. When, now, to tie in ends or piece the warp the loom requires to be stopped and the warp evened, the operative pulls on the cord m, and raises the arm h, the shoulder n', of the cam n, comes in contact with the shoulder h', and pushes the arm h, and the lower end of the lever g, forward, and the pin g', operates the shipper-lever D, to stop the loom. In the movement of the arm h, the bracket k, passes beyond the bracket v, the arm u, descends, the shoulder o', of the cam o, encounters the shoulder u', of the arm u, and draws this arm rearward and with it the lower end of the lever q, the upper end of which draws the evener-slide sidewise, and as it is supported on pins entering diagonal slots, it raises the evener-slide and operates the harnesses to even the warp in the usual manner, and by the old well-known means.

After the piecing is completed the lay A, is pushed back, thus partly rotating the crank-shaft C, and cam o, the shoulder o'' comes in contact with the shoulder u'' and pushes the arm u, with the lower end of the lever q, forward and the evener-slide T, inward and downward into the original position. The shipper-lever D, is now drawn forward to start the loom, and, by coming in contact with the pin g', the lever g, pushes the arm h, backward, the bracket k, coming in contact with the bracket v, lifts it and the arm u, and supports the same in the position shown in Fig. 2. By this arrangement the pull on the cord m, sets the mechanism in operation to stop the loom and even the harnesses, and a push on the lay puts the loom in condition to be started by the shipper-lever.

In the modified form shown in Fig. 3, the arm h, is connected by the lever 4, with the arm u^3, which is pivoted to the lever q. The lever 4, is pivoted in the slot of the bracket i', and only the cam n, is secured to the crank-shaft C. In this modified form the cam n, will have to be accurately adjusted so that the shipper motion to stop the loom and the movement of the evener-slide will correspond with the movements of the harness-operating mechanism.

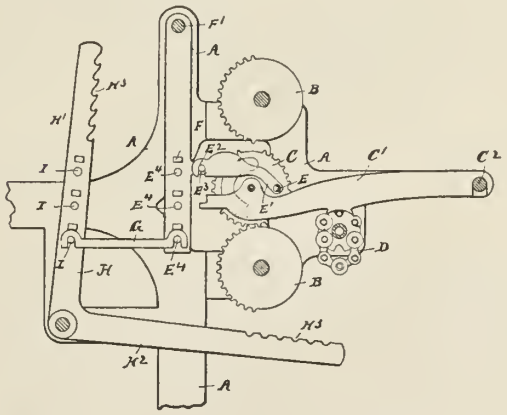
This improvement offers two good points: First, it is not necessary for the weaver to go to the side of the loom to stop the latter; secondly, it enables the weaver to operate the loom without uncoupling the head motion from the other parts of the loom and raising the harness by hand when tieing up threads in the warp. (*William Cavanaugh, Providence, R. I.*)

WICKS' AND ROY'S SHEDDING MECHANISM.

This device is shown in the accompanying illustration representing a side elevation of that part of the framework which supports the shedding mechanism, the frame next the beholder having been removed.

Letters of reference indicae thus: A, denotes the framework, and B, B, two-barrel-gears journaled in the framework and having gear-teeth upon a portion of their periphery, said barrel-gears being arranged one above and the other below a gear C, carried by the free end of a lever C', pivoted at one end upon a rod C^2, held by the frame A, so the angular motion of the lever C', will carry the gear C, up or down and bring its teeth into engagement with the teeth upon either the upper or lower of the barrel-gears B, B, the lever C', being actuated by a pattern-chain D. The barrel-gears B, B, rotate in opposite directions and the gear wheel C, will be rotated one-half a revolution in one direction or the other, as it is engaged by the upper or lower of the barrel gears B, B.

The gear C, carries a crank-pin E, to which a link E', is pivoted, having its opposite end provided with a hook E^2, adapted to engage a stud E^3, projecting from the side of a swinging lever F, pivoted upon a rod F', held in the frame A, so the rotation of the gear C, back and forth through a half-revolution will impart an angular movement to the lever F. The lever F, is connected by a link G, with a pivoted jack H, having arms H', and H^2, provided with notches H^3, to which the harness-straps are attached. A short distance above the studs E^4, on the swinging lever F, and the studs I, on the jack H, are projecting lugs which extend over the hooked ends of the connecting-links, so as to prevent them from being lifted and disengaged from the studs during the operation of the loom. The lever F, and arm H', of the jack are provided with a series of



studs E^4, and I, in order to allow the hooked link G, to be shifted from one to the other of the studs to vary the extent of the angular motion of the jack, so as to vary the motion of the harness-frames and produce what is known as an "angular shed" in the warp.

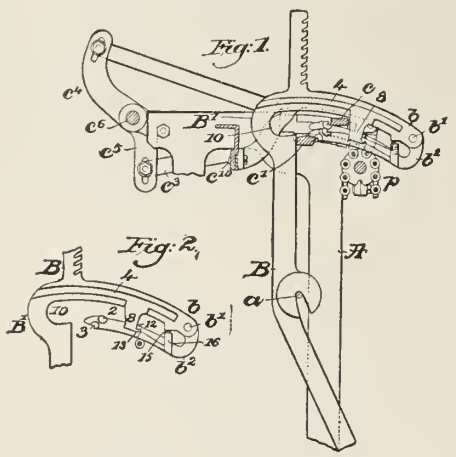
We thus describe the arrangement of a single lever, a rotating gear with a single jack, and intermediate lever F, which comprise the actuating mechanism for a single harness-frame, the several parts being duplicated for each harness-frame contained in the loom.

The novelty of the new device consists in actuating the jacks indirectly from the rotating crank-wheels C, with the use of an intermediate lever F. It is similar in its construction to the Knowles shedding mechanism, with the addition of lever F, and link G. (*J. F. Wicks and B. S. Roy, Worcester, Mass.*)

IMPROVED CONSTRUCTION OF HARNESS-LEVERS IN CONNECTION WITH LIFTER AND DEPRESSOR, ETC., FOR CROMPTON LOOMS.

Prior to this, the jacks have been provided with guiding-surfaces located remote from their fulcrum-points, usually more remote from the said fulcrum-points than the knives or one of them, and in practice much difficulty has been encountered by reason of the sticking of the jacks in contact with the said guiding-surfaces, so that the jacks do not move easily and quickly, nor with certainty, thus greatly interfering with the proper and rapid operation of the loom. To obviate this difficulty, is the object of the present improved construction of the device.

Fig. 1, in section, shows a sufficient portion of a Crompton loom, having the improvements added. Fig. 2 shows part of a lever and its jack as resting on a projection of the pattern-chain. Letters of reference indicate thus: A, the loom frame having a rod a, on which are mounted the slotted hubs of the levers B, having a latterly-extended arm b, which receives the pivot b', for a notched jack b^2, having at its upper edge a notch 2 (See Fig. 2), to be engaged by a de-



pressor or knife c, and at its under side a notch 3, to be engaged by an elevator or knife c', said depressor and elevator being each made as bars, to the ends of which may be connected, respectively, sets of links c^3, attached in turn in an adjustable manner to arms c^4, c^5, of a rock-shaft c^6. The arms b, of the levers have each a guide-surface (shown as on a lug 8), which is arranged intermediate the elevator and depressor and the fulcrum of the jack, and is of sufficient length to overlap the jack b^2, and act as a lateral guide therefore to prevent twisting or lateral movement of the jack out of place, the edge of said lug also serving the purpose of an evening-surface, it being acted upon by the outer edge of the depressor c, the inner edge of the elevator, by the action of its edge against one edge of the lever B, serving as the second guiding surface to effect the evening of the levers and of the shed, Fig. 1, showing the said depressor and elevator acting as eveners.

In order that the lever with the depressor arranged above the jack and the elevator below the jack at the same edge of the lever may have sufficient range of movement, said lever is shown as having an offset B', to thus provide a recess 10, in which the depressor may stand when the shed is open.

The top of the elevator c', (shown in Fig 1,) is made of such shape as to come in contact with the under side of such jacks as are engaged with the depressor c, such contact aiding in keeping the hooks of the jacks in engagement with the edge of the depressor during the movement of the depressor and while the elevator is being moved outwardly, and at the same time said lifter, by slightly lifting the jacks engaged by the depressor, causes them to bear more lightly on the rolls or protuberances of the usual pattern-surface, and consequently the wear of the jacks and of the pattern-surface is lessened.

In the present contruction the jack is made much shorter than before, and the shorter the jack the less its weight, said jack preferably terminating short of the lever.

The lug 8, carried by one arm b, acts not only on one side of the hooked jack pivoted upon it, but also against one side of the jack of the lever next to it.

Each of the notched jacks is provided (see Fig. 2,) with a stop pin or projection 12, which engages a toe 13, of the lug 8, said pin preventing the jack from dropping down horizontally when not held up by the pattern chain or surface p. The pin 12, and toe 13, aid in keeping the jack in place on the lever when it is removed from the loom.

The arm b, has, as shown, at its under side a small pin or projection which acts as a guide for a spiral spring 15, one edge of which acts against a seat 16, on the jack b^2, said spring acting normally to keep the jack pressed toward the pattern-surface.

The arms b, of the upright levers are provided at each end with wearing-surfaces 4, which contact the surface of one arm with the corresponding surface of an adjacent arm, all the arms being kept pressed together by bars, adjustably attached to a part of the loom-frame by suitable bolts c^{10}.

By reference to Fig. 1, it will be seen that the jacks may be readily withdrawn from engagement with both the depressor and elevator, and the harness-lever removed from the loom, for since both the elevator and depressor are arranged at the same side of the lever, and since they are not confined to the jacks by reason of traveling in slots in the jacks or otherwise, but so engage the jacks that the latter may be readily disconnected from the same by moving said elevator and depressor into close proximity one with the other, the lever may have a lateral movement sufficient to withdraw the end of jack from between and from engagement with the elevator and depressor, and the entire lever and its attached jack thereafter lifted bodily from position without necessary removal of either the elevator or depressor. To facilitate this removal, the jack may be sprung to one side far enough to disengage its stop-shoulder from the hook on the lug 8, which will thereby permit the jack to drop down into a vertical position.

The gist of the improvement may be thus stated shortly: First, a spring holds the finger on the chain at all times; second, the finger is made shorter than before and the jack can be removed from the loom without taking the depressor knife out, a feature not possible to be done with the jacks used heretofore. (*Crompton and Knowles Loom Works.*)

THE CROMPTON HARNESS-FRAME-MOVING DEVICE FOR WITCH-TOP LOOMS.

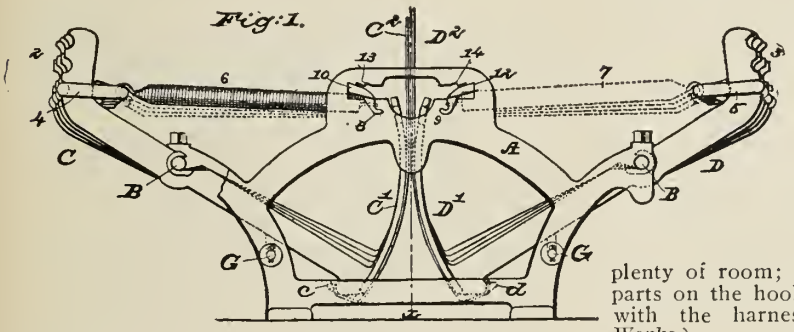
The inventors of this new device, Messrs. H. Wyman and A. A. Gordon, claim that mechanism for this purpose as theretofore constructed has been defective in that connections interposed between the harness frames and the spring-controlled levers are so made and attached to the levers in such a manner, that the conec-

tions wear so rapidly when joined to the levers as to entail expense in repairs, besides loss of time, this excessive and rapid wear being due chiefly to the fact that the connection tips on the lever at the point of their junction, owing to the particular lines of their movement.

In the newly-constructed device the spring-controlled levers are provided with sectors, against which the connections bear, one end of each spring being connected to the end of the lever farthest from the sector and also to the frame-piece. In this way all sidewise or swaying movements of the connections is overcome, and also the wear on the connections reduced to the minimum.

Heretofore spring-controlled levers have been arranged side by side on the same fulcrum rod; but by separating the levers into two sets and mounting them on two fulcrum rods, so that the strap attaching end of one lever points to the right and the other to the left of a vertical plane at a right angle to the series of harness frames, the builders of the new device are enabled to get two rows of levers in the line occupied by the connections leading to the harness-frames, and thus are enabled, by having two rows of levers, to make the harness connections broader than if using but one row, and by providing one end of each lever with a sector the connections may be sustained on a flat surface during the movements of the levers.

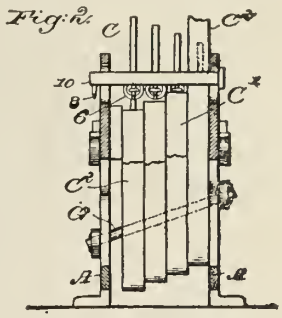
The levers have notches at their outer ends at different distances from their fulcra to receive the buckles or loops to which is attached one end of the springs used, the adjustment of a buckle or loop into one or the other of said notches providing for greater or less tension of the springs. The ends of the springs most remote from the notched ends of the levers are connected to a spring-holding bar, and the frame where this bar is located has a series of notches whereby the bar may be quickly adjusted in its position to at one operation vary the tension simultaneously of all the springs.



The back stop for the levers is made as a bar or rod, which occupies a position at an angle to the fulcrum rod for the levers, so that the said levers may occupy different positions in order that the front and back harness frames may occupy different horizontal planes, the back harness frame or the one farthest from the breast beam of the loom having the greater movement. The levers have their hubs slotted to be applied to or removed from the fulcrum rod without disturbing the latter, and the strain of the spring is such as to keep the levers seated on their fulcrum rod.

For a clear understanding of the construction of this improved device the accompanying illustrations are given, and of which Fig. 1, in side elevation represents a sufficient portion of a loom to illustrate the invention; Fig. 2, a section thereof in the line *x*, Fig. 1.

The supporting frame A, has two fulcra B, B, on which are mounted the slotted hubs of the two series of levers C, D, having sector-shaped ends C′, D′, being sufficiently wide to receive against their faces the connections C^2, D^2, one end of each of said connections being suitably attached, respectively, to one of said levers C′, D′, the means employed being the projections *c*, *d*, over which the straps are hooked. The ends of the two series of levers are made to face each other, just enough space being left to permit the (connection) straps C^2, D^2, to come between them, as in Fig. 1, the straps attached to the levers being attached in alternation to the successive harness frames. Parts of the sides of the levers may touch, or substantially so, and thus obviate twisting strains.



The outer ends of the lever C, D, are notched, as at 2, 3, to receive the loops 4, 5, attached by springs 6, 7, (fully shown at the left in Fig. 1) to hooks 8, 9, of rods or bars 10, 12, mounted in notches of the frame A, and, as shown in Fig. 1, there are a series of bar-holding notches 13, 14, in either of which the said bars may be placed when it is desired to alter at one operation the tension of all the springs. The open slots in the hubs of the levers to fit the rods B, are in such direction that the springs 6, 7, act normally to keep the levers on said rods, and to enable the levers of the series to be moved over different distances by the springs when acting to move the harness frames, the stop rods G, G, are set at an inclination, as represented, to the fulcrum rods B, B.

This new device is designed for looms having witch tops, *i. e.*, device for raising the harness and which in turn have to be pulled down by springs. The straps in the new device, running from the spring-levers with springs attached, give plenty of room; therefore do away with the wearing parts on the hooks, springs, and all straps connected with the harness. (*Crompton and Knowles Loom Works.*)

SCHEID'S SHEDDING MECHANISM.

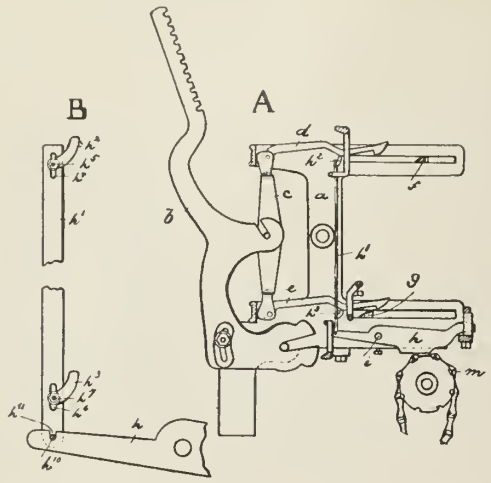
Fig. A, is a side elevation of a dobby provided with the improvements, and Fig. B, an enlarged detail view of one of the hooked jacks operating levers and its adjustable supporting arms.

The frame *a*, the harness lever *b*, the connector *c*, the hooked jacks *d*, and *e*, and the lifters *f*, and *g*, are of usual construction. The lifting lever *h*, pivoted as at *i*, to the frame *a*, and operated by the pattern surface *m*, in the usual manner, is provided near its inner end with an upwardly extending rod h', the horizontally arranged pin h^{10}, of arm h', resting in the vertical slot h^{11}, of lever *h*. Near the upper end of said rod h', is arranged an elongated vertical slot h^4, in which is adjustably secured, by means of bolt and nut h^5, or in any other desired manner, the arm h^3, adapted to bear on the under side of the upper hooked jack *d*.

In the lower portion of the rod h', is also arranged an elongated vertical slot h^6, in which is adjustably secured, by means of bolt and nut h^7, the arm h^8, which latter bears against the under side of the lower hooked jack *e*.

It is a well-established fact that the ordinary supporting means for the hooked jack, during the frequent

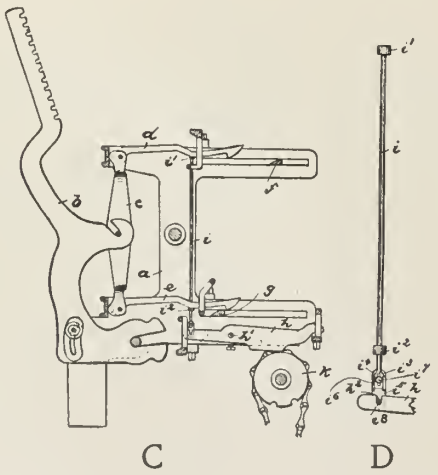
usage of the dobby, get worn off very rapidly and must be substituted by new ones from time to time to insure a perfect operation of the machine. This is avoided in



the new device, having arranged the arm h^2, and h^3, supporting the hooked jacks, adjustable on the carrying or supporting rod h'. As soon as the top portion of the said arms is worn off the nuts of the bolts h^5, and h^7, are loosened and the arms slid upward and turned outward in their respective slots to the height and position required, and the nuts are then again tightened up.

A further improvement of this dobby is shown in the accompanying illustration, of which Fig. C is a side elevation of a dobby provided with an improved jack-supporting rod, which is the gist of the present improvement; Fig. D, an enlarged detail view of the same, illustrated in connection with a portion of its lifting lever.

In said drawings, a, is the dobby frame; b, the harness lever, carrying the connector c, to the outer end of which are pivotally secured the upper and lower hooked jacks, d, and e, adapted to be engaged by the lifters f, and g, respectively.

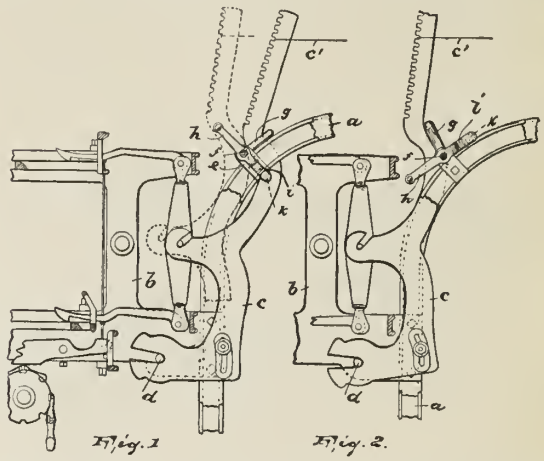


The lifting lever h, pivoted as at h^1, and operated through pattern chain k, is provided at or near its inner end with a vertically-arranged slot h^2, in which rests the pin i^3, projecting horizontally from link i^5. To said link is adjustably secured, by bolt and nut i^7, the flattened lower portion i^3, of the supporting rod i, which is for that purpose provided with an elongated slot i^4, through which the tightening bolt i^7, passes. The supporting rod i, is either round or flat, and is provided with an upper and lower collar or lug i^1, and i^2, adapted to support the upper and lower jacks respectively. The link i^5, can be provided with projecting flanges i^6, as shown in Fig. D, to obtain a more secure and firmer joint between the said link and the flattened portion i^3, of rod i, if so desired.

Should, during the operation of the machine, the jack-supporting collars or lugs i^1, and i^2, partially wear off, the tightening nut and bolt i^7, is loosened, the rod raised up to the required height and the bolt and nut again tightened. By this simple means the frequent changing of the jack-supporting rods and their respective collars is fully avoided and the device thus rendered more durable and economical. (*Adam Scheid, Harrison, Assignor to Robert Atherton, Paterson, N. J.*)

BIRCHALL'S HARNESS-LEVELING DEVICE.

Fig. 1 is a side elevation of a dobby with certain portions removed and others shown in section (ar-



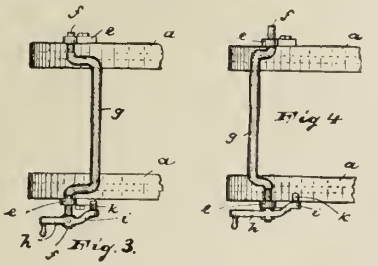
ranged on a portion of a loom-frame), and provided with the improved leveling device. Fig. 2, is a view similar to Fig. 1, illustrating the position of parts when the leveling device is in operation; and Figs. 3 and 4 are top plan views of the leveling device as shown in Figs. 1 and 2 respectively.

In said drawings a, represents a portion of the loom-frame, and b, the dobby-frame secured thereto, and provided with the cross-rod, serving as a fulcrum for the harness-levers c, the latter ones connected with the harness of the loom through the cords c'.

On each side of the dobby, and secured to the loom-frame a, in any desired manner, is a bracket c, serving as bearings for the ends f, of the crank-shaft g, of the leveling device.

On one end of said crank-shaft is secured the crank or handle h, provided with an arm i, on which is arranged a horizontally-inwardly projecting pin k, adapted to engage and bear on the loom-frame a. The said crank-shaft g, when in normal position, Figs. 1 and 3, does not fully touch the harness-levers, and bears on the loom-frame a, but is allowed a lateral motion in its bearings c, sufficient, when pushed inward, after being turned from right to left, to bring the said pin k, over and above and into engagement with the said loom-frame, as shown in Figs. 2 and 4.

In operation when the warp-threads from necessity of repairing or the harness-threads for any other reason have to be brought to one level, the operator



stops the machine and turns the crank-shaft *g*, by means of the handle *h*, from right to left, until the pin *k*, is over and above the loom-frame *a*. The crank-shaft is then pushed inward and the handle *h*, released. The pin *k*, bearing on the loom-frame, prevents the crank-shaft from returning to its normal position, and thus holds the harness and warp threads in a level. When the necessary repairs are done, the crank-shaft by means of its handle is pulled outward and allowed to returns to its normal position. (*Thomas Birchall, Assignor to Robert Atherton, Paterson, N. J.*)

ALVORD'S SHEDDING MECHANISM.

This shedding mechanism is shown in its sectional elevation in the accompanying illustration. Examining this drawing we find the harness-lever 1, hung on shaft 2, retained in place by pin 3, passed through curved slot 3', in said lever 1, and which harness-lever has the usual harness-frame connected to its ends by cording.

On the arm 4, of lever 1, is pivotally mounted at 8, a lock lever 5, the segmental arms of which are struck on a curve from the centre of shaft 2. Hook 6, is connected to a third radial arm of lock-lever 5, at a point 7, outside of pivot 8, on which lock-lever 5, is mounted. The free end of hook 6, is provided at top and bottom with two projections, between which there is a small space, forming at the upper side a notch to be engaged by the reciprocating knife 9, and at the lower side a notch to be engaged by the reciprocating knife 10, whereby the hook may be moved longitudinally.

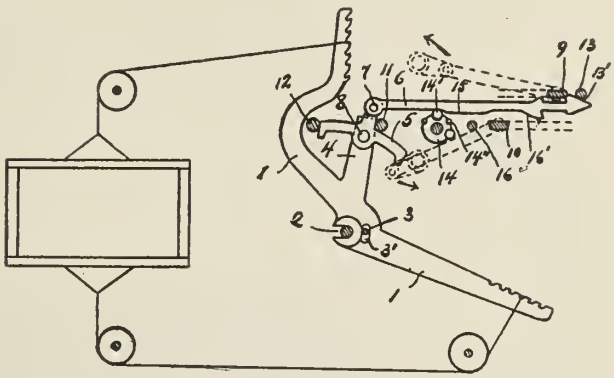
The knife 9, termed the "elevator" raises the harness-frame connected to lever 1, and the knife 10.

The "depressor" lowers the said harness-frame. The hook is vibrated by a pattern surface 14, to cause its notches to engage the reciprocating knives, a riser 14', on the pattern surface acting to raise the hook and place its upper notch in engagement with the elevator 9, and a "sinker" 14", permitting the hook to fall by reason of its own weight, thus engaging the lower notch of the hook with the depressor 10.

As the reciprocation of the knives 9, and 10, is constant, it is necessary that the hook be freed from engagement with said knives at the extreme of its movement; otherwise when once engaged by one of the knives there would be a like reciprocation of the hook and an open shed could not be formed. To effect this disengagement there is placed at a point near the position reached by the elevator 9, in its outward movement, a clearing bar 13, which co-acts with the beveled portion 13', on the upper side of hook 6, besides there is placed a clearing bar 16, at a point near the position reached by the depressor 10, in its inward movement, which clearing bar 16, co-acts with the beveled portion 16', upon the under side of the hook.

Upon the underside of the hook 6, is formed also the run 15, against which the risers of the pattern surface operate, and that end of the riser nearest the pivotal point of the hook is cut away to permit the hook to be depressed by the action of the clearing bar 13.

In order that the harness lever may be retained in either extreme position and an open shed be formed, there are provided stationary butting bars 11 and 12, which co-act with the lock lever 5, to lock the harness lever in either extreme position. These butting bars are arranged in an arc struck from centre of shaft 2, and placed one on each side of the arm 4, of the harness lever and of the radial arm of lock lever 5, and bear upon the segmental arms of said lever 5. When in this position the arm 4, and lever 5, are locked together, and the pull upon the hook 6, draws the arm 4, and moves the harness lever, the lock lever 5, having no independent movement at this time. This



movement will continue until the arm 4, of the lever 1, is brought against one of the butting bars, and at that instant the end of one segmental arm clears the opposite butting bar, and is by a slight turn of lever 5, upon its pivot, placed against the butting bar.

The tension on the warps carried by the harness frame cannot disturb the position of the parts, and the harness frame will be unmoved until the hook is moved in the return direction, at which time the lock lever 5, is turned slightly on its pivot and the end of the segmental arm freed from engagement with the butting bar. The harness frame is then free to be removed into its other position by the continued movement of the hook, the parts being locked at the end of the movement in the same way, as just described.

The operation of the mechanism is as follows: The pattern surface 14, is timed to move when the knives are at the opposite extremity of their motion to that shown in our illustration. When so timed, a hook 6, which has a sinker under it will drop on to the depressor knife, and a hook with a riser under it will be forced up and connect with the elevating knife 9. The forward movement of the knives will unlock the harness levers, and they will be moved into their opposite positions and locked in place.

An open shed will be formed and the harness frames will have been pulled positively into position. The harnesses will remain in their respective places so long as sinkers follow sinkers and risers follow risers on the pattern surface, but when a riser follows a sinker, or *vice versa*, the levers, and consequently the harnesses will move into the opposite position. The hooks are freed from the knives by the action of clearing bars 13 and 16, as previously described. (*Clinton Alvord, Philadelphia.*)

INGRAHAM'S SHEDDING MECHANISM.

This shedding-mechanism refers to for what are known as "open shed" looms, the object being to effect the movement of the heddle frames without any severe strain on the operating devices, to insure the locking of the heddle frames when the shed is open, so as to permit the jacks to be readily shifted, and to provide for lifting the depressed heddle-frames independently of the regular operating mechanism when it is desired to gain access to a warp thread in the lower portion of the shed.

Fig. 1, is a transverse section, partly in elevation, of a loom provided with the new shedding mechanism. Fig. 2, is an enlarged vertical sectional view of said heddle operating mechanism. Figs. 3 and 4, are like views of parts of the mechanism, in different positions, and Fig. 5, is a transverse section on the line 1-2, Fig. 2.

moved to and fro, their inclined slots, acting on the antifriction rollers carried by the studs d, of the heddle-levers, will cause said heddle-levers to vibrate upon the fulcrum shaft c, and will thus raise and lower the heddle frames B, and the path in which the roller is forced to travel by the action of the inclined slot will be curved, and will be almost at right angles to the thrust imparted by the inclined portion of the slide F, by which means the up and down thrusts upon the slide F, is lessened, as compared with a thrust directly across the line of movement of said slide.

At each end of the inclined slot of each slide F, is an offset f', and when the slide is in either of its extreme positions, the antifriction roller on the stud d, of the heddle-lever occupies one of these offsets and the heddle frames are thereby effectually locked in their extreme positions corresponding to the "open shed," the strain upon the heddles having no effect in

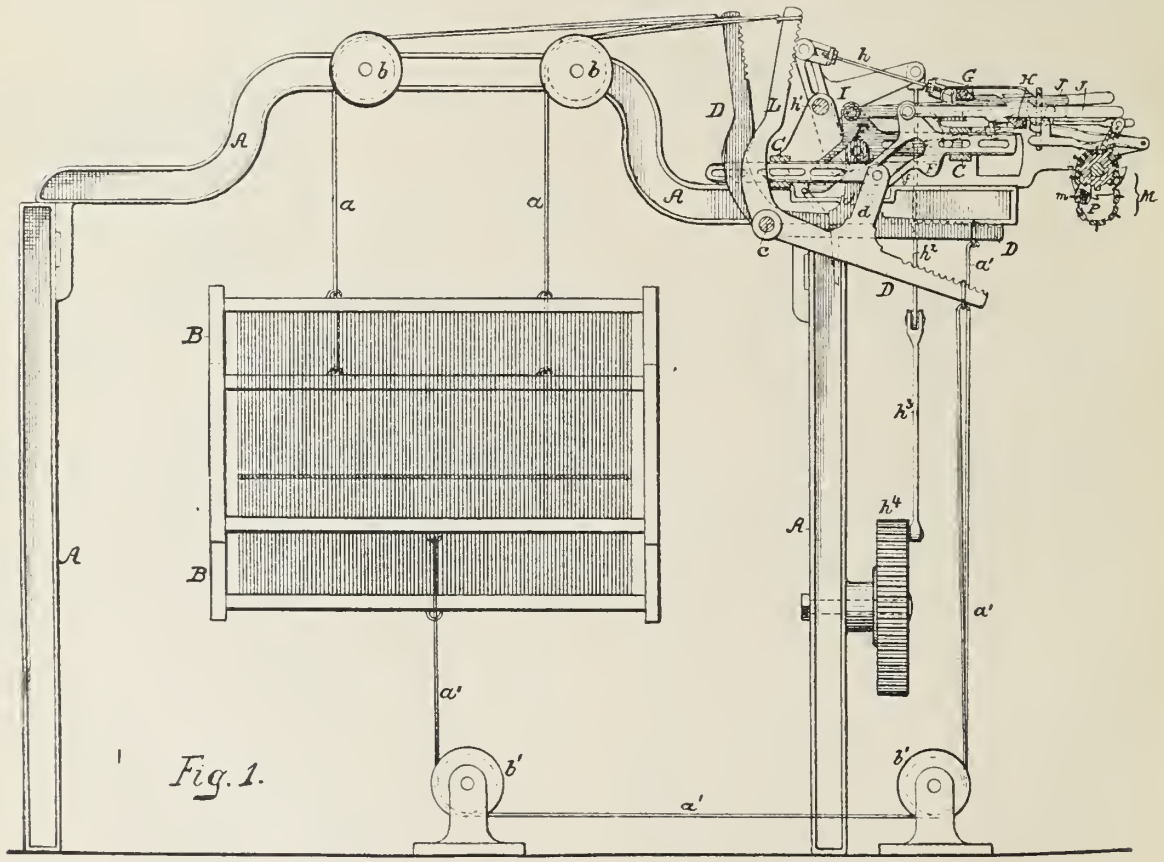


Fig. 1.

A, represents part of a frame of a loom, and B, represents heddle frames to which are connected cords a, a', passing over pulleys b, b', said cords being connected to heddle-levers D, mounted on the frame of the loom, and these heddle-levers being in the form of bell-cranks, one arm of each lever being connected to the upper cords a, of its corresponding heddle frame, and the other arm to the lower cord a', of the same. Each heddle-lever has on its lower arm an upwardly projecting stud d, the upper end of which carries an antifriction roller d', (see dotted lines Fig. 2) which is adapted to an inclined slot f, in slide F, guided in transverse bearings C, on the frame of the heddle operating mechanism, so that, as these slides are moving the slides from the positions to which they have been adjusted.

In order to provide for the effective guidance and lateral retention of the slides F, and yet permit said slides to be arranged closely together, the top and bottom edges of the guiding portion of each slide are beveled or **V**-shaped, and the guide-bars C, have like beveled or **V**-shaped grooves for the reception of these beveled edges of the slides as shown in Fig. 5.

The movement of the slides F, to effect the rise and fall of the heddle-frame demanded by the required shedding of the warp, is derived from reciprocating bars G and H, which are carried by guide blocks g, the latter being connected by rods h, respectively to the upper and lower arms of a three-armed lever I,

hung to a transverse shaft h', the third arm of said lever being connected by a rod h^2, and link h^3, to a spur wheel h^4, driven from any suitable part of the loom.

Hung to each of the slides F, is a jack J, which has, on its upper and lower edges, lugs i, i', facing in opposite directions, and each of these jacks J, is under the control of a finger k, on a pivoted arm K, which is acted upon by the pins m, of a pattern-chain M, carried by a pattern-drum N, the intermittent movement of the latter being effected by any suitable means, for instance by means of a ratchet-wheel n, on the drum shaft, acted on by a pawl carried by an arm n', hung to said shaft, and vibrated by the bar H, through the medium of a rod n^2, as shown in Fig. 2. When the parts are in the position shown in Fig. 2, the bars G and H are at the extremes of their rearward movement, and are about to move forward, that is to say, the bar G is about to move to the right and the bar H to the left. The jacks of the slides F of those heddle frames which are to be lifted have been raised so that their lugs i, are in engagement with the bar G, while the jacks of the slides of those heddle frames which are to be lowered, have been dropped so that their lugs i', engage with the bar H, the jacks of the slides of those heddle frames which are not to be raised being allowed to remain down, and the jacks of the slides corresponding to the heddle frames which are not to be depressed being allowed to remain up. As the bars G and H move forward, corresponding movement is imparted to those slides whose jacks are in engagement with the bars, as shown in Fig. 3, the movement of the heddle-frames from one position to the other being effected by the slides, which, owing to their inclined slots, so act upon the heddle-levers, that the movement of the latter is affected easily and smoothly and without shock or jar upon the operating portions of the device, the heddle-frames being finally locked in their extreme positions (that is to say with the shed open) owing to the off-set ends of the inclined slots in the slides. On the backward movement of the slides G and H, the pattern-chain is shifted and the jacks J, are raised and lowered in accordance with the requirements of the pattern. (See Fig. 4.) In order to permit the upper bar G to yield against the pressure of the jacks from below, said bar has journals p, which are free to turn in the guide-blocks g, the preponderance in weight being in advance of the journals, so that the acting edge of the bar G will fall into engagement with the lugs i, of the jacks, as soon as said bar is fully retracted.

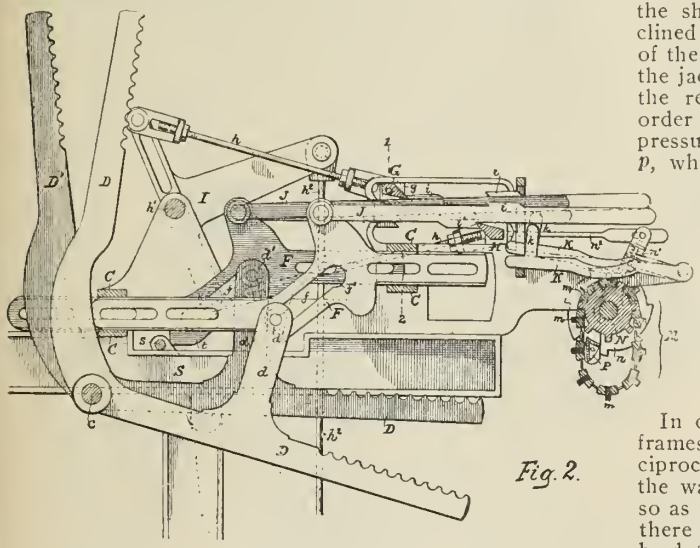


Fig. 2.

To prevent the links of the pattern-chain from being carried around by the under side of the drum N, there is mounted adjacent to the latter, a deflecting shoe P, which so acts upon the depending portion of the chain, as to press its links out of the spaces between the teeth of the drum, as shown in Fig. 2.

In order to effect the raising of the lower heddle-frames without corresponding movement of the reciprocating bar G, when it becomes necessary to raise the warps constituting the lower portion of the shed, so as to tie up a broken thread, or for other purposes, there is mounted at one side of loom a lever S, shown by dotted lines in Fig. 2, this lever carrying a transverse bar s, which acts upon downwardly projecting lugs t, upon the slides F, of all the depressed heddle-frames, so that on operating the lever S by hand, an outward movement of all of these slides can be effected independently of the regular operating devices. It will be observed that the reciprocating bars G and H act only upon one side of the lugs i, i', of the jacks J, so that said lugs are free to move away from the reciprocating bars when the slides are moved by the evener-bar. By so connecting the lever S, the leverage for raising the heddle-frames when desired, is so increased that this operation may be easily performed. This is of great importance, especially where the loom has a large number of heddles. (*Fairmount Machine Works.*)

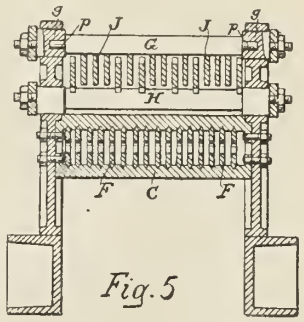


Fig. 5.

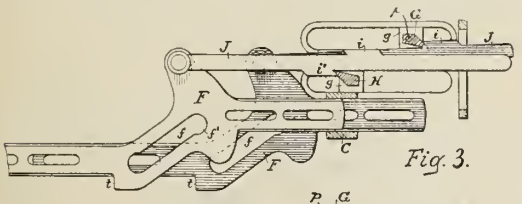


Fig. 3.

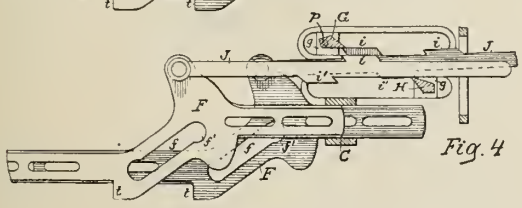


Fig. 4.

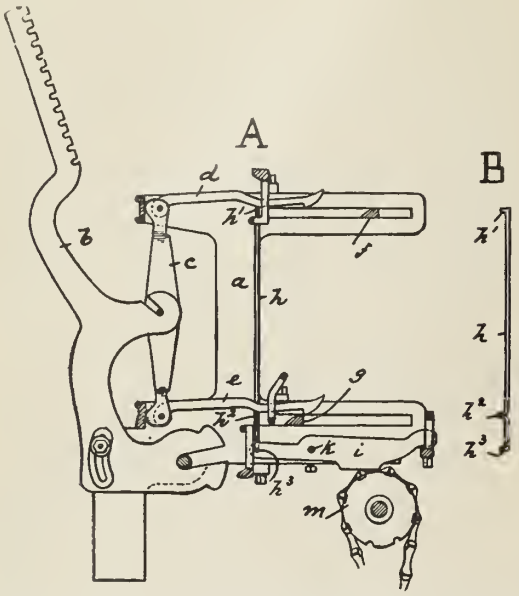
EASTWOOD'S SHEDDING MECHANISM.

Referring to the accompanying drawings, Fig. A, is a sectional side elevation of a dobby provided with the improvements; Fig. B, a detail view of one of the jack supporting rods.

In said drawings, a, represents the frame; b, the harness lever; c, the connector pivotally secured to said lever b; d, and e, the upper and lower hooked jacks, respectively, pivotally secured to the said connector, and f, and g, the lifters.

Pivoted, as at k, is the lifting lever i, acted upon by the pattern surface or chain m, in the usual manner. To the inner end of said lever i, is pivotally secured the upwardly extending rod h, which for that purpose

has its lower end bent horizontally, as at h^3, Fig. B, and rests with said portion h^3, in a horizontally arranged hole of lever i. The upper end of rod h, is also bent horizontally, as at h', and bears with said



horizontal portion under the upper jack d, while the lower jack e, rests upon the loop h^2, projecting horizontally from and integral with the rod h. (*Alfred Gartner, Newark, N. J., Assignor to Benjamin Eastwood, Paterson, N. J.*)

ECCLES'S HARNESS MECHANISM FOR OPEN SHED LOOMS.

In many fancy patterns the weaving requires one, two, three, or four heddles out of a set of ten or more to remain open for several picks, and thus an open shed prevents the unnecessary movement and chafing of the warp-threads.

By the present mechanism the heddle-frames are all liberated at each pick.

The invention consists of an automatically-operated clamp that will rigidly clamp all the heddle-levers open for the flight of the shuttle and automatically liberate them just as the lifter and depressor starts on the return stroke that opens the shed.

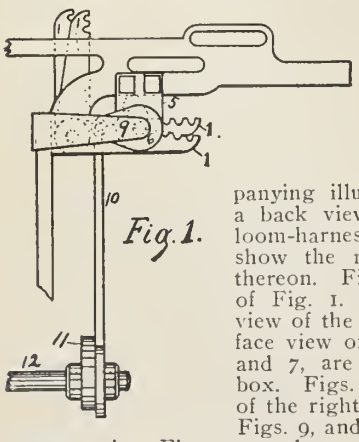


Fig. 1.

Of the accompanying illustrations Fig. 1, is a back view of so much of a loom-harness frame as will show the mechanism mounted thereon. Fig. 2, is an end view of Fig. 1. Fig. 3, is an edge view of the spring. Fig. 4, is a face view of Fig. 3. Figs. 5, 6, and 7, are views of the cam-box. Figs. 8, and 13, are views of the right-angle harness-lever. Figs. 9, and 10, are views of the pressure-pin. Figs. 11, and 12, are views of the eccentric cam.

The construction of the mechanism is as follows: 1, represents the right-angle harness-lever; 3, the double-hook moving jack. The jacks are controlled by a pattern-chain and operated by a lifter and depressor. To the lever 1, is fixed a bearing-surface 2. In a series of levers these surfaces bear one against the other, as shown in Fig. 2, which shows a series of ten levers nested one against the other at the bearing-surfaces 2.

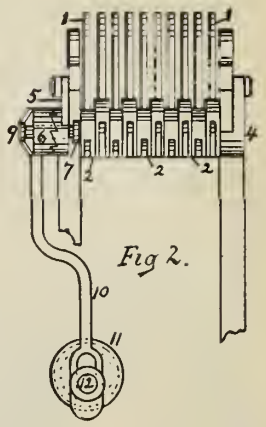


Fig 2.

4, indicates a fixed bearing placed at the right-hand side of the last lever in the series. 5, indicates a stand or hanger for the clamp-pin 7, and forms a part of the cam-box 6. 7, is a pressure-pin, the flanged end of which presses against the surface 2, on the lever 1. The plain end of pin 7, on the left is pressed by the spring 9. By means of a pin 13, the pressure-pin 7, is fixed to the part 6, of the cam-box. To that part of the cam-box 6, is an arm 8, and from which is a connecting-rod 10. 11, is an eccentric grooved cam, mounted on the crank-shaft 12.

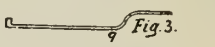


Fig. 3.

Fig. 4.

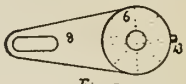


Fig. 5.

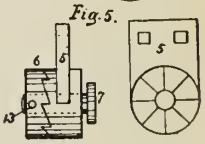


Fig 6. Fig. 7.

The operation of the new motion is as follows: Motion being given the cam 11, by shaft 12, as soon as the shed is opened the cam-box is closed as shown in Figs. 2, and 6. This closing of the cam-box allows the spring 9, through the pin 7, to press all the levers 1, together at 2, and clamp them tight, holding the shed open for the passage of the shuttle and a cross of the warp yarn on the previous pick until the next pick is crossed on. As the lifter

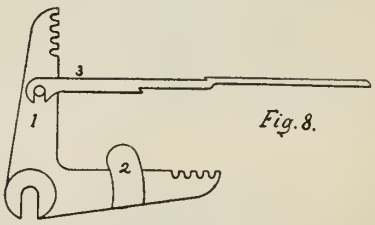


Fig. 8.

and depressor hooks on the jacks for a change of the shed, the cam 11, through rod 10, and cam-box 6, acting against the inclined cams of the box, press apart the cam-box 6, which draws to the left the pin head 7, and relieves all the levers, and they are free to be moved in either direction, up or down, when they are again clamped as before described.

Fig. 9


Fig. 10.

Fig 11

Fig. 12.

The cam-box shows eight bearing-surfaces; however a less number may be used. (*James Eeeles, Philadelphia.*)

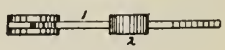


Fig. 13.

OLDHAM'S SHEDDING MECHANISM.

One of the principal objects sought to be secured in the construction of this dobby is the locking of each heddle-frame either at the highest or lowest point that it assumes in the weaving operation, and giving to each jack or lever a positive movement in either direction in order to operate each heddle-frame independently when called into action by the pattern-chain, and also the locking of the whole number of heddle-frames used in the weave in the position in which they have been placed for an intermittent period.

This means the production of an open shed or the establishment of a uniform line, at which the upper and lower warps will be held to insure the shuttle's flight and many other advantages in the weaving operation.

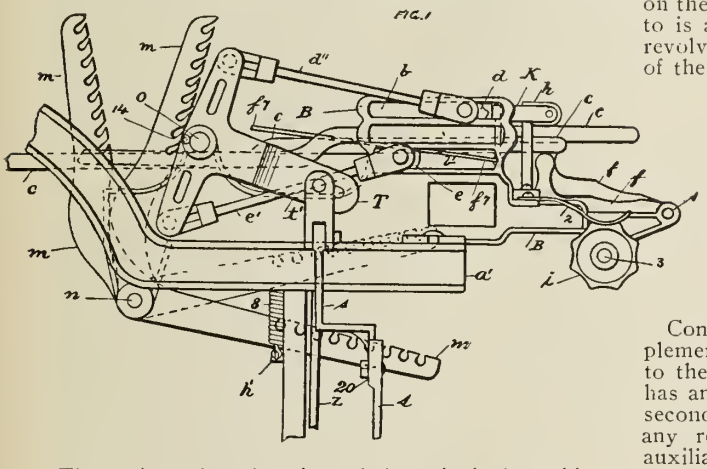


Fig. 1, is a side elevation of the principal working part of the device, represented as mounted on one end of the arch of the loom-frame and showing the jacks in their two directly opposite positions, or when the heddle-frame is at its highest and lowest point. Fig. 2, is a top plan view of the same. Fig. 3, represents a skeleton of the locking-frame in its operative position in connection with independent notched bars connected with the jacks, the locking frame being shown in section, holding the jack at its full forward movement, and the dotted position of the two parts illustrating the jack at the point of its full backward movement.

Letters of references indicate thus: a', represents the loom-arch, to the appropriate side of which on the top the dobby is securely mounted. B, indicates one of the two side-frames of the dobby-frame. Upon the inner ends of the side-frames B, is secured a shaft n, which gives a bearing to each of the levers or jacks m.

Directly forward of the shaft n, journaled in the two side-frames, is a rock-shaft o, to the outer end of which, at the proper side of the frame, is secured a **T**-shaped rocker-arm T, and in opposite position upon the other end of said shaft is a lever t. Pivotally connected by means of an integral boss or projection m', upon one side of the upwardly-directed arm of each jack m, is a long draw-bar c, provided with two notches c', and c, or teeth upon its upper edge, and the bottom edge of each of said draw-bars c, is constructed with a single notch or projection C^3. The said notches are for engagement with the transverse knives d, and e, located one above and the other below the notched draw-bars c, and sliding with a reciprocating movement in suitable openings b and b', in the side-frames B. These knives are connected by the rods to the **T**-shaped rocker-arm T, and the lever t.

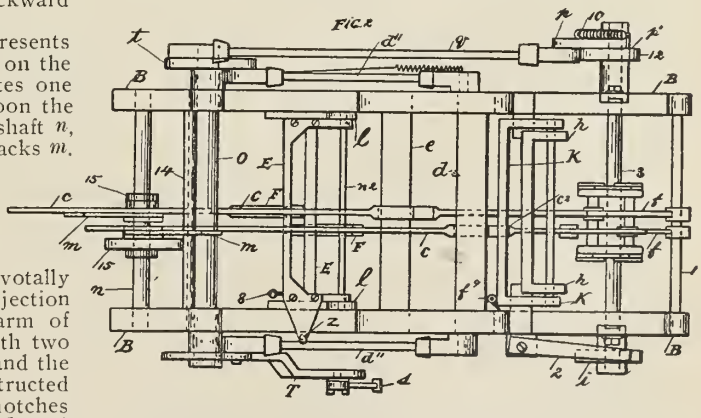
In the extreme outer end of the two side-frames B, of the machine are pivoted loosely on the shaft 1, small levers or feelers f, corresponding in numbers to the draw-bars c, and upon which the outer ends of the said bars rest, the feelers or levers being raised by means of the risers on the pattern-chain, the sinkers of the chain allowing for the fall of the levers or feelers in keeping with the character of the weave. A spring 2, secured to one of the sides of the machine, has its free end resting in one of the suitable curved depressions in the periphery of the hand-wheel i, secured on one end of the shaft 3, by which the pattern-chain cylinder is rotated.

To the main arm T, is connected a depending-rod s, adjustable at 20, and the same is pivoted at its bottom end to an eccentric gear that meshes with a similar gear, secured on the power-shaft of the loom. Pivoted on the frame in the rear of the eccentric gears referred to is a lever provided at its free end with a loosely-revolving roller, which is engaged at each revolution of the eccentric gear by the cam-piece. A vertically-moving rod Z, is secured to said lever, the upper end of which is connected to a frame E, pivoted by means of the rod n^2, on the stationary cross-girt l. A spring 8, has one end secured to the stationary rack h', and connects with frame E. Upon one end of shaft 3, is secured an arm p, supplied with a pawl p', a spring 10, connecting said arm and pawl and causing the latter to constantly be in engagement with the teeth of the ratchet-wheel 12.

Connected to the upper end of the arm p, is a supplemental connecting-rod q, whost rear end is pivoted to the lever t, and the front connecting part or head has an integral foot, which rests upon the face of the second rear tooth engaged by the pawl and prevents any recoil to the pattern-chains. Supplemental or auxiliary notched connecting-rods F, are pivoted near the rear ends upon suitable bosses or projections m^2 on the jacks m, their forward ends provided with suitable shoulders f^5, and notches f^6, for engagement with the pivoted locking-frame E.

A transverse rod 14, directly in the rear of the rock-shaft O, the two ends of which are secured in the two side frames, is covered with rubber, thereby limiting the forward movement of the jacks and furnishing a cushion for the latter to strike against.

The whole series of jacks are assisted in being supported in an upright position by means of the clamps

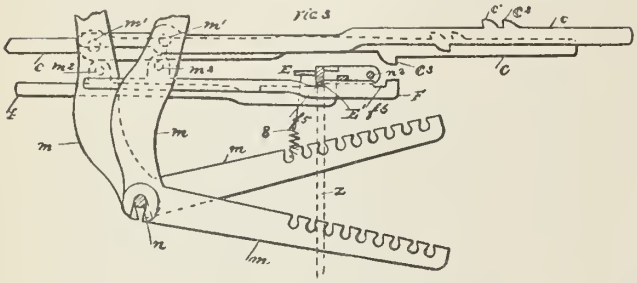


or guards 15, placed each side of the series and bearing against the two outer jacks, these clamps being rigidly secured on the shaft n.

Pivoted on the rack or grate h, is a hold-back or locking-frame K, placed transversely over the draw-bars c, for engaging the notches c^2, and the outer ends of said draw-bar c, and it is provided with an arm f^7, by

which the hold-back can be liberated from all the draw-bars by the operator.

In the operation of the machine motion is communicated from the drive-shaft of the loom by means of the eccentric gears, and communicated to the **T**-shaped lever by means of the adjustable arm *s*, and at each revolution of the gear to which the said arm is con-



nected. a proper amount of vibrating motion is imparted to the same, and by means of the connections *d''*, and *c'*, to the reciprocating knives *d*, and *e*. In the forward movement of the knife *d*, all of those draw-bars that have been raised by the movement of the pattern-chain will be in such a position as to cause the notches *c'*, of the draw-bars to be engaged by the upper knife *d*, and its forward movement will pull the draw-bars forward, thereby drawing the respective jack to which they are attached to its full stroke.

The opposite result will come to those draw-bars that are depressed by the directly opposite movement of the lower knife *e*, engaging those notches c^3, or projections on the bottom edge of the draw-bars. During the reciprocating movement of the knives the pivoted locking-frame E, will be elevated by means of the previously referred to cam, roller, lever, and vertical rod Z, so as not to engage the notches f^6, and shoulders f^5, of the auxiliary notched connecting-rods F, to the jacks *m*. When the stroke of the two knives is complete, the frame E, is forced by its own weight and assisted by the spring 8, to drop in the rear of the shoulders f^5, or into the notches f^6, of the proper connecting-rods F, and remaining there until the harness is to make another change, when the whole series of rods F, will be simultaneously liberated.

The locking-frame E, has its lower edge rounded slightly, as shown at E', Fig. 3, so as that if unusual strain is exerted on any of the bars F, the locking-frame E, will rise slightly against the tension of the spring 8, and free the bars F, so as to prevent breaking any of the working parts of the machine.

The spring 8, must be sufficiently strong to preserve at all times under ordinary circumstances an even shed-line. The supplemental spring f^9, connected to the locking-frame K, serves to form an additional hold on all those draw-bars connected with the jacks carrying the upper shed by engaging the upper notch C^2, of each of them in their forward position. The spring f^9, secured thereto, connects with one of the side-frames B, and an operating-rod f^7, serves to unlock it from all the draw-bars it engages from the opposite side of the loom. This is for evening the shed.

In case the pattern of weave requires a long pattern-chain the weight and momentum of the pattern-chain cylinder has a tendency to overlap or override to the following pick when the usual form of ratchet and pawl is used, but not so in this case. The integral foot prevents any further rotation of the pattern-cylinder than a single tooth of the ratchet-wheel.

It very often happens the loom is revolved backward, which would result in breaking any positive locking-device, the locking-frame E, having the beveled edge E', and the safety-spring 8, in this case instantly releasing the transverse locking-frame from all the supplemental draw-bars F, as hereinbefore explained, thus overcoming the danger of breakage when the loom is reversed. (*George Oldham, Philadelphia.*)

GOODYEAR'S SHEDDING MECHANISM.

To enable the reader to understand the mechanism the accompanying drawings are given, and of which Fig. 1, is an elevation looking at one side of the mechanism. Fig. 2, is a longitudinal sectional view of it.

The operation of the mechanism is as follows: With the parts in the positions shown in illustrations, the cam c^2, first draws the rods N, O, toward each other to enable them to be raised by the projection of the cam-guide Q, above the path of the head h^2, of the cam-slide G, the pattern-cylinder lifts the finger J, to raise the jack I, so its shoulder *l*, is in the path of the primary impelling-bar B, and the cam *c'*, moves the levers D, D', and the bar B, so as to impel the jack I, and the slide G, in the direction indicated by the arrow in Fig. 2. When the slide G, has been impelled to a point where the head h^2, moves beyond the end of the rod O, the cam c^2, moves the levers P', M, to separate the ends *n*, *o*, of the rods N, O, and allow the ends to descend into the path of the head h^2, so that the end *o*, will take position behind the head h^2, of said slide. Before the cam *c'*, completes its revolution, it withdraws the bar B, from engagement with the primary impelling-jack I, and the end *o*, of rod O, engages with the head h^2, so as to complete the movement of the slide G, in the direction indicated, this movement of the slide being completed by the time the cam *c'*, has made a full revolution, at which time the pattern-cylinder releases the finger J, so that the finger and jack I, will drop or fall by gravity. As the cam-slide G, is moved in the manner described, its incline *h'*. rides against the incline *f'*, and this pressure turns the double heddle-lever to move the heddle-frames. As the slide G, completes its stroke, the head h^2, is engaged by the rod O, to prevent the slide and heddle-lever from being

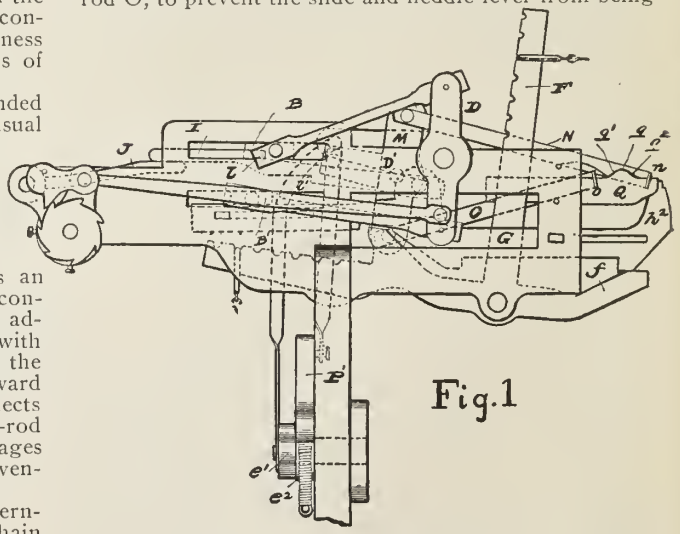


Fig. 1

moved accidentally. As the cams *c'*, c^2, continue to rotate, the cam c^2, operates the lever M, to again move the rods N, O, and cause the ends *n*, *o*, to approach and ride upon the inclines *q'*, q^2, *q*, of the guide Q, thus lifting the rods out of the path of the head *h'*, of said slide G, and the cam *c'*, now moves the levers D, D', in a manner to draw the primary impelling-bar B'. into engagement with the shoulder *l'*, on the lower side

of the jack I, which, it will be remembered, was lowered on the completion of the first stroke or movement of the slide G.

This primary impelling-bar B', now impels the slide G, in the reverse direction until the head h^2, thereof, passes the end n, of the bar N, at which time the cam

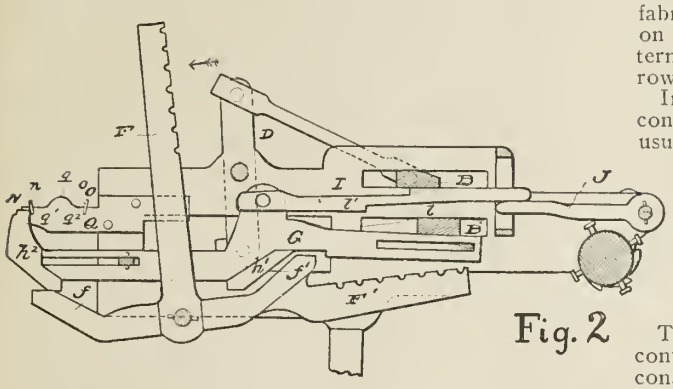


Fig. 2

e^2, moves the lever M, to separate the ends n, o, of the rods, and cause the end n, to take position behind the head h^2. The cam e', now retracts the bar B, and the cam e^2, impels the rod N, to force its end against the head h^2, and to cause the rod N, to impel the slide G, to the full limit of its stroke or until the slide again assumes the position shown by Fig. 2. As the slide G, is impelled in the direction referred to its incline h, rides against the incline f, to rock the double lever F, F', and cause it to again move the heddles. (*Robert B. Goodyear, Philadelphia.*)

EVANS'S SHEDDING MECHANISM.

The gist of the improved mechanism is found in doing away with a great amount of chain stuff, the arrangement of the new device acting as a multiplier on each bar.

It will put in as many repeats of one pattern as required by the design by one chain, then start another chain to weave another pattern as the fabric calls for. The change from one chain to the other, *i. e.*, the multiplier, is worked from the first jack, which jack can be used solely for that purpose.

In the usual construction of the harness-operating mechanism, known as the "dobby," having two rows of pegs on one bar of the pattern-chain, one set of indicator-fingers is operated from one row of pegs, and the other set from the other row of pegs on the same bar. The first set of indicator-fingers operates the lower jack-hook, and the second set operates the upper jack-hook. The lifting-knives move alternately at each successive pick of the loom, and when the jack-hooks engage with them, the corresponding harness is raised and lowered. One row of pegs on the bar of the pattern-chain determines which harness and warp-thread shall be raised for a certain pick, and the other row of pegs on the same bar determines the raising of the warp-threads for the next succeeding pick. One bar of the pattern-chain, therefore, represents two picks in the woven fabric, and the pattern-chain must have a sufficient number of bars to control the spring ing of the warp for the pattern of the whole length of the fabric.

In the weaving of a variety of fabrics, such as handkerchiefs, towels and similar goods, the length of pattern-chain required is objectionable on account of its cost of labor in pegging and the power and mechanism required to carry and operate it.

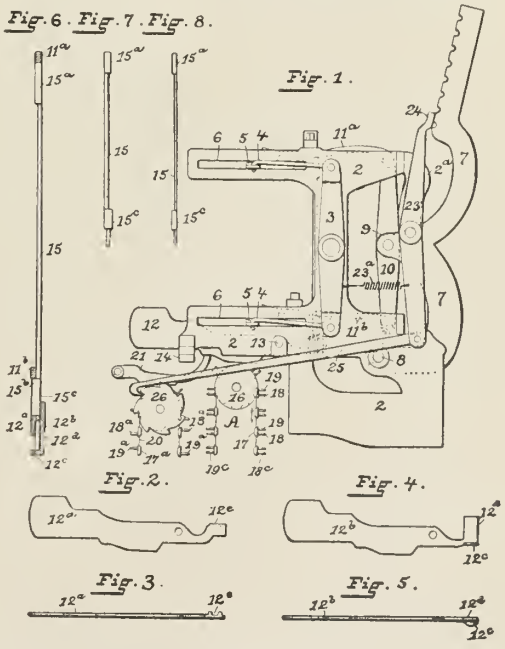
The object of the present invention is to so construct the dobby that fabrics, such as towels or handkerchiefs, in which stripes or borders of one peculiar pattern or weave are followed or preceded by a field of another pattern or weave can be produced with a short length of pattern-chain.

In a loom provided with a dobby constructed after this invention the pattern for the main portion of the fabric is represented by one of the two rows of pegs on each of the bars of the pattern-chain, and the pattern for the cross-borders is represented by the other row of pegs on the same bar.

Instead of using each bar of the pattern-chain to control the warp of two successive picks, as is the usual method employed herctofore, in the pattern-chain used in carrying out this invention each bar controls the springing of the warp for one pick only, and yet by use of a controlling mechanism, a short pattern-chain, or for some weaves a cylinder provided with a pattern-surface, will be sufficient to weave fabrics of any desired length in which two kinds of patterns of weaves are used at pre-determined intervals.

The controlling mechanism may also be arranged to control the harness-operating mechanism in the old construction of the dobby where two adjacent indicator-fingers operate the one, the lower and the other the upper jack-hooks.

Fig. 1, is a side view of a dobby provided with the improvements. Fig. 2, is a side view, and Fig. 3, a top view, of one of the pair of indicator-fingers. Fig. 4, is a side view, and Fig. 5, a top view, of the other of the pair of indicator-fingers. Fig. 6, is an edge view, on an enlarged scale, of a needle for operating the jack-hooks, showing the upper and lower hooks, and the two parts of the indicator-fingers in section. Fig. 7, is a face view, and Fig. 8, an edge view, of the needle on the scale of Fig. 1. Fig. 9, is a diagrammatic representa-



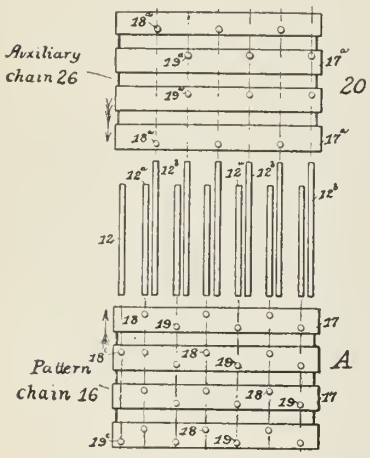
tion of the indicator-fingers, the pattern-chain, the auxiliary chain and their relative relation to each other, showing also the indicator-finger on one side through which the mechanism for operating the auxiliary chain is set in motion.

To illustrate the invention as clearly as possible and avoid confusion, the dobby part of the loom only is shown.

Of the accompanying illustrations, numeral of reference 2 indicates the end frames of the dobby, secured to or forming part of one of the end frames of the loom. The vibrator-arm 3, is secured to a shaft supported in the end frames 2. The ends of this vibrator-arm 3, are connected by the rods 4, with the lifter-knives 5, and these slide in the slotted ways 6.

The harness-lever 7, is the first one near the frame. The other harness-levers required to weave the patterns are not shown, but all are pivotally secured on the shaft 8, the ends of which are supported in the end frames 2. To the bracket 9, forming part of the harness-lever 7, is pivoted the connector-arm 10, and to each end of the same are pivotally connected the jack-hook 11a, to the upper end and the jack-hook 11b, to the lower end. The indicator-fingers are pivoted on the shaft 13, supported in the end frames 2, and rest on the bar 14, extending from one end frame to the other.

Fig. 9.



On referring to Fig. 6, it will be seen that the needle 15, supports jack 11a, on the upper end 15a, and the jack 11b, on the shoulder 15b, at its lower end, and that the needle is supported by the indicator-finger 12a, by a shoulder formed by the enlargement 15c, of the needle and by the lateral projection 12c, of the indicator-finger 12b. The indicator-finger 12a, is provided on one side with two projections (shown in Fig. 3), so as to form the groove or space 12e, and the indicator-finger 12b, is provided with the projection 12c (shown in Fig. 5), and also with the upward-projecting flat piece 12d. The lower end of the needle 15, passes through the space 12e, between the finger 12a, and the flat projection 12d, on the finger 12b. By this construction either of the fingers 12a, or 12b, may lift the jack-hooks independent of the other, but both the short ends of the indicator-fingers 12a, and 12b, must be depressed before the needle can descend and permit the jack-hooks to engage with the lifting-knives.

The object of this improved construction of a dobby and the mode of operating the same is best explained thus:

Referring to Fig. 1, it will be seen that the sprocket-wheel 16, is placed below the indicator-fingers 12, and that the primary pattern-chain A, on which the transverse bars 17, are secured, is supported and operated by the sprocket-wheel 16. On the bars 17, are secured two lines of pegs, each forming a pattern-surface. The row of pegs 18, on the forward edge of the bar corresponds with the harnesses required to be operated to weave one pick of a pattern—the cross-stripe, for instance—and the row of pegs 19, on the rear edge of the bar corresponds with the harnesses required to be operated to weave one pick of the other pattern—the field or body, for instance. These pegs are placed so that they register always with a certain one of the parts of the indicator-fingers throughout the series—that is to say, the pegs may register with either of the parts 12a, or 12b. This is clearly shown in Fig. 9, wherein the pegs 18, and 19, are so placed that they will operate the parts 12a, of each pair of indicator-fingers, the pegs of each row being arranged in the alternation shown. Now, in this condition, the pegs cannot operate the needle 15, because it requires both of the short ends of the parts 12a, and 12b, to be depressed to permit the needle 15, to descend and permit the jack-hooks to engage with the lifting-knives 5. If now, by any suitable mechanical means the weighted end of one of the two part indicator-fingers—in the present instance the part 12b,—be raised so as to depress the short end connected with the needle 15, then when the pattern-peg registering with the other half passes under the same, it will operate the needle to connect the jack-hooks with the lifter-knives and the proper harness will be operated. The means designed for thus operating the half of the indicator-fingers consists in the auxiliary or indicator chain 20, on which the transverse bars 17a, are secured. On each of these bars 17a, one row of pattern-pegs only is secured. The pegs 18a and 19a, are placed near one or the other edge of the bars 17a, the same as are the pegs 18 and 19, on the bar 17, so that the co-acting pegs will operate the respective halves of the indicator-fingers at the same time, the pegs 18a, corresponding to the pattern of the pegs 18, on the primary pattern-chain A; but they are laterally placed so that while the pegs 18, on the primary pattern-chain register, say, with the half 12a, the pegs 18a, register with or operate the other half, 12b, of the indicator-fingers, and the levers 21, pivotally secured at one end and bearing on the halfs 12b, of the indicator-fingers, being raised when the pegs 18a, pass under the same, will raise the weighted outer end of the half 12b, of the indicator-fingers and thereby permit the pattern pegs 18, to operate the other half, 12a, to connect the jack-hooks with the lifter-knives 5, and operate the desired harnesses. The row of pegs 18a, operates to unlock one of a pair of the indicator-fingers, and the row of pegs 18, operates the other one of the pair of indicator-fingers, the pegs 19a, performing the corresponding office for the pegs 19, because the needle is supported by two adjacent indicator-fingers forming the pair and cannot be lowered to engage the jack-hook if only one is used or the jack-hooks if, as shown in the drawings, two are used, until the weighted outer ends of both indicator-fingers are raised and the inner ends of both are lowered with the needle.

When now the row of pegs 18a, has raised the outer ends of one of the pairs of indicator-fingers corresponding with the pattern, then the row of pegs 18, can operate the other one of the pair of indicator-fingers, and thus lower the needle and the jack-hook or jack-hooks so as to connect the harness required to be operated to weave the pattern corresponding with the row of pegs 18. The row of pegs 19a, performs the corresponding office for the rows of pegs 19, on the pattern-chain.

The first indicator-finger 12, which is the one nearest the end frame, and the first harness-lever 7, are preferably used to operate the auxiliary or controlling pattern-chain 20, but they are not in any wise altered and both may be used to control the operation of a harness when the auxiliary or controlling pattern is not required, or when the auxiliary or controlling pattern-chain is operated by some other moving part. In the preferred construction, as shown in Fig. 1, the end frame 2, is provided with the arm 2a, near the lower end of which is pivoted the lever 23, the upper end 24, of which lever is bent inward so as to bear on the harness-lever 7. To the lower end of the lever 23, is pivotally secured the ratchet-bar 25, the hook on the front end of which engages with the ratchet-wheel 26. The spring 23a, is secured at one end to the frame 2, and at the other end to the lever 23. (*William Evans, Fall River, Mass.*)

PERHAM'S SHEDDING MECHANISM.

This motion is for a roller loom, easy in its action, doing away with the cams on bottom shaft, placing them on the crank shaft, obtaining a cheaper and yet a more durable device.

The device can be readily and quickly adjusted by the operative to conform to the desired pick, and in a similar manner to be adjusted in any order required for a particular pattern.

Of the accompanying illustrations Fig. 1, is an end view of the improvements represented as operatively connected with a loom, only so much of the latter and its equipments being shown as is necessary to explain the invention. Fig. 2, is a front view of the same, a part of the central portion being shown as broken out.

Letters of refcrence indicate thus: A, designates the loom-frame. B, is the crank-shaft, by which the lay C, is operated through suitable connections. D, is the breast-beam. E, designates the picker-sticks. F, the harness. G, the cloth-roll. H, a rod extending parallel with the breast-beam and connected with

Fig 1

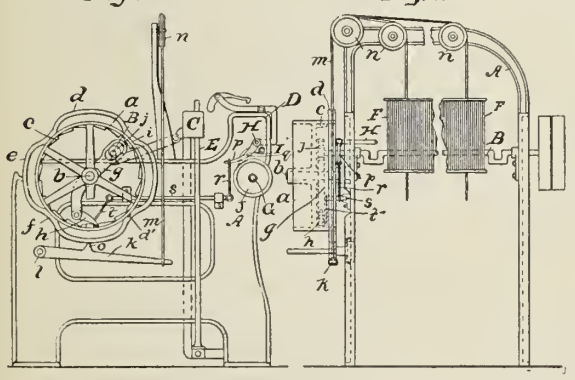


Fig. 2.

the stopping mechanism, and I, a holding pawl cooperating with a ratchet-wheel J, on the cloth-roll to prevent the latter from turning backward.

a, designates a broad-rim wheel, arranged to turn on a stud *d*, secured to the loom-frame and provided on the interior of its rim with a circle of ratchet teeth *c*, which may be an integral part of the rim, or be formed on a ring detachably connected with the rim.

Upon the outer surface or periphery of the rim-wheel *a*, are detachably and adjustably secured a series of cam-rings *d*, adjustably and removably held by means of a spline *d'*. The said cam-rings are provided on their peripheries with a plurality of rises *e*, and falls *f*, according with the number of ratchet-teeth *c*, to the pattern to be woven.

The means for detachably and adjustably securing the cam-rings upon the rim-wheel are not shown in the illustration, as any suitable device may be employed for this purpose.

Upon the stud *b*, is fulcrumed a lever *g*, to the end of one arm of which is pivoted a pawl *h*, adapted to take into the teeth of the rachet-ring described. The other end of said lever *g*, is provided with an elongated slot *i*, in which an eccentric *j*, on the crank-shaft operates, so that each rotation of the crank-shaft the lever *g*, and its attached pawl *h*, will be actuated so as to engage the ratchet-teeth *d*, and move the rim-wheel *a*, to the extent of the distance between two of the said ratchet-teeth.

k, designates a lever (as many as there are sets of harness to be operated), fulcrumed at its rear end, as at *l*, and has a cord *m*, attached to its other end, which cord extends over pulleys *n*, and is connected at its other end with the harness F, to be raised. On the lever K, there is a projection *o*, which rests upon the periphery of the cam-ring *d*, so that in the rotation of the rim-wheel with the said rings secured thereto, the rises and falls of the said rings will act upon the levers *k*, and through their connections with the harness raise the latter and allow them to be depressed, it being understood that a rise *e*, on a cam ring *d*, will operate to raise a heddle, under the arrangement shown, and that a fall *f*, will allow the heddle to be lowered, through any of the common and known means employed for the purpose, such as springs, weights, or connections with other heddles which operate to depress one set of heddles when another set is raised.

The finger *p*, employed on the rod H, of the common stopping mechanism, which is provided with a pin *q*, extending under the holding-pawl I, is elongated, as shown in Fig. 1, and thereto is attached one end of a cord *r*, the other end of which is connected to one of the angular ends of a rock-rod *s*, the other angular end of the said rock-rod being connected, by means of a cord *t*, with a pawl *h*, so that as the rod H, is rocked and the pin *q*, on the finger *p*, operates to raise the pawl I, the said finger will also, through the medium of its connections, operate to raise the pawl *h*, and so arrest the movement of the rim-wheel *a*, and its adjuncts.

The levers *k*, might be arranged above the rim-wheel and the cam-ring *d*, thereon, and the connections of the harness with the lever be made from the lower part of the latter and operate to depress the same.

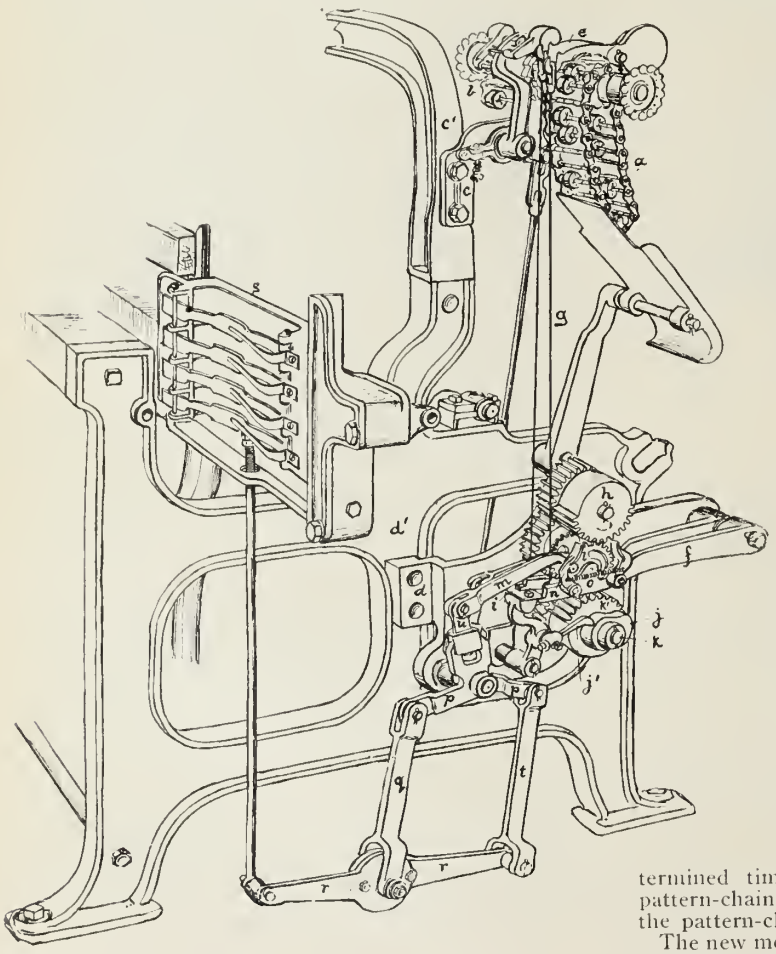
With this invention it will be seen that we are enabled to operate the harness-controlling mechanism directly from the lay-operating crank shaft, and greatly simplify and cheapen the cost of construction, making the machine easy of operation and of stopping and starting, and providing plenty of room for the cloth-roll and warp-beam. Besides this, the improvements provide a construction which is most ready of examination and manipulation by the weaver in case of need of turning the mechanism back or otherwise moving it without moving other parts of the loom to correspond with the required pick; and moreover, the mechanism is such as to materially lessen the momentum of the moving parts, so that the loom can be stopped quicker than heretofore without undue shock or jar. (*Charles Foster Perham, Lowell, Mass.*)

BOX MOTIONS AND SHUTTLE BOXES.

THE KNOWLES GINGHAM BOX MOTION.*

(For 4 x 1 or 6 x 1 Box Looms.)

This motion, as shown in the accompanying illustration, is controlled by the box pattern chain *a*, which is operated in connection with a multiplier chain *b*, by a cam on the bottom shaft (not shown). The stand *c*, for the box pattern and multiplier mechanism is bolted to the arch *c'*, and the stand *d*, for the box motion itself is fastened to the loom side *d'*. The box motion is also run from the bottom shaft. This causes



a complete movement of all the parts once in two picks and prevents the boxes from changing when the shuttle is in the dead box.

When a roll of the pattern chain *a*, comes under one of the levers *e*, which is connected with the vibrator lever *f*, by rod *g*, it raises the vibrator lever *f*, into connection with the top cylinder gear *h*. In order to prevent any skips, a lock-knife *i*, closes in under or over the vibrator lever *f*, as soon as it has been raised or lowered to its correct position, the lock-knife *i*, being operated by a cam *j*, (and lock-knife finger *j'*) on the shaft *k*, of the bottom cylinder gear *k'*.

Whenever the vibrator gear *l*, is raised into contact with the top cylinder gear *h*, the vibrator gear *l*, is turned through half a revolution, carrying the vibrator connector *m*, from the left to the right and locking it as it comes into the line of centres; in addition to this there is a lock-lever *n*, and spring *o*, which holds the connector *m* in place.

The motion of the vibrator connector *m*, in connection with the angle lever *p*, raises the boxes. The front lever *t*, using the end of the compound lever *r* as a fulcrum raises two shuttle boxes *s*. The back lever *q*, using the centre of the compound lever *r*, as a fulcrum raises one shuttle box *s*.

In the case of the 6 x 1 box loom there are two levers which raise two boxes each, and one that raises one box.

The adjustment of the box is effected by means of an adjustable tip *u*, which connects the vibrator connector *m*, to the angle lever *p*. (*Crompton and Knowles Loom Works.*)

*See also article on "Mechanism for Operating Shedding and Drop-box Pattern Indicators for Knowles Looms" in previous chapter.

MULTIPLIER MECHANISM FOR KNOWLES LOOMS.

This invention relates to that class of looms which are provided with an auxiliary or multiplier pattern-chain in addition to the main-pattern-chain. By means of the auxiliary or multiplier pattern-chain, certain bars of the main pattern-chain of the drop-box-indicating mechanism may be repeated without constructing successive similar bars in said main pattern-chain.

The object of the present invention is to provide a supplemental mechanism, to be combined with the main-pattern-chain and auxiliary or multiplier pattern-chain mechanism, which will operate automatically to stop, for a pre-determined time, the mechanism which operates said pattern-chains and to start said mechanism to cause the pattern-chains to operate.

The new mechanism may be combined with any loom of the class referred to, and is designed particularly for looms for weaving handkerchiefs, cotton blankets, etc., in which a solid color is put into the body of the goods for a certain number of picks.

In using the improvements on looms of the class referred to, the inventor of the new device, Mr. Wm. Wattie, combines the same with the cloth-take-up friction-roll, so that after a certain amount of cloth is taken up, the mechanism will operate automatically to start the mechanism which drives the pattern-

chains. The new mechanism is also combined with indicating mechanism on the main pattern-chain cylinder, so that said indicating mechanism will automatically operate the new mechanism to stop the mechanism which drives the pattern-chains when desired.

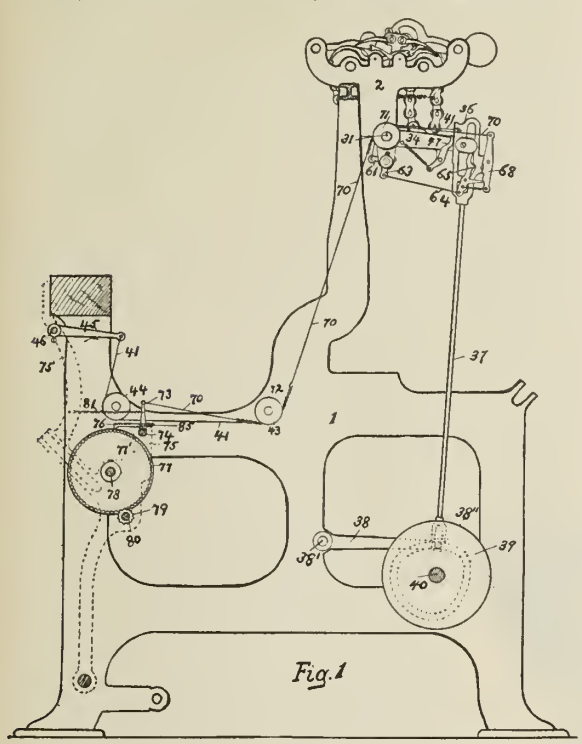


Fig. 1

In the accompanying drawings a multiplier mechanism for a 6x1 box-loom is shown.

Fig. 1, shows a loom side from the inside, the rear view of the box-pattern indicating mechanism, and the supplemental mechanism combined therewith. Fig. 2, is a rear view of the box-pattern indicating mechanism and a portion of the improvements, looking in the direction of arrow *a*, Fig. 4. Fig. 3, is a front view looking in the direction of arrow *b*, Fig. 4. Fig. 4, is a plan view looking in the direction of arrow *c*, Fig. 2. Fig. 5, is a section on line 5-5, Fig. 4, looking in the direction of arrow *a*, same figure. Fig. 6, is a detail of the indicating-disk on the friction take-up roll-shaft and the engaging finger or lever, looking in the direction of arrow *d*, Fig. 7. Fig. 7, is a plan view of the parts shown in Fig. 6, looking in the direction of arrow *e*, same figure; and Fig. 8, is a perspective view of one of the adjustable indicating cams or switches on the indicating-disk. Figs. 2 to 8, inclusive, are shown on an enlarged scale compared to Fig. 1.

In the drawings, 1, indicates the loom side, on the upper part of which is secured the stand or frame 2, on which are supported the several parts of the drop-box pattern-indicating mechanism. The drop-box pattern-indicating mechanism is in this instance, as before stated, arranged for a 6x1 box-loom. In the pattern-indicating mechanism, 3 is the main-pattern-chain cylinder, loosely mounted on a stud 4, secured in the frame 2. Cylinder 3, has grooved or notched heads or ends 3′, and carries the main pattern-chain 5, made up of links 6, which connect the bars 7, upon which are mounted rolls 9, and tubes 8. The cylinder 3, is provided with a hand-wheel 10, by means of which said cylinder is turned in either direction, as desired.

The auxiliary or multiplier pattern-chain cylinder 11, is loosely mounted on a stud 12, secured in the frame 2, and carries the auxiliary or multiplier pattern-chain 13, made up of links 6, bars 7, rolls 9, and tubes 8, similar to the main pattern-chain 5. The auxiliary pattern-cylinder 11, is provided with a hand-wheel 14, to turn the same as desired.

On a stud 15, secured in the upper part of the frame 2, on the outside of the stud 4, are pivoted, in this instance, three shuttle-box indicator-levers 16, 17, and 18, which are operated by the main pattern-chain 5. The outer ends 16′, 17′ and 18′ of said levers are enlarged as shown, to act as weights, and the inner end of each of said levers is pivoted to the upper end of the connector-rods 19 (see Fig. 3,) leading to the vibrator levers of the box-motion, (not shown) of any ordinary construction and operation, and which is arranged at the lower part of the loom. Upon said stud 15, is also pivoted one end of the weighted indicator-lever 20 and one end of the the lock-lever 21, which is provided with a convex portion 21′, adapted to extend into the concave portions 22′, in the stop-wheel 22, fast on the pattern-chain cylinder 3. (See Fig. 5.)

On the stud 4, and next to the frame 2, is loosely mounted a ratchet-wheel 23, which is secured to the main pattern-chain cylinder 3, and through said ratchet-wheel said main pattern-chain cylinder is operated.

On a stud 24, fast in the opposite end of the frame 2, from the stud 15, is pivoted one end of a weighted indicator-lever 25, which is acted on by the auxiliary or multiplier pattern-chain 13. On the stud 24, is also pivoted one end of the lock-lever 26, provided with a convex portion 26′, adapted to extend into concave portions 27′, in the stop-wheel 27, secured to the auxiliary pattern-chain cylinder 11. The lower end of the lock-lever 26, is secured to the lower end of

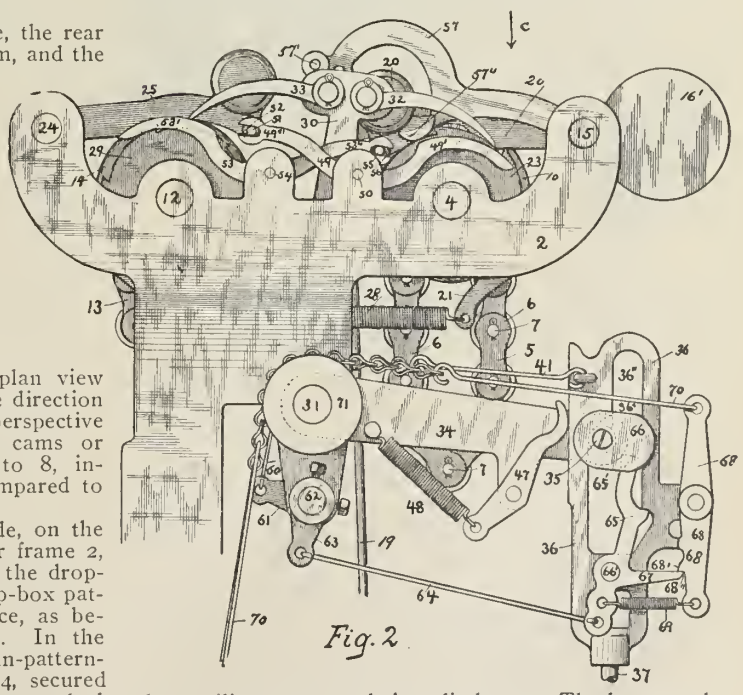


Fig. 2

the lock-lever 21, by a spring 28, (see Fig. 5,) which acts to move said levers toward each other and hold them in engagement with their respective stop-wheels 22 and 27.

A ratchet-wheel 29, is mounted loosely on the stud 12, and is secured to the auxiliary pattern-chain cylinder 11, and through said ratchet-wheel 29, said auxiliary pattern-chain cylinder is operated.

The mechanism for operating the ratchet-wheel 23, to communicate motion to the main pattern-chain 5. and for operating the ratchet-wheel 29, to communicate motion to the auxililiary pattern-chain 13, consists of a lever 30, fast on a rock-shaft 31, journaled in the lower part of the frame 2. This lever 30, carries at its upper end two oppositely-extending pawls 32 and 33, pivoted thereon. The pawl 32, is adapted to engage the teeth of the ratchet-wheel 23, of the main-pattern-chain cylinder 3, and the pawl 33, is adapted to engage the teeth of the ratchet-wheel 29, of the auxiliary pattern-chain cylinder 11.

On the other end of the rock-shaft 31, is fast the inner end of an arm 34. Motion is communicated to

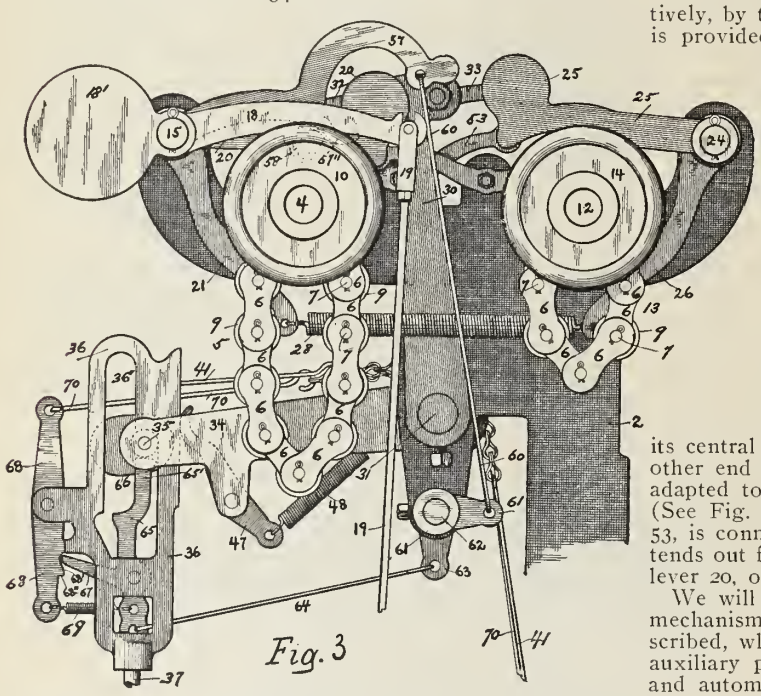


Fig. 3

said arm 34, and through rock-shaft 31, to the arm or lever 30, carrying the pawls 32 and 33.

A give-way or lock connection intermediate the arm 34, and the driven part of the loom, from which said arm is operated is provided, and means to automatically operate said give-way connection to disconnect the arm 34, and immediately stop the movement of the pattern-surfaces in case the filling gives out, and the filling-stop-motion shaft acts to stop the loom. In this instance, the outer end of the arm 34, is provided with a pin or screw 35, which is adapted to engage a notch 36′, in the slotted head 36, on the connector-rod 37 (See Fig. 2). The lower end of said rod 37, is connected with a lever 38, pivoted at 38′, and carrying a pin 38″, which extends into a groove in a cam 39, fast on a driven shaft 40 (See Fig. 1). A continuous up-and-down motion is communicated to said rod 37, and through the arm 34, to the rock-shaft 31, and the arm 30, carrying the pawl 32 and 33.

From the head 36 of the connector-rod 37, a chain or cord 41 leads over a pulley 42, loose on the rock-shaft 31, and over pulleys 43 and 44, mounted on the loom side (see Fig. 1), to an arm 45, fast on the filling stop-motion shaft 46. The rocking of the stop-motion shaft 46, will, through arm 45, and cord 41, draw the head 36, on the rod 37, toward the front of the loom and cause the pin 35, to be disengaged from the notch 36′, and be moved into the longitudinal slot 36″, in the head 36, to allow said head and the connector-rod 37, to move up and down without moving the arm 34, so that the pattern-indicating mechanisms may be instantly stopped, though the loom may continue to run.

A pawl 47, pivoted on the arm 34, and bearing at one end against the inner edge of the head 36, and attached at its other end to one end of a spring 48, acts to push outwardly the head 36, on the rod 37, and hold the pin 35, in the notch 36′, to form a give-way or lock connection between the connector-rod 37, and the arm 34.

In order to regulate the operation of the ratchet-wheels 23 and 29, of the main pattern-chain cylinder 3, and the auxiliary pattern-chain cylinder 11, respectively, by the pawls 32 and 33, a pawl guard or shield is provided for each pawl to keep the same out of engagement with its ratchet-wheel when desired. The pawl 32, which operates the ratchet-wheel 23, of the main pattern-chain cylinder 3, is provided with a pawl guard or shield 49, pivoted at about its central point on a pin 50, in the frame 2, in such a manner that the end 49′, which acts as a guard for the pawl 32, will extend under said pawl (See Fig. 2). The other end 49″, of said shield 49, is connected by a pin 51, to a boss 52, which extends out from the free end of the weighted indicator-lever 25, of the auxiliary pattern-chain 13. The pawl guard or shield 53, for the pawl 33, which operates the ratchet-wheel 29, of the auxiliary pattern-chain cylinder 11, is pivoted at about its central point on a pin 54, in the frame 2, with its other end 53′, which acts as a shield for the pawl 33, adapted to extend under the outer end of said pawl (See Fig. 2). The inner end 53″, of said pawl-guard 53, is connected by a pin 55, to a boss 56, which extends out from the free end of the weighted indicator-lever 20, of the main pattern-chain 3.

We will now proceed to describe the supplemental mechanism combined with the mechanisms before described, whereby both the main pattern-chain and the auxiliary pattern-chain will be automatically stopped and automatically started when desired.

On the stud 15, is pivotally mounted one end of an indicating-lever 57, which, in this instance, is located between the indicator-lever 20, and the lock-lever 21 (See Fig. 4).

The main pattern-chain cylinder 3, is provided with indicating-surfaces to act on said lever 57. Said indicating-surfaces may form a separate row of tubes and rolls between the heads or ends 3′, of the cylinder 3, or, as in this instance, the indicating surface or roll 58, may be substituted for one of the tubes 8, which extend into the notches or grooves in the ends 3′, of the cylinder or barrel 3 (See Fig. 4). In this way it is not necessary to use a longer barrel or cylinder. The inner end of the indicating-lever 57, is provided with a pin 57′, which extends over the top of the arm 30, which forms a stop to limit the downward motion of said lever (See Fig. 5).

A link or connector 60, attaches the end of said lever 57, to an arm 61, fast on a shaft 62, mounted in the lower part of the frame 2 (See Figs. 2, 3 and 5). A second arm 63, is also fast on said shaft 62, and is

connected by a link or connector 64, to the lower end of a switch-lever 65, pivoted at 66', on the head 36 (See Fig. 2). The upper end 65', of said lever 65, is adapted to extend under the pin or screw 35, in the outer end of the arm 34, as shown in Fig. 3, to cause said arm 34, to move up and down with the head 36, and rod 37, to operate the pattern-surfaces.

A guide plate or shield 66, is secured by the screw 35, to the end of the arm 34, as shown in Fig. 2, and extends over the slotted portion of the head 36, to hold the head in proper position relative to the arm 34. By means of the indicating-surface 58, through the lever 57, link 60, arm 61, shaft 62, arm 63, and connector 64, a positive motion is communicated to the switch-lever 65, to move the upper end 65', thereof out from under the pin 35, in the arm 34, as shown in Fig. 2, to allow the head 36, and rod 37, to move freely up and down without moving the arm 34.

The switch-lever 65, is provided with an outwardly extending arm 67, the outer end of which is adapted to ride over an inclined surface 68', on the lever 68, and extend into a notch 68", in the inner edge of said lever. A spring 69, acts to hold said arm 67, in engagement with said notch 68", in the lever 68, as shown in Fig. 2, and until said arm 67, is disengaged from said notch the switch-lever 65, will remain in the position shown in Fig. 2, in which position, as before stated, the head 36 and rod 37 are free to move up and down without moving the arm 34. Thus both the main pattern-chain and the auxiliary pattern-chain will remain at rest and the drop-boxes remain stationary while one shuttle is weaving in the body of the fabric.

To release the switch-lever 65, and allow the same to be moved back under the pin 35, to cause the arm 34 to be moved by the head 36, and rod 37 to operate the pattern-chains, the upper end of the lever 68, is connected through a connection 70, passing over a pulley 71, loose on the rock-shaft 31, and over a pulley 72, mounted on the loom side, (see Fig. 1) to a lever 73, pivoted at its lower end on a stud 74, in the stand 75, (see Fig. 6) and provided with an arm or lower lever 76, pivoted thereon to move in a horizontal plane. The free end of the arm or lever 76, is adapted to travel on the periphery of a disk 77, which is the indicating-disk, and in this instance is made integral with the gear 77', fast on the shaft 78, of the friction take-up roll.

A pinion 79, fast on a driven shaft 80, meshes with the teeth on the gear 77' (See Fig. 1). A spring 81, is attached at one end to the projection 82, on the stand 75 and at its other end to lever 73, and acts to hold projection 73', on lower part of said lever in engagement with the heel or projection 76', on the arm or lever 76, and the free end of the arm or lever 76, on the periphery of the disk 77 (See Fig. 7). Projections 73' and 76', are connected by a spring 85.

On the indicating-disk 77, are secured, in this instance, by screws 83, indicating devices or switch-cams 84, in this instance two in number.

As the indicating-disk 77 revolves, the arm or lever 76 travels on the periphery thereof until it engages the curved plate 84', of the switch-cam 84, which extends over the periphery of the disk, as shown in Fig. 8. The curved plate 84', causes the arm 76, to leave the periphery of the disk 77, and the spring 81, acts to move the lever 73, on its pivot 74, and cause the free end of the arm 76, to drop into the notch 84", in the switch-cam 84, against the action of the spring 85. The movement of the lever 73, through connection 70, moves the lever 68, inwardly at its upper end and disengages the arm 67, on the switch-lever 65, from the notch 68", in said lever 68, and allows the spring 69, to act to move the upper end 65', of the switch-lever 65, under the pin 35, in the arm 34 (See Fig. 3).

From the thus given description, in connection with the drawings, the operation of the supplemental mechanism, in connection with the operation of the main pattern-chain and the auxiliary pattern-chain mechanisms, will be readily understood.

The pattern-surfaces are made up to produce the desired pattern in the fabric, and the indicators, which operate the supplemental indicating-lever 57, of the mechanism, are arranged according to the length of the body of the fabric to be woven, and the indicating devices or switch-cams 84, on the indicating-disk 77, are adjusted to correspond.

Snpposing the parts to be in the position shown in Fig. 3 and the loom running, as long as a tube 8, on the main pattern-surfaces comes under the indicator-lever 20, said lever will stay down and through the pawl-shield 53, prevent the pawl 33, on the arm 30, from engaging with the ratchet-wheel 29, to turn the auxiliary pattern-chain 13, and a roll 9, on said auxiliary pattern-chain 13, being under the indicator-lever 25, (see Fig. 4) will hold said lever up and keep the end 49', of the pawl-shield 49, down, as shown in Fig.

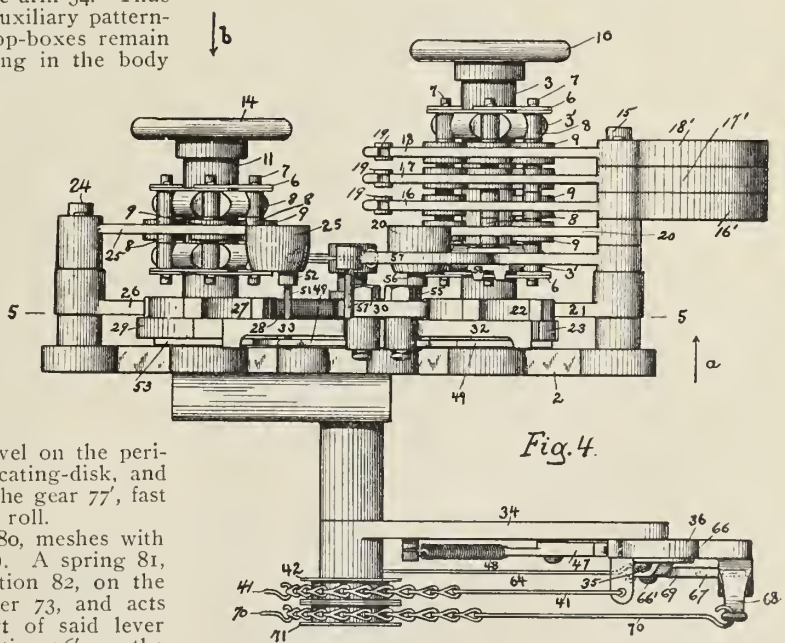


Fig. 4.

2, so that the pawl 32, will engage with the ratchet 23, and turn the main pattern-chain 5. The next turn of the main pattern-chain 5, as shown in the drawings, will bring a roll 9, under the indicator-lever 20, (see Fig. 4) which will raise said lever and at the same time lower the end 53', of the pawl-shield 53, connected with said lever 20, so that on the return movement of the arm 30, the pawl 33, will engage with the ratchet-wheel 29, and move the auxiliary pattern-chain 13, to bring a tube 8, under the indicator-lever 25, (see Fig. 4) which will cause said lever to drop down and at the same time raise the end 49', of the pawl-shield 49, connected with said lever 25, so that on the return movement of the arm 30, the pawl 32, will be held out of engagement with the ratchet-wheel 23, thus leaving the main pattern-chain 5, at rest as long

as the multiplier-chain 13, runs and a tube comes under the indicator-lever 25. As soon as a roll 9, comes under said lever 25, the same is raised and the end 49', of the pawl-shield 49, dropped, and then the main pattern-chain 5, is operated, as before described, and so the operation continues until in the revolution of the main pattern-chain cylinder 3, the indicating surface 58, is brought under the projecting point 57", of the indicator-lever 57. The next revolution of the main pattern-chain cylinder will raise said indicating-lever 57, and, through link 60, arm 61, shaft 62, arm

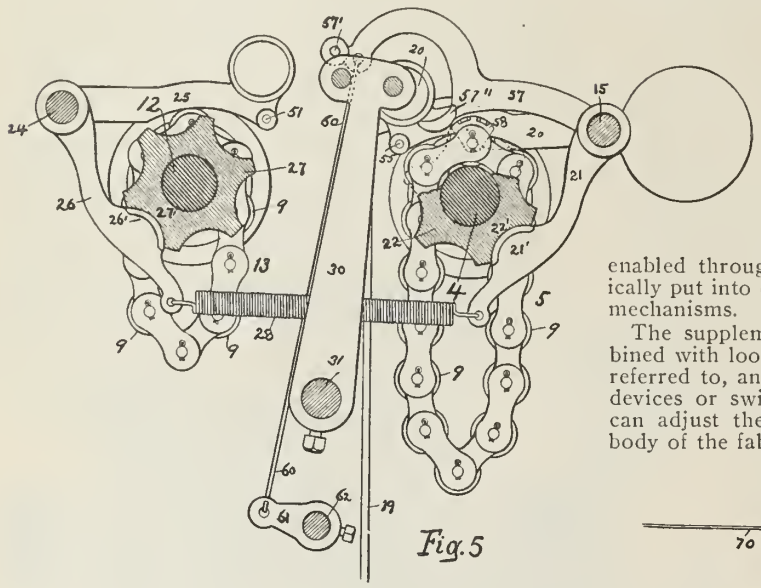


Fig. 5

63, and connector 64, move the switch-lever 65, into the position shown in Fig. 2. The switch-lever 65, will be held in this position by means of the arm 67, engaging the notch 68", in the lever 68, as above described. The head 36 and rod 37, are now free to move up and down without moving the arm 34, which operates the pawl-carrying arm 30. The body of the fabric is now woven, the main pattern-chain and the auxiliary pattern-chain remaining at rest.

The projecting end 57", of the indicating-lever 57, is so made relative to the indicating-surface 58, that it will engage said surface to operate the lever 57, in advance of the indicating-surfaces which act on the other levers over the main pattern-chain, and before the surface 58, reaches the top of the cylinder or barrel 3, (as shown in Fig. 5) the pawl-carrying arm 30, will continue to operate by the downward movement of the head 36, and arm 37, to move the cylinder 3, of the main patern surface sufficiently to carry the indicating-surface 58, beyond the projecting end 57", of the indicating-lever 57, to allow said lever to drop at the proper time.

When the desired length of the body of the fabric is woven, the revolution of the indicating-disk 77, as the friction take-up roll is revolved, will bring the switch-cam 84, into engagement with the arm 76, and, through spring 81, lever 73, and cord connection 70, the lever 68, will be moved in at its upper end, releasing the switch-lever 65, which is then moved by the spring 69, into the position shown in Fig. 3, with the end 65', extending under the pin 35, in the arm 30. The main pattern-surface and the auxiliary pattern-surface are then again put into operation.

If at any time in the operation of the loom the filling runs out, the give-way or lock connection between the arm 34, and the head 36, on the rod 37, operates through the cord or chain 41, attached to the arm 45, on the filling-stop-motion shaft 46, to move in the head 36, and cause the pin 35, to extend into the upper slotted part 36', of the head 36, and allow said head and rod 37, to move up and down without moving the arm 34. After the filling is replaced the return movement of the filling-stop-motion shaft 46, will slacken the cord 41, and allow the spring-actuated pawl 47, to act to push out the head 36, and bring the pin 35, on the arm 34, into the notch 36', and hold it there to make a connection between said arm 34, and the head 36, on the connector-rod 37.

We are thus enabled, automatically, through a supplemental indicating-surface and mechanism operated thereby to automatically stop the operation of the main pattern-chain and the multiplier pattern-chain, and through an indicating-disk on the take-up-roll shaft or other driven shaft of the loom we are enabled through intervening connections to automatically put into operation the main and auxiliary pattern mechanisms.

The supplemental mechanism may be readily combined with looms of ordinary construction of the class referred to, and by means of the adjustable indicating devices or switch-cams on the indicating-disk 77, we can adjust the same according to the length of the body of the fabric desired to be woven without chang-

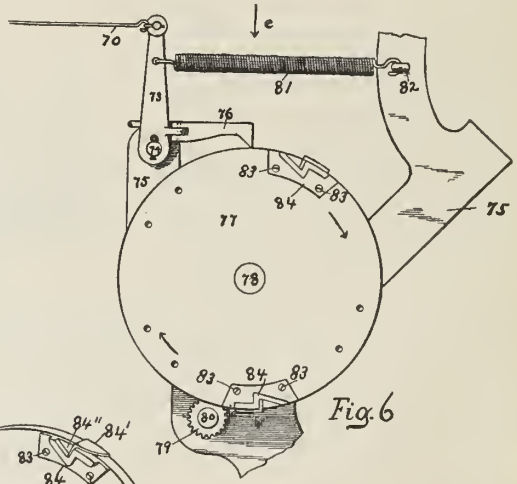


Fig. 6

Fig. 8

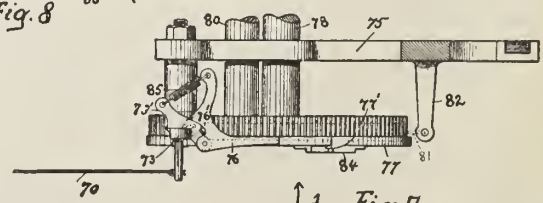


Fig. 7

ing the disk. By changing the gears 77', and 79, we may vary the speed of the indicating-disk 77, to make it revolve faster or slower, as desired. (*Crompton and Knowles Loom Works.*)

THE KNOWLES FOUR CHAIN MULTIPLIER.

The object of this multiplier is to do away with indicator-disk on the previously explained multiplier on the take-up roll and the connections therefrom to the chain mechanisms, and to provide a four pattern-chain mechanism which operates in connection with the main pattern-chain mechanism to start said mechanism instantly when desired, that is, to change on the pick. The fourth pattern-chain is also used in connection with the third pattern-chain as a multiplier chain in the same way as the ordinary multiplier chain is used in connection with the main pattern-chain. For example, if the third pattern-chain is weaving stripes by means of the fourth pattern-chain the stripes can be divided and additional stripes put in without increasing the length of the third chain.

In the accompanying illustrations the improvement is shown applied to a four-by-one drop-box loom combined with main and multiplier pattern-chain mechanisms.

Referring to the drawings, Fig. 1 shows a loom side, on the upper part of which is supported the box-pattern-indicating mechanism embodying the improvements and upon the lower part the box-shifting mechanism. Fig. 2 is a front view of the box-indicating mechanism shown in Fig. 1, looking in the direction of arrow *a*, Fig. 4. Fig. 3 is a rear view of the box-pattern-indicating mechanism, looking in the direction of arrow *b*, Fig. 4. Fig. 4 is a plan view looking in the direction of arrow *c*, Fig. 2. Fig. 5 is a vertical cross-section on line 5-5, Fig. 4, looking in the direction of arrow *a*, same figure. The parts shown at the left in Fig. 4 and some of the other parts are not shown in this figure. Fig. 6 is a vertical cross-section on line 6-6, Fig. 4, looking in the direction of arrow *a*, same figure; and Fig. 7 is a vertical section on line 7-7, Fig. 4, looking in the direction of arrow *a*, same figure. Figs. 2 to 7, inclusive, are shown on an enlarged scale compared to illustration Fig. 1.

In the accompanying drawings on the top of the loom side or end is supported the loom-arch stand 1, on the upper part of which is secured the stand or frame 2, on which are supported the several parts of the drop-box pattern-indicating mechanism.

In said pattern-indicating mechanism, 3 is the main pattern-chain cylinder, loosely mounted on a stud 4, secured in the frame 2. Said cylinder or barrel 3, has grooved or notched heads or ends and carries the main pattern-chain 5, made up of links 6, which connect the bars 7, upon which are mounted tubes 8, and rolls 9. The cylinder 3, is provided with a hand-wheel 10, by means of which said cylinder is turned in either direction, as desired.

The auxiliary or multiplier pattern-chain cylinder 11, is loosely mounted on a stud 12, supported in the frame 2 and in the bracket 2', and in this instance upon the opposite side of the stand 2 from the main pattern-chain cylinder (See Fig. 4). The cylinder 11, carries the auxiliary or multiplier pattern-chain 13, made up of links 6, bars 7, tubes 8, and rolls 9, similar to the main pattern-chain 5. The cylinder 11, is provided with a hand-wheel 14, to turn said cylinder in either direction, as desired.

On a stud 15, secured in a boss 16, on one end of the stand 2, are loosely mounted the outer weighted ends of two shuttle-box-indicator levers 17 and 18, which extend over and are operated by the main pattern-chain 5. The inner ends of the levers 17 and 18, are provided with open-end slots to receive the loops or heads 19', on the upper ends of the connector-rods 19, (see Figs. 1 and 2) which lead to the two connectors 48, to which they are adjustably attached by a collar 49 and set-screw 50 (See Fig. 1). The connector-rods 19, by reason of the open-end slots in the ends of the levers 17 and 18, can move up without raising said levers.

The connectors 48, are attached at their lower ends to the vibrator-levers 20, of the box-shifting mechanism shown in Fig. 1 and which consists of the upper and lower cylinder-gears 21 and 22, vibrator-gear 23, carried on the vibrator-lever 20, pivoted at its outer end at 24, and the vibrator-connector 25, pivoted at one end on the vibrator-gear 23 and at its other end to the compound lever 26, which operates the shuttle-box-lifter.

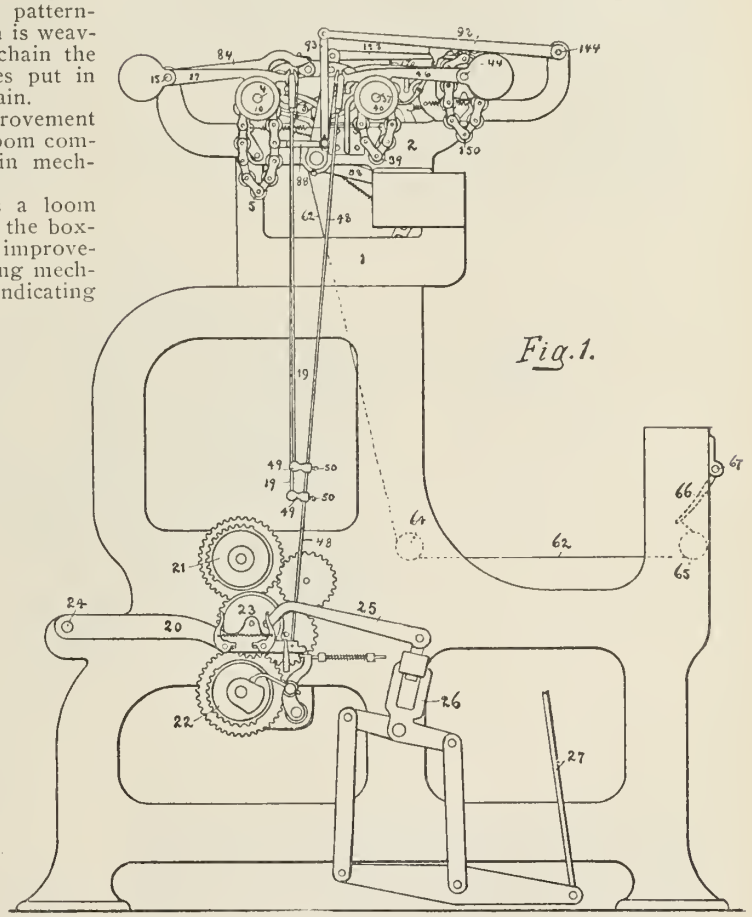


Fig. 1.

A ratchet-wheel 28, is mounted on the stud 4, and is secured to the main pattern-chain cylinder 3 (See Fig. 4). A stop-wheel 29, is also mounted on the stud 4, and secured to the ratchet-wheel 28, to turn with said ratchet-wheel. Said stop-wheel is provided with concave portions 29', in its periphery, into which is adapted to extend the convex portion 30', on the lock-lever 30, pivoted at 31, on the frame 2 (see Fig. 6), and connected by a spring 32, and link 32', to a similar lock-lever.

On the stud 12, of the multiplier pattern-chain cylinder 11, is mounted a ratchet 33, (see Figs. 4 and 7) which is secured to the multiplier pattern-chain cyl-

inder 11. A stop-wheel 34, (see Fig. 4) is also mounted on said stud 12 and secured to the ratchet-wheel to turn with said ratchet-wheel, and is provided with concave portions 34′, in its periphery, into which extends a convex portion 35′, on the lock-lever 35, pivoted at 35″, on the frame 2 (See Figs. 3 and 7). A spring 36, encircling a pin 36′, sliding at one end in an eye 36″, and secured at its other end to the lock-lever 35, (see Fig. 3) acts to hold said lever 35, in engagement with the stop-wheel 34.

We will now describe the third pattern-chain mechanism, combined with the main pattern-chain and the multiplier pattern-chain mechanisms above described and the shuttle-drop-box shifting mechanism and in this instance located at the front of the stand or frame 2, and in front of and in line with the multiplier pattern-chain 13.

On a stud 37, supported in the frame 2 and the bracket 2″, is loosely mounted a pattern-chain cylinder 38, carrying the supplemental pattern-chain 39, made up of links 6, bars 7, tubes 8, and rolls 9. The pattern-

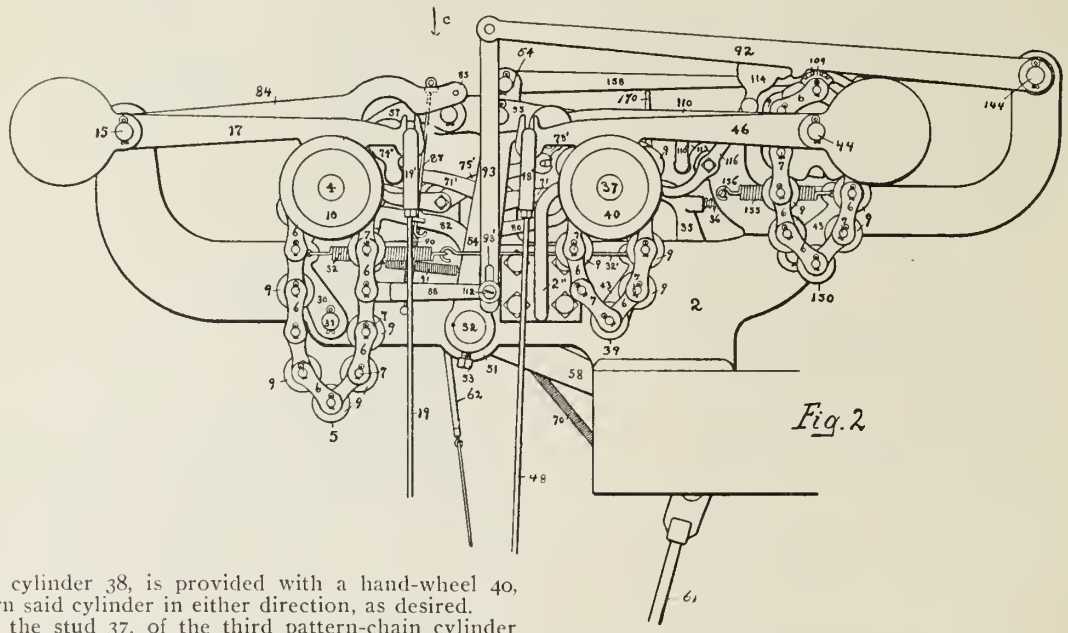


Fig. 2

chain cylinder 38, is provided with a hand-wheel 40, to turn said cylinder in either direction, as desired.

On the stud 37, of the third pattern-chain cylinder 38, is mounted a ratchet-wheel 41, which is secured to said third pattern-chain cylinder 38. A stop-wheel 42, is also mounted on said stud 37, and is secured to the ratchet-wheel 41, to turn with said ratchet-wheel, and is provided with concave portions 42′, in its periphery, in which is adapted to extend a convex portion 43′, on the lock-lever 43, pivoted at 43″, on the frame 2, (see Fig. 6) and connected by a link 32′, and a spring 32, to the lock-lever 30. The spring 32, acts to draw the lock-levers 30 and 43, toward each other, to hold them in engagement with the stop-wheels 29 and 42, as shown in Fig. 6.

On a stud 44, secured in a boss 45, on the frame 2, are loosely mounted the outer weighted ends of two shuttle-box-indicator levers 46 and 47, which extend over and are operated by the third pattern-chain 39. The inner ends of the levers 46 and 47, are in this instance provided with open end slots to receive the loops or heads 48′, on the upper end of the connector-rods 48, and allow said rods 48, to move up without raising said levers. The lower ends of said rods 48, are attached to the vibrator-levers 20, of the box-shifting mechanism above described (See Fig. 1).

It will be seen that the movement of the indicator-levers 17, and 18, on the main pattern-chain 5, through the connector-rods 19, attached to the connector-rods 48, will communicate motion to the vibrator-levers 20, of the box-shifting mechanism, and the indicator-levers 46 and 47, on the third pattern-chain 39, through connector-rods 48, attached to the vibrator-levers 20, will also communicate motion to said vibrator-levers 20, to operate the box-shifting mechanism.

We will now describe the fourth pattern-chain mechanism. On the stud 44, is loosely mounted a pattern-chain cylinder 149, carrying the fourth pattern-chain 150, made up of the links 6, bars 7, tubes 8, and rolls 9. On the stud 44, of the pattern-chain cylinder 149, is mounted a ratchet-wheel 151, which is secured to the pattern-chain cylinder 149. A stop-wheel 152, is also mounted on said stud 44, and is secured to the ratchet-wheel 151, to turn with said ratchet-wheel, and is provided with concave portions 152′, in its periphery, into which is adapted to extend a convex portion 153′, on the lock-lever 153, pivoted at 154, on the frame 2 (See Fig. 6). A spring 155, is connected at one end to said lock-lever 153, and at its other end to a pin 156, on the frame 2, and acts to hold the lock-lever in engagement with the stop-wheel 152, as shown in Fig. 6.

We will now describe the mechanism for operating the main pattern-chain 5, multiplier pattern-chain 13, and third pattern-chain 39, and fourth pattern-chain 150.

In the lower central part of the frame 2, in a boss 51, is mounted a shaft 52, (see Figs. 4 and 6) adapted to have a rocking motion. On the front end of the shaft 52, is secured by a set-screw 53, the lower end of the rocking pawl-carrying arm 54. Upon the upper end of said pawl-carrying arm 54, are pivoted four pawls 55, 56, 57, and 158. The pawl 55, acts as a pull-pawl and is provided with a hook 55′, at its free end, which extends over and engages the teeth on the ratchet-wheel 41, to move said ratchet-wheel, and with it the pattern-chain cylinder 38, and the third pattern-chain 39. The pawl 56, is pivoted on the opposite side

of the pawl-carrying arm 54, from the pawl 55, and acts as a push-pawl, and its free end engages the teeth on the ratchet-wheel 33, to move said ratchet-wheel and with it the pattern-chain cylinder 11, and multiplier pattern-chain 13.

The pawl 57, is pivoted on the front of the pawl-carrying arm 54, and extends in an opposite direction to the pawls 55, and 56. Said pawl 57, acts as a push-pawl, and the free end thereof engages with the ratchet-teeth on the rachet-wheel 28, to move said ratchet-wheel and the pattern-chain cylinder 3, and main pattern-chain 5. The pawl 158, is pivoted on the upper end of the pawl-carrying arm 54, and extends over the pawl 56, (see Figs. 4 and 6) and acts as a push-pawl, and engages the teeth on the ratchet-wheel 151, to move said ratchet-wheel and with it the pattern-chain cylinder 149, and the fourth pattern-chain 150. Upon the opposite end of the shaft 52, from the pawl-carrying arm 54, is secured the inner end of the arm 58, (see Fig. 3) which is connected through a give-way or lock connection with the driven part of the loom. Said lock connection and mechanism connected with the stop-motion shaft to automatically operate said lock connection and disconnect the arm 65, to stop the movement of said arm and the pawl-carrying arm 54, is of such construction that the movement of the four pattern-chains will cease in case the filling gives out and the filling stop-motion shaft acts to stop the loom.

The outer end of the arm 58, is provided with a screw or pin 59, which is adapted to engage a notch 60″, leading out from a vertical slot 60′, in the head 60, on the upper end of the connector-rod 61. The lower end of said connector-rod 61, is connected with a cam on the bottom shaft or with some other driven part of the loom, (not shown) from which a continuous up-and-down motion is communicated to said rod 61, and, through the arm 58, to the rock-shaft 52 and the pawl-carrying arm 54.

From the head 60, of the connector-rod 61, a connection 62, leads over a pulley 63, loose on the shaft 52, (see Fig. 3) and over two pulleys 64, and 65, mounted on the loom side, (see broken lines, Fig. 1) to an arm 66, fast on the stop-motion shaft 67, so that when the loom is stopped by the stop-motion shaft in the ordinary way, in case the filling gives out, the connection 62, will be pulled to draw the head 60, of the connector-rod 61, to the right in Fig. 3, and move the screw or pin 59, out of the notch 60″, into the slot 60′, to allow the head 60, and connector-rod 61, to move up and down without moving the arm 58, so that the pattern-indicating mechanism will be instantly stopped, though the loom may continue to run.

A pawl 68, pivoted at 69, on the arm 58, and bearing at one end against the inner edge of the head 60, and attached at its other end to one end of a spring 70, which is secured at its other end to the arm 58, acts to hold the screw 59, in the notch 60″, in the head 60, to form a lock connection between the connector-rod 61, and the arm 58.

We will now describe the mechanism for controlling the engagement of the pawls 55, 56, 57, and 158, with their respective ratchet-wheels, so that only one pattern-chain will be operated at a time—that is, the main pattern-chain, the multiplier pattern-chain, the third pattern-chain, and the fourth pattern-chain will be operated at the proper time.

The stopping and starting of the pattern-chains at the proper time is controlled by indicator-levers extending over and operated by the pattern-chains and connecting mechanisms.

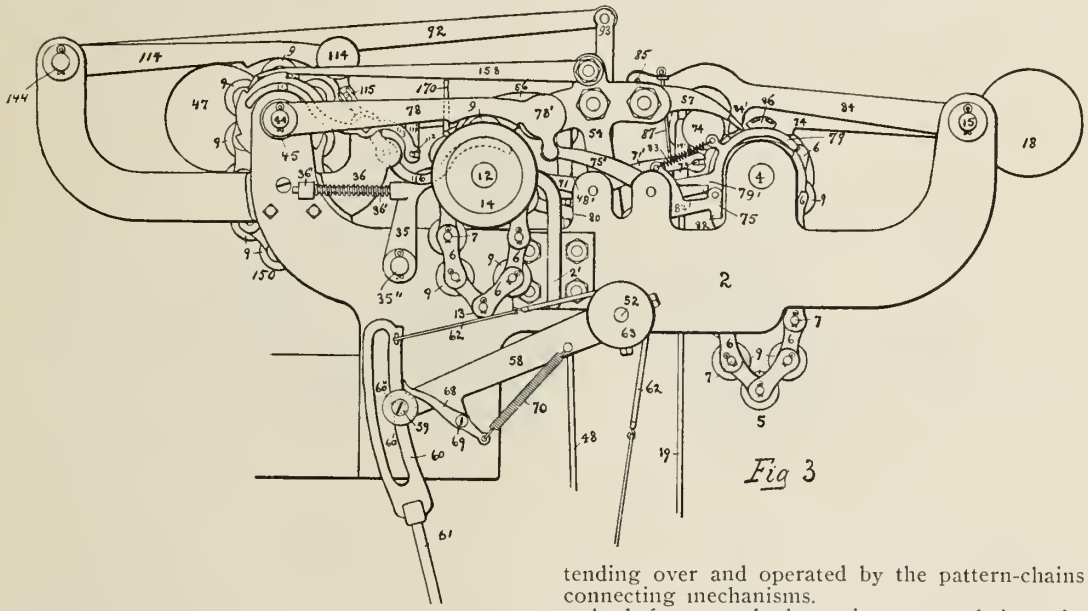


Fig 3

As before stated, the main pattern-chain 5, is used to weave in the headings or borders and the multiplier pattern-chain 13, is used in connection with the main pattern-chain 5, to repeat certain bars of the main pattern-chain, the main pattern-chain being at rest while the multiplier pattern-chain is working and the multiplier pattern-chain being at rest while the main pattern-chain is working.

The third pattern-chain 39, is used for weaving the striped body of the fabric between the headings, and the fourth pattern-chain 150, is used in connection with the third pattern-chain 39, to repeat certain bars of said third pattern-chain, said third pattern-chain being at rest while the fourth pattern-chain is working and the fourth pattern-chain being at rest while the third pattern-chain is working. It will be understood that of the four pattern-chains only one is working at the same time.

In order to control the movement of the ratchet-wheel 33, of the multiplier pattern-chain mechanism, a shield or guard 71, is provided, which extends under the pawl 56, (see Fig. 4) to raise said pawl and prevent its engagement with said ratchet-wheel 33. The shield or guard 71, is pivoted at 72, on the stand 2,

(see Fig. 7) and has an extension or arm 71', on the opposite side of its pivot-support, the end of which is provided with an open-end slot into which extends a pin 73, extending out from the weighted end 74', of the indicator-lever 74, extending over the main pattern-chain 5, loosely mounted at its outer end on the stud 15 (see Fig. 4). It will thus be seen that the row of indicators on the main pattern-chain 5, under the indicator-lever 74, through said lever 74, pin 73, and the arm 71', and shield 71, controls the action of the pawl 56 of the multiplier pattern-chain mechanism.

A shield or guard 75, extends under the pawl 57, which moves the ratchet-wheel 28, of the main pattern-chain mechanism. The shield 75, is pivoted at 76, on the stand 2, (see Fig. 7) and has an arm or extension 75', on the opposite side of its pivot-support, the end of which is provided with an open-end slot into which extends a pin 77, extending out from the weighted end 78', of the indicator-lever 78, extending over the multiplier pattern-chain 13, and loosely mounted at its outer end on the stud 44 (See Figs. 4 and 7).

It will thus be seen that the row of indicators on the multiplier pattern-chain 13, under the indicator-lever 78, through said lever 78, pin 77, and the arm 75' and shield 75, controls the action of the pawl 57, of the main pattern-chain mechanism, in connection with a shield or guard 79, connected with the third pattern-chain mechanism.

We will now describe the construction and operation of the shield or guard which extends under the pawl 55, which operates the ratchet-wheel 41, of the third pattern-chain 39.

The shield or guard 80, is pivoted at 81, on the stand 2 (See Fig. 7). Said shield or guard extends under the projecting end 55', of the operating pawl 55, of the third pattern-chain 39 (See Fig. 4). Upon the opposite side of the pivot 81, of the shield 80, is an extension or arm 82, upon the outer upper end of which is pivoted the lower end of the shield or guard 79, which extends under the pawl 57, of the main pattern-chain mechanism and operates in connection with the shield 75, as above stated.

The shield 79, has a pivotal motion in a vertical plane on the supporting arm 82, and is provided with a rear extension 79', which engages an upward extension 82', on the arm 82. A spring 83, attached to the shield 79, and to the upward extension 82', (see Fig. 3) holds the shield 79, in its raised position with the rear extension 79', engaging with the upward extension 82', on the arm 82.

Extending over the main pattern-chain 5, is an indicator-lever 84, the outer end of which is mounted loosely on the stud 15, and the inner end provided with a pin 85, which extends over the top of the pawl-carrying arm 54, (see Fig. 4) to limit the downward motion of said lever at its free end. The indicator-lever 84, has a downward extension 84' thereon, (see Fig. 3) which is adapted to be engaged by an indicator 86, on the main pattern-chain.

The indicators which act on the indicator-lever 84, form a separate row of tubes and rolls between the heads or ends of the pattern-cylinder, or, as in this instance, the indicators may be substituted for one of the tubes which extend into the notches or grooves in the ends of the cylinder or barrel (See Fig. 4).

A link 87, connects the outer end of the indicator-lever 84, with the arm 82, forming a part of the shield 80 (See Fig. 2).

An angle-lever 88, (see Figs. 6 and 7) is pivoted at 89, on the frame 2, and is provided with a notched portion 88', in the upper end of its vertical arm, into which a downward extension 82", on the arm 82, is adapted to extend. A spring 90, attached to the arm

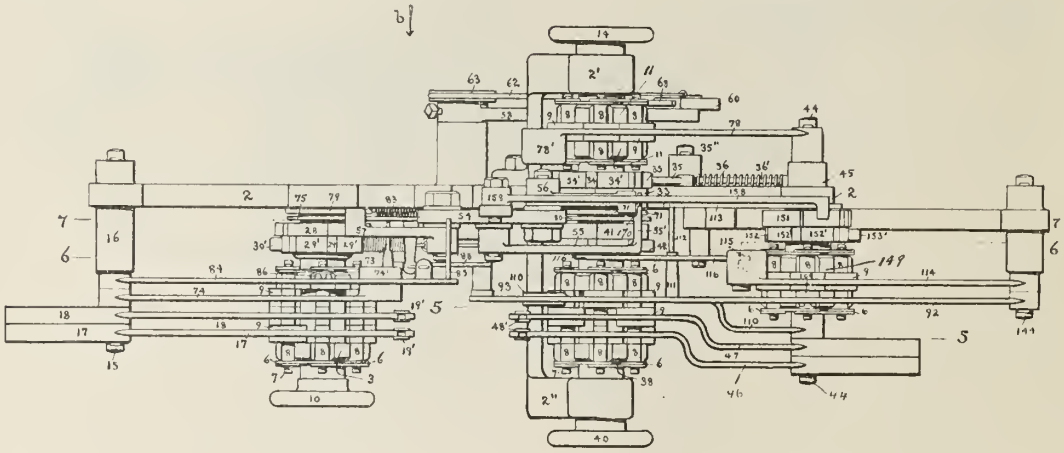


Fig. 4

82 and to the stand 2, and a spring 91, attached to the angle-lever 88 and to the stand 2, act to hold the arm 82, and the angle-lever 88, in engagement, as shown in Figs. 6 and 7.

Upon the stud 144, is loosely mounted the outer end of the indicator-lever 92, (see Figs. 2 and 4) which extends over and is acted on by indicators on the fourth pattern-chain 10. On the inner end of the indicator-lever 92, is hung the upper end of a connector 93, which has a vertical slot 93', in the lower end thereof, through which extends loosely a screw 112, secured in the end of the lower arm of the angle-lever 88 (See Fig. 2).

In the revolution of the fourth pattern-chain 150, when the pattern-indicator 109, comes under the lever 92, said lever will be raised and with it the connector or arm 93, (see Figs. 2 and 6) causing the angle-lever 88, through the engagement of the pin 112, thereon with said arm 93, to move on its pivotal support and be disengaged from the arm 82, of the shield 80, and allow the spring 90, to act to draw down the arm 82 and with it the shield 79, so that the pawl 57, can engage with the ratchet-wheel 28, of the main pattern-chain mechanism and put said mechanism into opera-

tion. At the same time the shield 80, is raised to hold the pawl 55, out of engagement with the ratchet-wheel 41, of the third pattern-chain mechanism to stop said mechanism. As soon as the pattern-indicator 109, passes from under the lever 92, said lever drops down at its free end and with it the connector 93, the slot 93′ in said connector 93, allowing the connector to drop without moving the angle-lever 88.

The revolution of the main pattern-chain 5, brings at the proper time the pattern-indicator 86, on said chain under the indicator-lever 84, and raises said lever 84, and through the link 87, raises the arm 82, and allows the spring 91, to act to draw over the angle-lever 88, and bring the end thereof under the arm 82, and hold it in its raised position, as shown in Fig. 7. The raising of the arm 82, raises the shield 79, under the pawl 57, of the main pattern-chain mechanism and lowers the shield 80, under the pawl 55, of the third pattern-chain mechanism, as shown in Fig. 7.

The shield 79, extending under the pawl 57, of the main pattern-chain mechanism, is pivoted to the arm 82, to have a movement in a vertical plane independent of said arm, so that the arm 82, may be raised while the pawl 57, is in engagement with the teeth of the ratchet-wheel 28, and after the pawl 57 has completed its stroke, the spring 83 will then act to carry the pawl from engagement with the ratchet-wheel by causing the shield 79, to lift the said pawl.

We will now describe the connections intermediate the third and fourth pattern mechanisms, by means of which they co-act, and the starting of one stops the other, and *vice versa*.

On the stud 44, is loosely mounted the end of an indicator-lever 110 (see Fig. 4) the inner end of which extends over the third pattern-chain 39 (See Fig. 5). Extending down from the indicating-lever 110, is an extension 110′, which has at its lower end a boss 111, extending out at right angles therefrom (See Fig. 4). In said boss is secured a pin 112, which extends into the open-end slot in one end of the shield or guard 113, centrally pivoted on the frame 2 (See Figs. 3 and 6). The opposite end of the shield or guard 113, extends under the pawl 158, which engages the ratchet-wheel 151, to operate the fourth pattern-chain 150.

It will be seen that in the revolution of the third pattern-chain 39, when a roll 9, comes under the indicator-lever 110, said lever will be raised and move the shield 113, on its pivotal support and cause one end of said shield to be raised and the other end under the pawl 158, to be lowered to allow said pawl 158, to drop down and engage the ratchet-wheel 151, to put in operation the fourth pattern-chain 150, as shown in Fig. 3.

On the stud 144, is loosely mounted the outer end of an indicator lever 114, (see Fig. 4) the inner end of which extends over the fourth pattern-chain 150. Extending out from the inner end of the indicator-lever 114, is a pin 115, which extends into the open-end slot in one end of the shield or guard 116, centrally pivoted on the frame 2 (See Fig. 6). The opposite end of the shield or guard 116, extends under the pawl 55, which engages the ratchet-wheel 41, to operate the third pattern-chain 39.

It will be seen that in the revolution of the fourth pattern-chain 150, when a roll comes under the indicator-lever 114, said lever will be raised and move the shield 116, on its pivotal support and cause one end of the shield to be raised and the other end under the pawl 55, to be lowered to allow said pawl 55, to drop down and engage the ratchet-wheel 41, to put into operation the third pattern-chain 39.

The third and fourth pattern-chains coöperate to weave the fabric according to the pattern, the fourth pattern-chain acting as a multiplier for the third pattern-chain in the same manner that the first and second pattern-chains coöperate to weave the fabric, the second pattern-chain acting as a multiplier for the first pattern-chain.

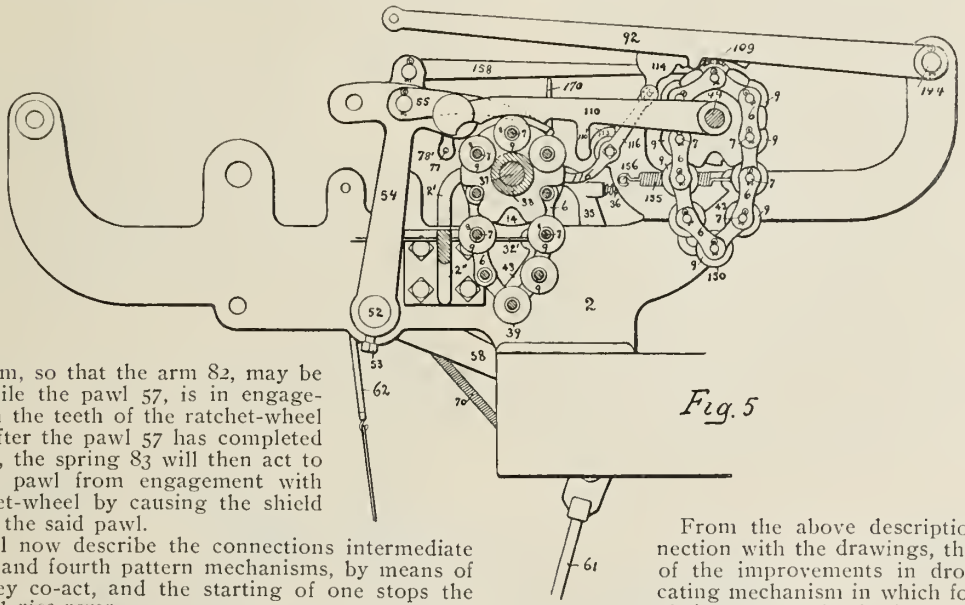


Fig. 5

From the above description, in connection with the drawings, the operation of the improvements in drop-box-indicating mechanism in which four pattern-chains are used will be readily understood.

Suppose the loom is running, with the third pattern-chain 39, in operation, to weave the striped body of a blanket between the headings or borders, in case a blanket is being woven, the other three pattern-chains will be at rest.

When a roll 9, on the third pattern-chain 39, comes under the indicator-lever 110, (see Fig. 4) said indicator-lever will be raised, and through pin 112, engaging the inner end of the shield 113, (see Fig. 6) the outer end of said shield will be dropped to allow the pawl 158, to engage and operate the ratchet-wheel 151, of the fourth pattern-chain 150. The revolution of the fourth pattern-chain 150, will bring a tube 8, on said pattern-chain under the indicator-lever 114, and will cause said lever 114, to drop, and through the pin 115, engaging the outer end of the shield 116, will raise the inner end of said shield 116, (see Fig. 6) and raise the pawl 55, out of engagement with the ratchet-wheel 41, of the third pattern-chain mechanism, so that the third pattern-chain 39, will stop. The fourth pattern-chain 150, will continue to run and repeat the bars of the third pattern-chain 39, until a roll 9, comes under the indicator-lever 114.

The lever will then be raised, and through pin, 115, the outer end of the shield 116, will be raised and the inner end will be dropped, allowing the pawl 55, to engage the ratchet-wheel 41, and operate the third pattern-chain 39 (See Fig. 6). The revolution of the third pattern-chain 39, will bring a tube 8, under the indicator-lever 110, and, through pin 112, engaging the inner end of the shield 113, will raise the outer end of said shield and raise the pawl 158, out of engagement with the ratchet-wheel 151, of the fourth pattern-chain mechanism, and the fourth pattern-chain 150, will stop.

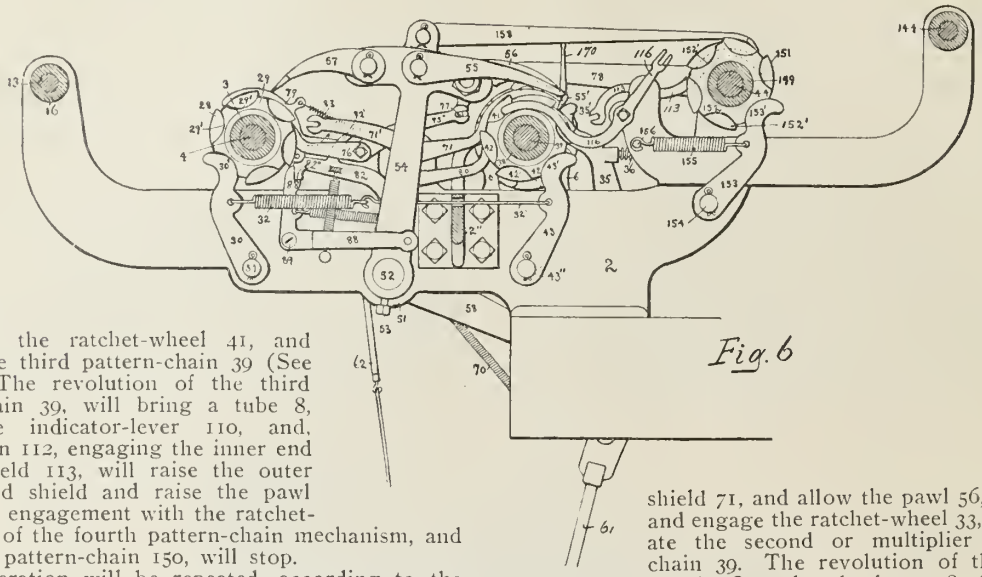


Fig. 6

This operation will be repeated, according to the arrangement of the third and fourth pattern-chains, the fourth pattern-chain acting as a multiplier for the third pattern-chain and the two chains weaving the striped body of the fabric between the headings or borders. In the revolution of the fourth chain 150, when the indicator 109, thereon engages the indicator-lever 92, as shown in Fig. 5, then said lever 92, will be raised and, through connector 93, (see Fig. 2) will rock the angle-lever 88 and disconnect the upright arm thereof from the extension 82", on the arm 82, (see Fig. 7) and allow the outer end of said arm 82 to drop down, actuated by the spring 90, and with it the shield 79, so that the pawl 57 can engage the ratchet-wheel 28 and operate the main pattern-chain 5. The lowering of the shield 79, and arm 82, raises the shield 80, which raises the pawl 55 from engagement with the teeth of the ratchet-wheel 41, of the third pattern-chain mechanism and stops the third pattern-chain 38, and a post or stud 170, fast at its lower end on the outer end of the extension 55' of the pawl 55 and extending under and engaging with its upper end the pawl 158, acts to hold the pawl 158, out of engagement with the ratchet-wheel 151, of the fourth pattern-chain mechanism, so that the movement of the pawl-carrying arm 54, to the right, Fig. 6, will not operate the fourth pattern-chain 150.

The main pattern-chain 5, will continue to operate until a roll 9, comes under the lever 84, which will raise said lever and, through pin 73, thereon engaging the arm 71', of the shield 71, (see Fig. 7) lower said shield 71, and allow the pawl 56, to drop and engage the ratchet-wheel 33, to operate the second or multiplier pattern-chain 39. The revolution of the chain 39, will bring a tube 8, under the lever 78, (see Fig. 7) and, through the pin 77, on said lever engaging the arm 75', of the shield 75, will raise said shield 75, and disengage the pawl 57, from the ratchet-wheel 28, so that the main pattern-chain 5, will stop. When in the revolution of the second pattern-chain 39, a roll 9, comes under the lever 78, (see Fig. 7) the shield 75, is lowered, allowing the pawl 57, to operate the main pattern-chain 5, and this operation is repeated as desired, the second pattern-chain 39, acting as a multiplier for the main pattern-chain 5, in weaving the headings or borders of the goods.

When in the revolution of the main pattern-chain 5, the indicator 86 thereon comes under the lever 84, it will raise said lever and through link 87, will raise the arm 82, of the shield 79, to allow the spring 91, to act and draw the vertical arm of the angle-lever 88 under the arm 82. The raising of the arm 82, will raise the shield 79, to disengage the pawl 57, from the ratchet-wheel 28, and stop the main pattern-chain 5, and, at the same time lower the shield 80, to allow the

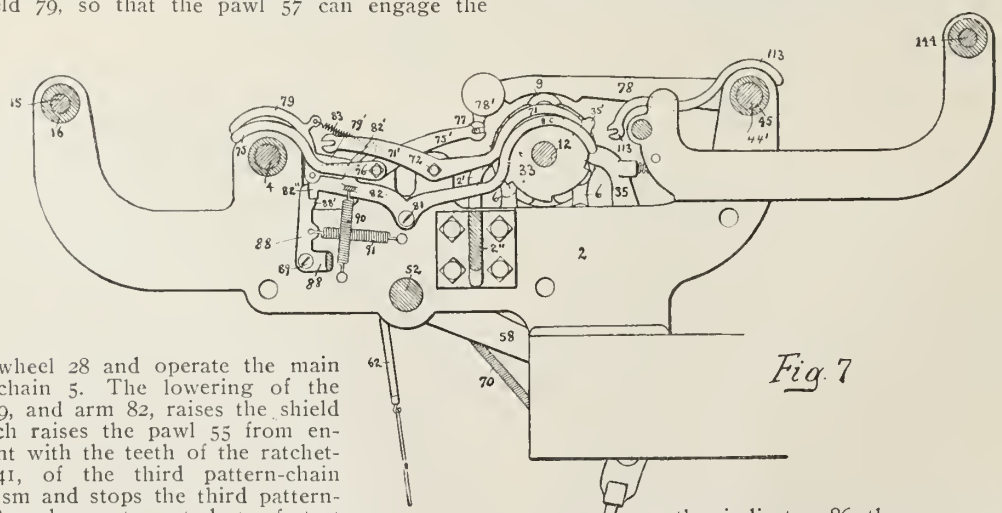
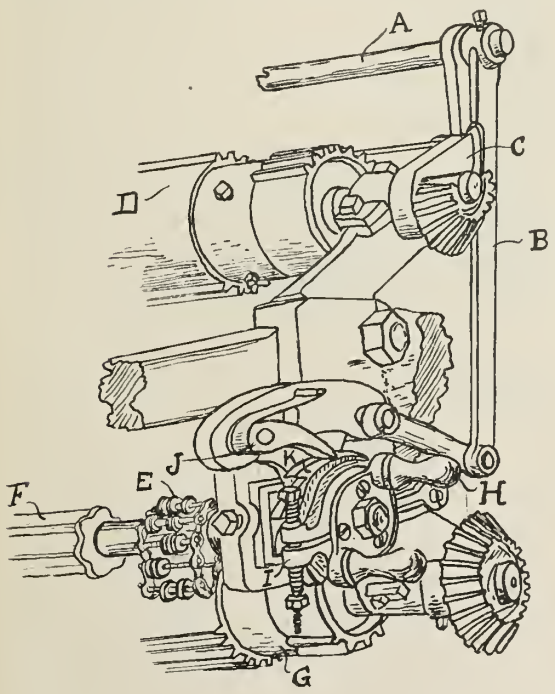


Fig. 7

pawl 55, to engage the ratchet-wheel 41, and operate the third pattern-chain 39. The lowering of the shield 80, and the pawl 55, will, through pin 170, lower the pawl 158, so that it will engage the ratchet-wheel 151, and move the fourth pattern-chain 150, once on the movement of the pawl-carrying arm 54 to the right, Fig. 6. The movement of the pawl-carrying arm 54 to the left, Fig. 6, will move the third pattern-chain 39, and bring a tube under the indicator-lever 110, to raise the shield 113, and thus hold the pawl 158, out of engagement with the ratchet-wheel 151 and prevent the turning of the fourth pattern-chain 150, on the return movement of the pawl-carrying arm 54, Fig. 6, to the right. The third pattern-chain 39 and the fourth pattern-chain 150 will then operate, as before described, to weave the striped body of the goods. It will be seen that the four pattern-chains all coöperate, and the stopping of one starts another, etc. It will also be seen that when the indicator 109, on the fourth pattern-chain 150, in the revolution of said chain comes under the lever 92, the shield 79, through connector 93 and angle-lever 88, is instantly dropped to allow the pawl 57, of the main pattern-chain mechanism to put into operation the main pattern-chain 5, and this change is made instantly or on the pick without any possibility of an extra pick or two being put into the fabric before the main pattern-chain 5, starts. (*Crompton and Knowles Loom Works.*)

THE KNOWLES SHAWL LOOM BOX PATTERN MECHANISM.

This mechanism is to be used on looms for weaving shawls and so forth where the goods have a plain body



and a striped border; the mechanism being operated by the weaver while the loom is running.

The mechanism will be best understood by referring to the following letters:—A, is the hand-shaft for calling box chain movement; attached to A, is a rod which extends across the entire width of the loom; B, is the cam-lever which rides on the cam C; D, is the top cylinder; E, is the box pattern-chain and cylinder which is loose on the end of the harness cylinder shaft; F, is the harness cylinder; G, is bottom cylinder; H, is a handle by which the box pattern-chain can be turned independently of the rest of the mechanism; I, is a friction upon the box chain shaft; J, is the pawl which turns the ratchet K, and the box chain; the ratchet K, being fixed to the pattern-chain.

In order to operate the mechanism the weaver pulls the rod (not shown) attached to the end of the rod A. This turns the rod A, and brings the lever B, against the cam C, and as the cam revolves it turns the ratchet K, one tooth and consequently the box pattern-chain one bar.

Once pulling the handle attached to A, only turns the box pattern-chain once so that the weaver must pull the handle each time a change is required. (*Crompton and Knowles Loom Works.*)

HUTCHIN'S FANCY COTTON AND SILK DOBBY PATTERN MECHANISM.

In the new mechanism the driving of the dobby pattern-chain, the box pattern-chain and the Knowles sliding pin wheel multiplier is trained together and so arranged that in picking out imperfect work or turning back the pattern-chains for any purpose the patterns can never get out of time with each other.

The stop motion is also connected to the pattern-chain driving so that whenever the filling breaks or runs out the pattern mechanism is automatically stopped on the pick in which the filling failed, making it unnecessary for the operator to turn back the patterns for failure of the filling.

Fig. 1 shows a plan view of the drop box pattern mechanism, and a double index dobby pattern mechanism (of which only a portion of the pattern cylinder and its mechanism is shown), with the improvements applied to said pattern mechanism. Fig. 2 is, on a reduced scale, an end view of the parts shown in Fig. 1, looking in the direction of arrow *a*, same figure, and shows also the loom side, and connections to the arm on the knock-off shaft. Fig. 3 is an edge view of the frame shown in Fig. 2, looking in the direction of arrow *b*, Fig. 2, showing by full lines the connections shown by dotted lines in Fig. 2. The pattern mechanisms are not shown, and, Fig. 4 is a sectional detail, through the gear and slide clutch, shown at the top of Fig. 1.

1, indicates the loom side or frame, at the left of the loom; 2, the dobby frame, supported on the upper end of the frame 1, and having the two upright side frames 3, in which is mounted the shaft 4, of the dobby pattern cylinder 5, for the harness frames, not shown. The pattern cylinder 5, is provided with a series of longitudinal grooves or recesses 6, in which extend the bars of the pattern-chain. Only one pattern-chain bar (7) is shown, and this is provided with two rows of pattern-pins 8 and 9, arranged alternately, for what is termed a double index dobby. The pins 8 and 9, act on the indicator-levers (not shown) of the dobby.

The end of the pattern cylinder shaft 4, extends beyond the inner side frame 3, and has a worm gear 10, loose thereon, which is held to turn with the shaft 4, by a spring-actuated clutch device 11, consisting of a spring-actuated arm or dog 11′, pivoted at one end on a plate 11″, the hub 11‴, of which is fast on the shaft 4.

A coil spring 12, bearing at one end against a collar 12′, fast on the end of the shaft 4, and at its other

end against the arm or dog 11′, acts to keep the said dog 11′, in engagement with the lugs 10′, on the worm gear 10, so that the revolution of the gear 10, will revolve the shaft 4, of the pattern-cylinder 5. The shaft 4, can be turned by hand, if desired, the dog 11′, slipping by the lugs 10′, on the worm gear 10, and the spring 12 contracting, so that the shaft 4 and pattern cylinder 5 may be turned in either direction, independently of said worm gear 10.

Secured to the dobby mechanism frame 2, is the frame 13, which in this instance supports the drop box pattern mechanism, and also the shaft 14, which drives

A lever 19, pivoted at 20, is provided with a yoke 19′, having pins or rolls which extend into the peripherial groove in the hub 16. The lever 19, is used to move said hub in one direction or the other, to secure the gear 15 to the shaft 14, or to cause it to run loose thereon, as above described. A spring 21, encircles the pivot stud 20, of the lever 19, and acts to move the lever 19 in one direction, to keep the hub 16 against the collar 18, as shown in Fig. 1 and the pin 17 in the hole 15′ in the gear 15.

The lever 19, is operated automatically, to move the hub 16 and withdraw the pin 17, from the hole 15′ in

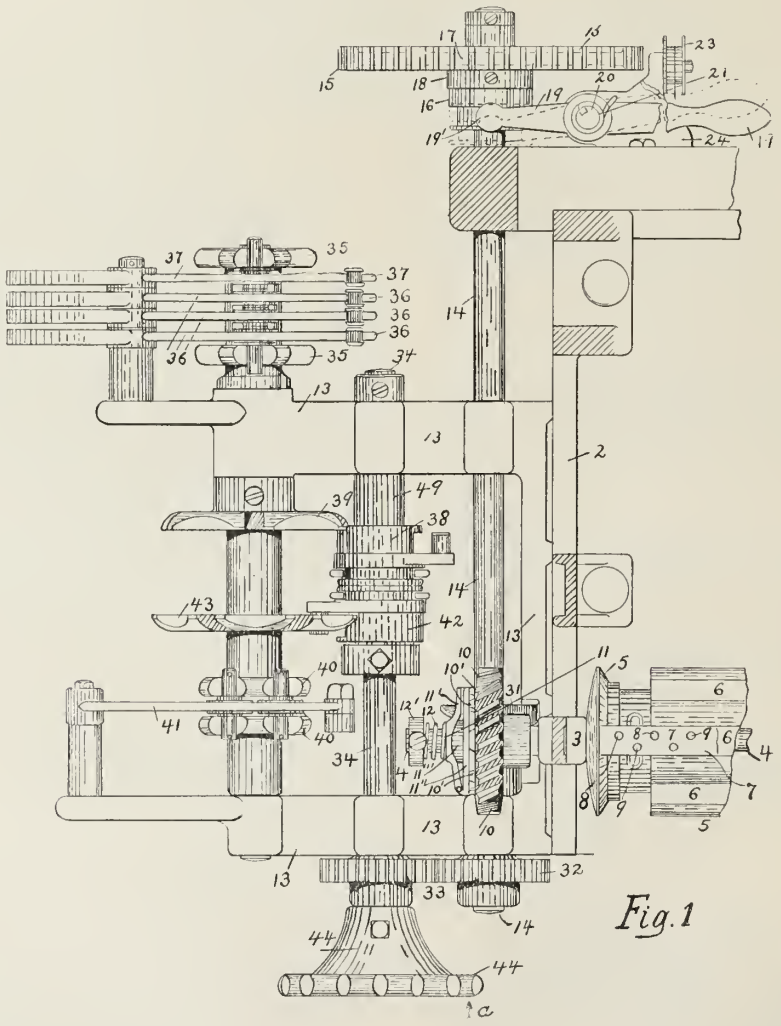


Fig. 1

the dobby pattern-chain cylinder 5 and the pattern surfaces of the drop box pattern mechanism. The shaft 14, has a gear 15, loose thereon, driven by a system of gears, or some driven part of the loom, not shown. Said gear 15 is attached to said shaft, to revolve the same, by means of a sliding grooved hub 16, and carrying a pin 17, which extends through a guide hole in a collar 18, fast on the shaft 14, (see Fig. 4) and is adapted to enter a hole 15′ in the gear 15, to cause the shaft 14 to be revolved with the gear 15, and to be withdrawn from said hole, to allow the gear 15, to run loose on the shaft 14 (See Fig. 4).

the gear 15, and allow said gear 15 to run loose on the shaft 14 and said shaft to stop, by a cord or flexible connection 22, which is secured at one end to the lever 19 in front of its pivot point 20, and runs over a pulley 23 supported on an arm 24, over a second pulley 25, and a third pulley 26 supported on the loom side, to an arm 27, fast on the knock-off shaft 28, mounted to rock in bearings 29, on the front of the breast beam 30 (See Figs. 2 and 3).

On the opposite end of the shaft 14 from the gear 15, is fast a worm 31, which extends below and engages and turns the worm gear 10. The worm 31 has

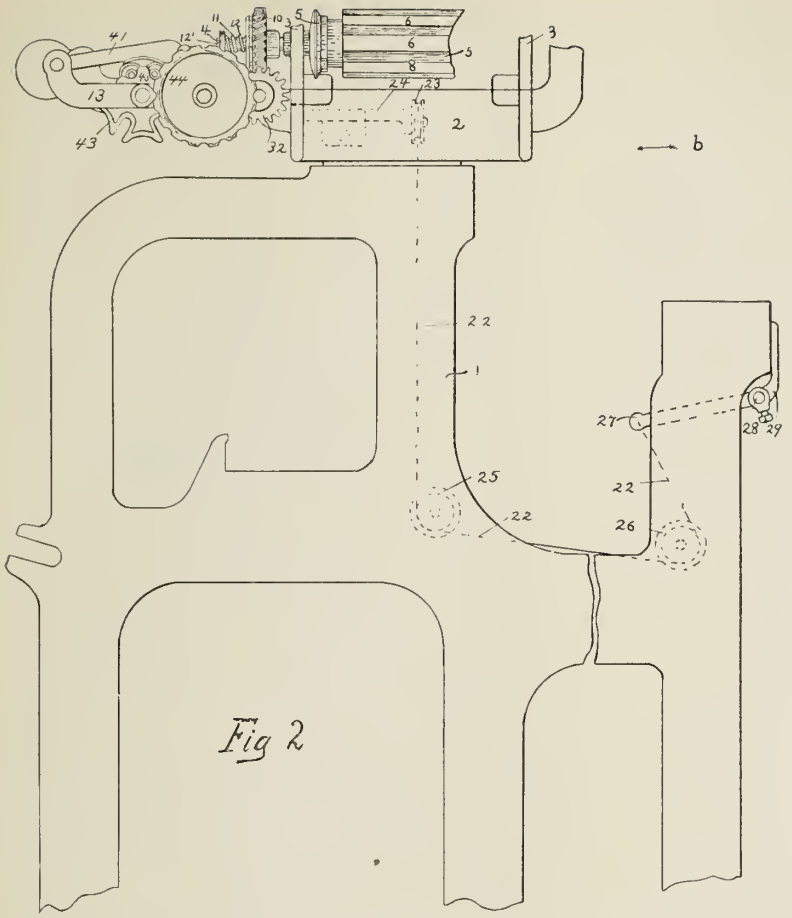


Fig 2

a dwell of one-half a revolution, as there are two sets of pins 8 and 9 on the pattern bars, and therefore a partial revolution of the worm gear 10, and pattern cylinder 5, is made only every two picks.

On the extreme end of the shaft 14 is fast a gear 32, which meshes into and drives a gear 33, fast on the shaft 34, of the drop box pattern mechanism. By means of the gears 32 and 33, the dobby pattern cylinder and the drop box pattern cylinders are connected, so that the turning of one in either direction will turn the other simultaneously.

In the drop-box pattern mechanism, 35 indicates the box pattern chain cylinder; 36, the pattern indicator levers for a series of six drop boxes, not shown. 37, is the indicator lever, connected through connectors and levers, not shown, with the pin wheel 38, splined on a sleeve 49, fast on the shaft 34, to slide said pin wheel 38, out of engagement, or into engagement with the star wheel 39, which operates the box pattern cylinder 35, in the ordinary way.

40, is the auxiliary or multiplier pattern chain cylinder, used in this instance, and 41, the indicator lever thereof, connected through connectors and levers, not shown, with the pin wheel 42, splined on the sleeve 49, to slide said pin wheel 42, out of engagement, or into engagement, with the star wheel 43, which operates the multiplier pattern chain cylinder 40, according to the indications of the box pattern chain, and the multiplier pattern chain. The box chain and the multiplier chain are operated in the manner fully explained in the article on the mechanism for operating shedding and drop-box pattern indicators for Knowles looms.

On the front end of the shaft 34, is fast a hand-wheel 44, by means of which both, the box pattern chain mechanism and the dobby pattern chain mechanism, through gears 33 and 32, are simultaneously turned backward or forward, the hand-lever 19, being first moved to the position indicated by dotted lines, Fig. 1, to disengage the pin 17 on hub 16 from the hole 15' in the gear 15, and allow the gear to be loose on the shaft 14. (*Crompton and Knowles Loom Works.*)

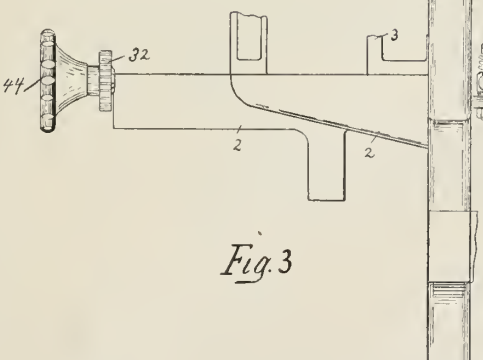


Fig. 3

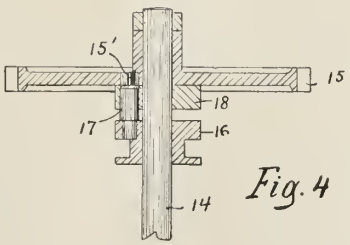
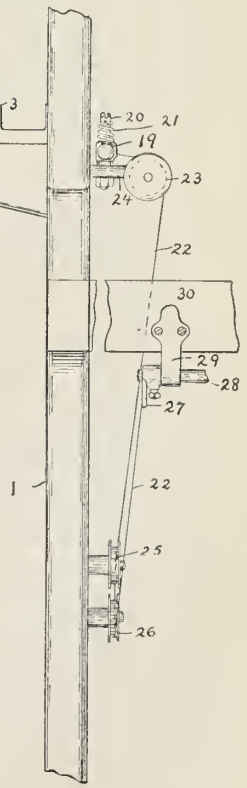


Fig. 4



BOX-MOTION FOR WITCH LOOMS.

Fig. 1 of the drawings shows in side elevation the framing of a loom having the improvement applied thereto, Fig. 2 shows in rear elevation the box-operating crank and its immediate connections, part of the support being in vertical section.

1, indicates the loom-framing; 2, the crank-shaft of the loom; 3, the cam-shaft; 5, 6, are the gear-wheels by which motion is transmitted from the crank-shaft to the cam-shaft; 7, represents the shuttle-boxes; 8, the box-rod; 9, is the box-lever; 10, is the operating connecting-rod, which joins the rear end of the said box-lever 9, with the operating-crank 40.

11, is the pattern-chain for the box-motion, it passing around a chain-barrel which is mounted on the shaft 12, the latter being supported by the elevated part of the loom-framing.

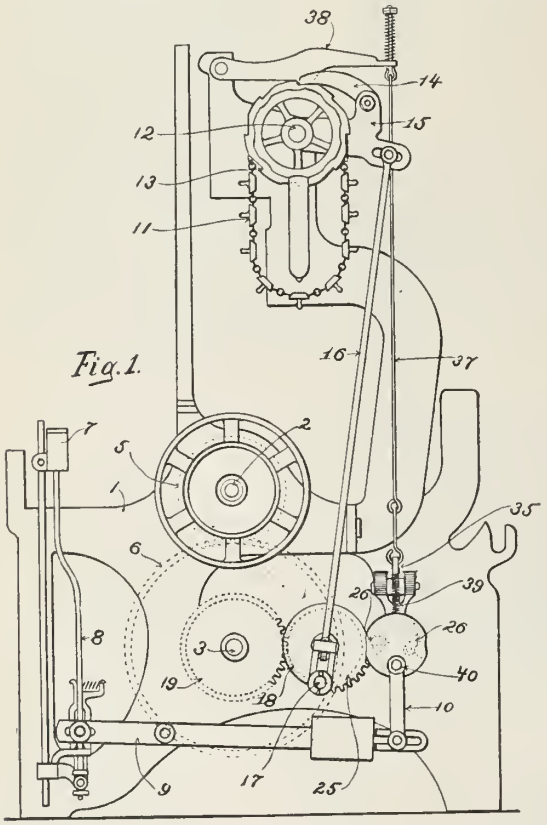


Fig. 1.

13, is the ratchet-wheel, which is connected with the pattern-barrel 12. 14, is the pawl which engages with the ratchet-wheel 13, for the purpose of actuating the pattern-barrel and pattern-chain. 15, is the swinging arm or carrier on which the pawl 14, is pivoted. 16, is the conecting-rod, which joins the said arm or carrier 15 to the crank 17, on the gear 18. 19, is a gear on the cam-shaft 3, which engages with gear 18 to rotate the latter.

The crank 40, is carried by a disk 20, having a hub 21, which latter is mounted to turn in a bearing 22, that is provided in a bracket 23, which is applied to the loom-framing. 24, is a partially-toothed gear which is connected with the hub 21, so that the said gear and the disk 20, with its crank 40, rotate in unison. This gear has blank or toothless spaces at one hundred and eighty degrees apart, these spaces separating the teeth of gear 24 into two segments.

25, is a segment-gear which is connected with gear 18, and rotates in unison therewith. This segment-gear constitutes a moving toothed surface for engagement with the gear 24, and its teeth are sufficient in number to act, in connection with one of the gear-segments of gear 24, and with also one of the rocking teeth which are referred to hereinafter, to occasion a semirotation of said gear 24, and the hub and crank-disk which are connected therewith, so as through connecting-rod 10 to move the box-lever 9 and shift the boxes 7.

26, are rocking teeth which are applied to the partially-toothed gear 24, at the blank spaces of the latter, the said gear 24 being recessed where the said blank spaces exist for the reception and play of the said rocking teeth. Each rocking tooth 26, has a hub portion, the latter having a hole for the passage of a pivotal pin, by which to pivotally connect it with the gear 24. Each of the said rocking teeth has also a pin or projection by means of which to move the tooth on its pivot. The pins or projections of the two rocking teeth engage the cam-slots formed in the concave outer faces of the two longitudinal portions or arms of an actuating cam-piece 31, having collars 30, between which is received a ring 32, having pins 33, at opposite sides thereof playing in slots 34, in the extremities of the members of the forked depending arm of a bell-crank 35. Said bell-crank is pivoted at 36, to the bracket 23, and has joined thereto the lower end of a connection or wire 37, the upper end of which is connected with the pattern finger or lever 38, which latter rests upon the pattern-chain and is acted by the risers thereon. The said risers act, through the said pattern-finger and the other devices which have been described, to move the cam-piece 31, lengthwise in one direction—for example, toward the left in Fig. 2. For the purpose of moving the said cam-piece in the reverse direction—namely, toward the right in Fig. 2—the spring 39, is employed, it having one end thereof connected with one arm of the bell-crank 35, and the other end thereof connected with a suitable portion of the framing.

Each cam-slot has two straight portions extending parallel with the length of the cam-piece 31, and on different lines which are parallel to each other, these parallel portions being connected by inclined portions, which constitute rests to hold the respective rocking teeth 26, fixed in the respective positions which are given them by each lengthwise movement of the cam-piece, the inclined connecting portions of the slots acting as cams to rock the respective rocking teeth on their pivots. The two cam-slots are formed or disposed so that when by the lengthwise movement of the cam-piece 31, one tooth 26, is retracted—the other tooth 26 is projected. Each rocking-tooth 26, has a contacting-surface adapted to bear against the adjacent end of one of the gear-segments of the gear 24, when the tooth is in its projected position. The said tooth is formed with a sloping outer surface so that when the tooth is in the retracted position, the rocking tooth will be wholly out of the range of movement of the gear-segment 25. The contacting-surface of each rocking tooth 26, with the adjacent end of a gear-segment of gear 24, affords a firm backing for the rocking tooth when the enlarged first tooth (see Fig. 1) of the segment-gear 25, comes around in the rotation of the latter and engages with such rocking tooth. As will be understood, when the cam-piece is moved in the proper direction to cause a rocking tooth to become projected into the path of the said enlarged first tooth, the gear 24 and connected parts will be impelled, by the engagement of said first tooth with the said rocking tooth so as to bring the teeth of the following segment of gear 24, around into position to be engaged by the teeth of segment-gear 25, where-

upon gear 24 and the connected parts, including the crank 40, will be rotated through one hundred and eighty degrees, thereby shifting the shuttle-boxes, after which the segment-gear will run out of mesh with the teeth of gear 24, at a blank space on the

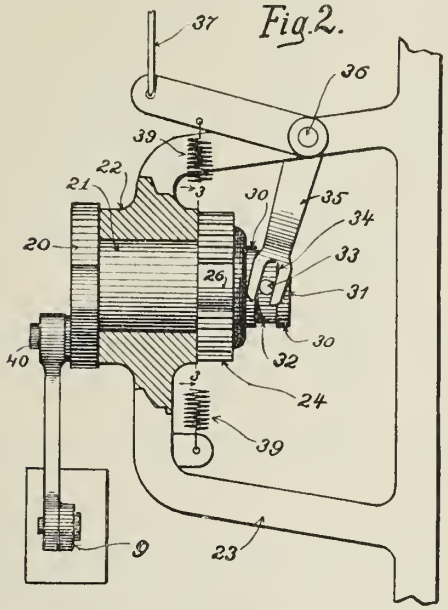


Fig.2.

latter, the rocking tooth in such space being retracted. The gear 24, and connected parts then will remain without movement of rotation, holding the shuttle-boxes in the position which was given them by the described movement of the parts until the cam-piece is moved in the opposite direction lengthwise by the action of the described devices, so as to project the other previously-retracted rocking tooth into the range of the segment-gear 25.

At the free ends of arms of the cam piece 31, the cam-slots are open-ended for convenience in assembling and separating the parts, this construction enabling the cam-piece conveniently to be slipped into place or removed after the rocking teeth have been mounted in the gear 24. (*Crompton and Knowles Loom Works.*)

SHUTTLE-BOX MOTION FOR PLAIN LOOMS.

This motion is adapted for weaving textile fabrics, etc., in which the shuttle boxes are arranged two by one, or four by one.

The box-operating mechanism is preferably arranged at the lower part of the loom, at the rear right or left hand end thereof.

Referring to the drawings:—Fig. A, is a side view of this box motion, looking in the direction of arrow *a*, Fig. C. Fig. B, corresponds to Fig. A, but shows the parts of the mechanism in the opposite position, and Fig. C, is an edge view of the parts shown in Fig. A, looking in the direction of arrow *b*, same figure.

1, is a frame or stand, adapted to be bolted to the lower side of the loom, at the rear right hand end thereof, and near the bottom shaft. 2, is the bottom shaft, journaled in bearings (not shown) and 3, is a two-leaf cam fast on the bottom shaft. 4, is an indicator lever hung on a stud 5, fast in the frame 1, and 6, is a connector attached at one end to said indicator lever 4, and connected at its other end with the box pattern chain indicator (not shown).

A cam arm 7, is pivoted at its lower end on a stud 8, fast in the frame 1, and is provided at its upper end with gear teeth 7'. The cam arm 7, has an opening 7'' therein, through which the bottom, or driver shaft 2, extends, and is also provided with two oppositely extending arm 7'''. On a pin 9, fast in the outer end of one arm 7''', is pivoted a cam finger 10, provided with an outwardly extending pin 10', adapted to be engaged by the indicator lever 4.

A second cam finger 11, is pivoted on a pin 12, fast in the outer end of the other arm 7''', of the cam arm 7, and is provided with an outwardly extending pin 11', which is adapted to be engaged by the outer end of the indicator lever 4.

The cam finger 10, is provided at its free end with a boss or roll 13, adapted to be engaged by the leaf 3', of the two-leaf cam 3, and the free end of the cam finger 11, is provided with a boss or roll 14, adapted to be engaged by the leaf 3'', of said cam 3.

A pin 15, on the arm 7''', of the cam arm 7, limits the downward motion of the cam finger 10, and a pin 15', limits the upward motion of said finger. A pin 16, on the other arm 7''', of the cam lever 7, limits the upward motion of the cam finger 11, and a pin 16', limits the downward motion of said finger.

The gear teeth 7', on the upper end of the cam arm 7, mesh with and drive a pinion 17, loose on a stud 18, fast in the upper part of the frame 1. Fast to or made integral with the pinion 17, is a crank disk 19, and upon the opposite side of said pinion is—in this instance, a disk 20, provided with a friction device consisting of two arms 21, pivoted at one end on a pin 22, on the frame, and provided with curved portions at their other ends, which encircle the disk 20, and are pressed thereon to produce friction by a bolt 23, extending through holes in said arms 21, and provided with a spring 24, intermediate the upper side of the upper arm 21, and the nut 25, on said bolt. By screwing up or down the nut 25, the friction of the arm 21, on the disk 20, may be adjusted as desired. Said friction prevents the disk 20, returning to its starting point, if the loom should start before said disk completes its motion.

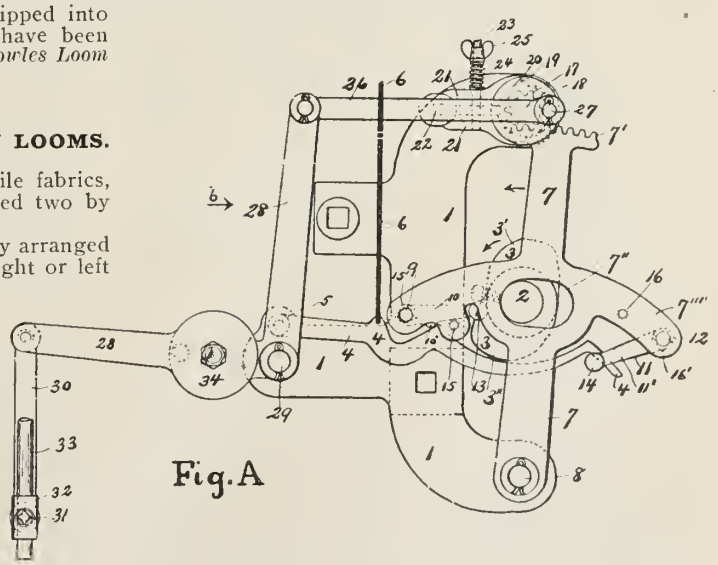


Fig.A

A connector 26, is pivoted at one end on a crank pin 27, on the crank disk 19, and at its other end is

pivoted to the upper end of the angle lever 28, which lever is hung on a pin 29, in the frame 1. To the other end of the angle lever 28, is pivoted a connector 30, the lower end of which is adjustably secured by a bolt 31, in the head 32, of the box lifter rod 33.

The angle lifter lever 28, may be provided with a give way, or safety device 34, which will yield and allow the lever to give at this point, so as to prevent the breaking of the parts of the box lifter mechanism.

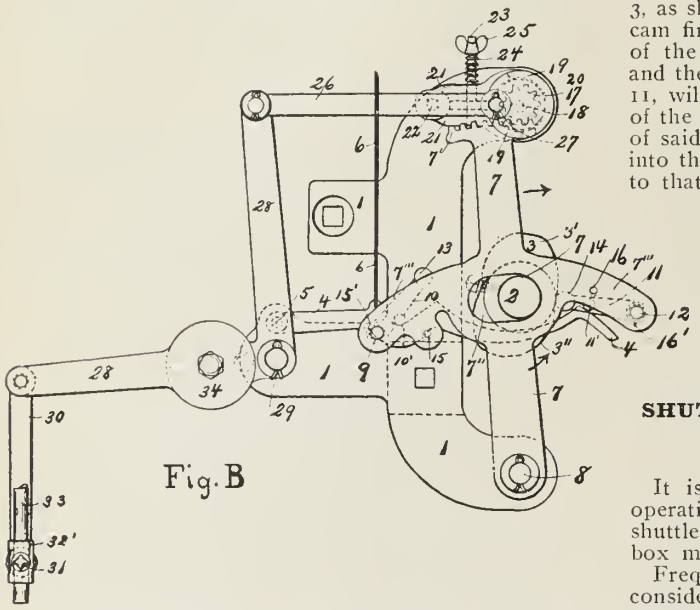


Fig. B

In Fig. A, the box lifter rod 33, is shown in its upper position, and therefore the bottom cell of the shuttle box (not shown), is ready to receive or discharge the shuttle.

To lower the lifting rod, so that the top cell of the box will assume the position occupied by the bottom cell, the operation is as follows: The leaf 3′, of the cam 3, fast on the bottom shaft 2, revolves in the direction of the arrow, Fig. A, toward the cam finger 10, and said finger having been lowered by the indicator lever 4, through the connector 6, into the position shown in Fig. A, will be in the path of said leaf 3′, of the cam 3, which will come in contact with the boss or roll 10′, on the end of said cam finger, and cause the cam arm 7, through said cam finger, to move in the same direction that the cam 3 moves, as indicated by the arrow in Fig. A, and the teeth 7′, on said arm 7, engaging the teeth of the pinion 17, will cause said pinion to revolve and also the crank disk 19, carrying the pin 27, and through the connector 26, attached to said crank pin, the angle lifter lever 28, will be moved, to lower the lifter rod 33, through connector 30, into the position shown in Fig. B, and thus the top cell of the shuttle box will be lowered. The shuttle box will stay in this position until the indicator lever 4 is lifted, through the connector 6, by a pattern-chain-indicator, and when said lever is so lifted, the cam finger 10, through the engagement of the pin 10′, thereon with said indicator lever 4, will be lifted out of engagement with the cam 3, as shown in Fig. B, and at the same time the other cam finger 11, will be lifted, through the engagement of the pin 11′, thereon, with the indicator lever 4, and the boss or roll 14, on the end of said cam finger 11, will be in position to be engaged by the leaf 3″, of the cam 3, as shown in Fig. B, and the revolution of said cam will cause the cam arm 7, to swing over into the opposite position from that shown in Fig. B, to that shown in Fig. A, thus raising the lifter rod, and also the lower cell of the shuttle box, and returning it to its first position shown in Fig. A.

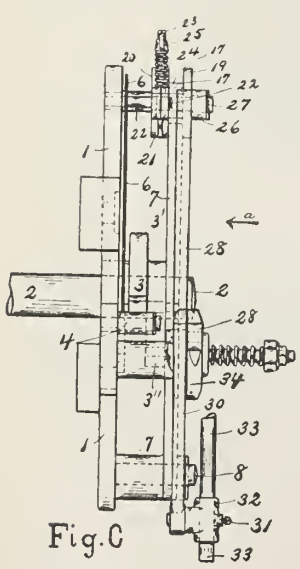


Fig. C

This motion can be used for looms running at high speed, the motion being sure to give a positive and quick change for the shuttle boxes. (*Crompton and Knowles Loom Works.*)

SHUTTLE-BOX MECHANISM FOR CROMPTON LOOMS.

It is a well-known fact to any fixer that in the operation of a modern loom the time in which the shuttle-boxes must be shifted is very short, and the box mechanism must act quickly and with precision.

Frequently the boxes and their connections are of considerable weight, and the shafts, wheels, and other parts required to move the same must necessarily be heavy and strong, so heavy, in fact, that difficulty is found in operating them at the speed and with the accuracy desired.

The present invention has for its object to provide an improved and novel box mechanism wherein the number and speed of operation of the several parts are reduced to a minimum.

The box operating or shifting member in the new mechanism is actuated by a cam, as heretofore, said cam, however, being rotated by a wheel provided with a plurality of slots or notches to enable it to be intermittingly rotated by a driving-wheel provided with a plurality of projections adapted to enter said slots or notches.

The slotted or notched wheel is of considerable diameter and provided with a large number of slots in order that each step-by-step or rotative movement of the wheel may be as slight as possible.

By means of the new device a continuously-rotating wheel is made to engage the notched wheel for nearly one-half of each rotation of the former, yet act through only about one-quarter of each rotation to actually move the said notched or slotted wheel and its cam, so that a quick intermitting cam movement may be obtained from a continuously and relatively slow rotating driving wheel.

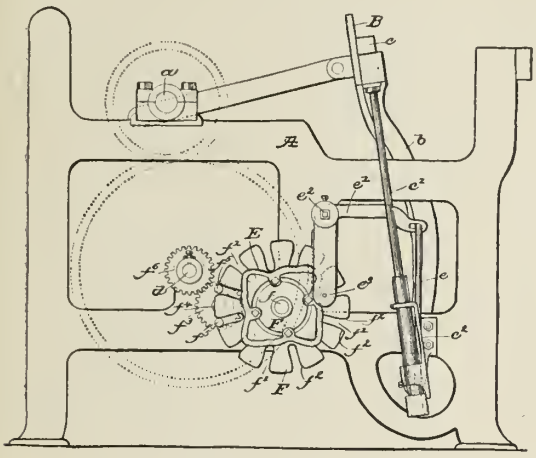
The accompanying illustration shows in end elevation, a sufficient portion of a loom to enable anybody to understand at once the new mechanism.

A, indicates the frame of the loom; *a*, the crank-shaft, connected with and to vibrate the lay B; *b*, the lay-swords; *c*, the shuttle-box; *c′*, its lift-rod; *c²*, the swinging bracket or frame connected with and vibrated with the lay and in which the lift-rod *c′*, slides; *d*, the main or driving shaft geared to and operating the crank-shaft.

The shuttle-box lift-rod *c′*, is connected by a link *e*, with one arm of the bell-crank lever or shifting member *e′*, fulcrumed at *e²*, on the frame and having

its other arm provided with a suitable roller-stud c^3, held in operative contact with the cam E, by the weight of the shuttle-box on its lift-rod.

The cam E, is provided with a plurality of projections or tappets, of the same, or of different heights, to impart the desired movement to the shuttle-box,



ranging from its highest to its lowest position, and these tappets or projections are formed so as to reduce as far as possible all unnecessary movement of the cam, and also to most quickly shift the box when the cam is changed.

For instance, the depression between two tappet projections is of a size nearly or quite fitting the roller c^3, so that the initial movement of the cam will act to move the roller and partially lift the shuttle-box, and the highest portion of the projection is made as pointed as is practicable in order that no unnecessary movement of the cam shall take place when the roller has reached the highest point on any projection.

The cam E, is secured to the face of a wheel F, loosely mounted upon a stud f. This wheel F, is provided with a large number of radial slots or notches f', the entrances to which are made slightly flaring, as at f^2, said wheel being driven by the driving wheel f^3, fast on a shaft, or it may be loosely mounted upon a stud f^4, on the frame and provided with two projections or pins f^5, adapted to enter the slots f', in the wheel F, to drive the latter.

The driving-wheel f^3, is geared to and driven by a mating wheel f^6, fast on the main or driving shaft d, of the frame.

The shaft d, rotates once for each two picks of the loom, and a corresponding rotation is imparted to the driving-wheel f^3, as the two wheels are of substantially the same diameter. At each rotation of the driving-wheel f^3, one of its pins f^5, enters a notch or slot f', in the slotted wheel F, and turns the latter a distance represented by the distance between two slots on the wheel.

In the illustration one of the pins is shown as just entering a slot, and the other pin as just leaving another slot, and starting from this position of the driving-wheel the uppermost pin f^5, will rotate for nearly one-eighth of a rotation of the driving-wheel before it will begin to move the slotted wheel F. It will then move the wheel through substantially one-quarter of its rotation and will then permit the said slotted wheel to stand at rest for another one-eighth of a rotation before its pin leaves the slot in the wheel, and, therefore, since the slotted wheel is held against movement during an eighth of a rotation before a pin leaves a slot, and after a pin leaves a slot for another one-eighth of a rotation, while the other pin is entering a new slot, the wheel is held against movement for one-quarter of a rotation of the driving-wheel f^3, is then moved for a distance represented by one-quarter of the rotation of the said driving-wheel, and again rested for another one-quarter of a rotation of said wheel, and so on.

The slotted wheel F, therefore, is given an intermitting rotary movement by and from a continuously-rotating driving-wheel, the slotted wheel having two movements and two periods of rest, all of substantially the same duration, during each rotation of the driving-wheel.

The driving-shaft d, and driving-wheel f^3, rotate at a relatively slow speed, and the slotted wheel F, being of relatively large diameter with a large number of slots f', receives only a comparatively short movement for each shifting of the shuttle-box, so that the wear and tear of the parts is reduced to a minimum, and the high speed heretofore necessary in operating the parts of the box mechanism is entirely overcome.

Furthermore, the pins working in the slots start the slotted wheel easily and without shock, thereby differing from pawl-and-ratchet or other mechanism for imparting a relative intermitting motion to the cam-wheel

The mechanism embodying the invention, *i. e.*, the axis of the driving-wheel f^3, lies inside of the peripheral line of the driving-wheel F. Hence, one of the pins f^5, enters its slot at the top of the driving-wheel before the other pin leaves its slot at the bottom of said wheel, so that the driving-wheel F, is always under the direct control of at least one of the pins f^5, whereas if the axis of the said driving-wheel was outside the peripheral line of the driving-wheel one of the pins must necessarily leave its slot before the other pin can fully enter its slot, thereby leaving the driving-wheel for at least two periods in each rotation of the driving-wheel without any means of holding it in position, except some means independent of the pins be provided to retain it positively in position during the periods when it is not engaged by one or the other of the pins.

As readily seen by explanations thus given, the object of the new mechanism is to get a motion that will work well on high speed looms running on plain work, *i. e.*, no pattern-chain to be used.

In the illustration a 3 box cam connection is shown, however, by changing the cam, 2 or 4 boxes could be used, but as this is a continuous motion worked from the bottom shaft, no rest of boxes can be had for more than one pick.

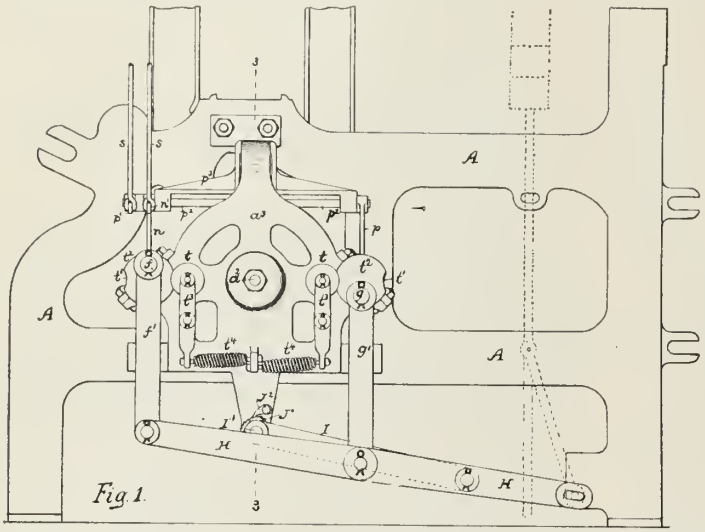
The new mechanism gives a quick motion to the cam and at the same time a slow motion to all the parts operating said cams, resulting in a quick and positive box motion with very little wear on the parts constituting said motion. (*Crompton and Knowles Loom Works.*)

INGRAHAM'S DROP-BOX MECHANISM.

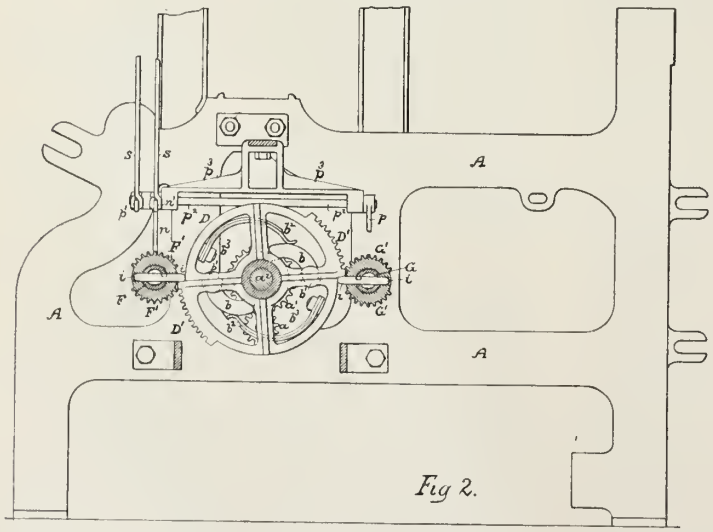
The object of this device is to construct a simple, positive, and efficient drop-box motion for looms, that the boxes, when adjusted, being effectually locked against vertical displacement in either direction.

To explain this mechanism, the accompanying three illustrations are given and of which Fig. 1 is a side view of sufficient of a loom to illustrate this improved drop-box motion. Fig. 2 is a similar view with some of the outer parts removed and some in sections in order to show internal construction. Fig. 3 is a transverse section on the lines 3-3. Fig. 1.

A, represents one of the side frames of the loom, having a bearing for the shaft B, which has a spur-pinion a, meshing with a spur-wheel a', which is free to turn on a stud a^2, secured to a hood or casing a^3, attached to the side frame A. On said stud a^2, also



turns a drum D, between which and the hub of the spur-wheel a' there is a frictional clutch connection consisting of fingers b, hung to studs b', on the drum and engaging at their free ends with notches in the hub of the spur-wheel a', the fingers being retained in engagement with said notches by means of springs b^2, bearing upon the fingers and secured to studs b^3, on the drum. On the periphery of the drum D, are formed two toothed segments D', being diametrically opposite each other, and on each side of the drum is suitably mounted a hollow shaft, that on one side of the drum being represented at F, and that on the opposite side at G. At the outer end of the shaft F, is a crank-pin f, which is connected by a link f', to one arm of a lever H, the latter being fulcrumed midway of its length to the lower end of a link g', depending from the crank-pin g of the shaft G, the forward

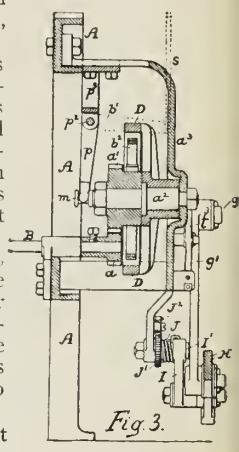


end of the lever H, being constructed for connection to the drop-box rod.

Connected to the drop-box lever H, is an arm I, which is hung to a stud I' on a depending portion of the hood a^3, said arm I, being connected to one end of a spring J, tending to lift it, and the tension of the spring being regulated by the adjustment of a ratchet-wheel J', to which the other end of said spring is attached, back movement of the ratchet-wheel being prevented by a pawl J^2. This spring-actuated arm serves to counterbalance the weight of the drop-boxes, and thus permits the easy elevation of the same and prevents uneven strain upon the operating mechanism for the drop-box lever.

The throw of each of the crank-pins f and g, is equal to the height of one of the boxes. Hence the construction shown is adapted for application to a four-box loom. When the parts are in the position shown in Fig. 1, the boxes will be fully depressed, the top box will be in line with the shuttle-race, the crank-pin f, being at the top limit of and the crank-pin g, at the bottom limit of its throw.

If it is desired to raise the boxes to the extent of one box, a half turn is imparted to the shaft F, so as to carry its crank-pin to the lowest limit of its throw, and thereby operate the lever H, so as to raise the boxes to the desired extent, the lever H, fulcruming upon the link g'.



If it is desired to raise the boxes from the lowest position to the extent of two boxes, the shaft F is permitted to remain stationary and the shaft G, has a half turn imparted to it. This imparts motion to the link g', and as the latter is connected to the lever H, at a point midway of the length of the lever and the inner end of the latter is fulcrumed upon the lower end of the link f', the movement of the outer end of the lever H, which is connected to the drop-box rod, will be doubled. Consequently the boxes will be lifted to the extent of two boxes.

If it is desired to effect a three-box lift, both shafts F and G, are given a half turn from the positions shown in Fig. 1, the operation of the shaft G, resulting in a lift of two boxes and the operation of the shaft F, resulting in a further lift of one box.

The boxes can be lowered in like manner to the extent of one, two, or three boxes, by the operation of either or both of the shafts F and G. In fact it will be readily understood that as the operation of the shaft F provides for a movement of the boxes in either direction to the extent of one box, and the operation of the shaft G provides for a movement of the boxes in either direction to the extent of two boxes, any desired operation of the boxes can be effected by moving either or both shafts. When both shafts are operated, the movement due to the operation of the shaft F, is added to or subtracted from the movement due to the operation of the shaft G. (*Fairmount Machine Company, Phila.*)

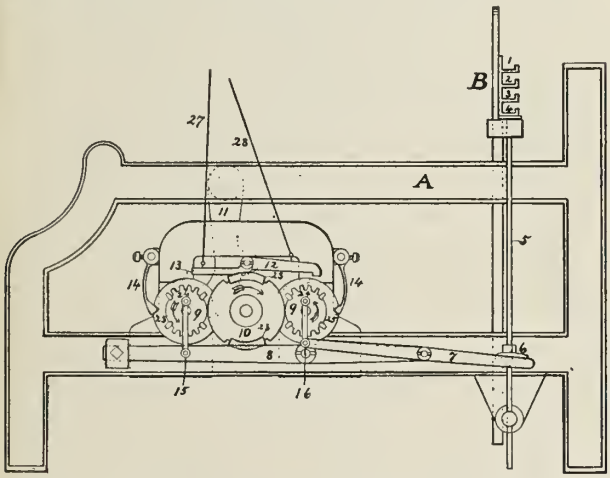
GOODYEAR'S SHUTTLE-BOX-OPERATING MECHANISM.

An explanation of the new device is best given by quoting letters and numerals of reference to the accompanying illustration and of which A, represents the loom side; B, the lay. At the end of the lay B, are arranged, in the usual manner, the shuttle-boxes 1, 2, 3, and 4. The shuttle-boxes are connected to the operating mechanism by rod 5, carrying a shoe 6, which shoe rests on a roller fixed in the end of lever 7. The levers 7, and 8, are double-pivoted. One pivot is on a stud fixed on the side of the loom-frame. The other pivot is on a stud in the short end of lever 8.

10, is a cog-wheel, in which are made ten teeth or cogs, five teeth being directly opposite the other five, as is shown by the dotted lines. This wheel is a driver, and is fixed on the "cam-shaft" of the loom. The outer ends of these teeth are flanged, 23, the first and last space between the first and the last tooth of each series being open.

9, are driven wheels, each having twelve cogs or teeth, six in each series, each series being directly opposite the other. The first and last tooth of each series has a lug, which lugs enter the open spaces at the beginning and end of each series of teeth on the wheel 10.

The wheels 9, are mounted on studs fixed to the loom side A. Each wheel 9, carrics a stud, and by pitmen 15, and 16, the wheels are connected to levers



7 and 8. To each of the wheels 9, is fixed or cast a flange 25. In these flanges are made notches, and on the back are cast lugs.

14, are spring-brakes, each having at its lower end a **V**-shaped lug. These lugs engage in the **V**-notches in the flanges 25.

11, is a lever hung on a stud fixed to the loom side. This lever 11, carries on a stud, fingers 12, and 13, which are connected by cords or wires 27, and 28, to the pattern-chain for controlling the movements of the shuttle-boxes. On the lower end of lever 11, is pivoted a trigger, also is fixed a stop-lug, and to said trigger is attached a cord by which the trigger is connected to the filling stop-motion.

The operation of the shuttle-box-motion is as follows: Motion is given by the cam-shaft that carries the wheel 10. The movement is in direction indicated by the arrows, one revolution for each two picks of filling. The wiper-cam and lever 11, give a to-and-fro movement to the fingers 12, and 13, which fingers, being controlled by the pattern-chain, raise or drop them so as to cause them to strike in their movement the lugs on wheels 9. The movements of the fingers and driver-wheel 10, are so timed that the push of the fingers will move the wheels 9, so that the first tooth of a series on wheel 9, will enter the open space of the flange 23, beginning with the scries of teeth on wheel 10. This flange 23, prevents the wheels gearing except in the first space of each series. In the position of the shuttle-box, as shown in our illustration, the top box 1, is in use. If finger 12, now moves the wheel 9, on the right hand, it will be revolved one-half of one revolution. The stud and pitman 24, will be moved to the bottom of wheel 9. The pitman 16, being connected to lever 7, will raise the box one shelf, and shuttle 2, will bc used. After two picks the finger 13, may be caused to strike a lug on wheel 9, to the left hand. This will cause that wheel to make one-half of one revolution, and its pitman 15, being connected to lever 8, will raise the box to shelf 4, and shuttle 4 will be used. If after two picks fingers 12, and 13, both act at the same time, both wheels 9, will be moved, giving a full drop, and put the boxes in position, as shown in our illustration. Box 3, may be called if box 1 is in position, by solely operating finger 13, wheel 9 on the left, and lever 8. This will skip box 2, and bring box 3, into position. If box 2, is in position, and box 3, is wanted, both pinions 9 are moved, lever 8 raises two and lever 7 drops one, and the box is only raised one shelf. Thus it is required to discount one shelf in order to reach the one desired. The wheel 9 on the right moves one box. The wheel 9 on the left, moves two boxes. Both wheels moving at the same time move three boxes, and it is plain and clear that with the improved device added to looms, any one of a series of four boxes can be commanded at will. (*Hughes & Russum, Frankford, Phila.*)

SCHEID'S SHUTTLE-BOX-OPERATING MECHANISM.

Fig. 1 is a side elevation of a loom provided with this mechanism, only those parts being shown which are necessary to illustrate the nature of the new device; Fig. 2 is an enlarged detail view of the upper shuttle-box lever-controlling cam-wheels and its operating mechanism; Fig. 3 is a top plan view of Fig. 2; Figs. 4 and 5, are left-hand end elevations of Fig. 2, in working and normal positions, respectively; and Fig. 6 is an enlarged detail view in elevation of the pattern-chain and of the treadle-levers operated thereby. The new device refers to looms operated by Jacquard machines or witches placed on top of loom.

The operation of the device is as follows: During the operation of plain weaving, the shuttle-box-operating mechanism is at rest. The hook c^8, having been lowered, engages the pin c^7, and thus prevents angle-lever c^4, from being operated by the cam c^3, on shaft c. When the Jacquard calls for the introduction of a color to be worked in a fabric, the cord c^9, is drawn upward by the Jacquard mechanism, thus releasing the pin c^7, and thereby bringing the angle lever c^4, into engagement with the cam c^3. Through the link c^6, radial lever c^{22}, and pawl c^{23}, the ratchet wheel c^{24}, is thus rotated the required distance. The shaft d^2, and sprocket-wheel d^3, are thus resolved, operating the pattern-chain until one of its rollers comes under and lifts one of the levers d^4, d^5.

In Fig. 1 of the drawings is illustrated the position of lever f^6, when the first or top compartment of the shuttle-box is brought opposite the lay or race and ready to discharge its shuttle. Supposing that the second shuttle from the top is called for after the first shuttle has performed its operation, the cam h^{20}, remains in its raised position—that is to say, the angle lever i^3, and its respective treadle d^4, are prevented

from returning to their normal positions. The roller on the pattern-chain next to the roller which has lifted the said lever d^4, engages and travels along the curved cam portion d^{20}, of the latter and thus will keep the said treadle in its raised position.

A second roller simultaneously lifts that treadle

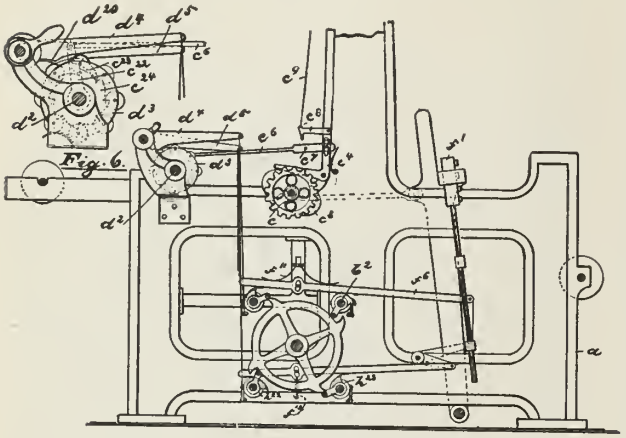


Fig. 1.

which controls through its cord connection the arm i^4 on shaft i, which latter, through the arm i^5, (its pin engaging the annular groove,) slides the cam-wheel h^{21}, on the shaft b^2, until the pin h^2, is in the path of the cam projection g, of wheel g°, and the projection h^3, directly beneath the lever f^6. The wheel g°, in its rotation and through the projection g, engaging the pin h^2, operates the cam-wheel h^{21}, until the projection h^3, has raised the lever to its highest position. The pointed end of said projection now rests against the lug or stop f^{14}, in which position it remains until the cam-wheel is about to be returned for a different shuttle call, as will be manifest.

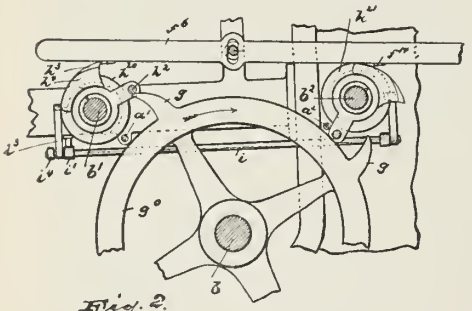


Fig. 2.

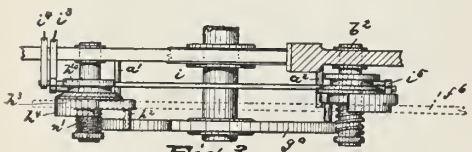


Fig. 3.

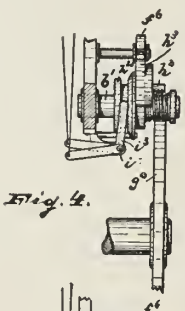


Fig. 4.

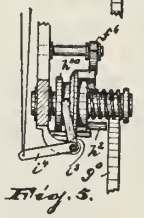


Fig. 5.

Raising second box:—Through the connection of the free end of the lever f^9, with the shuttle-box-supporting rod the latter is raised one compartment and thus, the corresponding shuttle (the second one from the top) brought into operation. Should said shuttle be required for more than one pick, the hooked end lever c^5, is lowered by the Jacquard machine into engagement with the pin c^7, of link c^6, thus withdrawing the angle lever c^4, from contact with cam c^3, and thus preventing a further rotation of the shuttle-changing device on shaft d^2.

Raising the third box:—Now supposing that the third shuttle from the top is required it is necessary to return the cam wheels h^{20}, and h^{21}, to their normal positions. The corresponding treadles d^4 and d^5 are lowered by the pattern chain, thus releasing the angle levers from the strain of the cord connections and thereby allowing the spiral springs n', to slide their respective cam-wheels h^{20}, and h^{21}, back on their stub-shafts until the pins h^2 are out of the path of the projections g of wheel g°, and the projections h^4 in alignment with the lever f^5. The said lever will be forced downward upon said projections h^4, by the action of the springs f^{11}, or f^{12}, (see Fig. 1) and as the cam-wheels are oscillated backward and thus returned to their normal position by the action of the uncoiling of their respective spiral springs n', the said lever f^5, will continue in its downward movement until it has reached its lowermost position. Through the connection of the free end of the lever f^9, with the shuttle-box-suporting rod, said rod and the box are lowered one compartment and the second shuttle from the top is thus brought into operation.

Raising the fourth box:—If the fourth shuttle from the top is called for, the cam wheel h^{21}, is operated until the projection h^3, has raised the lever to its highest position, when the pointed end of said projection engages the lug or stop f^{14}, as will be manifest.

From the foregoing it can readily be seen that when the cam-wheels are operated to raise the lever they are brought into engagement with the same by their respective angle-levers and are oscillated by the projections g, of wheel g°, while when the lever is to be lowered the spiral springs n', which by the former operation has been depressed and coiled tighter, perform the operation of returning (oscillating backward) the said cam wheels to their respective normal positions.

The mode of operation of the lower oscillating cam wheels h^{22}, and h^{23}, and the connecting lever f^7, is the same as that of upper cam wheel and its lever f^5. (*Adam Scheid, Harrison, N. J.*)

DU FAUR AND GARTNER'S SHUTTLE-BOX MECHANISM.

This motion is designed for Jacquard or witch-top looms. It is driven directly from the crank-shaft, by a double eccentric motion, an arm from one eccentric working the box pattern chain and an arm from the other eccentric working the cam-ratchet-wheels. It is an easy motion adopted for looms running at high speed.

Fig. 1, is a side elevation of a loom provided with the mechanism, certain portions being removed or broken away, and others shown in section, to better illustrate the nature of the box mechanism; Fig. 2, is a sectional view on the line x–x of Fig. 1, certain parts being added and others removed.

a, represents the loom frame, in which is arranged the driving-shaft b, carrying the eccentric c, and transmitting its motion, through the pitman e, pivoted, as at d, to said eccentric, to the lay or batten s, supported by swords f, which are fulcrumed, as at f^1, to the bracket-frames a^1, of the loom a, respectively.

At each end of the lay are arranged the shuttle-boxes f^2, carried by rods f^3, each of which rods is guided by the block f^4, secured to its respective sword.

On the shaft b, is also mounted an eccentric b^9, operating through its projecting arm b^1, the oscillating lever b^x, fulcrumed on the shaft b^3, the latter

having its bearing in the bracket-frame a^4. On said shaft is also mounted the sprocket-wheel b^2, carrying the pattern-chain b^4, which latter controls the treadle-levers b^6 and b^7, fulcrumed, as at b^5, to the projecting portion a^5, of the bracket-frame a^4. Any device for operating the treadle-levers b^6, b^7, can be used.

At the lower portion of the loom-frame a, is arranged a bracket-frame a^2, serving as bearings for the

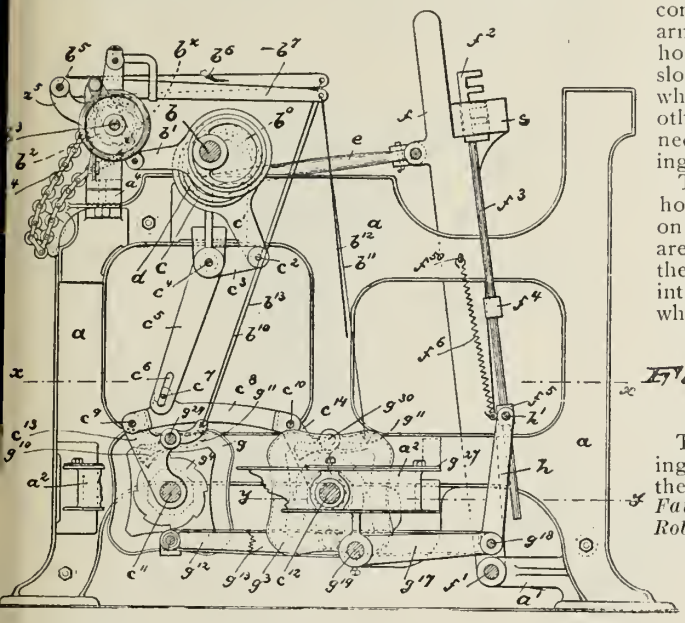


Fig. 1.

parallel cam-shafts c^{11} and c^{12}, which have their inner ends supported by the bracket-frames a^3.

On the cam-shaft c^{12}, which is provided at its forwardly projecting portion with a hand-wheel c^{15}, is secured the cam-groove wheel g^1, having integral therewith, the ratchet-wheel g^5, and the octagonal-shaped brake-wheel g^{24}. On said cam-shaft is also loosely mounted a sleeve, prevented from lateral movement by means of a collar on shaft c^{12}, which sleeve carries the cam-groove wheel g^3, the ratchet g^7, and the brake-wheel g^{20}. The projecting end of the sleeve c^{10}, is provided with a hand-wheel c^{18}, all as clearly shown in Fig. 2. As will be observed from said figure, the cam-groove wheels g^1 and g^3, and their respective ratchet and brake-wheels are arranged symmetrically with relation to each other, and the said ratchet-wheels are on the inner and the brake-wheels on the outer faces of said cam-groove wheels.

On the cam-shaft c^{11}, are arranged and mounted, in a manner similar to that described in connection with

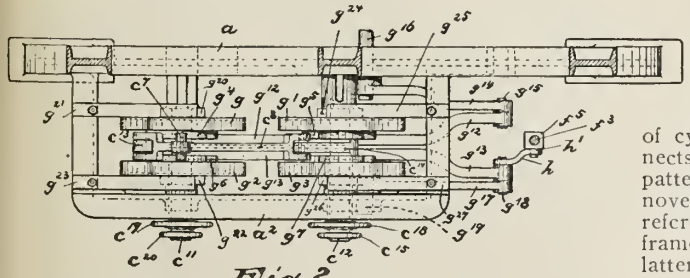


Fig. 2.

cam-shaft c^{12}. Fig. 2, the cam-groove wheels g and g^2, their respective ratchet-wheels g^4 and g^6, brake-wheels g^{20} and g^{22}, and hand-wheels c^{20} and c^{19}. (See Fig 2.)

The cam-groove wheels on one cam-shaft are in the same plane as the corresponding cam-groove wheels on the other cam-shaft and are each provided with an endless cam-groove consisting of four concave and four convex curves, arranged alternately and symmetrically, as clearly shown in Fig. 1.

On the cam-shafts c^{11} and c^{12}, are loosely mounted the oscillating levers c^{13} and c^{14}, respectively, pivotally connected at their free ends, as at c^9 and c^{10}, to the arm or link c^8, which latter is provided with the horizontally-arranged pin c^7, engaging the elongated slot c^6, of the free end of arm c^5, of an angle-lever which is fulcrumed, as at c^4, to the loom-frame. The other arm, c^3, of said angle-lever is pivotally connected as at c^2, to the arm c^1, carried by and projecting from the eccentric c, all as clearly shown in Fig. 1.

The oscillating levers c^{13} and c^{14}, are provided with horizontally-arranged pins g^{29} and g^{30}, respectively, on each of which pins and on each side of the levers are fulcrumed the pawls g^{10} and g^{11}, adapted to engage the respective ratchet wheels g^4, g^6, and g^5, g^7, to thus intermittently rotate the same (and the cam-groove wheels connected therewith).

The brake-wheel g^{20}, g^{22}, g^{24}, and g^{26}, which are octagonal-shaped, are each engaged and thus controlled by the flat springs g^{21}, g^{23}, g^{25}, and g^{27}, respectively, as clearly shown in Fig. 2 of the drawings.

The pawls g^{10}, and g^{11}, are connected at their projecting free ends by cords or wires b^{10}, b^{13}, b^{11}, b^{12}, with their respective treadle-levers b^6, b^7. (*Adolf Faber du Faur and Alfred Gartner, Newark, N. J., assignors to Robert Atherton, N. J.*)

DU FAUR'S MULTIPLIER.

The object of this mechanism is to provide a multiplier for box-looms, as explained in the preceding article, by means of which certain picks can be repeated without the use of a long and cumbersome pattern-chain.

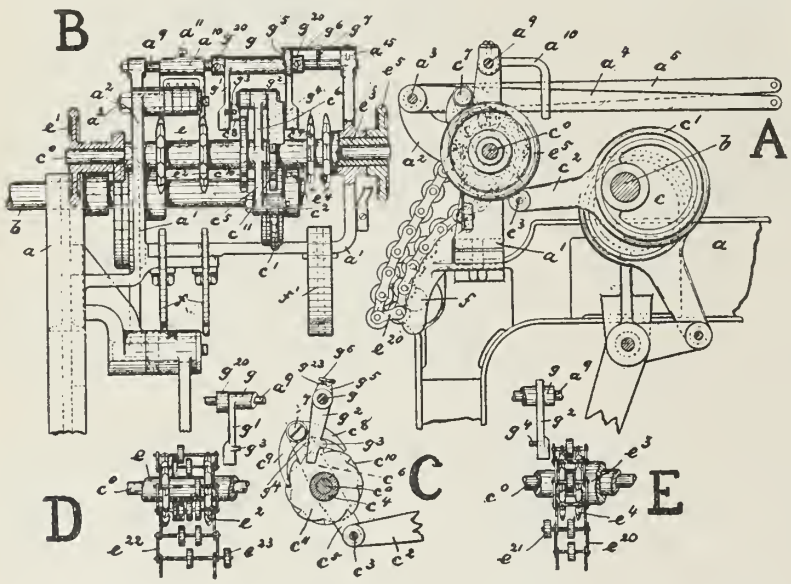
Fig. A, is a side elevation of this improved multiplier arranged on a portion of a loom-frame of ordinary construction: Fig. B, a rear elevation thereof, the pattern and auxiliary chain being removed; Fig. C, a detail view of the sprocket-wheel actuating and controlling mechanism; and Figs. D and E, detail views of the sprocket-wheels and of the pattern and auxiliary chains, respectively, carried thereby.

In place of using one chain as on his box motion explained in the preceding article, Mr. Du Faur uses in the present multiplier two chains. On the box chain is placed, where required, a long chain bar which extends out past the chain links and on which bar is placed a raiser every time "multiplying" is required. When this bar is raised to the top of cylinder it lifts an arm which stops the pattern-chain and starts the auxiliary chain. On this auxiliary chain is also placed, where required, a long bar having a riser placed thereon, and as soon as the pattern calls for another change of filling this long bar is brought to the top of cylinder, thus lifting a second arm, which disconnects the auxiliary chain and in turn connects the pattern-chain again. A thorough description of this novel multiplier is best given by quoting letters of reference of which a, represents a portion of a loom-frame, and a', a bracket-frame secured thereto, which latter furnishes the bearings for the shaft c^9, which is arranged parallel to the main driving-shaft b, mounted in the loom-frame a. On the shaft c^9, is securely mounted a sleeve e, having integral therewith the sprocket-wheel c^2, and ratchet-wheel c^{10}, and also the

wheel c', by means of which the shaft c^9, may be rotated by hand. On said shaft c^9, is also loosely mounted a sleeve c^3, having integral therewith the sprocket-wheel c^4, the ratchet-wheel c^{11}, and the hand-wheel c^5.

The ratchet-wheels c^{10}, and c^{11}, which have their teeth cut in opposite directions, are arranged in close proximity to each other and are separated by the sleeve c^4, loosely mounted on the shaft c^9, and provided with the arms c^5 and c^6. The free end of the arm c^5, is pivotally connected as at c^3, to the arm c^2, projecting from the ring or rim c', surrounding the eccentric c, which latter is secured on the main driving-shaft b. To the free end of the arm c^6, is secured the pin c^7, on which are arranged—and on each side of the arm—the pawls c^8 and c^9, adapted to engage the teeth of their respective ratchet-wheels c^{10} and c^{11}. (See Fig. C.)

In the bracket-frame a', and above and parallel to the shaft c^9, is secured the rod a^9, from which is adjustably suspended, by means of the set-screw a^{11}, the forked bracket a^{10}, serving as a guide for the levers a^4, a^5, fulcrumed on the stub-shaft a^3, which latter is secured in the projecting portion a^2, of the bracket-frame a'. Said levers are arranged above the sprocket-wheel c^2, and are adapted to be operated by the balls or rolls of the pattern-chain e^{22}, Fig. D, as will be manifest. On the rod a^9, is loosely mounted the sleeve g, which is prevented from lateral motion by the collar g^{20}, secured to said rod.



Integral with the sleeve g, or secured thereto in any desired manner are the depending arms g' and g^2, carrying the horizontally-projecting pins g^3 and g^4, adapted to engage the pawls c^8 and c^9, respectively, in a manner hereinafter described. The sleeve g, and its depending arms g', g^2, are held in operative position by means of the flat spring g^6, secured with one end to the projecting portion a^{15}, of the bracket-frame a', and provided at its other end with teeth engaging the notches g^{23}, arranged in lug g^5, which latter projects from the sleeve g. (See Fig. C.) The spring g^6, may be strengthened by the pin g^7, secured with one end substantially in the centre of the spring and with its other end to the rod a^9, all as clearly shown in Fig. B.

The pattern-chain e^{22}, is carried by the sprocket-wheel c^2, and rests with its depending portion on the slide or guide f, secured to and projecting from the bracket-frame a', while the auxiliary chain e^{20}, is carried by the sprocket-wheel c^4, and rests with its depending portion on the slide or guide f', also secured to the bracket-frame a'.

On one or more of the rods of the pattern-chain e^{22}, is arranged a ball e^{23}, in alignment with the depending arm g', and adapted at certain intervals to engage the said arm. The auxiliary chain e^{20}, is likewise provided with balls e^{21}, adapted at certain intervals to engage the depending arm g^2.

In operation a continuous oscillating motion is imparted from the main driving-shaft through the eccentric c, and arms c^2 and c^3, to the arm c^6, arranged on the sleeve c^4, and carrying the pawls c^8 and c^9. The pawl c^9, is normally held out of engagement with the ratchet-wheel c^{11}, by means of the pin g^4, and thus prevents rotation of the sleeve c^3, and the sprocket-wheel (carrying the auxiliary chain e^{20}) connected therewith. The pawl c^8, whenever the arm c^6, is oscillated from right to left, Fig. C, moves the ratchet-wheel c^{10}, and thus the pattern-chain e^{22}. The pattern-balls will thus come under and raise or operate the respective levers a^4 or a^5, thereby actuating the respective parts of the shuttle-changing mechanism to bring the required box in position to throw its shuttle. The pattern-chain continues to revolve until one box is required for more than one pick, that is to say, one of the levers a^4, a^5, is to be lifted and held in its raised position until the necessary picks or throws from the shuttle of the box, actuated from said lever, have been accomplished.

At the required moment the ball e^{23}, of the pattern-chain comes in contact with and throws or swings the depending arm g', carrying the pin g^3, outward until the said pin, after engaging the pawl c^8, has thrown the latter out of engagement with the ratchet-wheel c^{10}. Simultaneously the depending arm g^2, carrying the pin g^4, is thrown or swung inward, thus clearing the pawl c^9, and allowing the latter to engage the teeth of the ratchet-wheel c^{11}. The ratchet-wheel c^{11}, is thus rotated in a direction opposite to the direction of the ratchet-wheel c^{10}, and as it is in fixed connection with the sprocket-wheel c^4, the auxiliary chain e^{20}, is revolved or operated.

Said auxiliary chain continues to revolve until the respective pick has been repeated the required number of times. At that pick the ball e^{21}, comes into contact with and throws or swings the depending arm g^2, carrying the pin g^4, outward until the said pin has thrown the pawl c^9, out of engagement with the ratchet-wheel c^{11}, thus stopping the rotation of the latter. Simultaneously the depending arm g', carrying the pin g^3, is thrown inward, thus releasing the pawl c^8, which latter again engages the teeth of the ratchet-wheel c^{10}, and rotates the same. The depending arms g', and g^2, are held in their respective positions by the flat spring g^6, as heretofore described. It will thus be seen that when the ball e^{21}, of auxiliary chain e^{20}, engages the depending arm g^2, the said auxiliary chain is at rest, while the pattern-chain is rotated. On the other hand, when the ball e^{23} of pattern-chain e^{22}, engages the depending arm g', the said pattern-chain is stopped in rotation and the auxiliary chain started in a manner heretofore described.

To remedy defective picks, the sprocket-wheels c^2, and c^4, may be operated by hand forward and back-

ward by means of the wheels c' and c^5, respectively, as will be manifest. (*Adolf Faber du Faur, assignor to Robert Atherton, Paterson, N. J.*)

LUSCOMB'S SHUTTLE-BOX MECHANISM.

The object of the new mechanism is to provide a shuttle-box-operating mechanism for looms in which accurate and positive movement is imparted to the box or frame adapted to contain several shuttles which carry filling of varied colors or counts. The movement of the shuttle-box is rapid and accurate, and besides the shuttle-box is locked in position in the line of the shuttle-raceway between any two successive movements.

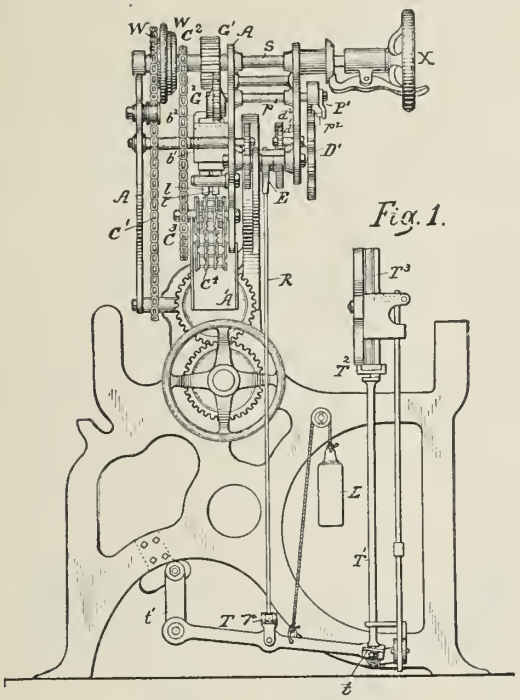


Fig. 1.

An advantage gained over a great many other motions of this kind is, that this motion can be thrown out of gear very handy when a weaver has occasion to turn the pattern-chain back by hand.

Of the accompanying illustrations, Fig. 1, is an end view of a loom showing the shuttle-box-operating mechanism in side elevation. Fig. 2, discloses the shuttle-box-operating mechanism in end elevation, viewing the same from the back of the loom. Fig. 3, shows the mechanism directly connected to the shuttle-box-lifting devices. Fig. 4, is a sectional drawing. Fig. 5, shows in detail an automatic release and stop-motion. Fig. 6, shows in detail a compound counterweight for balancing the weight of the reciprocating parts of the shuttle-box mechanism.

For explaining the mechanism, a shuttle-box with four compartments is selected, however a mere mechanical modification or reduplication of the device for raising and lowering the shuttle-box will enable that mechanism to be applied to shuttle-boxes of more or less than four compartments.

The shuttle-box T^2, is firmly secured to a rod T', which fits loosely at its lower end in the shoe t, on the free end of the lever T. A rod R, is joined by a flexible joint r, to the lever T, and forms the connection between the lever T, and a compound eccentric E. The lever T, is flexibly connected to the frame of the loom by a link t'.

The weight of the moving parts of the shuttle-box movement is counterpoised by the weight L, in its relationship to the other parts of the mechanism.

This counterweight is shown in detail in Fig. 6, and consists of two parts m', m^2, held together by a rod m^4, which is controlled by a spring m^6. The upper portion m', of the counterweight is turned down to a cylindrical projection m^3, which fits in a socket of corresponding dimensions at the top of the part m^2, of the counterweight. Into the part m^3, is screwed the rod m^4, which passes into the hole in the lower portion of m^2, in which the enlarged head of rod m^4, is fitted to slide. Spring m^6, holds the two parts of the counterweight together in such a manner that whenever the counterpart is lifted or dropped suddenly, the jolt of the movement is in part taken up by the yielding of the spring m^6.

The nature of the compound eccentric E, is seen by examination of Figs. 3 and 4. The rod R, is screwed into the tongue of the eccentric-strap e, which embraces the outer eccentric e', which in turn embraces and serves as a strap for the inner eccentric e^2.

The throw of eccentric e', is twice that of the eccentric e^2, so that if the throw of eccentric e^2, be regarded as the unit of the throw of the compound eccentric E, the rod R, may be lifted either one, two or three units, according to whether either or both of eccentrics e', e^2, are employed. The unit of throw is that which corresponds to a movement of the shuttle-box sufficient to shift it one shuttle-space.

Eccentric e^2, is integral with or screwed to the sleeve d, which rotates on the stud f, as a bearing. In the sleeve d, are cut gear-teeth which mesh with the pinion d', which in turn is driven by gear-wheel d^2, fast on the shaft, which is actuated by star-wheel D'.

The eccentric e', is slotted at e^3, and within that slot plays the pin f', secured to the crank-plate f^2, which forms an extension of the sleeve f^3, which, like the sleeve d, turns on rod f.

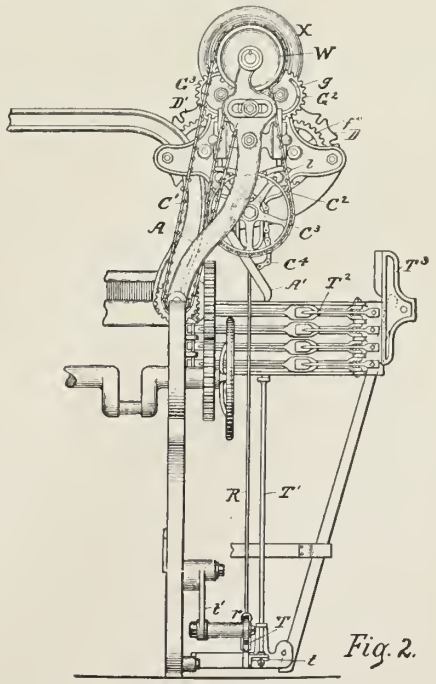


Fig. 2.

The sleeve f^3, is geared to mesh with the pinion f^4, which in turn meshes with the gear-wheel f^5, which is actuated by the star-wheel D.

Each of the trains of gears, actuated by star-wheels D, and D′, respectively, is designed to give the ec-

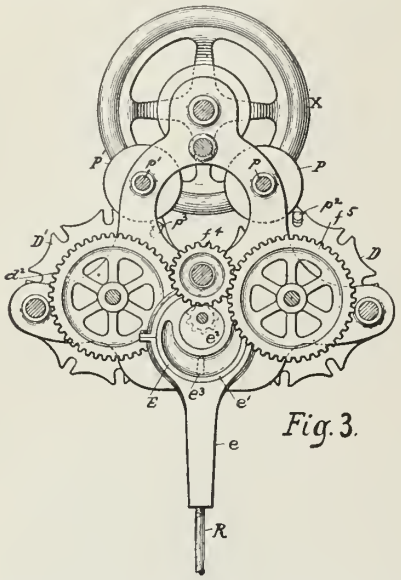


Fig. 3.

centrics e', and e^2, exactly one hundred and eighty degrees of revolution, so that each turn consequent upon the passage of one segment of the star-wheel will result in giving the eccentric its maximum throw.

As eccentric e', has an amplitude of throw twice that of eccentric e^2, the resultant throw of the two eccentrics may be made to be either one, two or three units, either up or down. If, for instance, eccentric e^2, is at the uppermost position of its throw and eccentric e', at its lowermost position and it is desired to move the shuttle-box system another unit of throw upward, simultaneous movement of the two trains of gears connected, respectively with star-wheels D, and D′, will result in the desired movement, eccentric e', moving two units up, while eccentric e^2, moves one unit down, subtracting its unit from the two of upward throw of eccentric e'.

The normal position of the system, as shown in the drawings, is the one in which the uppermost compartment of the shuttle-box T^2, is in line with the shuttle-raceway. The three other possible positions of the shuttle-box are secured by movement of the compound eccentric E. Determination of the movements of the compound eccentric E, is secured by the following mechanism:—

The intermittent movement of star-wheels D, and D′, is secured by the agency of pin-wheels P, and P′, mounted, respectively, on shafts p, and p', which shafts are adapted to slide longitudinally in their bearings in the machine frame. At the left-hand end of shafts p, and p', viewing the machine as in Figs. 1 and 4, are shipper cam-wheels G^2, and G^3. The wheel G^2, and its duplicate G^3, are spur-gears, meshing with the spur-gear G′, and having upon their faces flange-cams g. The wheels P, P′, are driven from the main shaft of the loom through the train of mechanism consisting of the chain C′, wheel W, and its shaft S, on which the spur-gear G′, is keyed. This gear meshes with gears G^2, and G^3, on shafts p, p'.

The rotation of the pin-wheels is continuous and their operation upon star wheels D, D′, determined by the lengthwise movement of the shafts p, p'. This movement is determined by the operation of the shippers b^2, which operate on the cam-flange g, by means of the finger b^3, and thumb b^4, Fig. 4. The shippers b^2, consist of plates sliding in boxes which form integral parts of the yoke b'. The lower ends of shippers b^2, extend through the boxes on b', and rest upon the ends of lifting-levers l, l', which are provided with toes l^2, resting upon the links of a pattern-chain C^4, which is moved at a uniform rate by means of the chain C^2, and wheel C^3, Fig. 1. Apron A′, is provided with means which insure a proper disposition of the slack loop of pattern-chain C^4, when the latter is unusually long. Through levers l, l', operated by the links of pattern-chain C^4, the shippers b^2, are raised or lowered. The movements of the pattern-chain C^4, are timed so that the movement of the shipper up and down shall occur when the cam-flange g, is making the upper half of its revolution. The finger and thumb b^3, and b^4, are so proportioned and disposed (see Fig. 4) that a movement of the shipper b^2, must result in a movement of shaft p' either to the right or left.

Viewing the machine as in Fig. 4, it is obvious that a movement of shaft p', to the left, will result in the engagement of star-wheel D′, by pin-wheel P′, and a consequent movement of the eccentric-rod R, through the trains of gears hereinbefore described. To effect this movement, let the lever l', be raised by a lug on pattern-chain C^4. Then the shipper b^2, will be pushed up into such a position that the thumb b^4, will upon the next half-revolution of the gear G^3, come into operative contact with the cam-flange g^2. This contact instantly throws the gear G^3, shaft p', and pin-wheel P′, to the left. The gear G^3, moves along the face of wheel G′, which is made sufficiently wide to permit this movement and at the same time continue its work of driving the gears G^2, and G^3, and their respective trains of mechanism. The longitudinal movement of shaft p', to the left, brings the flange g', under the guide portion of finger b^3, and so long as the shipper b^2, remains elevated, the star-wheel D′,

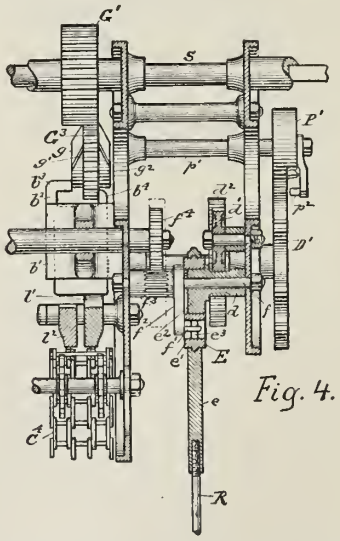


Fig. 4.

is rotated intermittently with every revolution of pin-wheel P′. As the pin p^2, of pin-wheel P, leaves the star-wheel notches, the disk portion of P, fits in the concave faces of the star-wheel sectors and locks the star-wheel between the intermittent movements of rotation. The same action takes place with pin-wheel P′, and its pin p^3. In order to throw star-wheel D′, out of operation, the reversal of the mechanical move-

ment just described, is effected by arranging the links of pattern-chain C', so that lever l', will drop and permit the shipper b^2, to rest in its normal position, as shown in Fig. 4. This movement, like the upward movement of lever l', and shipper b^2, takes place when the flange-cams g, are in the upper half of their revolution. The finger b^3, then operates to throw the gear G^3, and shaft p', with pin-wheel P', a sufficient distance to the right to throw the pin-wheel out of engagement with the star-wheel D', the disk portion of the pin-wheel remaining in the corresponding face of the star-wheel segment and locking the same in position.

The above description relates only to one of the star-wheels and its train of operating mechanism, but is equally applicable to the others.

Reduplication of the mechanism described in connection with either of the eccentric members e', e^2, and their respective actuating mechanism will render the shuttle-box-operating attachment capable of securing the requisite movement to a shuttle-box having more than four compartments or members.

In connection with the shuttle-box-lifting mechanism there is provided means for throwing the box-motion out of connection with the main shaft of the loom.

This disconnection may take place at the will of the operator who desires to manipulate the box-motion by hand, or automatically, when some obstruction to the movement of the shuttle-box renders instant disconnection with the source of power necessary. The portion of the mchanism contrived to secure these results is shown in Fig. 5, which is a detail of Fig. 1.

The driving-shaft of the shuttle-box mechanism is made in two parts S, and S', the outer shaft S, being

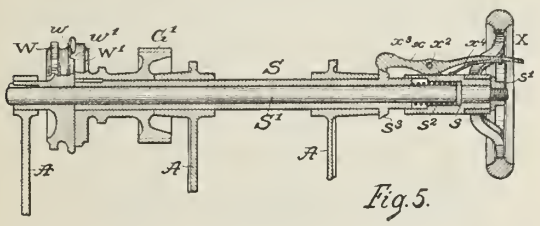


Fig. 5.

capable of sliding along the inner shaft S'. The main driving-wheel W, turns upon the inner shaft S', and is normally in engagement with the disk W', by reason of the interlocking of the tooth w', and the notch w, in disk W', and wheel W, respectively. At the end of the shaft S', remote from wheel W, is mounted the hand-wheel X. The hub of hand-wheel X, is bored out to receive the end of shaft S', upon which is the collar s, which rests against a shoulder of the hub of wheel X. The nut s', screws the wheel and hub to the shaft S'. The hollow shaft S, is inserted in the hub of wheel X, and in the space between shaft S', and the sides of the hole bored in the hub of wheel X, is placed a coil spring s^2, which, bearing against the collar s, at one end, and the end of hollow shaft S, at the other, constantly exerts its bias to hold disk W', against wheel W. This thrust of spring s^2, holds the disk W', and wheel W, normally in engagement with each other by means of the tooth and notch w', and w, heretofore described.

The hollow shaft S, has a collar s^3, integral with it, and which collar is turned to a bevel or conical surface, so as to permit the claw x^3, of notch x, to ride up when shaft S', is thrust to the left, as viewed in Fig. 5. A spring x^4, constantly presses the claw x^3, of catch x, against the conical surface of collar s^3.

If the operator desires to turn the shuttle-box mechanism by hand he has only to thrust the hand-wheel X, toward the disk W', against the pressure of spring s^2. The claw x^3, of catch x, rides up over the collar s^3, until it catches on the back side of the collar. With the parts in this position the spring s^2, is locked out of action and the shaft S', is moved through the hollow shaft S, until disk W', and wheel W, are turned out of engagement. Then through the mechanism shown and described in connection with Fig. 1, the shuttle-box-mechanism may be operated by hand. Likewise the mechanism of Fig. 5, is useful as an automatic release or stop motion whenever by chance the normal movement of the shuttle-box is interrupted or obstructed.

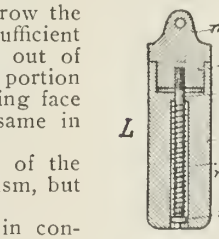


Fig. 6.

The sides of tooth w', and notch w, are inclined at such an angle that while under normal operation the spring s^2, holds the tooth and notch w, and w', in engagement with each other, the interposition of an obstruction will increase the sliding tendency of the inclined sides of the said tooth and notch w', and w, to such a point that the pressure of spring s^2, will be firm, and the tooth w', be thrown out of notch w. This results in a lengthwise relative movement of the shafts S, and S', so that the claw x^3, of catch x, hooks over the collar s^3, holding the wheel W, and disk W', out of engagement. In this position the mechanism is retained until the workman in attendance upon the loom can repair the damage or remove the obstruction. (*Andrew Luscomb, Fall River, Mass.*)

SHUTTLE-BOX FOR PLAIN LOOMS.

The object in the construction of this box is, to improve the shuttle-box end of the lay, whereby the flight of the shuttle may be started in the proper direction across the raceway of the lay.

In looms as now commonly made, having a binder in the back of the shuttle-box and an adjustable front plate, said front plate is constructed to present a straight face with short rounded ends.

The portion of the front plate next the end of the lay is adjusted and held in place at just the proper distance from the back plate to leave a space just sufficient to receive the shuttle as it comes to rest in the shuttle-box; but, if the face of the front plate, commencing at its end nearest the end of the lay, should be held parallel with the reed then the space afforded at the open mouth of the shuttle-box to admit the shuttle, would be too small and would not properly receive the shuttle should it be a little out of alignment as it passed the selvage-warps.

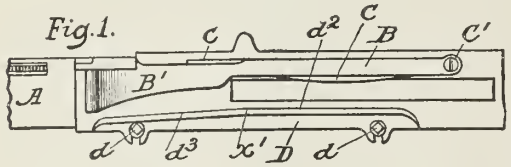
Consequently the face of the front plate is commonly set at an angle to the plane occupied by the face of the reed, and as a result thereof the shuttle, on its arrival in the box, may stop in an inclined position with relation to the face of the reed, and the shuttle when started in such position will be moved in an angular direction with relation to the face of the reed and will be thrown off, of the race of the lay into the shed, causing what is called a "smash."

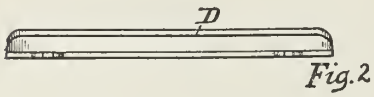
One of the chief purposes of the face-plate is to correctly position the shuttle in the shuttle-box or line it up in the box, so that when it starts on its flight after it has been struck by the picker, it will have a straight-line movement, and it will continue such movement from end to end of the lay.

To overcome the possibility of starting the shuttle in an angular direction, with relation to the direction of the lay and at the same time afford ample space

for the entrance of the shuttle in the shuttle-box should it have deviated somewhat from a straight line at the time it emerged from the shed, a novel front plate is arranged having two straight or plane surfaces, one intersecting the other at a slight angle, that part of the straight face of the improved front plate nearest the outer end of the shuttle-box, being set substantially parallel with the reed, the second portion of the straight face nearest the open end of the shuttle-box being inclined from the junction of said angle somewhat outwardly toward the breast-beam to thus form an enlarged entrance for an incoming shuttle, the said shuttle when it reaches the picker in the box being positioned parallel with the lay by the straight face of the front plate nearest the outer end of the lay and remaining in that position when it is struck by the picker and during the first part of the flight being guided in a straight line parallel to the reed.

Of the accompanying illustrations Fig. 1, in plain view, shows one end of a lay with the improvements added, and Fig. 2, is a side elevation of the front plate detached.





A, indicates the lay; B, the back plate of the shuttle-box, having an overhanging lip B', at the entrance end of the box. C, indicates the binder as pivoted at C'.

The front plate D, forming one side of the shuttle-box, has slotted ears, which receive the screws d, used to connect the front plate adjustably to the lay. The face of the front plate from near its end nearest the end of the lay is made straight, as at d^2, to substantially the point x', and from that point toward the opposite end of the front plate the face is also straight, but the second straight-line face d^3, is at an obtuse angle to the straight-line face of the other part of the front plate. The straight face d^2, is located substantially parallel to the reed carried by the lay, so as to insure the proper position for the shuttle when fully into the shuttle-box, so that as the picker strikes the shuttle to throw it from the box through the shed, the said shuttle will start straight.

By inclining the face d^3, ample entrance for the shuttle into the box will be insured, and thereafter the straight face d^2, will correctly position the shuttle preparatory to a new flight. (*Draper Co.*)

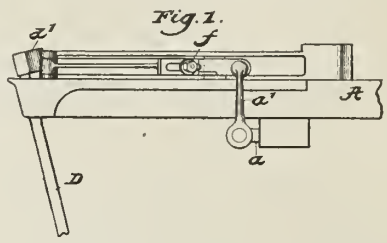
NORTHROP'S SHUTTLE-CHECK FOR PLAIN LOOMS.

The object of this check is the construction of a binder whereby the same may be adjusted in such manner as to present more or less of its swell in the box to check the shuttle or raise the dagger higher.

The free end of the usual binder used in looms is commonly acted upon by the protector-rod finger.

In this check the binder is made in two parts, one part being adjustable on the other part, whereby by a greater or less adjustment of one part on the other, a greater or less projection of the swell of the binder into the shuttle-box may be effected.

Fig. 1, in side elevation, represents part of one end of a lay and part of a picker and its stick and the



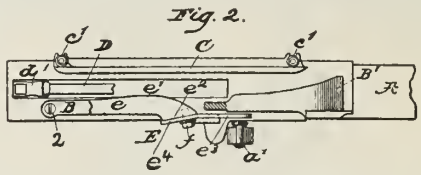
improved binder; and Fig. 2 is a top or plan view of Fig. 1, with the part of the back plate of the shuttle-box broken out to better show the improved binder.

A description of this shuttle check is best given by quoting letters of reference.

A, indicates the lay; B, its back plate having an overhanging lip B'. C, is the adjustable front plate connected by screws c'; D, is the picker stick, and d' the picker; a, the stop-rod, and a', its finger.

The binder E, pivoted at 2, is shown as made of two parts, the part e, having the swell e', and at its back an inclined seat e^2 and a part e^3, having an angular end e^4, said end bearing on said seat, the part e^4, being slotted to receive a threaded stud, on which is placed a clamping-nut f.

With the parts in the position shown in the drawings the swell of the binder projects its greatest amount into the shuttle-box; but to secure a less projection of said swell into the shuttle-box the nut f, may be loosened and the end e^3 be adjusted on the stud to the right, such adjustment putting the fore end of the part e^3 in a different vertical plane with relation to the acting face of said swell, and when in



the desired or proper position the nut will be again set to hold the parts firmly. (*Draper Co.*)

SHUTTLE-BOX FOR NORTHROP LOOMS.

In automatic looms, or looms in which the shuttle is replenished with a bobbin while the shuttle is in the shuttle-box and the loom in motion, it is necessary in the operation of supplying the shuttle with a bobbin or filling-carrier that the shuttle always occupies as nearly as possible exactly the same position in the shuttle-box whenever the pusher used to push the filling-carrier from the usual filling-carrier feeder into the shuttle acts, the filling in the shuttle having been exhausted or broken.

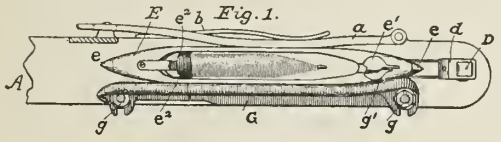
To accomplish this is the object of the present invention, *i. e.*, securing a definite position for the shuttle in the shuttle-box.

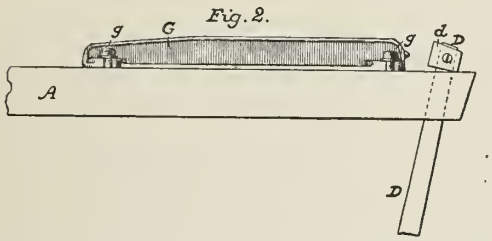
Fig. 1, is a top or plan view of a part of lay with its shuttle-box and a shuttle therein, and Fig. 2, is a front elevation of the same.

The lay A, having at its end a shuttle-box slotted through from top to bottom, as shown by dotted lines,

Fig. 2, the binder a, the spring b, acting thereon to normally keep the binder pressed into the box, the picker-stick D, having a picker d, and the shuttle E, having tips e, a suitable self-threading device e' and suitable jaws e^2 to receive the ringed head of a bobbin or filling-carrier, are substantially as explained in the previous article "Northrop's Shuttle Check for Plain Looms," and in practice this loom will have coöperating with it a filling-carrier feeder and a pusher, to put a fresh filling-carrier into the shuttle whenever the filling has been broken or exhausted in the shuttle.

To insure the correct positioning of the shuttle in the shuttle-box under the pusher referred to, the





shuttle-box is provided at its front side with a front plate G, having ears presenting elongated opening for the reception of screws g, by which to confine the front plate in adjusted position. The inner side of this front plate, (see Fig. 1) near its outer end, is provided with an inclined surface g', of such shape as to conform, substantially, to the contour of the shuttle just back of its point e, so that as the said shuttle arrives fully into the box its inclined side will meet and bear against the inclined face of the front plate, the further movement of the shuttle in that direction being stopped by the said incline g', the binder acting on the shuttle at its opposite flat side back of the pointed end, thus seating the shuttle against the said incline g', so that the said shuttle will be checked and positioned correctly with relation to the slot in the lay, through which the spent filling-carrier in the shuttle may be ejected. The rigid front plate acts to receive against it the front side of the shuttle, the shuttle being acted upon at its rear side by the binder, which coöperates with the flat or straight side of the shuttle between its poined ends, the binder exactly positioning the shuttle with its filling-carrier, so that the latter may be correctly ejected from the shuttle and so that the shuttle will be so placed that the transferrer, whenever it operates, can unerringly put a new filling-carrier into the shuttle, and, further, the binder being extended along the back of the lay throughout the length of the shuttle prevents any possible displacement of the shuttle with relation to the width of the lay and the slot made in the same, as described. (*Draper Co.*)

WERNER'S SHUTTLE-CHECK.

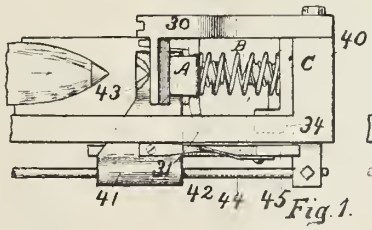
The object of this device is to provide a simple and effective check or buffer adapted to be quickly assembled and disposed in looms already in use and readily removed therefrom, as required, without loss of time or the services of a machinist, and whereby, in the use thereof, the shuttles may be more gradually brought to rest, and the shocks and jars, as well as the wear on the pickers, incident to machines of this character, thereby materially reduced.

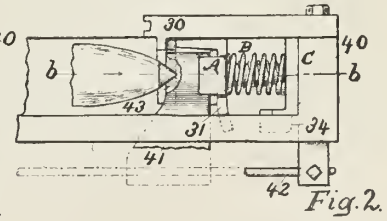
Fig. 1, is a top view of the check, showing the shuttle moving into position to engage the picker and the buffer device in its normal inoperative position with its buffer expanded. Fig. 2, is also a top view showing this buffer device with its buffer compressed, to thereby check or cushion the shuttle.

Heretofore it has been the usual practice to form a buffer by means of cotton or other suitable waste placed in the rear of the picker; but such a buffer is not only unreliable, in that it has no uniform resistance, and therefore permits the picker and the shuttle to come to rest in various positions at different times, but it also becomes, in a short time, compressed into a rigid and practically solid mass, and thus materially loses its action as a buffer.

To obviate these defects and disadvantages, is the object of this buffer device, simple in construction, and effective in operation, and in the use of which, by reason of the uniformity of resistance furnished, the device materially assists in maintaining the regularity and perfect operation of the loom, and also, by reason of the relatively long stroke of the buffer block or head as compared with buffer means heretofore in use, the shuttle is brought to rest more gradually, so that it can be held in the shuttle-box by a less powerful shuttle-binder, and consequently requires a less powerful blow of the picker-staff in order to drive the shuttle out of the box and through the shed into the opposite shuttle-box of the loom, whereby the loom can be operated with less power and a material saving thereby effected, not only in power, but in continuity of operation and cost of maintenance.

The buffer device comprises in a general way, a buffer block or head A, preferably composed of metal, although any suitable material might be used, such as raw-hide, adapted to engage the picker-head when in its position of rest; a buffer B, comprising one or more springs, herein shown, however, as two in number, preferably one inside of or superimposed upon the other, adapted to cushion and counteract the





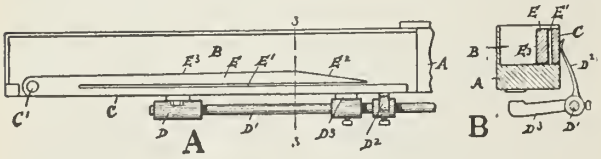
thrust of the shuttle and permit the same to gradually come to rest on its engagement with the picker-head, and a base-block C.

In the use of this device, the picker having been placed in its race 35, with the shank 41, thereof carried by the guide-rod 42, and connected by the strap 44, to the picker-staff 45, the buffer-head is placed in position with its guide-arms 30, and extension 31, in their respective positions, to permit the buffer-head to engage the picker-head 43. The base-block is then placed in position with its rear face, engaging the transverse wall 40, and its wings or extensions 34, in the recess 36. The springs are then compressed and placed in position intermediate the base-block and the buffer-head, and the device is then in position for use, and when the shuttle, by means of the picker and picker-staff, is forced through the shed and the end

thereof strikes one of the pickers, the springs are compressed. (See Fig. 2.) The force of the blow is thereby taken up, the shuttle and the picker cushioned with uniform regularity, and the shuttle permitted to gradually come to rest. (*Louis C. Werner, East Windsor, Connecticut.*)

COWGILL'S SHUTTLE-BINDER.

This binder is an excellent device for single box looms running at high speed, and is shown in the accompanying illustrations of which Fig. A, represents a top view of one end of the lay of the loom, showing one of the shuttle-boxes having such a shuttle-binder attached. Fig. B, is a sectional view on line 3-3, of Fig. A.



Quoting letters of reference will clearly explain the construction and operation of the device.

A, denotes a portion of the lay of the loom. B, denotes one of the shuttle-boxes, and C, the binder, pivoted upon a stud C′, with the inner side of the binder C, placed in the path of the shuttle, so that when the shuttle enters the box B, the binder C, will be swung upon the stud C′, and the free end of the binder moved outward.

Journaled in bearings D, which are attached to the lay, is a protector-rod D′, to which is attached a finger D^2, with its end bearing against the binder C. A weighted arm D^3, is attached to the protector-rod and extends beneath the lay, so that its weight will rock the rod and hold the end of the finger D^2, pressed against the outside of the binder C, with a uniform pressure, or in lieu of the weighted arm D^3, a spring can be applied to rock the rod D′.

The binder C, consists of a bar of wood pivoted upon the stud C′, and provided upon its inner side with an elastic finger E, integral with the bar C, and separated from it by the saw-kerf E′. The finger E, has its free end scarfed at E^2, for the incoming shuttle to strike against, and the binder is held in its normal position with the inner side E^3, of the elastic finger lying within the path of the shuttle, so as to exert a friction upon the shuttle as it is received within the box. As the incoming shuttle strikes against the scarfed end E^2, of the elastic finger E, the finger yields slightly to the impact of the shuttle, gradually checking the momentum of the shuttle as it approaches the end of the box. The continued motion of the shuttle, however, after pressing the elastic finger, causes the free end of the binder to be moved out, thereby rocking the protector-rod D′.

This method of construction not only renders the binder extremely cheap and simple, and obviates entirely the employment of a tempered spring-blade attached by screws or bolts, but it also provides a binder which is extremely sensitive to the impact of the shuttle, and causes the momentum of the shuttle to be gradually retarded, as the resistance of the elastic finger is chiefly expended to control the action of the shuttle during the period of its impact against the scarfed end E^2. In practice, a binder constructed and operating as herein described, renders the loom capable of considerably increased speed. (*James Cowgill, Lowell, Mass., assignor to David L. Bradt and William J. Woods, Worcester, Mass.*)

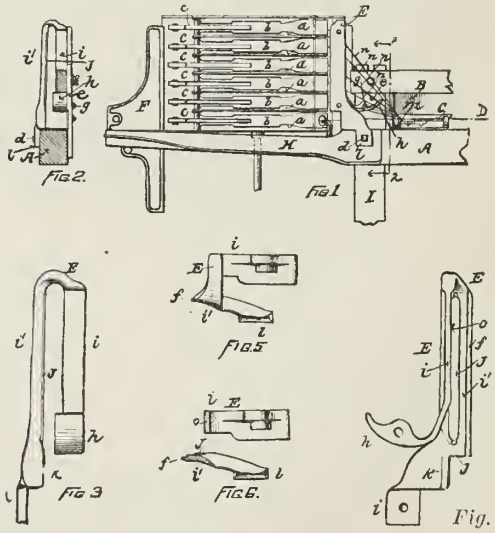
NOLAN & WILKIE'S MOUTHPIECE FOR LOOM SHUTTLE-BOXES.

The object of this mouthpiece for shuttle-boxes for any kind of loom, is to provide means for preventing the yarn of the shuttles in the raised shuttle-boxes from being drawn into the shed with the yarn of the outgoing shuttle; to prevent the straining or breaking of the yarn by engagement between the side of the traveling shuttle and the side of the shuttle-box mouthpiece and to force the shuttle into the box if it does not fully enter the same.

Fig. 1, represents a front side view of the shuttle-boxes and the mouthpiece with a portion of the lay-beam. Fig. 2, represents a vertical section taken in the line 2-2, of Fig. 1, showing a front edge view of the mouthpiece. Fig. 3, represents an enlarged front edge view of the mouthpiece. Fig. 4, represents an enlarged rear side view of the same. Fig. 5, represents an enlarged top view. Fig. 6, represents a horizontal section.

A, represents the lay-beam; B, the reed; C, the loom-temple, and D, the line of the web. The mouthpiece E, is provided with a recessed lip *f*, which serves to guide the up-and-down movement of the forward edge of the drop-shuttle boxes *a*, in which the shuttles are held by the shuttle-binders *b*, which are actuated by means of the springs *c*. The rear edge of the shuttle-boxes is guided in its up-and-down movement by the plate F, which is secured to the arm H, extending outward from the lay-beam A.

The mouthpiece E, is secured to the lay-beam A, by means of the bolt *d*, and to the upward extension *e*, of the lay-sword I, by means of the bolt *g*, the curved surface *h*, of the rear arm *i*, of the mouthpiece serving to guide the nose of the shuttle into its shuttle-box, and the inclined surface *j*, of the said



arm serving upon the upward movement of the shuttle-boxes to force the shuttle completely into its box, in case it has not fully entered the same from the shed, thus preventing the liability of accident to the shuttle-box mechanism, and the upright plane surface *o*, of the said arm *i*, serves to prevent the endwise forward movement of the shuttles from the raised boxes.

The arm *i′* of the mouthpiece E, is offset backward from the attaching-ear *l*, in the direction of the line of the lay-beam, so that the extreme inner surface *k*, at the lower proportion of the offset-arm *i′* will only bear against the shuttle when the shuttle is close

up to the shuttle-box, and the backward position of the said bearing-surface serves to prevent the yarn from the shuttles in the raised shuttle-boxes from being caught and broken between the inner surface of the mouthpiece and the side of the traveling shuttle, and the yarn is prevented from being discolored by contact with the outside of the shuttle, as in the mouthpieces heretofore employed.

Another advantage of this construction consists in the saving effected in the wear of the shuttles. The striking side of the end of the shuttle when passing through the ordinary shuttle-box mouthpiece is liable to engage with the forward edge of the shuttle-box, whereby the end of the shuttle becomes worn and splintered, so that in a few months it becomes useless, whereas when the bearing-surface of the shuttle-box mouthpiece is offset from the attaching-ear *l*, so as to carry the bearing-surface farther than heretofore toward the mouth of the acting shuttle-box, the shuttle is prevented from coming in contact with the forward end of the shuttle-box and the lasting qualities of the shuttle are increased.

To the inner side of the upright arm *i'* of the mouthpiece E, which extends above the line of the acting shuttle-box, is secured the friction-cushion J, made of a strip of felt or woolen cloth, serving to support the threads of yarn *n*, which extend from the selvedge *m*, of the woven web D, at the loom-temple C, to the several shuttles in the raised shuttle-boxes *a*, and when the yarn is so supported by the cushion J, it will not be drawn into the shed by entanglement with the yarn of the outgoing shuttle.

By the use of the thus explained improved attachment to a loom, the selvedges of the web may be woven in a perfect manner, so that the trouble and expense of repairing the selvedges is avoided. (*Messrs. Nolan and Wilkie, Pawtucket, R. I.*)

GARTNER'S SELF-ADJUSTABLE SHUTTLE-BOX-SUPPORTING ROD.

Fig. 1, is a front elevation of a portion of a loom provided with the improvement; Fig. 2, an enlarged detail sectional view of the self-adjustable shuttle-box-supporting rod.

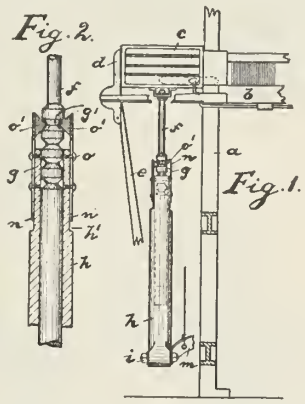
In said drawings, *a*, is the loom-frame; *b*, the lay; *c*, the shuttle-box; *d*, the extended portion of the lay; and *e*, the picker-stick.

To the bottom of the shuttle-box *c*, is secured the shuttle-box-supporting rod *f*, provided at its enlarged portion *g*, with a series of annular **V**-shaped grooves *g'*. Said enlarged portion *g*, of the rod *f*, is arranged and adapted to operate in the tube or hollow rod *h*, pivotally secured at *i*, to arm *m*.

In the upper portion of the tube are arranged a series of vertical grooves *h'*, in each of which is adjustably secured a flat spring *n*, provided with a vertical slot, through which the tightening screws *o*, pass.

The upwardly projecting portion of the spring *n*, is provided with a **V**-shaped block *o'*, adapted to rest, when in normal position, in one of the grooves *g'*.

In operation, should a shuttle become jammed between the box and the raceway, or should the shuttle-box be stopped in its downward movement by any other cause, the block *o'*, will be forced outward



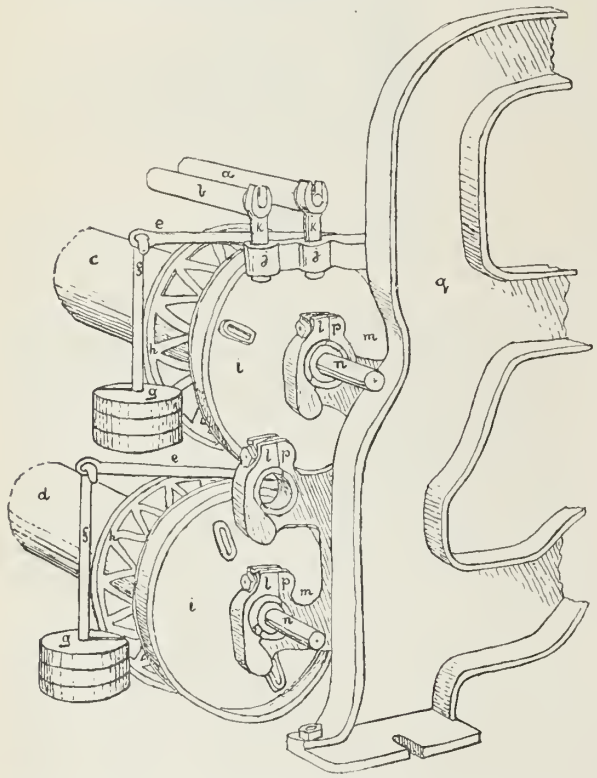
out of engagement with the **V**-shaped groove *g'*, and the rod *f*, with its enlarged portion *g*, will slide down in the tube *h*, thereby avoiding breakage without interfering with the movement of the shuttle-supporting-rod operating mechanism.

The chief object of this device is to protect the shelves from breaking when anything catches or breaks on the picking motion. Frequently, on account of the breaking of the picking-stick, picking-straps, picker, or pull-back spring, the picker is left to the front end of the box when said box is about to change. There is a stiff spring on the box-rod for the purpose to give way by such accidents, but it is necessary to have this spring very stiff on the rod, so as to hold the boxes steady in position, and for this reason a shelf or lever will frequently break before the spring will act. To overcome this trouble is the object of the present device. The **V**-shaped blocks will at once be pulled from the grooves and thus allow the box to remain still, in turn avoiding breakage of any kind to any part of box or levers. (*Alfred Gartner, Newark, assignor to Robert Atherton, Paterson, N. J.*)

LET-OFF MECHANISMS.

THE KNOWLES FRICTION LET-OFF MOTION.

The same is shown in the accompanying illustration and best explained by means of quoting letters of references of which *a*, indicates the back warp roll for the top beam *c*. *b*, is the back warp roll for lower beam *d*. *k*, are the pockets setting in back roll stands *j*, for the back warp rolls *a* and *b*. It is always best to set back warp roll *b*, a little higher than back warp roll *a*. *e*, indicates the friction levers and *f*, the racks for



holding weights *g*. *h*, indicates the inside beam-heads or flange-heads. *i*, the outside beam-heads having hub bearings *m*. *n*, the beam shaft. *l*, are the lock levers to hold beams in beam stands *p*. *q*, is the loom side.

Beam heads *i*, are the Knowles Patent Ratchet Beam heads explained in the article on the Knowles Warp Beam. (*Crompton and Knowles Loom Works.*)

THE KNOWLES WARP SLACKENER.

It frequently happens in drop-box looms, that by reason of the breaking or catching of the picker, shuttles are placed in the wrong box, and when, for any reason, one shuttle fails to leave its box at the proper time, a shuttle coming from the other side of the loom, not being able to enter the right box, will remain in the shed or warp, so that when the lay beats up, the shuttle will cause a breakage of the warp threads, before the loom stops.

The object of the warp-slackening mechanism is to prevent the breaking of the warp threads, above referred to, and to provide an auxiliary mechanism, combined with the ordinary mechanism of the loom, to cause the warp to be automatically slackened, by the tension on the warp, as the lay beats up, in case one or more shuttles stop in their passage across the lay. Thus the present Warp Slackener is also a "smash protector."

Referring to the accompanying drawings: Fig. 1 is a sectional elevation of the auxiliary attachment showing the parts thereof in their normal or working position, and also showing a portion of the lay sword, and lay and connections thereto. Fig. 2 corresponds to Fig. 1, but shows the auxiliary attachment after the same has been operated to slacken the warp. The lay sword and lay, shown in Fig. 1, are not shown in this figure. Fig. 3 is, on a reduced scale, a detail of one end of the back roll and rod, looking in the direction of arrow A, Fig. 1, showing the curved or bent construction of the end thereof.

The method of operation of the mechanism will be best explained by means of numbers of references in the accompanying illustrations, and of which 1 is the bottom wooden girt, 2 is a stand bolted thereto by a bolt 3, and 4 is the upper portion of one of the back roll stands, at one end of the loom, which stand is secured at its lower end to the loom side, not shown.

5, is the back roll, supported at its end in the bearing 4', on the stand 4, and adapted to rock therein. Said back roll 5, has, in this instance, its end curved or bent downwardly, as shown in detail, Fig. 3, which is an ordinary constuction of the back roll. 6, is an arm extending up from said roll 5, and supporting at its upper end one end of the rod 7, over which the warp 8, from the warp beam 9, passes to the harness.

In the stand 2, attached to the bottom girt 1, is loosely mounted, to have a vertical motion therein, the upright spring actuated rod 10. Said rod 10, is supported in the stand 2, and has a yielding motion therein, by means of the spiral spring 11, bearing at its lower end upon the upper surface of said stand 2, and at its upper end against a collar 12, adjustably secured to the rod 10, by a set screw 13. A collar 14, is adjustably secured to the lower end of the rod 10, by a set screw 15, and extends below the stand 2, to prevent the rod 10, from being raised out of said stand. The upper end 10', of the spring actuated rod 10, is pivotally connccted by a pin 16, with one end of the arm 17. The other end of said arm 17, is provided with a hub, loosely mounted on the back roll 5. On the lower end of the downward projection 17", of the arm 17, is pivoted, on a pin 18, a rocking locking arm 19, the upper end 19', of which is pivotally connected, through a link 20, with the connector 21, leading to and connecting with the lay 36, see Fig. 1, carrying the lay beam 37, supported on the lay sword 38. The connector 39, connects the lay with the crank-shaft, not shown, through which motion is communicated to the lay. The rocking locking arm 19, has a forward extension 19", provided with a side flange, or horizontal lip 22, extending out from one side thereof. Said locking arm 19, has also the rearward projection 19"', provided with a stud 23, adapted to engage the upper end of the swinging arm 24, pivoted at its lower end on the pin 18, and provided at its upper end with a side flange, or horizontal lip 24', extending out in the same direction as the lip 22, on the locking arm 19.

Combined with the back rod 7, is a clamping device for holding said rod in its normal position, as shown in Fig. 1, except when a sufficient tension is put upon the warp, by a shuttle stopping in its passage across the lay, to cause said clamping device to operate to release the back rod, and allow the same to rock inwardly, to slacken the warp, as shown in Fig. 2.

Said clamping device consists of an arm 25, provided at one end with a hub 25′, mounted on the back roll 5, and secured thereto by a set screw 26. The other end 25″, of the arm 25, extends up at substantially right angles to the straight portion thereof, and is provided with a recessed portion 25‴, adapted to engage one side of a stud 27, extending out from the arm 17,

The extreme end of the portion 25″ of the arm 25, has an opening therein, in which is secured a block 28, by a set screw 29. The block 28, extends out from one

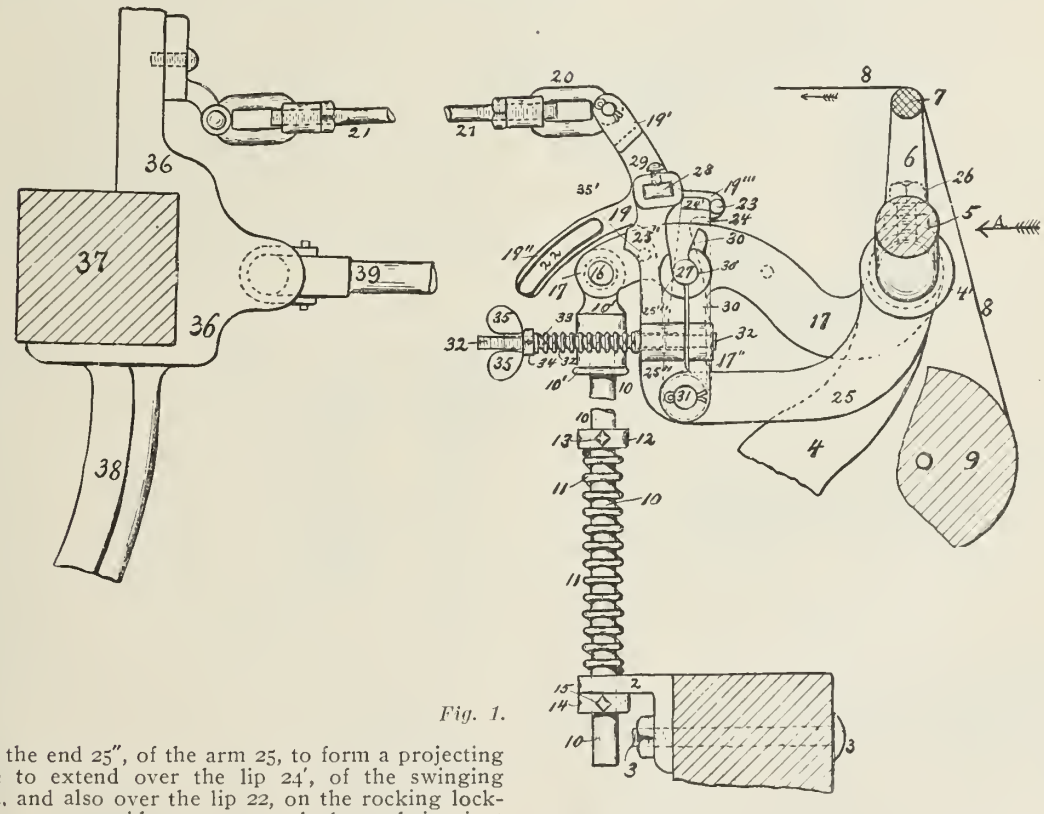


Fig. 1.

side of the end 25″, of the arm 25, to form a projecting surface to extend over the lip 24′, of the swinging arm 24, and also over the lip 22, on the rocking locking arm 19, as said arms are rocked on their pivot point.

Combined with the end 25″, of the arm 25, to form the movable jaw for engaging, in connecting with said end 25″, the stud 27, is an arm 30, pivoted at its lower end on a stud 31, on the arm 25, and provided at its upper end with a recessed portion 30′, adapted to engage in connection with the recessed portion 25‴, of the end 25″, the stud 27, on the arm 17. The arm 30, forming the movable clamping jaw, is yieldingly connected with the end 25″, of the arm 25, forming the stationary clamping jaw, by a spring actuated rod 32, extending loosely through hub portions on the end 25″, and arm 30, and headed at its inner end to prevent it from being drawn out from said hubs.

The rod 32, is encircled by a spiral spring 33, one end of which bears against the edge of the end 25″, of the arm 25, and the other end against an adjustable nut 34, held by the thumb nut 35, screwed on to the outer end of said rod 32. On the arm 17, is a pin 35′, which limits the motion of the swinging arm 24, away from the pin 23.

The clamping device above referred to is spring actuated, and is not a positive device for holding the back rod 7, in its upright position, and in order to have the device act quickly at the proper time, a comparatively light tension is put upon the clamping arm 30, so that the ordinary tension of the warp 8, passing over the back rod 7, might rock or move inward the said back rod, and cause the arm 30, to be disengaged from the stud 27, to release the clamping mechanism.

In order to prevent the accidental releasing of the clamping mechanism, and the slackening of the warp, except at the proper time, there is provided an auxiliary attachment, which operates to positively lock and prevent the releasing of the clamping mechanism, to slacken or loosen the warp, except when the lay on its forward movement reaches a point where a shuttle remaining in the warp would break out the warp, unless the warp was immediately slackened or loosened, and at this point the locking mechanism for the back rod clamping device is so constructed, that the clamping device is free to release the back rod and slacken the warp.

The length of the lip 22, on the rocking arm 19, in connection with the lip 24′, on the swinging arm 24, is a little less than the distance covered by the movement of the lay; and on the forward throw of the lay the lip 22, extends under the block 28, to prevent the disengagement of the clamping device, as the lay beats up, and in case there is no shuttle remaining in the warp, the continued forward motion of the lay moves forward the swinging arm 24, by the engagement of the stud 23, therewith, to bring the lip 24′, under the block 28, to lock the clamping device during the

remainder of the forward motion of the lay. After the lip 22, has passed from under the lock 28, and before the lip 24', passes thereunder, in case a shuttle

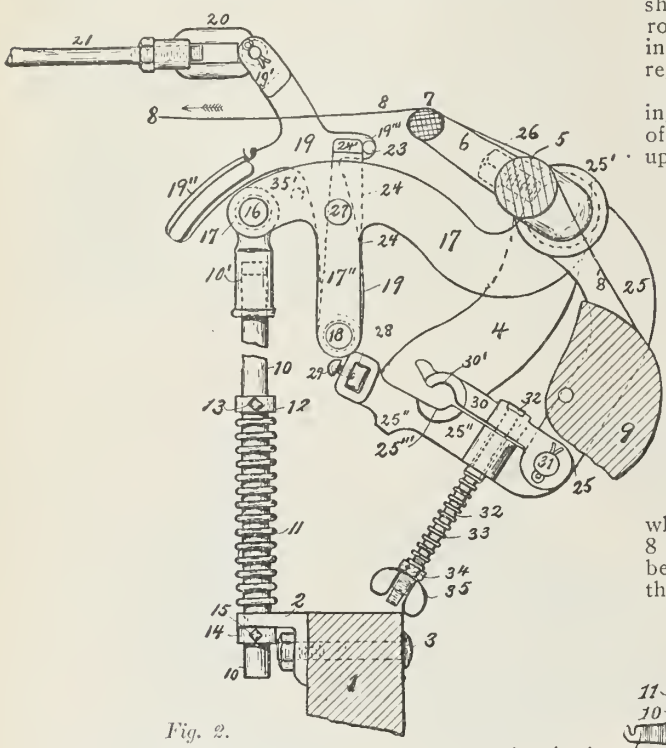


Fig. 2.

remains in the warp, the lay is at that point in its forward movement where the tension on the warp will be sufficient to disengage the clamping device, and at this time the block 28, is free to drop, to release the back rod and loosen or slacken the warp. On the return movement of the lay, the lip 24, bearing against the inner end of the lip 22, is moved backward to pass under the block 28, until the swinging arm 24, has passed by its centre, when it will drop back to engage the pin 23, preparatory to again being moved forward on the forward beat of the lay, to operate, in connection with the lip 22, to lock the clamping device, as before described. (*Crompton and Knowles Loom Works.*)

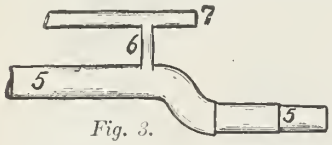


Fig. 3.

THE MASON WHIP-ROLL.

Whip-rolls or bars are usually supported at the rear of the loom and are held in the normal position by a spring acting on a lever, which is secured to the shaft of the whip-roll.

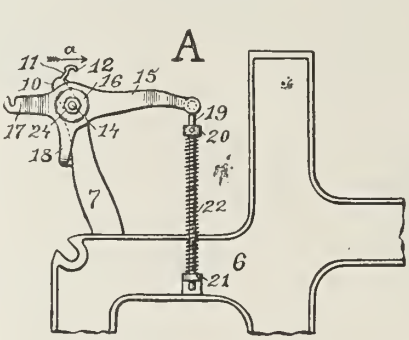
The surface of the whip-roll, or the bar on which the warp is supported, is offset on one side of the axis of the shaft or the bearings of the whip-roll, so that the whip-roll forms a long crank. The whip-roll is held in the normal position by a lever, the longer arm of which bears on a spring, which tends to raise the whip-roll and exerts a yielding tension strain on the warp and gives way to the strain when the warp is sprung to form a shed.

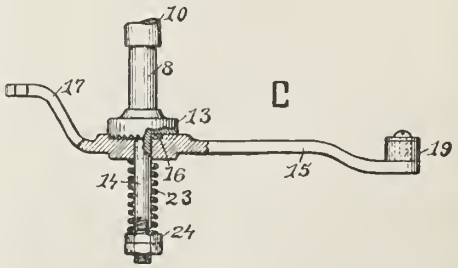
The object of the Mason improved construction of a whip-roll is to increase the capacity of the whip-roll to yield to the strain on the warp, so that when a shuttle from any cause stops in the shed the whip-roll will yield to the strain, and thereby prevent the smashes which happen when the warp is sprung while the shuttle is between the warp. Thus the present whip-roll is also a "smash protector" on account of its action in case the shuttle is caught in the shed and the regular protecting rod on the loom refuses to work.

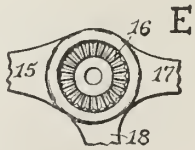
A spring whip-roll is also of advantage for the weaving of various kinds of textile fabrics, taking off some of the strain on the warp when the reed and lay beat up the filling.

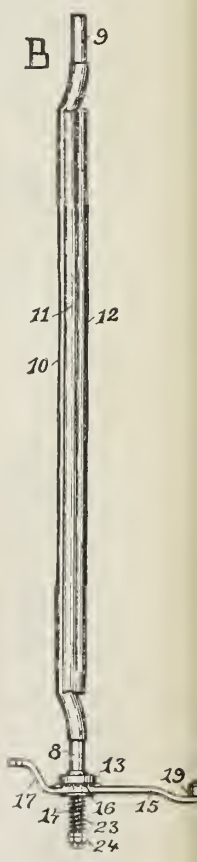
Of the accompanying illustrations diagram A, represents a view of portions of a loom and the improved whip-roll in position, the direction of the movement of the warp being indicated by the arrow *a*. Diagram B, represents a plan view of the whip-roll and its lever, showing one means of yieldingly connecting the same. Diagram C, represents an enlarged view of parts of the whip-roll and its lever, partly in section. Diagrams D and E, represent details of construction, showing the clutch-plates of the roll and the lever.

In the drawings, 6 indicates one of the side frames of a loom, and 7, is a bracket-arm, in which one end of the whip-roll is journaled, it being understood that the opposite end of the whip-roll or its shaft is similarly journaled. The whip-roll in the present instance consists of the shafts 8 and 9, in axial alignment and the main portion 10, bent out of said alignment and furished intermediate the bent portions with the friction leverage-plate 11,









having the rounded lip 12, over which the warp passes from the warp-beam to the harnesses.

On the shaft 8, of the whip-roll is a clutch-plate 13,

extending from the centre of which is a short shaft 14, having a screw-threaded end. On this shaft 14, is journaled the lever 15, having a clutch-plate 16, which engages with the clutch plate 13, on the whip-roll Extending from the lever 15, are the counter-weight arm 17, and the stop arm 18, which prevent the undue rearward rotation of the whip-roll when relieved from the drag of the warp. The free end of the lever 15, is pivoted to a rod 19, having a collar 20, and movable at its lower portion through the guide 21, secured to the loom frame, the spring 22, mounted on this rod between the collar 20, and the guide 21, tending to exert an upward pressure on the rod and on the free end of the lever 15.

The clutch-plate 16, is held in contact with the clutch-plate 13, by the yielding pressure of the spring 23, mounted on the shaft 14, and held against the back of the clutch-plate 16, by the nuts 24, adjustable on said shaft to increase or diminish the pressure exerted by the spring 23, to hold the clutch-plates together.

Under normal conditions the warp passes over the curved edge 12, of the whip-roll plate 11, which exerts a slight tension on the warp nearly sufficient to overcome the counter-balancing effect of the offset portion 10, of the whip-roll. During the opening of the shed the frictional contact between the warp and the curved edge 12, of the whip-roll is increased by the sudden taking up of the warp in spreading to form the shed, and the spring 22, allows the free end of the lever 15, to move downward as the edge 12, of the whip-roll is drawn forward, thus relieving the tension on the warp. The filling thread is received by the open shed and in due process another shed is opened with similar action on the part of the whip-roll.

When, in place of closing the shed on a fine filling-thread and opening another shed—which takes up the warp over the whip-roll to but a small extent—a shuttle becomes caught in the shed which closes thereon, it is obvious that many times the amount of warp must be taken up by the great diameter of the shuttle or a warp smash must occur. When this is the case, the relief afforded by the yielding of the spring 22, is not sufficient to so reduce the friction of the plate of the whip-roll on the warp that it (the warp) may readily pass. To provide for accidents of this nature is the province of the yielding connection furnished by the clutch-plates 13 and 16, with the tension-spring and adjustment therefor. It will be noticed that by the use of these and by the construction of the whip-roll this roll may be rotated in the direction of the moving warps until the threads are supported below the axial centre of the whip-roll, where they are relieved from the take-up caused by the offset of the shaft and its plate 11. (*Mason Machine Works, Taunton, Mass.*)

PRATT'S LET-OFF MECHANISM.

The object of this let-off mechanism is, to give to the warp beam the capacity to yield to the extra strain on the warp threads when forming the shed, and automatically take up the slack when the shed has closed.

Fig. 1, is a side view of the rear end of the loom, showing the let-off motion and its connection with the pinion shaft, by which the warp beam is operated. Fig. 2, is an end view of part of a loom, showing the warp beam and the pinion shaft. Fig. 3, is a sectional view showing the worm gear mounted loose on the pinion shaft and connected by a coiled spring with a collar secured to the pinion shaft.

4, indicates the frame of the loom and 5, the rachet gear which operates the let-off of the warp. This ratchet gear is secured to the vertical shaft 6, on which the worm 7, is secured, and this worm engages with the worm gear 8, mounted loosely on the shaft. The worm gear 8, is secured to the spiral spring 10, surrounding the pinion shaft 9. The opposite end of the

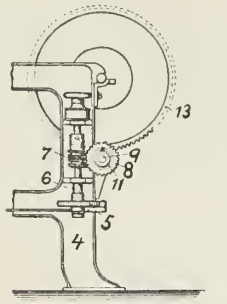


Fig. 1.

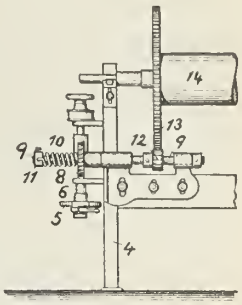


Fig. 2.

spiral spring 10, is secured to the collar 11, which is secured to the pinion shaft 9, adjustably by means of a clamp-screw, so that in place of the former rigid connection with the shaft the worm gear 8, is now connected yieldingly by the coiled spring 10, with the shaft 9. The pinion 12, on the pinion shaft 9, engages with the gear 13, secured to and turning with the warp beam 14.

All the parts are supported in their usual bearings, and the operation of the parts remains practically the same as heretofore, with the exception that any excessive strain on the warp is transmitted to the pinion shaft and the coiled spring 10, and any slack in the warp is taken up again by the reaction of the coiled spring acting on the pinion shaft, and through the pinion 12, and gear 13, on the warp beam.

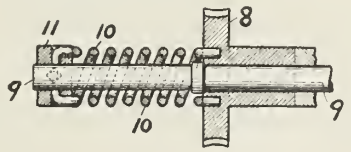


Fig. 3.

The worm gear 8, is held in the required position by suitable collars against longitudinal movement on the shaft by the torsion on the coiled spring 10.

By applying the coiled spring so as to exert the torsional spring action on the pinion shaft, a powerful strain is applied to the warp by a comparatively small spring, because the spring strain is multiplied by the small pinion 12, which engages with the large gear on the warp beam, and thus the let-off of the warp is more perfectly controlled. (*Albert K. Pratt, Assignor, one-half to Frank S. Berry, both of Northbridge, Mass.*)

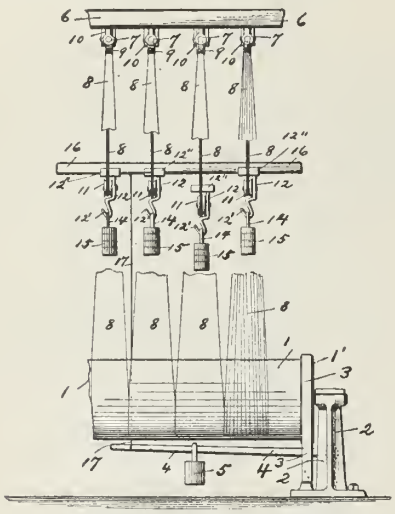
WAITE'S LET-OFF MECHANISM.

Heretofore in narrow-ware looms there has been a separate warp beam for each set of warps that are used in making one of the narrow-ware fabrics, as suspender goods, lamp wicks, etc., and a separate weighted pulley block, carrying a pulley around which the warps pass, said weighted pulley block or frame acting to apply the proper tension to the warp as it is drawn into the loom. In this construction the tension on each set of warps is independent of the tension

on any other set, and the tension is liable to vary in the operation of the loom, so that the finished fabrics will vary, and will not be of uniform tension. Some will stretch more than others.

It is very desirable in manufacturing narrow-ware goods that all the goods manufactured on one loom should be made uniformly and the same tension applied to all the sets of warps simultaneously, so that the finished product will all correspond, and one fabric will not stretch or give more than another, and will not be woven closer or more open than another, etc.

The object of the present invention is to obtain the desired result mentioned above, by using one warp beam for a number of sets of warps, as twelve, instead of an individual warp beam for each set. Ordinarily two warp beams are used in an ordinary narrow-ware



loom, and by using a supplemental attachment or device, combined with all the weighted pulley blocks or frames used for the sets of warps, on one beam, there being one weighted pulley block and pulley for each set of warps, said attachment consisting of a heavy metal bar or rod, (evener bar) which rests and is supported directly on top of the weighted pulley blocks and extends between the warps in the direction of the width of the loom, and is of a length corresponding to the length of the warp beam or the width of all the warps wound thereon.

The weight of the evener bar, which is considerable, ordinarily about fifty pounds, increases the tension on the warps over what is ordinarily given to them by the weighted pulley blocks, so that an additional tension is obtained which is found very desirable in making narrow-ware goods, as the finished goods are substantially non-stretchable.

By means of the evener bar, which rests on all the pulley blocks, as above stated, an almost uniform tension is maintained on all the warps, for in case the tension on one set of warps in weaving the goods tends to raise the weighted pulley block, the evener bar prevents it from raising, as the weight thereof is sufficient to overcome the extra tension. In case several of the pulley blocks are raised simultaneously by increased tension on several sets of warps, the tension being sufficient to raise the evener bar, there is provided a connection from said bar to the friction let-off of the warp beam, to release the friction and allow the beam to let off faster, until the evener bar returns to its normal position, resting on all the pulley blocks.

The accompanying illustration is a rear view of a portion of a warp beam and let-off attachment of a narrow-ware loom, sufficient to illustrate the improvements applied thereto. Numerals of references indicate thus:—1 is a portion of a warp beam, mounted to turn, in this instance, in stands 2 (only one stand is shown), located at the rear of a loom. The beam 1, is provided with a head 1′, around which a friction band 3, passes attached at one end to the stand 2, and at its other end to a lever 4, pivoted at one end on the stand 2, and provided with an adjustable weight 5. The top castle 6, is provided with a series of eyes 7, through each one of which one set of warp threads, as 8, pass, and a series of pulleys 9, mounted in brackets 10.

Each set of warp threads, as 8, pass from the beam 1, through an eye 7, and around a pulley 11, mounted in a pulley block or frame 12, then over pulleys 9, mounted in blocks 10, to and between a set of rolls and to the harness.

Each pulley block 12, is provided with a hook 12′, on which is hung a rod 14, carrying weights 15, of the desired size to produce the desired tension on the warp threads.

Combined with the pulley blocks 12, is a metal bar or rod 16, of the desired weight. Said bar 16, rests on the top of the blocks 12, and is held in position by projections 12″, on each block.

The bar 16 (evener bar) extends between the sets of warp threads in the direction of the width of the loom, and bears evenly on all the pulley blocks when they are in their proper position, and increases the tension on all the warp threads, over the tension produced by the weights 15, by the weight of said bar 16. The weight of said bar is sufficient to prevent any one of the pulley blocks 12, raising said bar out of a horizontal plane, in case the tension on any one set of warp threads is sufficient to overcome the weight of the weights 15, but in case of an increased tension on all or several of the sets of warp threads the bar 16, may be raised with the weighted pulley blocks 12, and when raised to a pre-determined point will, through cord 17, attached at one end to said bar and at its other end to the free end of the lever 4, raise said lever and release the friction band 3, to allow the warp beam to let off more warp. The letting off of additional warp allows the bar 16, and weighted pulley blocks 12, to drop down to their normal position.

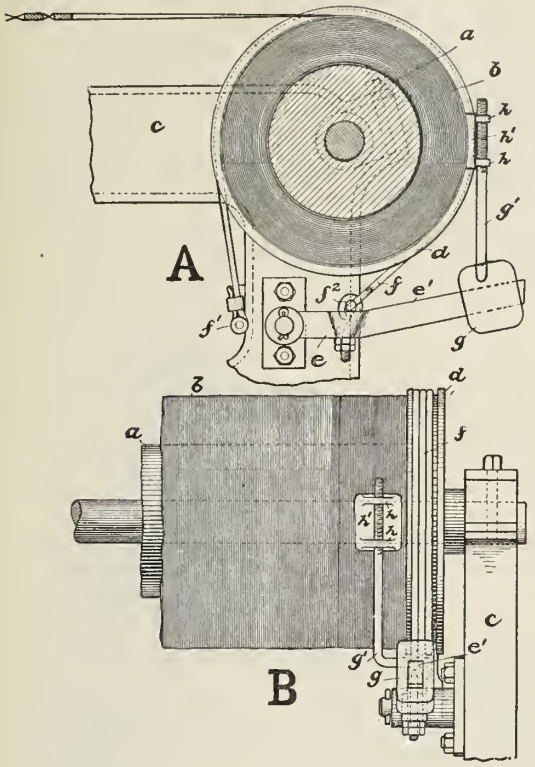
In case the tension on any one set of warp threads is lessened for any reason, the weighted pulley block 12, may temporarily drop down below the evener bar 16, but the tension will ordinarily keep each pulley block 12, in engagement with said evener bar. (*Samuel Waite, Lowell, Mass.*)

FOLSOM'S LET-OFF MECHANISM.

Of the accompanying illustrations Fig. A, shows the mechanism in side elevation with the warp beam in section and B, a front elevation of the same.

The principle of the working of the new device is thus:—The weight for friction is entirely regulated by the yarn on the beam. When the beam is filled with warp yarn, the plate as resting against the warp, moves the weight to the outer end of the weight lever. When the yarn runs off the beam the weight in turn moves automatically gradually back towards the centre, in turn slackening the friction bands running around the heads of the warp beam. The mechanism is simple in construction and will be readily understood by quoting letters of references, of which *a*, designates the beam

from which the warp *b*, is unwound, and which is journaled in the frame *c*, of the loom and carries near one end a disk or pulley *d*.



A lever *e*, is pivoted at one end to the frame of the machine under the warp beam and has a part e^1, inclined to the vertical axial plane of the beam. A brake strap *f*, winds about the pulley *d*, a number of times and is fastened at one end to the frame of the machine, as shown at f^1, and at the other to the lever near its inner end, as shown at f^2. It is here to be noted that by having the friction band or brake strap pass a number of times around the pulley, sufficient friction is provided for to permit the employment of a comparatively short lever and consequent reduction in space occupied by the let-off mechanism. In fact, the lever need not project to an appreciable extent beyond the plane of the warp beam.

A weight *g*, embraces and is adapted to slide on the inclined part e^1, of the lever *e*, and has a rigid arm g^1, which is angular, projecting laterally to clear the pulley and thence upwardly into the horizontal plane of the warp beam. At its upper end this arm g^1, is screw threaded to engage ears *h*, on a shoe h^1, adapted to bear against the roll of warp. The bearing of this shoe against the said roll controlls the position of the weight *g*, on the inclined arm, for the said weight constantly tends to slide down the incline, and is only restrained from so doing by the bearing of the shoe against the roll. The jarring of machine in operation is sufficient to insure the downward movement of the weight on the arm.

The operation will be apparent. As the diameter of the roll lessens the weight moves inward on the lever and the tension on the brake band is lessened. (*Nehemiah T. Folsom, Manchester, N. H., Assignor of one-half to John S. Folsom, Millis, Mass.*)

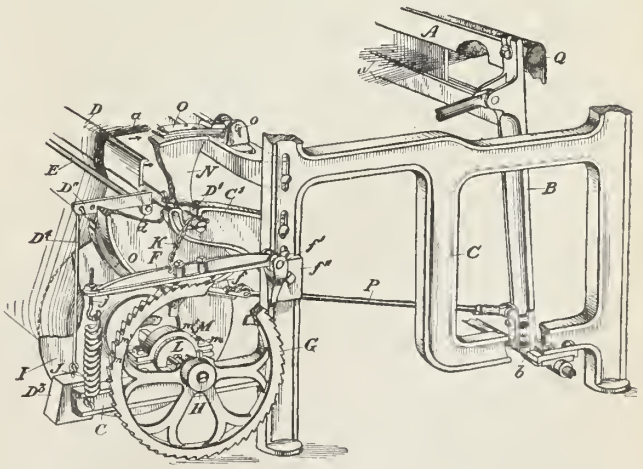
TALBOT'S LET-OFF MECHANISM.

This mechanism relates more particularly to means for effecting a positive and uniform tension on the warp threads in carpet looms without reference to the quantity of thread on the warp beam, so that a carpet of even weight may be produced as the result of this tension.

In the accompanying illustration a perspective view of that portion of a carpet loom is given, as is necessary to clearly show the mechanism.

A, represents the rced of the loom supported and carried by the lathe, the sword B, of which is pivoted at *b*, to the lower portion of the frame C. Connected to each side of the rear of the frame C, are brackets C', and journaled in the brackets C', is the spindle D', of the whip roll D. Connected to the spindle D', of the whip roll D, are two lugs *d*, in which is mounted the tension rod E, rigidly connected to the spindle D', and located one at either end of the whip roll D, are two outwardly arms D''. A weight D^3, is suspended from each of the arms D'', by means of a rod D^4. A dog F, provided with two teeth *f*, is pivoted at *f'*, to the bracket *f''*, which is rigidly connected to the frame C. Connected to the frame C, below the dog F, is one end of a spiral spring J, while the opposite end of the spring J, is connected to an adjustable hook *j*, extending through the outer end of the dog F. The normal tendency of the spiral J, is to draw downward the said outer end of the said dog to bring the teeth *f*, of the dog F, into engagement with the teeth of the ratchet wheel G. The ratchet wheel G, is rigidly mounted on the end of the spindle H, of the warp beam I. Connected to the dog F, at or about the middle thereof is one end of a chain K, while the other end of the said chain extends partially around spindle D', of the whip roll and is securely fastened thereto.

During the operation of the machine the tension of the warp threads draws the whip roll in the direction indicated by the arrow and causes a partial revolution of the spindle D', of the whip roll D. The partial revolution of the spindle D', causes the chain K, to be partially wound on the said spindle so that the dog F, will be lifted to disengage the teeth *f*, from the teeth of the ratchet wheel G, and allow of the unwinding revolution of the ratchet wheel G, and spindle H.



Rigidly mounted on the spindle H, is a friction collar L, made of wood. Surrounding the collar L, is a dividing strap M, the sections of which are connected together by means of bolts and nuts *m'*, and *m*, respectively, the lower section of the dividing strap M,

being secured to the frame of the loom. By means of the bolts and nuts m', and m, the diameter of the strap can be increased or diminished to respectively increase or diminish the friction on the collar L.

Rigidly mounted on the spindle D′, of the whip roll D, is a sector N, and pivoted to the frame C, is one end o, of a brake shoe O. The brake shoe O, extends around the sector N, and the opposite end of the brake shoe O, is connected to the lathe sword B, by a pitman P. The brake shoe O, holds the sector N, during one portion of the movement of the lathe sword B.

Wound on the warp beam I, are the warp threads a, which pass from the warp beam I, under the tension rod E, over the whip roll D, and the reeds A, to the cloth beam Q.

The advantages arising from the use of the mechanism are:—

The ratchet wheel G, it will be remembered, is rigidly mounted on the spindle H, of the warp beam I, and the unwinding revolution of the warp beam I, and spindle H, is prevented until the teeth of the dog F, are disengaged from the teeth of the ratchet wheel G. When the whip roll D, has been moved in the direction indicated by the arrow, the spindle D′, of the whip roll D, is partially turned to partially wind the chain K, on the said spindle D′, and lift dog F, sufficiently to disengage its teeth f, from the teeth of the ratchet wheel G. When the teeth f, of the dog F, have been disengaged from the teeth of the ratchet wheel G, then the ratchet wheel G, the spindle H, and the warp beam I, are free to turn. The tension of the warp threads a, as the carpet is wound on the cloth beam Q, is sufficient to move the whip roll D, into a forwardly inclined position. This position of the whip roll D, may, if desired, be reached every third stroke of the lathe, and it is when the whip roll D, is in its forwardly inclined position that the dog F, is lifted to disengage the teeth f, from the teeth of the ratchet wheel G. The whip roll D, during its return from its forwardly inclined position to its upright position draws on the warp threads a, and causes the unwinding revolution of the warp beam I, the spindle H, and the ratchet wheel G.

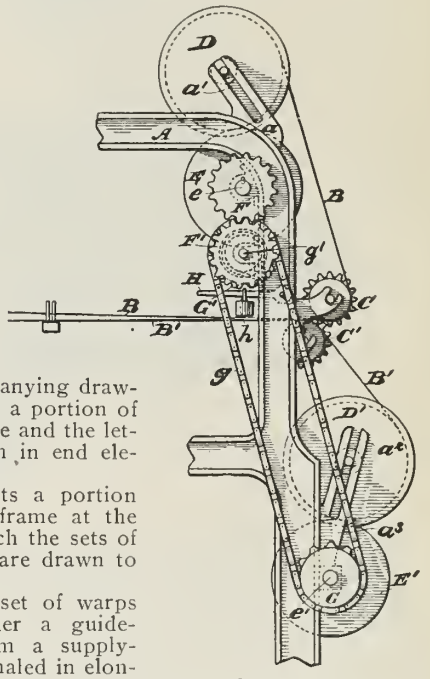
When the whip roll D, has returned to upright position the dog F, is drawn back into its normal position and its teeth f, engage with the teeth of the ratchet wheel G. The normal tendency of the spring J, is to draw downward the outer end of the dog F, so that a quick return of the teeth f, into engagement with the teeth of the ratchet wheel may be effected.

To regulate the tension of the spring J, on the dog F, the adjustable hook j, is connected to the dog F, and by lengthening or shortening the hook j, the tension of the spring J, can be respectively diminished or increased as required. It is by means of the weight D^3, that the quick return of the whip roll D, from its forwardly inclined position to upright position shown in the drawings is effected and the weight D^3, counteracts to a large extent the tension of the warp threads a, on the whip roll D, and also holds the whip roll D, at all times firmly against the warp threads so that the said warp threads will be kept perfectly taut from the top of the whip roll D, to the reeds A. To prevent the possibility of more than the required quantity of warp thread unwinding from the warp beam I, during the disengagement of the teeth f, on the dog F, from the teeth of the ratchet wheel G, there is provided a friction collar L, and friction strap M. The friction collar L, and friction strap M, prevent the free revolution of the spindle H, and yet allow the spindle H, to be turned to unwind sufficient warp threads to allow the whip roll D, to return to its normal position.

In order to further facilitate the making of a carpet of uniform weight throughout, the sector N, and brake shoe O, which are operated immediately upon the forward movement of the lathe sword and reed so that the whip roll is held stationary during the period that the filling is being forced home into the main body of the web. (*William Talbot, Toronto, Canada.*)

PALMER'S LET-OFF MECHANISM.

The same relates more in particular to an improvement in let-off mechanism for looms, where, from any cause, such, for example, as forming suspension-loops of the warp threads in weaving hammocks, it is found desirable to advance one of the sets of warp threads faster than the other set for the purpose of either leaving an unwoven series of loops across the fabric or fulling one of the sets of warp threads.



The accompanying drawing represents a portion of the loom frame and the let-off mechanism in end elevation.

A, represents a portion of the loom frame at the end from which the sets of warp threads are drawn to be woven.

The upper set of warps B, leads under a guide-roller C, from a supply-roller D, journaled in elongated slots a', formed in standards fixed to the frame A. The supply-roller D, rests upon supporting-drums E, fixed on a shaft e, journaled in the frame A, and having secured on one of its ends a slip gear-wheel F, so secured to the shaft e, that it will rotate together with the shaft, but be permitted to slide longitudinally of the shaft.

The lower set of warp B′, extends over a guide-roller C′, in proximity to the guide-roller C, from the supply-roller D′, mounted in elongated slots a^2, in standards a^3, fixed to the frame A. The roller C, may be geared together. as shown, when the loom is employed for ordinary plain weaving; but when employed for weaving hammocks in which the warp threads are utilized for suspension-loops, the rollers are disengaged by removing one of the intermeshing gear-wheels. The supply-roller D′, rests upon supporting-drums E′, fixed on the shaft e'. journaled in the frame and provided at one end with a sprocket-wheel G. The sprocket-wheel G, is connected by a sprocket-chain g, with a sprocket-wheel G′, fixed on a spindle g', in suitable bearings in the frame. The spindle g', has fixed thereon a spur-wheel F′, corresponding in the number of teeth to the spur-wheel F. Spindle g', has further fixed thereon a brake-wheel (not shown in the illustration) which receives around it a band, one end of which is secured to the frame A, and the

opposite end to the lever H, carrying a weight *h*, adjustable along the lever H, for the purpose of increasing or decreasing the frictional contact of the band with the brake-wheel to increase or decrease the tension under which the warp threads are to be fed.

In operation, whenever it becomes desirable to momentarily advance one of the sets of warp threads, in the present instance the upper set B, the wheel F, is slipped out of engagement with the corresponding gear-wheel F', and the warp threads composing the set B, may then be pulled forward independently of the lower set of warp threads B', the particular means for pulling the threads forward being a matter to be determined for the purposes in hand. The inventor employs a rod which he inserts momentarily under a set of warp and moves it in a direction to pull the threads of the upper set quickly along a distance sufficient to make the desired length of unwoven loops. As soon as this has been done, the gear-wheel F, may be slipped back again into engagement with the corresponding gear-wheel F', and the weaving will continue again as before.

In cases where it is desired to feed one set of warp continuously faster than the other to produce a fulling effect, the supporting-drum or drums, engaged with the supply-roll of the set to be accelerated, may be made larger than those of the other set, the supporting-drums on one or the other of the shafts *e*, or *e'*, being for this purpose conveniently made interchangeable. Instead of changing the size of the drums the drum-driving gear can be made interchangeable to drive one set of supporting-drums faster than the other. (*Isaac E. Palmer, Middletown, Conn.*)

PIERCE'S AND McALLEN'S WARP-BEAM BREAK.

In a loom, the warp-beam carrying the warp for the fabric to be woven, is rotated partially from time to time and usually at each pick to let off the warp as the woven fabric is taken up. The warp-beams are usually provided with some kind of friction-brake, which may be adjusted to regulate the frictional resistance. When a new warp-beam is inserted into these looms it requires regulating of the

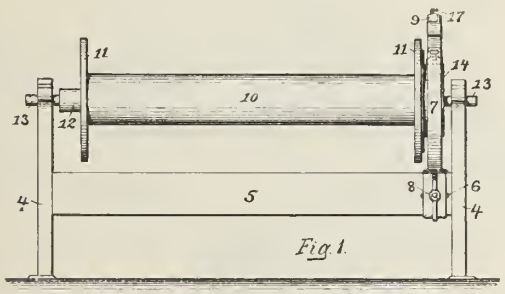


Fig. 1.

tension so as to hold the warp taut during the forming of the shed and the beating up of the filling.

The object of this brake is to so construct the same, that warp-beams may be exchanged without readjusting the tension on the brake and to secure a reliable frictional resistance on the warp-beam and uniform tension on the warp.

Fig. 1, is a view of so much of the rear end of a loom as is required to illustrate the brake. Fig. 2, is a sectional view of the rear end of a loom, showing the friction-brake. Fig. 3, is a side view of the friction-brake, shown partly in section.

4, indicates the side frames of a loom; 5, the rear strut or beam, extending horizontally and connecting the rear ends of the side frames. In this horizontal beam 5, the slot 6 is formed. The bracket 7 has its lower end formed into a socket inclosing three sides of the beam and is secured to the beam by the bolt 8, extending through the slot 6, so that the bracket can be adjusted laterally.

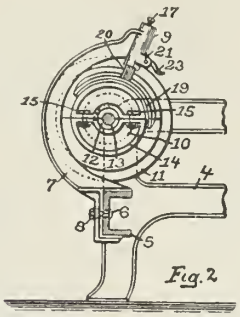


Fig. 2.

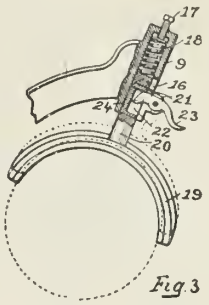


Fig. 3.

The bracket 7 is curved, as shown in Fig. 2, and terminates at its upper end in the cylinder 9, the axial line of which is radial from the centre of the warp-beam 10, which is provided with the end flanges 11 and the bosses 12 on opposite ends thereof. The warp-beam is supported on the shaft 13, resting in bearings formed in the side frames.

To one end of the warp-beam the brake-wheel 14 is secured. In the drawings the brake-wheel is shown secured to one of the end bosses 12 of the warp-beam, as this method secures exact concentricity of the brake-wheel with the warp-beam. In Fig. 2, the brake-wheel is shown as made in two halves, secured together by the bolts 15, so as to firmly secure the brake-wheel to the warp-beam.

The lower end of the cylinder 9, has a slot 16. The upper end of the cylinder has the adjusting-screw 17, by which the tension of the coiled spring 18, inclosed in the upper end of the cylinder 9, may be adjusted. The brake 19, has its bearing-surface formed to closely fit the brake-wheel 14 and is provided with the cylindrical post 20, which fits the bore of the cylinder 9 with a sliding fit. The post 20, is provided near its upper end with the projection 21, which extends through the slot 16 of the cylinder 9, and has the cavity 22, formed below the projection 21, into which the end of the lever 23 extends. The lever 23, is pivotally supported between two lugs projecting one on each side of the slot 16. By pressing on the lever 23, the brake 19 and brake-post 20, are raised off from the brake-wheel 14, into the position shown in broken lines in Fig. 3.

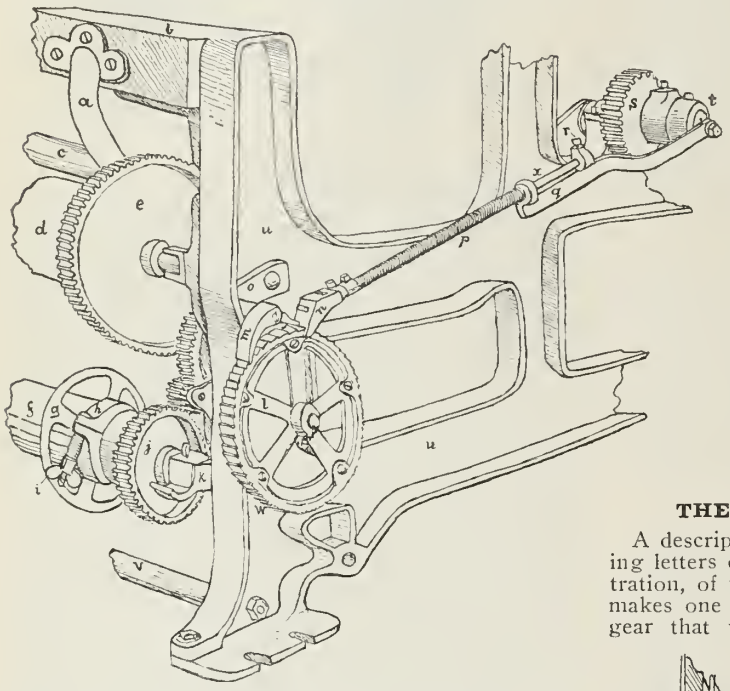
When the brake-wheel is secured to the warp-beam and they are in the proper position in the loom, the pressure of the brake on the surface of the brake-wheel is regulated by the screw 17, until the desired uniform tension on the warp is secured. When, now, the warp on the beam is exhausted, a full beam is either provided with the brake-wheel of the exact diameter as the brake-wheel on the warp-beam in the loom, or the brake-wheel on the empty warp-beam is removed and secured to the full warp-beam, and before making the exchange the lever 23 is depressed so as to raise the brake 19, off from the brake-wheel. The brake is suported in this position by the cam end of the lever 23 against the pressure of the coiled spring 18.

After the full warp-beam has been placed in the loom, the raising of the outer end of the lever 23 permits the coiled spring 18 to press the brake on the brake-wheel with exactly the same pressure and the same frictional resistance on the warp-beam and warp as existed under the previously-adjusted conditions, and the readjustment, which takes up time, is not required. (*O. S. Pierce and J. McAllen, Central Falls, R. I.*)

TAKE-UP MECHANISMS.

THE KNOWLES RATCHET-RING-TAKE-UP.

The same is shown in the accompanying illustration. Letters of references indicate thus:—*a*, the bracket fastened to the breast beam *b*, with screws, for holding the iron guide cloth roll *c*. *d*, is the sand roll; *e*, the



sand roll gear; *f*, the bottom roll that takes the cloth and winds it in a roll. *g*, the hand wheel; *h*, the friction band; *i*, the thumb-screw for tightening friction band; *j*, the ratchet gear that is worked by a pitman from the bottom of lay sword. *k*, is a box for holding the bottom cloth roller; *l*, a spider that holds the ratchet rims *w*; *m*, a catch that holds the ratchet *w* from flying backwards; *n*, the dog fastened to the end of pitman *x*, that engages with the teeth of the ratchet rings *w*. *o*, is a casting bolted to the loom frame *u*, and which has a stud riveted fast to hold the top catch *m*. *p*, indicates the spring that goes on the pitman rod *x*, to be used only for conditional motion. *q*, is a casting that holds the pitman rod *x* at one end, and at the other end it is fastened loosely by a bolt to a collar *t*, that is fastened to the crank shaft (not shown).

At each revolution of the crank shaft which is once at each pick the pitman rod *x* is moved forward and back. The collar *t*, has a slot cut from the centre to the outer end of the collar, and the further the bolt that fastens the casting *q*, to the collar, is moved from the centre, the more sweep the pitman rod *x*, will have, making the dog *n*, take up as many teeth as required on the ratchet ring *w*.

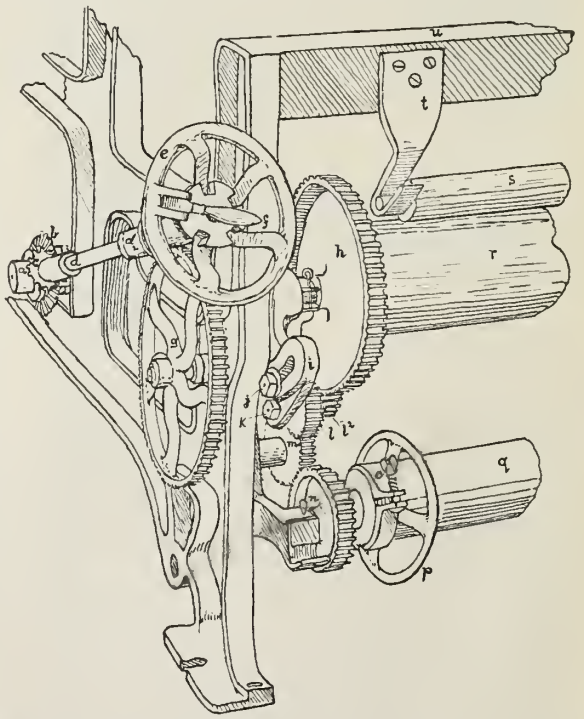
s, is the gear that drives the head motion; *u*, is the loom frame; *v*, a rod fastened near the foot of the loom frame extending the width of the whole loom and fastened at the same place on frame on the opposite side of loom so as to make the loom frame more rigid. *r*, is a set screw that fastens the pitman rod *x*, to the casting *q*, and is only used when using a positive motion.

When using a conditional motion the set screw *r*, is left loose, and the pitman rod *x*, is then forced through the hole in the casting *q*, by the tightness of the cloth pulling against the top of the cloth roller *d*, which depresses the spring *p*. As the cloth then slackens a little, the spring *p*, will force the pitman rod *x*, back again, moving the dog *n* and the ratchet *w*, forward. The proper weight must then be kept on the warp that will put in the amount of picks required per inch.

If using a positive motion the set screw *r*, is tightenend and the dog *w*, will take up 1, 2, 3 or 4 teeth each pick as may be required. To change the number of picks on a positive motion, the ring ratchet *w*, is changed by loosening the screws that fastens the ring ratchet *w*, to the spider *l*, and another ring ratchet wheel with more or less teeth is put on. If the dog *n*, takes up one tooth at a time it will put in one inch of cloth as many picks as there are teeth in the ring ratchet; if the dog *n*, takes up two teeth, half as many picks will be put in, and so on. (*Crompton and Knowles Loom Works.*)

THE KNOWLES WORM TAKE-UP.

A description of this take-up is best given by quoting letters of references from the accompanying illustration, of which *a*, indicates the bottom shaft which makes one revolution every two picks. *b*, is a bevel gear that works on bottom shaft to drive Worm



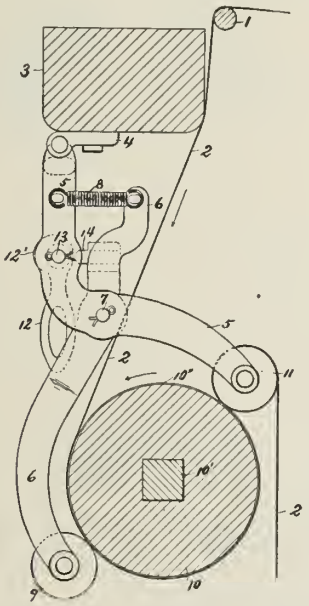
Take-Up. *c*, is another bevel gear one-half the size of gear *b*, making it a two to one drive. *d*, is the

shaft that connects the take-up with the bottom shaft *a*. *e*, is a hand wheel with which to manipulate the take-up. *g*, is a spur gear that connects with d^2, which is a small worm gear. *f*, is a handle which locks hand wheel *e* to worm gear d^2. *h*, is a cloth roll gear, geared into l^2.

l is a change gear. Multiplying number of picks by 5 and dividing by 12, will tell you the number of teeth that are required in gear *l*, to produce number of picks required. Gear *m*, is an intermediate gear to drive bottom cloth roll by friction. *o*, is the friction band; *p*, the hand wheel; *q*, the bottom cloth roll; *r*, is the top cloth roll; *s*, the guide roll; *t*, one of the stands for guide roll, and *u*, the breast beam. *(Crompton and Knowles Loom Works.)*

TAKE-UP ATTACHMENT FOR THE KNOWLES NARROW WARE LOOM.

The gist of the improvement consists in providing a take-up attachment which will take up the goods as they are woven, and which is provided with a release device to release the woven fabric or cause it to become slack in case the operator wishes to pick out, etc.



The accompanying illustration is a side view of this take-up attachment, showing the breast-beam and friction-roll in section and the clamp-rolls closed or in the position they occupy when the take-up is in operation.

Numerals of references indicate thus:—1, is the glass rod over which the woven narrow-ware fabric 2 is drawn. 3, is the breast-beam, to the under side of which the stands 4, carrying the take-up attachment, are bolted or secured.

The take-up attachment consists of the pair of hangers 5, and 6. One of the hangers, as 5, is pivoted at its upper end in the stands 4. The other hanger, as 6, is pivotally supported by a pin 7, on the hanger 5, and the upper ends of said hanger 6, extend above its pivotal support and are connected by spiral springs 8, with the upper part of the hanger 5, to draw said ends toward said hanger. The lower end of the hanger 6, carries a roll 9, which is adapted to bear against the fabric 2, on the under side of the take-up or friction-roll 10, as said fabric passes under said friction-roll and over a roll 11, carried at the lower end of the hanger 5. Said roll 11, is adapted to bear on the fabric to hold it on the take-up or friction-roll 10, in connection with the roll 9.

The friction-roll 10, fast on a central square shaft 10', is driven by gearing, and is provided with a sandpaper or other covering 10", to make a frictional contact between said roll and the woven fabric passing around the same. The springs 8, act to move the two clamp-rolls 9, and 11, toward each other to hold the woven fabric on the friction-roll.

In order to move apart the rolls 9, and 11, to release or slacken the fabric, there is combined with one of the hangers, as 5, a cam-lever 12, which is pivoted on a pin 13, on said hanger. The cam portion 12', of said cam-lever 12, as said lever is raised, is adapted to engage the projecting end of a (non-metallic) stud or pin 14, secured in the hanger 6, above its pivotal support.

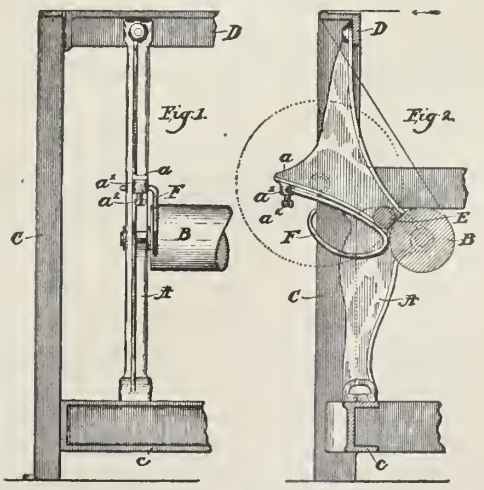
It will thus be seen that when it is desired to release or slacken the woven fabric to pick out, or for any other purpose, the operator simply raises the cam-lever 12, which operates to move apart the lower ends of the hangers 5, and 6, carrying the rolls 9, and 11.

It will be seen that the revolution of the friction-roll 10, in the direction indicated by the arrow, when the clamp-rolls 9, and 11, are in the position shown in illustration, will cause the fabric 2, to be positively taken up, and if at any time it is desired to stop the take-up of the fabric or to slacken the same, it is only necessary to move the cam-arm 12, to release the fabric from the friction-roll.

When it is desired to bring the take-up into operation again, the free end of the fabric is drawn over the upper roll 11, to tighten the fabric around the friction-roll 10, and the cam-lever 12, is moved down into the position shown in illustration to allow the springs 8, to act to bring the rolls 9, and 11, toward each other to bear on the fabric. *(Crompton and Knowles Loom Works.)*

THE MASON ADJUSTABLE GUIDE FOR CLOTH-ROLL STANDS.

The same has for its object the improvement of that part of a loom which is used for winding the cloth into a roll after it is woven, so that the selvage may be wound evenly, and so that the cloth may not be



soiled or frayed by coming in contact with any of the adjacent parts of the loom.

As usually constructed, there is no provision on the loom for guiding the edges of the cloth as it is wound upon the cloth-roll after being woven, and it therefore frequently happens that one edge or selvage as it progresses in its winding gradually works sidewise until it comes in contact with the stand or bearing which supports the cloth-roll. This stand or bearing having been lubricated in common with the other bearings, it follows that the edge of the cloth contacting therewith is stained by the lubricant, and is also sometimes frayed by the stand or bearing.

The new device is best explained by means of the accompanying drawings, of which Fig. 1, is a fragmentary elevation showing the guide applied to one end of the take-up roll. Fig. 2, is a vertical cross-section of Fig. 1

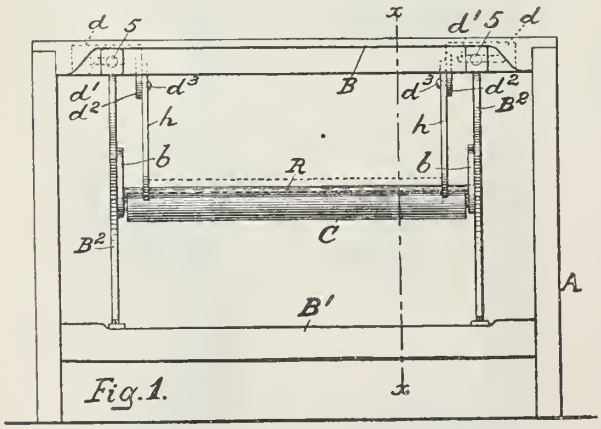
Letters of reference indicate thus:—A, designates the stand of an ordinary loom for supporting one side of the take-up roll B, said stand resting at its base on a cross-beam c, of the frame C, and suitably secured at its opposite end to the breast beam D. The take-up roll B, is similarly supported at its opposite end. (Not shown.) Adjacent to the take-up roll is the cloth-roll E, loosely mounted above the take-up roll on a suitably inclined track a, along which it rolls as it increases in size by reason of the cloth wound thereon, as shown by dotted lines.

F, designates the cloth-guide, consisting of a stiff wire bent in suitable shape so as to be brought adjacent the edge or selvage of the web of cloth before the same is wound on the cloth-roll E. This guide is shown in the illustrations as adjustably mounted in a hub a', perforated to receive the same and securely clamped therein in desired adjustment by the set-screw a^2. As the cloth comes from the loom in the direction of the arrow, Fig. 2, it passes over the breast-beam and around the sand roll or take-up roll B, and is guided in proper alignment to the cloth-roll E. by having its edges brought against the side of the adjacent bent portion of the guide F. (*Mason Machine Works.*)

SULLIVAN'S CLOTH-GUIDE.

The object of this device is to guide the cloth evenly and without injury as it is wound up on the cloth-roller in a loom, since unless carefully watched, the cloth will not be wound true or its selvage edges will be folded over or creased during the winding.

By means of the new device we are enabled to weave



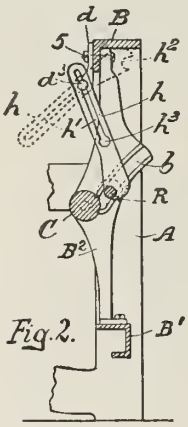
cloth the full width of the loom, if desired, or any narrow width, by a very simple adjustment of the guide mechanism, which can be applied at once to looms now in common use without altering them at all.

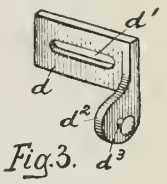
When it is desired to remove the cloth-roller, the guides are simply thrown into inoperative position out of the way of the attendant.

Fig. 1, is a front elevation of a sufficient portion of a loom to be understood with the invention applied thereto. Fig. 2 is a longitudinal section thereof on the line x-x, Fig. 1, looking to the right; and Fig. 3 is an enlarged perspective view of one of the adjustable guide-supports.

A, indicates the loom-frame; B, the breast-beam; B', the cross-girth; B^2, the standards, secured to the breast-beam and girth, providing bearings for the sand roll C, and the open guide ways b, to form bearings for the journals of the cloth-roller R.

On bolts 5, securing the standards B^2, to the breast-beam, are mounted guide-supports, shown as brackets d, longitudinally slotted at d', to receive the bolts and provided with downturned ears d^2, at right angles to the body portion of each bracket.





Each ear has integral therewith on its inner side, when in place, a headed stud d^3, adapted to enter a longitudinal slot h', in the cloth-guide h.

The cloth-guides h, two in number, are made as arms with enlarged lower ends, in which a substantially semicircular recess h^2, is made (see dotted lines Fig. 2) to embrace as much as possible of the cloth-roller R, the size of said recess corresponding to the diameter of the latter.

The longitudinal slot h', in the arm extends from near its upper end and terminates at its lower end in an enlargement h^3, large enough to admit the head of the stud d^3.

When the brackets d, are adjusted in position, the guides h, are hung upon the studs d^3, with the recesses h^2, embracing the cloth roller close to the selvage of the cloth, said guides hanging freely upon the studs by their own weight.

As the cloth rolls up, the roller R, is lifted gradually in the open bearings b, (see Fig. 2) the guides h moving up as required along the studs d^3, and as the roll of cloth increases the outward pressure on the guides is resisted by the ears d^2, and the heads of the studs d^3. The cloth is thus kept straight and smooth on the roller and wound hard and firmly thereupon, while the selvages cannot creep in or catch between the roller and the guides, owing to the large portion of the roller embraced snugly by the recesses h^2.

When the roll of cloth is to be removed, the guides are slid up along their supporting studs to the ends h^3, and then swung upward until they assume the dotted line position, Fig. 2, resting against the under side of the breast-beam, the weight of the slotted portions of the guides retaining them in such position by gravity.

It will be seen that the guides are very thin and that they can be moved up against the bearings *b*, by adjustment of the brackets, so that the width of the cloth to be woven is practically limited only by the loom itself.

The notched ends of the guides are of such shape that they will not at any time contact with the sand-roll C. (*Patrick Sullivan, Fall River, Mass.*)

BRADY'S TAKE-UP AND DROP-BOX GOVERNING MECHANISM.

The object of this device is to provide a loom with mechanism whereby the movement of the take-up and of the drop-box chain will be arrested on the stoppage of the loom caused by the action of the stop motion, said parts remaining out of action during the time that the loom is being operated by hand, so that when the loom is again thrown into action, said take-up and drop-box mechanism will be in precisely the same position as when the loom was knocked off.

The device applies to looms having one box on one side and two or four boxes on the other side. On all these looms built without the present improvement added, when the filling breaks the loom will turn over 2 or 3 picks before the belt will entirely leave the tight pulley, and the take-up and box will work when no filling is weaving; but by the new device this trouble is done away, as soon as the stop motion acts, the dog that operates the box-chain will be raised and also the catch that holds the take-up wheel will be raised, therefore letting the boxes and the take-up remain the same and not changing them while the loom is running without filling.

Fig. 1 is a perspective view showing sufficient of a loom to illustrate the application of the improvement thereto, the parts to which said improvement particularly relates being shown in full lines and the remaining parts in dotted lines. Figs. 2 and 3 are perspective views on a larger scale, illustrating parts of the loom to which the new mechanism relates.

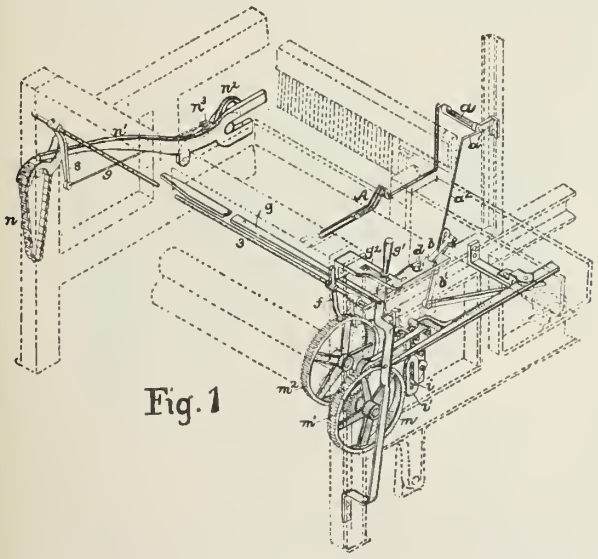


Fig. 1

In Fig. 1, A, represents the usual stop motion connected by a rock-shaft *a*, which has an arm *a'*, connected by a cord a^2, to a pivoted finger *b*, carried by a bell-crank lever *b'*, the latter being hung to the side frame of the loom and acted upon by a cam on the main shaft, so as to impart a reciprocating movement to the finger *b*.

When the pick is properly shot into the open shed of warp threads, said pick will, on the forward beat of the lathe, strike the stop motion and push the same forward, so as to swing the rock-shaft *a*, and lift the finger *b*, to a point above a lug *d*, on a slide *d'*, known as the "stop-motion tripper-slide," and which is guided on the frame of the loom. Hence, the forward motion of the finger has no effect upon said stop-motion tripper-slide; but in the absence of a pick in position to strike the stop motion A, the latter is not

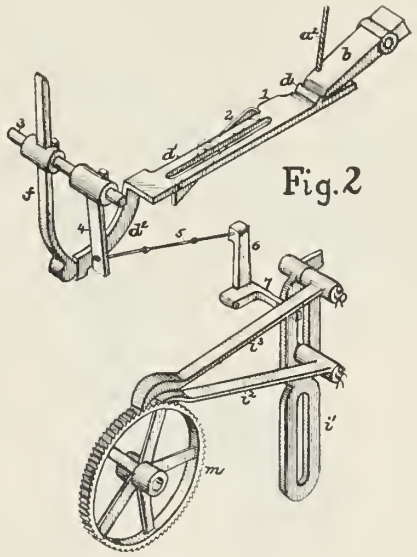


Fig. 2

moved forward and the finger *b*, is permitted to hang down, so as to strike the lug *d*, and move the slide *d'*, forward, a depending finger d^2, at the outer end of the slide in such case acting upon one arm of a trip-lever *f*, the other arm of which acts upon the shuttle stop-lever *g*, hung to the under side of the breast-beam, the outer end of said lever thereupon pressing upon the spring shifter-lever *g'*, and releasing the same from the notch in the retainer plate g^2, so as to permit it to swing outward and shift the clutch on the main shaft, so as to throw the loom out of gear.

The swinging lathe has a projecting stud *i*, which enters a slot in a lever *i'*, hung to the frame of the loom and carrying a pawl i^2, which acts upon a ratchet-wheel *m*, constituting the primary wheel of the take-up train, the shaft of said wheel having a spur-pinion *m'*, meshing with a spur-wheel m^2, on the shaft of the take-up roll, any backward movement of the ratchet-wheel *m*, being prevented by means of a retaining-pawl i^3, hung to the pivot-stud of the lever *i'*.

The drop-box chain *n*, is actuated by a reciprocating bar *n'*, which receives movement from a cam n^2, on the main shaft, said cam acting upon a pivoted toe or finger n^3, hung to the bar *n'*.

On the inner side of the stop-motion tripper-slide *d'*, is a lug or projecting 1, and with this lug is adapted to engage a spring catch or retainer 2, hung to the side of the loom, so that when the slide *d'*, has been pushed forward by the finger *b*, the retainer will engage with said lug 1, as shown in Fig. 3, and will hold the slide so far as regards any accidental backward movement of the same, but will permit it to be moved back when sufficient force is applied to it.

Upon a rock-shaft 3, which carries the trip-lever *f*, is mounted an arm 4, connected by a suitable link 5, to an arm 6, on a lever 7, hung at some fixed point and adapted to act upon the retaining-pawl i^3, of the ratchet-wheel *m*, so that when the slide *d'*, is pushed

forward, said retaining-pawl will be lifted from engagement with the teeth of the ratchet-wheel, and there will be no forward movement of said wheel or of the take-up roll until the pawl has been again permitted to drop into engagement with the teeth of the wheel, an operation which is not effected until the clutch-operating lever g', has been pulled into the notch of the retainer-plate g^2, in order to again start the loom, this operation having the effect of pushing back the slide d', under the action of the lever f.

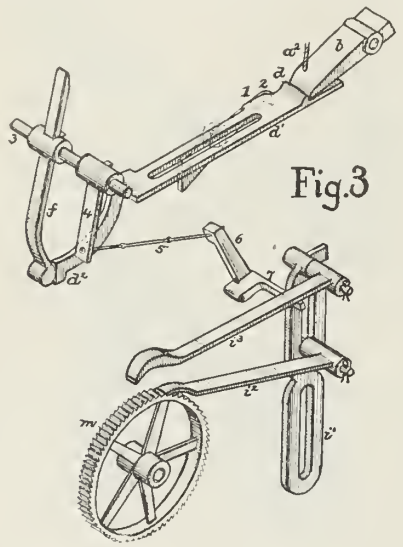


Fig.3

The rock-shaft 3, has at the other side of the loom an arm 8, connected by a cord 9, to the pivoted toe n^3, on the reciprocating bar n', which operates the pattern chain, and the same movement of the rock-shaft 3, which actuates the lever 7, and lifts the pawl i^3, causes such movement of the arm 8, as to lift the toe n^3, out of the path of the cam n^2. Hence, as soon as the loom is knocked off there will be no operation either of the take-up mechanism or of the drop-box pattern-chain, the throwing of the loom again into gear, however, restoring both take-up and drop-box chain to operative position, the loom thus starting again with the take-up and drop-boxes precisely at the points which they occupied when the loom was stopped. (*Thomas A. Brady, Phila.*)

KASTLER'S CONDITIONAL TAKE-UP MECHANISM.

This mechanism is shown in the accompanying illustrations of which Fig. 1, is a side view of a part of a loom having the device applied thereto. Fig. 2, is a partial front view of the same, and Fig. 3, is a detail perspective of the device.

A, designates a short or stud-shaft suitably attached to the loom frame A'. On shaft A, is journaled, so as to turn freely a wheel B, and alongside of the latter is pivoted on said shaft a swinging arm C. To the face of the wheel B, is secured a pinion b, which by a train of gears is connected with a cloth roller B', to enable the latter to be revolved by the rotation of the wheel B.

In the drawing no support is shown for the wheel and pinion intermediate the pinion b, and the gear on the cloth shaft, in order to simplify the illustration by reducing the parts shown.

Pivoted to the arm C, is a pawl D, that engages the periphery of the wheel B, against which it is pulled with considerable friction by a bowed flat spring E, that at one end is secured to the outer extremity of the arm C, and has at its other end connected by a rod e, to pawl D, which stands substantially tangential to the wheel so that when the arm C, moves it in one direction, it will slip over the wheel B, without revolving it, while when moved in the opposite direction, it will engage said wheel B, with sufficient friction to rotate it.

Y, is a handle whereby the pawl may be lifted from engagement with the wheel. The wheel has its periphery **V**-shaped in cross section and the pawl is correspondingly grooved to engage it, and in order to produce friction has its wheel engaging faces covered with leather and other analogous material.

Extending outward from a collar f, that is fixed to a shaft A, is an arm F, that at its outer end carries a pin g, to which is pivoted a friction pawl G, that is forced yieldingly against a wheel B, by a coil spring h. Said pawl G, serves to hold the wheel B, against backward rotation when the pawl D, is slipping over the same.

To the side of the arm C, opposite wheel B, is attached a plate I, having a radically extending slot i, by means of which a link J, is adjustably attached to said arm. The outer end of the link is pivoted to the lower end of the pivoted arm K, which is moved by a spring N, in the direction which causes pawl D, to slip over the wheel B, without revolving it, while the reverse movement is effected by rod L, actuated by an eccentric L', the rod passing through an opening in a lug k, carried by the arm K, and has a collar l, to strike said lug k, and thereby swing the said arm K, and through it move the pawl D, in the direction necessary to revolve the wheel B.

The feed is regulated by the size of the roll of cloth, by limiting the backward throw of the arm C, by means of a pivoted rod or lever M, that has one end m, in the plane of motion of said lever, and at its other m', arranged to engage the periphery of the roll of cloth.

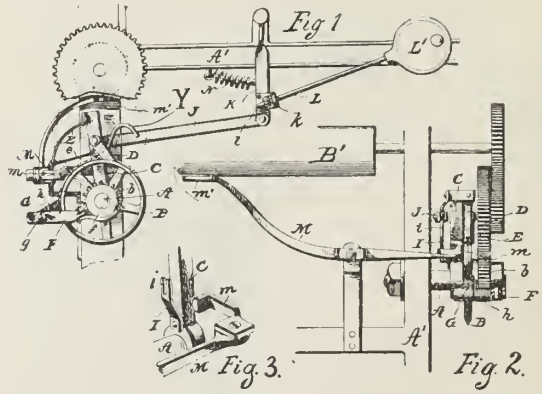


Fig 1

Fig. 3.

Fig. 2.

As the diameter of the roll of cloth increases, the bar M, will be moved to change the position of the end m, to cause it to engage the arm C, at points successively further and farther outward from the centre of motion of said arm C. The spring is required on account of the variation of the throw of the arm C, caused by the engagement therewith of the end m, of the lever M. The latter will operate to vary the throw as described because its end m, is placed to engage the arm C, at a point to one side of a vertical line passing through the centre of the motion of the said arm C. (*E. Kastler, Philadelphia.*)

WARP-BEAMS.

THE KNOWLES WARP-BEAM AND RATCHET BEAM-HEAD.

Fig. 1 shows the warp-beam in its perspective view; Fig. 2 is a transverse section of it, and Fig. 3 a transverse section on an enlarged scale, of the upper portion of the warp-beam, such section being to exhibit the mechanism for connecting the aprons to the beam.

a, denotes the warp-beam body, it being, as usual, provided at each end of it with a journal *j*, and a grooved beam-head *c*.

Between the two beam-heads and concentric therewith there are two circular flanges *b*, each of which is a wheel or disk consisting of two equal segments provided at their chords with flanges *b'*, the segments being held together by means of headed screws b^2,

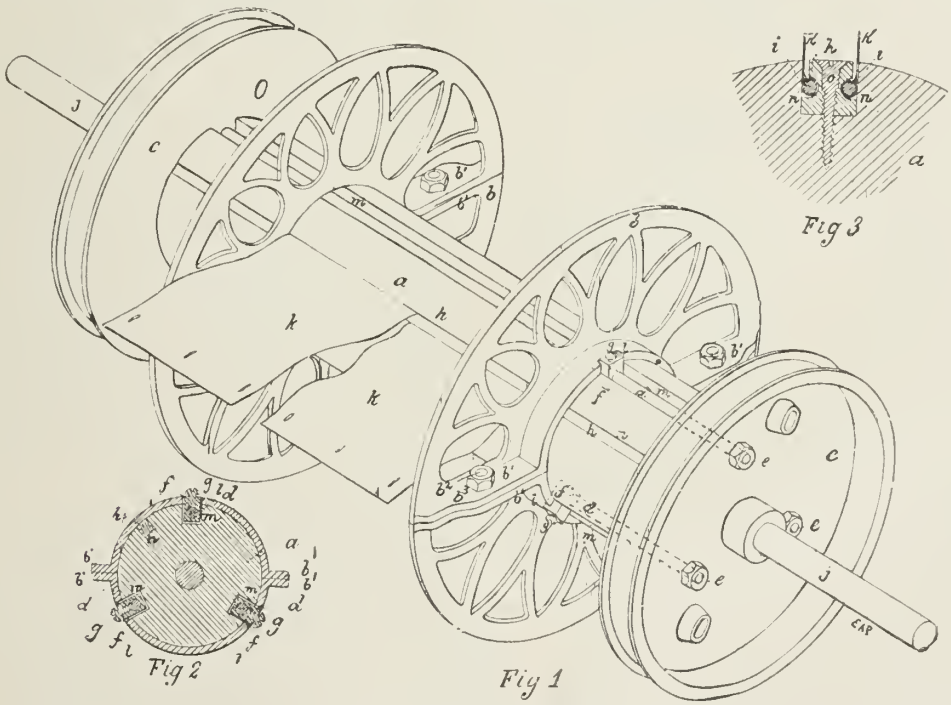


Fig 1

Fig 2

Fig 3

going through these flanges, and by nuts b^3, screwed on such screws, thus enabling the flanges to be easily applied to or removed from the beam, as occasion may require. The hub of the head is also formed by continuations of the flanges around the beam, as shown, each of such continuations having in it one or more rectangular notches *l*, each of which is for reception of a slider *f*, arranged on one of three rods *d*, and provided with a set-screw *g*, for clamping it to the rod. Each of these rods is placed within one of three grooves *m*, made in the beam and opening out of it at its periphery, and having a width sufficient for the reception of the slider and to allow of it being moved along upon the rod in either direction of the length of the latter. Each rod at its ends is securely fastened to the beam or extends through the beam-heads, and is held thereto by nuts screwed upon it, three of which are shown at *e*, in Fig. 1.

Each of the flanges is movable on the beam longitudinally thereof, and is held in position thereon by certain of the sliders *f*, and their set-screws *g*, the notches in the hub of the head serving, with the said sliders, to prevent the flange from being revolved on the beam independently thereof when a weaver may take hold of such flange and turn it for the purpose of revolving the beam. The object of having the flanges so movable on the beam is to adapt them to the width of warp to be wound upon the beam, the two aprons shown at *k*, being to aid in connecting the warp to the beam, such warp being suitably fastened to the two aprons, each of which is movable lengthwise of the beam and more or less across the other or fellow apron.

At its inner end each apron is hemmed to receive a wire or rod *i*, arranged within the hem and extending across the apron. Furthermore, there is made in the beam, longitudinally of it, a groove *n*, square or rectangular in transverse section. In this groove there is fitted or arranged, as shown in Fig. 3, a tongue *h*, shaped very like a **T**-rail of a railway, the opposite sides of it being grooved or channelled to receive the two aprons and their wires or rods in the manner as represented in said Fig. 3. This tongue is fastened in the groove by screws going through the tongue and screwed into the beam, one of such screws being shown at *o*, in said Fig. 3.

From the above it will be seen how each apron can be moved lengthwise of the beam, so as to carry the outer edge of the apron up to the inner face of the next adjacent flange *b*.

In illustration, Fig. 4, the inside of the Knowles Ratchet Beam-Head is shown. An explanation of its

working is best given by quoting letters of references of which *a*, indicates the beam-head where the friction band goes on; *b*, the inside ratchet gear as made fast to the beam-barrel. *c*, are small lugs cast on to ratchet, and embedded into the beam wood barrel. *d*, are small lugs cast on the ratchet same as *c*. The lug *d*, is where the iron rods go through running from one end of the beam to the other, holding them tight to the beam, making it impossible for the ratchet to get loose. *e*, is a small hold-fast pall; *f*, is a small plate riveted on to beam-head *a*, coming down on the inside of ratchet gear *b*. This is what holds the beam-head *a*, in position. Loosen screw *g*, turn plate half round, and the beam-head *a*, will slip off.

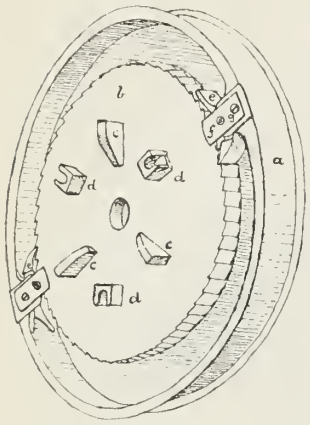


Fig. 4

(*Crompton and Knowles Loom Works.*)

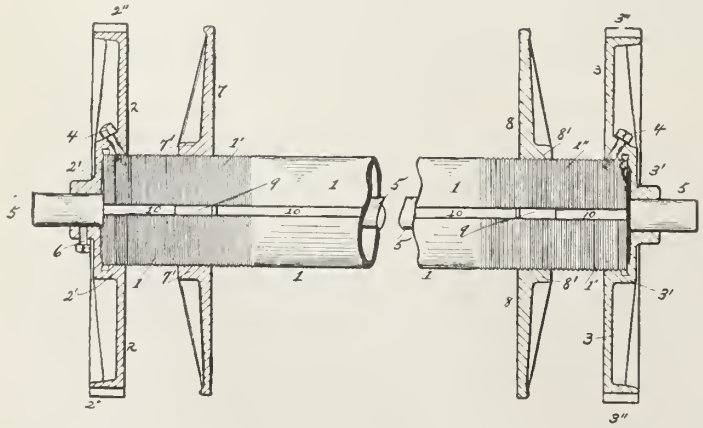
THE KNOWLES WARP-BEAM FOR EXTRA HEAVY BUILT LOOMS.

This beam is shown in sectional elevation in the accompanying illustration. 1, indicates the warp-beam body, made of iron pipe, five or six inches in diameter; however, the size of the pipe may be varied, according to the length of the beam and the strain to be put upon it.

One end of the pipe or beam 1, is provided with an external right-hand screw-thread 1′, thereon, and the other end with an external left-hand screw-thread 1″.

One of the outside beam-heads as 2, has the central portion or hub 2′, thereof recessed or cored out to form a chamber, which is provided with an internal right-hand screw-thread, and said beam-head 2, is screwed onto the right-hand screw-threaded end 1′, of the pipe 1, until the end of the pipe butts against the end of the chamber in the hub, as shown.

The other outside beam-head, as 3, has the central portion or hub 3′, thereof recessed or cored out to form a chamber, which is provided with an internal left-hand screw-thread, and said beam-head 3, is screwed onto the left-hand screw-threaded end 1″, of the pipe 1, until the end of the pipe butts against the end of the chamber in the hub as shown.



Both beam-heads 2, and 3, are secured on the ends of the beam 1, and prevented from turning off in this instance by bolts or screws 4, which extend through holes in the hubs of said heads and are tapped into the ends of the beam 1.

The peripheries of the outside beam-heads 2, and 3, are in this instance provided with teeth 2″, and 3″, which mesh into let-off pinions (not shown) in the ordinary way.

A central shaft 5, extends through the beam 1, and the ends thereof extend beyond the hubs of the outside beam-heads 2, and 3, as shown in the illustration, to act as journals for the warp-beam. A bolt 6, tapped into the hub of one of the outside beam-heads, as 2, secures the shaft 5, in place.

Mounted upon the beam 1, between the outside beam-heads 2, and 3, are the inside beam-heads 7, and 8, the hubs 7′, and 8′, of which are internally screw-threaded and adapted to turn on the screw-threads on the ends of the beam 1, to adjust the distance between the inner ends 7, and 8, as desired.

In order to hold the beam-heads 7, and 8, in their adjusted positions and prevent them from turning on the beam 1, a key 9, for each beam-head is employed. This key is adapted to slide in a longitudinal external groove 10, made in the beam 1, and to enter a corresponding groove in the hub of the inner beam-head. (*Crompton and Knowles Loom Works.*)

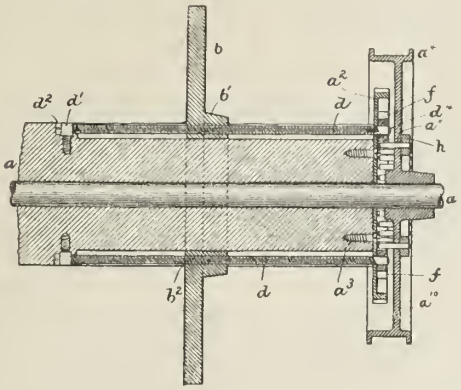
ADJUSTABLE HEAD FOR WARP-BEAMS.

The same is shown in the accompanying illustration in vertical longitudinal section. Quoting letters of reference in the description will readily explain the construction of this device to the reader. *a*, represents a portion of one end of a warp-beam to which ratchet a^2, is secured by means of screws a^3. Loosely mounted upon the shaft a', adjacent to the ratchet a^2, is a wheel or head a^4. Mounted upon the inside of this head and in a position to engage with the teeth of the ratchet a^2, is a pawl which is pivoted to the head of a^4, by means of a pin, and one of its ends is kept in engagement with the teeth of the ratchet a^2, by means of any suitable spring.

Slidingly mounted upon the beam is the adjustable head *b*, which is provided with a centrally-apertured hub *b*′, arranged upon the beam *a*. This head is designed to be adjusted back and forth on the beam, in order to confine the warp within a space corresponding to the width of the fabric to be woven. This width is the distance between the adjustable head *b*, and a corresponding fixed head (not shown) upon the other end of the beam.

d, represents screw-threaded rods mounted in screw-threaded apertures b^2, formed in lugs b^3, integral with the hub *b*′, and extending into grooves in the beam. These grooves are of sufficient depth to receive the rod so that the rod will be below or flush with the surface of the beam. The inner ends of these rods are rotatably mounted in eyes *d*′. The object of this construction, that is, the arrangement of the rods with the eyes, is to permit the rod to turn in the nut and at the same time to prevent any longitudinal movement of the rods. This is accomplished by omitting the screw-threads at this end of the rods and making the inside bore of the eyes *d*′, smooth, the rods being maintained in the eyes by means of a

collar d^2, fastened on the ends of the rods. At their outer ends these rods are also free from screw-threads



and are arranged in suitable apertures in the ratchet. To the outer ends d^4, of the rods d, that extend through the ratchet, there are rigidly secured spur-gears f. From the foregoing it will be seen that as the rods are rotated by means of the spur-gears f, the head b, will be adjusted back and forth. The rods are preferably provided with screw-threads having a steep pitch, in order that the head may be quickly adjusted. The head being in one piece and controlled in its movement by the screw-threads, there is no liability of its slipping on the beam after it is adjusted. Any desired means may be employed for turning these rods; but it is necessary that the rods be turned in unison. For this reason the rods are provided at their ends d^4, with spur-gears f, each having the same number of teeth and which are operated by means of a disk provided with pins, arranged in a circle on one side of said disk after the manner of a lantern-gear. The web a^{10}, of the head a^4, is provided with a circular series of apertures a^{11}, through which the pins previously referred to pass into a position so as to engage the teeth of the gears f.

The operation is as follows: It being desired to adjust the head b, the pawl is thrown out of engagement with the ratchet a^2, and held out in any way. This releases the head a^4, from the ratchet and permits the former to turn upon the shaft a', without effecting the beam. The disk as provided with pins, is then inserted, the pins of the disk passing through the apertures a^{11}, in a position to engage the teeth of the gears f. Now, by turning the head a^4, the gears f, will be rotated, causing the head b, to travel back or forth until the desired position is reached. The disk as provided with pins is then removed, and the pawl permitted to return into engagement with the ratchet. (*Thomas Blackburn, Dover, N. H., assignor of one-half to John Lancaster, same place.*)

THE FAIRMOUNT MACHINE COMPANY'S ADJUSTABLE BEAM-HEAD FOR GINGHAM-LOOM WARP-BEAMS.

Fig. 1 is a plan of this beam-head, and Fig. 2 a sectional view of the same. This beam-head serves a double purpose, being used as warp-flange and friction head at the same time.

The construction of this beam-head is best explained by quoting letters of references of which a, is the open space for the beam-barrel onto which the warp is beamed; b, is a projecting flange cast to the head;

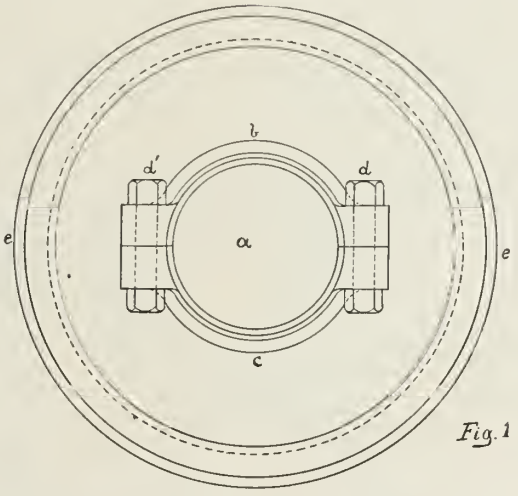


Fig. 1

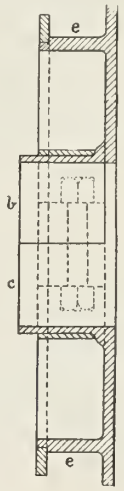


Fig. 2

c, is a cap that is bolted to the projecting flange b, by means of bolts d and d'; c, is a depression designed to hold a rope or band for creating friction to the warp-beam and in turn onto the warp threads.

This combined beam-head and warp-flange can be readily adjusted to any width of warp desired by simply loosening bolts d and d', placing the beam-head the required distance apart and then tightening bolts d and d' again. Two of these beam-heads are employed on a beam, one at one side and the other at the opposite side, both having their flange sides placed against each other. (*Fairmount Machine Co., Philadelphia.*)

STOP-MOTIONS.

THE KNOWLES CENTER STOP-MOTION.

The same is shown in the accompanying illustrations of which Fig. 1 is a perspective view of the complete motion, and Fig. 2 a view in detail of the sliding shield tumbler, its spring and the sliding shield, seen from the other side compared to view given in Fig. 1.

A, is the race plate; B, is the lay wood; C, is the reed; D, are the feeler wires; E, is the slot in the race plate and lay into which the feeler wires drop when the lay comes forward; F, is the feeler stand; G, is the dagger; H, is the cam on which the dagger G, slides to raise and lower the feeler wires; I, is the dagger socket; J, is the sliding shield which prevents the dagger G, from knocking the loom off on the first pick after the shipper handle is pulled on; K, is the tumbler, which, when struck by the dagger, throws off the shipper handle; L, is the tumbler finger which connects the tumbler with the shipper shaft; M, is the shield spring finger; N, is the breast-beam stand; O, is the shipper shaft; P, is the protector rod; R, is the sliding shield tumbler, which, with the aid of the spring M, throws the sliding shield J, up to the end of the slots S, when the shipper handle is thrown off and holds it up until the dagger comes in contact with

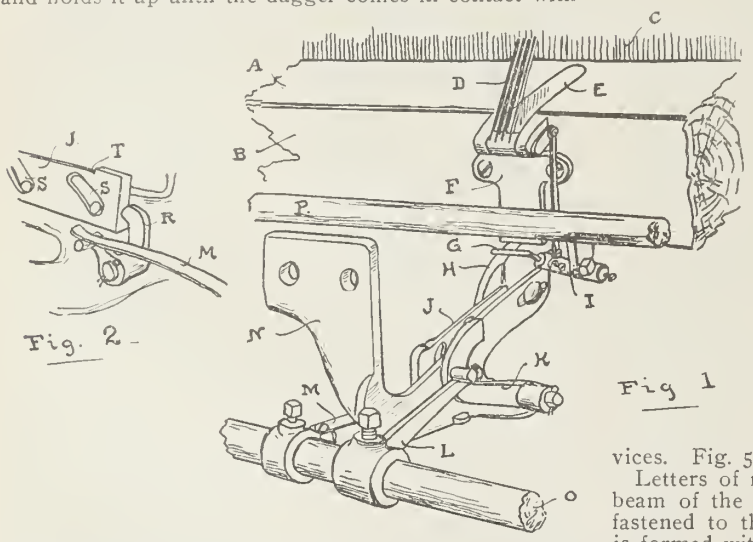


Fig 1

Fig. 2.

the notch T, and pushes the shield back on the first pick after the handle is pulled on.

As the lay moves back the feeler wires are raised, by the dagger G, sliding up the cam H, to allow the shuttle to pass under them. If there was no filling under the feeler wires when the lay came forward, the dagger would slide down the cam H and strike against the tumbler K, throwing off the shipper handle; but when the filling is under the feeler wires the dagger is held up so that it cannot slide down the cam and strike the tumbler, but instead passes over the tumbler without striking it.

When the loom is stopped and the lay turned back, the filling is apt to get out from under the feelers, so that if it were not for the sliding shield, the shipper handle would be thrown off on the first pick after it was pulled on. This shield is thrown up into place when the shipper handle is thrown off and remains up, preventing the dagger from striking the tumbler, until the first pick after the handle is pulled on, when the dagger strikes the notch in the shield and pushes it back and down, leaving the dagger free to strike the tumbler on the next pick if there is no filling under the feeler wires. (*Crompton and Knowles Loom Works.*)

McMICHAEL'S FILLING STOP-MOTION.

In devices of this character heretofore constructed, difficulty has been experienced from the fact that the stop-motion was found to offer an obstruction to starting up the loom again when it has been stopped with the lay up close to the breast-beam, and it was found necessary for the weaver to move back the lay by manual exertion before the loom could be set in motion. To overcome this difficulty, additional devices were employed to remove the obstruction offered by the stop-motion, in the first pick of the loom, when no filling is present to sustain the fork of the locking-dog.

The new device provides a stop-motion which requires no such additional attachments and at the same time allows for starting up the loom, with the lay in any position, without obstruction being offered by any part of the stop-motion, although it may have just operated to throw the loom out of action.

In addition to the above, the invention has in view the combination of the filling stop-motion with the loose-reed motion of the type known as the "McMichael Smash Protector."

Fig. 1 shows a top plan view of a sufficient portion of a loom to illustrate the application of the invention thereto. Fig. 2 shows a perspective view of the stop-motion devices which are attached to the lay. Figs. 3 and 4 show perspective views of two of these devices. Fig. 5 shows a section on line x, x, of Fig. 1.

Letters of reference indicate thus: a, designates the beam of the lay, and b, the breast-beam. A plate c, fastened to the front side of the said rail of the lay, is formed with a dovetailed slideway which receives a plate c', having a raised cam-surface c^2, along a portion of its upper edge and a vertical shoulder c^3, adjacent to one end of said cam-surface. A dog d, is pivoted between ears on the plate c', and rests by gravity on the cam c^2, and said dog is provided with a detector fork or finger d', which extends over a depression a', in the lay, and is designed to be sustained by the pick 2, crossing said depression, so as to prevent the dog entering into engagement with the shoulder c^3.

The design is to cause the plate c', to reciprocate in the slideway of the plate c, as the lay moves to and fro, and so long as the filling is unbroken and extending under the fork d', the reciprocations of the plate c', carry its shoulder c^3, past the dog d. The cam c^2, riding under the dog, elevates the fork d', to allow the shuttle to pass under it, and after the shuttle

passes, the fork drops upon the pick left by the shuttle. Should the pick be absent over the depression a', the dog will be free to gravitate into the path of the shoulder e^3, and the plate e', is thereby prevented from

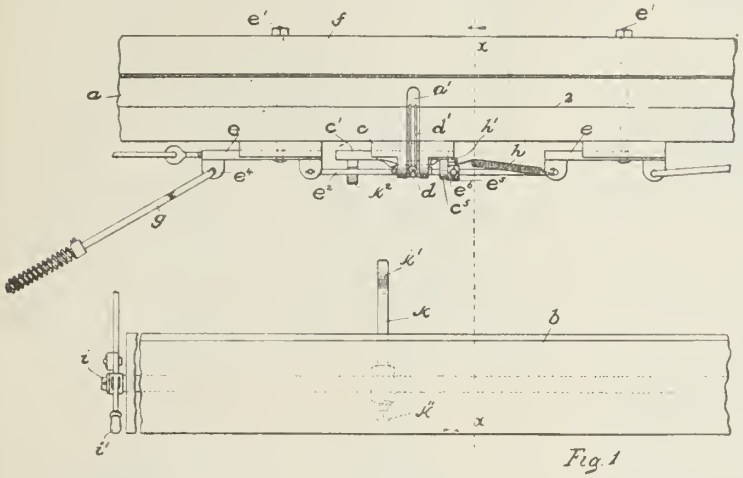


Fig. 1

completing its stroke, and is held at a position to effect the discontinuance of the loom's operation.

c, designates two of the slotted locking-plates of the loose-reed motion, previously referred to, which plates are arranged to reciprocate lengthwise of the lay and alternately lock and release the reed by registry of different-sized portions of their slots with heads of bolts e', which connect with a holding-bar f, back of the reed. The two plates c, are connected together by a rod e^2, whose ends are bent at right angles and entered through ears on the plates, and one of the said plates is connected by a rod g, with the breast-beam, the said rod g, having a bent end passed loosely through an ear e^4, on the plate and being connected, through a swivel g', with an ear g^2, on the breast-beam.

By reason of the connection between the locking-plates of the loose-reed motion and the breast-beam, it will be readily seen that reciprocations of said plates will be produced by the to-and-fro movement of the lay. A further object is to also reciprocate the plate c', through the same agency, but as it is not desirable to restrict the movement of the plates e, by the locking of the plate c', provisions are made permitting continued movement of said plates e, after the plate c', has been locked by the dog d.

The rod e^2, passes loosely through an ear e^5, on the plate c', and carries a collar e^3, fastened by a set-screw e^6, and arranged to abut one side of the ear e^5, and by acting against said ear under one direction of movement of the plates e, to impel the plate c', unyieldingly, in that direction.

A spiral spring h, is connected at one end to an ear h', on the plate c', and at the opposite end to one of the bent ends of the rod e^2, and this spring exerts itself to hold the ear e^5, against the collar e^3, and cause the plate c', to travel with the plates e, in the reverse direction to that above mentioned in the absence of any obstruction such as the dog d, presents when it has dropped down in front of the shoulder e^3.

i, designates a rock-shaft or rotary shipping-rod which is located under the breast-beam and carries a handle i', whose turning operates a belt-shipping or clutch mechanism, so as to throw the loom into and out of action. An arm k, is affixed to the shaft i, by a set-screw k'', and projects out in front of the breast-beam, and it is formed at its free end on the upper side with a **V**-shaped cam k'. The plate c', has a pendent arm k^2, which when said plate is locked by the dog d, encounters the cam k', in the movement of the lay toward the breast-beam, but at all other times clears said cam by passing around the end of the same.

In the operation of the loom when the filling is running properly there is no operation of the stop-motion to throw the loom out of action, for the filling extending over the depression a', in the lay serves to support the fork d', and prevent the dog d, from dropping far enough to take it into engagement with the shoulder e^3. The plate c', receives its full movement and the cam e^2, raises the fork each time for the passage of the shuttle, allowing said fork to lower after the shuttle has passed and rest on the filling. As long as the plate c', makes its full stroke lengthwise of the lay, its arm k^2, is carried around the cam k', in the to-and-fro movement of the lay. Upon breakage or depletion of the pick or other cause preventing its extending across the depression a', so as to support the fork d', the latter will fall into the said depression and the dog d, will then drop in front of the shoulder e^3, and prevent completion of the stroke of the plate c'. When the said plate is thus locked, its pendent arm k^2, is directly in line with the cam k', and as the lay approaches the breast-beam, said pendent arm, by action against the said cam, moves the arm k, sufficiently to throw the clutch or shipper, the said arm k, then taking a position some distance below the arm k^2.

An advantage of the new device is, that while the latter adjustment of parts obtains and the lay is close up to the breast-beam the loom can be started by turning the handle, substantially three-quarters of a full movement of the latter being allowed without causing the arm k, to encounter the arm k^2, and this three-quarters movement being sufficient to put the loom in operation. This is principally due to the formation of the arm k, with a **V**-shaped cam k', for after the arm k^2, has passed the point of the cam the

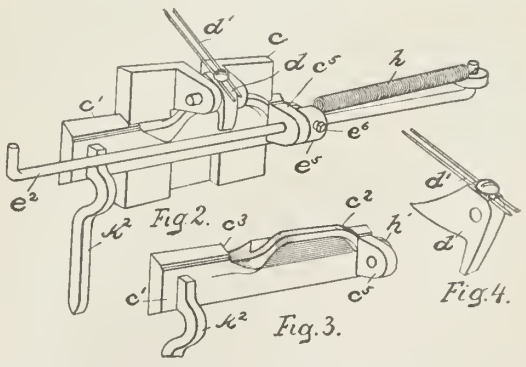
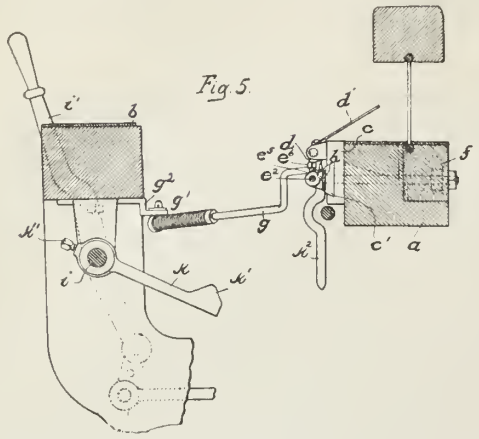


Fig. 2. Fig. 3. Fig. 4.

arm k, can be raised to a sufficient distance without encountering the arm k^2, to put the machine in operation.

With the new arrangement by holding the handle three-quarters on, the weaver can run the loom while the detector-fork has no support, and the arm k^2, will pass over the cam k', without touching it. This is an advantage, as it is frequently desired to run the loom experimentally without doing any work, and,

therefore, in the absence of filling. The new device can be also readily attached to looms in which the



shipper-rod moves longitudinally under the breast-beam instead of rocking. (*Woonsocket Machine and Press Company, Woonsocket, R. I.*)

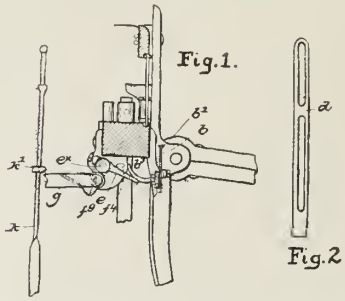
WARP STOP-MOTION FOR NORTHROP LOOMS.

In this stop-motion the detectors, which are normally supported by the warp-threads, are located between the harness mechanism and the lay, so that they are brought as closely as possible to the fell or weaving point, such position bringing the said detectors nearer the usual breaking point of the warps, which point is for the most part in front of the harness mechanism. Being located in front of the harness, the operator can readily see any dropped detector, due to warp breakage, and so locate it to repair the warp more readily than if he were required to look through the harness to see a dropped detector, as is necessary with the usual location of the warp stop mechanism. The location of the detectors in a stationary horizontal plane at the back of the lay makes them also free from the frictional action on the warp that would ensue were they carried by the lay.

When the loom is running properly the parts are in the position shown by full lines in our illustration Fig. 1, (being a side elevation of a portion of the new mechanism, the lay being forward, the vibrator, the releasing-lever of the stopping mechanism, and the intermediate connections being shown in normal position by full lines and by dotted lines in abnormal position, due to a dropped detector) the friction-locking device holding the rock-shaft and its attached parts in inoperative position, the path of movement of the outer end of the dagger g, being below the collar k', on the releasing lever k, when the lay is forward. The finger e, at such time bears against the feeler b^3,and the vibrator b and its flange b', are free to enter the detector guide in the back stroke of the lay, all of the detectors d, (see Fig. 2,—a side elevation of one of the detectors enlarged) being lifted. A dropped detector, however, will encounter the flange b', of the vibrator, the web supporting the rear edge of the detector when the lay moves back, and the vibrator will be turned into the dotted line position, Fig. 1, depressing the curved feeler b^3.

The depression of the feeler turns the finger e, into its dotted line position, thereby partially rotating the rock-shaft e^x, withdrawing the lug f^4, from the depression f^2 (see Fig. 3, showing a detail of the connections intermediate the vibrator and stopping mechanism) in the ear f, and moving into the depression f^3, a spring permitting sufficient longitudinal movement of the rock-shaft for such purpose. This rotative movement of the rock-shaft elevates the outer end of the arm f^7, causing its tip f^9, to act against and lift the dagger g, the said parts assuming thereby the position shown in dotted lines, Fig. 1, so that the forward movement of the lay will bring the dagger into engagement with the stop k', of the releasing lever k, and knock it out from its usual holding-notch, permitting the lever to fly outwardly in the usual manner and moving the belt shipper to stop the loom.

It will be seen that the connections between the detectors and the stopping mechanism will be moved into operative position at the first back stroke of the lay after a detector is dropped, and that the next forward stroke of the lay causes the stopping mechanism to stop the loom. All the intervening devices which thus control the stopping mechanism by the position of the vibrator are carried by the lay and are very simple and efficient, as well as rapid in their operation. The loom having been stopped, the operator lifts the dropped detector and mends the warp, and when the



lay moves back again the stopping mechanism is in proper position to act again without any necessity for the attendant to pay any attention to it. (*Draper Co.*)

NORTHROP'S FILLING STOP-MOTION.

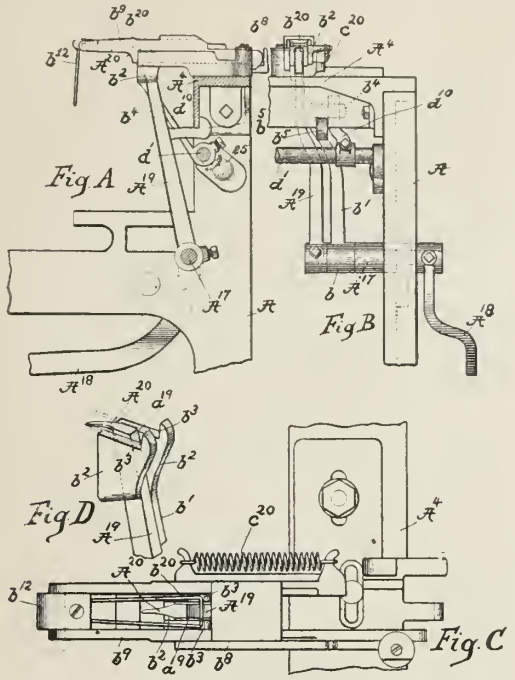
Fig. A, shows a sectional detail of a sufficient portion of a loom with the improvement embodied therein. Fig. B, is a front elevation of the mechanism shown in Fig. A. Fig. C, is a top or plan view thereof, on a larger scale, and Fig. D, is a perspective detail of the upper ends of the filling-hammer and actuating-arm.

The loom-frame A, breast-beam A^4, the starting-shaft d', the filling-fork b^{12}, its carrying-slide b^9, sliding in the guide b^8, the lever A^{18}, actuated by a cam (not shown) on the usual lower shaft of the loom, and the spring c^{20}, are all of usual construction.

In the drawings Figs. A, and B, there is shown a rock-shaft A^{17} to which the lever A^{18} is attached, and a filling-hammer A^{19}, is rigidly secured to said shaft to be vibrated thereby, the upper end of said hammer having a convexed rearwardly extended upper end A^{20}, to readily pass under the tail b^{20}, of the filling-fork when the latter is not acted upon by the filling.

The hub b, of an actuating arm b', Figs. B, and C, is herein shown as loosely mounted on the shaft A^{17}, said arm having a bifurcated head b^2, recessed to receive the filling-hammer A^{19}, as it swings inward (see Fig. D,) the top of the head being cut away laterally to form a seat, and leave shoulders b^3, at its front side, between which and the straight front face a^{19}, of the filling-hammer, the looplike tail b^{20}, of the filling-fork enters when the filling fails. The arm b', has a lug or projection b^4, thereon to engage a finger d^{10}, fast on the starting-shaft d', when the actuating arm is operated, to turn said shaft in the direction of arrow 25, Fig. A, a detent b^5, on the actuating arm engaging some fixed part of the loom to limit its movement rearwardly.

The filling-fork slide is normally held by spring c^{20}, in the position best shown in Figs. A and C, and so long as the tail b^{20}, of the filling-fork is not caught between the shoulders b^3, of the actuating arm and the



filling-hammer, the latter will swing back and forth without moving the actuating-arm, and the starting-shaft d', will not be turned. If the filling fails in front of the fork, however, and the latter is not tipped, its tail will be caught between the filling-hammer and the shoulders b^3, and the actuating-arm b', will be moved toward the breast-beam with the filling-hammer, thereby causing the lug b^4, to act upon the finger d^{10}, turning the starting-shaft d', without the intervention of the filling-fork proper, or its slide.

The shoulders b^3, are separated by a space only sufficient to admit the entrance of the filling-hammer and present broad abutments against which the tail of the filling-fork is held by the hammer, so that the strain upon the tail is more evenly distributed. (*Draper Co.*)

MOMMER'S ELECTRIC WARP STOP-MOTION FOR LOOMS.

This invention, relating to looms, has for its object to provide a warp stop-motion which when a warp thread breaks will permit a metallic drop device having a warp eye and a slot, to fall and effect the closing of an electric circuit, the closing of the circuit causing an electromagnet, carried by a knock-off lever, to put a lever or finger, pivoted and forming the armature of the said magnet, in position to be struck by a hammer actuated continuously by a suitable device on a cross-shaft of the loom, the blow of the hammer causing the knock-off device or lever to be moved and push the usual shipper-handle out of its usual holding notch.

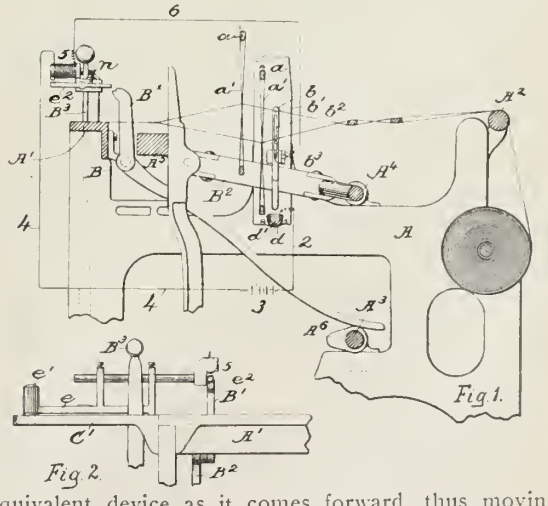
Fig. 1, shows a sufficient portion of a loom with the improvement added to enable the invention to be understood. Fig. 2, is a partial front elevation of the left-hand end of the loom, showing part of the usual shipper-handle and the knock-off device or lever.

A, represents the loom frame; A', the breast-beam; A^2, the whip-roll; A^3, the under shaft; A^4, the crank-shaft; A^5, the lay; A^6, the cam on the under shaft; B, the rock-shaft, and B', a hammer and B^2, the lay connecting rods; a, the harness frames having harnessses a'; B^3, the shipper-handle adapted to be moved in a slot in plate C', one side of said slot having a notch to receive the said shipper-handle and hold it in place, to keep the driving-belt on the driving-pulley (not shown).

The object of the new device is to stop the loom on the breaking of a warp thread, and for this purpose there are provided a series of flat ribbon-like drop devices b, each having a warp eye b', to receive a warp-thread, and at one side of said eye a slot b^2, through which is extended a metallic bar b^3, said bar acting to keep the said drop devices substantially parallel and to also act as a guide for a series of said devices. Below the lower ends of these drop devices is arranged a closure device, shown as a trough d, properly insulated from the frame of the machine and shown as filled with mercury d', the breaking of a warp-thread letting a drop device fall so that its lower end enters the mercury and closes an electric circuit.

The electric circuit shown contains a wire 2, which starts from the mercury cup and extends to a battery 3, and from the battery by wire 4, to an electromagnet 5, mounted at or near the end of a knock-off lever or device e, pivoted at e', and carrying a finger or lever e^2, which constitutes the armature of said magnet, the outer or heavier end of said armature keeping the same in its "normal" position, a wire 6, connecting the opposite end of said magnet to the said guide-bar b^3.

When the circuit is open, the inner or right-hand end of said armature is normally kept elevated out of the range of motion of the hammer B', operated at each rotation of the shaft A^3, and said hammer device passes under the said armature, but in case a drop device falls into the mercury, it constituting a closure device for the circuit, the magnet is excited and turns the armature, putting its inner end in its abnormal position when it will be struck by the hammer or



equivalent device as it comes forward, thus moving the armature and with it the knock-off device or lever e, causing it to meet the said shipper-handle and push it from its holding notch and effect in usual manner the shipping of the belt to stop the loom.

The screw n, is employed as an up-stop for the magnet. Instead of the mercury any other suitable device, which, as the lower end of the drop device meets it, will close the electric circuit, can be used. (*Draper Co.*)

PICKING MECHANISMS.

KRITLER'S SWEEP-STICK FOR CONNECTING THE SWEEP-ARM AND PICKING-STICK OF A LOOM.

The object of the device is to so construct this member of a loom so as to obviate the disadvantages which have been heretofore experienced, consequent upon the inability of the sweep-stick to adapt itself to the variety of movements occasioned by the transmission of power from a sweep-arm, moving in one plane about a center, to a picking-stick moving in a plane

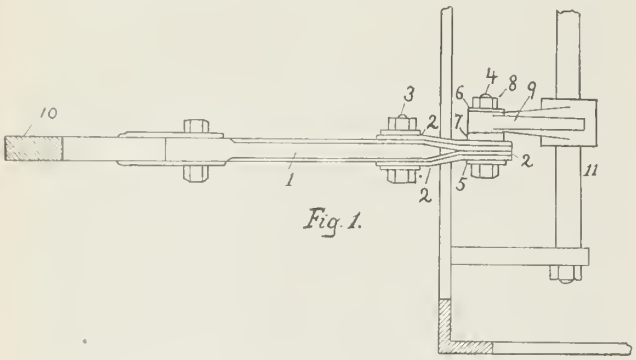


Fig. 1.

at right angles thereto and about another center, as well as swinging back and forth in the same general plane as the sweep-arm.

Fig. 1, is a sectional plan view of a portion of the frame of a loom, showing the sweep-arm, picking-stick and sweep-stick, in one of the positions assumed by these parts in their operations; Fig. 2, is a similar view, showing another of the positions assumed by these parts and illustrating the several strains to which the sweep-stick is subjected; Fig. 3, is a side elevation of the sweep-arm and the sweep-stick; and Fig. 4, is a section taken at the line x, of Fig. 3.

The difficulties heretofore experienced in the operations of the shuttles of a loom by the picking-stick, from power transmitted thereto from the sweep-arm, through the sweep-stick, have been lost motion, occasioned by the necessity of having to connect the sweep-stick to the sweep-arm and picking-stick, by very loose joints formed by the passage of bolts through enlarged holes in said sweep-stick; the rapidity with which the connecting holes in the sweep-stick are enlarged by the constant hammering of the bolts therein, occasioned by the lost motion; the inaccuracy with which the shuttle was thrown from side to side, on account of this lost motion; the varying time in which the shuttle was thrown, on account of the wear in said holes; the loss of time occasioned by the stopping of the loom to replace the worn-out sweep-stick; and the cost of constantly having to replace said sweep-stick.

These disadvantages are necessitated by having to connect too loosely the sweep-stick to the sweep-arm and picking-stick on account of the several movements of said arm and picking-stick, which require that the sweep-stick shall adapt itself to the several angles thus occasioned. All these disadvantages are overcome in the present device by forming the sweep-stick in two sections 1, and 2, the former being made of hard wood and the latter of leather; the flexible section to be composed of four layers of leather, so divided at one end that two layers will embrace one end of the wooden section upon either side thereof. 3, in the illustrations indicates a bolt, with suitable washers and nut, whereby the layers of leather are securely clamped to the wooden section, as clearly shown in Fig. 4. At the inner end of the flexible section, the layers of leather are brought together parallel and are held firmly in this position by the bolt 4, passing therethrough, and the washers 5, and 6, and hub 7, drawn together by the nut 8.

The hub 7, is reduced in diameter so as to pass through a hole in the upper end of the sweep-arm 9, whereby the sweep-stick is pivoted to said arm, as will be readily understood by reference to Fig. 4. The outer end of the sweep-stick is secured by a collar and lug strap to the picking-stick 10.

The operation of the mechanism is thus:—During the operation of a loom, the lathe or member in which the shuttles are guided, has a to-and-fro movement lengthwise of the loom, which is at right angles to the swinging movement of the picking-stick, and as the picking-stick is connected at its upper end to this lathe, it has a swinging movement which is utilized to throw the shuttle. The picking-stick receives this latter movement from the sweep-arm, which is rocked in an arc by the shaft 11; and as said sweep-arm is rigid as to any side movement, the sweep-stick which connects the arm and picking-stick, is compelled to assume a number of angles relative to said arm and picking-stick so that if the sweep-stick be bolted to the arm and picking-stick without lost motion, it must be capable of giving in several directions, in order that it may assume these angles, and this, the present stick does, by reason of the flexible section 2.

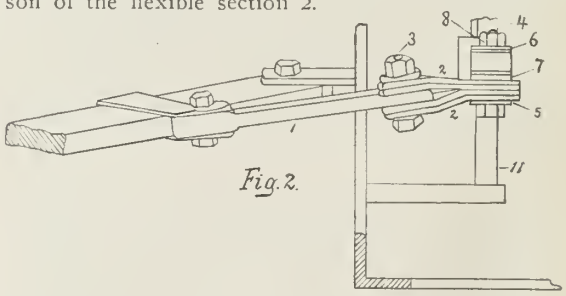


Fig. 2.

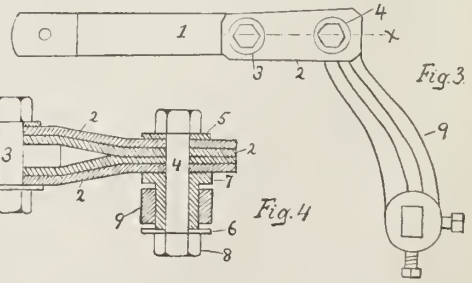


Fig. 3.

Fig. 4.

When the swinging movement is imparted from the sweep-arm to the picking-stick the hub 7 is free to turn in its bearing in the upper end of the sweep-arm

and when the picking-stick is swung laterally by the movement of the lathe, the flexible section bends sidewise and is also given a tortional action, as shown in Fig. 2, by reason of the twisting of the sweep-stick upon its axis, in following the compound movement of the picking-stick.

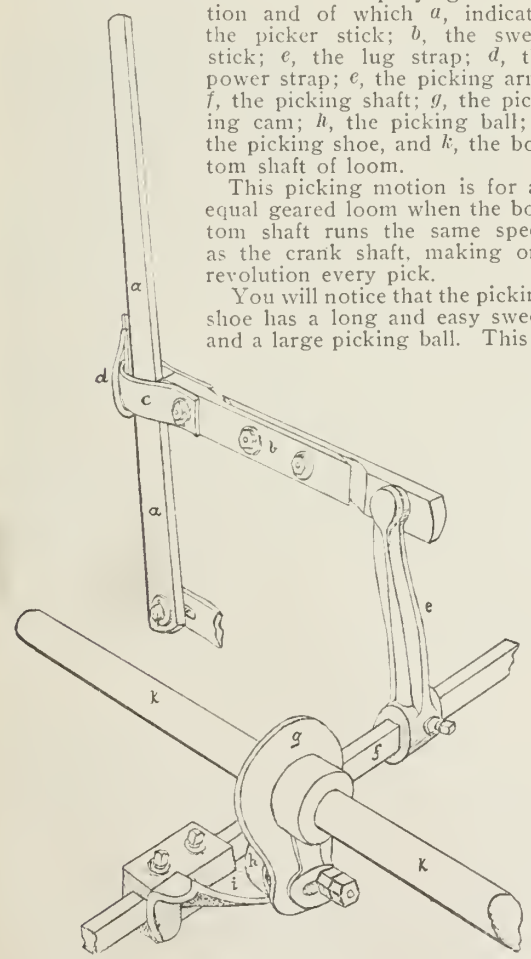
In practice, by the use of Kritler's mechanism, the number of picks per minute of a loom may be increased, since as there is no lost motion between the sweep-arm and picking-stick, the shuttle is thrown with more accuracy and less loss of time and the wear and tear upon the loom is decreased as less power is required to throw the shuttle and less vibration is imparted to the machine, by reason of the hammering caused by the lost motion, and a better result is had in the fabric woven. By actual experiments, it has been found that from twenty-five to thirty-five per cent. more fabric can be woven by a loom having the improvement applied thereto, and the cost of maintaining said loom is greatly decreased, on account of the decrease in vibration and the increased length of time in which the sweep-stick has to be replaced. (*Geo. W. Kritler, Philadelphia, Pa.*)

THE KNOWLES PICKING MOTION FOR EQUAL GEARED LOOMS.

The same is shown in the accompanying illustration and of which *a*, indicates the picker stick; *b*, the sweep stick; *e*, the lug strap; *d*, the power strap; *e*, the picking arm; *f*, the picking shaft; *g*, the picking cam; *h*, the picking ball; *i*, the picking shoe, and *k*, the bottom shaft of loom.

This picking motion is for an equal geared loom when the bottom shaft runs the same speed as the crank shaft, making one revolution every pick.

You will notice that the picking shoe has a long and easy sweep and a large picking ball. This is



on account of the picking ball traveling so fast it does not require as sharp a picking shoe as a loom where the bottom shaft makes one revolution in two picks. (*Crompton and Knowles Loom Works.*)

THE MASON PICKING MECHANISM.

This mechanism has for its object to improve the picking motions of looms, providing means for holding the picking roll or "bowl," as it is called, the

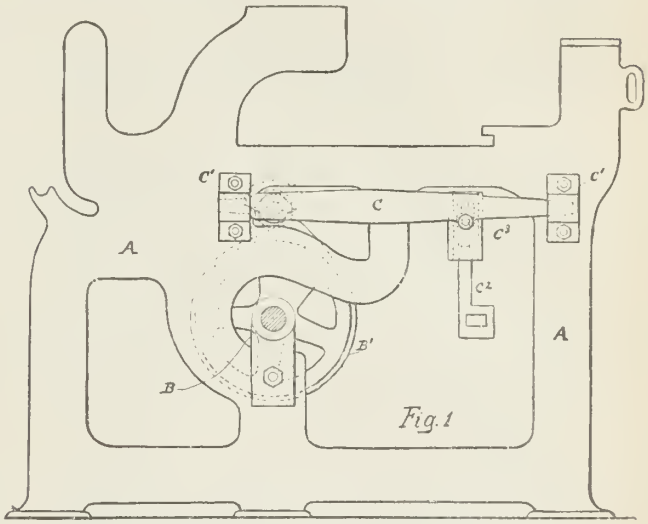


Fig. 1

shell inclosing the said roll or bowl being in one piece and firmly or rigidly carried by the picker rock-shaft. Means are also provided whereby the stud on which the roll or bowl rotates may be lubricated.

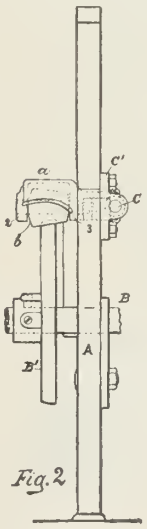


Fig. 2

Fig. 1, in side elevation, represents part of a loom having this mechanism added; Fig. 2 is a partial elevation from the left of Fig. 1; Fig. 3 is an enlarged detail of the picker rock-shaft. Fig. 4, shows the roll detached. Fig. 5, shows the stud detached, and Fig. 6 shows a modification.

A, indicates the loom side and B, the cam-shaft, having the picking-cam B^1 thereon. The picker rock-shaft C, mounted in bearings C^1, has an attached arm C^2, made adjustable thereon by a bolt C^3 in a slot of the said arm. The arm C^2, is connected by a strap to the picker-stick. The shell *a*, extended from the picker rock-shaft, is made in one piece, and integral with the rock-shaft; however the said shell and its hub made in one piece may be attached firmly and rigidly by a set-screw 7 to the said shaft, as in Fig. 6. The shell has two rigidly-connected bearings 2, 3, through which is extended the stud 4, on which is mounted and rotates the roll or bowl *b*, which, as shown, is extended between the bearings 2 and 3 when one end of the said pin (shown as the inner end

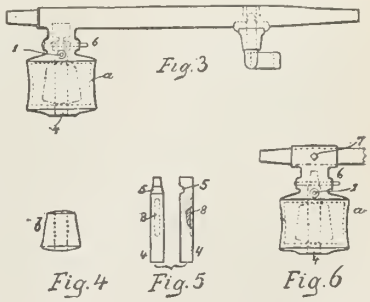


Fig. 3 Fig. 4 Fig. 5 Fig. 6

provided with a notch 5) receives a locking device 6. (Shown as a pin.) The stud 4 is shown as provided with an oil-chamber, as at 8, (see Fig 5) the oil entering therein through the hole 1, to lubricate the stud on which rotates the said roll *b*.

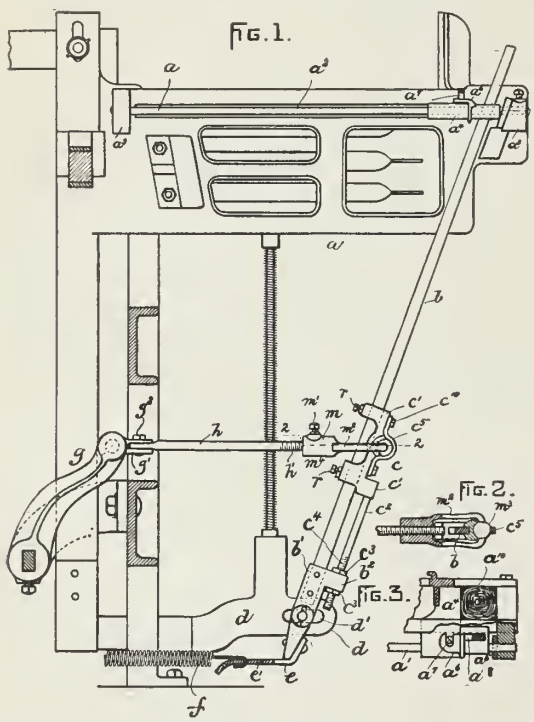
Making the shell, including the bearings 2 and 3 and the shank of the shell, in one casting adds greatly to the strength, stiffness, and durability of the parts. (*Mason Machine Works, Taunton, Mass.*)

WERNER'S PICKER AND RELIEF MOTIONS.

A. PICKER MOTION.

The same is shown in the accompanying illustrations of which Fig. 1, is a front view of an end portion of a loom, showing the motion applied thereto. Fig. 2, is a horizontal sectional view of the adjustable means on the line 2-2, of Fig. 1. Fig. 3, is a top view of a portion of the shuttle-box showing the picker and its engagement with the stick.

a, represents a shuttle-box, and *b*, the picker-stick (steel) pivoted at its lower end in a slot *d'*, of the casting *d*. A strap *c*, is connected to the lower end of the picker-stick and provided with holes *c'*, in which one end of a coil spring *f*, is inserted. A series of holes are provided so that the tension of



the spring may be regulated as desired. The picker-stick *b*, and its casting *b'*, are shown in illustration as in two parts; but they may be made equally as well in one.

a^5, is a picker block provided with the slot a^9, in which the picker-stick can play up and down. a^4, is the picker. a^6, is a latch upon the block engaging a screw a^7, or other part upon the picker to join the picker and block together. Said picker and block are mounted to slide upon a rod a', and in a groove a^2, thus insuring the picker moving in a straight line to and fro. Since the picker-stick is pivoted in its movement to and fro, it will have a sliding engagement with the block a^5, by means of the slot a^9.

The tendency of the picker-stick when it first starts is to throw the picker upward, very often dislodging the shuttle by causing the picker to make a lateral blow upon the end of the shuttle. To obviate this and to insure the picker giving a direct blow upon the shuttle in the direction of its axis, the picker block is provided, and which is loosely connected with the picker.

Now, when the picker-stick moves forward and gives its blow to the picker block, this blow is transmitted to the picker in a direct line, and the picker and block, by means of the latch, move together.

a^{10}, is the ordinary buffer for the picker and a^3, for the picker block.

g, represents the arm of the rock shaft. *h*, is the rock rod having a swivel connection at one end with said arm by means of the lugs *g'*, and the pin g^2, passing through said lugs and the reduced end of the rock arm.

c, is an adjustable sleeve mounted upon the stick *b*, and having its arms *c'* hollow and shaped to fit the stick, and provided with set-screws *r*, for securing the sleeve upon the stick at any desired point.

c^2, is a rod rigidly secured to a lug *c'*, upon the sleeve, and provided at its opposite end with screw threads c^4. The pivoted end of the stick or its casting *b'*, when the two are made separate, is provided with a lug b^2, having an aperture in which the rod *c'* is arranged.

c^3, are nuts, one upon either side of the part b^2, by means of which the rod c^2, and its connected sleeve *c*, may be adjusted up and down on the stick and retained in any desired position.

m, is a connecting piece provided with a hollow head m^4, to receive the screw threaded end *h'*, of the rock rod *h*. *m'*, is a set-screw for firmly binding the rod in said head. m^2, is a loop connected to the head and provided at its end with the ball shaped projection m^3, which fits in a correspondingly shaped socket in the sleeve. A strap c^5 is arranged to fit over said ball shaped projection and hold it to its seat, the strap being secured to the sleeve by means of rivets or screws c^{10}.

The sleeve is adjusted upon the stick by means of the nuts c^3, and the set-screws *r*, to any desired position, according to the length of the throw it is desired for the stick to take, the length of the rock rod *h*, being also suitably adjusted.

Upon the starting of the machinery the picker-stick moves back and forth, driving the picker and sliding freely up and down in the slot a^9, in the picker block. At the same time the picker-stick by means of the swivel connection is permitted to have a lateral play. The ball-joint by means of which the loop is connected with the sleeve gives a secured and almost frictionless connection between the rock rod and the picker-stick.

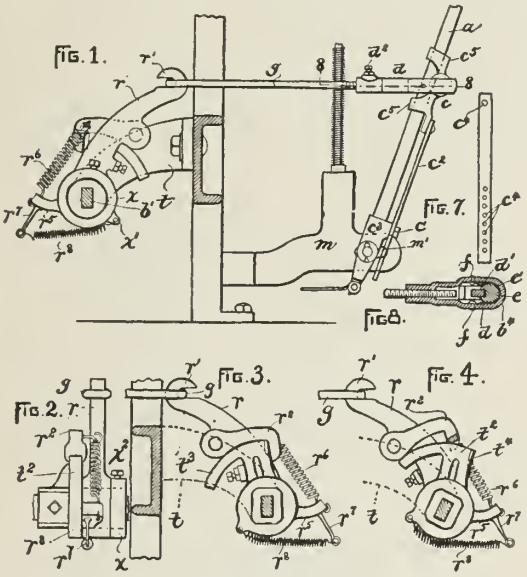
The picker block and adjustable sleeve may be made of aluminium if desired.

B. RELIEF MOTION.

The same relates to a clutch mechanism constituting a relief motion, for use in connection with the picker-motion, and has for its object, among other things, to provide means whereby the rocker arm may be released and the shipper rod operated to stop the loom should any unusual strain come upon the picker-stick.

Fig. 1, is a view of a portion of the loom, showing the relief motion associated therewith. Fig. 2, is a front view of the clutch mechanism. Fig. 3, is an end view of the clutch mechanism, showing the parts in operative position. Fig. 4, is a similar view, showing the parts released from operative connection with the rocker shaft. Fig. 5, is a detail view, showing the

picker stick, picker block and picker in operative connection. Fig. 6, is a detail view, showing the arrangement of the picker and its associated parts in the shuttle-box. Fig. 7, is a detail view of the adjusting strap. Fig. 8, is a sectional view taken on the line 8-8 of Fig. 1. Fig. 9, is a view similar to Fig. 1, showing the connection between the relief motion and the shipper rod, the connection between the relief motion and the picker-staff being omitted for the sake of clearness. Fig. 10, is an end view of Fig.



1, looking from the inside of the loom frame. Fig. 11, is a detail, showing the connection between the relief motion and the shipper rod.

a, represents a picker-stick (steel) pivoted at its lower end in a slot m', of a projecting arm m.

a', represents a picker block provided with a slot a^2, in which the stick plays. b, represents the picker provided with a finger-piece b', having a finger b^2, arranged to engage a projection a^3, on the picker block.

Both the picker and picker block are constructed and arranged to travel at one end on a rod b^4, and the other end in a slot in the shuttle-box (not shown). By this arrangement the picker can travel back and forth in a straight line uninfluenced by the upward thrust of the picker-stick, which plays up and down in the slot a^2.

c, is a sleeve having two arms c^5, engaging the picker-stick. c^2, is an adjustable connector secured to the lower arm of said sleeve at one end and at its other end secured to a lug on the casting c^3, by means of a screw c'. This connector is provided with a series of holes c^4, by means of which the sleeve may be adjusted to any desired position on the stick.

g, is the rocker rod provided at one end with a loop engaging a hook r', on the end of the rocker arm r.

At its other end said rocker rod is provided with screw-threads for engagement with a hollow head d, of a loop d^4, the rod being retained in said head by means of a set-screw d^2. The loop is provided upon its interior with horizontally arranged flanges d', on both upper and lower edges. e, is a ball cast on said sleeve arranged to play in the said loop to form a ball-and-socket bearing. f, are pins inserted in the loop to prevent the ball from leaving the flanges. The ball is provided with a slot e', in which the picker-stick rests.

b', is the rocker shaft. On said shaft is mounted loosely the rocker-arm r and a coupler t^2, fast upon said shaft, said rocker-arm and coupler being retained in place by collars x', rigidly secured to said rocker shaft by set-crews x^2. The rocker shaft is carried by the arms t.

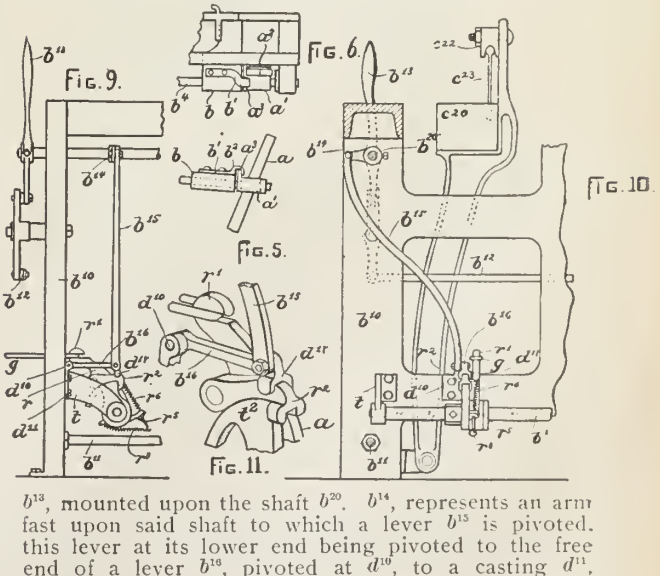
r^2, is a dog pivoted on the rocker arm and arranged for detachable engagement with the coupler t^2. Said dog is provided with a slot at its free end in which the arc-shaped portion t^3 of the coupler can play, thus keeping the dog always in alignment with the coupler. The coupler is provided with a radical portion t^4, with which the dog engages.

r^6, is a spring connected at one end with the free end of the dog and at the other end with a lug r^5, projecting from the hub of the rocker arm. r^8, is a spring connected at one end with an arm r^7, projecting from the lug r^5, and at its other end with a lug x'', on one of the collars x. The spring r^6, serves to return the dog to its engagement with the coupler, and the spring r^8, serves to draw the rocker arm forward so that its dog can engage with said coupler.

The parts being constructed and arranged as shown and described, it will be seen that the picker-stick plays up and down in the slot in the picker block, driving the picker to and fro in a straight line. The sleeve c, enables the loom fixer to adjust the throw of the picker, and at the same time to so connect the rocker arm with the rocker rod and with said sleeve as to allow a lateral play of the picker-stick.

The coupler and its associated parts being in the position shown in Fig. 3, with the coupler in engagement with the dog, the picker-stick will be moved back and forth as the rocker arm moves. Now, should any unusual strain be brought upon the picker-stick, the dog and coupler are so arranged that under such circumstances the free end of the dog will be released from the coupler, thus releasing the rocker arm and leaving the coupler, free to rock with the shaft.

Referring now to Figs. 9, 10, 11, in which the relief motion is shown connected to the shipper rod in order to stop the loom should the picker meet with any obstruction, the connection between the relief motion and the picker-stick being omitted in these views for the sake of clearness, b^{12} represents the usual shipper rod connected and operated by a lever



b^{13}, mounted upon the shaft b^{20}. b^{14}, represents an arm fast upon said shaft to which a lever b^{15} is pivoted. this lever at its lower end being pivoted to the free end of a lever b^{16}, pivoted at d^{10}, to a casting d^{11}, secured to the loom frame b^{10}. The free end of this

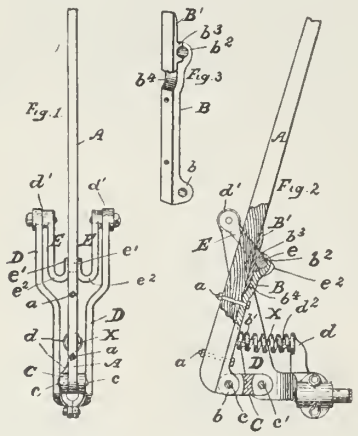
lever is provided with a saddle d^{17}, constructed and arranged to straddle and ride upon the top of the dog r^2.

From the foregoing, it will be seen that as long as the picker meets with no obstruction, the relief mechanism will move back and forth with the parts in normal position the saddle d^{17} and its lever resting upon the dog r^2, which plays back and forth in said saddle without affecting the lever b^{16}. Should, however, the picker meet with any obstruction, as has already been described, the dog r^2 will be thrown upward, releasing the rocker arm, and leaving the coupler free to rock with the shaft, as heretofore described. This upward movement of the dog r^2, will give an upward thrust to the lever b^{15}, turning shaft b^{20}, and by the connections operating the shipper rod to stop the loom.

In Fig. 10, c^{20} represents the lay, c^{21} the lay sword, c^{22} the hand rail, and c^{23} the reed, and which are shown merely to clearly exhibit the motion in relation to the other parts of the loom. b^{11}, represents one of the rods connecting the parts of the frame. (*Louis C. Werner, Broadbrook, Conn.*)

PAIGE'S PICKER MECHANISM.

The object of this motion is to prolong the life of the picker and picker-stick as well as to throw the shuttle straight. Fig. 1, is a front elevation; Fig. 2, is a vertical sectional elevation, and Fig. 3, an enlarged detail view of the mechanism.



A, is the picker-staff or stick. Bar B, is bolted to the picker-stick at a, a, the lower end of the bar being enlarged, as at b, sufficiently to receive and form a bearing for a pin c, which connects said picker-stick with one end of a link C, the other end of said link being pivoted at c', to a bifurcated bracket or support D, adapted to be rigidly attached to a loom.

As shown, the stick is supported directly on the link and immediately on the bracket or support D. The said bifurcated support comprises short and long arms, respectively, d, d', the short arm d, being provided with a boss d^2, opposite to which on the bar B of the picker-stick is a similar projection or boss b', each boss or projection being designed to support the ends of a helical spring X, for insuring the quick return of the picker-stick to its normal position.

The long arm d', of the bifurcated support carries the free ends of a yoke E, which is provided with a journal e, adapted to fit a bearing formed in the upper end of the bar B, and thus support a picker-stick. This bearing in the upper part of the bar B, is open or separable, one portion being formed in said bar, as at b^2, and the other portion being formed upon a plate B', as at b^3, said plate being formed quite long, its journal-bearing being located at a point midway from its ends so that it cannot even produce an abrasion upon the picker-stick, against which it rests on a plane with the bar B, said plate B', being let into the bar B, as shown at b^4, for this purpose.

The plate B', is reversible, end for end, and is not fastened in any way to either the picker-stick or the bar B, the flanges or shoulders e', of the yoke E, at each side of its journal e, answering the purpose of holding said plate in position, and thus providing just enough elasticity in the connection of the yoke E, with the picker-stick to avoid unnecessary friction.

The present picking mechanism prevents the stick from being worn by the bearing, and the plate B', being made easily reversible can be frequently reversed to insure uniformity of wear, which, however, will be comparatively small.

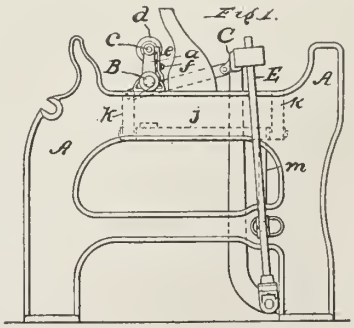
To avoid weakening the stick at this point and to provide for easily reversing plate B', the bar B is recessed at b^4, to receive between itself and the stick the plate B' and to aid in holding the plate in its proper situation. Said plate is held laterally by the shoulders e' of the swinging yoke E, and by these means the journal-bearing of the yoke is provided and the stick left entire adjacent thereto.

The metal at each side of the journal e, of the yoke E, is curved, as will be seen at e^2, below the said journal, and this is done to allow more room for the picker-strap, permitting it to drop as low as may be required. (*J. W. Center and S. C. Kennard, Manchester, N. H.*)

PERHAM'S PICKER-OPERATING MECHANISM.

Fig 1, is an end view of sufficient of a loom to explain the device. Fig. 2, is a front view of the same, a part of the crank-shaft, breast-beam, and lay being shown as broken away, so as to better illustrate the picking mechanism.

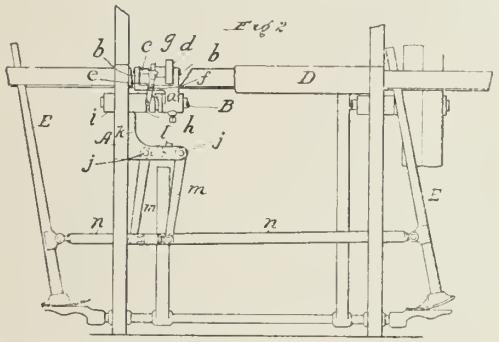
A, designates the loom-frame. B, is the crank-shaft, by which the lay C is operated. D, is the breast-beam, and E are the picker-sticks. Fastened upon the crank-shaft by means of a set-screw, is a bracket a, with two arms b, b. Journaled in and extending between the arms b, b, there is a short shaft or pin c, supporting a wiper d, which is adapted to be moved from side to side thereon between the said arms. e, is a lever fulcrumed at f, on the bracket a, and having one end loosely engaged with a collar or flange g, connected with the hub of the wiper d, so that in moving the lever on its fulcrum it may move the wiper from side to side on its pin or shaft. The



other end of the said lever is provided with a traveler, pivoted to the lever and adapted to move in a double cam-groove h, formed in the box.

j, are rock rods or pins journaled in brackets *k*, connected with the loom-frame, which rods or pins have upwardly-projected crank-arms *l*, secured to their outer ends, the ends of which arms extended into the path of the wiper *d*, when it is shifted to the extremes of its allowed movement longitudinally on its supporting shaft or pin. To the other ends of the rods *j*, *j*, are secured the upper ends of arms *m*, *m*, the lower ends of which are connected with straps, or it may be rods or cords *n*, with the picker-sticks E.

It will now be seen, that as the crank-shaft B, is rotated, the bracket *a* will be rotated, revolving the wiper *d* around the shaft, and as the traveler crosses from one cam-groove to another, as it were, the lever *e* will be moved upon its fulcrum, so as to shift the wiper *d*, from side to side on its supporting-pin, and cause it to act first upon the end of one of the crank-arms *l*, and then upon the other, actuating



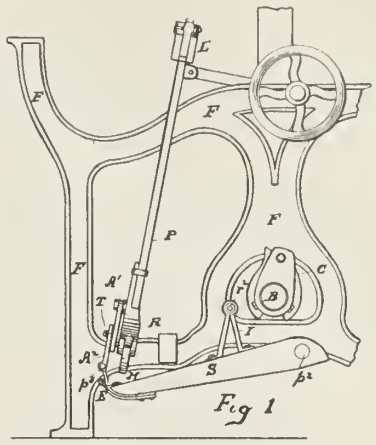
one of the arms *m*, and the picker-stick operatively connected therewith, so as to pick the shuttle through the shed.

By means of this mechanism it will be possible in the construction of a loom to entirely dispense with the cam-shaft for operating the picker-staves or their equivalents—thus greatly simplifying the construction and cost of manufacture of the loom, giving more room for the warp-beam and cloth-roll, and lessening the liability of breakage of parts. Besides this, the loom is made much easier of operation, is more quickly and easily stopped, and is relieved of much of the shock and jar that is occasioned by the abrupt cams of the picker motion on the cam-shaft. The wiper makes double the number of revolutions of the cams on the cam-shaft, and hence, it is not necessary to make the said wiper so abrupt or blunt, or to act with the same suddenness, so as to create the same shock or jar. (*Charles Foster Perham, Lowell, Mass.*)

BARSELOU'S ROCKER AND SHOE CONNECTION FOR PICKER-STICKS.

Fig. 1, is an end view of a part of a loom-frame, showing the end of the lay, the picker-stick, the main driving-shaft, and its cam operating the shoe, and a side view of the connection made between the shoe and rocker, to which the picker-stick attaches. Fig. 2, is a view in elevation of a part of a loom-frame, showing the lay, the picker-stick, and the rocker, and a front view of the connection made between the rocker and shoe. Fig. 3, is a perspective of the mechanism for connecting the shoe and the rocker.

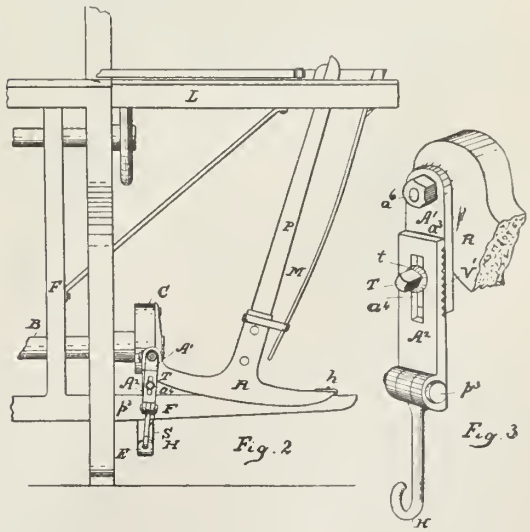
F, designates that part of the loom-frame with which the improvement connects. B, designates the main driving-shaft, and C, a cam located on said shaft where projecting beyond the frame. S, designates the shoe, which is at its heel end, at p^2, pivoted to the frame. L, designates the lay. P, the picker-stick, and R, the rocker, with which the picker-stick connects. I, designates a standard upwardly projected from the



shoe, and r^2, a friction-roller arranged in the top of of the standard for engagement with the cam which operates the shoe.

A', designates a plate which at its upper end a^3, pivotally connects with that end of the rocker which is opposite to that which is hinged to the frame at *h*, and this plate A', on its outer face a^3, is provided with a **V**-shaped rib V', projecting therefrom at right angles to the side edges of the plate. A^2, designates another plate provided with **V**-form recesses V^2, arranged side by side on the inner face of the plate, in which they are formed at right angles to the side edges of the plate, and each of these recesses is adapted to receive the ribbed projection V', on the outer face of the underlapping plate A'.

a^4, designates a slot made in the exterior plate A^2, and T, designates a set-screw which is passed through the slot a^4 to be threaded into the plate A' and at its outer end this set-screw is provided with a collar



t, by which when the set-screw is screwed inwardly this collar will straddle the slot so as to hold the two plates A', and A^2, with the rib V', in such one of the recesses V^2, of the plate A^2, as is desirable to

regulate the distance at which the shoe shall pull down the rocker and the measure of throw given to the picker-stick. The lower end of this plate A^2, is provided with a hook H, which latter is pivoted to the plate A^2, at p^3, and this hook is arranged to hook into the toe end of the shoe S, in the eye E, formed therein.

As thus made, the connection made between the shoe and the rocker, to which the picker-stick is attached, is adjustable as to length, is quite free from jar, and is much more durable than the ordinary leather loop used.

The operation of the mechanism thus described is as follows:—The driving-shaft B, when revolving, causes its cam C, to engage with the roller r^2, so as to force downwardly the shoe S, on its hinged connection, thus pulling down the rocker and operating the picker-stick to throw the shuttle, with the picker-stick drawn back to its initial position after the cam has passed from off the roller r^2, by the return-spring M. (*A. Barsclou, assignor of one-half to L. N. March, Cohoes, N. Y.*)

DOYLE'S PICKER-CHECK.

Heretofore, yielding abutments supported by springs have been used to receive the blow of the picker as it is driven back or outward by the point of the shuttle as the latter enters its appropriate shuttle-box. In this class of devices the reaction of the spring used to sustain the yielding abutment has always heretofore caused the shuttles to rebound, more or less, which has interfered greatly with the introduction and use of devices of this class.

In the present picker-check, we find introduced, between the yielding abutment which receives the impact of the picker and the point of application of the sustaining-spring therefor, means for creating frictional resistance, which dulls or deadens the recoil of the sustaining-spring, and although this spring still has considerable strength, its action is slowed or dampened, so that it is not so quick in its recoil as to cause the shuttle to rebound. This feature may be accomplished in a variety of mechanical forms, of which one is shown in the accompanying illustrations.

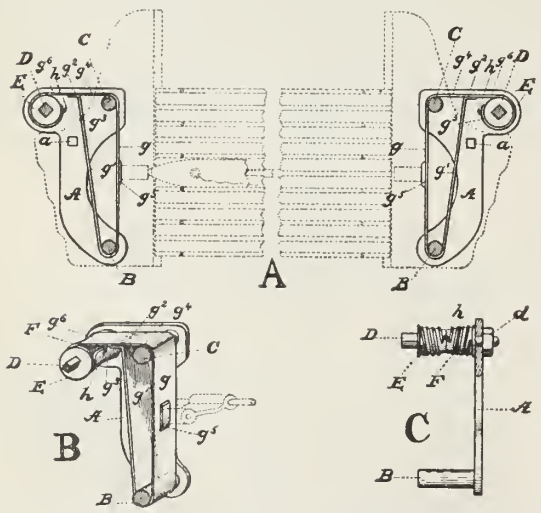


Fig. A, is a side view of the mechanism, shown therein by solid lines, and showing also the position, by dotted lines, of the adjacent portions of the loom to which the same is designed to be attached. Fig. B, is an isometric view of the new device, the view also indicating by dotted lines the relation thereto of the picker and the rod upon which it slides. Fig. C, is a view in end elevation, partly in section, showing some of the parts of the improvement.

A, is a plate of suitable size and shape and intended to be applied and secured to a portion of the frame-work of the lathe of a loom at the outer end of the shuttle-box thereof.

The device illustrated is intended particularly for use in looms having shifting shuttle-boxes, but if desired, it may be applied to looms in which the boxes do not move or shift.

The base-plate A, is secured in suitable manner to the part by which the check is to be carried, as, for instance, by a bolt passing through a hole a, in the base-plate, said hole being shown in Fig. 1.

To the base-plate A, are secured studs or posts B, and C, and at a short distance laterally from the stud C a short shaft D is mounted on said plate. One end of the shaft D, passes through a hole in the plate A, and is threaded. A nut d, being turned upon the threaded end of D tightly against the plate A, secures said shaft D in position. Upon this shaft is fixed a sleeve or barrel E, to which is applied a spring F, the opposite ends of said spring being secured to the sleeve or barrel near the ends of the latter, and the middle portion of the spring first being coiled around the sleeve or barrel to form oppositely-directed spirals, is then bent to form a hook h.

A belt of flexible material—as, for instance, leather—is shown at $g\ g'\ g^2\ g^3\ g^4\ g^6$. This belt is drawn around the studs B and C to form a loop, as is indicated by the drawings at $g\ g'\ g^2\ g^4$. The slack portion of this loop toward the rear is attached by a connecting-link $g^2\ g^6\ g^3$ to the hooked end h of the spring F. Upon the front face of the belt $g\ g'\ g^2\ g^4$ a protective shield or reinforcement g^5 is shown at that point, which is likely to be abraided by the impact of the picker.

The operation is as follows: When the shuttle is driven rapidly into its box, its point engages with the picker, and the latter is driven backward or outward against the front face of the loop $g\ g'\ g^2\ g^4$ at the point indicated by the reinforce or shield g^5. This is the point which constitutes the yielding abutment for the picker. This abutment at g^5 is driven backward or outward, and in this operation certain portions of the loop, which are shown as lying between the stud C and the point g' (at g^4) are made to slide over the surface of the stud C from the rear to the front, and if the blow of the picker is sufficiently strong, this will continue until the points of the loop at g' and g^4 are in contact, when the loop being all taken up, a dead-stop will be obtained. During this movement the link $g^2\ g^6\ g^3$ will have drawn the spiral spring out around the barrel E, and this spring being of proper strength will finally check the rearward movement of the picker, after which its resiliency will restore the parts to their normal position. (Indicated in the drawings.) In this return movement of the spring F, portions of the loop $g\ g'\ g^2\ g^4$ are again drawn over the surface of the stud C with considerable friction, which dulls or deadens the recoil of the spring, and the parts return less rapidly to their normal position than in devices in which no resistance is interposed between the yielding abutment and the sustaining spring. The loop will be found to slide very little, if any, around the stud B. (*James T. Doyle, Skaneateles Falls, New York.*)

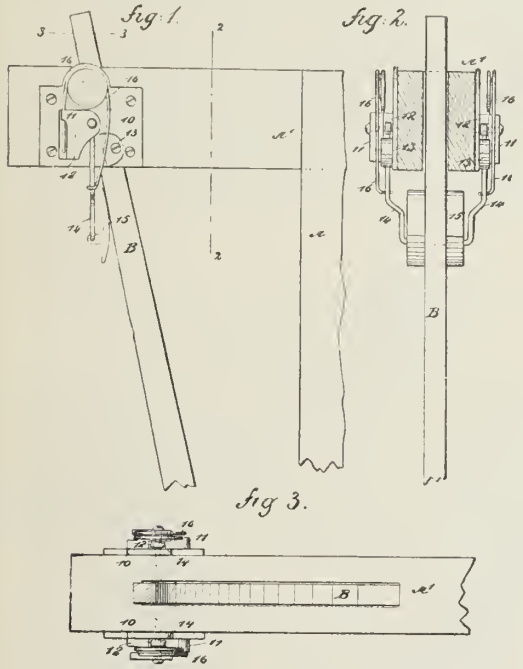
SARTWELL'S PICKER-STICK CHECK.

This mechanism is adapted for use in that class of looms in which the shuttle that carries the filling is thrown back and forth in the lathe by picker-sticks, located one at each end of said lathe; the

object being to provide a yielding stop to check the picker-stick in its outward movement and to cushion the said stick and thus relieve the shock at the sudden stopping of the shuttle as it shoots through the shed and comes in contact with said stick; and a further object of the mechanism is to provide a check which will be exceedingly simple, durable, and economic, and which will not exert a downward thrust on the picker-stick, but a tension in a horizontal direction.

Fig. 1, is a side elevation of a portion of the lathe of a loom, illustrating the picker-stick in side elevation and likewise the check. Fig. 2, is a vertical section taken on the line 2, 2, of Fig. 1; and Fig. 3, is a horizontal section taken practically on the line 3, 3, of Fig. 1.

A, represents a portion of the loom-frame; A', the lathe, and B, the picker-stick, arranged to throw the shuttle. At each side of the lathe a plate 10, is secured, and each of said plates is provided with a lug 11, provided with a recess 12, while adjacent to



the lug 11, an offset 13 is secured to the plate, as is best shown in Fig. 1, and the face of the offset substantially opposed to the lug 11, is of a yielding or elastic material, such as leather or rubber, or the equivalent thereof.

A substantially **U**-shaped arm 14, has its members pivoted in the upper portion of the recesses 12, of the said lugs 11, the bottom or bow portion of the arms being a predetermined distance below the bottom portion of the lathe, and upon the lower or bow portions of the arms 14, a stop-plate or shield 15 is secured, adapted to be engaged by the picker-stick B, in its outward movement, and the face of the stop-plate or shield which is engaged by the picker-stick B, is made cylindrical or convexed, as best shown in the said Fig. 1.

A spring 16, is located at each side of the lathe A', and one end of each spring is secured in one of the lugs 11, of the base-plate 10, the spring being provided with one or more coils above the top of the lug with which it is connected, and the said springs are then carried downward to an engagement with the side members of the **U**-arm 14, the tendency of the spring being to carry the stop-plate 15, in an inward direction, at which time the arm 14, will have a downward and inward inclination.

In the operation of this device, when the shuttle strikes the picker-stick, the picker-stick is forced outward or rearward, engaging with the stop-plate 15, and as this plate has a convexed surface it has a rocking connection with the picker-stick, and, therefore, the plate will exert a lateral tension upon the picker-stick (and in turn impart it to the picker and shuttle) at all times and not the downward tension which is found in most other checks for looms, and under this construction the picker-stick will have less wear than heretofore.

Furthermore, when the picker-stick is carried outward the springs 16, will be placed under tension, and as these springs are simply engaged with the pivoted **U**-arm 14, their ends are free to slide on the members of the arm 14, and they are not weakened to any appreciable extent when acted upon by the stick, since none but torsional strain will come upon the springs; and when the springs act to return the picker-stick in an inward direction, the moment that the **U**-arm 14 strikes the check-projections 13, on the base-plate 10, the springs will be free to vibrate independently of the arm 14, and, therefore, will come to rest more rapidly than if they were secured to the arm to vibrate therewith. Therefore, it is obvious that even in both movements of the picker-stick the springs 16, will not be in any manner injured, while they will act as effectively as though the springs were connected directly with the stop-plate 15. (*William E. Sartwell, Troy, Vt.*)

MOONEY'S PICKER CHECK-STRAP.

By it the weaver is enabled to see at a glance whether the shuttle is running properly or not, and the adjustment and correction are made with great ease.

Fig. 1, in front elevation and centrally broken out, represents the lay of a loom with the improvement applied thereto. Fig. 2, is a plan view thereof, also centrally broken out.

A, represents the lay which is slotted at a, for the picker-sticks P. B, B', are the shuttle-box binders. A check-strap C, is secured at its ends to the lay, back of the shuttle-boxes, passing around outside of the picker-sticks and along the front of the lay through guide-loops 20.

At the under side of the lay and near its center, is secured a stand B^x, having ears 5, through which and into the lay suitable screws 7 pass, a third outwardly-extended ear b, projecting in front of the lay.

The ear b, is notched or slotted at b', and the stand B^x is provided with upturned guides b^2, rounded at their inner sides and adapted to rest against the front of the lay.

A headed stud b^3, having a wooden roll b^x thereon is threaded at its lower end and extended through the slot or notch b' and held securely in place by a check-nut n, a washer w being interposed between the nut and under side of the ear b.

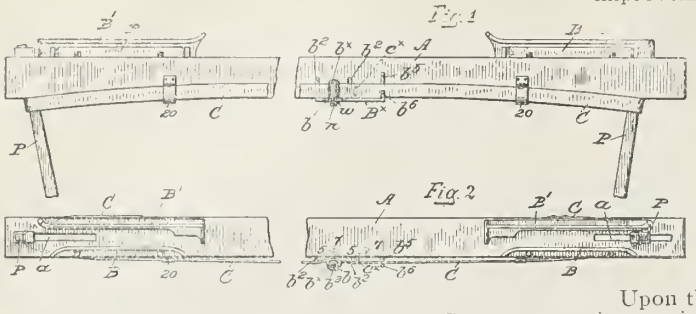
The roll b^x is held in parallelism with the guides b^2 of the stand B^x and with its inner periphery set more or less within the plane of said ends, according to the adjustment of the stud in the ear b.

The check-strap passess over the guides b^2 and under the roll, and the tension on said strap will be greater or less, according to the position of the roll nearer to or farther from the bottom of the notch or slot b', varying the bend in the strap as it passes the roll and thus regulating the friction.

As the picker-sticks are oscillated within the looped

ends of the strap, the latter moves longitudinally back and forth, regulated by the tension device.

A suitable lug or stop c^x, (a block of leather) is



fastened to the outer face of the strap C, between one of the guides b^2, which also forms a stop, and a second upturned stud or stop b^5 on the stand B^x, the opposite reciprocations of the said strap bringing the lug c^x into engagement with one or other of said stops, the further movement of the looped strap being stopped and the picker-stick arrested. A short upturned stud b^6 in front of the stop b^5 serves to guide the strap between them.

The tension-roll b^x is so adjusted that when the shuttle engages the picker-stick at the right-hand, Figs. 1 and 2, the momentum will be checked gradually, and when the lug c^x engages the stop b^5 further movement of the strap and stick is checked just before the stick engages the outer end of its slot a. The stop b^2 will coöperate with the lug c^x on the opposite throw of the shuttle and the latter will be brought to a stop gradually in the shuttle-box, eliminating the chance of rebound.

If the shuttle is not running properly, the lug c^x will not bring up against the stops b^2 b^5, and the attendant, by noting the movement of the lug, can thus know whether the shuttle is operating properly.

This check-strap is adapted to looms wherein the lay or the shuttle-stroke varies in length, it being obvious that the shorter the stroke of the shuttle the greater the force with which it will enter the shuttle-box, the blow of the picker-stick being constant, and for a longer stroke the force of the shuttle at the end of its stroke will be diminished.

When the stroke is long, the tension on the strap is decreased by moving the roll b^x outward, but when the stroke is short the roll is moved inward, thus increasing the friction on the check-strap and acting to take up the greater force of impact of the shuttle upon the picker-sticks.

By the use of this check-strap the shuttle-box binders may be adjusted to permit the shuttle to enter freely, yet with sufficient friction to be retained in place, so that wear on the shuttle and binders is decreased.

The length of the strap is such that neither picker-stick can strike the end of the slot a, on its outward throw, the stick striking the inside of the strap and avoiding shock. *(Draper Co.)*

DURKIN'S PICKER MECHANISM.

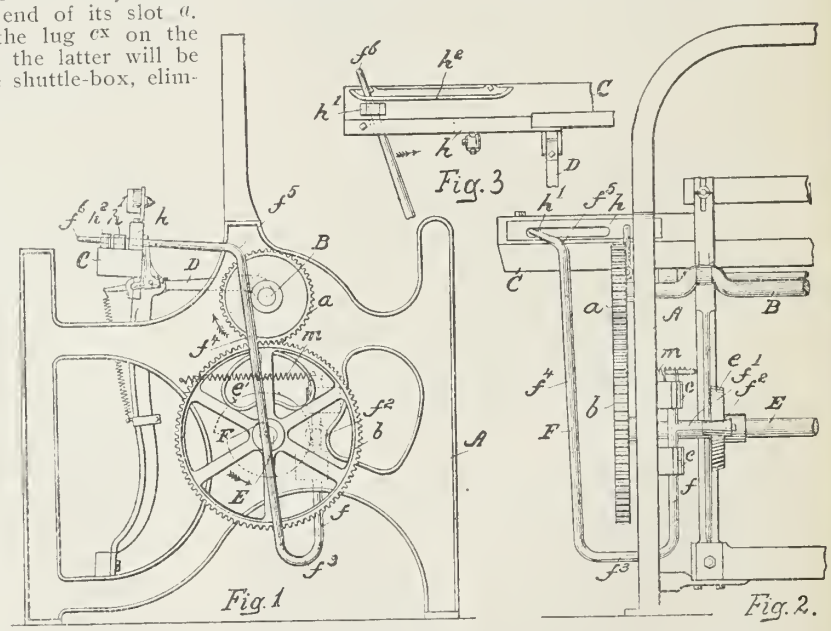
The novelty of this picker mechanism consists in improvements whereby the picker is actuated to throw the shuttle across the loom.

Fig. 1, in side elevation, represents a sufficient portion of the right-hand side of a loom to enable the improvements to be understood; Fig. 2, is a rear view of the part of the loom shown in Fig. 1, and Fig. 3 is a detail view.

Letters of references indicate thus:—A, the loom-frame; B, the crank-shaft; C, the lay; D, the connecting-rods between lay and crank-shaft; E, the under or picking shaft; and a, b, the gearing connecting the said shaft with the crank-shaft.

Upon the inside of the loom-frame are located bearings c, in which are placed the arm f, of picker-rod F, the said arm having projecting from it a finger f', upon which is a roll f^2, which is normally kept pressed by a spring m, toward the picking-bowl c, on the shaft E.

The rod F is bent at f^3 outwardly through the loom side and is then carried upwardly outside the loom side, as at f^4, to the point f^5, where the rod is again bent horizontally forward at an inclination, as shown in Fig. 2. The substantially horizontal extremity f^6, of the rod extends through a slot in the binder h, forming one side of the shuttle-box, and through the usual picker h' in the shuttle-box and through the stationary side h^2, of the shuttle-box. The spring m



acts to normally keep the roll f^2 against the cam e'. *(Draper Co.)*

LEMAIRE'S PICKER-STRAP.

Figs. 1, and 2, are side elevations showing the opposite sides of this improved strap, and Fig. 3, is a plan.

Picker-straps of this kind (for plain looms) as heretofore made, consisted of a stiff strip of leather having a leather strap at each end. These straps were passed one around the picker-stick, and the other around an arm of the picker-shaft, and the free

end of each strap was secured to the stiff connecting-strap. Picker-straps made in this way soon wear out, because of the severe strain put upon the straps,

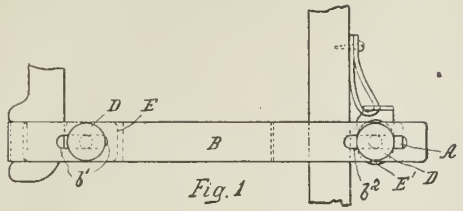


Fig. 1

and are, moreover, hard to adjust, a change in the adjustment necessitating the removing of the nuts on the ends of the bolts which connect the straps to the strip. To overcome these objections is the purpose of the new strap, which is made up of strips A, B, and C of metal, the strip B, being bent to form a hook *b*, and the strip C, being bent into the form of a staple. These three strips are fastened together by bolts D, D', the bolt D, passing through the strip B, the free end of the hook *b*, and the strip A, while the bolt D', passes through the strip B, the free ends of strip C, which is placed between the pieces A, and B, with its closed end toward the bolt D, and through the strap A. The bolt D, and hook *b*, form a loop to hold the picker-shaft and the bolt D', and the strip C, form a loop for the picker-stick.

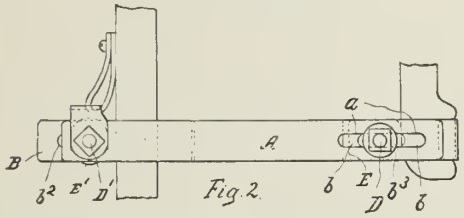


Fig. 2.

The bolts D, D', pass through the blocks E, E', made of pressed paper, which are placed between the strips A and B, and serve to make a better bearing for the picker-stick and arm of the picker-shaft.

The strip A has a lengthwise slot *a*, and strip B has three lengthwise slots *b'*, *b²*, *b³*. These are adjusting-slots and form an important feature of the improvement, for it will be clear that the long slot *a*, in strip A, and the shorter slots *b'*, *b²*, *b³*, in strip B,

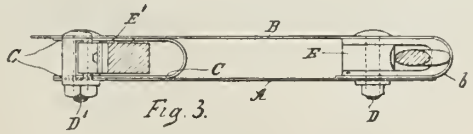


Fig. 3.

provide for the adjustment of the length of the picker-strap, and also for the adjustment of block E'.

A cushion of leather H, is placed inside the hook *b*, thus rendering the operation of the strap less noisy. (*N. Lemaire, Taunton, Mass.*)

LAHUE'S PICKER-STRAP.

This strap relates to the connection between the pick-strap and the staff.

Fig. 1, is a side view of that portion of a loom comprising the picker-staff and connected mechanism. Fig. 2, is an end view of the same. Fig. 3, is a top view of the pick-strap connection with the staff. Fig. 4, is a side view of the same. Fig. 5, is an end elevation of the same from the left end. Fig. 6, is an end elevation of the same from the right end.

The staff 1, is pivoted by a pin 2, in a slot 3, in the head 4, of the shaft 5, which carries the sword 6.

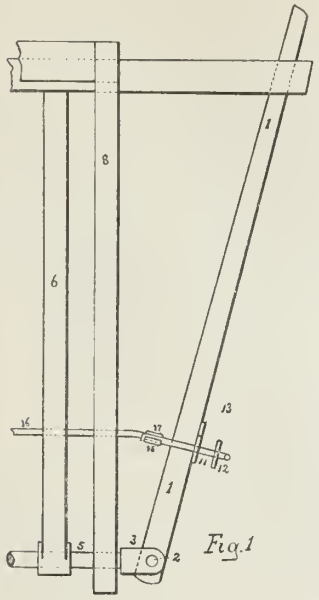


Fig. 1

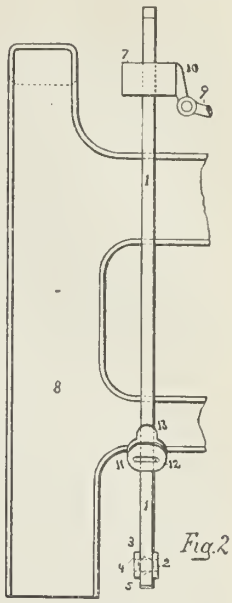


Fig. 2

7, is the lay-sill, and 8 is the frame of the loom. 9, is the pitman, and 10, its bearing on the lay-sill.

11, is a round rod bent into a **U**-shape, making the clear distance between the stems of the **U** somewhat greater than the thickness of the staff 1. Two leather pieces are cut out whose outline is immaterial, but one of which, 12, is made oval, while the other, 13, is provided with a tab or flap, and two holes are punched in each piece, so that they will slip upon the **U**-shape rod. The oval piece is slipped on first and pushed to the bend of the **U**. The flapped piece is then attached to

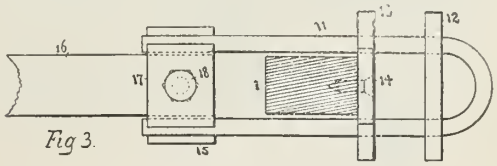


Fig 3.

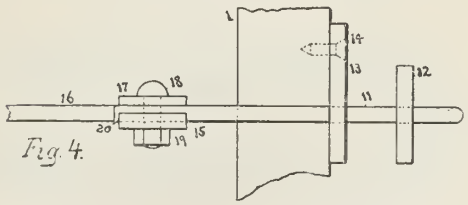


Fig. 4.

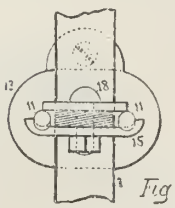


Fig 5

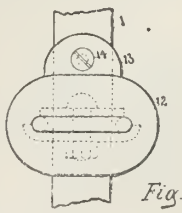


Fig. 6

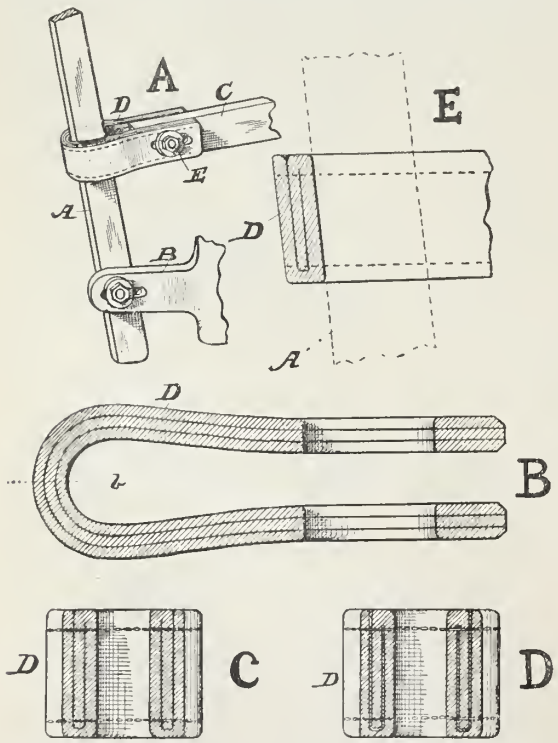
the picker-staff by a screw 14 at whatever distance from the pivot of the staff will give the desired power. A plate 15, with bent-up ends, is placed under the ends of the **U**, the pick-strap 16 is laid upon it and be-

tween the stems of the **U**, and a leather washer 17 laid over that, and all are clamped together by a bolt 18 and nut 19, passing through corresponding holes in them. To make the clamp surer, the extreme ends of the **U** are bent down, as at 20, to form shoulders. Thus, however violent and frequent the jerks on the pick-strap, it can never pull loose from its connection. Owing to the different angles of the staff with respect to the direction of pull of the strap the ordinary connection chafes the sides of the staff, as well as wearing out the connecting-loop; but with the new connection, the **U**-shaped rod never touches the staff and all the wear comes on the leather piece 13. The rod being round, even that wear is slight. The leather piece 12 is pressed slightly into the bend of the **U** at each pull of the strap and forms an exceptionally simple and durable cushion, its elasticity relieving the strain on the staff and on the shuttle. (*O. A. Sawyer and M. M. Lahue, Lowell, Mass.*)

WARREN'S PICKER-STAFF STRAP.

Fig. A, represents sufficient of a picker-staff, its strap and connections, as is necessary to illustrate the application of this strap to practice. Fig. B, is a full-size central longitudinal section of said strap. Fig. C, is a transverse section thereof, taken at the point indicated by line *b*, Fig. B; and Fig. D, is a similar view, showing a slight modification. Fig. E, is a partial sectional view of this improved strap, taken on line *b*, Fig. B, cutting through the fold at the center of the bend of the strap.

The object is to produce a lug-strap for looms which shall embody strength, durability, and elasticity



during use, and consists in a lug-strap made of a single piece of leather of sufficient size to produce the strap, said piece being folded upon itself and then fastened near the folded edges and bent into the loop form of a lug-strap.

A, represents the picker-staff of a loom, which is pivoted at its lower end to a stationary bearing B, forming, in practice, a part of the loom-frame.

C, represents part of the lug-strap operating-bar, to the outer end of which is attached the lug-strap D, through the loop of which the picker-staff passes, as shown in Fig. A.

The completed lug-strap is made from a single piece of leather, about square in shape, said piece being folded upon itself to produce several thicknesses, one lying against the other, with folds at the edges of the completed strap, as is shown in the drawings.

This strap is so folded that one edge of the piece of leather from which the strap is made comes upon the outside of the strap at what is to be the top thereof, and the other edge of the said piece of leather comes upon the inside of the completed strap near what is to be the bottom thereof, thus forming a wide fold at the bottom of the strap, with the inner edge of the leather lying in said fold, and a narrower fold at the top of the strap, with the outer edge of the leather lying against the outside of the fold.

By folding the leather in the manner just described, with the wide fold at the bottom of the completed strap and the narrower fold at the top thereof lying against the outer edge of the leather, it results that when the strap is bent into its proper shape for use the top of the loop formed by the bend in the strap flares outwardly, slightly upwardly, so that what may be termed the "end" of the completed loop, against which the picker-staff strikes, is somewhat inclined relative to a vertical plane, as shown in Figs. A and E, and thus conforms to the radial striking position of the picker-staff at the time of the impact of the blow of the latter. Moreover, in forming the completed lug-strap by a single piece of leather, folded as described, it will be observed that the wearing portions of the said strap, or the parts thereof, subjected to the blow of the picker-staff, are all upon what is the finished surface of the piece of leather before the latter is folded, which surface has the greatest capability for resisting wear, and, consequently, the greatest endurance in use.

The strap, after having been folded, as above described, has its several plies firmly secured together, this being done by two rows of stitching, as shown in the drawings.

The completed strap is provided near its ends with transverse openings, through which passes the fastening-bolt E, or other securing devices by which the strap is attached to the operating-bar C.

The piece of leather from which the lug-strap is formed may have a lining of cloth, as shown in Fig. D. if desired. (*J. F. and C. G. Warren, Worcester, Mass.*)

ASHBY'S PICKER-STRAP.

The object of the device is, to prevent the wearing of the loop of the picker-strap by so constructing the dog that at the time when the blow is given and the full force exerted the loop will bear on the dog fairly and along its whole width.

Fig. 1, is a view showing the connection of the picker-arm with the picker-stick in the relative positions when the picker-stick has been drawn fully back by the picker-stick spring. Fig. 2, is an enlarged view showing the dog secured to the picker-arm, the loop of the picker-strap being shown in section and the poition of the picker-arm being the same as in Fig. 1, when no strain is exerted on the picker-strap. Fig. 3, is an enlarged view showing the picker-arm, the dog, and the loop of the picker-strap in the position when the projection on the cam strikes the

picker-roller and the force is transmitted by the picker-strap to the picker-stick to send the shuttle across the fabric and the loom. The loop of the

Fig. 1.

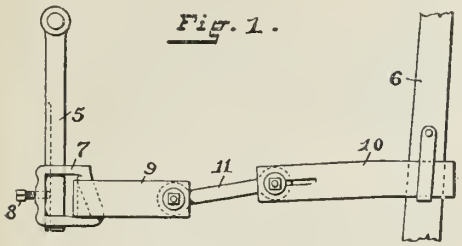


Fig. 2.

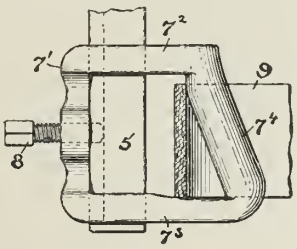


Fig. 3.

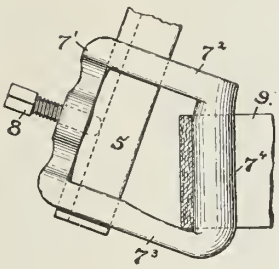
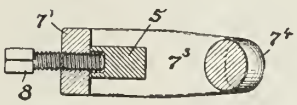


Fig. 4.



picker-strap is shown in section and shows the surface bearing on the dog the whole width of the strap. Fig. 4, is a transverse sectional view of the dog.

5, indicates the picker-arm; 6, the picker-stick; 7, the dog secured to the free end of the picker-arm. The dog 7, consists of the face-plate $7'$, in the centre of which the clamp-screw 8, is secured by screw-threaded engagement. From the upper end of the plate $7'$, the bracket 7^2 projects and from the lower end the bracket 7^3. Both of these brackets are slotted for the reception of the picker-arm 5.

The bracket 7^3 is longer than the bracket 7^2. The ends of the brackets 7^2 and 7^3, are connected by the strap-bar 7^4, which forms an angle of less than ninety degrees or right angle with the bracket 7^3, and an angle of more than ninety degrees with the bracket 7^2, the angular position of the strap-bar 7^4, being such that the strap bears its whole width on the bar when the greatest strain on the strap is exerted.

In practice it is found that the strap-bar 7^4, when inclined at an angle of about twenty degrees to the picker-bar, will form a fair bearing on the loop, but the same may be varied to the oscillation of the picker-arm. The loop 9, extends through the dog and is connected with the loop 10, by the link 11. This construction allows some adjustment of the loops to their bearings on the dog and the picker-stick.

It will be found that with a dog the strap-bar of which is placed, as shown in the drawings, at an inclined angle to the picker-bar, instead of parallel with the same, the picker-strap wears evenly its whole width. (*Whitin Machine Works, Whitinsville, Mass.*)

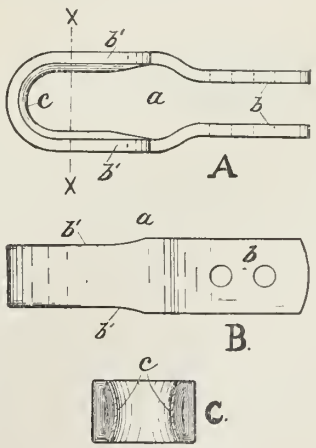
LIVSEY'S LUG-STRAP.

In order to show the advantages of the new strap the accompanying illustrations are given, of which Fig. A, is a side view, and Fig. B, a top or plan view of a lug-strap of the new form. Fig. C, is a cross-sectional view of the same on line x, x, of Fig. B.

a, indicates the strap as a whole, the same being made of duck or similar material, that is saturated with cement and rolled upon itself until the desired thickness is reached. The blank thus provided is then doubled back upon itself in approximately the shape shown in Fig. B, of the drawings and is then placed in a powerful mold (while yet in a plastic condition) and molded into the form here illustrated, that is to say, the ends are left flat, of uniform thickness, and parallel with each other, as at b, so they may be conveniently secured to the flat sides of the sweep-stick, but the body portion of said blank is upset edgewise, as b' Fig. A, thus reducing its width and forcing the surplus material into the inner side of said body portion, leaving the inner face of the strap curved, as at c Figs. A and C, and the outer face flat. This construction provides an increased thickness of material opposite the centre of the curve c, at the point of impact of the picker-stick, thus reinforcing and strengthening that portion of the strap which ordinarily wears out first. When the strap thus molded becomes thoroughly hardened, it is practically as solid and strong as if made of a single piece of raw-hide or other tough material, yet it requires no more material in its construction and costs no more to produce than the ordinary cemented duck lug-strap.

To prevent the picker-stick from striking the ends of the thickened portions,the sides b', of the loop or bowed portion of the strap, are located farther apart than the ends b, which is accomplished by forming a gradual bend or jog between the portions b, and b', and by gradually compressing the ends of the thickened portions, an inclined surface is presented leading from the inner surface of the flat portions of the sides to the inner surface of the concaved portions, which will avoid any abrupt shoulders against which the picker-stick might engage as it entered the loop.

It is of advantage to provide the curved and thickened portion c, not only at the bow end of the strap,



as already described, but also along the sides of said strap, as seen in Fig. B. By thus shaping the sides only, the projecting central portion of the strap is in contact with the picker-stick and friction of the parts is thus reduced to a minimum as the stick swings back and forth, and the curved and thickened sides

are also made stronger and less liable to yield and weaken under the constant pounding of the bow end by the picker-stick.

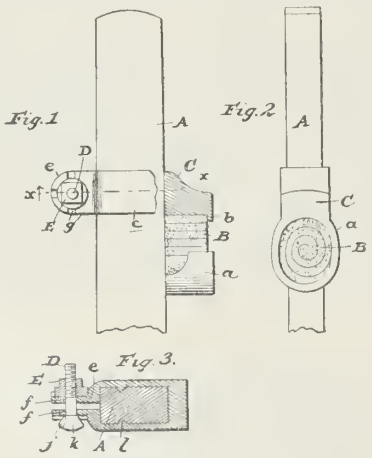
It will be found in practice that this strap gives better results and lasts longer than straps of uniform thickness as commonly constructed. (*E. H. Jacobs Manufacturing Company, Danielsonville, Conn.*)

DEVICE FOR SECURING PICKERS TO LOOM PICKER-STAFFS.

The object of this device is to provide a cheap and simple picker-holder which may be quickly and easily secured upon a picker-staff, and one which when properly secured upon the staff will not be liable to be loosened by the shock and jar to which pickers and picker-staffs are ordinarily subjected.

Of the accompanying illustrations Fig 1, is an elevation, partly in section, illustrating the device as holding a picker on a picker-staff. Fig. 2, is a similar view taken at right angles to Fig. 1. Fig. 3, is a transverse section taken in the plane indicated by the line x-x, of Fig. 1, and Fig. 4, comprises perspective views of the picker-holder and the devices by which it is fixed on the picker-staff.

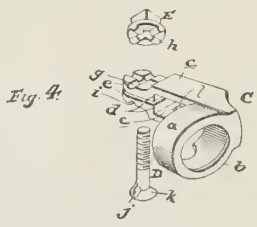
A, indicates a picker-staff; B, the picker, and C the holder which receives the picker and secures the same to the picker-staff A. This holder C, is formed in one piece and of metal and it comprises the body portion *a*, provided with an inwardly-directed flange *b*, to retain the picker within it, and the resilient



arms *c*, which are designed to receive the staff A, between them, as clearly shown in Fig. 3, and are provided with shoulders *d*, between which and the body *a*, the staff is interposed. The forward portions *c*, of the arms *c*, are provided with alined transverse apertures *f*, to receive the fastening-bolt D, and one of said portions *c*, is provided in its outer side with four (more or less) grooves *g*, designed to receive the four (more or less) protuberances *h*, on the inner side of the nut E, which is mounted on the bolt D. The portion *c*, of the other arm *c*, is provided in its outer side with one or more grooves or seats *i*, which are designed in practice to receive the protuberance *j*, upon the head *k*, of the fastening-bolt as clearly shown in Fig. 3.

The arms *c*, are furthermore provided upon their inner sides with the barbs *l*, which are designed and adapted to take into the shaft A, as shown in Fig. 3, to better fix the picker-holder thereon.

In applying the improvements to a picker-staff the picker B, is placed in the holder C, after which the picker-staff is inserted between the arms *c*, of the holder, as illustrated. The bolt D, is then passed through the apertures *f*, of the arms *c*, until the protuberance on its head rests in the seat *i*, in the one arm *c*, and the nut E, is turned upon said bolt until the protuberances on its inner side engage the outer side of the adjacent arm *c*. As the said nut is tightened it will be seen that the barbs *l*, will be sunk into the sides of the staff A, and will assist materially in securing the holder on the staff and when the nut is sufficiently tight it is left with its protuberances *h*, resting in the seats or grooves *g*, of one of the arms *c*, as shown. By means of this and the fact that the protuberance on the bolt-head rests in a seat *i*, of the other arm *c*, and the said arms *c*, are resilient it will be seen that both the bolt and the nut will be effectually prevented from working loose, no matter how much shock and jar the picker and picker-staff are subjected to, as the arms *c*, will exert an outward pressure against the nut and bolt-head, and will consequently retain the protuberances thereof in the grooves. The arms *c*, by reason of their resiliency, will give inwardly when the nut D, is tightened, and consequently will not prevent the nut from turning upon the arm which it impinges against. (*W. B. Moody, Blackstone, Mass.*)



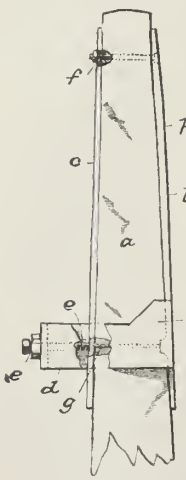
KEITH'S PICKER-STICK.

The objects of this picker-stick are to lessen the wear on the stick itself and on that part of the picker through which the stick projects and to render the stick less liable to break.

The new picker-stick consists in a stick having on its front edge a metallic plate which comes in contact with the picker in the forward movement of the stick, and on its back edge a plate which comes in contact with the picker in its backward movement and means for firmly securing the lower extremities of said plate to the faces of the stick by pressure.

In the accompanying illustration a side elevation of the improved picker-stick, with parts broken away, is given.

A, represents a picker-stick. To the front and back edges of the stick are attached plates *b*, and *c*, respectively. Integral with the lower extremity of the front plate *b*, is a collar *d*, surrounding the stick and the lower extremity of the back plate. In the top of the collar is a set-screw *e*, adapted to the screwed down upon the lower end of the back plate in such manner that the lower ends of both plates are firmly secured to the stick. The top ends of both plates are secured to the stick by a screw threaded bolt passing through them and the stick.



To prevent bolt *f*, from working loose, the hole in the end of the plate *c*, is threaded, which taken in connection with the ordinary nut on the end of the bolt outside of the plate, serves as a check to prevent the bolt from working loose.

To prevent the plates from wearing in the wood and to give a firm bearing for the set-screw, there is inserted in the stick at a point under

the set-screw in the collar a metal screw *g*, upon which both plates bear. The screw may be so small that it will weaken the stick but very little, and yet afford a perfectly unyielding bearing for the plates. To strengthen the front plate, the middle *h*, can be made thicker than the ends.

Where the top of the picker is of wood alone the wood soon becomes worn and rough and wears the hole in the picker very rapidly, thus necessitating the constant renewal of both picker and stick, it very often happening that a picker breaks out before the shuttle receiving end of the picker is worn out, while under the new construction, it will last until both edges of the shuttle receiving end of the picker are worn out.

The advantages as claimed for the new stick are that it does not wear the picker or stick, it is easily attached to the stick, it does not weaken the stick, it does not wear loose on the stick, it gives a steady picker motion, and, if the stick becomes broken for any reason, it can be easily removed and attached to another stick. (*W. L. Keith, Milltown, N. B.*)

BEARING FOR LOOM PICKER-STICKS.

Great annoyance and loss of time, as well as expense, have been heretofore occasioned by the constant wear and breakage of picker-sticks at the point where they are pivoted to the loom-frame, and when a stick is rendered useless by such wear or breakage it is necessary to stop the loom and remove the old stick, replacing it with a new one; all of which requires time, thus resulting in a loss of product of the loom. These disadvantages are overcome in the new picker-stick by providing a metal bearing which may be quickly attached to or detached from a picker-stick.

Fig. 1, is a perspective of a portion of a loom-frame and lay, showing a picker-stick attached thereto by the new device; and Fig. 2, is a detailed perspective of the lower end of the picker-stick and the bearing removed therefrom.

Examining these illustrations we find provided a semi-circular plate A, with which is formed a box B. Within the box is a half-bearing C, adapted to fit the pivot-bolt D, which projects from the stud E.

From the inner surface of the box project prongs F, so that when the box is to be attached to the picker-stick G it is only necessary to place said prongs in proper position against the inner edge of said stick and embed them therein by sufficient force, after which

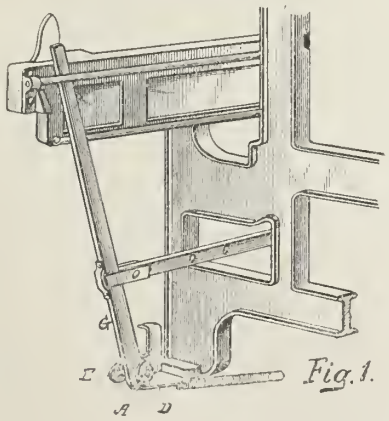


Fig. 1.

a screw passed through the hole H, formed in the plate, and into the face of the picker-stick will securely hold the box and plate in position upon said stick.

A half-bearing I, is formed in the edge of the picker-stick which corresponds with the half-bearing in the box, so that the pivot-bolt D is inclosed upon one side by the bearing I and upon the other by the bearing C.

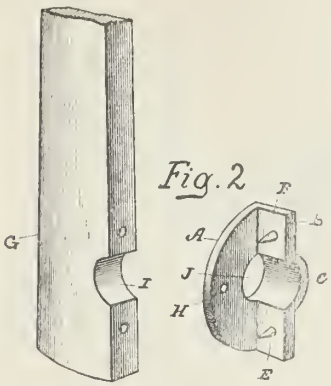


Fig. 2

From this it will be seen that when a picker-stick is thus pivoted to the stud E and the loom is in operation the thrust upon the lower end of the picker-stick which is incident to the action of the sweep in causing said stick to throw the shuttle will be received by the bearing in the box, and as this may be made of steel or other suitable metal it is obvious that but little wear will be brought about by this thrust, and, further, that it will be impossible to split the picker-stick at its lower end, as no strain comes upon the grain of the wood passing through the bearing-hole, as is the case in picker-sticks as now used.

The return movement of the picker-stick, occasioned by a suitable spring, causes the bearing in the stick to act upon the pivoting-bolt, but as this movement performs no work it is obvious that but little strain will be exerted upon this bearing; but to prevent the liability of considerable wear taking place upon the bearing I, the hole J is made to fit the bolt D snugly, thereby causing the plate to receive a portion of the strain incident to the reverse movement of the picker-stick.

As now constructed the life of a picker-stick is very short, as it is constantly liable to split at the point where the pivoting-hole is formed, as such a stick is subjected to an enormous strain and jar by the rapid movements and sudden stops which are necessarily transmitted thereto by the actions of the loom.

One of the advantages of the new device is that it may be readily attached to a picker-stick with little or no alteration of the latter, and when the stick has become worn or useless from any cause it may be removed and attached to another stick. (*Harry M. Schadewald, Philadelphia.*)

LANGUIRAND'S PICKER-STAFF.

This device relates more particularly to means for effecting a connection between the picker-staff and the connecting bar or stick for transmitting motion to said staff; and it has for its general object to provide a simple and durable device through the medium of which the tug of the connecting bar or stick may be adjustably fixed at various points on the picker-staff so as to regulate the throw of said staff and that of the shuttle without the objectionable necessity of perforating the staff or otherwise weakening the same.

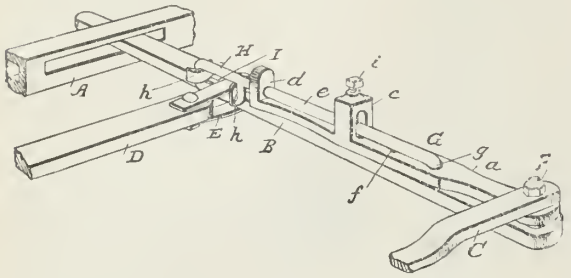
The accompanying illustration is a perspective view of so much of the mechanism of a loom as is necessary to explain the device.

A indicates the lay of a loom; B indicates the picker-staff; C indicates the arm of the rocker-shaft (not illustrated); D indicates the connecting bar or stick, and E indicates the staff-receiving tug carried by the bar or stick D.

The rocker-shaft arm C, and the picker-staff B, are connected by a bolt F, and this bolt also serves to effect a connection between the picker-staff and the adjust-

ing device G, the body portion *a*, of which is mounted on the bolt between the arm C, and the picker-staff, as shown.

The body portion *a*, of the device G, is formed from malleable iron and it is provided with an aper-



tured post *c*, and a guide lug *d*, to receive the shank *c*, of the adjustable section H, and is also provided at intervals with transverse sockets *f*, to receive the angular stud *g*, of the said shank.

The loop or eye I, of the section II, receives the tug E, of the bar or stick D, and it is provided at its ends with the transversely disposed curved portions *h*, which present a convex surface to the loop E, and thereby prevent unnecessary frictional wear of the same. The shank *c*, of the adjustable section extends as before stated, through the apertures of the lug *d*, and post *c*, and its stud *g*, is designed to be fixed in any one of the apertures *f*, by the binding screw *i*, which takes through the post *c*, and engages the shank as shown. By this construction it will be seen that the loop or eye I, may be readily and positively fixed at various distances from the free end of the picker-staff to increase or diminish the throw of the said staff, without the objectionable necessity of perforating or otherwise weakening the same. It will also be seen that the device has no direct connection with the picker-staff and consequently when said staff is worn or broken, it may be readily removed and a new staff employed in conjunction with the adjusting device. (*J. Languirand, Woonsocket, R. I.*)

HOLBROOK'S PICKER.

The same is shown in its perspective view in the accompanying illustration.

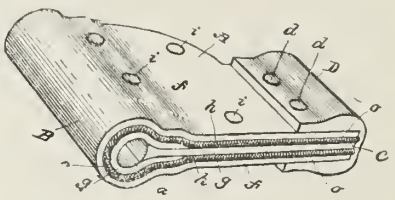
In raw hide loom-pickers, as heretofore constructed, considerable difficulty has been experienced on account of their liability to become cracked or split under the hard wear and blows to which they are subjected, especially when the loom is running at a very high speed. To overcome this difficulty and to greatly increase the strength and durability of loom-pickers of this description, is the object of the new picker.

A, represents the body or shank of a loom-picker, one end of which is enlarged to form the rod-holder B, which is provided at its centre with a rod-hole *a*. Over the opposite end *c*, of the shank A, is fitted a head-cap D, into which the shank extends as shown, the end *c*, and the cap D, which embraces it, and is secured thereto by rivets *d*, constituting the head of the picker, which contacts with the point or beak of the shuttle.

The body A, is composed of an outward layer or thickness *f*, of raw hide folded or doubled over, and having an inner raw hide filling *g*, composed of any desired number of pieces, and, between said layers or pieces *f*, *g*, is interposed a piece of thick woven fabric *h*, preferably canvas or heavy cotton duck, the several layers or thicknesses of raw hide and woven fabric being securely fastened together by rivets *i*.

In constructing the picker a piece or strip of wet raw hide of suitable shape or size is taken, to form the outside layer or thickness *f*, and lay upon it the woven fabric *h*, which is doubled in such manner as to cause the folded edges *o*, to lie flush with the adjacent edges of the raw hide or preferably extend a little beyond the same. The filling *g*, is then laid in place and the raw hide and canvas are then doubled over a spindle to form the rod-hole *a*, after which the rivet holes are punched and the rivets inserted. The picker is then removed from the spindle and allowed to dry, after which the operation of riveting is completed. The head-cap D, composed of a solid piece of raw hide of single thickness throughout, is then applied and secured in place by the rivets *d*.

By thus interposing a piece of woven fabric between the layers of raw hide as before described the picker is rendered much stronger and more durable, as the woven fabric, on account of its toughness and elasticity, will hold the layers of raw hide together in such a manner as to effectually prevent splitting or cracking of the picker, and will also enable the picker to better resist the blows of the picker-stick and the concussion produced by the contact of the picker with the end of the loom box. Furthermore, the extension of the doubled or folded edges *o*, of the woven fabric beyond the edges of the raw



hide forms elastic cushions or buffers, which thus relieve the picker of the sudden shocks to which it is subjected from contact with the picker-stick and loom box and reduces the wear to a minimum, thus particularly adapting the picker for use in looms which are run at a very high speed. (*C. W. Holbrook, Providence, R. I.*)

GLEASON'S PICKER.

The great wear that a picker is exposed to in a loom in receiving many thousand blows per day from the steel point of a shuttle has made it very important to find some material of which to make it that will last a reasonable time. Cotton very closely compressed together and confined, offers a most durable resistance and for this reason is made use of in the construction of this picker, producing in turn an article which will work well and last longer than the average leather pickers (the raw hide pickers excluded). The new picker is well suited for plain one shuttle looms.

The accompanying illustrations show this picker. The same consists of several vertical layers of leather, of a shape to be easily secured to the picker-stick, cemented together so as to make practically one thick piece of leather, and the duration of this thickness is limited to a few days use. Next take all the layers of leather but the two outside ones *s*, *s'*, and punch a piece out of the centre of the broadest part of each, as seen in Fig. 2, in which *a*, is the hole. Then these punched layers *b*, are cemented together

with one of the whole layers *s'*, on the outside. The chamber formed by the holes in the punched layers is then filled with cotton compressed together very hard, and the other outside layer *s*, is cemented on over the chamber, so that the whole resembles an ordinary picker. The picker is then attached to the picker-stick, and being put to use the steel point of the shuttle soon pierces the outside layer of leather *s*, and beds itself in the compressed cotton.

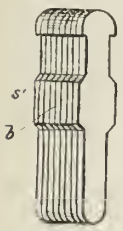


Fig. 1.

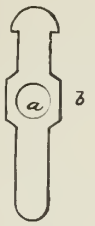


Fig. 2.

The main cause of the destruction of a picker arises from the impossibility of striking it with the shuttle-point exactly in the centre, and consequently it sways to one side. Owing to the coarse texture of the leather, the steel point soon makes its way toward that side, disintegrating the leather and spoiling the picker. This trouble is obviated in this picker by the extremely fine texture and hardness of the compressed cotton, which prevent the shuttle-point from taking effect on the sides of the recess first formed by it, as these sides do not offer the point the chance to begin an entrance that the coarse texture of the leather does. (*M. Gleason, Bristol, R. I.*)

WARDWELL'S PICKER.

Fig. 1, represents a perspective view showing the parts assembled together on a picker-staff for use. Fig. 2, represents a longitudinal section of the same. Fig. 3, represents a cross-section on the line 3-3, shown in Fig. 2. Fig. 4, represents a vertical section on the line 4-4, shown in Fig. 3.

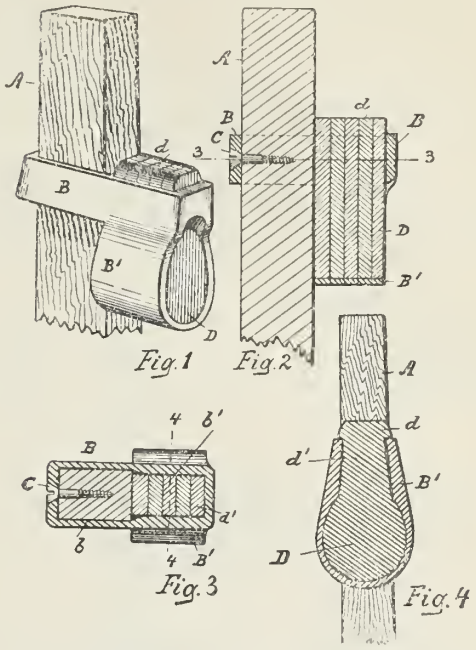
In the drawings, A represents a loom picker-staff, adapted to receive the metal loop or binder B, secured to such staff by means of a screw C.

In one piece with the loop or binder B, is made the picker casing or shield B', in which is retained the picker or filling D, made of leather or other suitable material.

The loop or binder B, is made as a skelton frame and has at its rear portion a vertical, rectangular, perforation *b*, of sufficient size to receive the picker-staff, as shown. The forward portion of said skeleton loop has a reduced perforation *b'*, which forms a continuation of the opening *b*, but is of a reduced width as compared with the opening *b*.

The picker D, has a shank *d'*, adapted to fit the interior of the loop or binder-opening *b'*, said shank terminating at its upper end as a head *d*, of a width equal to the interior width of the opening *b*, in the loop or binder B.

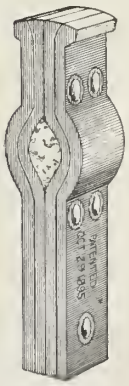
In assembling the parts together for use, the picker D is first put up from below through the picker-staff slot *b*, in the loop or binder B, and then moved forward into the narrow slot *b'*, and into the shield or casing B', after whch the picker-staff A is pushed through the slot *b* and secured to the loop or binder B, by means of the screw C. It will thus be seen that the picker or filling D will be most firmly secured in place within the reduced slot *b'* of the loop or binder B, as it cannot move upward on account of the lower increased size of said picker, and it is prevented from moving downward on account of the increased head *d*. The picker-staff holds it from going backward and the forward end of the loop or binder B prevents it from moving forward, and it is thus firmly locked in position relative to the loop or binder and the picker-staff.



The picker casing or shield B' may be dispensed with, particularly in slow looms running on heavy goods. (*Frank A. Wardwell, Methuen, Mass.*)

WILKINS' LOOM PICKER.

The majority of pickers for single box-looms in use to-day in cotton mills, are known as the "doll picker," and are composed of several lifts of leather cemented one upon the other until the desired thickness is obtained. These pickers in a short time are worn through by the action of the shuttle striking the leather the short way of the grain, making the average life of the pickers from two weeks to six months, according to the quality of the leather used and the care the picker gets by the loom fixer. Some mills frequently have them nailed together to keep the cement from breaking.



The Wilkins' picker, as seen by the accompanying illustration is composed of four pieces of leather, riveted together with strong iron rivets, in such a manner that the shuttle strikes the leather edge ways, thereby obtaining the greatest strength of the leather.

At the point of contact of the picker with the shuttle, there is an opening made and filled with common cotton put in under pressure, thus the picker receives an elastic blow, as both cotton and leather yield.

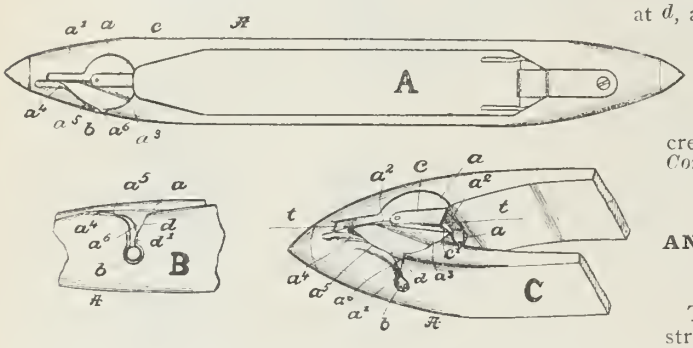
These pickers are an improvement upon Gleason's picker illustrated and explained in a previous article. Gleason's patent having been improved in the picker as made by the Wilkins Mfg. Co.

The Wilkins' loom pickers can be applied to the loom in about one half the time, and will last three or four times as long, some having been yet in good condition after fourteen months use. (*Wilkins Mfg. Co., Woonsocket, R. I.*)

SHUTTLES.

DRAPER'S SELF-THREADING SHUTTLE FOR NORTHROP LOOMS.

Self-threading shuttles for looms are now usually constructed with a slot through which the thread is led to the eye in the side of the shuttle. When such shuttles are used in automatic looms provided with devices for supplying fresh filling to the shuttle when



the previous filling is nearly or quite exhausted, the thread must guide itself into the slot by reason of its position, as it is drawn off from the end of the filling-carrier or bobbin. It frequently happens that the thread thus led into the slot will slip or fly out again before it has passed under the spur or projection which is intended to guide it to the side eye. This shuttle has for its object the production of means for guarding or confining the thread while in line with the threading-slot, so that it cannot accidentally escape therefrom before passing about the guide, projection or spur.

Fig. A is a top view of this shuttle. Fig. B is an enlarged perspective view of the eye end of the shuttle, showing the thread as confined by the guard, and Fig. C, is an enlarged detail in side elevation of a portion of the shuttle adjacent the thread-eye.

The shuttle-body A, shown as entirely open at its upper and lower sides, has a filling-carrier or bobbin held therein, and the shuttle-body is cut away beyond the tip of the filling-carrier to receive therein a thread-guide block a, longitudinally slotted at a', to receive the thread after it has entered the thread-eye, the block having a vertical face a^2, and an inclined face a^3, converging to the said slot to direct the thread thereinto as it is drawn off from the end of the filling-carrier.

At that side of the guide-block a, having the inclined face a^3, the spur or projection a^4 is formed to guide the thread along the passage formed by the shuttle-body and the edge a^5 of the guide-block to the thread-eye b, in the side of the shuttle.

Now, when the thread t is drawn off from the end of the filling-carrier, in line with the slot a', it frequently slips or flies out of the slot before it had been guided to the thread-eye b, and to prevent this there is provided a thread-guard shown as a shelf c, bent or curved downward at c', and overhanging the entrance to the guide-slot a', the lower edge of the guard approaching closely the inclined face a^3, while permitting the thread to pass easily thereunder to the slot a'.

In Fig. C the thread t is shown as above and in line with slot a', but confined by the overhanging guard in such a manner that it cannot fly or slip out of position, the guard maintaining it in line with the slot a' to properly enter it, and be guided by the spur or projection a^4, to the thread-eye b. The rear edge a^6, of the spur-base is inclined forward and downwardly, the shuttle-body being similarly shaped at d, and extending slightly below the spur-base at d', making a better construction of the parts, whereby the thread cannot become wedged or caught between the two parts, as the pull of the thread over the downwardly-inclined edge draws it away from any possible crack or crevice between the wood and metal. (*Draper Company.*)

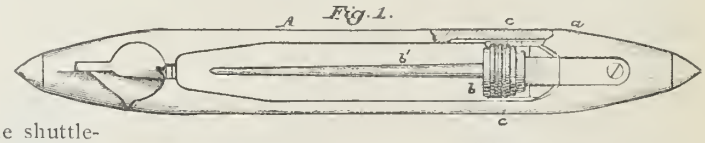
ANOTHER IMPROVEMENT IN SHUTTLES FOR NORTHROP LOOMS.

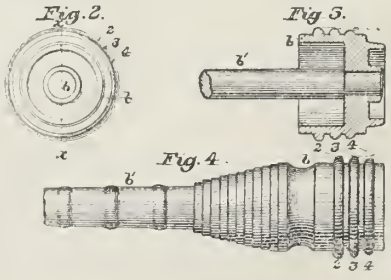
The object in this instance is to improve the construction of loom-shuttles containing bobbins, the heads of which are held by or between separable spring-arms, whereby the said arms may hold the said bobbin-head more securely and spread their hold more uniformly over the head.

Of the accompanying illustrations, Fig. 1 shows a top view of this shuttle; Fig. 2, a left-hand end view of the head of the bobbin or filling-carrier; Fig. 3, a section of Fig. 2 in line x, and Fig. 4 shows a modified form of bobbin.

The shuttle-body A, has an inclined bridge a, to direct the head b of the bobbin, down into position between the jaws c and c of the bobbin-holder.

Heretofore the heads b of the bobbins b' have been cylindrical from end to end, and the rings or annular





projections thereon have been of the same diameter.

In use it has been found that the jaws c, fail to engage the ring nearest the tip of the bobbin as firmly as that farthest from the said tip, and to overcome this difficulty and insure the firm and secure holding of the head throughout its entire outer ringed surface, the rings 2, 3, 4, of the said heads are made of a decreasing diameter from the tip end of the spindle

outwardly, and in this way, as the jaws connected at a common point and adapted to be sprung apart, are sprung apart by the insertion of the ringed head, the inclination of the jaws due to their change of position exactly contact with and engage and hold all the rings of the head alike and with equal force, thus preventing any liability of the bobbin being held loosely and moving unduly in the jaws in the shuttle.

Of the series of rings 2, 3, 4, the ring 2, is of greater diameter than 3, and ring 3, is of greater diameter than ring 4. (*Draper Company.*)

BOBBIN HOLDER FOR DRAPER SHUTTLES.

This holder is intended as an improvement on the class of shuttle wherein the head of a bobbin is held between spring-jaws, the bottom of the shuttle being open for the passage of a spent bobbin through it, and the delivery end of the shuttle having a self or automatically threading slot into which the thread on the cop-holder is threaded during the movement of the shuttle through the shed. In this class of shuttle the thread as it is unwound from the end of the bobbin, it then describing a circular path, is thrown into an open slot at the top of the shuttle, and in practice it sometime happens that the thread does not enter the slot instantly. To overcome this, means are provided in the present shuttle whereby the free end or tip of the bobbin is held in a slightly-elevated position, so that the thread can readily enter the slot as it first starts to run off.

The shuttle referred to has spring arms which constitute holders, the said arms at the interior having a series of grooves to be centered by a series of rings surrounding the base of the bobbin, but the said grooves are perpendicular to a line drawn longitudinally through the shuttle.

In the new shuttle the grooves are inclined so that the said rings as they slide down in said grooves cause the bobbin to assume an inclined position with its tip elevated a little above the center line of the shuttle.

Fig. 1, shows the improved shuttle in its top or plan view, Fig. 2, is a longitudinal section.

A, indicates the shuttle body; c, c', the inclined bobbin-directing plate, and B, the bobbin, having the rings a.

The holder to engage and hold the bobbin consists of two like arms C, the grooves c, being so inclined as to receive and hold the bobbin with its tip or delivery end a', elevated substantially as shown in Fig. 2.

Fig. 1.

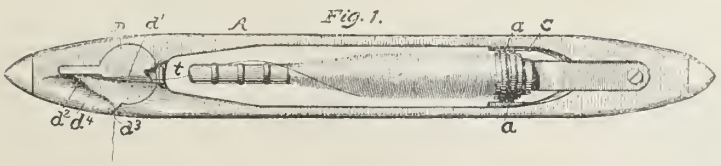
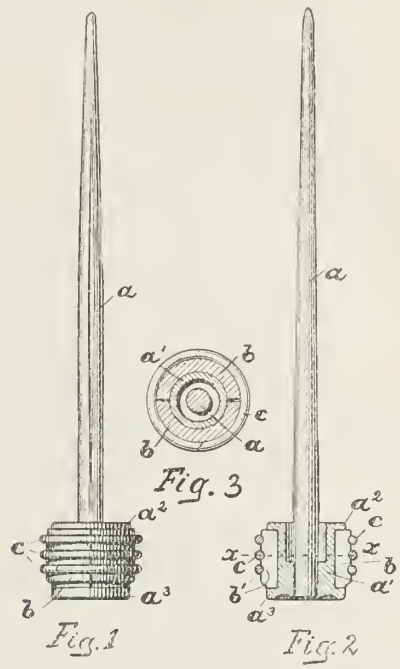


Fig. 2.

The self or automatic threading device D, has a substantially straight slot d', at one side of which is a horn d^2, along the outer side of which is a space d^4, so that the thread t, coming into the slot d', to get under the horn, is led into the delivery-eye d^3. (*Draper Co.*)

COP-SKEWER FOR SHUTTLES FOR NORTHROP LOOMS.

Cop-skewers or filling-carriers for shuttles have heretofore had their heads provided with unyielding ribs or rings which were adapted to enter grooves in springs carried by shuttles.



In "automatic looms," the "cop-skewers" or "filling-carriers" are transferred rapidly from the filling-carrier feeder into the shuttle while the loom is in motion, and much trouble has been experienced therein owing to the rapid wearing away of the grooves in the shuttle-springs, that being due to the hard unyielding rings surrounding the head of the skewer or filling-carrier.

The object of construction of the new device is the production of a cop-skewer or filling-carrier the head of which is capable of yielding to a limited extent when being inserted into the shuttle between the said springs, such construction greatly reducing the wear of the shuttle-spring grooves. To effect this improvement, the metallic head of the skewer or filling-carrier has been surrounded with a wooden split ring, and the head of the filling-carrier has been provided with an annular groove in which this split shell or cylinder is located, the shoulders of the groove preventing longitudinal movement of the split ring.

Fig. 1, represents in side elevation this new cop-skewer or filling-carrier. Fig. 2, is a vertical sectional view of the head, the blade of the skewer being in elevation. Fig. 3, is a transverse sectional view of the head on the line x-x, Fig. 2.

a, is the skewer-blade which has secured thereto a metallic head a', provided at its ends with annular flanges a^2, a^3.

A wooden split shell or cylinder b, surrounds the head a' between the flanges thereof, and it is annularly grooved, as at b', to form seats for the encircling

metallic split rings *c*, which enter the grooves in the shuttle springs or jaws. These rings retain the shell *b* on the metal head *a*, and when the filling-carrier is being forced into the shuttle-springs, the split shell yielding slightly to the pressure, thus greatly reduces the wear on the shuttle-springs.

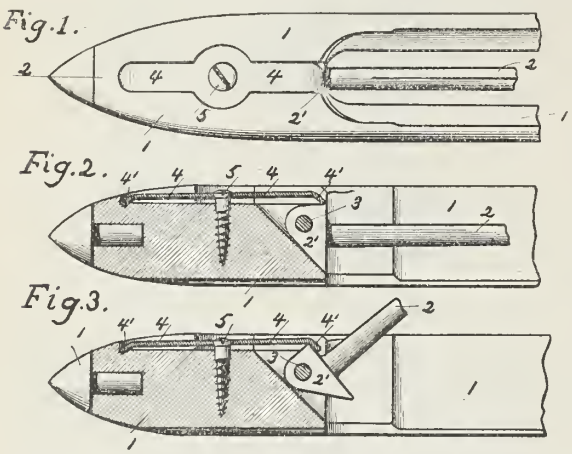
It will be seen that the ends of the wooden shell do not abut one against the other, and therefore the shell has a capacity of yielding somewhat under pressure put upon the metallic rings *c*.

Fig. 3 shows the ends of the shell as separated to permit limited amount of yielding of the shell. (*Draper Co.*)

THE LITCHFIELD SHUTTLE.

The improvement relates to the spring of shuttles, which holds the spindle in its lowered or raised position.

In the ordinary construction of the spring which engages with the head of the spindle, the spring is liable to set or break when the spindle is raised by



reason of the strain thereon. This setting or breaking of the spring causes considerable trouble, and also expense in replacing the broken springs with new ones; and, further, the screw which secures the spring to the shuttle, by reason of the great strain on it when the spindle is raised, freqeuntly breaks or pulls out, necessitating other means for holding the spring. The pressure of the spring during the operation of raising the spindle on the head thereof will wear the corner of the head very fast, so that the point of contact of the spring with the head will be worn back to a point nearly over or back of the fulcrum-point of the head, and the leverage of the spindle thus being lost, the pressure of the spring, to hold the spindle in its lowered or raised position will be practically ineffective, so that a new spindle must be substituted.

Other objections to the ordinary construction and shape of the spring which bears on the head of the spindle to hold it in its lowered or raised position might be stated, for example, by increasing the leverage of the spindle by placing the fulcrum-pin farther from the point of contact of the spring with the spindle-head, or by increasing the pressure of the spring by screwing in the holding screw, so that the spindle will be more firmly held down in the shuttle-body when the shuttle is in motion. The strain on the spring and screw when the spindle is raised is also increased in proportion, which is very objectionable for the reasons before stated.

The object of this shuttle is to provide a spring which will overcome the objections before stated; and the improvement consists more particularly in so constructing the spring that the strain thereon will be relieved when the spindle is being raised, and when it is in its raised position, and the leverage of the spindle, and the pressure of the spring on the head of the spindle can be increased without increasing the strain on the spring and screw when the spindle is raised.

Referring to the drawings, Fig. 1, is a plan view of one end of a loom-shuttle provided with a spring embodying the improvements. Fig. 2, is a central longitudinal section on line 2, Fig. 1. Fig. 3, corresponds to Fig. 2, but shows the spindle raised. Fig. 4, show a spring embodying the improvement used in connection with what is termed the "Baldwin-head" spindle. Fig. 5, corresponds to Fig. 4, but shows the spindle in its raised position.

A description of the improvement is best given by quoting letters of references along with explanations:—1, is the shuttle-body; 2, is the spindle, provided with a head 2′, which extends in a recess in the body of the shuttle and is pivoted on a pin 3, extending transversely in the shuttle-body.

4, is a top spring embodying the improvement, which extends in a recess in the top of the shuttle-body, and is secured therein by a screw 5.

In the spring 4, which is reversible, the ends of the spring which extend over and engage the upper side of the spindle-head when the spindle is in its lowered position are made bent, or provided upon their inclined surfaces with inclined portions 4′, which extend at an angle to the main portion of the spring, so that while the inner surface or main portion of the body of the spring extends in the arc of one circle the inner surface of the ends which come in contact with the spindle-head, lie in the arc of another circle.

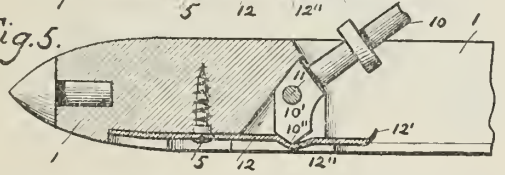
By this construction of the ends of the spring a recess is formed to receive the projecting portion of the spindle-head, and lessen the pressure or strain on the spring when the spindle is being raised and held in its raised position, for as soon as the top point of the head of the spindle passes by the point or extreme end of the spring it follows the curve or incline on the end of the spring until it reaches the inner end of said incline when it is in its raised position, as shown in Fig. 3, and in this position the end of the spring is not raised to strain or break the spring or pull out the attaching-screw, but is substantially in its normal position. Moreover, by this construction the upper corner of the spindle-head is not worn and rounded, so as to bring the point of bearing of the spring on the head of the spindle back over the fulcrum. At the same time the fulcrum-pin may be set farther from the point of contact of the spring with the spindle-head to increase the leverage, or the attaching-screw may be screwed in to increase the pressure of the end of the spring on the spindle-head without causing the end of the spring to be raised any higher when the spindle is in its raised position.

In Figs. 4, and 5, is shown what is termed a "Baldwin-head" spindle and a spring embodying the present improvement combined therewith. The spring is attached to the lower side of the shuttle instead of the upper side, as in the case of the spring 4, and acts upon the spindle-head to hold it in its raised or lowered position below and back of the fulcrum point of the spindle-head. The upper edge of the spindle-head, when the spindle is in its raised position, strikes against the body of the shuttle and limits the raising of the spindle. In said Figs. 4, and 5, the spindle 10, is provided with a head 10′, ordinarily termed the "Baldwin-head." A transverse pin 11, forms the fulcrum of the spindle.

The spring 12, embodying the present improvement is secured in the under side of the shuttle-body by the attaching-screw 5, and is in this instance provided with a catch 12′ at its end which extends into the circumferential groove in the bobbin. The spring 12, is provided with a recess 12″ therein for the purpose of relieving the strain on the spring when the spindle is being raised and is in its raised position, as shown in Fig. 5. That portion of the spring just back of the recess 12″, bears on the spindle-

Fig. 4.

Fig. 5.



head back and below the fulcrum-point thereof when the spindle is in its lowered position, as shown in Fig. 4.

When the spindle is being raised, the lower corner, or point 10″ of the head thereof follows down the outward incline or depression in the spring formed by the recess 12″ therein, and extends into said recess. When the spindle is in its raised position, as shown in Fig. 5, the inclined portion of the recess bears on the inclined edge of the spindle-head below and back of its fulcrum-point, and forces the upper edge of the spindle against the shuttle-body, as shown in Fig. 5.

By means of the bend in the spring forming the recess 12″, the same results are accomplished with the Baldwin-head spindle than that accomplished with the spring 4 in connection with the ordinary spindle-head; that is, the strain on the spring is relieved when the spindle is in its raised position. At the same time the leverage of the spindle can be increased by placing the fulcrum-pin farther from the point of contact of the spindle and spring, or the pressure of the spring can be increased by screwing in the attaching-screw 5, without increasing the strain on the spring to any extent, and, further, the wearing of the lower corner, or end of the spindle-head, is prevented from the raising and lowering of the spindle, as is the case in the old form of spring used in connection with the Baldwin-head spindle. (*Litchfield Shuttle Company, Southbridge, Mass.*)

SERGESON'S SHUTTLE.

In this shuttle a catch for holding a bobbin is provided, the same being released by throwing up the spindle. The catch is so constructed that a pivot-pin therefor is dispensed with, and provision is made for preventing the catch when thrown up from breaking out the shuttle.

Fig. 1, represents a top or plan view of a portion of this shuttle. Fig. 2, represents a longitudinal section thereof. Fig. 3, represents a longitudinal section showing the parts in different positions from those shown in Fig. 2.

A, represents the body of the shuttle. B, the spindle for holding the bobbin, the same being secured to a head C, which is pivoted to the body, whereby the spindle may be thrown out and in. In the upper part of the head C, is an opening D, which receives the pivot E of a catch F, the latter projecting over the head and having a flange or tongue G, which is adapted to enter a groove in the bobbin for securing the latter on the spindle.

Bearing against the under side of the rear or heel end of the catch F, is a spring H, which is seated on the head C, and serves to hold the tongue end of the catch in engaging contact with the bobbin.

J, represents a knuckle freely fitted within the body A, consisting of a partly-cylindrical piece forming a journal *a*, an outwardly-projecting lip *b*, and a longitudinally-extending stem *c*. In the back of the head C, is a circular recess *d*, which receives the journal *a*, of the knuckle, said journal being pressed against the head C, by means of a spring K, which bears against the knuckle and a proper part of the body, so that the pressure of the spring is exerted against the head C, for holding the spindle B in position. The lip *b*, of the knuckle extends at an angle to the heel of the catch F, and is so disposed that when the spindle is thrown out said heel engages with the lip and motion is imparted to the catch, so that the front end, or tongue G, thereof is raised clear of the bobbin.

When the bobbin is to be removed, the spindle is thrown out, and the heel of the catch then reaches the lip of the knuckle and impacts against the same as a deflector. The knuckle slightly yields, so as to prevent binding of the parts, and the catch is forced toward the head C, whereby the opposite tongue end is raised, and the tongue emerges from the groove in the bobbin. As the bobbin is now uncontrolled by the catch, it may readily be withdrawn from the spindle.

It will be seen that owing to the knuckle the catch is thrown out, and said catch is prevented from bearing against the wall of the slot in the body in which it plays and breaking out said wall, the body thus being prescrved intact.

When the bobbin is restored to the spindle, or a fresh bobbin applied thereto, the spindle is returned into the body of the shuttle, and as the catch is re-

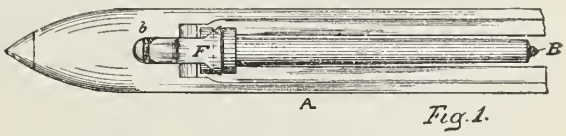


Fig. 1.

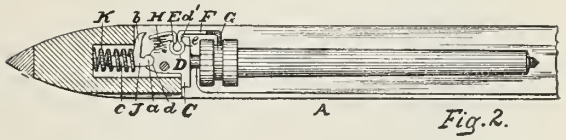


Fig. 2.

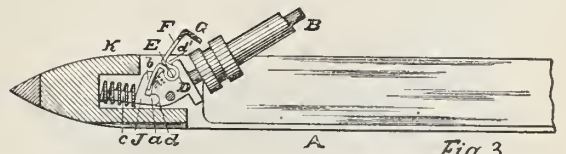


Fig. 3.

leased of the pressing action of the knuckle or deflector J, it returns to its normal position, the tongue G then entering the groove in the bobbin, so that the catch engages with the bobbin, and the bobbin is firmly held on the spindle, the latter retaining its position in the body owing to the action of the spring K.

The pivot E, of the catch F, is integral therewith, and is formed by bending the metal of the same in partly-cylindrical form, leaving a contracted portion

or neck d', at the place of meeting of the catch and pivot. The outer end of the opening D, in the head C, is also contracted, as at e, and receives the neck d', of the catch.

The pivot is inserted in the opening D, at the side of the latter, and owing to the contracted portion e, of said opening, the pivot is prevented from being displaced, said pivot turning freely on the wall of the opening as its bearings, and a separate or loose pivot-pin being obviated.

The lower portion of the head C, is provided with a shoulder or projection adapted to be brought in contact with the body of the shuttle when the spindle is thrown in, so as to limit the movement thereof. (*James C. Sergeson, Philadelphia.*)

ANOTHER SERGESON'S SHUTTLE.

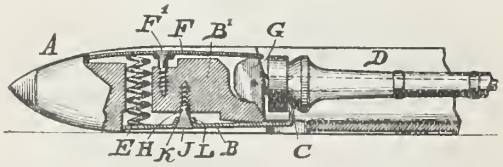
The improvements in this shuttle consist in having a catch plate for engagement with the bobbin, formed with an angular and tapering opening, and a screw which is provided with an angular and tapering head, said plate having on its inner surface a boss which is continuous of the wall thereof, and having its opening coinciding with that of the plate, whereby the screw is prevented from rotating itself loose, it having a broad bearing on said plate, and its hold on the body is firm and secure without the employment of a nut for such purpose.

The accompanying illustration represents a longitudinal section of a portion of this shuttle.

A, designates the body of a shuttle; B, the catch plate, which is connected with the part B', of the body of the shuttle, and has at one end a nose C, for engagement with an angular groove on the head of the bobbin D, whereby the latter is held in operative position, the other end of said catch plate being pressed outwardly by the spring E, which bears against said catch, and the opposite spindle-holding plate F, on the heel ends thereof, said plate F, exerting pressure on the pivoted head G, of the spindle.

The plate F, is adapted to bear upon one face of the spindle head to hold the spindle in proper alignment in the shuttle, and upon another face of the head when the spindle is raised to hold it in position to change the bobbin.

H, designates the bolt or screw which connects the catch plate with the body of the shuttle, the same having an angular head J, the latter occupying a countersunk opening K, in said plate, whereby the latter is permitted to rock or oscillate lightly on said head as the bobbin engages with and disengages from the nose C. The walls of the opening K are extended inwardly, forming the boss L, whose opening is continuous of said opening J, and whose wall is both



angular and tapering, like a truncated pyramid. The head of the screw coincides in its angle and tapers with the walls of said opening and boss, and occupies the opening of both the plate and the boss, whereby it has an increased holding surface on the catch plate, and the material of said catch around said opening K is vastly strengthened at a place where the plate is subjected to considerable strain, the screw being also prevented from rotating in reverse direction, as its head is controlled by the wall of the opening K, and the boss L.

When the plate B is forced inwardly against the spring E, the head J of the screw H, is uncovered, when the same may be engaged by a suitable key, and rotated to remove the screw H, and consequently said plate, the same provision existing when said plate is to be restored to position, the head being caused to register with the opening K, the plate then being let go, whereby the wall of said opening and boss L, again embraces the head of the screw. The plate F, has a boss similar to that of the plate B, and the screw F', is formed with an angular head similar to the screw H. (*James C. Sergeson, Philadelphia.*)

SERGESON'S COP-SHUTTLE.

The special feature of this shuttle consists in so constructing the same that when yarn, thread or stock is used therein in wet condition, in the shape

Fig. 1.

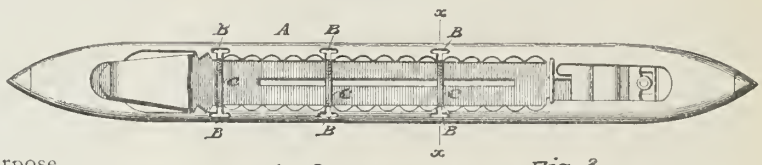


Fig. 2.

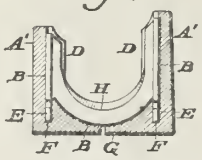
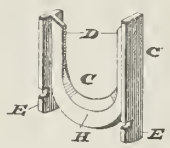


Fig. 3.



of cops, the body of the shuttle is prevented from warping or becoming injuriously irregular on its outer face.

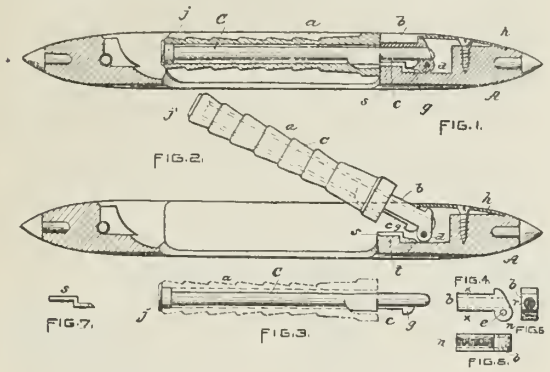
Fig. 1, represents a top or plan view of this shuttle. Fig. 2, represents a transverse section thereof, on an enlarged scale, on line x x, Fig. 1. Fig. 3, represents a perspective view of a detached portion thereof.

The inner face of the side and base of the body A, of the shuttle has grooves B, formed therein, the same receiving the braces or stays C, which consist of somewhat **V**-shaped pieces of metal. The side limbs D, of said stays have projecting flanges thereon, so as to make said limbs **T**-shape in cross-section, and the sides grooves B, are similarly shaped, so that said limbs which occupy said side grooves are interlocked with the side wall A', of the body of the shuttle, thus preventing said walls from springing apart and warping or materially warping. Again there depends from the limbs D, the legs E, which enter the grooves F, in the side portion of the base G, of the body of the shuttle. Hence, as the limbs D, are connected at bottom by the webs H, of the stays, said legs E, serve to resist the tendency of the base of the bottom to swell or expand laterally. By these means the shape of the body of the shuttle is preserved and caused to run true in the raceway which it occupies. (*James C. Sergeson, Philadelphia.*)

SUTCLIFFE & MARSHALL'S SHUTTLE.

The advantage of this shuttle consists in the improved method of holding the bobbin spindle in the shuttle where such spindle is made removable for the purpose of changing an empty bobbin for a full one.

Fig. 1, shows a vertical section of this shuttle, taken lengthwise through its centre with the spindle in elevation. Fig. 2, shows the same parts as Fig. 1, with the spindle turned up in position to be removed to change the bobbin. Fig. 3, represents the spindle and bobbin separate from the socket, which remains



in the shuttle when the bobbin is changed. Fig. 4, is a side elevation of the socket that holds the spindle. Fig. 5, shows the under side of the socket. Fig. 6, is a cross-section of the socket taken on the line *x*-*x*, Fig. 4. Fig. 7, is a separate view of plate *s*.

A, indicates the body of the shuttle made of wood, and protected at each end by steel points. C, is the spindle that holds the bobbin, and which is made removable to facilitate changing the empty bobbin for a full one when run out.

b, is the socket made to hold the spindle C, in the shuttle, and which has a hole *e*, made through it sidewise at the lower part of its rear end to receive a pivot *d*, held on both sides in the wood of the shuttle-body, and on which it turns when raised as shown in Fig. 2. A hole *r* is made through the socket lengthwise to receive the spindle C, and a wide slot *n*, (see Fig. 5) is made through the under side of the socket into the hole *r*, for about two-thirds of its length from the front end to receive a raised spline *e*, made on the under side of a portion of the spindle that enters the socket. This spline *e*, is for the purpose of preventing the spindle from turning, and as a guide in entering the spindle in the socket properly. The wood *t*, of the shuttle-body under the socket *b*, is cut out in a stepped form to receive the metal plate *s*, which is held in place by a screw entering the wood beneath. The plate *s*, forms a step or notch *j*, to receive a block *g*, made on the back end of the spline *e*, which shuts into it when the spindle is pushed down, as in Fig. 1, and prevents it from coming out of the socket.

The spline *e*, in front of the block *g*, projects out of the slot in the socket and rests on the plate *s*, to assist in keeping the spindle steady and from wearing loose. A button *j'*, is made fast on the free end of the spindle C, consisting of a body to enter the end of the bobbin and a flange or head that projects, so as to protect the thread from being injured by the rough end of the bobbin when it is pulled off over the end in weaving. A flat stiff spring *h*, of the usual form is held on the top of the shuttle by a screw through its middle, screwing in the wood, with the front end of the spring resting on the socket *b*, just in front of the pivot *d*, so as to hold the spindle down when in use.

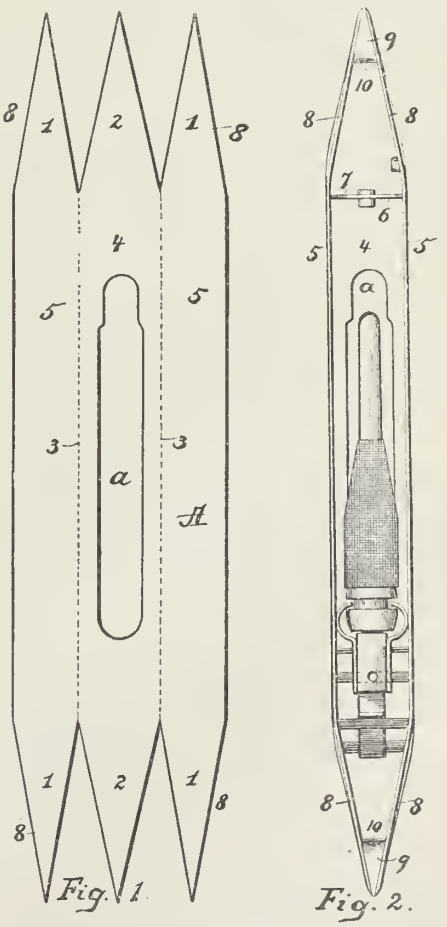
To change the bobbin *a*, the spindle C is raised, as in Fig. 2. Then the spindle, with the bobbin on it, is taken from the socket. The spindle is then drawn out of the bobbin by the button *j'*, and inserted in the full bobbin and then put back into the socket and turned down again, as in Fig. 1. (*T. Sutcliffe and J. Marshall, Pawtucket, R. I.*)

MORRISON'S SHUTTLE.

Fig. 1, is a view of the blank from which the shuttle-frame is made. Fig. 2, is a plan view, of the complete shuttle-frame.

An explanation of the construction of this new shuttle is best given by quoting letters and numerals of reference of which A, represents a blank, rectangular plate of thin sheet-steel having a slot *a* in its centre. Each end of the blank is cut so as to form three points 1, 1, 2. The blank is then bent up on the lines 3, 3, so as to form the rectangular open frame of the shuttle, said frame comprising a bottom 4, and sides 5. The points 1, 1, 2, at the respective ends of the frame are brought together and brazed to form the pointed ends of the shuttle-frame. The brazed joints between the meeting edges of the points 1, 1, 2, are slightly rounded and made perfectly smooth.

Between the sides 5, a brace 6, is located near one end of the frame, the sides of the frame at the other end thereof being braced by the transverse pins or bars with which the spool-holder is connected. The



edge 7, of the brace is curved so as to be out of line with the sides of the frame, and the edges of said sides 5, are slightly rounded, so as to avoid all possibility of the warp-threads being cut by them.

It will be observed that those portions of the sides

of the frame which constitute parts of the pointed ends of said frame are so shaped that their edges 8, will be beveled or inclined and said pointed ends will therefore be nearly conical.

Within the extremities of the pointed ends of the frame, steel blocks or tips 9 are brazed, and the upper faces of said blocks or tips will be made smooth and exactly flush with the edges 8, of the frame, so as to expose no projection whatever, which can catch or engage the warp-threads.

In order to further guard against the engagement of the warp-threads by the inner ends of the blocks or tips 9, said inner ends are beveled or rounded, as shown, at 10.

By making the walls of the frame thin, the amount of frictional contact of the shuttle with the warp-threads and parts of the loom will be reduced to a minimum.

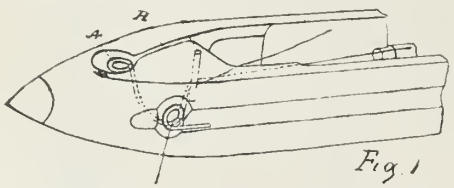
Another advantage of thin walls of the frame is, that the space within the frame will be enlarged, thus permitting the use of a large amount of thread on the spool when the latter is first inserted into the shuttle-frame. The improved shuttle-frame is a mere shell of steel and is open from tip to tip, and by thus making the frame open the frictional surface is still further reduced.

This shuttle-frame cannot chip, splinter, or break, and there are no exposed points or connections and consequently nothing to catch or injure the warp-threads. (*Thomas Morrison, Williamsport, Penna.*)

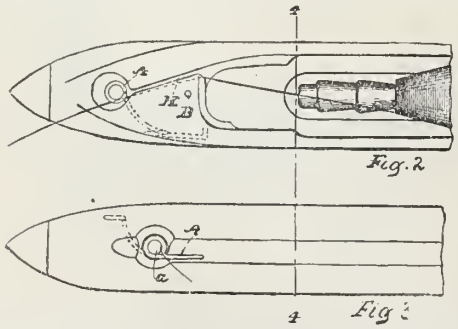
NASON'S SELF-THREADING SHUTTLE.

Fig. 1, is a view, in perspective, of the front end of this shuttle. Fig. 2, is a plan, and Fig. 3, an elevation of the same, and Fig. 4, a cross-section on lines 4-4 of Figs. 2 and 3.

A, is the feeding pin preferably in one piece with

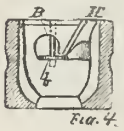


the eye *a*. The thread from the bobbin must be passed about that pin and thereby guided into the eye. The groove H, is at its front end at the middle line of the shuttle, but the mouth of the groove H, slants away from that line as shown in Fig. 2, and the walls of the groove also slant inward from top to bottom, as plainly shown in Fig. 4; and it is this



groove, doubly slanted, as above described, which constitutes the main feature of the improvement in the construction of this shuttle. With such a groove the thread will when led from the bobbin and along the groove as shown in Fig. 2, be brought into proper relation with the feeding pin A; and while this is a practical advantage of some consequence, because it makes it easier for the weaver to bring the thread into proper relation with the feeding pin A, it also facilitates the slipping of the thread down the feeding pin to cause a bight in the eye *a*, as clearly shown in Fig. 1. The slanting of this groove inward also enables a guide pin B, to be used in the thread passage.

To thread the shuttle, the thread is led from the bobbin through groove H, and is thereby brought to the proper side of the feeding pin A, (see Fig. 2) and the free end of the thread is then pulled sidewise, to form a bight about the feeding pin, and then back through the groove H, to cause it to follow down the feeding pin A, and form the bight through the eye *a*, as clearly shown in Fig. 1. This bight is then caught by a wiping motion of the fingers, and the free end of the thread pulled through the eye as shown in Fig. 3. The whole operation is performed rapidly and with certainty by reason of the relation of the doubly slanted groove H, to the feeding pin A.



When the shuttle is in use the thread extends from the bobbin through the space between the guide pin B, and that part of the shuttle body, which forms the inner wall of groove H, and thence out of the eye *a*.

The angle formed in the thread by the guide pin B, serves as a light tension, and this tension may be increased by a fibrous washer *b*, as shown in Fig. 4. (*Joseph Herbert Nason, Somerville, Mass.*)

ALLEN'S TWO-BOBBIN SHUTTLE.

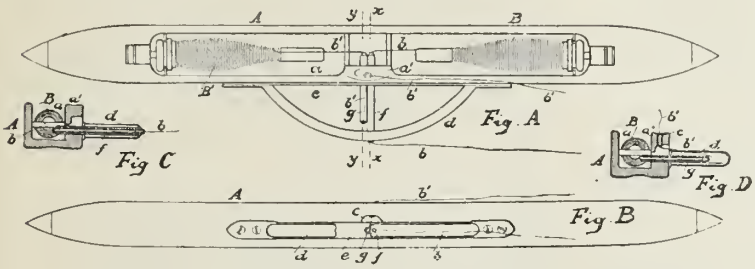
This shuttle, while capable of application to weaving generally, is especially adapted to the weaving of silk fabrics, and generally to that class of silk fabrics, which may be designated as "changeable," "iridescent" or "cameleon," such fabrics being generally composed of three differing colors, one of said colors being supplied by the warp and the other two by the filling.

To produce the optical effect peculiar to this kind of silk fabrics, the filling threads are necessarily woven in parallel relation and have a regular and uniform alternation of color. This effect has been previously accomplished by the use of two separate shuttles in a loom of the drop-box type; the employment of said separate shuttles being necessary to avoid the twisting, mixing or tangling of the two threads, the occurence of which, even in a slight degree, is fatal to the peculiar effect desired. By means of this two-bobbin shuttle, the extra shuttle, as formerly required, is dispensed with, and, consequently, we are enabled to employ for the manufacture of the fabrics thus referred to a single-box-loom. The improved shuttle has two bobbins which feed simultaneously two filler threads at the point of delivery from the shuttle, and thus insures the same result as that attained by the employment of the two separate shuttles in the drop-box-loom.

Aside from the great economy incidental to the use of the single-box-loom as compared with the use of the box-loom, the extra shuttle is dispensed with and the output of the loom is greatly increased. Moreover, we are enabled to attain by the performance of this shuttle an improved product, owing to the maintenance of parallelism of the filling threads throughout the body of the fabric and the conse-

quent regular and uniform alternation of color. In addition to these advantages the plain type of loom employed, is more readily controlled and can be operated at less expense than a loom of the drop-box type. For a clear understanding of this ingenious shuttle the accompanying illustrations are given, of which Fig. A, is a plan view of the improved shuttle. Fig. B, is a side elevation partly broken away. Fig. C, is a sectional view on line *x-x*, of Fig. A, and Fig. D, is a sectional view on line *y-y*, of same figure.

A description of the construction of this shuttle is best explained by quoting letters of reference, of which A, denotes the shuttle-body, provided with the recess *a*, made of sufficient length to accommodate two bobbins BB′ which are mounted on tongues pivot-



ally arranged. The said bobbins lie in position end to end and deliver the threads centrally of the shuttle, at which point the body is provided with a thread-delivery eye *c*, vertically arranged in an enlargement *a′*, of one of the side walls of the body, said eye being located centrally between the ends of the shuttles, but to one side of the line thereof. Secured to one side of the shuttle is a semi-circular guard *d*, and a strip *e*, is interposed between the side of the body and the guard to serve as a means for holding rigidly two thread-tubes *f*, *g*, lined with porcelain, and at their inner ends extend to a point in line with the bobbins. The tube *f*, extends to and through the guard; but the tube *g*, terminates short thereof.

In threading the shuttle, the thread *h* from the bobbin B, is passed directly through the tube *f*, being thereby delivered at a point some distance from the body of the shuttle. The other thread *h′*, of the bobbin B′, is first passed through the tube *g*, and from thence to and through the eye *e*, the point of its delivery being thereby within the side of the shuttle adjacent to the point of delivery of the thread *h*, and same distance from the latter. By this means threads are not only fed or delivered in a separate condition, but the separation is maintained by reason of the initial distance between the points of delivery until the weaving actually takes place. There is no contact until the threads are in the cloth, and hence there is no twisting nor tangling, as would be the case were the threads delivered from the same eye. (*The Rettger Allen Co., Paterson, N. J.*)

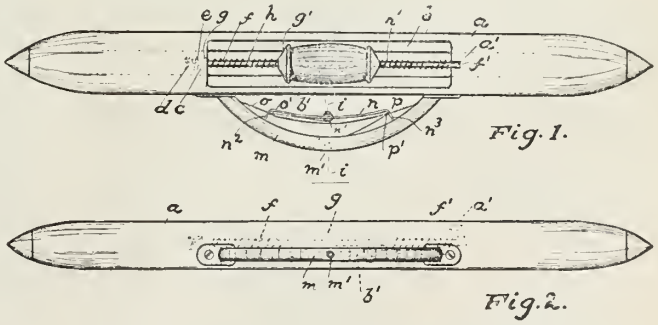
TODD'S SHUTTLE FOR NARROW WARE LOOMS.

The novelty of the shuttle consists in its tension and bobbin holding and controlling device, being a spring which holds the bobbin from rotating too fast. Fig. 1, is a plan view of this shuttle and its tension and bobbin holding and controlling device and Fig. 2, a front elevation of Fig. 1.

a, represents the shuttle-body provided with a longitudinal chamber *b*, in the top thereof and with an elongated slot *b′*, in its front portion.

In the shuttle-body and at one end of the chamber *b*, is arranged a horizontal hole or recess *c*, closed by a centrally-perforated plate or disk *g*, through which one end of the bobbin shaft or rod *f*, is adapted to pass. Said shaft bears against the plate *c*, resting on the spiral spring *d*, arranged in said hole or recess. The other end of said shaft is bent upward at an acute angle, as at *f′*, and is adapted to engage a vertically-arranged recesss *a′*, having its inner back wall at an acute angle to its bottom. On said shaft is slidingly arranged the bobbin *g′*, carrying the thread or threads *i*, which bobbin is normally held and controlled by means of the spiral springs *h*, and *h′*, arranged on and surrounding the unoccupied portions of the shaft *f*. On the front portion of the shuttle-body *a*, and in alinement with the elongated slot *b′*, is secured the shuttle bow *m*, provided in its culminating point with the horizontally-arranged eye *m′*. Within said bow is arranged, and secured thereto by means of its depending ends n^2, and n^3, a bridge *n*, parallel to the shaft *f*, and provided in its centre with an eye *n′*. The ends n^2, and n^3, are each provided with an opening penetrated by its respective spiral spring *o*, and *p*, secured with their outer ends to and within the end portions of the bow or conductor, and are provided at their ends with loops *o′*, and *p′*, respectively, forming passages for the thread or threads *i*. Said thread or threads pass from the bobbin through eye *n′*, into and through loop *o′*, from whence into and through loop *p′*, and finally leave the shuttle after passing through the eye *m′*, in the bow or conductor *m*, as clearly shown in Fig. 1.

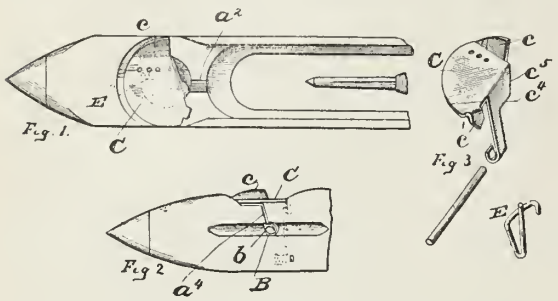
In placing the bobbin in position the rounded end of the shaft *f*, is inserted through the perforated plate *g*, into the recess *c*, and the spiral spring is depressed sufficient to allow the insertion of the bent-up por-



tion *f′*, of shaft *f*, into the recesss *a′*. When said shaft is released, it remains locked within the chamber *b*. The spiral springs *h*, and *h′*, normally hold the bobbin in position, but are so adjusted that said bobbin can move from one side to the other when the shuttle, for instance, is thrown over the race, and is suddenly stopped in its movement by the box on the loom, by which arrangement breakage is avoided, and yet the proper tension is maintained. The spiral springs *o*, and *p*, serve also as take-up or tension devices and thus prevent a breaking or looping of the thread. (*Walter Todd, Paterson, N. J.*)

DAUDELIN'S SELF-THREADING TENSION DEVICE FOR SHUTTLES.

This device is shown in the accompanying illustrations, of which Fig. 1, represents a top plan view of the portion of a shuttle containing the threading

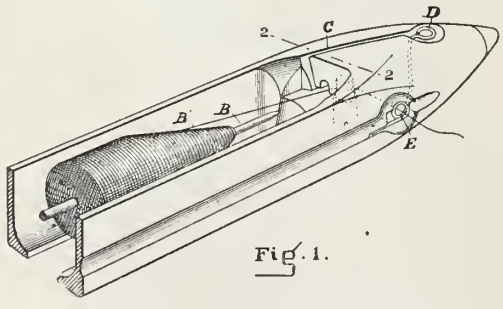


mechanism. Fig. 2, is a side elevation of the same. Fig. 3, is a detail perspective view of the threading plate, its securing devices, and the thread-tension device.

In order to thread the shuttle but two movements are necessary. The thread is drawn forward longitudinally of the shuttle until it is caught beneath the upturned end c of plate C, and conducted thereby into the semi-circular threading passage formed beneath the plate C, between said plate and the upper surface of the shuttle body, and is then drawn laterally toward the side on which the thread-delivery eye is located. This latter movement causes the thread to find the vertical threading slit a^4, which takes it directly into the delivery eye. As the thread is paid out it is drawn into engagement with the tension device E, and made to engage the inclined edge c^6, of the plate C, which guides it down below the shoulders c^4, which prevents its rising. The thread will also be drawn by the movements just described into the thread notch a^2, and will pay off from the spindle through said notch around the arms of the tension device, and directly out through the delivery eye. The delivery eye B, is provided with the retaining finger b, to prevent the escape of the thread upwardly. *(Jean Baptiste Daudelin, Fall River, Mass.)*

NASON'S TENSION DEVICE FOR SHUTTLES.

The object of this device is to provide means whereby the tension of the yarn carried by the shuttle may be accurately controlled, the tension-clamp being



so constructed that the thread is drawn into it by the same movement that threads the shuttle

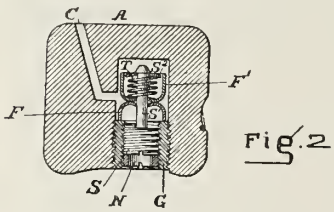
Another object is to provide a tension which will yield at need to permit small knots in the yarn to pass through without breaking the yarn. This device with its friction-surfaces not positively adjusted in their relations the one to the other, but controlled by means of a spring, which tends constantly to press them together, serves this purpose admirably, the spring yielding more or less readily, according to the position of the adjusting screw, to permit the passage of the knot between the friction-surfaces.

Of the accompanying illustrations, Fig. 1 is a perspective view of one end of a self-threading shuttle with this device added. Fig. 2 is a sectional elevation on line 2-2, of Fig. 1, enlarged for clearness. Letters of reference indicate thus:

A, the shuttle-body; B, is the spool, and B′, the yarn upon the spool; C, is the slot, and D, the pin which carries the yarn B′, to the eye E.

The tension-clamp consists of two friction-surfaces F, F′, relatively adjustable by means of a screw S, working in the body of the shuttle, which controls the pressure of a spring which presses upon the back of one of the friction-surfaces, and a side pin S′, prevents the yarn from drawing between the friction-surfaces, the tension device being held within a recess formed within the shuttle.

G, is a socket of metal screwing into the body of the shuttle, in which work the adjusting screws S, and the check-nut N, for locking the screw S. The adjusting-screw S, carries pin S′, which projects into the cavity formed in the body of the shuttle for the tension device, and serves, among other uses, as a side pin to keep the yarn in its proper position between the friction-surfaces.



The friction members F, F′, are hemispherical in form, the poles being slightly flattened or indented and having a hole through the flattened part through which the pin S′ passes, the flattened surfaces upon the two hemispheres being opposed. A spring T, surrounds the upper end of pin S′, one end being in contact with the inside of F′, and the other end being in contact with a disk S^2, fast to the end of a pin S′, or the upper end of the spring may be attached to the upper end of pin S′.

The operation of the tension device is as follows: The yarn B′, is laid in the slot C, about the upper end of the guide pin D, and back again in the slot C. It is then drawn back and slips downward along the slanting guide-pin D, to the eye E, the movement drawing it into the tension device between the two friction-surfaces F F′, to one side of the pin S′. By a wiping motion of the finger of the operative over the eye E, the loop of yarn is drawn out of the eye. The eye E, being upon the opposite side of the shuttle from the slot C, the pin S′, serves to cause the yarn to draw between the friction-surfaces F, F′, near their centre. To adjust the tension, the screw S is turned in the required direction, the pin S′, and disk S^2, upon the screw S, putting more or less pressure upon spring T, which in turn presses upon F′. The requisite pressure having been secured, the check-nut N is turned to place, securely holding screw S. *(Joseph Herbert Nason, Somerville, Mass.)*

HOWARD AND FITTON'S TENSION DEVICE FOR SHUTTLES.

The object of this device is to provide means applicable in drop-box weaving for automatically stopping

the feed of the filling thread in a shuttle when the shuttle passes into the drop-box and for holding the thread taut or without undue slackness while said shuttle is within the box, thereby avoiding liability of the idle filling thread from one shuttle being partially drawn into the warp or fabric by a shuttle thrown from an adjacent box when the boxes are changed.

Another object is to provide a shuttle with improved means adapted to be automatically operated by contact with the common shuttle-binder of the loom as the shuttle enters the drop-box for retarding or stopping the feed or for increasing the tension on the filling-thread running from the shuttle, thereby to tighten or hold the filling-thread straight until beaten up into the web, and to prevent the fabric being woven loose or heavier at the selvage or adjacent thereto than in its central portion.

Of the accompanying illustrations, Fig. 1, is a top view of a shuttle illustrating the nature of this tension device; Fig. 2, is a plan view of the shuttle as entered in the drop-box, showing the manner in which the stop device for the filling is actuated by the shuttle-binder of the drop-box.

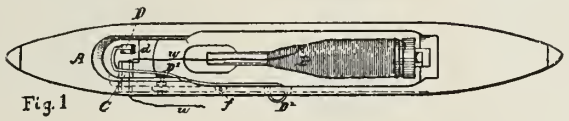


Fig. 1

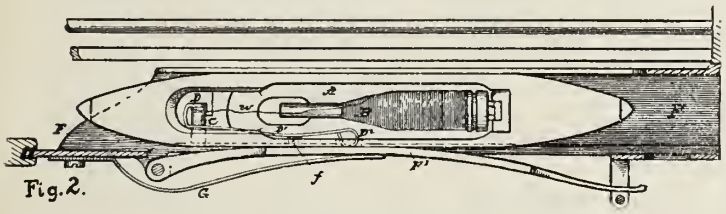


Fig. 2.

A, denotes the body of a loom-shuttle; B, the cop or bobbin; *w*, the filling-thread which is delivered through guiding eye C.

D, indicates a movable presser or stop device arranged to be forced down upon the thread *w*, where it passes into the eye C, for retarding or stopping the run of the thread from the shuttle. Said presser is an arm or lever D′, pivoted to the side of the body at *f*, and having a portion D^2, that projects through an opening *a*, in the side of the shuttle-body, standing out therefrom in such manner that, when the shuttle is in use, it will engage with the inner surface of the binder which is commonly employed in the shuttle-boxes of looms and be thereby pressed inward flush with the side of the shuttle, swinging the lever D′, and causing the pad to bear upon the thread at the shuttle-eye, as indicated in Fig. 2. The arm of the lever is made of an elastic bar, so as to yield or spring somewhat under excess of pressure. This presser-lever can be adapted to the various forms and sizes of shuttles employed for weaving different classes of fabrics and materials—as silk, wool, cotton, or other fibre. The bearing-head of the presser is provided with a facing *d*, of leather, rubber, felt, or such material as will give the desired action on any particular class of filling in any instance employed. An adjusting-screw arranged in the presser-lever and having a head that strikes against the body of the shuttle, serves to arrest the action of the presser and regulate the approach of the pad upon the thread to give greater or less force of pressure thereon, any excess of movement of the operating-arm being accommodated by the yielding or spring of said arm.

F, indicates the shuttle-box or one of a series of drop-boxes; F′, is the shuttle-binder thereof, and G, the binder-spring.

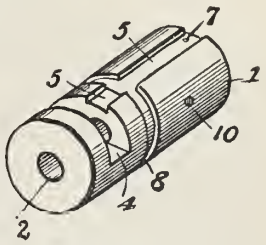
In the operation as the shuttle passes into the box F, the projecting part D^2, of the presser-lever by striking the binder F′, is automatically forced inward causing the pad *d*, to be pressed down upon the thread *w*, which is embraced between the pad and the end of the guide C, thereby retarding or stopping the delivery of the filling as the shuttle approaches or arrives at its destination, also holding the thread from running from the shuttle or increasing its slackness while the shuttle remains in the shuttle-box, but instantly and automatically relieving the stop upon the filling as the shuttle is delivered from the box and the end D^2, released from contact with the face of the binder or engaging part.

By combining the stop or presser device with the shuttle in a manner shown and described and adapting it to be automatically brought into action by the binder with which it makes contact as the shuttle comes to the end of its throw, we attain the following benefits viz.: The filling stop is rendered simple, efficient, and comparatively inexpensive, and conveniently practical for service in fancy weaving where changeable shuttle-boxes are required, the improvement can be incorporated in shuttles of the ordinarily employed types, and applied to use in the common drop-box-loom without necessitating any change in or addition to the drop-box structure. The filling, while the shuttle is retained in the box is held from running off, thus preventing any liability, when the boxes are changed, of the shuttle thrown from an adjacent box drawing the idle thread from the standing shuttle into the edge of the woven fabric. (*T. Howard and J. R. Fitton, Worcester, Mass.*)

SWEENEY & STROBLE'S AUTOMATIC TENSION DEVICE FOR SHUTTLES.

Of the accompanying drawings Fig. 1, is a perspective view of this tension device with the tension lever or arm removed. Fig. 2, is a longitudinal sectional view with the lever or arm in position. Fig. 3, is a perspective view of the tension lever or arm removed from the tension device.

Fig. 1.

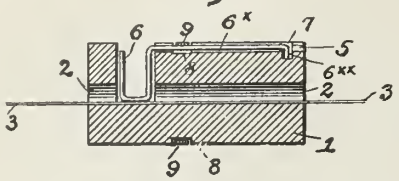


Numerals of references indicate thus:—1, the tension device *per se*, the same consists of an elongated cylinder of metal, china or other suitable material provided with a central opening 2, as to its entire longitudinal axis for the passing of the thread 3.

The cylinder 1, near one end thereof is provided with a recess 4, extending into the opening 2, and also with a longitudinal guide 5, on its outer surface extending from the recess 4, to the opposite end of the cylinder; the recess and groove combined adapted to receive a tension lever or arm 6. This tension lever or arm 6, (see Fig. 3) consists of a piece of steel or other desired suitable material, broad and **U**-shaped at one end at right angle with its shank or extension

6^x; and its opposite end provided with a bent or downward projection 6^{xx}, the **U**-shaped end of the lever or arm adapted to be seated in the recess 4, and the shank portion 6^x, adapted to be seated in the

Fig. 2.

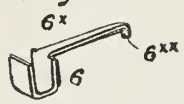


groove 5, of the cylinder 1, while the bent end 6^{xx}, of the lever or arm takes into a hole 7, formed in the cylinder 1, near the outer end of the groove 5, (see Fig. 1) to prevent endwise or lateral movement of said lever or arm. The cylinder 1, in juxtaposition to its recess 4, is further provided with a circumferential groove 8, which receives, after the placing of the lever or arm 6, a band of rubber 9 or other resilient means adapted to hold the lever or arm 6, in normal working position; that is to say, permit vertical movement of the lever or arm only that the latter may accommodate itself to inequalities in the thread, at the same time preserving a steady uniform tension.

The tension device is mounted within the eye of the shuttle secured in place by a set-screw passing from the outer side of the shuttle and takes into a bearing 10, conveniently located on the outer surface of the cylinder 1, for either a right or left-hand shuttle.

A tension device for the construction described permits the passing or feeding of the thread from the cop in an easy and uniform manner without damage to or cutting of the same, the thread 3, passing into and being guided in the first place by the opening 2, in the cylinder 1, and thence passing under the **U**-head of the lever or arm 6,—the latter accommodating itself as to its tension properties to the irregularities or inequalities in the thread, and this by reason of the resilient means 9, employed for retaining the lever or arm in position and operation and permitting vertical movement only while at all times preserving the tension, and encounters no rough, sharp, uneven or other cutting edges or contacts to cut or damage the thread. (*J. Sweeney, Pottstown, and G. Stroble, Philadelphia.*)

Fig. 3



HAMBLIN & CORNELL'S TENSION DEVICE FOR SHUTTLES.

The object of this device is to prevent the screw which secures the tension device in the shuttle, and by means of which the tension is regulated, from working out, and thereby breaking the warp threads as forming the shed.

Fig. 1, is an elevation of a shuttle-tension device provided with the improvement. Fig. 2, is a view in cross sections of a shuttle through the point occupied by the tension device. Fig. 3, is a view showing the peculiar construction of the screw which secures the tension device in the shuttle, and by means of which the degree of tension is regulated. Fig. 4, is a plan view of a lock plate, which prevents the screw from working out. Fig. 5, is a view of the key, by means of which the screw is operated.

a, indicates a screw, having a small portion of its shank, immediately under its head, made square as at *a'*. *b*, indicates a plate, having a square hole *b'*, in its centre, to fit the square shank *a'*, of the screw, and provided with the wings b^2. *s*, represents the shuttle, and *s'*, its delivery eye.

In the sides of the opening made to receive the tension plug *c*, are the grooves *h*, adapted to receive the wings b^2, of the plate *b*, so that said plate may move easily up and down in said opening.

The tension device consisting of the screw *a*, plate *b*, plug *c*, and spring *e*, being adjusted in the shuttle as shown in Fig. 2, the plate cannot turn, because of its wings b^2, projecting into the grooves *h*; and the

Fig. 1.

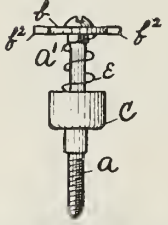


Fig. 2.

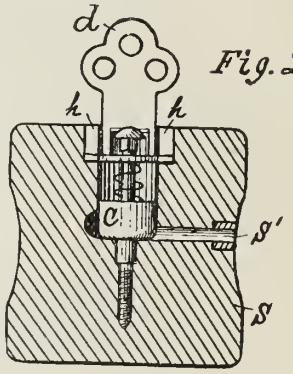


Fig. 3.

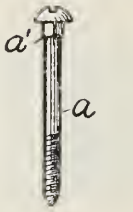


Fig. 4.

Fig. 5.

screw cannot turn, because the spring *e*, holds the plate on the squared shank of the screw, and thus locks it in position.

To advance or retract the screw, a key *d*, shown in Fig. 5, having the legs *d'*, is used, as shown in Fig. 2. The legs *d'*, push the plate below the squared portion of the shank of the screw, and the key then takes into the slot of the screw, and is turned in the direction desired. On the key being removed, the spring *e*, acts to push the plate *b*, upward on the squared shank of the screw, and thus locks the screw in position. (*S. M. Hamblin and P. Cornell, New Bedford, Mass.*)

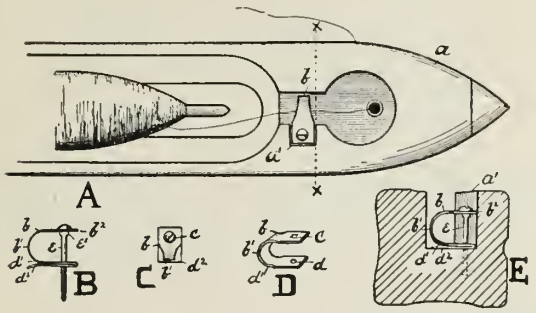
HAMBLIN AND DAMON'S TENSION DEVICE FOR SHUTTLES.

Fig. A, is a top view of a portion of a loom-shuttle showing this tension device adjusted therein. Fig. B, is a side view of the tension device as it appears when removed from the shuttle. Fig. C, is a top view of the same. Fig. D, is a view in perspective of the device with the regulating and retaining screw removed and showing a slight modification in its construction. Fig. E, is a view in cross-section through the dotted line *x-x* of Fig. A.

a, indicates a portion of a shuttle-body having the recess *a'*, made in one side of the throat thereof, in which recess is secured the tension device *b*, consisting of a piece of spring sheet metal bent into a semi-circle with the ends elongated parallel to each other having one end provided with the square hole

c, and the other end with the round hole a, and a screw e, adapted to pass through the hole d, having a square shoulder e', under its head adapted to fit in the square hole c.

In Figs. B and E, the spring b is shown as having its lower end bent upon itself and extending to a



point in line with the portion of the circle b', where it is slightly bent downward, as at d^2.

When the tension device is constructed as shown in Fig. B, the thread runs between the parts d' and d^2; but when it is constructed as shown in Fig. D, the thread runs between the part d' and the bottom of the throat of the shuttle, and when greater tension on the thread is desired, the end b^2 of the spring b, is pressed downward until the square hole c therein is free from the square shoulder e, and the screw is advanced to a sufficient degree. To lessen the degree of tension, the screw is retracted.

The ends of the spring b, are made square, so that when the device is adjusted, as shown, the said ends will bear against the side of the recess and prevent the device from turning from side to side and getting out of its proper position.

It will be observed that when the square shoulder of the screw is in the square hole in the spring b, the screw is prevented from turning and working out, and thus a uniform tension is maintained on the thread.

It will also be observed that the operation of threading the shuttle is the same either with or without the tension device and that the thread will draw under the tension device of its own motion. (*S. M. Hamblin, New Bedford, and E. S. Damon, Plymouth, Mass.*)

HAMBLIN AND DAMON'S IMPROVED TENSION DEVICE FOR SHUTTLES.

The gist of the invention consists of a piece of spring-wire having one end formed into nearly a circle, adapted to hold itself by expansion in the threading cavity of a shuttle, then carried downward in a curve to a lower plane, where it is provided with a straight portion adapted to bear against the floor of the threading-cavity and produce tension on the thread as it is drawn under it.

Fig. A, is a view of the head of a shuttle in horizontal section through the line x-x of Fig. B, and showing the improved tension device adjusted in place. Fig. B, is a view in cross-section of a shuttle-head through the line x-x of Fig. A, with the tension device removed. Fig. C, is a view of the same, showing the tension device in place. Fig. D, is a front view in perspective of this improved tension device constructed with a close coil between the portions of the device which produce the tension and the portion which operates to retain the device in the shuttle. Fig. E, is a view in perspective of the tension device constructed without the said coil.

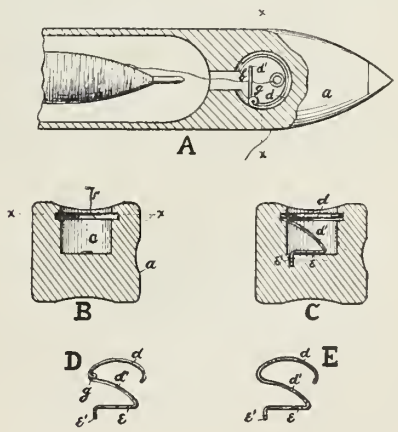
a, represents the head end of a shuttle, the threading-cavity c, being provided with the shallow groove b, near the top of its walls.

This tension device is constructed of spring-wire, one end of which is bent into nearly a full circle d. It then is carried downward in a curve d', to a lower plane, and is then bent backward in a straight line, as at e, to a point nearly coincident with the sweep of the circle d, where it is carried downward at a right angle with the plane of the portion e, as at e', as shown in Fig. E.

In order to give the device greater rigidity it may be provided with the close coil g, between the portions d, and d'. The portion of a circle d, is made larger in diameter than the cavity c, in order that when it is sprung into the groove b, it will expand into said groove and be held securely in place. The perpendicular portion e', is made to enter loosely a hole in the floor of the cavity c.

The device being arranged in the shuttle, as shown in Figs. A, and C, does not obstruct the operation of threading the shuttle, and when threaded the thread draws down over the curved portion d', and under the portion e, where it receives the necessary tension by being pressed between the portion e and the floor of the cavity c.

As will be seen, the device cannot of itself become displaced, nor is there any part of it, when adjusted in the shuttle on which the thread can catch and



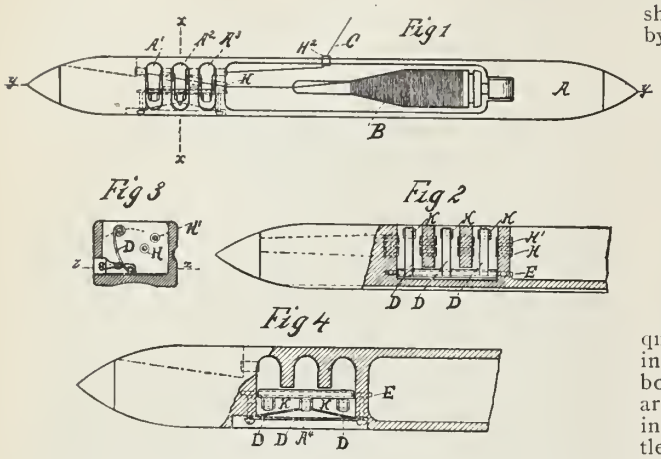
break. The tension on he thread may be regulated by slightly bending the wire between the portions d', and e. (*S. M. Hamblin, Taunton, and E. S. Damon, Plymouth, Mass.*)

GRANT'S TENSION DEVICE FOR SHUTTLES.

Fig. 1, is a top view of a shuttle with this tension device secured therein. Fig. 2, is a part side sectional view through the lineY-Y, of Fig. 1. Fig. 3, is a part end sectional view through the line X-X, of Fig. 1, and Fig. 4, is a part sectional plan view on the line Z-Z, of Fig. 3.

In Figs. 1, 2, and 3, dotted lines extending from end of shuttle to the wall of compartment A', indicate that a piece of the shuttle is cut out in order to expose the upper end eye H', and lower end eye H, to enable the thread to be passed from the lower series of eyes to the upper series.

A, represents a shuttle, which is provided with the perpendicular recesses or compartments A^1, A^2, A^3, and the horizontal recess or compartment A^4, into which the other compartments open. B, represents



the spool or bobbin containing the silk or thread C. A long pin E, is secured in the bottom of the compartment A^4. To the pin E, are secured arms, such as D, which are adapted to move or swing in the compartments A^1, A^2, A^3, into which they extend. The swinging ends of said arms D, are provided with the eyes K. The arms D, are slightly curved, as shown in Fig. 3, in order that each arm D, when pressed forward will bring the eye K, in direct alignment with an upper series of eyes H', located in the walls of the perpendicular compartments, in order that the thread or silk or other material may be passed or drawn alternately through the eyes H', and the eyes K, in the ends of the arms D, after having been passed through a series of eyes located beneath the upper series of eyes. The silk C, first passes from the bobbin B, and is conducted through the lower series of eyes H, and out of the end of the bobbin, or near the end of the bobbin, through an opening indicated by the dotted line in Figs. 1, 2 and 4. The swinging arms D, are then pressed forward until the eyes K, in the ends of the arms D, are in line with the upper series of the eyes H'. The thread is then conducted, by means of a hook or needle, up to and through the upper eyes H', and the eyes K, in the ends of the arms D, and through the eyes H^2, as shown in Fig. 1.

The relative position of the upper and lower series of eyes is shown in Figs. 1, 2 and 3.

The arms D, are held in the position, as shown in Fig. 3, by means of an elastic or rubber band, which is secured to the said arms, and to the shuttle, so as to give the required tension.

As the shuttle performs its functions in weaving, the thread C, is drawn from the bobbin B, passing through the lower series of eyes H, up to the upper end eye H', and then alternately through the said upper eyes and the eyes K, and out of the eye H^2, as shown in Fig. 1. As the thread C, is drawn through the eye H^2, the arms D, are drawn forward, so as to turn on, or with, the pin E, and when the shuttle is about to return, the elastic or rubber band secured to the shuttle and to the swinging arms D, as shown in Figs. 3 and 4, causes the swinging arms to return to the position shown in Fig. 1, thus taking up the slack thread.

The elastic or rubber band may be varied in size or thickness, so as to provide various degrees of tension. (*William A. Grant, Paterson, N. J.*)

WHITLEY'S TENSION DEVICE FOR SHUTTLES FOR WEAVING BROAD SILK GOODS.

The object aimed at in the construction of this shuttle is to secure the accurate binding of the cloth by the use of tension-springs, to afford facilities for the proper adjustment of these springs and to regulate the tension thereof with alacrity.

In what is commonly known as the "French" shuttle a semi-circular plate is secured to the outside of the shuttle, and arms provided with guides as well as tension-springs are secured to said plate, all of which necessitates the use of a lathe constructed specially for their use, the projection on outside of shuttle working outside of the lathe.

The purpose of the new shuttle is to accomplish the same results then obtained by the French shuttle by employing a plate of metal three-quarters of an inch in width by about three inches in length, which is placed within the shuttle on the bottom thereof and to which are secured guide-arms and tension-springs so as to extend longitudinally along the same in the bottom of the shuttle, as shown in the accompanying illustrations of which Fig. 1 is a plan of the device; Fig. 2 is a side or edge view; Fig. 3 is a detail view of eye bar with binder; Fig. 4 is a plan of shuttle with device in position, and Fig. 5 is a longitudinal section of the same.

Letters of references indicate thus:—A, the shuttle; A^2, a lip-engaging device; A^3, a groove in side of shuttle; B, the quill; S, the filling.

a, is the plate of the device, which is provided with the engaging lip *a'* adapted to slide under the projecting part of the shuttle A^2, when the plate *a*, is slid along the bottom of the shuttle into its proper position.

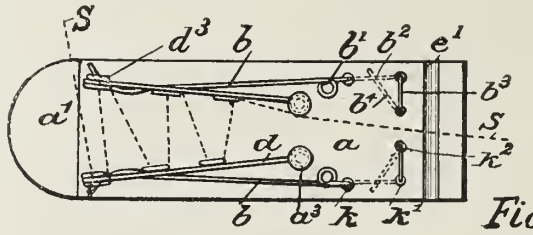


Fig. 1

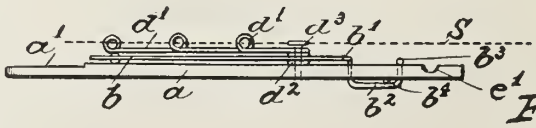


Fig. 2

Fig. 3

When the plate *a* is in its proper position, it is securely held there by means of the securing pin or screw *e*, which passes transversely through the sides of the shuttle along the transverse groove *e'*, in the top of the plate *a*.

A spring *b*, having a coil *b'*, is secured to the plate

a, by means of the loops b^2, b^3, b^4, formed by passing the steel wire through and under the plate by means of the small perforations or openings shown in Fig. 1.

A looped tension-bar d, or, rather, a pair of the same, are secured to the plate a, by screws or rivets

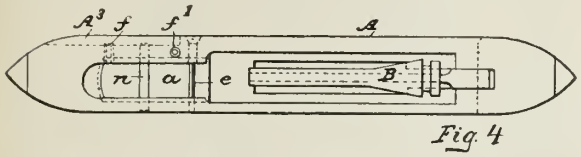


Fig. 4

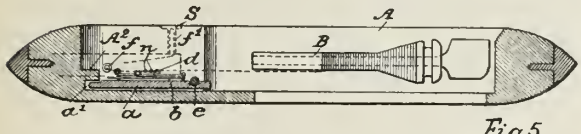


Fig. 5

a^3. On the back of each of said loop tension-bars is an eye d^3, through which the end of the spring b, passes and is permitted to move as the loop-bar is operated by the tightening or loosening of the thread or filling S. The loop tension-bar d, is provided with the desired number of loops or eyes d'. f, and f', are the eyelets in the shuttle.

In the construction of this new tension device strength and durability are attained by winding a copper wire e, around the steel loops d', and soldering the same together to prevent the loop from opening or breaking by the concussion of the shuttle. Two or more threads or cords, as indicated by the letter n, in the illustrations, are passed from one side of the shuttle to the other, over which cords the filling passes from the quill to the eyes in the tension-bars to prevent it from becoming entangled or caught in the springs.

To regulate the tension of the springs, they may be adjusted for that purpose by increasing or diminishing the number of the coils b', thereby varying the length of the springs b. The springs being constructed of a very fine and delicate wire which is easily manipulated, the length of the springs may be changed with facility for the purpose of regulating the tension.

Instead of passing the ends of the tension-springs through the lower eyes d^3, of the tension-bars d, said tension-springs b, may have the ends thereof coiled around said tension-bars d, at a point anywhere between the engaging ends d^2 of said tension-bars and the nearest loops thereon without varying from the essential principles of the improvement, the gist of which consist in the combination, with a shuttle, of the plate a, placed within the shuttle and extending longitudinally along the bottom of the same, the two looped tension-bars secured to said plate, the two tension-springs also secured to said plate being provided with the coils b', the ends of said tension-springs b, being loosely connected with the loop tension-bars to afford the tension required. (*Ralph Whitley, Paterson, N. J.*)

KOESTER'S TENSION DEVICE FOR SHUTTLES FOR RIBBON LOOMS.

The object of this device is to provide a spring for that class of shuttles where a lever is pressed against the quill containing the silk, the tension of the spring to be regulated without removing or bending the spring; the device, from its simplicity of construction and ease of operation, to facilitate and regulate the taking of the silk from the quill in the operation of weaving.

In shuttles as now in use, the lever is pressed against the bottom of the quill by a flat spring, one end of which is secured in the shuttles by means of a pin, the free end being forked to receive the arm of the lever.

To regulate the tension of the spring in shuttles as now in use, said spring is taken out and bent more or less, or it is bent without taking it from the shuttle. It is difficult to regulate the tension desired, by this procedure, and often the spring has to be manipulated several times before the desired degree of tension is obtained, while with the improved tension device the tension-spring is regulated positively to suit, and this almost instantly, thus saving time and labor.

The gist of the improvement consists in the employment of a supplemental spring guide or strip beneath the spring proper and of a sliding connection for holding down or releasing the spring, as required.

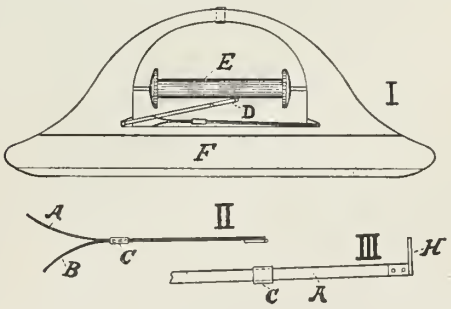
Fig. 1, represents a shuttle provided with a quill, a lever, and the improved tension-spring adapted to operate said lever. Fig. 2, represents the tension-spring, guiding-strip and sliding connecting-piece, being a side view thereof. Fig. 3, is a top view of spring, slide and pin for securing spring in shuttle.

A, is the spring; B, the guiding-strip; C, the sliding connection; D, the lever; E, the quill; F, the shuttle-body, and H, the pin for securing the spring in shuttle-body.

Fig. 3, shows a spring and guide riveted together at the end where the securing-pin is located.

The old spring device is not exact enough, and especially when heavy dyed silk is in use; but the improved spring may be regulated to a nicety, according to the quality of the silk.

In the drawings the sliding connection shown is a loop, which encircles the spring and the guide, and by sliding the same backward or forward the tension



is regulated by holding down or releasing the spring A, which presses the lever D, upward against the bottom of the quill E.

The regulation of the tension of the spring A, is greatly facilitated by the use of the guide B, and sliding connection C, it being but the work of a moment to adjust the sliding connection for that purpose. (*George C. Koester, Paterson, N. J.*)

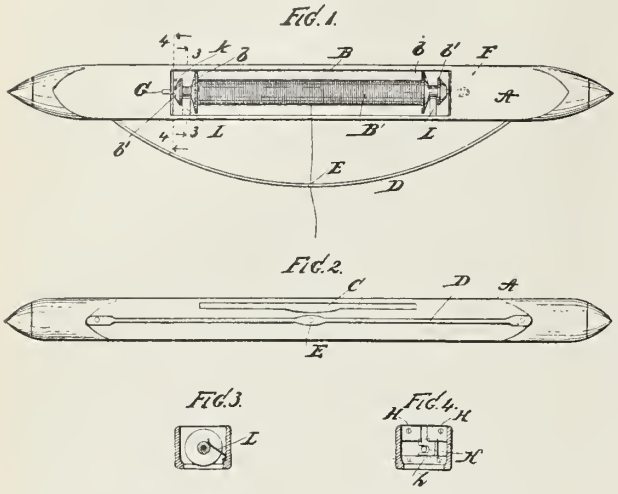
TODD'S TENSION DEVICE FOR SHUTTLES FOR NARROW WARE LOOMS.

The object thereof is to provide a simple, durable and effective tension device, dispensing with the complicated and expensive tension devices now in use.

Fig. 1, is a plan view of this shuttle, showing also a reel or spool in position thereon, on which is

wound the yarn. Fig. 2, is a side view of the shuttle. Fig. 3, a section on the line 3, 3, of Fig. 1. Fig. 4, a section on the line 4, 4.

A, represents a shuttle provided with a longitudinal chamber B, in the top thereof and longitudinal slot C in one side, and secured to the side of the shuttle in which the slot C is formed is an outwardly-curved



wire or rod D, in which is formed a perforation E.

At one end of the longitudinal chamber B, is formed a small central hole or bore F, adapted to receive one end of a shaft or rod which passes through the reel or spool B', and at the other end is formed a vertical slot G, which extends to about the middle of the end of the chamber B, and at the top of the end of the chamber, and secured to the end wall thereof are plates H, which are separated by a space equal to the width of said slot, and below said slot is a transverse plate *h*, and between these plates is a sliding plate K, having a groove or recess in the inner end thereof, and the outer end of which is outwardly-curved, as shown at K, forming a projection by means of which said sliding plate may be operated.

The reel or spool B', is provided at each end with main heads *b*, and with supplemental heads is placed a spring L, one end of which is secured to the side wall of the longitudinal chamber B, and the other end of which is adapted to bear upon the spool between the supplemental heads, as clearly shown in Fig. 1.

In placing the reel or spool in position, one end of the central shaft thereof is inserted into the hole or bore F, and the other end is dropped down into position through the vertical slot G, after which the sliding plate K is moved forward, so that the slot or recess in the end thereof incloses the shaft or rod of the spool or shuttle and prevents the removal thereof, as shown in Fig. 4.

The same principle of construction can also be applied to shuttles having two compartments, *i. e.*, where using two bobbins.

The springs L constitute the improved tension device and are so formed and arranged as to bear upon the spool or reel with just sufficient force to provide the proper tension and prevent the too free movement of the spool or reel, and the object of the supplemental heads *b'*, is to hold the spool or reel in place and prevent the longitudinal movement thereof. (*Walter Todd, Paterson, N. J.*)

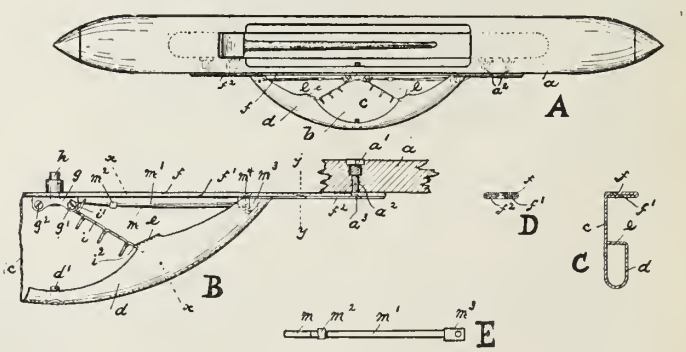
RIGBY'S CONDUCTOR FOR SHUTTLES FOR NARROW WARE LOOMS.

The advantages of this new conductor are: That it is made in one piece; that the tension-wires are made of one piece of finely tempered steel wire; that the springs are so constructed that the whole spring is in full play, from end to end at all times, no matter how much tension is on, which is a great improvement on the style of spring in the ordinary conductor; that the springs can be most readily and easily taken out for repairs; that there is nothing about the conductor but what can be attended to by the loom fixer, since there is no soldering about it and none to get loose and cause trouble.

Fig. A, represents a top plan view of a shuttle provided with the improved bow or conductor. Fig. B, is an enlarged detail view of a portion of the latter and also illustrates the means for securing the latter to the shuttle-body. Fig. C, is a sectional view on the line *x*, *x*, of Fig. B. Fig. D, is a sectional view on the line *y*, *y*, of Fig. B, and Fig. E, is a detail view of the tension-spring used in connection with the improved shuttle-bow.

a, represents a shuttle of ordinary construction, and *b*, the bow or conductor, secured to said shuttle by means of the screws or bolts a^2, having their heads a^3, embedded in the projecting flanges of the bow and engaging the internally-threaded nuts *a'*, having their heads embedded into the body of the shuttle, as clearly shown in Fig. B.

The bow or conductor *b*, is formed of one continuous plate or sheet of metal, which is struck up and bent to form the straight bottom *c*, the hood-shaped front *d*, and the back *f*, which latter projects upwardly from the bottom and on the same side as the hood *d*. To strengthen said back *f*, and to thus obtain the desired thickness, the portion forming said



back is doubled over or folded upon itself, as clearly shown at *f'*, in Fig. C, and to avoid sharp edges at the portions of the back projecting beyond each side of the bottom, the metal is bent or returned upon itself, as clearly shown at f^2, in Fig. D, that is to say, said projecting portions consist of three thicknesses of metal.

The hood *d*, in the central portion of which the eye *d'* is arranged, is provided at each side of its centre with a projection or stop *e*, bent substantially at right angles to the bottom of the bow and soldered thereto.

Within the bow and secured to the central portion of its back is arranged a bracket *g*, supporting the

pins g', g^2, which latter are adapted to serve as fulcrums for the tension-wires i, each provided at its free end with a projection i^2, adapted to bear against the stop c, formed by the bow, as hereinbefore described. At the inner end of said tension-wire, and projecting therefrom at substantially right angles, is arranged a loop i', adapted to be engaged by the free end of the flat spring m, the other end of which is fixed to a block m^3, which latter is removably secured by means of the screw m^4, to and within the bow, as clearly shown in Fig. B. The flat spring m, and its tension are controlled and regulated by a flat spring-plate m', of less elasticity and resting on the said flat spring m, and secured with one end to the block m^3. A sleeve m^2 fits snugly over the flat springs m, and m', and can be moved thereon for the purpose of regulating the tension of said springs.

The bracket g, as well as the back f, is penetrated by the eye h, arranged directly opposite the eye d'. (*Holden Rigby, Paterson, N. J.*)

DOLBER'S SHUTTLE-THREADER.

Fig. 1, is a perspective view of a loom-shuttle. Fig. 2, is an elevation of the improved threader. Fig. 3, is a similar view, but showing a modified form.

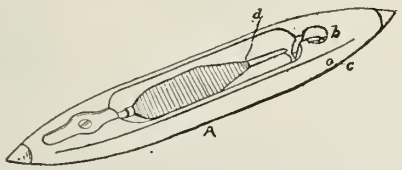


Fig. 1.

Fig. 4, is a detail view of the removable brush portion, and Fig. 5, is a detail view of one of the arrangements for holding the removable brush portion.

A, denotes the shuttle, which is provided with the usual pot-eye b, and the side eye c, and d, is the thread, which in practice is deposited on the pot-eye and is drawn through the side eye by the use of the improved threader.

The threader comprises a handle e, in one end of which is inserted and held the shank f, for the brush, and secured to and projecting laterally from said shank is a finger g, having a recessed or notched end g', which in practice engages the thread and forces it to the bottom of the pot-eye.

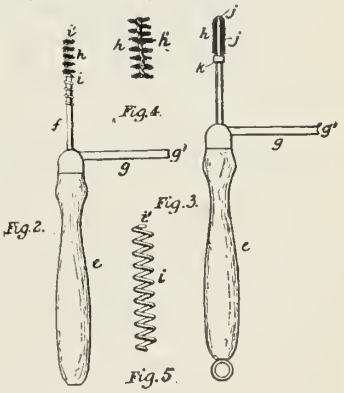
The brush portion h, (shown in detail in Fig. 4.) is cylindrical in form and consists of bristles spirally arranged on a shank h', formed of twisted wire.

In the drawings are shown two arrangements for removably securing said brush portion to the holder, one arrangement being a spiral coil i, of stiff wire, having one end i', closed and the other end open and adapted to be turned in the shank f, in the manner shown in Fig. 2.

The brush portion being cylindrical in shape may be turned or screwed into the coil, the flexible bristles readily following the spiral turns, and when the brush is so inserted the bristles project beyond the coil sufficiently to engage the thread when the threader is inserted and partially rotated in the side eye.

Fig. 2, shows the threader when ready for operation, the brush portion being arranged within the coil and interposed between the closed end i', and the end of the shank f. When the brush from constant use becomes worn and useless, the coil is turned until disconnected from the shank f, the brush is withdrawn by rotating it in the reverse direction and a new brush is inserted.

Referring now to Fig. 3, the shank f, is divided into four parts, each of which terminates in a jaw j, and these four jaws receive and hold the brush when the jaws are closed by a sleeve or ring k, which latter is slidable on the shank. The bristles of the brush project beyond the jaws, as shown, and when worn and useless the brush is removed and a new one inserted by sliding the ring downward and opening said jaws.



In practice, the thread being deposited by the finger in the base of the pot-eye, the brush is inserted to the depth of the side eye, and upon being slightly rotated the bristles engage and hold the thread, and as the brush is withdrawn the thread is drawn through the eye and the operation is completed.

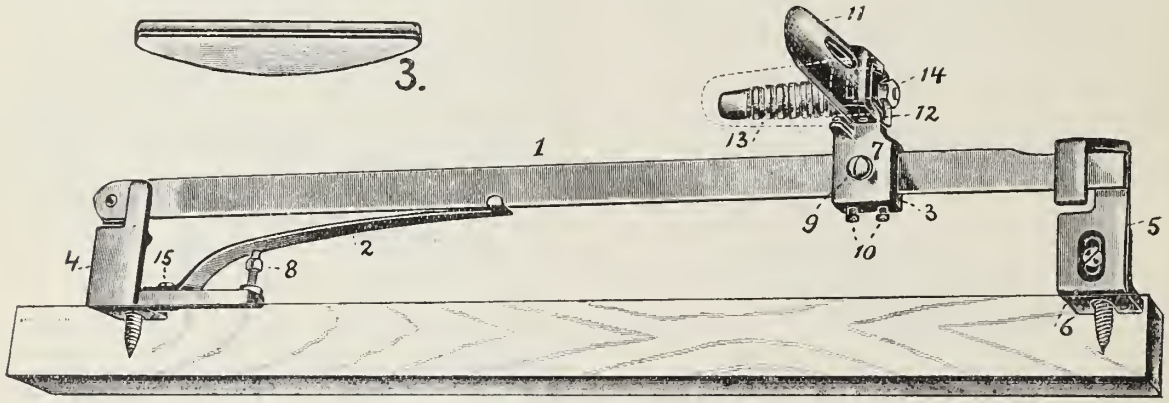
This shuttle-threader is only used on shuttles where there is a top and side eye. (*John E. Dolber, Manchester, N. H.*)

TEMPLES.

THE KNOWLES TEMPLE.

This temple is shown in the accompanying illustration and is best explained by quoting numerals of references, of which 1, is the bar to which the temple complete is fastened and on which it can be moved to suit the width of cloth to be woven. 2, is the spring that bears against the bar to keep it up to the weaving point. At 3, the swivel is located that is used for adjustment of the temple, throwing in properly placing the fabric in engagement with the teeth of the bur-rolls, particularly when two bur-rolls are used, and the fabric has to be drawn edgewise under one roll and over the other. To obviate this difficulty is the object of this new temple.

Fig. 1, of the drawings is a plan of this improved loom-temple. Fig. 2, is an end elevation. Fig. 3, is a side elevation. Fig. 4, is a sectional plan of the same with the upper or movable leaf of the temple and one bur-roll raised into a vertical position, the cutting



the inner teeth of rolls away or to the weaving point. This swivel is not shown in the main illustration and for this reason a separate illustration of it is given (enlarged compared to the main illustration and one-third of its actual size).

4, is the inner bracket which holds the bar, also the tension screw for adjusting spring 2. 5, is the outer stop which holds the bar from moving forward. 6, is the outer bracket which holds outer stop 5. 7, is the temple-head which holds the bur-rolls, also the top cap 11 and which is movable on bar 1.

8, is the tension screw whereby the spring 2 is adjusted.

9, is the screw that holds the temple-head and fastens it to the bar. 10, are the screws that are used in adjusting the swivel. 11, is the cap which is fastened by the pin 12, to the head 7, and covers the bur-roll. 12, is the pin which fastens the top cap 11 to the temple-head 7. 13, is the bur-roll that goes in the head 7, that revolves and holds the cloth out. 14, is the nut that fastens the bur-rolls to the temple-head 7.

15, is the screw that fastens the spring to the inside bracket 4. This temple is the favorite make for woolen and worsted mills, especially for open-shed looms. (*Draper Co.*)

PAINCHAUD'S TEMPLE.

Loom-temples having one or two bur-rolls mounted upon fixed axes are in common use, but, as heretofore constructed, with the two leaves of the temple-frame bolted together in fixed positions relative to each other, serious difficulties are often experienced

plane being on line x, x, on Fig. 5. Fig. 5, is a sectional elevation of the same, the cutting plane being on line y, y, on Fig. 4. Fig. 6, is a vertical transverse section on line z, z, on Fig. 3. Figs. 7 and 8, are respectively a side elevation and an end view of the spindle set in the lower leaf of the temple and upon which the bur-roll is mounted, and Figs. 9 and 10,

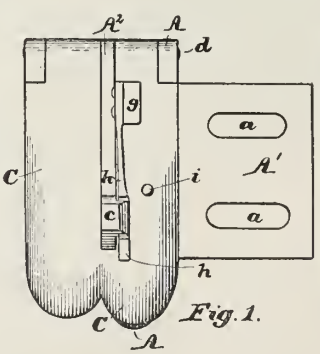


Fig. 1.

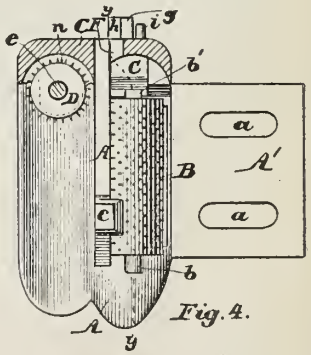


Fig. 4.

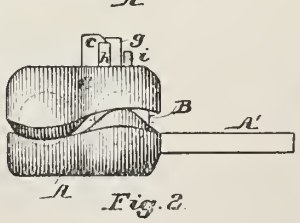


Fig. 2.

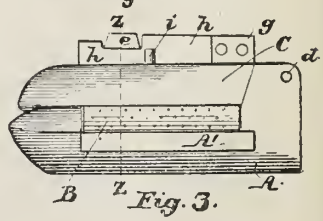
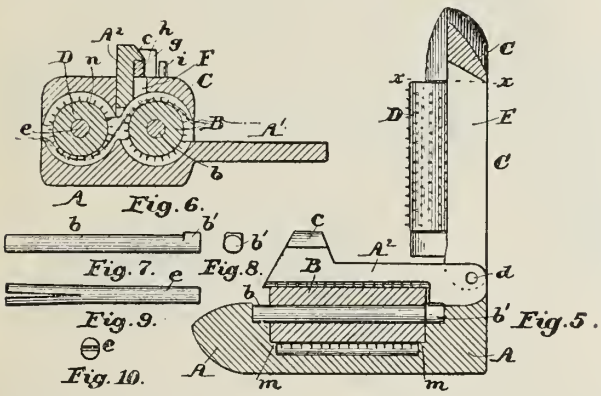


Fig. 3.

are similar views of the bur-roll spindle for the upper leaf of the temple .

A, is the lower leaf of the temple-frame, provided with the flange A′, having slots *a*, *a*, by means of which and suitable screws or bolts it is securely attached to the ordinary carrier. This leaf A, has mounted therein, so as to be non-revoluble, but easily removable therefrom, the spindle *b*, provided with the flat-sided head *b′*, and upon this spindle is mounted, so as to be revoluble thereon, the burr-roll B.

The leaf A, has formed thereon or secured thereto the overhanging arm A^2, connected thereto only at its outer end and provided at its other or free end with the catch *c*, as shown.



The upper leaf C, of the temple-frame is pivoted or hinged at *d*, to the leaf A, and has mounted in bearings therein the spindle *e*, which has its outer end bifurcated and slightly expanded and made of spring steel, so that when inserted in its bearings it is compressed and the tension of the spring or its tendency to expand creates sufficient friction in its outer bearing to prevent its rotation in its bearings, and also prevents its moving endwise in said bearings when the upper leaf is turned upward into a vertical position.

The spindle *e*, has mounted thereon the bur-roll D.

The leaf C, of the temple-frame has a slot F cut through it, from its outer end toward its inner end, of suitable length and shape to receive the arm A^2, and catch *c*, the latter projecting above the upper surface of said leaf C, when in its normal or closed positions, as shown in Figs. 2 and 3. The leaf C, is also provided with the upwardly-projecting ear *g*, to which is firmly secured one end of the spring-latch *h*, the other end of which engages the catch *c*, to lock the two leaves together when closed, and *i*, is a stop-pin set in the upper side of the leaf C, to limit the movement of the spring-latch *h*.

The leaves A, and C, both have formed in their inner or adjacent faces two nearly semi-cylindrical cavities having diameters somewhat larger than the diameters of the bur-rolls B, and D, including the projecting spurs or teeth thereon, and the cavities in the leaf A, beneath the bur-rolls B, and in the leaf C, above the bur-roll D, have in each end thereof nearly semi-circular shoulders *m*, and *n*, respectively, upon which the ends of the bur-rolls B, and D, respectively bear when the strain of the fabric inserted in the temple is applied thereto and the bearing of the roll upon its spindle has become worn, the purpose of which is to prevent the points of the spurs of said rolls coming in contact with the bottoms of said cavities to their injury.

By this construction of the loom-temple, the fabric can be very readily and easily placed in position between the bur-rolls without disturbing or drawing out of shape said fabric, as when the fabric is to be inserted the operator simply presses the spring-latch *h*, to disengage it from the catch *c*, and lifts the leaf C, and bur-roll D, into or past a vertical position, and then passes the fabric beneath the arm A^2, and over the bur-roll B, draws it straight and smooth, then turns the leaf C, and roll D, down into its closed position, when the spring-latch *h*, will automatically engage the catch *c*, and lock the parts together. (*Ludger Painchaud, Salem, Mass.*)

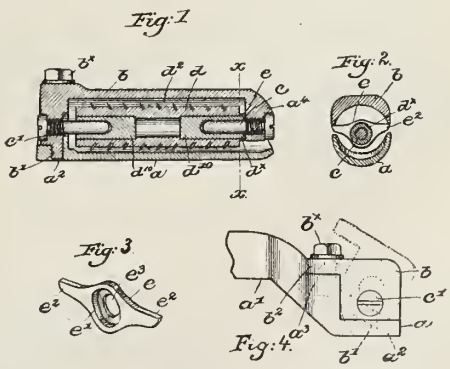
THE DUTCHER TEMPLE.

In the use of temple-rolls, with different kinds of cloth, much difficulty has been experienced in the marks which are left by the teeth of the rolls on thin fine goods, and with heavy closely woven cloth the rolls fail to take proper hold, particularly at the selvedges, which latter curl up, and cloth with straight slevedges are hard to be made.

The construction of this temple has for its object the production of a temple-roll which will overcome the before-named objections, the wear on the journals of the temple-roll being also decreased.

Of the accompanying illustrations, Fig. 1, is a vertical longitudinal sectional view of the new temple-roll, the pod and cap being shown in section. Fig. 2, is a transverse section taken on the line x, x, Fig. 1, looking to the right. Fig. 3, is an enlarged inner side perspective view of the dust protector for the roll-journal, and Fig. 4, is a rear end elevation of the pod and cap with a portion of the supporting-shank.

Referring to Figs. 1 and 4, the inner end of the pod *a*, forming a part of the shank *a′*, is transversely slotted at a^2, to receive a locking ear *b′*, formed on the cap *b*, the latter in this instance, supporting the temple-roll. A lug b^2, on the cap (see Fig. 4) rests on the enlarged end a^3 of the shank when the cap is in operative position, a bolt b^x passing through the lug and into a threaded hole in the end a^3, retaining the cap rigidly in place. The inner end of the cap is down turned at a^4, and threaded to receive and support one of the pivots or stud-bearings *c*, of the temple-roll *d*, a similar pivot or bearing *c′*, being held



in the outer end of the cap, as clearly shown in Fig. 1.

In the same the temple-roll is shown provided with bushings d^{10}, axially bored at the ends to receive and freely turn upon the smooth inner ends of the stud-bearings *c*, *c′*, the end of one bushing projecting beyond the end of the roll, as at d^x.

It is found in practice that lint, dust, etc., are apt to collect about the inner end bearing of the usual temple-roll and which is prevented in the construction of this temple by extending the bushing, as at d^x,

and inserting it loosely in the counterbore c' of a protector c. (Shown separately in Fig. 3.) This protector is made of brass with laterally extending wings c^2, which enter between the edges of the cap and pod, holding it in place, the bearing or pivot c, passing through a hole c^3, in the protector, the latter also taking up the end-thrust of the temple-roll when in use. By this means the necessary longitudinal play of the roll is permitted while effectually protecting the bearing from the entrance of lint or dirt.

In weaving heavy, closely-woven cloth it is found that if the teeth of the roll are reduced in number at the outer end of the roll, they take a much better hold of the cloth along the selvedges, and slack selvedges can then be held properly, thus preventing the curling up of the selvedge.

With the usual temple-roll, having the teeth disposed equally from end to end, the teeth cannot properly enter and take hold of slack selvedges, and cloth with straight selvedges cannot be woven.

The teeth are also made at the outer or selvedge end of the roll of uniform height, the teeth gradually decreasing in height from about the point d^2, Fig. 1, to the inner end of the roll. This prevents the teeth at the inner end of the roll from taking the greatest hold of the cloth and marking it, for the gradually decreasing height of the teeth toward the inner end of the roll causes them to take a gradually diminishing hold on the cloth inward from the selvedge.

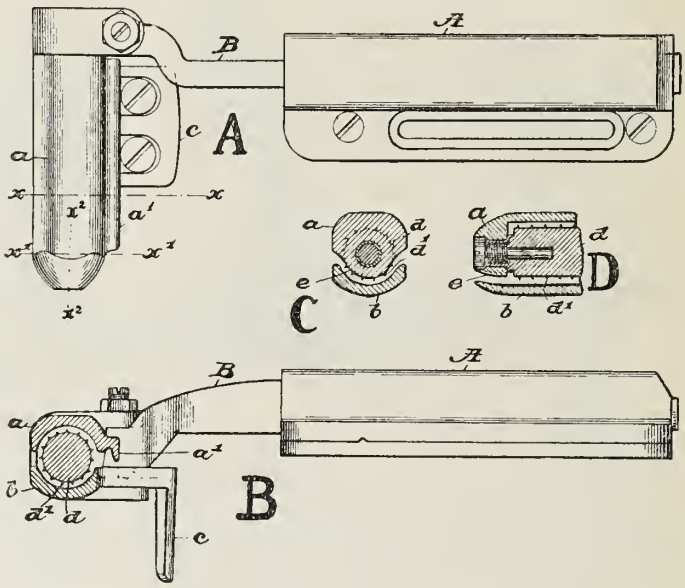
When weaving thin fine goods the arrangement of the teeth as to number is reversed—that is to say, the teeth are set closer together at the selvedge end, so that a greater number engage the cloth at any one time, and being set closer together they cannot enter so deeply into the material, thus avoiding marking. Furthermore, the close setting of the teeth enables them to let go of the fabric more easily as the cloth is moved along.

The arrangement of the teeth as to height is, however, the same as heretofore, the teeth decreasing in height from the vicinity of the middle of the roll to the inner end, as described. This "tapering" of the teeth, as it may be termed, decreases the pressure of the cloth on the inner end of the roll and so decreases the wear on the bearing. (*Draper Co.*)

IMPROVED DUTCHER TEMPLE.

In loom-temples as now commonly made and in use, the cloth after passing the roll emerges from the temple through an open slot between the inner side edges of the cap and pod. This construction is objectionable, because when a fault occurs in the cloth, so that the latter presents loose yarn, which becomes wrapped about the roll or in any way obstructs its movement, or if a fault occurs in the cloth which should be removed by cutting the same out, the operative, with a knife or other cutting instrument, cuts the yarn or cloth while on the roll, the blade of the knife being used against the roll, and in this operation the knife always strikes the very fine, sharp teeth of the roll and blunts or damages them, so that thereafter they cannot enter the cloth properly, but, on the contrary, they tear and damage the cloth, and the temple-roll has to be removed and a new one inserted. To prevent the operative from putting a knife against the roll, the inner edge of the cap is provided with a downturned lip or guard, which so far closes the cloth-passage at the rear side of the roll as to preclude the introduction of the blade of a knife to cut anything off against the roll.

Fig. A, shows this improved loom-temple in top or plan view; Fig. B, a section in the line x-x, Fig. A; Fig. C, a section in the line x'-x' of Fig. A, and Fig D, is a partial longitudinal section of the cap above the roll in the line x^2-x^2, Fig. A.



Letters of references indicate thus:—A, the stand; B, the shank; a, the cap; b, the pod; c, the heel, and d, the roll having the characteristic sharp points or pins d'.

The cap a, is provided with a lip or guard a', extending downwardly from the inner side of the cap toward the top of the heel, said guard almost closing up the usual cloth-passage at the rear side of the roll and completely obviating the introduction of a knife-blade in such position as to cut against the roll d, to sever the cloth or yarn.

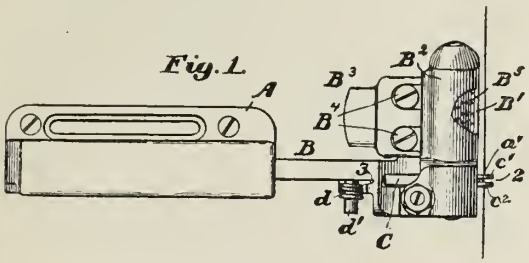
The lug or ear c, at the free end of the cap, which receives the usual journal or pin on which the roll turns, is made longer than heretofore, so that it extends down to substantially the line occupied by the periphery of the roll, so that said lug, and not the roll, as heretofore, keeps the cloth down. This construction results in greatly reducing the wear on the said journals and on the said rolls, and adds very greatly to the life of the temple.

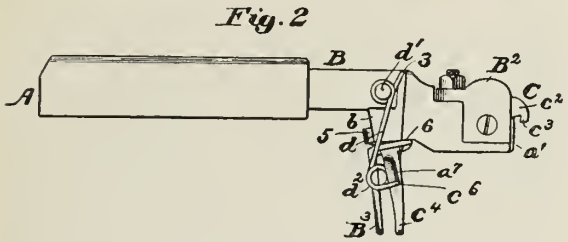
In Fig. D, the lug or ear c, is shown extended down to take the strain of the cloth. The dotted lines in said figure show where the said ear usually terminates. (*Draper Co.*)

THE DUTCHER THREAD-CUTTING TEMPLE.

In automatic looms, the filling is supplied to the shuttle in the shuttle-box while the loom is in action, the filling-carriers are supported above the shuttle-box and the outer end of the filling on the filling-carrier is connected to a filling-end holder, so that after the filling-carrier has been put into the shuttle and the shuttle thrown through the shed the said filling-thread, so held, will be automatically threaded

into the delivery-eye of the shuttle. Each insertion of a new filling-carrier into a shuttle consequently leaves outside the selvage a filling-end of from fifteen to twenty inches long, it leading from the selvage to the said filling-end holder. This filling-end must be removed, else it is liable to be caught by subsequent shots of filling, making bunches at the selvage which





damage the appearance of the goods and lessens its salable value in the market. Numerous attempts have been made to break or cut off these filling-ends, but none of them so far known have been so completely successful as to promptly part or cut off the said filling, and the loom might sometimes run a dozen picks before the filling-end was removed. In experiments made, to provide a cutter which will operate promptly and unerringly to cut off this filling it was ascertained that the filling-end should be caught and cut before the temple carrying the cutter is moved toward the breast-beam as the lay beats in the filling.

In the present temple, a cutter-blade or cutter mounted on or so as to move with the temple, is provided, and the cutter is so shaped that it normally stands in a plane outside the path of the filling-end, and its movement is such that at each beat of the lay the cutter is moved so that it catches behind the filling-end, if one is present, and the cutter, having engaged the filling-end, is then moved toward the breast-beam to engage the thread between itself and the temple and cut the same, this cutting movement being substantially completed a little before the temple is ready to start with the lay toward the breast-beam. In this way the filling-end when present is promptly cut off.

Fig. 1, is a top or plan view of the new thread-cutting temple; Fig. 2, a side elevation thereof; Fig. 3, a front end elevation, the roller being omitted; Fig. 4, a partial section taken longitudinally through the cutter-blade or cutter and part of the temple; Fig. 5, shows the cutter-blade or cutter detached and enlarged, and Fig. 6, is a detail drawing.

The loom-temple, consists of the stand A, adapted to be secured to the breast-beam of the loom, the slide-bar B, having the pod B', the cap B^2, the heel B^3, attached to the pod by screws B^4, and the toothed roller B^5 between the pod and cap turning on pivots. The said stand A, contains a spring which surrounds the bar B, to normally keep it pressed forward toward the lay. The pod (see Figs. 3, and 4,) is slotted at *a*, to receive a steel blade *a'*, said blade having, as shown in Fig. 3, an open space at both sides of it.

The shank or bar B, has secured to or formed as part of it an ear *b*, which is slotted in continuation of the slot *a*. In the slot in the ear is inserted the body *c* of the thread-cutter C, the acting front end of the cutter being shown as slotted at *2*, to leave two arms *c'*, c^2, each having a suitable hook c^3.

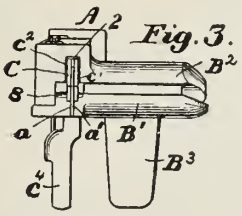
The slot *2*, straddles the steel blade, and in its normal or inoperative position the acting end of the cutter is, by the action of a spring *d*, kept projecting through the slot *a*, and elevated as shown in Figs. *2* and 4.

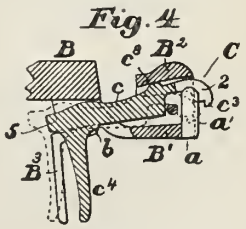
The spring *d*, has near one end a coil which is fitted over a stud *d'*, extended from the bar B, the end 3 of the spring bearing against a part of the bar, but the opposite free end of the spring is bent into the form of a circular loop d^2, one edge of which enters a notch d^3, in the heel c^4 of the cutter, the end c^6 of the spring near the loop d^2, resting against a shoulder a^7 of the heel, said spring serving to retain the said cutter in its normal forward position, with its cutting end out of the plane of the filling-end, and as herein shown elevated. By removing the loop of the spring from the notch d^3, the cutter may be readily removed to be cleaned or oiled.

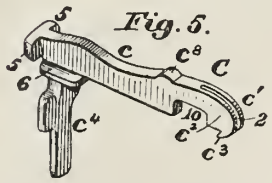
The cutter has two forward stop-lugs 5-5 to limit the forward position of the cutter under the action of the spring *d*, and a shoe 6, which slides on the under side of the ear *b*, which under side is beveled or shaped, as shown in Fig. *2*, to let the shoe both slide and rock. The shoe also receives the wear of the cutter and keeps the top side of the cutter from being worn.

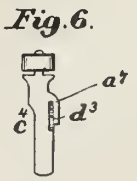
The temple at its front edge (see Fig. 3) is cut or milled away each side the slot *a*, to leave grooves 8, to receive the filling-end when the cutter acts on the same to sever it. said grooves obviating any liability of the cutter drawing the said ends into said groove *a*, during the operation of severing the end, for the cutting edge of the hooks c^3 are moved into the temple only substantially flush with the bottoms of said grooves, the edges of the steel plate standing outside the line of the bottom of the said grooves.

The body of the cutter at its upper side is provided with a projection c^8, which as the cutter rises under the action of the spring *d*, meets the bottom of the









groove in the cap, (see Fig. 4) thus preventing the slotted front end of the cutter from striking said cap and being battered or jammed to close the slot *2* in any way.

The cutter has near its front end a notch 10, to embrace the stud by which the roll B^5 is supported at one end.

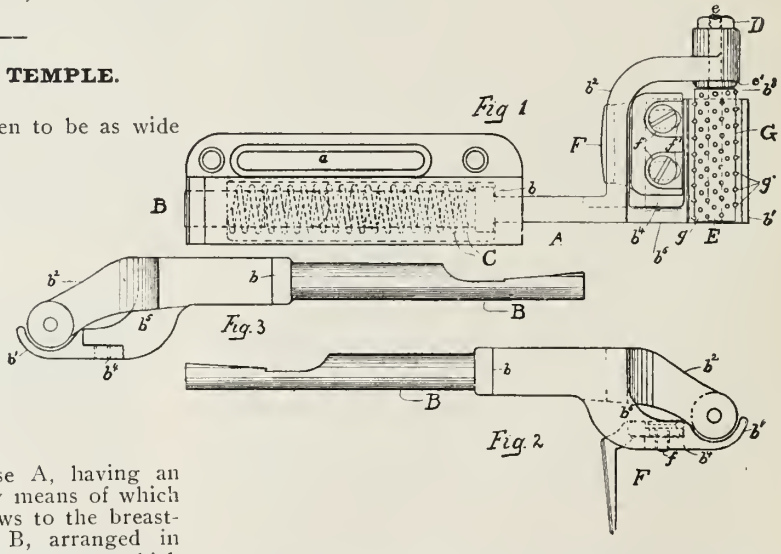
In use the cutter herein shown will stand with its hooked end c^3 elevated and removed for a distance from the front of the blade a', as represented in Figs. 2 and 4. As the lay comes forward at each beat, after filling has been thrown into the shed, the lay strikes the heel c^4 of the cutter, which immediately causes the hooked end to move from the position Figs. 2 and 4, placing the hook c^3 of the cutter behind the filling-end, provided there is such an end between the selvage and the filling-end holder described, and the said hooked end having caught the filling-end the slight further movement of the lay forward causes the cutter to be drawn into the temple-head, drawing the filling-end across the steel blade and severing the same at that point, thus severing the thread usually before the lay meets the heel b^3 of the temple to move the latter and the cutter back for their full stroke. This cutting of the filling-end is performed close to the selvage. The time at which the cutter operates is just before the reciprocation of the temple, and it is also just before the regular running filling-thread is beaten in, and hence the cutter described cannot catch that thread, but is always in position to operate upon the filling-end extended from the selvage to the filling holder on the very first pick, severing it at such pick, so that the selvage is left clean and without any liability of being damaged by the filling-end.

In practice it is found that the cutting mechanism shown, severs the thread before the temple is started back by the lay; but if for any reason the thread should not be cut at this exact time it will be cut while the temple and cutter are being moved toward the breast-beam together. (*Draper Co.*)

CLAUS'S AND LUDLAM'S TEMPLE.

This temple enables the cloth woven to be as wide as the distance between the outer ends of the temple-heads, causes the temple-rolls to be retained on their spindles by the tension of the cloth, allows of the rolls being removed from their spindles when the cloth is not in the temples, and enables any temple to be used either side up.

Fig. 1, is a plan of such an improved loom-temple; Fig. 2, an outer side elevation of the same; Fig. 3, an inner side elevation of the same, the case and spring being omitted in Figs. 2 and 3.



The loom-temple comprises a case A, having an attaching-plate or slotted flange a, by means of which said case is secured by bolts or screws to the breast-beam of a loom, a temple-shank B, arranged in said case and having a shoulder b, between which and the front end of the case A, is arranged a spiral spring C, surrounding said shank, to force the temple-head or rear end of said temple-shank toward the fell of the cloth.

The pod or cloth-pressure b', is rigidly secured to the shank, being cast in one piece therewith, and projects from the inner face of said shank B, and an arm b^2, projects from said shank laterally inward and backward as far as the inner or free end of said cloth-presser, leaving a space b^3 between said presser and arm for the introduction of the cloth.

To the outer face of the arm b^2, near the free end of said arm, is secured the roll-spindle E, by passing the inner screw-threaded end portion e of said spindle through a hole in said arm b^2, up to a shoulder e', with which said spindle is provided, and turning a nut D upon the part of said spindle which projects from the inner face of said arm. Said spindle E is arranged parallel with the upper edges or operative surfaces of the cloth-presser b'.

The temple-roll G is a cylinder g, provided with pins or teeth g', to engage the cloth and having a central longitudinal hole which receives the spindle E, said roll turning on said spindle and being retained thereon by the tension or tendency to contract of the cloth. Said roll is sufficiently long to reach from the shoulder e', or other inner end bearing of said roll to the outer end of the cloth-presser—that is,to the outer face of the shank B—and will in that case hold the selvage in line with said outer face at the fell, the shank B, just in front of the presser, being offset at b^5 downward, and the upper inside corner of said offset part being rounded to allow said selvage to bend more readily around said offset part.

The position of the presser and the roll may be reversed or the temple-head may be inverted and the presser changed to the opposite selvage of the cloth, a right-hand temple when inverted becoming a left-hand temple, and *vice versa.* When so inverted, the height of the temple-head must be changed accordingly by securing the plate to the under side of the breast-beam instead of on top of the same. The plate or arm b^4, is also cast in one piece with the shank B, and is provided with holes through which and through slots f', in the bracket or heel F, screws f are driven to secure said heel F adjustably to the temple-head, said heel receiving the blow of the screw in the lay in beating up. (*Draper Company.*)

SYKES'S TEMPLE.

This temple is so constructed that the toothed roller and its casing can be turned out of the way of the cloth when it is desired to pick out defective shots with which said roller and its casing would otherwise interfere. This object is obtained by rounding the forward end of the bar or shank of the temple at and near the roller casing so that when the temple is retracted to its full extent, this portion of said shank

will occupy the forward guide and will therefore permit the roller and its casing to be turned part way around so as to be clear of the web of cloth.

Fig. 1, is a perspective view of this loom-temple,

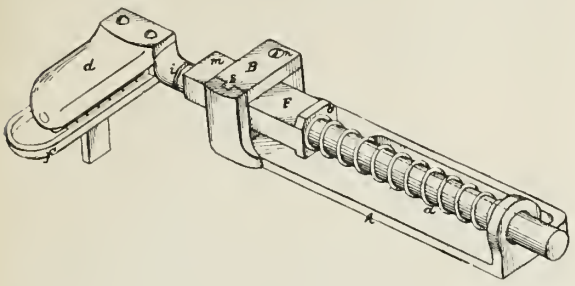


Fig. 1.

showing the parts in the position which they assume when the temple is in use; Fig. 2, is a perspective view illustrating the roller casing turned down so as to clear the woven web.

A, represents the slotted plate adapted to be secured to the breast-beam of the loom and having front and rear guides, B and D, for the shank F, of the temple, the forward portion of said shank being rectangular in cross section and adapted to slide in the front guide B, while the rear portion of the shank is circular in cross section and is adapted to the rear guide D, a spring *a*, being interposed between said rear guide and a shoulder *b*, of the shank, so as to tend to project the same.

The outer end of the shank carries the usual toothed roller and the casing therefor, said casing comprising the cap *b*, and trough *f*, but that portion of the shank at and near the roller casing is rounded, as shown at *i*, this reduction in the size and shape of the forward end of the shank resulting in the formation of a shoulder *m*, at the junction of the round and rectangular portions of the shank. During the working of the loom the rectangular portion of the shank F, slides backward and forward in the forward guide B, and retains the toothed roller and its casing in proper condition for engaging with the web of cloth, but when it becomes necessary to pick out a defect in the web, the toothed roller and its casing would otherwise interfere, thus the web is simply withdrawn from engagement with the toothed roller, and the temple is pushed so far forward that the

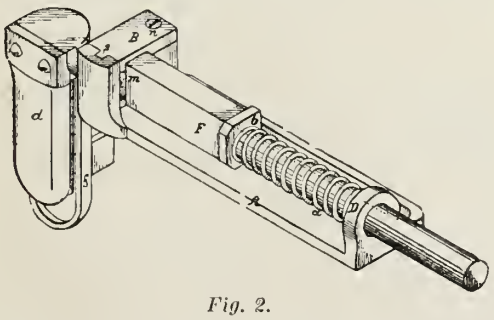


Fig. 2.

rounded front end *i*, of the shank F, occupies the forward guide B, and thus permits the turning of said shank and the roller casing part way around, as for instance, by turning it downward, as shown in Fig. 2, or downward and outward, the shoulder *m*, engaging with the front guide B, so as to prevent the spring *a*, from projecting the temple, and said shoulder also serving to retain the roller casing in the position to which it has been adjusted, the friction between the shoulder *m*, and the guide B, being sufficient to prevent accidental displacement of the roller casing.

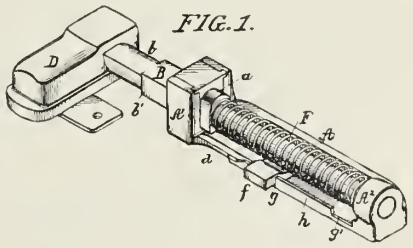
When the roller casing has been turned to a vertical position, it is beyond the selvedge of the fabric, and hence is entirely out of the way of the same and does not interefere with the picking out of filling threads, so that defects extending even as far as the breast-beam of the loom can be easily remedied.

The shoulder *m*, of the temple-shank also serves, by engagement with one side of the guide B, to retain the temple in a retracted position without turning the same, said shoulder performing, in this case, the same function as the usual side notch of the rectangular temple shank.

The cap of the forward guide B, is detachable, being held in place by a screw *n*, at one end, and a tongue *s*, at the other end, so that it can be readily taken off when it is desired to remove the temple shank. (*Thomas Sykes, Philadelphia.*)

SYKES'S IMPROVED TEMPLE.

The previously explained temple has thus far met with favor amongst our manufacturers; however there are two disadvantages to this loom-temple, viz., the accidental turning of the temple shank in its bearings when the shank has been pushed inward to its full extent, and the reduced portion of the shank occupies the forward guide. The second objection consists in the vertical or lateral play of the shank in the forward guide. These two objections have been



successfully overcome in the new temple and of which Fig. 1, is a perspective view and Fig. 2, is a side view of the same, showing the temple shank pushed fully inward, but locked so as to prevent turning. Fig. 3, is a similar view showing the shank unlocked, so as to permit of the turning of the same.

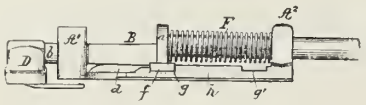
Of the letters of reference accompanying the illustrations—A, represents the fixed guide plate of the temple, adapted to be secured to the breast-beam of the loom, and B, is the temple shank, having at its forward end the roller box or casing D, the said shank having a rectangular portion adapted to a forward guide A′, on the plate A, and a cylindrical portion adapted to a rear guide A^2, on said plate, a spring F, being interposed between said rear guide A^2, and the rectangular portion of the temple shank, so as to serve to normally project the latter, the extent of such projection being limited by the contact of an enlarged portion or lug *a*, of the temple shank with the cap or top plate of the forward guide.

Adjacent to the roller box or casing D, the shank B of the temple is reduced, as shown at *b*, so that when the shank is driven inward until this reduced portion occupies the forward guide A′, the shank can be turned in said guide so as to permit the roller box, or casing D, to be turned down out of the way of the

fabric, in order to permit of the ready picking out of the imperfect shots.

It occasionally happens, however, that the temple is accidentally forced inwards until its reduced portion occupies the forward guide, as for instance, when the shuttle fails to properly enter the box and strikes the temple on the beating up of the lathe, and at such times it is advisable to prevent the turning of the temple shank in its guide. For this reason this temple is provided with a movable locking bolt which normally engages with the shank of the temple when the latter is pushed inward, and prevents the turning of said shank in its guides, the bolt, however, being capable of retraction or withdrawal, so that the temple shank is then free from its influence, and

FIG. 2.



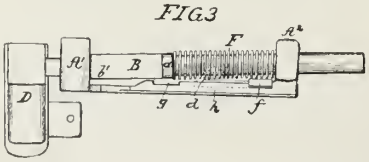
can be turned in its guides when pushed so far inward that the reduced portion of the shank occupies the forward guide.

The locking bolt, (see Fig. 1) is represented as in the form of a plate d, resting on the base plate A, of the temple beneath the sliding shank B, said plate having a laterally projecting lug or finger f, which may be adapted to either of two notches g, g', formed in a flange h, at one side of the base of the temple.

When the finger f, occupies the forward notch g, the rectangular shank B, of the temple bears upon the locking bolt when the shank is pushed inward as shown in Fig. 2. Hence any turning of the temple shank in its guides is effectually prevented, but if the locking bolt d, is drawn backward so that its finger f, occupies the rearward recess g', as shown in Fig. 3, the temple shank when pushed fully inward will be free from the influence of the locking bolt and hence will not be retained but can be turned in its guides so as to carry the roller box or casing away from the woven web.

The turning of the temple shank in its guides causes a slight inclination of said shank as shown in Fig. 3, and for this reason the opening formed in the guide A^2, for the reception of the cylindrical portion of the shank is beveled, as shown by dotted lines, so as to provide for this disposition of the

FIG3



temple shank and yet prevent any excessive looseness of fit of the cylindrical portion of the shank in said outer guide. The opening in the forward guide A', is slightly wider than its height and the portion B, of the temple shank is so formed as to completely fill said forward guide A', so as to prevent any vertical or lateral motion of the shank in said guide as the shank is reciprocated longitudinally, the reduced portion b, of the shank being rounded so as to permit of the turning of the roller box, in which case the shoulder b', formed by reducing the shank, engages with the bottom portion of the forward guide, the reduced portion in this case vertically filling said guide so as to prevent any rise of the temple shank, such as would release the same and permit its projection by the spring. (*Thomas Sykes, Philadelphia.*)

MASON'S TEMPLE.

Fig. 1, represents a top view, and Fig. 2, a side view of this temple.

a, indicates the shank of the temple, whose rear end is constructed in the ordinary manner, and inclosed in the ordinary box or casing, which is adapted to be adjustably secured to the breast-beam of the loom. The front end of the shank a is provided with an arm a', extending at right angles thereto and parallel with the loom reed.

b, indicates a shank, having its rear end b^2, projecting downward at right angles thereto, and the lower end of said projection is provided with a screw c, adjustable in a direction parallel with the shank b; and its front end is provided with the arm b', extending underneath, and parallel to the arm a'. The shank b, is also provided with the ear q', by means of which it is pivoted to the shank a, by the bolt q. Opposite to the rear end of the shank b, the shank a, is perforated vertically to receive the spiral spring g;

Fig 1.

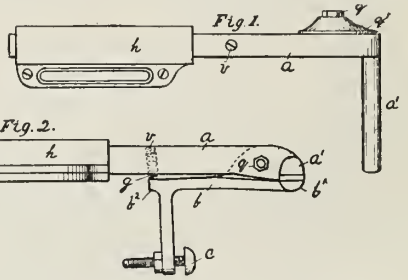


Fig. 2.

and the top of said perforation is screw-threaded, to receive the screw r, by means of which, the pressure of said spring, to force the shanks a, and b, apart, is regulated, by advancing or retracting said screw. The shank b, is provided with a shallow perforation for the bottom of the spring g, to rest in.

In operation, the screw c, is adjusted, so that the lay in beating up, strikes its head, before the reed comes in contact with the front of the arms a', and b', thereby compressing the spring g, and causing said arms to recede from each other, and allowing the cloth to pass between them. As the lay recedes, the expansion of the spring g, causes the said arms to clamp and hold the cloth until the next beat up.

It will be observed that the fabric is held between surfaces which can leave no mark upon it, as there is no part which penetrates it; and as no part of the device which comes in contact with the cloth, requires lubrication, there is no liability of oil stains thereon. This temple is for plain fabrics which will hold itself out to the reeding point. (*Henry W. Mason, New Bedford, Mass.*)

REEDS AND REED MOTIONS.

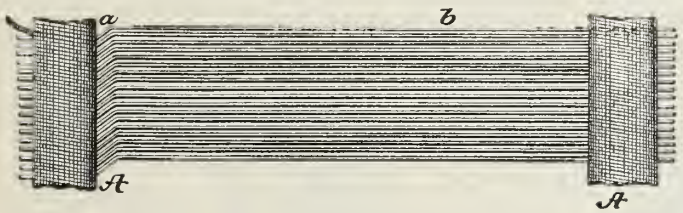
ADAMSON'S REED.

The accompanying illustration represents an elevation of this improved reed.

The novelty in construction of this reed consists in forming a suitable bend or curvature *a*, in each of the wires or dents *b*, inside the reed and next to the back A, in such manner as to allow an elastic movement of the wires or dents within the reed, thereby reducing friction upon the said wires or dents and increasing the usefulness—that is to say, the resiliency or elasticity of the dents laterally permit of greater freedom of the warp-threads through the reed, and especially those threads which have knots, tufts or other imperfections—of the same while in operation.

The wires or dents of the reed are arranged in the usual manner in parallel lines, and are firmly wound and held rigidly in position in the back of the reed, the elastic movement being secured by the expansion of the wires at the parts *a*, and the return to their normal positions by virtue of the springy nature which the formation of the wire imparts.

It will be observed that the wires may be provided with the small bends or curvatures *a*, at or near both backs or on one side only, and the form or shape of the bends or curves may be varied or modified at



pleasure to produce the elastic action desired. It will thus be seen that the spring action or elasticity of the wires or dents is confined wholly between the backs of the reed, the ends of the said wires being firmly bound in the backs of the same. (*Joseph Adamson, Pawtucket, R. I.*)

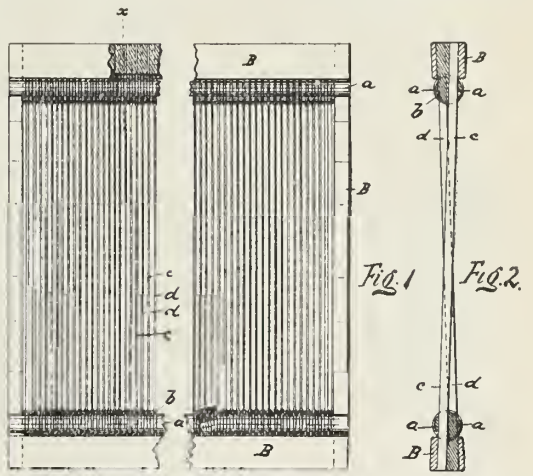
LIOTARD'S REED.

The improvement consists in the arrangement of the teeth of a reed, the method of attaching them to the reed frame and the combination and arrangement of the various parts thereof. The novel construction of this reed strengthens its centre by having a double wire instead of a single one.

Fig. 1, is a front elevation of this improved reed; Fig. 2, is a sectional view on line *x*, Fig. 1.

B, B, represents the frame of the reed, to which are secured semi-cylindrical cross bars *a*, *a*, around which is wound a wire *b*, forming a continuous spiral coil.

Between the bars *a*, *a*, and resting between the coils formed by the wire are arranged two sets of teeth *c*, *d*, in such a manner that one set runs from the front of the upper frame to the rear of the lower one, the other set, from the rear of the upper frame to the front of the lower one. By this arrangement the teeth will alternate in their direction and thereby cross each other at or near the centre of the reed, as clearly shown in Fig. 2. It will be understood the



semi-cylindrical cross-bars *a*, *a*, are fixed in their relative positions by the coil *b*, that is, they are held so that they face each other and yet are separated sufficiently to permit the teeth to be inserted directly in the frame. The space between the wire coils, the cross-bars and the upper and lower portion of the frame is filled up with solder as in ordinary reeds. (*Louis F. Liotard, Paterson, N. J.*)

THE CROMPTON REED FOR WEAVING TUFTED FABRICS.

In these fabrics the tuft-yarns must be regularly inserted between the warp-threads.

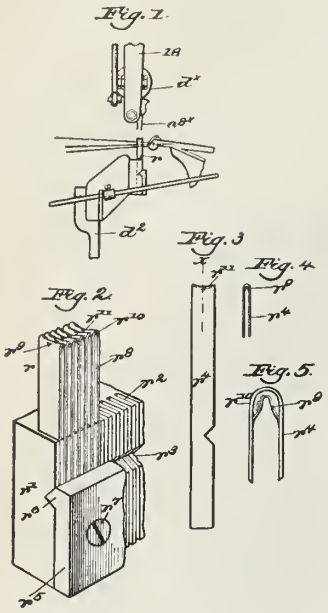
The object of the new reed is to provide the same with reed-spaces having at or near their upper ends entrances made flaring, to better receive enlargements or knots on the warp-threads traveling therethrough and to prevent said enlargements or knots catching at the entrances, to said spaces.

Fig. 1, in side elevation represents a sufficient portion of a tufted loom provided with this reed to enable the latter to be understood. Fig. 2, in perspective shows a part of this reed. Fig. 3, in side elevation shows one of the reed-dents detached; Fig. 4, a detail on the dotted line *x*, *x*, Fig. 3, showing one of the reeds and reed-spaces in vertical cross-section; Fig. 5, an enlarged detail of the top of the upper end of the reed member in elevation.

Referring to the drawings, the various parts of the mechanism are indicated thus:—The arms 18, the tuft-arm beam or spool d^x, the tuft-yarn tubes or quills c^8x, the lay d^2.

Referring to Fig. 2, r' is a bar mounted upon the lay d^2, and shown as provided at its front side with a series of closely-arranged vertical slots r^2, intersecting which is a longitudinal (preferably **V**-shaped) groove r^3. The reed r, as herein shown, is made

up of a series of independently-removable (preferably **U**-shaped) members r^4, shown as formed from flat metal strips and arranged with their legs in the slots r^2, each slot receiving adjacent legs of two of said **U**-shaped members, as best shown in Fig. 2. The legs of these **U**-shaped members r^4, are notched at their front edges to correspond and register with the **V**-shaped groove r^3, the said members, as shown, being retained in proper position by a clamping member r^5, applied to the face of the bar r', and having a **Λ**-shaped longitudinal lip or flange r^6 which enters the groove r^3, referred to and the corresponding notches in the legs of the **U**-shaped members and is secured in position by screws r^7.



By this construction, removal of the plate r^8, permits any single reed member to be removed without disturbing the position of any other member, each pair of vertical legs in any single slot r^2, constituting a reed-dent and each space r^8, formed by and within a **U**-shaped reed member constituting a reed-space.

The reed-spaces r^8, are of a normal width sufficient to permit two or more warp-threads passing therethrough to be freely crossed in shedding. At one of their ends—herein their upper ends—the said reed-spaces are shown at their middle contracted at r^9, accomplished by pinching together the legs of the members adjacent the crown-bends thereof to a width as will receive but a single thread each, so that when the threads are opened in shedding, those threads moved into the upper plane of the shed will be carried into these contracted portions of the reed-spaces and will therefore be properly centered and spaced one from another and restrained against lateral vibration or play. The entrances to the reed-spaces and preferably the entrances to the upper portions of said spaces at opposite sides of the reed are made larger than the smaller portions back of said entrances; that is, said entrances are made, as it were, flaring, as best indicated at r^{10}, to enable burs or knots on the warp-threads to more freely enter the reed-spaces. Thus, were it not for the flaring entrances, the contracted upper portions of the reed-spaces would frequently bar the entrance thereto of any considerable enlargement on a warp-thread, whereas by the new reed the flaring entrances admit of the entrance to the reed-spaces of any burs or enlargements, which latter are worked or carried through the more contracted portions of the reed-spaces without breaking the threads or interrupting the passage of the same through the reed.

The tops of the reed-spaces are also depressed as shown at r^{11}, at their middle, to not only provide a better and more suitable enlargement at the entrances thereof, but also to present at least a part of the tops of said reed-spaces in such positions as will more nearly conform of the angular position of the warp-threads relatively to the reed when the latter is in its extreme angular position. (*Crompton and Knowles Loom Works, Worcester, Mass.*)

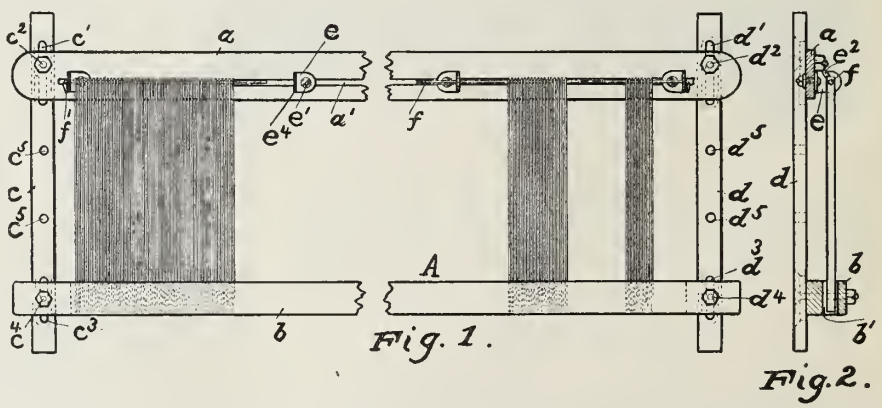
ALBINSON'S FALSE REED.

The object of the reed is to provide a false reed for looms to take the place of the ordinary "cord or string reed." It is intended for separating the ends back of harness, as in warps run from spools; it also may be used back of reed in loom for separating the threads in some kind of work where it is necessary to divide the ends in each split of reed.

Fig. 1, is a front elevation of said improved reed, certain portions being broken away, and others removed to better illustrate the nature of the improvement; Fig. 2, is a vertical central section of the same.

A, indicates the rectangular-shaped reed-frame, consisting of the sections or sides a, b, c, and d. The side sections c, and d, are each provided at or near the ends with elongated slots c', c^3, and d', d^3, penetrated by the bolts c^2, c^4, and d^2, d^4, respectively, by means of which latter the said longitudinal sections or sides a, and b, are adjustably secured to the side sections c, and d.

The upper section or head-bar a, is provided with an elongated slot a', in which are adjustably secured,



by means of the bolts e', the end and intermediate brackets e, provided in their forwardly-projecting portions e^4, (arranged at right angles to the head-bar a,) with the inclined slots e^2, adapted to receive and support the rod or wire f.

Said rod is bent at its end portions, as at f', adapted to bear against the end brackets, and to thus prevent a lateral motion of the said rod, or wire f.

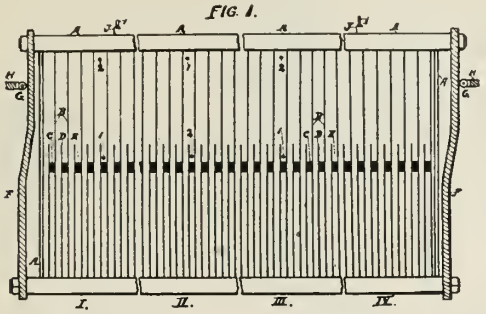
On the latter are fulcrumed and slidingly arranged a series of dents of uniform width and length, which dents project downward into the elongated groove or slot b', of the bottom section b, by means of which latter, the swinging motion of the dents is limited.

The frame A, is adapted to be secured to the batten of a loom by means of screws or bolts penetrating the openings c^5 and d^5, arranged in the side sections c and d, of the reed-frame A, or in any desired manner. (*Thomas Albinson, Paterson, N. J.*)

REED FOR DOUPING.

The object of this reed is to produce cross-weaving for low textured fabrics (chenille weaving) thus far produced by passing one set of warp threads through

FIG. 1.



eyes in a bar having a traverse motion and then leading them between the splits of a combined comb and reed, while the other set of warp threads pass beneath this bar and through the eyes of teeth in the combined comb and reed.

The new reed is designed to have a traverse and a vertical motion, by means of which and its peculiar construction it both crosses the warp and forms the shed for the filling.

Fig. 1, illustrates the reed, broken in parts or sections in the first position occupied in the operation; and Fig. 2, illustrates it in the second position of the operation.

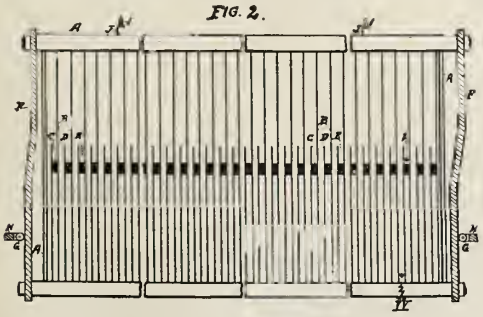
The reed frame A, is provided with two sets of metal strips. The primary splits B, cross the frame and are secured in the usual manner. The secondary splits D, extend part of the distance only across the frame and divide the spaces formed by the primary splits. The lower ends of these secondary splits are secured to the frame and each is correspondingly secured to the adjacent primary split as at C, a point below the top of the secondary split, thus forming a space E.

Guide rods F, bent as shown in the drawings, are secured to the ends of the reeds, and bear against rollers G, mounted in the stationary parts H, of the loom-frame.

The usual mechanism for lifting heddles may be used for lifting the reed, and the straps I, and hooks J, constitute a part of this mechanism. As the reed harness lifts, the rollers G, bearing against the guide rods F, at a point just above the bends, impart a traverse motion to the reed.

The numerals 1 and 2 designate the two warp threads or spitfuls, and the several parts of the

FIG. 2.



drawing show the several positions they occupy in weaving chenille. The position of these threads in Part I, is that of the first pick of the loom, when the shed is open, thread 2 being at the top of the reed, while thread 1 lies in space E, between the primary and secondary splits. The position of the threads in Part II, is that of the second pick of the loom, thread 1 being now at the top of the reed, while thread 2 lies in the secondary space between the primary and secondary split. The position in Part III, is that of the third pick of the loom, it being the same as that shown in Part I. The position shown in Part IV, Fig. 2, is that of the fourth pick of the loom, effected by the lifting of the reed harness, which lifts with it the thread 1, lying in the space E, the reed also being moved sidewise or transversely by the guide and rollers thus crossing the threads, the thread 2, now lying at the bottom of the reed. The crossing of the whip thread, or the douping, is thus accomplished, and the shed formed without the use of a douping harness.

It will be readily understood that the reed is in the present invention required to form the shed for every fourth pick only and coincidently to cross the whip thread, the first three sheds for picks 1, 2 and 3 being formed by the usual mechanism. (*A. Weithasse, Philadelphia.*)

DAVENPORT'S REED FOR WARPING.

The object is to provide a reed for warping which, from its simplicity of construction and ease of operation, greatly facilitates the forming of a single or a double cross or lease or a cross of two or more threads in preparing warps and to avoid the necessity of changing reeds, one reed only being employed for any one combination, thus saving the trouble and expense as well as avoiding the waste of material in threading a reed each time a warp is to be made.

When the new reed is once threaded, it is not necessary to be changed, as the ends left in the reed when one warp is made may be tied to the ends of the next warp-threads as the bobbins are changed instead of threading the reed anew for the next warp.

At present in warping the single or double filaments are separated either by lifting the strands by hand or by the use of a reed in which the dents are so united by blocks that in the centre of the reed longitudinally a row of eyes or openings is formed which alternate throughout the length of the reed with spaces which are open from the top to the bottom of the reed-frame. These reeds may be so constructed that the eyes or openings in the centre of the reed are either single or double. When these eyes are double, the double eyes alternate with two vertical slits extending from the top to the bottom of the reed-frame.

Under the methods now in use in order to change from a cross of single threads to a cross of groups of more than one thread it is necessary to change reeds or to employ two reeds.

The new reed obviates the necessity of using more than one reed, and with it any desired cross of threads may be obtained by uniting with blocks the number of dents required to carry the desired number of threads to be crossed.

The new reed is composed of dents having wide or enlarged ends, either with or without an eye or opening at each end thereof, which may be formed in any suitable manner, the dents being secured at top and bottom in a suitable frame with the necessary spaces between the dents, the upper ends or eye portions of the dents being joined at different portions by blocks soldered between said portions of the dents, leaving a space between the middle portions of dents where all the threads pass through, and the ends or eye portions of the dents being joined by blocks soldered between them. (*Herbert Davenport, Paterson, N. J.*)

THE KNOWLES LOOSE-REED MOTION FOR SILK LOOMS.

The same relates to looms for weaving textile fabrics provided with spring-reeds, and more particularly to a supplemental attachment combined with the spring-reed.

The object of the improvement is to provide a supplemental mechanism combined with the spring-reed of a loom by means of which the reed will be caused to strike a sharp quick blow to beat up the filling just as the lay reaches its forward position thus making a fabric of closer and evener texture, particularly silk fabrics.

The accompanying illustration shows a portion of a loom side, one lay-sword, and a sectional view of the breast-beam, lay, and spring-reed frame and the supplemental mechanism applied thereto.

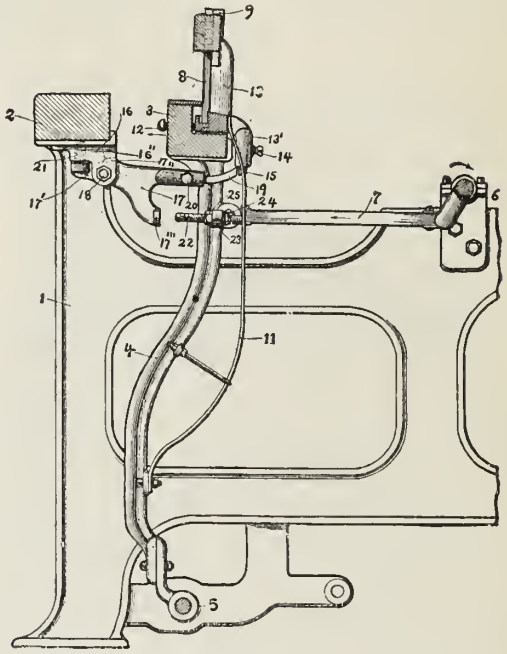
1, indicates the loom side; 2, the breast-beam; 3, the lay; and 4, the lay-sword, pivoted at its lower end at 5, and operated by the crank-shaft 6, through the crank-connector 7. The reed 8 is pivotally supported at its upper side between uprights 9, at each end of the lay 3, by pins to swing in and out at its lower part, which extends in a recess in the rear upper part of the lay. A flat spring 11, secured at its lower end on the lay-sword 4, bears at its upper free end against the rear side of the reed 8. Screw 12 extends through the lay and may be turned in or out to regulate the forward swing of the reed.

To the back of the swing reed-frame, near the end thereof, is secured a stand 13, having an arm 13′, which extends down below the lay and is provided with a socket at its end, in which is adjustably secured by a set-screw 14, a contact piece 15, made of hardened steel.

A bracket 16 is secured to the under side of the breast-beam, and in this instance is slotted to receive the rear end of the knock-off lever or arm 17, which is pivoted to the bracket 16 by a bolt 18 and carries at its front end in a socket therein a finger or contact piece 19, adjustably secured by a set-screw 20 and adapted to engage the contact-piece 15.

A coiled spring 21 extends in a recess in the bracket 16 and bears on the rear end 17′ of the knock-off lever 17 back of its pivotal support and acts to raise the front end of said lever 17. A projection 17″ on said lever 17 engages with the projection 16″ on the bracket 16 and limits the raising of said lever. The engagement of the rear end 17′ with the bracket 16 limits the downward motion of said lever.

A downwardly-extending projection 17‴ on the lever 17 is adapted to be engaged by a screw 22, ad-



justable in an ear or lug 23 on the lay-sword 4 and held in its adjusted position by two nuts 24 and 25. The screw 22 acts as a trip to engage the knock-off lever 17 on the forward movement of the lay and move it down to cause the finger 19 to be disengaged from the contact-piece 15 on the swing-reed 8, and allow the spring 11 to act to force the reed forward.

As the lay beats up the finger 19 will engage with the contact-piece 15 and hold or retard the reed 8 at its lower part. Just as the lay reaches the limit of its forward movement the screw 22, which is properly adjusted as desired, engages the lever 17 and moves it down to trip or disengage the finger 19 from the piece 15 on the reed 8 and allow the spring 11 to act to force the lower part of the reed forward and cause it to beat up the filling with a sudden sharp blow. (*Crompton and Knowles Loom Works.*)

HEDDLES AND HARNESSES.

REDDING'S DOUP-HEDDLE FOR LENO-WEAVING.

Leno or cross-weaving is effected by a doup action that crosses warp-threads between the picks. For this purpose doups threaded in the heddles and connected with a separate harness-frame have been employed; also frames carrying needle-formed heddles have been employed for such purpose; but so far a heddle having a wire doup mounted and guided

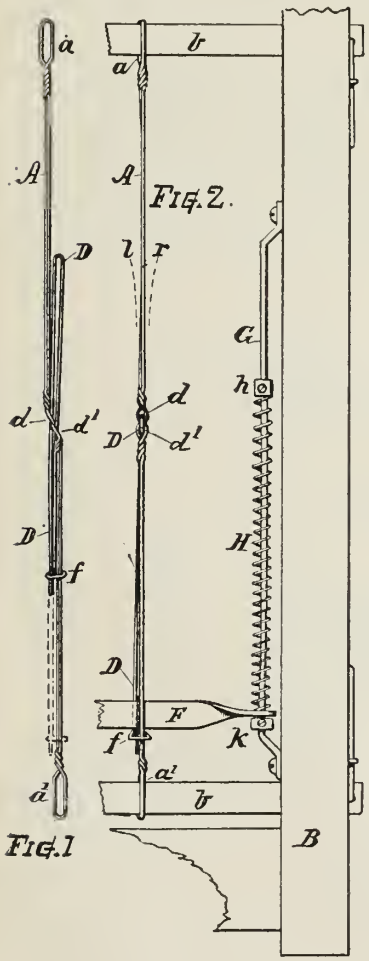


Fig. 2.

Fig. 1

Figs. 4 & 5.

thereon has not been devised, neither means for depressing or controlling the tension of the douping devices.

The object of the new heddle is to provide a more efficient and durable device; also, to provide a heddle with a wire doup supported and guided thereon.

Another object is to provide, in combination with the heddles having the sliding doups thereon, means for weighting or depressing the doups to afford a proper degree of tension therefor.

These objects are attained by the heddle mechanism illustrated in the accompanying drawings, wherein —Fig. 1, is a side view of the heddle. Fig. 2, is a front view of the heddle, together with a portion of the harness-frame showing the manner of combining the heddle and doup depressing devices. Fig. 3, is an enlarged or detail view showing the manner of arranging the doup upon the heddle, and Figs. 4 and 5, show, by side and front views, the modification of the heddle as made from a flat metal strip.

A, denotes the heddle, having the open ends a, a', whereby it is supported on the rods b, b, in the harness-frame B, and also provided with a double central eye or guide-openings d, d', as indicated.

D, indicates the doup, which is formed of wire or a metal strand folded at the top to form a loop or eye for the warp-thread W, and having its parts brought together and extended downward through the openings d, d', in the heddle A, and having its lower extremities joined by means of a loose-running clasp, turn, or connection f, about the wire of the heddle or one strand thereof, so that the doup D, can move freely up and down thereon, it being supported and guided by the eyes d, d', and the clasp f. The doup is shown as elevated in Fig. 1, and as depressed in Fig. 2.

F, indicates a small bar arranged through or engaging with the foot of the doup D, for normally depressing the same. Said bar may extend across the harness-frame and engage all or any desired number of the doups in a row of heddles, and its ends are best arranged in movable connection with guide-wires G, suitably attached to the frame, and having light springs H, combined therewith for normally pressing down the bar.

An adjustable collar h, is provided for regulating the tension of the spring H, as required in any instance, and a stop k, is disposed beneath the bar for limiting the downward action of the bar F and doups D. A spring of very light tension is ordinarily sufficient to depress the bar F and heddle-doups D, and in some instances even the bar of its own weight may be sufficient. In other instances the heddles may be used without the bar F, the gravity of the doup or a slight weight added to the lower part thereof being depended upon for the normal depression of the same.

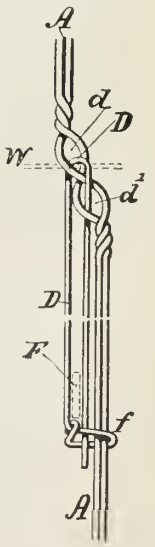
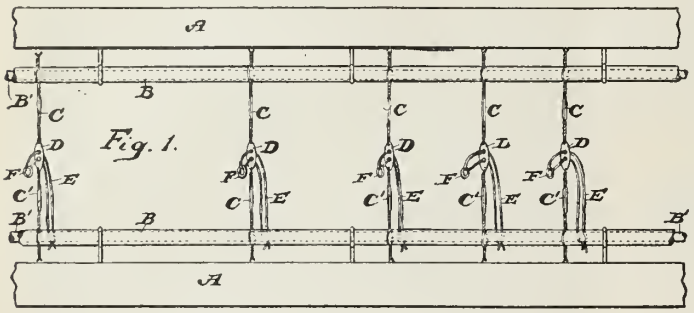


Fig. 3

The heddle A, is made of wire twisted to form the eyes d, d', as in Figs. 1, 2 and 3, but in some instances it can be made of flat band metal, with the eyes and doup-guiding slot punched through the same, as shown in Figs. 4 and 5, the doup D, being of wire or metal and arranged to slide up and down the heddle, as above set forth. When made as shown in Fig. 2, the doup can be threaded to pass either to the right or left, as indicated by dotted lines r and l. If made of flat form, then the heddles may be set in the harness with their inclined portions at either right or left position, as required for weaving any particular pattern. (*William H. Redding, Worcester, Mass.*)

HAMPSON'S LOOM-HARNESS FOR WEAVING LENO GOODS.

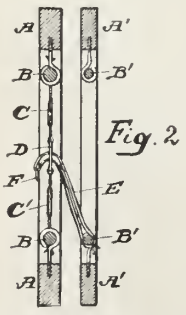
These goods are usually woven with several harnesses, in some of which the warp-threads do not pass directly through the leashes, but are run through the bight of a double cord, which is rove through the eye in the leash and is attached to an adjacent heddle. These cords are called "doups," and serve to pull down certain warp-threads at each pick of the loom, so that the shuttle will pass over instead of under said threads, as the figure demands.

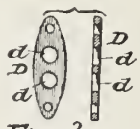


The varying action of the heddles causes the doups to work back and forth through the eyes of the leashes and the warp to pull through the doups, so that the doups break very frequently, the usual life of one being not more than a day or two, and sometimes much less. The material of which they are made is the best, and they are quite expensive, so that the loss of material and of the time required to make repairs is excessive and costly. To avoid this delay and expense by improving the construction of the leashes and the doups is the subject of the improved loom-harness thus to be described.

Fig. 1, is a front elevation of a heddle-frame provided with the improved doup attachment. Fig. 2, is a cross section showing the manner of connecting the doups. Fig. 3, shows forms of guide-plates for the doups.

The heddle-frame A, has near its top and bottom the metallic rails B, to which are attached the upper and lower ends of the respective strands C, C', of the leashes made of wire. The adjoining ends of the strands C,C', are fastened to guide-plates D, of rigid material, such as metal, bone, ivory, celluloid, hard rubber, glass or the like. Each plate contains two enlarged apertures or eyes d, which are arranged between and in alignment with the end apertures of the plate. Said eyes are provided with rounded edges to prevent wear of the doups in working through them.





The doups E, are rove through the eyes in the guide-plates. The ends of the doup are secured to a rail B', on an adjoining heddle-frame A', which has no leashes.

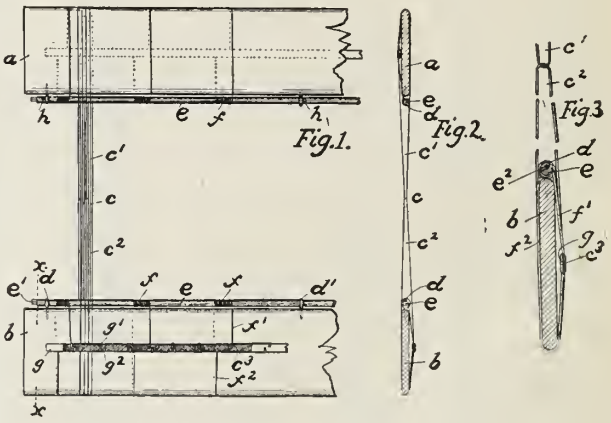
In the bight of the doup is a loose ring F, of rigid material, such as metal, hard rubber, or the like, through which the warp-thread is passed. (*Joseph Hampson, Fall River, Mass.*)

HARNESS SHIFTER AND ADJUSTER.

The object of this shifter is to provide a harness and its shafts with means for shifting the harness, that is to say, changing its relative vertical position on the said shafts for the purpose of introducing at certain intervals new portions of the harness for their looped connections to prevent the said harness at the place above mentioned from being worn through by the continuous friction with the warp-threads, and to thus make it more durable.

Fig. 1, is a front elevation of a portion of the shafts and the harness carried there by and provided with the improvements. Fig. 2, is a side elevation of Fig. 1, and Fig. 3, an enlarged sectional view on the line *x*, *x*, of Fig. 1.

A description of this shifter is best given by quoting letters of references, of which *a*, and *b*, represent the shafts, and *c*, the harness, which latter consists of the looped threads *c'*, and *c²*, connecting substantially midway between the shafts and passing over the outer edges of the latter. At the inner edge of each shaft and near each end thereof, are arranged the bearings *d*, *d'*, for the shaft or rod *e*, which latter is provided at one end with a squared portion *e'*, adapted to be engaged by a key. Around said shaft or rod *e*, are wound at certain intervals, a series of cords *f*, having their central portions or loops secured to the said shaft. One end *f'*, of each of said cords *f*, is directly secured to the rod or strip *g*, while the other end *f²*, passes first over the outer edge of its respective shaft and is then also secured to the said rod or strip *g*. The said strip is provided with a series of fingers or projections *g'*, *g²*, by means of which latter it is secured to the band or edge *c³*, arranged on and connecting the free ends of its respective harness.



The shaft or rod *e*, is provided with an elongated groove, in which is arranged a wire, by means of which latter the central portions or loops of the cords *f*, are secured to the said shaft or rod. Said

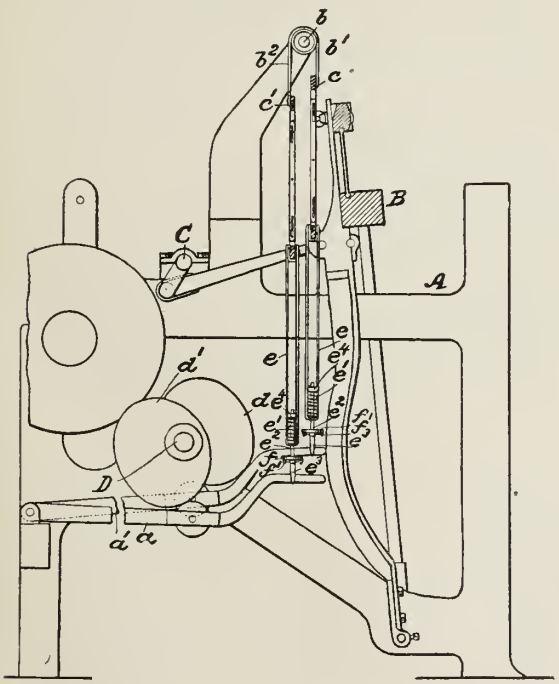
wire extends beyond the bearings d, and d', and is thus held firmly within the groove.

The shaft or rod e, is prevented from lateral motion by means of pins h.

Whenever a certain amount of weaving is accomplished, the shafts or rods e, on the shafts a, and b, are turned by means of the key or wrench. The length of the ends f', and f^2, of the cords f, are thus changed, and the rod or strip g, raised or lowered, and as the latter is firmly connected with the harness-connecting band or edge c^3, the said harness is vertically shifted, that is to say, a new portion of it will form the connecting-loops. By this arrangement the harness is made more durable. The warp-threads will wear on different portions thereof, as will be manifest. (*John David Ulrich, Haldon, N. J.*)

HARNESS CONNECTION FOR PLAIN LOOMS.

In ordinary looms for weaving plain cloth with two or more harnesses, and in which the harness-frames are actuated by treadles struck by cams, the treadles are commonly connected with the harness-frames by flexible straps, and in use, owing to the wear of the parts, these straps become slack and the harness-frames are not held at tension, and when the loom stops the backlash, due to the slackness of tension or lack of firm holding of the harness-frames, results in making thin places in the cloth.



The straps commonly used are difficult to get at, and with the buckle commonly used they cannot be adjusted to exactly the proper point, and frequently the straps are adjusted so that they are too tight, which, besides creating undue wear of the parts, adds materially to the power required to run the loom. The looseness of the usual harness not only occurs through the stretch of the straps, but also from the impracticability of making a connection between one harness-cam through the heddle, straps, roll above the harness, and back again through harness and heddle to another cam, one heddle being longer than the other and the roll at the top being longer for one harness than the other, at the same time maintaining the bearing of both heddles against both cams all the way around.

If every part were made with absolute correctness of design, this might be accomplished, but such correctness is impossible in ordinary mechanical work. To overcome this objectionable connection between the usual treadles and the harness-frames, a novel connection is produced by means of the new device, it containing two parts connected by a spring, the spring acting normally to keep the treadle always up to and against its actuating-cam, so that there is no backlash or slip, and the harness-frames are moved uniformly and with the least amount of objectionable strain.

The accompanying illustration shows in section a sufficient portion of an ordinary loom with the improvements added.

A, indicates the loom-frame; B, its lay; C, the crank-shaft; D, the cam-shaft, having the shed-forming cams d, d'; a, a', are the treadles, having rolls acted on by said cams; b, is the top roll, supporting the top cording b', b^2, attached to the harness-frames c, c'.

Each lower bar of the harness-frames, has connected to it a metallic loop or connection e, which supports a suitable spring e', and a rod e^2, having loosely hung on its head at its lower end an eye e^3 to fit over the free end of the treadle, is passed upwardly through this spring and has applied to it a nut e^4, so that said two-part connection may yield to any endwise strain and yet keep the treadle always against the actuating-cam.

The nut e^4, is restrained from rotation in the loop e, but the stress of the spring may be readily adjusted to the required amount by rotating the bolt in the loop and in the eye. To do this, there is applied to a squared part of the bolt an adjusting device f, having a series of lugs f', which embrace the flattened sides of the head of said eye and keep it from rotating when the loom is in use. To adjust the spring, it is only necessary to lift the device f far enough to remove its lugs f' from the head of the eye and turn the device f and rotate the bolt, it moving in the nut e^4 and adjusting the stress of the spring. When adjusted to the desired tension, the device f will be dropped.

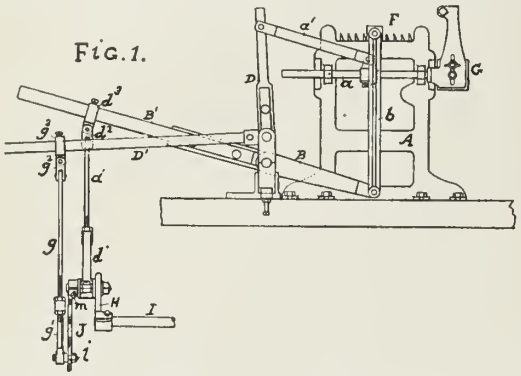
By the use of a harness connection such as described the levers may be always kept firmly against their actuating-cams and no loss of motion is permitted, the spring obviating any difficulty due to wear of parts.

The harness-frames are shown as provided with sheet-metal heddles and with such heddles which add to the weight of the harness-frames the thus explained device has great and peculiar benefit. (*Draper Co.*)

JACQUARDS AND CARD-CUTTING MACHINERY.

HALTON'S JACQUARD MECHANISM.

The object of this mechanism is to operate the griff-frame or frames and Jacquard cylinder of a Jacquard machine from the same shaft, but independently, and to provide for varying the time of



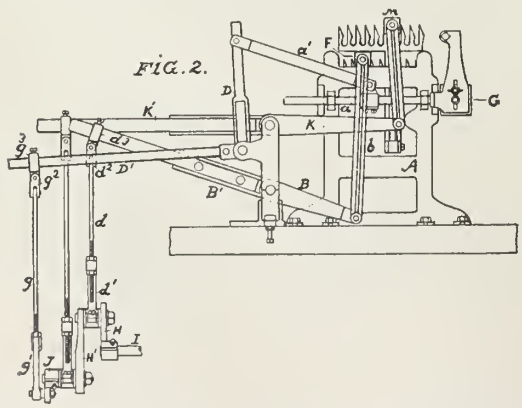
one part in respect to the other to accord with practical requirements.

Of the accompanying illustrations, Fig. 1 is a side view of sufficient of a "single-lift" Jacquard machine to illustrate the application of the new mechanism thereto. Fig. 2 is a similar view illustrating the application of said mechanism to a "rise-and-fall shed" Jacquard machine.

A, represents part of the frame of a Jacquard machine; F, the griff-frame; B, B′, the operating-lever therefor; G, the card-cylinder and D, D′, the operating-lever therefor.

The card-cylinder is carried by guided rods *a*, connected to the arms D, of the operating-lever by links *a′*, while the griff-frame is connected to the arms B of its lever by links *b*.

The arm B′, of the griff-frame operating-lever is connected by a rod *d*, *d′*, to a crank-pin carried by a crank-arm H, on the operating-shaft I, the latter



being any available rotating shaft of the loom. The portion *d′*, of the connecting-rod has a two-part bearing for the reception of the crank-pin and the portion *d*, of the rod is threaded and provided with nuts whereby it can be adjusted longitudinally in respect to the portion *d′*, the outer end of said portion of *d*, of the rod being connected by a universal link d^2, to an adjustable block d^3, on the arm B′. In like manner the arm D′, of the operating-lever for the card-cylinder is connected by means of a rod *g*, *g′*, link g^2, and block g^3, to a pin *i*, on an arm J, which is rotatably mounted upon a projecting portion of the crank-pin, so that it can be adjusted on said pin, a set-screw *m* serving to secure it in position after such adjustment.

By this construction the movement of the card-cylinder in respect to that of the griff-frame may be regulated to any desired extent. For instance, if the arm J is turned so as to be directly in line with the arm H, the movement of the griff and cylinder levers will be exactly the reverse of each other, the cylinder being at its extreme outward position when the griff-frame is fully raised and in its extreme inward position when the griff-frame is fully lowered, while by shifting the arm J, in one direction or the other the movement of the card-cylinder may be caused to lead or follow that of the griff-frame to any desired extent.

The same principle of operation attends the use of the new mechanism in connection with the rise-and-fall machine shown in Fig. 2, the adjustable arm J, in this case being hung to the crank-pin, which is carried by the outer crank-arm H′, and receives the operating connection for the lever K, K′, which operates the second griff-frame M.

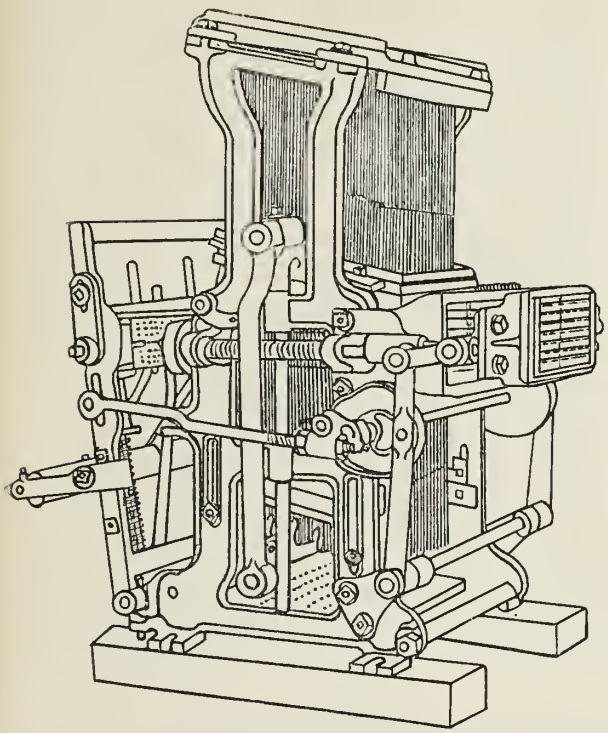
The connections shown in Fig. 1 may be reversed, if desired, that is to say, the griff-frame operating-lever might be actuated by the pin of the arm J, and the cylinder operating-lever by the pin of the arm H, again the arm J, might be secured permanently to, or form part of the crank-pin, if said pin is capable of turning around its axis and susceptible of being secured to the arm which carries it in any position of adjustment. (*Thomas Halton, Philadelphia.*)

THE KNOWLES OPEN-SHED JACQUARD.

This class of Jacquard machine is rapidly coming into favor on certain classes of goods where the open-shed feature is found desirable as compared with the ordinary straight-lift, so called, or rise-and-drop closed-shed type of machine. The difficulty with open-shed Jacquards heretofore has been, that the action of the machine was such, that the cylinder carrying the pattern cards was required to make two beats, or in other words, to present the same pattern card twice in one beat of the loom. This of necessity involved a decrease of speed in the operation of the loom, owing to the fact that the movement of the cylinder was twice as fast, so to speak, as the beats of the loom.

In the construction of the Jacquard as shown in the accompanying illustration this defect has been overcome. The machine, properly speaking, is of the ordinary straight-lift type, that is to say, the shed is lifted from its lowest normal position into the upper shed and returned again to that point when required to descend from the upper shed. By the

peculiar action of this machine, however, hooks that are indicated to rise and on the succeeding pick of the loom are required to be up, remain up, and



continue to do so for an indefinite number of picks, unless a card is presented that governs the needle in such a way that the hook will descend carrying the shed in normal position.

In this improved form there are two stationary griffs, so called, one at the top of the machine and one at the bottom; between the griffs above mentioned there is a second intermediate griff, which has a vertical movement at each pick of the loom. The griffs here shown are set upon an angle for the purpose of varying the distance between the position of the hooks on the upright and the needle, so that a movement of the needle gives the same kind of lateral movement to an upright in the back row as at the front.

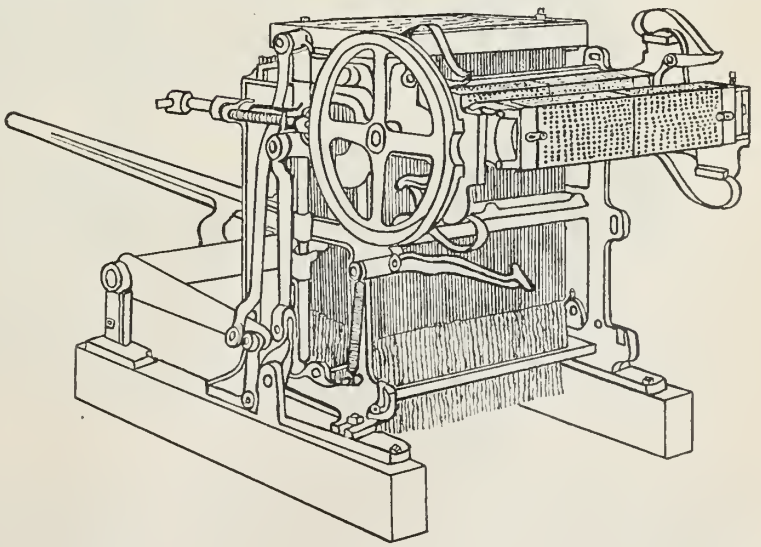
The operation of the machine is as follows: When the shed is open, the cylinder with pattern-card upon it comes in contact with the needles and depresses such needles as there are blanks in the card, the effect being to throw the bottom of the upright clear of the stationary griff at the bottom; at the same time the needles so depressed are acted upon by the reciprocating griff at the back of the machine, the needles through their angular form being raised to come in contact with the plates of the reciprocating griff, and this in its backward movement engages with the back end of the needles and holds them back; thus when the downward movement of the vertical movable griff takes place, the hooks so held back by the action of the needles, descend with the harness and warp threads into the lower shed. It will be seen therefore that the action of the card cylinder takes place when the vertical moving griff is at its highest point, or the shed open, this being the exact reverse of the action of a Jacquard cylinder in the ordinary construction of Jacquard. It naturally follows that any needles acted upon by the cards, that is to say, the blank portion of the card, must of necessity rise to come in contact with the reciprocating griff as mentioned above, and the griff having considerable dwell at its extreme outward movement, necessarily holds the needles and the uprights passing through in such position that they must of necessity descend into the lower shed.

It will be seen that in this operation there is no complication in designing or card cutting; an ordinary set of cards that will produce the goods on a machine in the usual manner will produce exactly the same pattern on this machine, the only difference being, comparatively speaking, as to the time of their coming in contact with the needles. This machine has been found particularly desirable for narrow ware goods, as in such goods the shed requires to remain open, or warp threads remain in upper shed, for sometime, hence there is a very perceptible decrease in the wear and tear of the harness by the use of a machine of this class. (*Crompton and Knowles Loom Works.*)

THE KNOWLES DOUBLE CYLINDER SINGLE-LIFT OR RISE-AND-DROP JACQUARD.

This device has been found in practice doing excellent work, running two sets of cards for the production of goods having cross-borders or all-round borders. The cylinder is mounted upon horizontal-reciprocating rods having a movable head with two or more cylinders upon it.

In operation the cylinder reciprocates, coming in contact with the needles in the usual manner, and on one of the cylinders is placed a sufficient number of



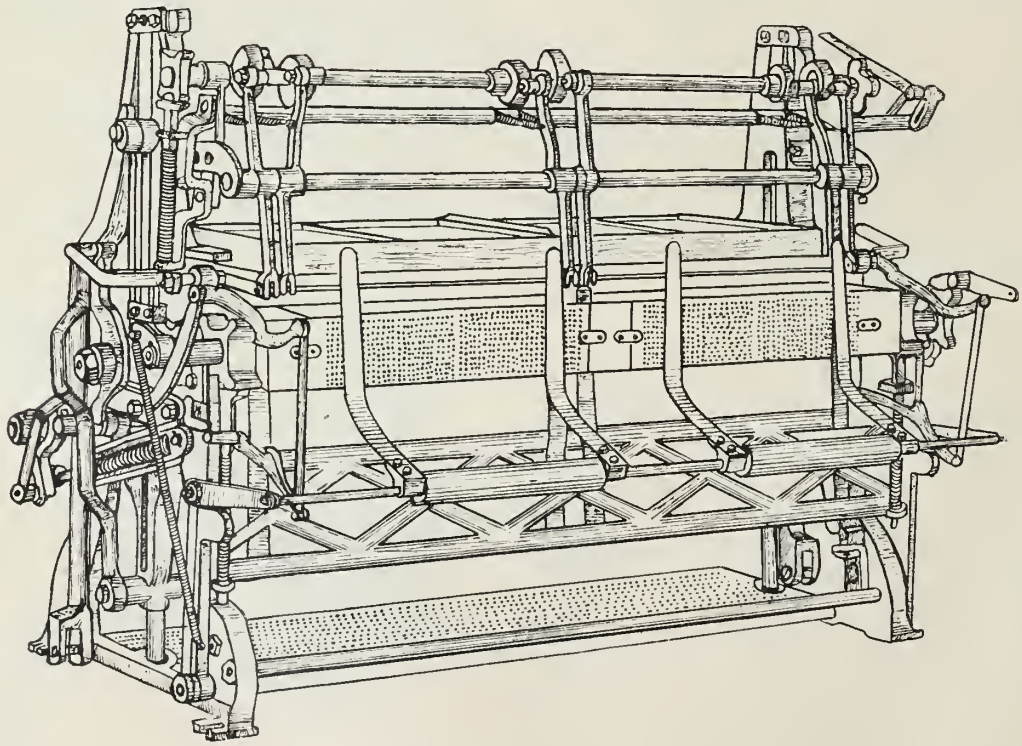
cards to make a cross-border on the goods or possibly two cross-borders.

The borders are woven making either one or two revolutions of the set of cards, as the case may be, and at the same termination of the weaving of the second border the card operates upon a needle, which in turn governs a hook in the Jacquard machine, which in turn governs the multiplying-device on the box-motion and effects a stoppage of the loom through the usual stop-motion device on the loom. The operator then revolves the cylinders by means of a cord, as shown, throwing one cylinder out and bringing another cylinder into position to act upon the needles. The second cylinder may have a series of cards for a figure, or simply a set of twill cards for a twill ground.

In operation this cylinder will be used a sufficient number of picks to weave whatever space may be contained between two borders in the goods to be woven, and the number of picks contained in such space is determined by the multiplying-device attached to the box-motion of the loom, and through such multiplying-device the given distance between two borders is determined; at the termination of the space the loom is again stopped by the action of the multiplying-chain and the usual stop-motion attachments of the loom, and the cylinders are again revolved bringing into position the border cards, borders are woven, and a repetition of the foregoing completes the fabric woven. (*Crompton and Knowles Loom Works.*)

THE KNOWLES MARSEILLES-QUILT JACQUARD.

In the accompanying illustration is shown the Knowles rise-and-drop Jacquard machine, having a plain card attachment, and which Jacquard is extensively used for quilt weaving and similar goods where heretofore a plain card between each two figure cards has been required.



In this case the plain card, so called, is entirely dispensed with, thus largely reducing the total number of cards required. This feature of saving cards is accomplished by means of the device shown in the illustration on the top of the machine, which has a cam upon shafts running across the machine, coming in contact with the end of the lever fulcrumed at a point lower on the machine, as shown, and a series of rods in reciprocating frames, one rod in front of each row of the upright hooks in the Jacquard machine and under the griff that lifts the hooks. When the griff rises the pawl acting upon the ratchet held at the side of the machine gives a movement to the cam shaft, that throws the cam in contact with the lever, thus depressing one-half of all the upright hooks in the machine, leaving the other half of the hooks in position to be acted upon by the griff, and upon further movement of the machine the cam is turned out of contact with its lever and a second cam operating upon a second lever performs the same operation upon the hooks that were formerly not acted upon by the rods; hence a two-weave attachment is got without any action of the Jacquard cylinder or cards. The plain ground of any kind of fabric may be woven in this way.

This machine as previously mentioned has been very extensively introduced in mills manufacturing Marseilles-quilts. To fully understand its operation necessitates a description of the principles of Marseilles weaving, and which is thus:—

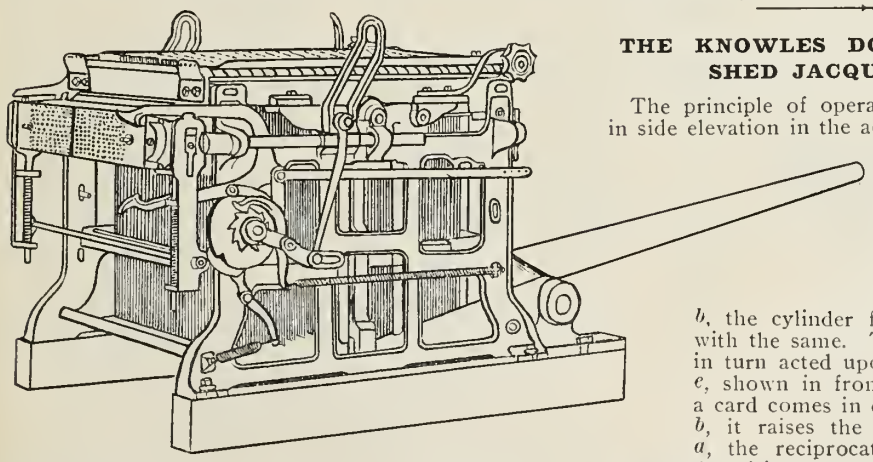
Two warps are used, a coarse and fine; the coarse being the figure or binder warp, and the fine the face warp. The fine warp is operated by ordinary harnesses in front of the Jacquard harness; two shuttles are used, one for the fine or face filling, the other for the coarse or backing filling. In operation, the Jacquard (the hooks being operated by the figure card) rises, opening the shed, and remains up, or shed open, for three picks, putting in coarse filling for first pick and fine for remaining two picks, then falls, immediately rises, lifting half of all the hooks,

and necessarily half of all the warp threads operated by it. And putting in another fine pick, it again falls, and on this movement a figure card is again presented to the needles, and a figure lift produced to remain up as before. During this action of the Jacquard the plain harnesses are working, weaving plain, as follows: First pick, all face warp in the upper shed; second pick, half of face warp descends to the lower shed or bottom; third pick, bottom shed rises and top descends; and on the fourth pick, all face warp is again raised to the upper shed and then repeats. The action of the filling during these movements is two picks of fine on face, and one each of fine and coarse to the back. There are other methods of Marseilles weave; however that quoted is the one most generally used.

Before the introduction of the plain card attachment shown, it was customary to use a card with perforations for every alternate needle, by this means operating one-half of all the hooks in the machine. The use of this card necessitated that the cylinder be presented to the needles on the third and fourth pick, whereas, by the use of the new attachment, the cylinder is so presented only on the fourth pick, hence a large saving in cards accomplished, and the wear and tear on the mechanism greatly reduced. (*Crompton and Knowles Loom Works.*)

THE KNOWLES TWILL JACQUARD.

The object in the construction of this Jacquard machine is, to admit of the weaving of twills without any action of the cylinder or cards. The machine in its construction resembles an ordinary Jacquard machine, and is made either straight-lift or rise-and-drop.



The upright hooks rest upon round wires on the bottom griff of the machine. These wires which pass from side to side of the machine pass through a round eye in hooks that are somewhat heavier than the ordinary hook; one of these hooks being placed at each side of the Jacquard machine. These hooks pass through a slotted plate at the top to serve as a guide, but are not acted upon by the ordinary needles of the Jacquard.

In weaving an 8-harness twill there are 24 rows of hooks in the machine, dividing by 3 gives an 8-harness movement, and thus three griffs would be operated in producing an 8-harness twill at each pick.

The griffs are so made that they oscillate or swing upon a pivot. Over the top of the griffs is passed a series of bars having notches in them, each bar coming in contact with a certain number of griffs in the machine, and there are as many bars so arranged as there may be changes in the ground weave that is desired to be produced.

These bars are acted upon by a peg-cylinder which is equivalent to a ball-chain on a box-motion. When the griff rises, one movement of the shaft having these peg-cylinders takes place, moving certain of the cross-bars and with them their respective griffs; they then descend, and on their next forward movement the griffs so moved engage with the larger hooks mentioned before at each side of the machine, thus lifting them and carrying with them one of the round rods before alluded to, on which the regular upright hooks are at rest thus carrying with them an entire row of the usual uprights.

This sufficiently explains the action, and it naturally follows that the number of rows so lifted determines the amount of twill or the nature of a twill that is being woven. If a 5-harness twill were desired there would be 25 rows of hooks in the machine, and the division would be made by 5 instead of 3, and in such case one row of the needles would of necessity have three uprights passing through each needle instead of two as is the case usually.

These machines are largely used on fine damask where a large figure is desired. The designer in painting the design simply paints the figure; no twill or ground weave is painted on the design or cut in the cards; hence, a 600-hook machine will produce a figure at least twice as large as an ordinary 600-hook for the reason that all the hooks are used in figuring and are not required to be used in the ground as is usually the case. (*Crompton and Knowles Loom Works.*)

THE KNOWLES DOUBLE-ACTING OPEN-SHED JACQUARD MACHINE.

The principle of operating this Jacquard is shown in side elevation in the accompanying illustration Fig. 1. It will be observed that there are practically three hooks combined in one. Needles *a*, have three hooks passing through each needle, and the means of indicating from the card are through the vertical needles *b*, the cylinder falling and rising in contact with the same. The horizontal needles *a*, are in turn acted upon by the reciprocating plate *c*, shown in front of the needles, thus when a card comes in contact with a vertical needle *b*, it raises the respective horizontal needle *a*, the reciprocating plate *c* passes forward, the needle rising upon the same, and the reciprocating plate *c* depressing the needle, throwing back the hook so that the same will not engage with the griff (shown in section in illustration); this action taking place when either one of the two sets of griffs of the double acting Jacquard is at its lowest or normal position. The hooks engaging with the (vertical moving) griffs are made in one piece, and the third hook to which the harness is attached is made with a loop at its bottom end as shown at Fig. 2, and hooks onto the double upright hook as acted upon by the vertical moving griffs. When it is desired that the shed remains open, the hook engaged to rise by action of the griff, raises at the same time its long hook (on account of bend *d*, on long hook) and which is carried up to a point above a stationary griff. If the reciprocating plate *c* indicates, and its harness or hook is to remain lifted,

the crook of the long hook comes in contact with the griff *d*, and remains suspended thereon until such time as the action of the card and reciprocating griff determine that said hook shall again descend into the lower shed. This action applies to both of the vertical moving griffs, making no difference which one of the hooks engages in the moving griffs, the action is the same on the longer hook, and it will remain up if indicated to come in contact with the stationary griff at *e*.

In Fig. 1—at *f*, the hooks are shown at rest or in their normal position; at *g*, they are shown raised half-way (shed half open or half closed) by either one of the respective vertical griffs; at *h*, the hooks are shown raised in the same position as at *e* by one of the griffs only; at *i*, the hooks are shown raised to the highest position (top of shed) by one of the vertical moving griffs (the long hook being in contact with stationary griff *e*); and at *k*, the hooks are placed in the same position as that shown at *i*, by means of the other vertical moving griff (*i. e.*, that griff having its first bar nearest to needle-board).

In the needle-board *l*, carrying the horizontal needles, *m* indicates a vertical wire (one of these wires for each vertical row of needles) for dividing said needle-board into spaces and for guiding needles; *n* indicates the sections of horizontal wires for needles *a* to rest upon.

The particular object of the machine is to avoid the difficulties encountered in many cases by the use of the ordinary double-lift Jacquard in that the shed is practically half closed at the time when the filling beats up, this being made necessary by the peculiar action of such construction; in fact at the moment when one hook starts to rise, its corresponding hook starts to descend, thus closing the shed half way. In many classes of goods this makes a defect in the figure and is particularly marked in the beat up of the filling in the goods. By the use of the new device an absolutely full open shed is maintained and the possibility of marking the cloth, as previously referred to, is avoided. (*Crompton and Knowles Loom Works.*)

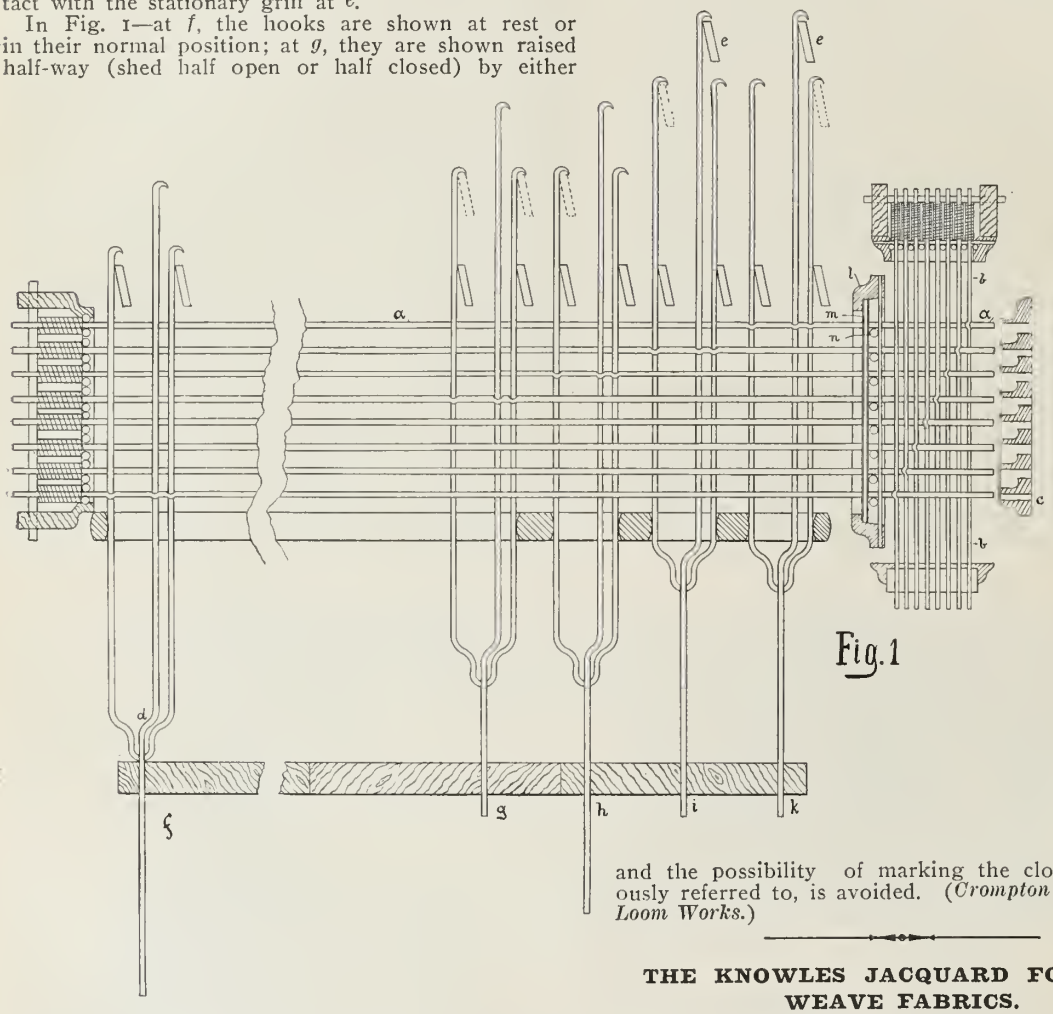


Fig. 1

Fig. 2

THE KNOWLES JACQUARD FOR TWO WEAVE FABRICS.

Certain classes of woven goods—such, for example, as table covers and the like—are characterized by having cross-borders at the opposite ends thereof, and an intermediate body portion having some suitable pattern, there being usually a number of repeats of the said pattern of the body between the two cross-borders pertaining to a table cover or the like article.

For the weaving of goods of such classes it is required that the Jacquard mechanism of the loom in which the weaving is effected should be equipped with cards that are punched in accordance with the pattern in the body of the goods intermediate the cross-borders and also with cards that are punched in accordance with the pattern of the cross-borders. In the case of ordinary Jacquard mechanisms, it is necessary to employ a great number of cards, one card for every pick in the entire length of a table cover. This renders the set of cards very expensive,

and adds very much to the cost of weaving the goods.

The object of this Jacquard mechanism is to reduce greatly the number of cards which it is necessary to employ, and thereby to lessen the expense as well as to obviate the various disadvantages and inconveniences which are incident to the employment, handling, and storing of an extended series of cards.

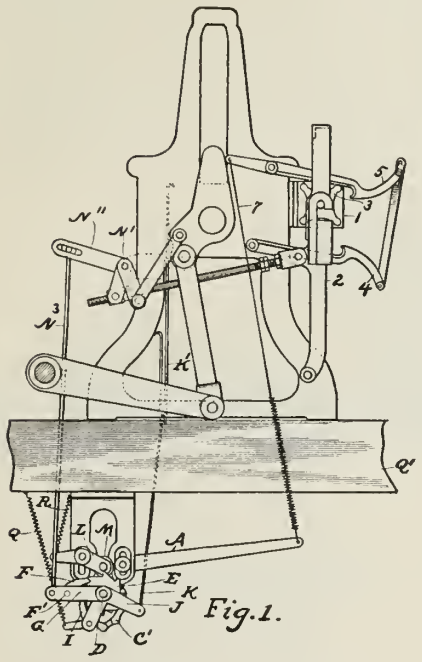


Fig. 1.

The novelty of the new mechanism consists in the combination, with the feeding devices for the cards of a Jacquard mechanism, of certain devices whereby the working of the said feeding devices is controlled automatically, with the result that the direction of rotation of the said devices is reversed from time to time as often as a repeat of either the pattern of the cross-border or that of the body should occur.

In the accompanying drawings, Fig. 1 shows in side elevation the said embodiment of the improvement. Fig. 2 is a view looking from the left in Fig. 1, and showing the auxiliary pattern devices, detached, but only a portion of the pattern-chain.

A description of this ingenious and labor-saving mechanism is best given by quoting letters and numerals of references in our illustrations, and of which 1 indicates the prism of the Jacquard machine, and 2 is the support for this prism.

3 is the lantern and 4, 5 are the catches for turning the prism. 7 is a connection to catches 4, and 5, and which is joined to the outer end of the operating-lever A, for the pawls. The inner end of the said lever is arranged to project over a cylinder C, around which latter is passed a pattern-chain C', having balls B, applied thereto, the sequence of balls and empty spaces on the said pattern-chain being, as prearranged, in order to conform with the exigencies of the weaving.

A ball on the pattern-chain coming under the inner end of lever A, acts to move the said lever, with the effect of placing catch 4, in position to engage the lantern 3, so as to cause the prism to be rotated in one direction, while when an empty space on the pattern-chain presents itself beneath the inner end of lever A, the catch 5 comes into position to cause the prism to be rotated in the opposite direction. The cylinder C is fast upon the shaft D, which latter has fast thereupon also the ratchet E, and the notched detent-wheel N. The ratchet E is engaged for the purpose of rotating the shaft D, and parts fast thereon by pawl F, the latter being pivoted on a pin F', projecting from an arm G, which is mounted loosely upon the shaft D, the said pawl being pressed toward the teeth of the ratchet E, by a spring G'.

The notches of the detent-wheel N are entered to prevent overrunning of shaft D, and the parts that are fastened thereon by a detent consisting of a roll M, mounted on a lever L, that is acted upon by a spring R.

For the purpose of actuating the arm G and pawl F carried thereby, the said arm is connected by the rod N^3 to the arm N'' on the moving shaft N' pertaining to the Jacquard mechanism.

In order to enable the length of the pattern-chain to be reduced, the pawl F, is combined with devices whereby to determine the times at which the same shall be permitted to engage with the ratchet C. Upon shaft D, is mounted loosely a bent lever or bell-crank J, one arm of which is connected by a cord with one of the hooks K' of the Jacquard mechanism. To the other arm of lever J, is pivoted the pawl-lifter I, the end of which is caused to bear against the face of the ratchet E, below pawl F, by means of spring Q, one end of which latter is connected with the timber Q', while the other end thereof is connected with the projecting tail of the pawl-lifter I.

The spring Q causes the pawl-lifter I to occupy normally a position which keeps the actuating-pawl F raised from engagement with the adjacent tooth of ratchet E, so that ordinarily the pawl F, in its movements fails to actuate the said ratchet, the shaft D, the cylinder C, and the pattern-chain C'.

When, however, a forward shift of the said pattern-chain should take place, the hook K' is caused

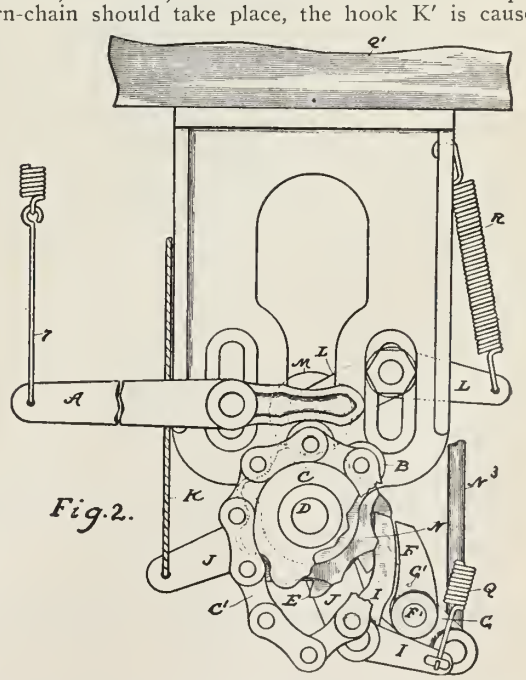


Fig. 2.

to be raised in the working of the Jacquard mechanism, and thereby the bent lever J is moved so as to draw the pawl-lifter I out of the way and permit pawl F to engage with a tooth of rachet E.

In the use of this Jacquard there are employed as many cards as are necessary for a cross-border and one repeat of the pattern in the body of the goods. For instance, if one repeat of the pattern in the body of the goods should be eight inches long, and if the goods should contain fifty picks to the inch, there would need to be used four hundred cards for this repeat in addition to the number of cards which might be required for one cross-border. It may be assumed that the weaving has been proceeded with up to the completion of the body portion of a table cover, also that at this stage the devices act to present No. 1 card of the cross-border and then continue presenting the cards of the cross-border in regular succession, the pawl-lifter I meanwhile holding pawl F out of action. The last of the said cards of the cross-border is perforated so as to cause hook K′ to be raised, whereby pawl-lifter I is retracted and pawl F is allowed to engage ratchet E, and cause pattern-chain C′, to be advanced one step. On the descent of hook K′, the pawl-lifter I is caused by spring Q to move again into position to hold pawl F from acting upon ratchet E. A new indicator upon the pattern-chain C′ having by the advance of the latter been presented to lever A, the catches 4, 5 are shifted in position, so as to cause the direction of rotation of the prism to be reversed, so as to feed in the reverse direction the cards of the cross-border.

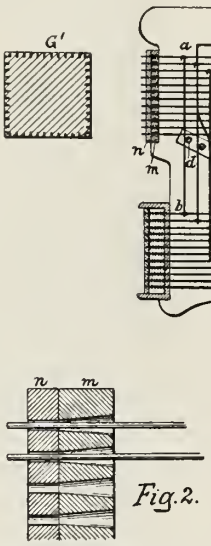


Fig. 2.

This provides for weaving a second cross-border, namely, the first one pertaining to the next table cover or other article. On the completion of this second cross-border the last card pertaining to the cross-border is presented to the needles. This card is perforated to occasion retraction of the pawl-lifter I, in the manner set forth hereinabove, but inasmuch as the indicator that is presented at this time to lever A, is of the same character as that last presented thereto no change occurs in the action of the pawls. The continued feeding of the cards without change of direction causes those pertaining to the body-pattern to be presented successively to the needles until one repeat of the body-pattern has been woven. The last card which is used at this time in the production of the said repeat is perforated to occasion the withdrawal of pawl-lifter I. The action of pawl F, now brings a different kind of indicator beneath lever A, and causes the pawls to be shifted so as to feed the cards of the body-pattern in the reverse direction. The reversal of the direction of the feed of the said cards is effected in the foregoing manner as many times as may be required for the production of the desired length of body, whereupon the pattern-chain causes the cards of the cross-border to be presented to the needles, and so on, in the manner which has been described. (*Crompton and Knowles Loom Works.*)

HALTON'S JACQUARD FOR TWO-WEAVE FABRICS.

The object of the construction of this jacquard (similar to the foregoing jacquard mechanism) is to permit changing it from one pattern to another, as for instance in weaving fabrics with borders, where the body of the fabric requires the use of one set of cards, and the border demands the employment of another and different set.

Fig. 1 is a diagram illustrating such a Jacquard machine. Fig. 2 is an enlarged section illustrating the special construction of the needle guide-board.

A, represents one of the side frames of the Jacquard; B, the griff-bars; D, the lifters or hooks; and E, the rest or supporting bar. Two sets of needles F and G are used, the former being acted upon by the cards upon a needle cylinder F′, while the needles G are acted upon by the cards upon a needle cylinder G′, said card-cylinders being located

Fig. 1.

respectively at the right and left-hand sides, or rather at the front and rear of the machine. The two sets of needles are connected for joint operation by means of levers H, which consist of wires having hooked upper ends engaging with eyes *a*, upon the needles G, the lower ends of the wires engaging with eyes *b*, upon the needles F, said levers having their fulcrums upon transverse rods *d*, suitably mounted upon the fixed frame of the machine.

The needles F, have eyes *f*, which engage with the lifters D, hence it will be seen that these lifters can be operated either when the needles F are acted upon directly by the cards upon the cylinder F′, or indirectly through the medium of the needles G and levers H, by the cards upon the cylinder G′, hence all that is necessary in order to change from one pattern to another, is to throw one needle cylinder out of action and the other into action, it being understood that one cylinder carries the cards for the pattern of one part of the fabric, and the other cylinder the cards for the pattern of the other part of the fabric, each cylinder being allowed to remain in action as long as the pattern for which its cards are designed is to be produced.

In machines of this class it is advisable that the needles shall be accurately guided, hence, the openings in the guide-board through which the needles pass should be but little larger than the needles themselves but when such small openings are used they soon become clogged with lint or dirt so as to interfere with the free movement of the needles, and the sticking of the needles prevents proper operation of the lifters and spoils the pattern. Frequent cleaning of the openings in the guide-board, therefore, becomes necessary, and in order that this may be done without risk of disarranging the needles or per-

mitting them to assume any other than their proper relation to each other, the guide-board is made in two parts *m*, and *n*, as shown in Fig. 2, the part *m* having openings considerably greater in diameter than the needles so that they are not liable to become clogged, while the part *n* has openings but little larger than the needles themselves, these openings, therefore, constituting the guide openings.

When it becomes necessary to clean the openings in the board *n*, the latter is readily removed from the board *m*, which, however, supports the needles and retains them in their proper relation to each other, so that the board *n* can be readily re-applied to the ends of the needles after the openings of said board have been properly cleaned.

In order to insure the holding of the needles in correct relation to each other by the board *m*, the openings in the same are tapered from the inner to the outer ends, the said outer ends of the openings being no larger in diameter than the openings in the board *n*. (*Thomas Halton, Philadelphia.*)

DEVICE TO INSURE THE PROPER GUIDANCE OF THE REAR ENDS OF THE NEEDLES OF A JACQUARD MACHINE.

Fig. 1 is a longitudinal section of sufficient of a Jacquard machine to illustrate the device. Fig. 2 is a sectional plan view of part of the same on a somewhat larger scale, and Fig. 3 is a detached view of a retainer-bar to which the improvement particularly relates. The improvement is applicable to any ordinary form of a Jacquard machine.

A, represents part of the frame; A′, some of the

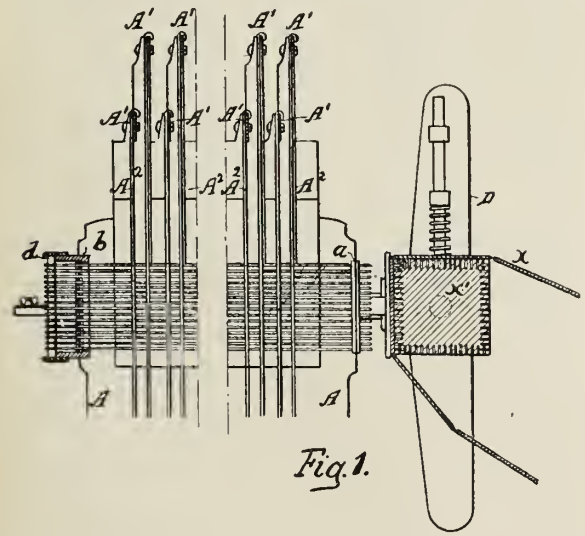


Fig. 1.

griff-bars; and A^2, some of the lifters; B, B′, and B^2 representing three sets of needles controlling these lifters. The needles are guided at the front ends by a perforated guide-board *a*, and the projecting ends of the needles are acted upon by cards *x*, which are carried by the card-cylinder *x′* on the vibrating or reciprocating frame D. The rear ends of the needles pass between horizontal guide-rods *b*, whereby they are held in proper vertical position, and also between vertical guide and retainer-bars *d*, whereby they are held in proper lateral position, and whereby, also, their forward movement is limited, such forward movement being due to coiled springs *f* acting upon the rods, and this movement being restricted by the engagement of the hooked rear ends *g*, of the rods with the vertical guide-bars *d*.

In machines in which a large number of needles are used said needles are very closely bunched. Hence the guide-bars *d* are very thin, but are of considerable length, owing to the large number of needles in each vertical row, and the central portions of these guide-bars are therefore liable to be deflected laterally to such an extent that adjoining needles sometimes engage with each other, and thus cause improper operation of the lifters. In order

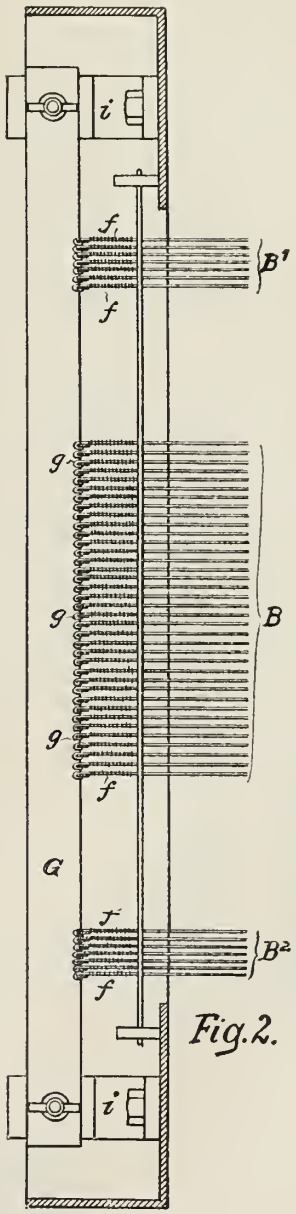


Fig. 2.

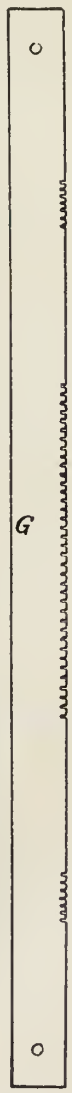


Fig. 3.

to overcome this defect the rear portion of the Jacquard machine is provided with projecting brackets *i*, upon which is mounted a transverse retainer-bar G, notched in its front edge, as shown in Fig. 3,

for the reception of the rear edges of the vertical guide-bars d, for the needles, the vertical position of said retainer-bar G, being about midway of the length of said bars d, so as to firmly brace the same at the point where deflection is otherwise most likely to occur. (*Thomas Halton, Philadelphia.*)

JACKSON'S JACQUARD MECHANISM.

The novelty of this mechanism relates to improvements in the means for moving the upper and lower grates in a Jacquard mechanism to and from each other, resulting in a device simple and durable in its construction.

Fig. 1 shows a side view of a Jacquard mechanism with the improved elements attached, with all the inner working parts—such as the hooks, needles, etc., omitted. Fig. 2 shows an end view of the Jacquard with the guide-bars B of the upper grate and the elements that elevate said upper grate, and also the guide P, attached to the lower grate, to which are attached some of the improved elements.

A, indicates one of the side frames in a Jacquard mechanism; C, the upper grate; D, the lower grate. B, is the guiding-bar, attached firmly to the upper grate in the arm B′ and is otherwise guided in the apertures for that purpose provided in the frame A. E, is a connecting-rod attached at one end to a pin in the upper grate arm B′ and at its other end furnished with a screw-cut hole screw-cut so as to receive the upper similarly screw-cut part of the connecting-rod E′, whose lower part is attached to a bolt or pin F, which in addition to connecting-rod E′ supports the link G and attaches them both to the grate-elevating lever H, consequently also supporting this latter.

The two connecting-rods E and E′, the rod E′ being secured to rod E by lock-nuts E^2 and E^3, thus form the element that raises and lowers the upper grate C when said elevating-lever H, which has its fulcrum H^2 in two standards, of which H′ is one, is given the necessary motion by means of connecting-rod H^3, connecting lever H with the eccentric arm H^4, which with the eccentric arm H^5 gives, (arm H^4 being secured to arm H^5 and arm H^5 secured to shaft H^6) when shaft H^6 is revolved, the

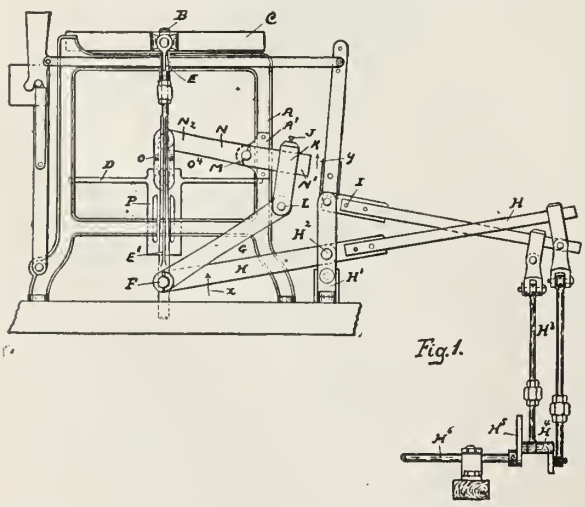


Fig. 1.

requisite movement to their respective motion-levers H and I.

The pin F, which, as previously described, carries the connecting-rod E′, having attached at its other end E, which, attached to the upper-cradle arms B′ thus elevates and lowers the said upper-cradle. Pivoted on this said pin F is a lever-arm G, whose other

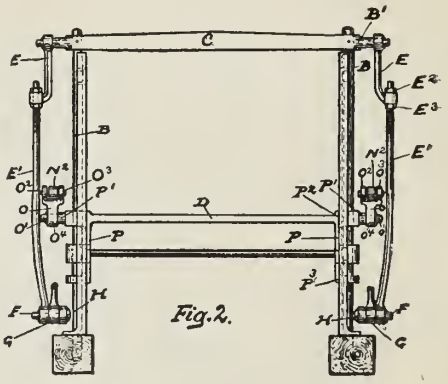


Fig. 2.

end is pivoted on a pin L between two prongs and of a knuckle-joint K. Pivoted to a bearing A′, secured to the main frame A by means of a pin M, secured in said support or bearing, is a fulcrumed lever N, one arm N′ of which is rectangular-shaped and fits in a similarly retangular aperture in the knuckle-joint K. The other arm N^2 is by a hole attached to the pin O′, secured in the two prongs O^2 and O^3 of the knuckle-joint O. The lower prong O^4 of knuckle-joint O is secured to an arm P′ of a guide P, part of or firmly secured to the lower grate D. This guide P is furnished with an upper projection P^2 and a lower projection P^3, both furnished with holes through which the guide-rod B slides, giving said guide-rod a steady support. The other motion-lever I appertains to the in-and-out movement of the cradles to and from the needles.

Method of operation:—The upward motion of the upper grate C is transmitted direct, inasmuch as when the motion-lever H is caused to move around its fulcrum H^2 in the standard H′ in the direction of arrow-head x the combination of the connecting-rods E and E′ will lift the grate C by the two arms, of which B′ is one. At the same time the lower grate ought to be moved in the opposite direction, consequently downward, and doing this by means of the same movement administered by the same motion-lever H, is the object of the new mechanism. To this effect a fulcrum is created in the pin M, attached to the support A′, located between the upper and lower grates, nearest to the lower grate and attached to the part of the frame adjacent to the operating-levers. On the pin M, representing said fulcrum, is pivoted a double-armed lever N, the obvious result of this being that an upward movement of the arm N′ of lever N in the direction of arrow-head y, would result in a downward movement on the part of N^2 and consequently be transmitted to the lower grate D, to which said lever-arm N^2 is attached, by means of the knuckle-joint O, being pivoted on the pin O′, of the arm P′, on grate D. The connection of the different elements with each other will thus be seen to be the following:—To each prong of motion-lever H, there is attached by the pins F the two levers G, both of which levers at their other ends are secured by pins L between the prongs of knuckle-joints K. Passing through an aperture in said knuckle-joints are the square arms N′ of the two fulcrumed levers N. Said levers N are each pivoted in its respective support, and the other arms N^2 of the levers N are each secured between the prongs of the knuckle-

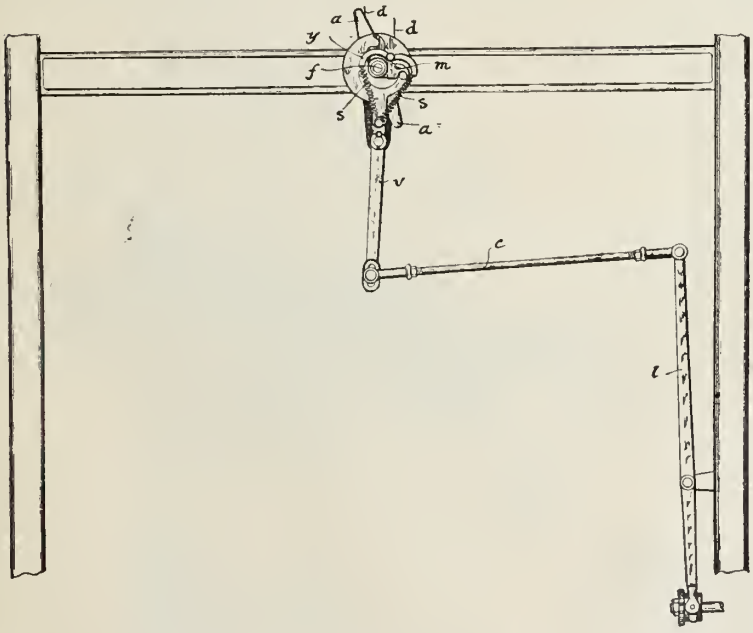
joints O, and pivoted to the arms P′ of the guides P, attached to or part of the lower grate D, thus completing the combination.

It will be observed that the knuckle-joint K is secured to the arm N′ by the screw J and can be slid back and forth, and in being thus adjustable can lengthen or shorten the rise of the lower grate. This same adjustability relates also to the upper and lower connecting-rods E and E′ of the upper grate, inasmuch as the end of rod E′ being screw-cut, so as to fit the similarly screw-cut hole in rod E, it will be apparent that rod E′ can be screwed up and down in rod E and thus shorten or lengthen the rise and fall of the upper grate at the operator's will and in exact proportion to the rise and fall of the lower grate. (*James Jackson and Sons, Paterson, N. J.*)

THE KNOWLES JACQUARD BOX CHAIN INDICATOR MECHANISM.

When required the Jacquard can be made to do the duty of the pattern-chain multiplier. The action of this multiplier was shown in the article on the "Knowles Mechanism for Operating Shedding and Drop-box Pattern-indicators." The new mechanism is shown in detail by the accompanying drawing.

The upright lever *l*, slides into and out of engagement with its star-wheel the pin-wheel which turns

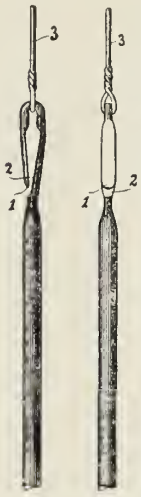


the box pattern-cylinder. Upright lever *l*, is actuated through connector *c*, from lever *v*, which is moved by cam *m*, integral with arms *a*, which are pulled up alternately as indicated by the punching of the Jacquard cards, by means of the cords *d*, which lead to lifter needles in the Jacquard.

The cards can be punched to indicate the box-pattern-chain to rest or move as desired. The springs *s*, acting through the yoke *y*, serve to hold the cam in position either side of the fulcrum *f* and prevent the jar of the loom getting it out of place. (*Crompton and Knowles Loom Works.*)

STAFFORD'S LINGO.

The object is to produce a lingo having a spring-head which shall permit the loop of a heddle to be connected therewith without any difficulty, which shall not tend to cut such loop, and which shall not exceed in its proportions in cross-section the proportions of the body or lower portion of the lingo to thereby take up room laterally or interfere with the vertical movements of the lingo when grouped with a number of others in a Jacquard harness.



The accompanying illustrations are views from different sides of the finished lingo with a wire heddle applied thereto.

This lingo presents a spring-head in which the wire is swaged to a smaller diameter than the body, it having a flattened tongue 1, an opposing flattened back portion 2, and a neck portion of circular cross-section extending throughout the bend of the neck. The neck portion is wholly free from any projection or edge such as would tend to cut the loop of a heddle. At 3, is shown part of a heddle which is connected with the lingo. (*Crompton and Knowles Loom Works.*)

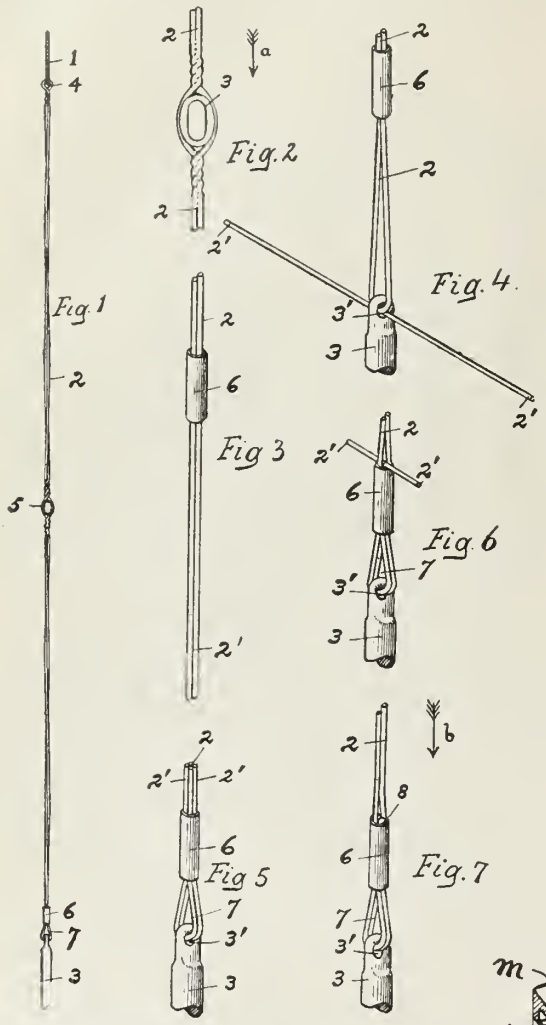
BUTCHER'S JACQUARD HEDDLE.

The object in the manufacture of this heddle is, to provide a two-strand wire heddle with an eye therein intermediate its end for the thread to pass through, said eye consisting of an oval-shaped metal eye-let secured between the two strands; the lower end of the wire heddle to be attached to the lingo by means of a tube without twisting the ends of the wire.

Fig. 1, shows this wire heddle attached at its upper end to the lower end of the cord leading to the Jacquard machine and at its lower end to the upper end of a lingo. Fig. 2, is a detached view of a heddle-eye. Fig. 3, shows the lower end of the wire heddle with the tube thereon preparatory to attaching the lingo thereto. Fig. 4, shows the next step in attaching the lingo, the ends of the wire have been bent up and passed through the eye in the upper end of the lingo from opposite sides. Fig. 5, shows the next step, the ends of the wire having been bent up again against the main wires and inserted in the lower end of the tube, which is then drawn down on the four strands of wire as shown. Fig. 6, shows the next step, the two free ends of the wire having been bent outwardly in opposite directions to extend over the top edge of the tube. Fig. 7, shows the next step, the projecting ends of the wires being cut off close to the tube, leaving the hooked ends extending over the upper edge of the tube. Figs. 2 to 7 inclusive, are shown on an enlarged scale compared to Fig. 1.

Numerals of references indicate thus:—1, the lower end of a cord leading to the Jacquard machine, to which is attached the upper end of the wire heddle 2. The lingo 3 (only the upper part of which is

shown) has an eye 3′ at its upper end, by which it is attached to the lower end of the heddle-wire 2.



The heddle-wire 2 is made from a single piece or length of wire, which is bent upon itself at its middle portion intermediate its ends and then the bent or loop portion twisted to form an eye 4, through which the cord 1, is passed to attach the heddle-wire thereto.

At a point in the heddle-wire about midway between its upper and lower ends the eyelet 5, having its outer edge grooved or recessed, is placed between the two strands of the heddle which extend in the grooved edge of the eyelet 5, and the two strands are twisted together just above and just below the eyelet 5, to secure it in place. (See Fig. 2.)

The eyelet portion of the heddle-wire 2 is tinned or coated with metal to fill any opening or joint and make a smooth and even surface which will not catch on or chafe or rub the threads as the heddle-wires are raised and lowered.

Upon the lower free ends 2′ of the heddle-wire 2, is strung a tube 6, (see Fig. 3,) which has an internal diameter just large enough to receive four thicknesses of the single wire or strand from which the heddle is made. After the tube 6 is placed on the lower end of the wire heddle, the free ends 2′ of the two wires are bent up and passed through the eye 3′ of the lingo 3, from opposite sides, as shown in Fig. 4. The ends 2′ are then bent up against the body or main portion of the heddle-wire 2, and the tube 6 drawn down over the four strands of wire (see Fig. 5) as far as it can be to form the loop 7 in the lower end of the heddle-wire for the lingo 3.

The ends 2′, which extend upon opposite sides of the main wires of the heddle, are then bent outwardly in opposite directions to extend over the top edge of the tube 6, (see Fig. 6,) and the projecting ends are then cut off close to the tube, as shown in Fig. 7, leaving hooked ends extending over the top edge of the tube 6, which prevents the tube from slipping or moving up on the wires.

The tube 6 remains in its place on the lower end of the heddle-wire and cannot work loose, because it cannot move down by reason of the divergence of the wires to form the loop 7, and it cannot move up by reason of the hooks 8 extending over its upper edge, and by means of the tube the free ends of the wire are secured to the body or main part of the heddle to form the loop 7 for the lingo 3, without any twisting of the ends or any soldering, etc. (*Edwin Butcher, Worcester, Mass.*)

COMBERBOARD TO PERMIT CHANGE OF TEXTURE.

One of the greatest inconveniences to manufacturers of Jacquard fabrics is the fact of being always more or less restricted to a certain texture after the loom is once tied up. To overcome this inconveni-

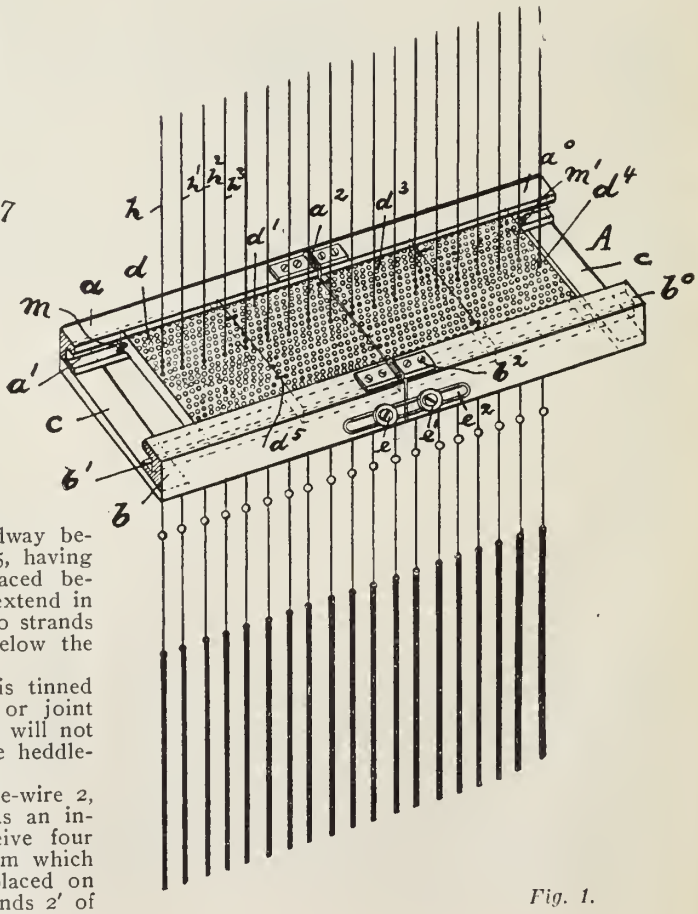


Fig. 1.

ence is the object of the new comberboard, the inventor providing an adjustable sectional comberboard by means of which the same patterns can be woven in different widths without the necessity of changing the harness and the comberboard, and thus greatly simplifying the work and reducing the time.

The improvement consists in an adjustable sectional comberboard, its adjusting and locking or tightening mechanism.

Fig. 1 is a perspective view of the improved comberboard in connection with a series of harness threads and Fig. 2, a front elevation of Fig. 1, and illustrating the comberboard adjusted to a different position.

A, represents a rectangular frame consisting of the parallel sectional side bars a, a^0, and b, b^0, hinged together at a^2, and b^2, respectively, and of the connecting braces c, c, arranged at or near the outer ends of said sectional side bars, which latter are provided on their inner sides with longitudinally extending grooves a', and b', as clearly shown in Fig. 1.

One of the side bars in the drawings b, b^0, is provided on its outside and at or near its hinge with the headed studs or screws e, e', which latter penetrate and are engaged by and in frictional contact with the elongated spring-wire loop e^2, by means of which latter the sections of the frame are held in adjusted and normal position.

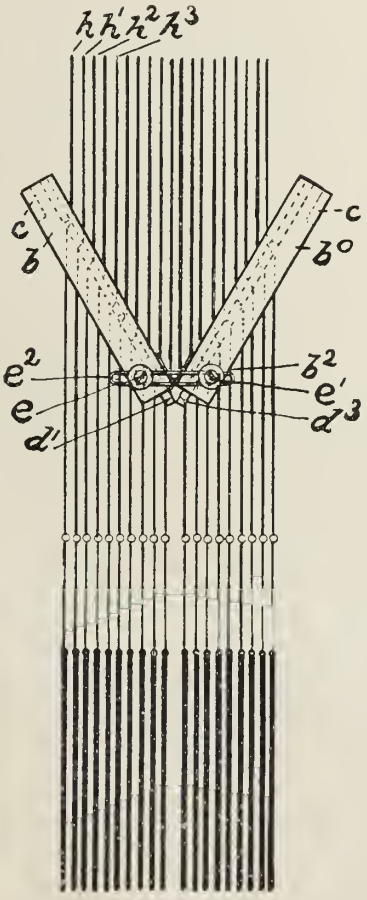


Fig. 2.

In the grooves a', and b', is arranged the comberboard proper, consisting of a series of two or more sections d, d', d^3, and d^4, connected together by threads d^5, and which boards are held in a fixed position by pins m, m'.

The harness threads h, h', h^2, h^3, pass through the openings in the comberboard in the usual manner.

As shown in the drawings, the centre line of the hinge is above the face of the comberboard, but it may be placed in the plane of the face of the said comberboard, so as to avoid the sliding of the said board within the groove of the frame during the adjustment. In this case the frame may also be dispensed with and the hinge directly arranged upon the central sections of the comberboard.

Whenever a certain pattern is completed and a different pattern is desired, calling for a different number of harness threads to the inch, the frame containing the comberboard, or the latter one, if no frame is used, is swung upon its pivot until the proper adjustment is obtained. The spring-loop e^2, being in frictional contact with the headed pins e, e', will hold the sections in adjusted positions.

A further improvement in the construction of this comberboard is the manner of boring the holes by means of which the friction on the harness cords, which would appear by using a comberboard with straight bored holes, is overcome.

By means of boring angular holes in the comberboard, friction to the harness cords is impossible; the comberboard may be placed in any position whatever required by texture and width of fabric

These harnesses will give a one-third spread of their width in the narrow position, for instance, a harness 21″ wide can be spread to 28″ or any width between the two; a 24″ harness to 32″ and so on; a harness say 300 ends per inch can be spread ⅓ and make a harness 200 ends per inch or any count between. (*Cleaver and Leather, Paterson, N. J.*)

JACQUARD LOOM WITH SHAFT-HARNESS ATTACHED.

The object of the construction of this Jacquard loom is to produce damask or figured fabrics without the use of special mountings for the ground-binding.

The ground-binding in this instance is produced by means of a special device, operating directly on the harness heddles.

The accompanying drawing shows in perspective so much of the loom as is necessary to explain the procedure.

In the drawing it is assumed that the ground-binding is that of eight-leaf satin.

1 to 8 indicate a row of hooks of a Jacquard machine.

a, are harness cords. c', to c^8, are the shafts. d, and f, are the harness boards.

e' to e^8, is an additional harness board divided into eight parts or rods with projections o' to o^8, and r', to r^8. At the right-hand side of these harness board parts, there are arranged springs s', to s^8, having a tendency to draw these rods to the right.

g, is a crank-shaft. h, is an eccentric with a connecting-rod i.

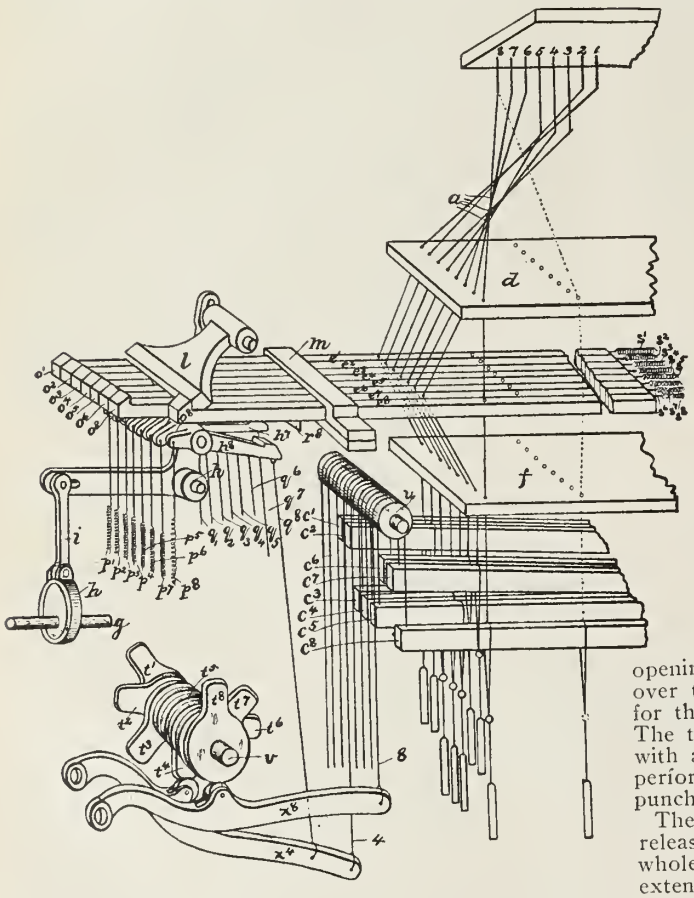
k, is a bell-crank lever. One of the arms of this lever is connected with the eccentric; the other with the reciprocating knife l.

m, is a guide for the divided harness board.

n', to n^8, are locking-pawls held against the divided harness board by springs p' to p^8, and engaging with the projections r', to r^8. The pawls n', to n^8, are connected by cords q', to q^8, with treadles or levers x', to x^8, suitably arranged in the loom and serving for lifting out of engagement the said pawls. This lifting mechanism for actuating the shafts c', to c^8, and

pawls n', to n^8, consists of levers x', to x^8, pivoted in the frame and actuated by cams t', to t^8, set at equal angles on the shaft v.

Each of these levers is connected by a cord passing round a drum u with one of the shafts c', to c^8, and by other cords q', to q^8, with the pawls n', to n^8, acting on the bars c', to c^8, of the divided harness board. The parts are as shown so arranged, that when one of the levers x', to x^8, for instance x^4, is depressed by the corresponding cam of the group t', to t^8, the corresponding shaft c^4, will be raised, while at the same time a pawl not corresponding to the raised shaft, for instance n^8, is caused to release its portion c^8, of the divided harness board, such pawl being connected with the said lever x^4, by a cord q^8.



There are as many lifting levers as eccentrics t', to t^8, but only two are shown for the sake of clearness in the drawing.

It will be assumed that the Jacquard has raised the lifting-wires 1, 2, 6, 7, and 8, for forming the pattern, but as the cord attached to lifting-wire 8, is straightened by shifting the corresponding portion c^8, of the divided harness board to the right, the corresponding shaft c^8, is allowed to remain in the lower shed for binding purposes, whereas the shafts c', c^2, c^6 and c^7, are raised in the upper shed, as required by the pattern. The return of the divisions of the harness board is effected by the parts h, i, k, l.

On pulling down one of the pawls n', to n^8, for instance, the pawl n^8, and thereby releasing the projection r^8, the division or rod c^8, is pulled by its spring to the right, following the movement of the knife l, which at this moment recedes by its projection o^8, abutting against the edge of the knife. When the knife l returns, the pawl n^8 again engages with the projection r^8, and the division c^8, is held in position by the pawl n^8, until it is again released by the cord q^8. (*E. V. Oberleithner, Machrisch-Schoemberg, Austria.*)

ROYLE'S PIANO-MACHINE FOR PUNCHING JACQUARD CARDS.

The advantage of the new mechanism in piano-machines for punching Jacquard cards, is, that banks of punches are placed under the control of locking-levers operated by keys to hold any desired number of them in operative adjustment with relation to the card to be punched.

Since the improvement is confined to the means for mounting, locking, and releasing the punches, there is only shown in our illustrations so much of the piano-machine as necessary to afford a clear understanding of the parts referred to, it being understood that the means for bringing the cards into engagement with the punches are of well-known form.

In the accompanying drawings, Fig. 1, is a top plan view, partly in section, of that part of a machine embodying the improvement. Fig. 2, is a vertical transverse section along line x-x, of Fig. 1. Fig. 3, is a vertical section from front to rear along line y-y, of Fig. 1. Fig. 4, is a partial vertical section from front to rear along the line z-z, of Fig. 1. Fig. 5, is a partial transverse vertical section along the line w-w, of Fig. 1, and Fig. 6, is a view of a portion of one of the pattern-cards.

The table or bed for supporting the pattern-cards to be punched is denoted by A, and it is provided at a point beneath the punches with an opening a, having a perforated plate a', supported over the top of the opening and forming a bearing for the card at the point where the punches operate. The table A, is surmounted by a guide B, provided with a series of perforations b, corresponding to the perforations in the plate a', and intended to guide the punches to their work.

The punches and the mechanism for locking and releasing them are carried in a head (denoted as a whole by C) supported upon a pair of rods c, c', which extend down through the guide-piece B and table A to a suitable connection with an operating-treadle (not shown in illustrations). The head C is composed of an upper plate c^2, and a lower plate c^3, the latter having a punch-supporting section c^4, in which the banks of punches are mounted, and an intermediate spacing portion c^5, between the upper and lower plates for the reception of the sliding locking-bars.

In the present instance there are shown sixteen punches arranged in a line and composed of two banks, a punch of the shorter bank alternating with a punch of the longer bank.

The punches of the shorter bank are denoted by D, and have collars d, for preventing them from dropping downward out of their support c^4.

The punches of the longer bank are denoted by D', and in like manner are provided with collars d', to prevent them from dropping downwardly out of their support c^4. Each individual punch of both

banks D, D′ is provided with a light spring d^2, which has a tendency to keep the punch at the limit of its downward movement. The lower end of the spring

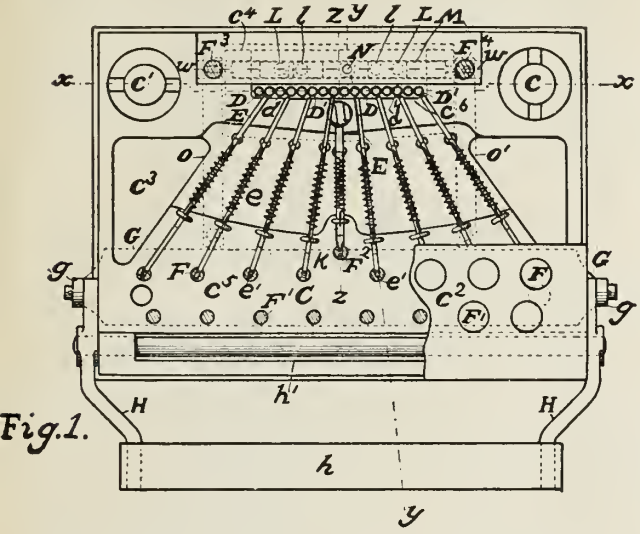


Fig. 1.

rests against a shoulder d^3, formed by reducing the body of the punch.

There is a recess or chamber c^6, provided in the spacing portion c^3, and in the plane of the line of punches for the extension of the bank of punches D′, upwardly toward the upper plate c^2, of the head, leaving a space between the plate c^2, and the tops of the punches D′, for the passage of the locking-bars.

Each individual punch D′ has its horizontally-sliding locking-bar adapted to move into the space between the top of the punch and the upper plate c^2, to lock the punch and back out of said space to release the punch. In like manner each of the punches D, of the shorter bank has a similar horizontally-sliding locking-bar adapted to be slid over the top of the punch to lock it and back out of the way to leave the punch free to move. The sliding locking-bars for the punches D′, are denoted by E, and are held normally out of engagement with the punches D′, by means of a retracting-spring e. The locking-bars E, gradually diverge from one another as they extend toward the front of the machine from the punches as shown in Fig. 1, and at their forward ends they are beveled, as shown at e', to engage a corresponding bevel f, on one of a bank of operating keys F. The keys F, are mounted in the head C, in such a manner as to have a limited vertical movement, their movement downward being limited by the contact of the under side of their heads with the top plate c^2, and their upward movement being limited by the engagement of a pin or stud f' coming in engagement with the under side of the locking-bar E.

The locking-bars for the lower or shorter bank of punches are denoted by E′, and like those already described for the longer bank of punches, are provided with retracting-springs and have their ends in like manner beveled to engage a corresponding bevel on the bank of keys F′, mounted in the present instance farther toward the front than the bank F, as shown in Fig. 1.

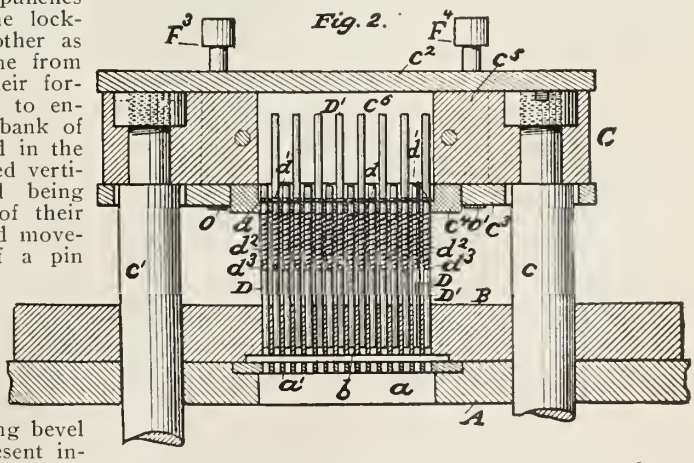
Provision is made for simultaneously returning all the keys F, or F′, which may have been depressed as follows: A plate or flat bar G, extends transversely across the machine beneath the head C, in such position as to engage the lower ends of the depressed keys F, F′, when the bar or plate is raised and said plate G, is connected by end extensions g, with the arms of a pair of operating-levers H, connected at their free ends by an operating-bar h, and pivoted on a rod h', at the front of the head C. By depressing the bar h, the key-returning plate or bar G is elevated, and any keys which project below the head are returned to their normal position, thereby permitting the locking-bars E, E′, to spring back away from over the punches into position to be again forced forward by the depression of the keys.

The punches thus far described are for the purpose of making the pattern-holes i, in the card I. In addition to these it is desirable to make, during the passage of the card through the machine, lacing-holes of greater diameter than the pattern-holes and also a peg-hole. The lacing holes are denoted in Fig. 6, by i', and the peg-hole by i^2.

The peg-hole i^2, is made centrally near the end of the card, and the punch K, for making it, is locked by a sliding locking-bar k, similar in all essential respects to the bars E, E′, before referred to, and operated by a centrally-located key F^2, quite like the keys F, and F′, referred to, and in position to be returned to its elevated adjustment by the upward movement of the bar or plate G.

The lacing-holes i', in some instances are required to be the distance apart shown by the holes represented in full lines in Fig. 6, and in other instances the distance apart shown by the holes represented by dotted lines in Fig. 6. To provide for punching them at either of these distances apart at pleasure, a bank of four punches is located in groups of two, as represented in Fig. 5, the punches for punching the holes the farthest apart being denoted by L, and those for punching the holes nearer together being denoted by l. These punches L, and l, are located to be operated by means of a sliding-bar M, provided with beveled ends m, m', the one, m, adapted to engage a vertically-movable key F^3, to slide the bar in one direction, and the other, m', adapted to engage a vertically-movable key F^4, to slide the bar in the opposite direction. A central plunger N, provided with an actuating-spring n, and working in the **V**-shaped groove m^2, in the top of the bar M, serves to return the bar M, to its normal position to release all the punches L, l. The under side of bar

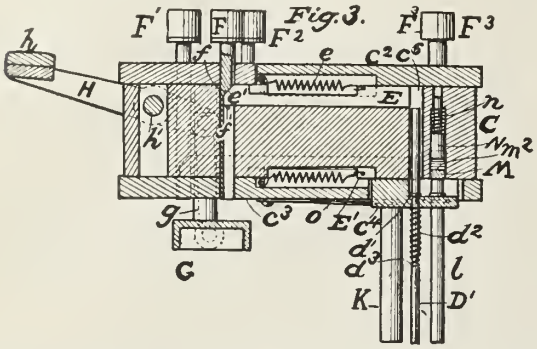
Fig. 2.



M, is provided with recesses, one of them, m^3, being of sufficient length to receive one group L, l, of the punches when the bar is in its normal position, and with recesses m^4, and m^5, separated by a partition m^6, which is normally located between the

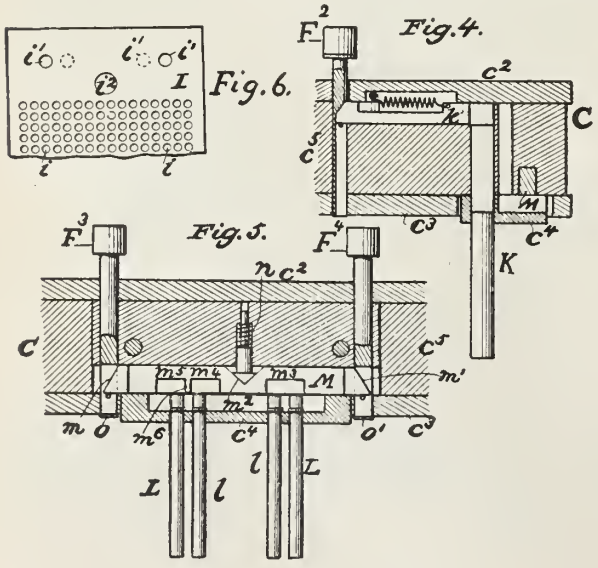
other group L, l, of punches, leaving the punches L, l, of that group free to lift one of them, L, into the recess m^5, and the other, l, into the recess m^4.

When one of the keys is depressed, for example



F^3, it will slide the bar M toward the right as Fig. 5 presents itself to the observer, carrying the partition m^6, over the punch l, of one of the groups, and the bottom of the bar itself over the punch l, of the other group, so that the two punches l, will be brought into action, and will punch the lacing-holes in the position shown in dotted lines in Fig. 6. When, on the other hand, the key F^4 is depressed, it will force the bar M to the left and will bring the partition m^6, over the punch L, of one of the groups, and the bar itself over the punch L of the other group, leaving the remaining punches l free to pass into the recess in the bar M, and bringing the punches L, into action to punch lacing-holes in the position shown in full lines in Fig. 6. The keys F^3 and F^4, are returned to their normal position, when released from the hand of the operator, by means of springs O and O' (shown in section in Fig. 5), one of them being shown in edge elevation in Fig. 3.

In operation as the card to be punched is fed beneath the punches more or fewer of the punches—according to the pattern to be punched—are locked



in operative adjustment by the depression of the proper keys F, F', and the head C, with the punches locked, is then depressed, forcing the punches through the card as it rests upon the perforated plate a'. As soon as the head C, is returned to the upper limit of its stroke, the punches may all be released by the depression of the finger-bar h, in case the pattern is to be changed at the next step, and such other combination of punches may be locked in operative adjustment by the depression of the proper keys ready for the next downward stroke of the head C. The pattern may thus be wrought out upon the card as it is fed beneath the punches, and the desired peg-hole and lacing-holes may be punched at each end of the card in the proper positions. (*John Royle & Sons, Paterson, N. J.*)

ROYLE'S MACHINE FOR PUNCHING AND STACKING JACQUARD CARDS.

Fig. 1 is a view of the machine in side elevation. Fig. 2 is a top plan view. Fig. 3 is a view in rear elevation, and Fig. 4 is an enlarged view in detail.

The supporting-frame of the machine consists of a head A and a backbone A', projecting at an angle to the head, the whole being supported upon three legs, two of them, a, a', located at or near the extremities of the head A and the third, a^2, located at or near the extreme end of the backbone. This particular form of frame is light and at the same time affords a rigid stable support for the movable parts of the machine. The head A is surmounted by a table B, from which uprises a pair of end guides C, C', for holding the supply-stack of blank cards to be fed to the punches.

The punching mechanism is located immediately to the rear of the stack-guides C, C', and is denoted as a whole by D. As the present invention does not relate to the punching mechanism in detail, it will suffice for the purpose of understanding the present invention to say that the cards as they are fed rearwardly from the supply-stack are received upon a punch-bed d, and that the punches are forced through them by means of connecting-rods d', connected with the punch-carrying head d^2 and actuated by eccentrics d^3, d^4, on the shaft E, driven by the main drive-shaft F, through the intermeshing gear f and e.

The means for accomplishing the feed is effected by a flat plate g, (see Fig. 3,) fixed to a pair of rack-bars g' g^2, mounted in suitable dovetailed grooves in the top of the table B and actuated by a pair of sector-bars G, G', fixed to a rock-shaft H. The rock-shaft H, is mounted on a spindle h, supported in suitable forwardly-extending portions h' and h^2, of the head-frame A and provided with collars, one of them h^3, being interposed between the bearing h', and the end of the sleeve H' and the other, h^4, being interposed between the bearing h^2 and the opposite end of the sleeve H', and provided with an extended neck h^5, which extends through the bearing h^2 into position to engage the nut h^6, screwed onto the projecting end of the spindle h.

By tightening on the nut h^6, the washers h^3 and h^4 are forced into closer frictional contact with the opposite end of the sleeve H', so as to at all times prevent the pitching forward of the sleeve H' under the momentum of its throw. This is an important feature, inasmuch as the slightest pitch beyond the predetermined point will tend to advance the card slightly beyond the position where it should rest to be punched, and the holes in it are thereby made more or less out of adjustment, a feature which becomes objectionable when the cards are employed for determining the pattern.

For purposes of lifting the supply-stack of cards, whenever from any cause an imperfect card becomes curled, split, or broken during the operation of feed, the end standards C, C', are provided with vertical

slides c, one on the inner face of each, the said slides being provided at their lower ends with offsets c', adapted to take under the ends of the lowermost card and lift it, together with those above it, upwardly from the table. The slides c, are provided with operating-handles c^2, which extend through elongated slots c^3, in the standards C, C', and bracket outwardly from the outer faces of the standards. Retaining-hooks c^4 are pivoted to the outer faces of the standard C with their operating ends in position to hook under the handles c^2, when the lifting-slides are elevated and retaining the supply-stack in the desired elevation while the defective card is being removed. As soon as the trouble is remedied, the supply-stack may be again lowered by simply tripping the retaining-hooks c^4. Offsets c' at the lower ends of the slides c, are adapted to rest normally within recesses c^5, formed in the table, so as to form no obstacle to the free passage of the cards along the surface of the table.

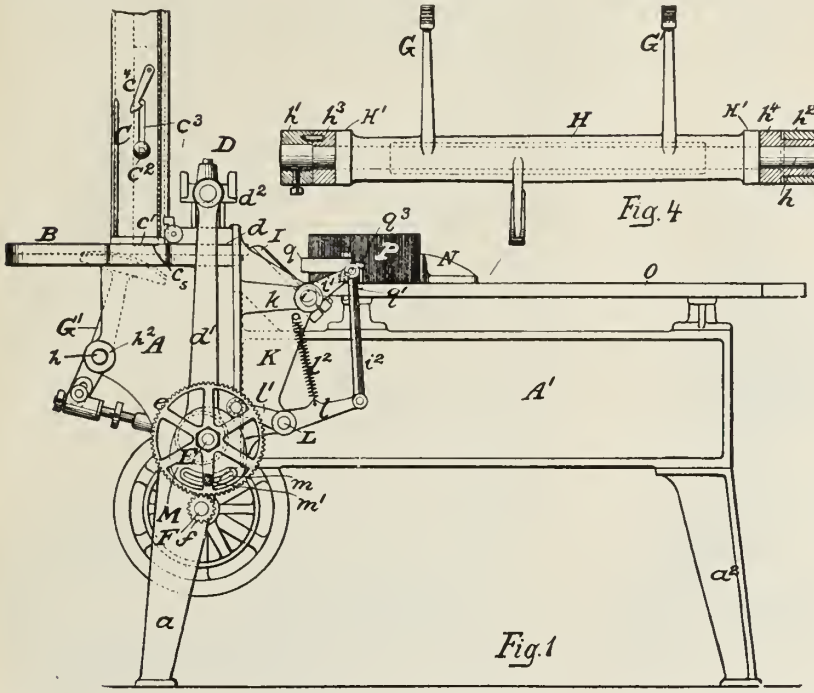


Fig. 4

Fig. 1

As the punched card is pushed forward by the next succeeding card from the bottom of the supply-stack, it is received upon a skeleton rest I, consisting of arms fixed to and radiating from a rock-shaft i, mounted in lugs k, projecting rearwardly from a pair of brackets K, K', fixed in vertical adjustment at the rear of the head-frame A. The shaft i, is rocked by means of a crank-arm i', connected by a rod i^2, with the arm l, of a vibrating lever pivoted at L, to the bracket K, the opposite arm l', of said lever being in engagement with a cam M, secured to rotate with the gear-wheel e. The cam M is provided with an elongated slot m, through which the clamping-bolt m', extends for locking the cam to the wheel e, in the desired rotary adjustment relative thereto, in order to rock the shaft i, and hence the rest I, at the proper moment during the rotation of the wheel e. The vibrating lever pivoted at L, is operated in a direction to return the rest I, by means of a spring l^2, connected at one end with the arm l, and at its opposite end with the supporting-frame.

After the punched card has fallen upon the rest I, the shaft i is operated and the card is thrown over into an upright position, resting on its edge and supported against a traveling stop N, mounted to slide along a groove o, in the upper face of a support O, mounted on the supporting-frame A'. It is intended that the stop N shall be sufficiently weighted or otherwise retarded by friction, so as to afford the necessary resistance to hold the stack of cards in an edgewise upright position against it, and yet, so that it will yield step by step the distance of the thickness of a card under the pressure of each succeeding card which is forced by the rest I against it, or the cards which have already been pressed against it.

As the cards approach their edgewise upright position to form the stack P, their ends are caused to slip past a pair of spring-actuated retaining-hooks q, which swing outwardly as the card is pressed between them, and immediately the card has reached its upright position swing forwardly toward one another under the tension of light actuating springs q'. Stops q^3, are employed to limit the throw of the retaining-hooks q.

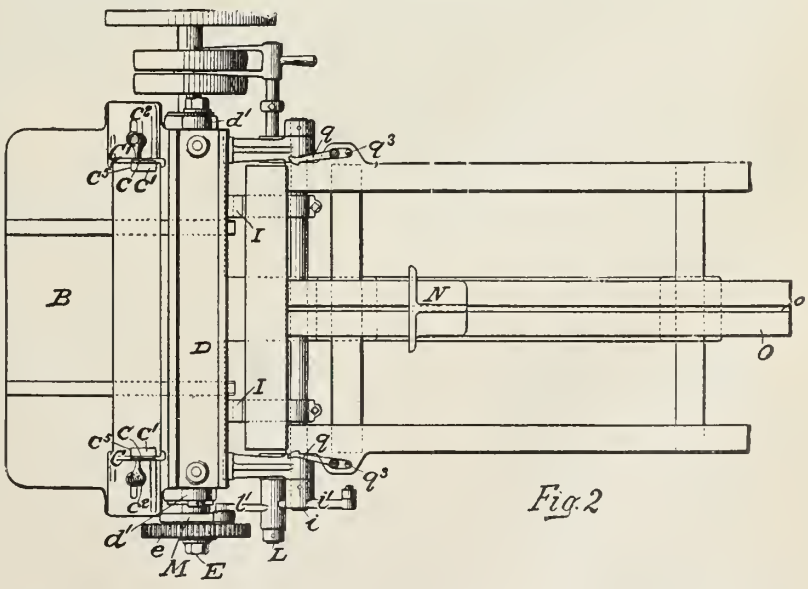
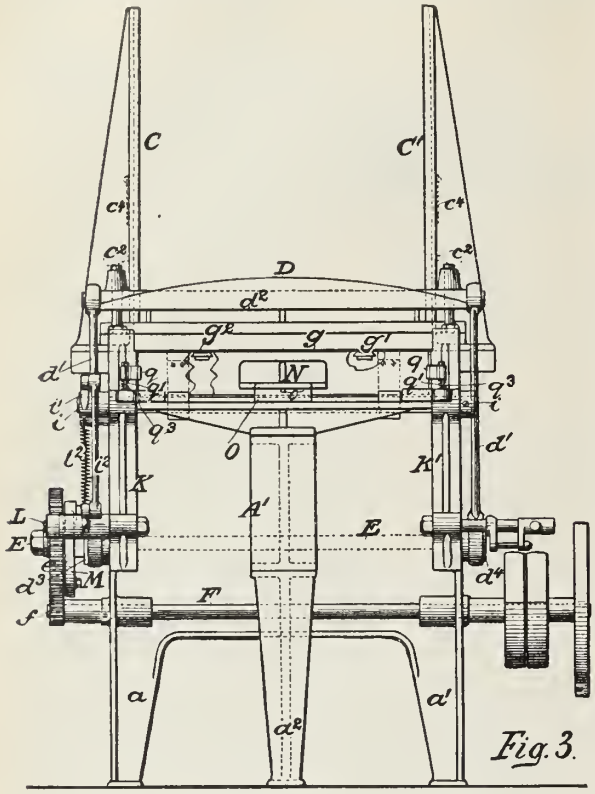


Fig. 2

The operation as a whole may be briefly described as follows:—The cards are fed one by one from the



supply-stack beneath the punches and after having been punched are fed forward by the action of the next succeeding card, so that when one card is pushed forward from the bottom of the supply-stack in position to be punched, it at the same time pushes a punched card onto the rest I. While the card is being punched, the rest I is operated and the punched card thereon is forced rearwardly against the end of the stack P, between the retaining-hooks *q* and is there held, while the rest I is returned to receive the next succeeding card from the punches.

The stack P, may be continued to any desired length by simply extending the support O. (*John Royle, & Sons, Paterson, N. J.*)

WIRE ROD FOR JACQUARD CARDS.

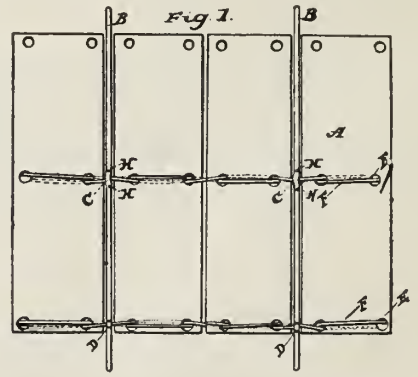
This Jacquard card wire will not slip in the working of the cards or shift its position as the cards pass around the card-cylinder. It is secured by a staple and hook-eyes to the card-laces or by a string or wax end.

Of the wires in use, some have two wire rings soldered on the middle portion, between which the tying-strings are secured, and the wire can only slip the distance between said wire rings, whereas others have plain straight wires, again others have, in lieu of the two rings soldered on, two flat places where the wire has been flattened, this making two stops, between which the string is tied, and in these the wire may slip the distance between the flat places.

The new wire rod consists of a wire provided with one or more curves adapted to fit over the card-lacing, permitting the main stem of wire to go between the two adjoining cards, and provided with a small hole on each side of said curves adapted to permit a cord or fine wire staple to pass through the wire for the purpose of securing it to the card-lacing; two or more wire loops are used and which pass around the card-laces and which are provided each with two eyes or rings formed at right angles to the main loop portion, which passes around said laces, said eyes being adapted to permit the card wires to pass through them.

Fig. 1 is an illustration of the improved wire and some Jacquard cards laced together, showing the position of the wire between the cards, the curve that fits over the laces, and the holes on each side of the curve, and the loop-eyes through which the wires pass. Fig. 2 is a view showing the card wire provided with the curve and a hole passing through the wire on each side of the curve, a staple passing through said holes and adapted to hold the card wire and laces together to prevent the slipping of the wire and showing the wire loop adapted to hold the card wire and laces together, the card wire passing through the eyes or rings on wire loop.

A, is the card; B, the card wire; C, the curve which fits over the lacing between the cards, as many of which may be provided as desired; D, the loops provided with eyes or rings, the loop portion going under the laces and the eyes or rings onto the card wire, thus locking the wire and lacing together; E, the holes in card through which laces pass; F, is the lacing, and G, are the staples, consisting of very fine wire. Although string, or cord, waxed or otherwise, might be used, yet the use of staples is more advantageous. If cord is used it is not necessary to pass it through the holes H, H, the curves being tied to the lacing, virtually accomplishing the



desired object. (*J. Cleary and T. M. Miller, Paterson, N. J.*)

The Royle "Repeater," for punching Jacquard cards from a set previously punched on a piano machine, is not explained in this chapter, this machine having been illustrated and explained in "Posselt's Jacquard Machine Analyzed and Explained."

SPOOLING, WINDING, WARPING AND REELING MACHINERY.

THE FURBUSH AUTOMATIC STOP-MOTION FOR SPOOLING MACHINERY.

This stop-motion consists of a series of iron trap-guides equipoised on a rod extending the full length of the machine, and having a thread or screw its entire length. The trap-guides are fitted loosely on this long-threaded rod, so that they can be quickly adjusted to any gauge, and they have each a wire

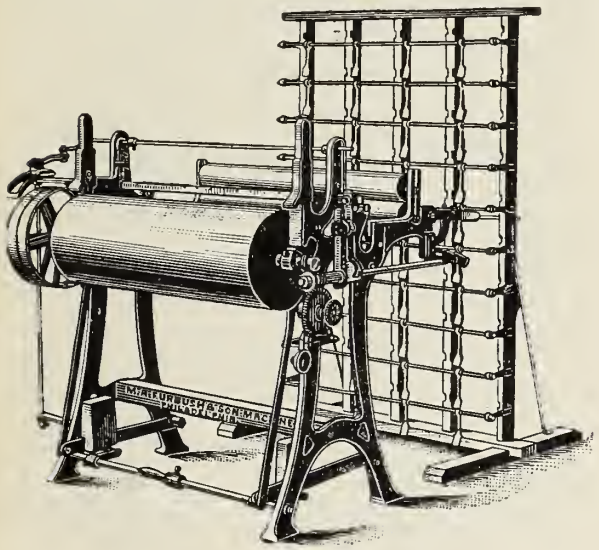


Fig. 1.

hook made of hardened and tempered steel, fastened to them by means of a small screw. These wire hooks are reversible, so that as the yarn cuts and wears them at one end, they can be turned and the other end used, or being merely fastened by a small screw, they can be easily and cheaply replaced with new ones. When an end breaks, the trap-guide falls and comes in contact with a constantly vibrating bar, and the machine is immediately stopped.

Another feature of the spooler is the tension-rolls on the back of the machine. These rolls keep a constant and equal tension on the yarn when the machine is running or stopped, and when the spooler stops on account of a broken end, the rolls are connected positively with the driving pulleys by means of a belt and a clutch, and reversed with the machine and spool in turning back to find and piece up the broken end. By these means, the trap-guides, with the exception of the one on the broken thread, are all kept up in place and the tension on the yarn preserved.

A description of the construction of the new device is best given by means of the accompanying illustrations. Fig. 1, is a perspective view of this well-known Furbush Spooler, and to which the present invention more in particular refers to; Fig. 2, is an enlarged diagrammatic view illustrating in side elevation and vertical section the latch, a rocking-arm, the spooling mechanism, the thread, and the feeding mechanism for the thread, and Fig. 3, is an enlarged perspective view of the latch and its supporting-shaft or screw detached from the machine, and illustrating a preferred method of securing the latch on its shaft.

Examining our illustrations, we find spool B, and drum B′. Both are to be situated in the frame work of a regular spooling machine and driven by pulley and belt in the common manner. At the other end of the machine and in the frame, the two tension-rolls D and D′, are supported, and over these tension-rolls the threads E to be spooled are passed. The threads E are passed or guided through a reed F′, which is longitudinally movable back and forth across the machine to properly wind each thread upon the spool B.

Secured in the frame of the machine parallel with and below the guide-rod F′, is a fixed shaft or rod a, upon which is loosely supported a series of latches b, corresponding in number to the number of threads E, and each latch is provided at one end with a hook b', by means of which the latch is hung upon a thread E. The hook end of the latch b, is also provided with a projection, or shoulder b^2, and the other end of the latch is cut out or recessed, as at b^3. Through the recesses of the latches is passed a rod b^4, serving as a stop to limit the movement of the latches upon the shaft a. The hook end of the latch b is weighted, so as to be heavier than the recessed end, the object being to permit the latch normally to be depressed at its hook end.

The latch is held with its hook end elevated by means of the thread E, but should the thread break, the weighted hook end carrying the shoulder b^2, will immediaetly drop by gravity (and thus automatically, by means of proper connection and arrangements, arrest the motion of the machine).

Below the supporting-shaft a, and parallel there-

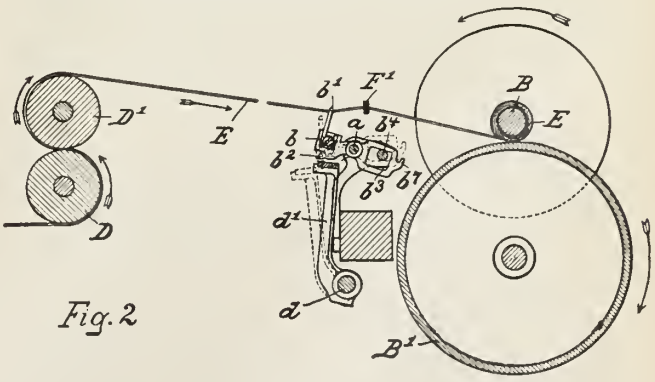


Fig. 2

with is placed a rocking shaft d, rocking in suitable bearings in the frame of the machine. To this rocking shaft d, is secured at either side of the machine a vertically disposed rocking arm d', the two arms d'

being connected at their upper free ends by means of a cross-bar. As the arms d' are rocked by the shaft d, this cross-bar oscillates in a path directly below the elevated hook end of the latches b', and particu-

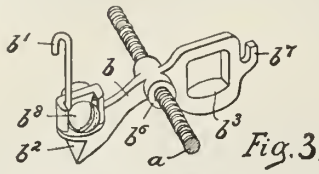


Fig. 3.

larly below the shoulder b^2, thereof. When, however, the hook end of one or more of said latches drops by gravity, the shoulder or shoulders b^2 thereof, will drop into the path of said oscillating cross-bar, and thereby prevent its further oscillation and thus stop the machine by means of connecting with the shipping device.

During the passage of the threads E, over and through the tension-rolls D and D', these rolls are caused to rotate and by their momentum will ordinarily continue to rotate for some time, even when the machine is stopped, and the threads E, no longer wound upon the spool. The threads would, therefore, sag and tangle in the machine between the tension-rolls and the spool, and this would especially occur should, for any reason, the spool and winding-drum B be suddenly stopped. To obviate this difficulty, a special mechanism is devised, by means of which one of the tension-rolls is connected with and driven positively by the driving-pulley at the moment the belt is shifted or transferred from the fast to the loose pulley, but before the belt has completely left the fast or driving pulley. The tension-rolls are thus brought directly under control of the driving-pulley of the winding or spooling drum B, and when this pulley and drum cease to rotate the rolls are stopped.

In Fig. 3, there is illustrated a preferred way of mounting the latch b, upon the fixed shaft or screw a, so as to permit of an adjustment of the latch on the shaft toward the sides of the machine. This is accomplished by threading the shaft a and the opening b^9 of the latch b, through which the shaft a extends. The threaded connection between the latch b and shaft a, is sufficiently loose to permit the fall of the hook end of the latch, as previously described.

When each latch is turned on the threaded shaft independently of the others, the grouping of the latches into required position can be effected, and this position will be determined by the number and arrangement of the threads E. The latch b is also provided with a hook b', at its recessed end, upon which hook a weight may be suspended to hold the latch with its hook end b' elevated, out of the path of the cross-bar when the latch is not required to be suspended from a thread E.

The hook b', is a double hook and constructed so that either end may be used to suspend the latch from the thread. Thus the lower hook is secured, by a nut or screw b^8, to the latch, and should the upper hook wear through, or nearly through, the hook may be reversed, so that the lower hook can be used to suspend and the upper hook secured to the latch by the screw b^8.

Although the new device is explained in connection with a spooling-machine, it is to be understood that with proper changes or modifications as will readily suggest itself, this device can be applied to spinning, doubling, winding machinery, looms and, in fact, any textile machine wherein upon the breaking of a manipulated thread, it is desirous to automatically stop the machine. (*M. A. Furbush & Son Machine Company, Philadelphia.*)

DRAPER'S SPOOLING MACHINE.

In the use of spooling machines intended to wind the yarn off from a plurality of cops or bobbins onto a large spool, the end of yarn on a fresh bobbin must be united to that of the preceding bobbin. The spooler-tender ties a knot joining the two threads, and as the spool-supports are continuously rotated the tender, while tying a knot must keep the spool from rotating with its spindle, by holding it from rotation with her hand. This interferes seriously with the tying of a proper knot, and, in fact, becomes a positive disadvantage when it is expected or required that the operator shall tie a "weaver's knot," which requires the free use of both hands, and is much the best knot as regards the effect upon the future weaving operation.

The object of the new mechanism is the production of simple and convenient means for positively raising the spool from its friction-seat on the spindle when a knot is to be tied, the spool being held out of contact with its rotating mechanism while the operative has the free use of both hands to tie the knot, means being provided for permitting free retrograde rotation of the spool while so held.

Fig. 1 is a sectional view of the new mechanism, and Fig. 2 is a detached detail view of the spool-controlling device.

The spindles B, have secured at their bases hubs or collars b', provided wih disk-like flanges or tops b^3, upon which the spools S, rest, and are rotated by friction, the spindles extending through the barrels of the spools.

Brackets a, attached, as herein shown, to the spindle-rail A, support a box D at the rear of the spools, and stands a' are bolted to the front of the box D, one for each spool. To a depending ear a^2 on the stand is pivoted a lifter-bar a^3, bent downward at its outer end and having mounted thereon at a^4 a friction roll a^5, normally below and out of engagement with the base of the adjacent spool.

On its under side the bar is cut away to present a cam-surface d^x, and leave shoulders 2, 3, which form limiting-stops for a pin or stud d', on the outer side of the lower arm of a lever d, pivoted to the stand at d^2, and extended upwardly

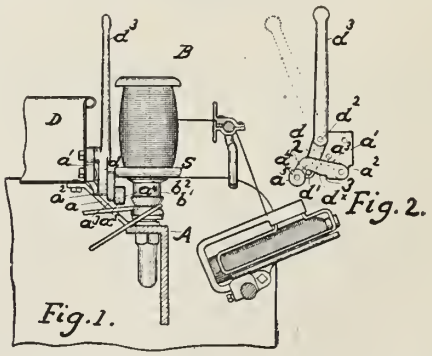


Fig. 2.

Fig. 1.

above the top of the spool to form a handle d^3. Normally the handle d^3, occupies a substantially vertical position, as shown in full lines, Fig. 2, the pin or stud d' then resting against the shoulder 2 of the lifter-bar a^3, the shoulder being concaved as shown in Fig. 2, to form a species of lock, the roll a^5, being at such time held away from the spool-base.

When it is necessary to stop the rotation of a spool for any purpose, as to tie a knot in the yarn, the operative moves to the left, Fig. 2, the handle of the actuating-lever d' of the particular spool into dotted-line position. This moves the stud d' along the cam-

surface d^x of the lifter-bar a^3, raising the outer end of the latter until its roll a^5 bears against and lifts the base of the spools S from the actuating-disk b^2, acting as a brake to stop the rotation of the spool and maintaining it lifted and stationary as the stud d' bears against the shoulder 3, and the adjacent portion of the cam-surface d^x, the weight of the handle d^3 then serving as a counterbalance to the weight of the spool and maintaining it raised.

Any number of spools can thus be rendered inoperative and brought to a standstill until the operative has tied the knots or performed any other necessary act, when by a slight push on the handle d^3, the spool-lifting mechanism is rendered inoperative and the spool lowered upon its driving-disk b^2. (*Draper Co.*)

LORD'S SPOOLING MACHINE.

The object of this spooler is to enhance the value of spooling machines by improving the stop-motion devices, so that they will act to take up the usual slack without stopping the machine, yet, when the yarn breaks or becomes snarled the said devices will be moved to stop the winding of the yarn.

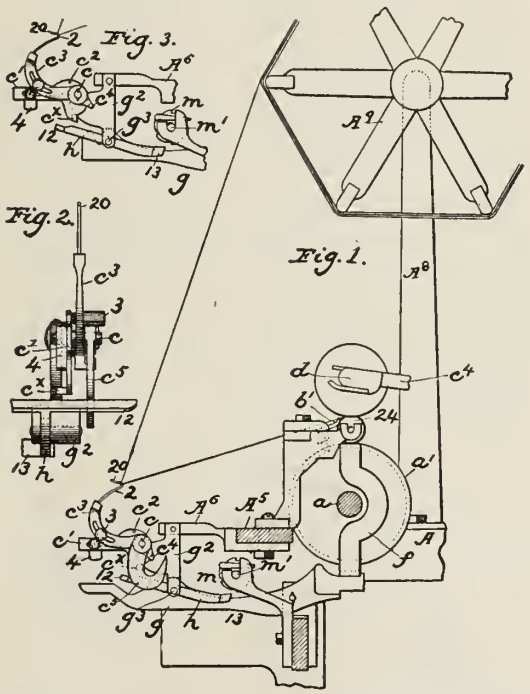


Fig. 1, in side elevation represents a sufficient portion of a spooling machine with the improvements added to enable its construction to be understood. Fig. 2, is a partial view of Fig. 1, looking from the left; and Fig. 3, is a detail with the snarling stop-lever shown omitted in the other figures.

Letters of references indicate thus:—A, the frame; A^8, upright; A^9, reel; a', grooved drum; 24, winding-roll; d, the spindle on which is mounted a conical or other shell to enable the yarn to be wound in a conical or other mass; c^4, the support for the spindle; b', the traversing yarn-guide, reciprocated by the usual groove in the face of the drum; g, the lever; f, the lifting device to elevate the roll 24 from the drum to stop the winding operation; m, the rotating ratchet-wheel on the shaft m'; A^5, the stringer; A^6, the arm; g^3, the leg, pivoted to it and having a pivot g^3, on which is mounted a leg-lever h, the inner end 13 of which is adapted to be lifted at times to be struck by the teeth of the ratchet m, and cause the leg or a part carried by it to strike and turn the lever g, and elevate the lifters f, one at each end of the roll 24, and remove it from contact with the drum to stop the winding of the yarn.

The leg g^2, or its equivalent, is provided with a stud c, on which several independent devices are mounted, viz., a two-armed lever c', having a pin or projection c^2, and a heel c^x, a take-up lever c^3, having at one end an open thread-receiving eye 2, and at its other end a toe c^4, and a snarling stop-lever c^5.

The eye 2, of the take-up lever, hangs on the yarn between the usual traversing guide and the reel, and the lever is provided with a suitable weight 3, for regulating the tension on the yarn, and in case the yarn breaks, the take-up lever drops and meeting the broad outer end 12, of the leg-lever, lifts its inner end 13, so that it is struck by the usual rotating stop-wheel to stop the winding operation.

The snarling stop-lever c^5, normally hangs near but not in contact with the broad end 12 of the leg-lever, but when said snarling-lever is struck by the toe c^4, of the take-up lever, the snarling-lever is swung forward and strikes the said end 12, of the leg-lever and depresses it, lifting the inner end 13, to be caught by the stop-wheel to stop the winding operation.

The extremity of the take-up lever beyond its eye 2, is bent outwardly to form a cast-off portion 20, which, when the yarn has turned the said lever far enough on the stud c to cause the toe c^4 to meet and actuate the snarling-lever, which, owing to its peculiar shape, will discharge itself from the thread, and thereafter the take-up lever will drop, as hereinbefore provided for.

The heel c^x, of the lever c', rests against the leg g^2, and said lever c' has attached to it, in an adjustable manner, a weight 4, said weight controlling the amount of strain which shall be exerted on the yarn after the take-up lever (it being raised by a snarl in the yarn) meets the pin c^2, for before the said take-up lever can be moved far enough to cause its toe to meet and move the snarling-lever, the take-up lever must meet the pin c^2, and lift the lever c'.

By adjusting the weight 3, the tension can be either increased or decreased, according to the requirements of the yarn being wound. By the adjustment of the weight 4, the operator is enabled to determine the amount of strain to be put on the yarn, to take out if possible, a snarl before the snarl-lever will be actuated. These adjustments, therefore, constitute very important features of the new spooler, they controlling the winding of the yarn absolutely to the wants of the operator. (*C. S. Lord, Winooski, Vt.*)

DRAPER'S SPOOLER-GUIDE.

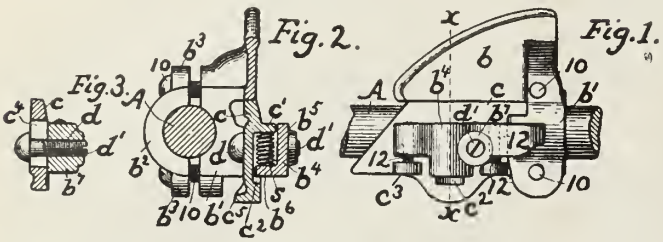
In this new guide the blades may be readily separated to temporarily widen the slot or space between the blades, whereby, if the guide becomes clogged, as frequently happens, the obstruction can be readily removed by the attendant.

One of the blades is mounted to tip and is yieldingly held in normal position relatively to the other blade, and means are provided for adjusting the distance between the edges of the blades.

The mounting of the movable plate in such a manner that it will tip, prevents the tampering with the guide in such manner as to leave the opening wide enough at all times to permit a bunch on the yarn to pass through without breakage of the yarn. If an attempt is made to wedge apart the blades, the movable one will tip on its support, closing the outer end and becoming inoperative.

Fig. 1, is an enlarged rear side view of this spooler-guide. Fig. 2, is a vertical section thereof on the line x-x, Fig. 1, looking toward the right; and Fig. 3, is a sectional detail of the pivotal sliding-connection between the blades.

The new guide comprises, essentially, two blades b, c, the upper blade b, having a lateral offset-portion or base b', in which is a recess to partially embrace the supporting shaft or rod A, and forming one member of a clamp, the other member of the clamp consisting of a plate b^2, recessed to embrace the shaft



A, and having ears b^3, through which clamp-screws 10 are extended into threaded holes in the member b'.

By tightening or loosening the screws the guide as a whole is firmly adjusted or moved upon the supporting-shaft.

The blade b, has a foot b^4, extended from the base b' below and behind the blade, provided on its inner side with a socket b^5, open at its top and inner side, as shown in Fig. 2, the foot having a threaded hole at each side of the socket to receive adjusting-screws 12, the lower ends of which project more or less below the foot, as shown in Fig. 1.

The blade c, has on its rear face and about midway between its ends a lug c', to enter loosely the socket b^5, and bear upon a spring s therein, Fig. 2, said spring resting on the bottom b^6 of the socket, the said bottom projecting into a vertical groove or depression c^2 in the face of the blade c. Ears c^3 extend from the said blade and are held against the adjusting-screws 12 by the expansive force of the spring s, the position of the screws thus determining the distance between the edges of the two blades b and c.

The blade c is vertically slotted at c^4, to receive the shank of a screw d, (see Fig. 3) which is firmly screwed into a boss b^7 on the foot b^4, thereby connecting the two blades, yet permitting bodily movement of the blade c toward and away from the blade b, and also movement of blade c on d as a pivot, a separate screw d' in the boss acting as a check to prevent loosening of screw d by jarring.

A lip on the blade c, engages the foot b^4, and limits the downward movement of the movable blade, which latter on its front side near its lower edge is provided with a finger-piece c^5.

If the guide becomes clogged, as it frequently does, the attendant grasps the finger-piece c^5 and draws the blade c down, compressing the spring s and separating the blade edges, so that with the free hand the attendant can remove the obstruction from between the blades.

When the finger-piece is released, the spring expands and automatically returns the movable blade to operative position, controlled by the adjustment of the screws 12, without any further attention.

If a wedge be inserted between the blades at their inner ends, so as to be unnoticed, the movable blade will tip on its yielding support, closing its outer end, so that the guide will be inoperative, and such tipping of the movable blade prevents tampering with the guide in the manner described. (*Draper Co.*)

DRAPER'S BOBBIN-HOLDER FOR SPOOLERS.

The object of the new holder is to adapt the same for the use of short and long bobbins. The accompanying illustration is a side elevation of this bobbin-holder.

The upper arm A of the holder rises from a clamp A', (shown as forked, as at A^2,) and provided with a set-screw to aid in confining the said arm in place.

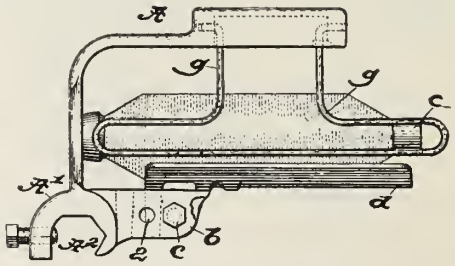
Extended from the clamp is a bracket b, having a plurality of bolt holes 2, one of which is entered by the bolt c, employed to hold the rest or pan d on which the bobbin c is laid, said bracket also, as shown, having at one side of each of said holes a notch, in which enters a teat or tongue at the inner end of said rest or pan.

By taking out the bolt c, the rest or pan d may be adjusted in the bracket, and the bolt may then be put back into whichever of the holes 2 desired, that depending upon whether a long or short bobbin is to be held, the parts being shown in the illustrations adjusted for the longer bobbins.

The enlarged free outer end of the arm A is chambered at its under side, and one end of said chamber is provided with an extension entering said chamber, made by sawing slots out of the solid casting on each side, and the end walls of the chamber are provided with holes to receive the bent ends of the arms of the guards g, said extension acting as a separator for the guards, so that they will remain separated for a short distance when the bobbin is not in place between the arms.

The rest or pan d, upon which the bobbin is placed, has a central cavity and side wings extended therefrom, leaving corners between the said cavities and the wings.

A full bobbin resting upon the corners is maintained central with relation to the pan, and when the bobbin is being unwound it grows smaller in diameter and enters the cavity, and when nearly unwound in jumping about in the cavity the corners act to

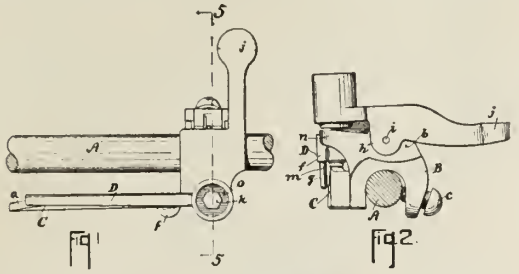


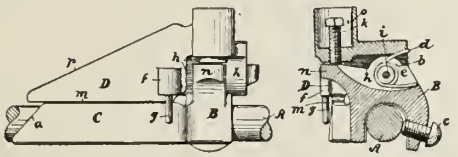
check the movement of the bobbin, and should the bobbin escape over the corners it will rest upon the wings, and under the action of the guards will be pushed back again into the cavity. In this way the wings prevent the escape of the bobbin from the pan. (*Draper Co.*)

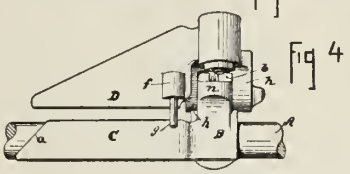
BUNCH-ARRESTING YARN-GUIDE FOR SPOOLING MACHINES.

This mechanism relates to means for preventing the winding of imperfect yarn onto the spool, and it consists in the improved construction of a bunch-arresting yarn-guide, attached to the traverse-rod and adapted to receive the yarn from the traverse-rod and guide it onto the spool. The guide can be changed to suit any size of yarn.

Fig. 1, represents a top view of the yarn-guide. Fig. 2, represents an end view of the same. Fig. 3, represents a side view showing the jaws in their closed







condition. Fig. 4, represents the same view with the jaws in their opened condition. Fig. 5, represents a vertical section taken in the line 5-5, of Fig. 1.

Letters of reference indicate thus: A, represents the traverse-rod of a spooling-machine, to which the bunch-arresting yarn-guides are attached, the said yarn-guides consisting of a holder B, provided with a set-screw *c*, for attachment to the rod A; the said holder being provided at one side with an elongation which forms the stationary jaw C, which is provided with the inclined edge *a* at its outer-end and with the ear *b*, to which is pivoted the movable upper jaw D, the said jaw being actuated to close upon the stationary jaw C, by means of the spring *d*, which is held in a recess *e*, made in the middle portion of the ear *b*. At the base of the jaw D is formed the boss *f*, to which is attached the pin *g*, which serves to limit the lateral movement of the yarn as it is being run onto the spool.

The movable jaw D is provided with the opposite ears *h*, which embrace the opposite sides of the ear *b* of the holder, and are secured thereto by means of the pivot *i*. The movable jaw D is also provided with the projecting arm *j*, by means of which it may be raised from its normal closed position with the jaw C, against the closing action of the spring *d*, as shown in Fig. 4, and with an adjusting-screw *k*, by means of which the width of the elongated opening *m*, between the parallel jaws C and D, may be adjusted to adapt the device for spooling different grades or sizes of yarn, the projecting lug *n*, upon the holder B, forming a bearing-seat for the lower end of the screw *k*.

In order to prevent the operator of the machine from readily tampering with the adjustment of the yarn-guide, as they are liable to do in order to avoid the trouble of piecing the broken ends, the head of the adjusting screw *k*, is placed in a chamber *o*, which upon the proper adjustment of the opening *m*, may be sealed, thus providing a check against the dishonesty of the operator. The movable jaw D, is also provided with the downwardly-inclined edge *p*, which serves to assist in the rapid threading of the guide.

The yarn to be wound upon the spool first passes over the surface of the traverse-rod A, and then through the opening *m*, between the horizontal jaws C and D, and thence passes to the spool; and when a bunch or enlargement of the yarn arrives at the opening *m*, the said bunch or enlargement will be arrested, and the thread will be broken between the said jaws and the spool, so that the imperfect yarn will not be wound thereon. The operator of the machine can then, by raising the jaw D, as shown in Fig. 4, release the yarn from the opening *m*, and readily remove therefrom an impediment to the subsequent proper passage of the yarn therein. (*Frederic W. Easton, Pawtucket, R. I.*)

SHELL-HOLDER FOR SPOOLING MACHINES.

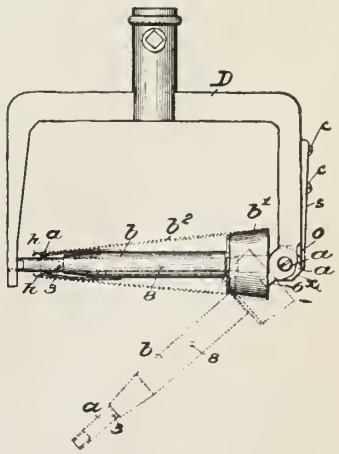
The object is to manufacture a spindle that can be thrown to one side when a shell is to be changed from a full one to an empty one.

The accompanying illustration shows in elevation such an improved holder mounted in a yoke; the dotted lines showing the yoke turned out to enable a shell to be removed or applied, as desired.

This holder consists of a dead spindle *a*, or a spindle on which is mounted to rotate a sleeve *b*, having an attached base or enlargement *b'*, said enlargement being adapted to receive the inner or enlarged end of a shell *b²*, supposed to be of paper or thin light weight material, the shell being shown as of cone shape, and as being held in position by dogs pivoted on the base and having pins extended through holes in the base; a suitable cam or device, acting on said pins to throw the dogs out, to engage and hold the shell, or to draw them in to release the shell.

The dead spindle has at one end an eye through which is extended a pivot bolt *a'* to thus pivot the dead spindle to one arm of the yoke D, the opposite arm of the yoke having a shoulder and spring to coöperate with the free end of the dead spindle and hold it steadily when in the position shown by the full lines, but enabling the spindle to be turned out, as shown by the dotted lines. The sleeve *b* is kept on the dead spindle between a shoulder and a pin 3.

At the rear side of the base *b'* and within it and surrounding the dead spindle loosely, there is provided a cam-plate having two pins, one of which pins will strike a stop 6, carried by the yoke, when the spindle is turned out, as shown by dotted lines, one or the other of said pins striking said stop according to which direction the sleeve and base are turned about the spindle, and as soon as the cam-plate is arrested by the stop 6, the further movement of the sleeve and base causes the pins of the dogs to ride over the edge of the cam-plate and throw the dogs in or out, as desired.



The sleeve *b*, is provided with an oil hole 8, for the introduction of oil between it and the dead spindle.

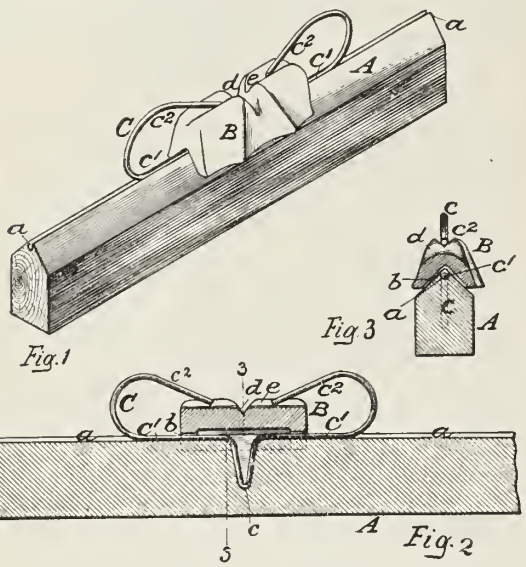
The head or pivoted end of the spindle *a* is shown as flattened at *x*, *o*, and the yoke has connected to it

by screws *c* a spring *s*, the latter acting on said flattened faces *x* or *o* to keep the spindle in one or the other of its two positions. The hollow sleeve *b*, is also provided with shell-holding springs *h*, which engage the interior of the small end of the shell or cone b^2, and aid in keeping it steadily in place. (*Foster Machine Co., Westfield, Mass.*)

THREAD GUIDE FOR SPOOLING AND WINDING MACHINES.

The object of this invention is to provide greater facility for the adjustment of the guides sidewise along the traverse-bar, to bring them in exactly proper relation to the bobbins or spools of the machine.

Fig. 1 is a perspective view of a portion of the traverse-bar of a winding machine on which there



is placed such an improved thread-guide. Fig. 2 is a longitudinal sectional view of a portion of the bar and of the thread-guide; Fig. 3 is a transverse section in the lines 3-3 of Fig. 2.

A, is the traverse-bar. B, is the guide proper, of glass or other material, and C, the spring or elastic holder for holding the guide B to the bar.

The bar A is represented as having its upper surface formed with a ridge along which there is a narrow groove *a*, extending the whole length of the bar, and which is just wide enough to receive within it the thickness of the wire of which the holder C is composed.

The guide B has in its back or under side a transversely-angular recess *b*, fitting to the ridged top of the bar in such manner as to permit the adjustment of the guide lengthwise of the bar, and the said guide has in its crown a transverse groove *d* to receive the thread, and a longitudinal groove *e*, for the reception of the ends of the holder.

The spring or elastic holder C for each guide B is formed of a single piece of wire, bent at the middle of its length to form a taper double shank *c*, which is driven tightly into a hole provided for it in the bar in the bottom of the groove *a*, and from the so-formed taper double shank, straight portions *c'*, project in opposite directions to be received lengthwise within the groove *a* in the bar, and the terminal portions beyond these straight portions are turned back toward each other to form springs c^2, the ends of which enter the groove *e* in the crown of the guide. These springs c^2 yield easily to permit the placing of the guide between them and the straight portions *c'* of the holder, and over the bar, and when the guide is so placed it is held by the springs firmly enough to retain it in its proper place, yet permitting the easy adjustment of the guide lengthwise on the bar, the holder being firmly seated in the bar by its straight portions being sunk into the groove *a*.

There is a separate and distinct holder complete in itself for each guide. (*Atwood Machine Co., Stonington, Conn.*)

THE ALTEMUS FILLING WINDER.

This filling winder belongs to that class of winding machines in which the nose of the bobbin is contained in a fixed cup or between rollers on the frame of the machine, the spindle moving rearward as the yarn is wound upon the bobbin.

The spindle in this winder is so driven that a uniform rotating movement of high speed may be imparted thereto, which movement can be readily stopped when necessary.

Another point in favor of this winder is to be able to effect the automatic stoppage of rotation of the spindle when the latter is full, and a still further good feature is to prevent overrunning of the reels carrying the skein when the yarn is being wound upon that portion of the nose of the bobbin which is smallest in diameter, the formation of slack yarn being thus avoided, and the danger of breakage, due to the sudden jerk when the slack is taken up, being effectually overcome.

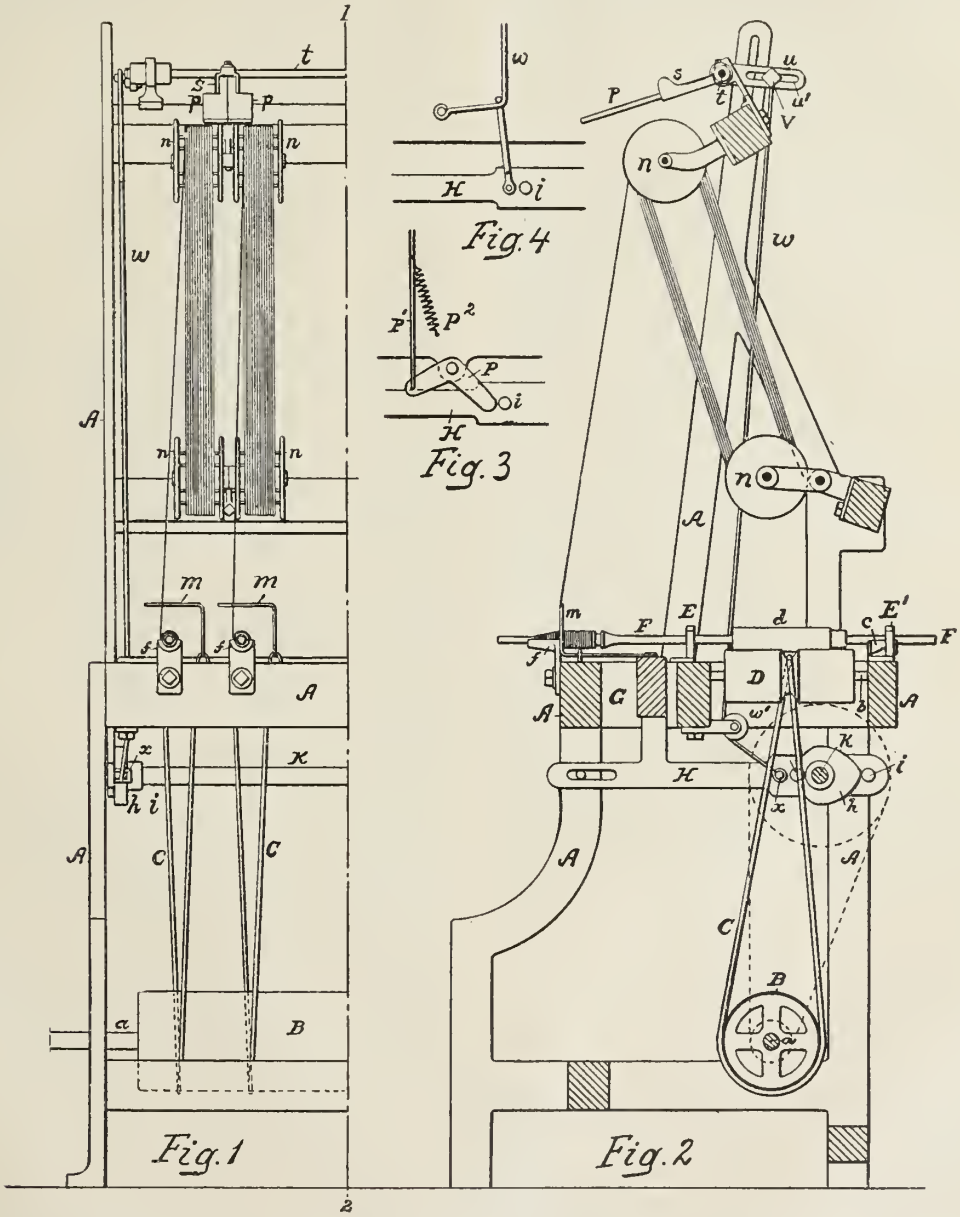
Fig. 1, is a front view of sufficient of a winding-frame to illustrate the improvements. Fig. 2, is a transverse section of the same on the line 1-2, of Fig. 1; Figs. 3 to 4, are detached views, on a larger scale, of parts of the machine.

A, represents part of the frame of the machine, in which are bearings for the shaft *a*, of the longitudinal drum B, and for a series of short transverse shafts *b*, each of which has a drum D, centrally grooved for the reception of a driving-belt C, from the drum B. Upon each of these drums D rests a cylinder *d*, carried by the winding-spindle F, which is adapted to bearings E, E', on the frame A, in front and rear of the drum D, the front end of the spindle carrying the bobbin, and the front bar of the frame A being provided with cups *f*, for the reception of the tapering end or nose of the body of yarn which is being wound upon the bobbin, the spindle being gradually forced rearward as the successive courses of yarn are wound upon the bobbin.

As a general rule, in winding machines, the belt C is applied directly to the cylinder *d* of the winding-spindle—a plan which is objectionable, because the necessary tension of the belt causes such a downward pull upon the spindle that the nose of the bobbin will be pressed firmly in the cup, thus causing the yarn to heat and glaze or burn, owing to the friction. Attempts have been made by some machine-builders to overcome this objection by the use of a longitudinal driving band or belt, upon which the cylinder *d* rests, and by frictional contact with which it is driven; but this necessitates the use of means for confining the spindle vertically and keeping the cylinder in frictional contact with the belt, the cylinder in the absence of such confining device having a tendency to jump upon the belt, and thus interfere with the application of a proper uniform high-speed movement of rotation to the spindle.

In the present winder for each spindle, a single driving drum D is used, and upon which the cylin-

der *d* of the spindle rests, the front end of the spindle being supported by the forming-cup *f*, and the spindle being unconfined vertically so that there is nothing but the weight of the spindle and the yarn wound thereon to cause friction in the cup, and any desired portion of this weight can be thrown upon the drum by adjusting the axis of the spindle nearer to the vertical line drawn through the axis of the drum, so that the friction on the yarn can be varied as circumstances may suggest.



The rotation of the spindle can be instantly arrested by lifting the front end of the bobbin, so that the cylinder is free from contact with the drum; and for the purpose of supporting the spindle in the elevated position each of the bearings E, E′, has a shallow slot, in addition to a deep slot, the latter of which receives the spindle when the cylinder is in contact with the driving-drum. Each of the rear bearings E′, has a sliding block *c*, to a concave recess in the upper face of which the spindle F is adapted, the under face of each block being beveled and having a bearing upon the beveled base of the deep slot previously referred to, the length of the bearing-block being considerably in excess of that of the stud, so that, when, on the rearward movement of the spindle, the rear end of the cylinder *d* strikes the front end of the block *c*, the latter will also be moved rearward, and, owing to the beveled faces of the block and bearing, will be caused to rise, so as to lift the cylinder *d* free from contact with the drum D and stop the rotation of the spindle F.

G, is a traverse-bar to which a lateral reciprocating motion is imparted by the action of a cam *h*, upon pins *i*, on a guided frame H secured to the traverse-bar, said cam *h* being carried by a shaft K, driven from the shaft *a*, by means of the belt and

pulleys shown by dotted lines in Fig. 2. The traverse-bar has bent wires *m*, one for each bobbin, the yarn passing over the horizontal portion of this wire in its course from the skein to the bobbin, so that there is no lateral confinement of the yarn, and the passage of the latter to the bobbin is permitted with very little friction; hence fine and tender yarns can be wound without difficulty.

When the yarn is being wound upon that portion of the bobbin which is of large diameter, it is drawn from the skein with considerable rapidity, the speed of draft rapidly decreasing as the yarn is directed to that portion of the bobbin at and near the end of the nose, where the diameter is much less. If the speed of the skein-reels *u*, is not checked, there is a tendency of the yarn to overrun and form slack yarn while winding at and near the end of the nose of the bobbin, and when this slack yarn is taken up as the yarn is directed toward that portion of the bobbin which is of larger diameter, there is a sudden jerk upon the yarn which has a tendency to break the same. To overcome this trouble an automatic brake is provided for the upper skein-reel, consisting of a plate *p*, loosely hung to an arm *s*, on a rock-shaft *t*, adapted to bearings in the upper portion of the frame of the machine, said shaft having another arm *u*, with a slot *u'*, in which is adjusted a pin or bolt *v*, connected to the upper end of the cord or wire *w*, the lower portion of which passes around a pulley *w'* on the frame, the lower end of the cord being connected to a pin *x* on the frame H, of the traverse-bar G.

As said frame moves outward, therefore, in order to carry the yarn toward the end of the nose of the bobbin, the cord *w* is slackened and the plate *p* is allowed to fall, so as to rest upon the periphery of the head of the upper skein-reel and serve as a brake therefor, the plate being lifted and the brake removed as tension is imparted to the cord *w*, on the rearward movement of the frame H.

Generally each of the arms *s* is constructed so as to carry a pair of brake-plates *p*, for the adjacent rims of adjoining reels, although each plate may have an independent arm, if desired, and in some cases the arms *s* may serve as brakes, the pivoted plates being dispensed with.

The means shown in Fig. 2 for operating the brakes for the skein-reels in unison with the movement of the traverse-bar, may be modified in various ways, for instance, in Fig. 3 is shown a modification in which a bell-crank lever P is used, one arm of which has a rod P', acted upon by a spring P^2, and intended to be connected to the arm *u* of the rock-shaft *t*, while the other arm of the lever is acted upon by a pin *i*, of the traverse-bar frame H; and in Fig. 4 is shown a cord *w*, connected at the lower end to a fixed stud on the frame A and acted upon by a pin projecting from the frame H, so as to be alternately tightened and slackened as said frame is reciprocated. (*W. W. Altemus & Son.*)

BOWMAN'S BOBBIN HOLDER OR CLAMP FOR HORIZONTAL BOBBIN WINDERS.

The principle objects of this holder are, first, to provide a simple, durable, efficient, reliable, and comparatively inexpensive device, for not only preventing endwise play or wabbling movements of the bobbin in respect to its spindle, whereby waste of yarn is obviated and accuracy and uniformity of winding insured, but also permitting of the ready, convenient, and rapid removal and application of the bobbin to and from the spindle, and, second, to so construct, arrange, and combine the various parts of the clamp, device, or holder as that it may be conveniently applied to such bobbins and spindles as are commonly employed without requiring any addition to or alterations or changes in such standard spindles and bobbins.

Of the accompanying illustrations Fig. 1 is an elevational view illustrating this bobbin clamp or holder in application to a spindle or bobbin. Fig. 2 is a perspective view illustrating the bobbin holder or clamp shown in Fig. 1, and Fig. 3 is a sectional view showing the parts detached.

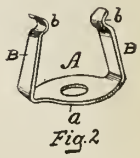


Fig. 2

Letters of references indicate thus:—D and *d* are the respective parts of a spindle, which are adapted for connection by means of a screw *d'*.

H is a pulley or wheel by means of which rotary motion is imparted to the spindle.

D is a spindle-head provided with one or more projections or lugs adapted to take into corresponding recesses in the base of the bobbin E in order to impart rotary motion from the spindle thereto.

f is an annular groove cut around the base of all bobbins for use in mounting them in shuttles.

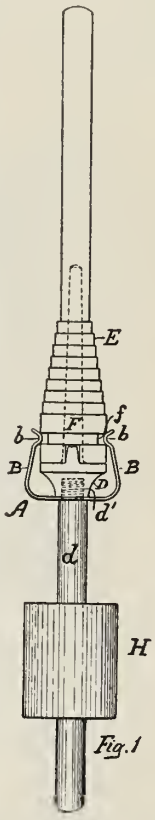


Fig. 1

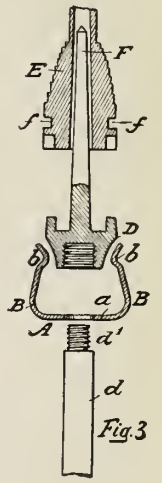


Fig. 3

A, is a clamp or holder comprising a base *a*, perforated, as shown in Fig. 2, for the accommodation of the portion *d'* of the spindle. This base *a* is adapted to be held between the parts *d* and D of the spindle and is provided with integral upwardly and inwardly extending spring-arms B, adapted to engage the base of the bobbin E. For this purpose each of the arms B is provided with a shoulder *b*, formed thereon and adapted to take into the groove *f* of the bobbin E.

In use the part D of the spindle is detached from the part *d* thereof. The base *a* is mounted upon the part *d* of the spindle F by passing the threaded portion *d'* through the aperture of the base *a*, whereupon the part D is secured to place, as shown in Fig. 1. Under these circumstances the clamp or holder A is firmly attached to the spindle in such manner that the shoulders *b* of its arms B are adapted to take into the groove *f* of the bobbin E.

The mode of operation of the holder is as follows: Let it be assumed that the spindle *d* is rotated around a horizontal axis through the intervention of the pulley or wheel H. The empty bobbin E may be readily applied to the portion F of the spindle by the simple operation of pushing the bobbin onto the latter until the lugs on the part D enter their corresponding recesses and until the shoulders *b* take into the annular recess *f*. Under these circumstances the arms B hold the bobbin E firmly up against the face of the spindle-head D, so that the bobbin E is not only held against movement in the direction of its length, but

is also prevented from wabbling at its free end in respect to its axis of rotation.

The absence of endwise play and freedom from wabbling movements is important for many reasons, among which the following may be mentioned: If the bobbin were afforded endwise play, it would become detached from the projections upon the spindle-head D and consequently would cease to rotate. In fact it has hitherto been customary in starting the bobbin to manually wind the thread or yarn not only onto the bobbin but also downward onto the spindle-head D in order to tie the bobbin to the spindle-head and thus prevent endwise play of the former. However, this resulted in the waste of considerable yarn or thread. Moreover, under such circumstances the free end of the bobbin wabbles slightly in respect to its axis of rotation because the thread did not tie the bobbin firmly to the spindle-head D, and this wabbling motion of the bobbin resulted in uneven or, as it is sometimes called, "lumpy" winding, which in the subsequent use of the thread or yarn, for example, in a shuttle, resulted in breakage and waste. (*George T. Bowman, Phila.*)

MACHINE FOR WINDING YARN FROM CHAINS ONTO FILLING BOBBINS.

The object of this machine is to dispense with the spooling of the yarn.

In winding yarn after the same has been dyed or bleached directly from the chain onto the filling-bobbin, the individual threads of the chain have to be separated and connected each to its respective spindle. The machines for winding the yarn on the cop or bobbin have usually eight banks of spindles and contain as many spindles as there are threads in the chain.

As the cops or bobbins must be wound in conical layers to the very end of the same, and must form a well-wound nose at the end to make the cops or bobbins perfect and prevent stripping when used in the shuttle in weaving, it is essential to the practical and successful use of these machines that the tension on all the threads of the chain shall be uniform, and all soft places in the cops or bobbins avoided.

The yarn, during the process of doubling, dyeing and splitting becomes more or less entangled, and broken ends frequently occur in the chain. To successfully wind this yarn directly on filling-bobbins, the operation of separating the yarn strands of the chain requires to be under the constant control of the operative, so as to prevent imperfect yarn passing through the machine. In these machines the successful operation of all the spindles receiving the yarn from one common source (the chain) requires mechanical refinements and automatic self-adjustments that in the ordinary spinning, twisting, or winding machines, in which each spindle is supplied from an independent source, are either unnecessary or not of such importance as would make the machine useless without them. In machines for winding the thread directly from the chain on the cop or bobbin, the great saving in time, labor and mill-room, has been made possible by close attention to the details of the machines, by which the uniform speed of the spindles, the accurate adjustment of the tension of the yarn, the accessibility of the spindles in doffing, the starting of the machine to wind on the new bobbins after doffing, the uniform and regular laying of the yarn on the cops or bobbins, the protection of the yarn from floss and fibre, and other advantages are secured.

The accompanying illustration is a view of the end of the improved winding machine and the chain-tension machine which delivers the yarn under the required tension to the winder. This illustration will readily explain the machine to the reader.

The machine is provided with eight lines of spindles secured to bolster-rails extending from one end to the opposite end of the machine and placed so that the second bolster-rail is behind the first and above the same, and all the other bolster-rails (whether four, six, eight or more are used), are each placed in the rear of the rail in front and above the same, so that the spindles form an inclined bank or slope and can each be readily reached by the attendant for the purpose of doffing or piecing.

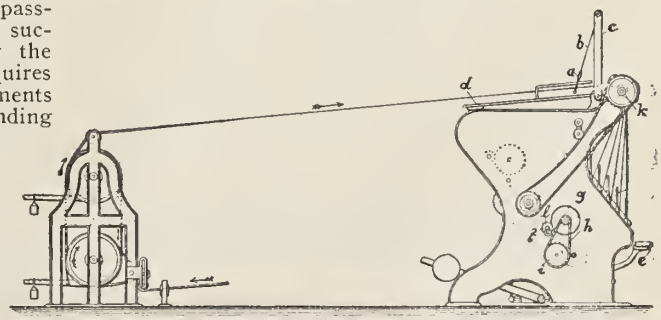
The large number of spindles require to be so closely grouped together, since the driving-cylinders can be only of limited diameter, and therefore require a central support.

On the top of the machine is suspended the reed *a*, by the rods *b*, connected with the upper end of the posts *c*, secured one to each end of the machine, or, when convenient, from the ceiling of the room in which the machine is located. This movable suspended reed *a*, is specially made for this work and is equally spaced over its entire length to conform to the space of the spindles.

It can be moved backward and forward by the operative to facilitate the separation of the threads of the chain, and when the strain on the reed is excessive, the operative stops the machine. When the operative releases the reed, it swings toward the top rolls until it rests on the table *d*. A bench is usually placed in front of the foot-treadle *e*, on which the operative stands, so that when the operative, whose hand is on the swinging-reed, feels that excessive strain is exerted on the reed, he can stop the machine with his foot.

When the threads require to be bunched to facilitate doffing, the reed *a* is moved back to facilitate the bunching of the threads. The point at which the rods *b*, are pivotally connected with the posts *c*, is in practice much higher above the machine, and the reed swings through an arc of greater radius than that shown in the drawings. The rods *b*, are connected to eyes on the upper bar of the reed, so that the reed may swing independently of the rods.

On the projecting end of the shaft of the lowest driving-cylinder, the pinion *f*, provided with a groove, is connected with the shaft which has a spline and turns with the same while in the normal geared position, and is held in that position by the stop-link



g, which rests on the shaft between the nut on the end of the shaft and the pinion *f*, so that when the stop-link is removed, the pinion *f*, can be drawn outward, and the pinion disconnected from the gear *l*, thereby disconnecting the spindle-driving mechanism from the cop-building mechanism and permitting

the winding back and independent adjustment of the cop-building mechanism.

The chain *h*, connects the sprocket-wheel on the shaft of the gear *l*, with the sprocket-wheel *i*, from which motion is imparted by means of gearing to the cop-forming mechanism by which reciprocating guide-wires are operated.

To secure the most economic results, the machines require to be of such lengths that the greatest number of spindles that can be attended to by one attendant are massed in one machine. To lay the yarn on all the quills, or bobbins, uniformly, the guide-wires must all move together.

Practical experience has demonstrated that the reed *a*, requires to be placed near the top rolls so as to accurately guide the yarn onto the delivery-roll *k*, and from the same to the spindles; but in bunching the yarn in doffing, this close proximity of the reed to the top rolls interferes with the bunching. Therefore the reed *a* is suspended by the rods *b*, at each end from the vertical posts *c*, extending at each end above the end frames of the machine, so that the operator on preparing for doffing, before he stops the machine, simply pushes the reed *a* backward.

In a machine for winding yarn from the chain onto filling-bobbins, such a very large number of threads have to be separated from each other and guided to the bobbins that it becomes difficult for one operative to overlook the separation of the threads and the winding on the bobbins. The vibrating threads passing through the swinging reed cannot be readily seen without a suitable background. The table *d* forms such a background and is used for this purpose, as also to prevent the loose ends separated by the reed from falling on the threads passing from the top rolls to the bobbins. In these machines, where as many as three hundred and seventy-six (376) spindles are used, it is impracticable to connect all the ends after doffing with the new bobbins. Some arrangement is therefore required by which all the ends are automatically connected with the new bobbins. This arrangement consists in a bobbin-holder and the arrangement for disconnecting the spindle-driving mechanism from the cop-building mechanism.

When the new or empty bobbins have been placed on the spindles, the driving mechanism is started to drive the spindles, the frame supporting the guide-eye is raised, and the threads connected with the bobbin-holders are guided onto the bottom of the cone of the bobbins, the machine is stopped, the gear *f* is pushed in to connect it with the gear *g*, so as to connect the cop-forming mechanism with the spindle-driving mechanism; the machine is started, and a new set of bobbins is wound. By this arrangement the operation of the machine is practically continuous, the saving effected is large, as by reason of the improvements incorporated in the machine the operative has a complete oversight and control of the large number of threads as the yarn is delivered to the top rolls, as well as over the whole bank of spindles, being able to stop and start the machine while his eyes are on the yarn coming from the chain as well as on the yarn being wound on the spindles. (*H. L. Pratt, Lewiston, Me., and C. T. Upton, of Lowell, Mass.*)

THE UNIVERSAL METHOD OF WINDING.

In the ordinary winding of balls or cops of yarn or thread, it is common to take a spool, spindle, or hollow tube and wind the thread in spirals upon the tube, without an attempt to place the successive coils of thread in contact with each other upon the tube at the first winding nor thereafter, nor to arrange them with any precision so as to preserve their parallelism throughout the winding, and when the winding, as is usually the case, is effected mechanically the thread is carried in coils along the length of the tube during its revolution in such a manner that the number of coils to each revolution decreases as the diameter of the cop increases. As a consequence, the winding is more or less irregular, the threads are not parallel in the successive coils, the cop is open or loose and lacks firmness and solidity, the thread is not evenly laid, etc., etc.

The accompanying illustrations are given to show the "Universal-winding" process. Fig. 1 is a diagrammatical view illustrating this winding; Fig. 2 is a perspective view of a complete cop.

Numeral 1 in Fig. 1 indicates a tube, spindle or cylinder upon which the thread *x* is to be wound thereon with any suitable number of turns or coils to the length of the tube (two turns of the thread to the length of tube are shown wound on in illustration).

In winding mechanically, the thread is applied to the tube by means of a guide having such a reciprocating lateral motion in respect to the tube that the same number of coils or turns are applied upon the tube and upon each layer of the cop, whatever may be the diameter that the latter attains. Instead, however, of reversing the traverse or motion of the guide at each lay as soon as the cop completes its revolution, in the new process either the tube or the guide is so operated that the thread of each coil as it is laid at the extreme end of the cop is carried across and to the outside of

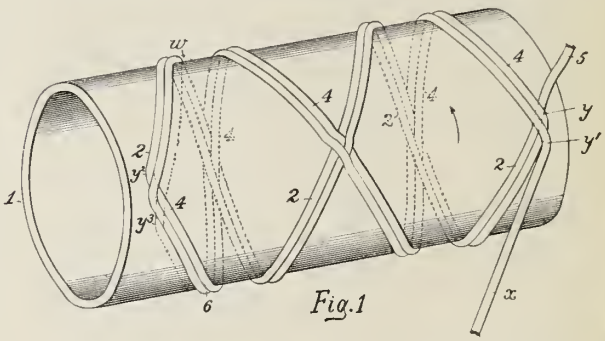


Fig. 1

the preceding thread upon that end and laid against or parallel to the outer or inner side of that thread, and is then reversed in its winding and carried toward the opposite end. Thus, as shown in Fig. 1, 2 represents the first coil of thread *x* applied to the tube 1, and 4 represents the succeeding coil. Assuming the cylinder to be turning in the direction of the arrow, the thread *x* before it reaches the turn *y* will be laid upon the inside of one of the coils 4, which holds down the loose end 5, and will then cross the said thread at a point back of the bend *y* of the latter, and will then be bent back at the point *y'*, and upon the further revolution of the tube will be laid on the outside of the thread of the coil 4, and will follow the said thread throughout its convolutions to the opposite end of the tube, and will finally be laid on the inside of the said thread 4 at the left-hand, as indicated by the dotted lines *w*, and will then cross the coil to the outside of the same, and will be bent back at y^3 and laid upon the outside of the thread 6. This is the course of each coil of thread in each layer of the cop, so that each coil in each layer lies throughout its length parallel to coils previously laid upon the spool. While it is not absolutely necessary, it is preferable in many cases that each coil of thread shall be laid in actual contact with that of one of the preceding coils, so as to bring the windings into as close proximity as possible and secure a ball of

minimum size and maximum density. As a consequence of this construction the threads are laid at each edge of the cop, each thread reversing its direction at a point y, y', y^2, y^3, etc., in the plane of the side or end of the cop, and the succeeding coil of thread is carried over the preceding coil to such an extent as is necessary to bring such thread to the outside of the

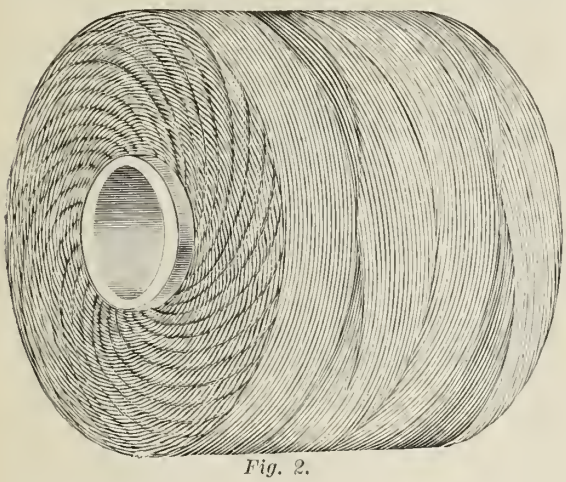


Fig. 2.

preceding thread and to the extreme end of the cop, and then the winding of the succeeding thread is reversed at its point y, y', y^2, y^3, etc., beyond the preceding point y, y', y^2, y^3, etc., and so on. The threads, therefore, are laid uniformly, evenly, and regularly at each end or edge of the cop and in each of the successive layers or windings upon the cop, and as each coil starts at the edge of the cop at a point beyond that where the underlying thread started from the said edge it is laid alongside of and, if desired, in close contact with the preceding coil throughout the whole extent of the surface of the cop.

At the points where the different windings of successive layers cross each other the thread last laid is of course carried above that previously laid, so that at each point of intersection they overlap first in one direction and then in the other, as will be understood from Fig. 2.

It will be seen that in order to effect the result thus described it is necessary either to continue each revolution of the cop a little farther than the preceding revolution before reversing the direction of the guide or to delay the beginning of the reverse motion of the guide.

The advantages of a ball or cop wound by the "Universal Method of Winding" are as follows:—In the first place, the same amount of thread may be condensed into a much smaller space, thus securing economy in packing, storage, and transportation. Again, in consequence of the regularity of winding the thread may be unwound from the cop without danger of entanglement, and loss is thus prevented. In consequence of the density and firmness of the cop it will maintain its shape and integrity until the thread is completely wound off, and in shipping the cops do not get crushed out of shape and the coils of thread tangled together. In consequence of the regularity and solidity of the cop, it is practicable to apply the tension directly to the cop itself. In consequence of the close winding, the thread retains the moisture absorbed during the process of manufacture, which is a matter of much importance.

In the case of linen thread and fine cotton, the open winding causes each thread to have isolated supports upon the coils beneath, and any pressure tends to force these supports into the threads above and to indent or abrade the same to a very detrimental extent. The improved winding in which the coils are all brought close together affords such a multiplicity and close juxtaposition of supports that no such abrading or cutting can result, and the same pressure that would mar the thread of an ordinarily-wound cop has no detrimental effect upon one wound in the improved way. As distinguished from ordinary cops each portion of the thread extends from one end to the other of the improved cop in each layer and has the same number of turns in each layer throughout the entire cop. No slipping of the threads at the ends of cop can occur by this method of winding, inasmuch as each thread the moment it reaches the edge or end of the cop takes another direction across the face of the cop to throw it back, so that it cannot under any circumstances fall down or under and across the end of the cop and become entangled or afford any additional friction.

The neat appearance of the new cop is also a matter which is commercially of great importance. (*Universal Winding Co., Boston, Mass.*)

FURBUSH'S DRESSING, WARPING OR REELING MACHINE.

Hitherto, in the reeling of the yarn or thread to constitute the warp for the weaving operation, it has been customary to conduct or lead the ends of the yarn or thread from spools or bobbins mounted in a creel or frame, through a supported heck or lease and sectional reed to a reel to cause the thread or yarn to be wound in sections onto the cross-arms thereof, within range of detachable pins mounted in and projecting from the arms until the spools or bobbins of the creel or frame were depleted and the cross-arms of the reel were provided with their full quota of said material, when it was wound off of the reel onto a warp beam.

The use of detachable pins in connection with the cross-arms of the reel has long been regarded as exceedingly objectionable, because in the winding of the yarn onto the reel at a high rate of speed there is a constant tendency for the material to become entangled with the pins, and thus for the thread or yarn to break

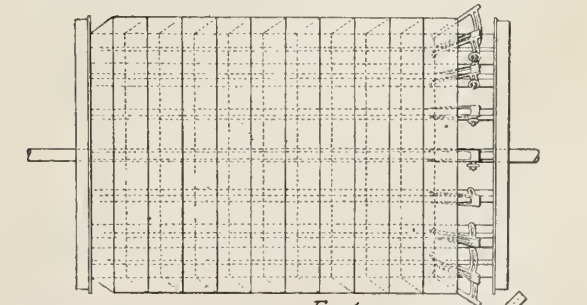


Fig. 1.

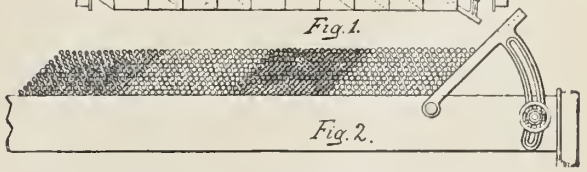


Fig. 2.

short or the pins to kink the same in such manner as to deteriorate the strength thereof in the one instance, or to necessitate in the other the stopping of the reel to take up and unite broken ends.

Another trouble is the intermeshing and hugging of the individual threads to the neighboring threads thereof, and the lack of regularity in tension, so that there is abnormal stretching of some of the threads

and slackening or sagging of others, whereby in unwinding from the reel onto a beam, due to such lack of tension and the use of detachable pins, it has been found in extended practice that the material is very apt to be so deteriorated as to give a warp unfit for subsequent use.

The principal objects of the Furbush method of dressing, warping or reeling, are:—*First*, To overcome the previously mentioned objections and disadvantageous features in the winding or reeling of yarn. *Second*, To provide a warping-reel with attachments or devices adjustably connected with the cross-arms thereof, and so arranged as that the thread or yarn in the reeling operation is built up in regular lays onto one another into substantially truncated cones and in such manner as that in the formation of one of such figures or forms, it will become a form or guide for the building or laying up in regular sequence of a series of cone-shaped deposits of the yarn or fibrous material onto the respective cross-arms of the reel in the rotation thereof until the spools or bobbins of the creel or frame have been depleted, or until the cross-arms of the reel have been completely covered and in such manner as to present a smooth cylindrical surface, when the same is transferred, in such state or condition, to a beam to constitute warp for use in the weaving operation. *Third*, To provide a warping-reel adapted to cone the yarn or thread thereon, and provided with mechanism adapted to move automatically, step-by-step, in one direction in the laying or building up of the thread or yarn into cone-shaped figures or forms thereon. *Fourth*, To provide a warping-reel adapted to improve the winding of the yarn or thread, and with the absence of broken threads, or of having to stop the reel to take up and unite broken ends in the unwinding of the same onto a beam to become warp; and *Fifth*, To provide a reel or frame and an adjustably supported heck or lease and sectional reed for employment in connection with a rotatable coning-reel and mechanism for detachably supporting and rotating a beam for the reception of the thread or yarn from the reel in a reverse step-by-step movement of the same, and the said mechanism so constructed and arranged as that the warping and beaming operations are appreciably improved and a superior quality of warp for weaving is obtained, due to the uniformity of tension maintained throughout the winding or reeling of the yarn or fibrous material.

The improvement, stated in general terms, consists of a warping-reel provided with attachments adjustably connected therewith and so arranged as that the yarn is formed in regular and united sequence thereby into cones presenting a smooth cylindrical surface for transfer therefrom to a beam to become warp.

To more clearly explain the invention, the accompanying two illustrations are given, and of which Fig. 1 is a front elevational view of the reel detached from its standards with the adjustable coning attachments of the invention in application thereto and showing also the mode of building or laying up the yarn or fibrous material onto the reel according to the principle involved in and by the process. Fig. 2 is a side elevational view partly in section of one of the cross-arms of the warping-reel and also a longitudinal section through the yarn or threads wound thereon, serving to illustrate the general appearance of the respective groups and overlapping layers of thread or yarn comprising the series of united conical figures or forms thereof constituted by the winding in the rotation of the reel.

The beaming of the yarn, it will be understood, is carried out with due regard to required tension of the reel with respect to the beam in order to insure uniformity in the transfer of the fibrous material from the reel, in entirety onto the warp-beam. It may, however, be here remarked that in the beaming operation the rotation of the reel is reversed and also that the same is allowed to travel in an opposite direction to that required for the reeling of the material until the point at which the reeling of one section of yarn onto the same is reached, when the entire contents of the reel will have been wound off onto the warp-beam. (*M. A. Furbush & Son Machine Co., Phila.*)

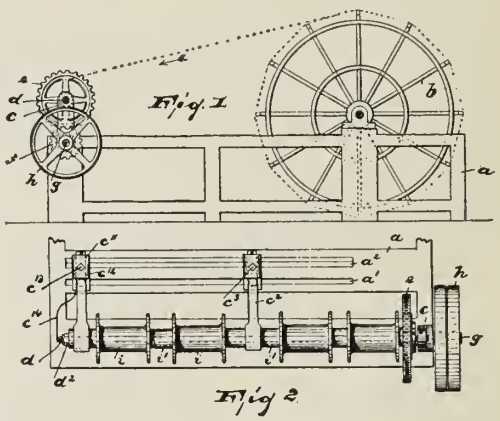
ATHERTON'S WARP BEAMING MACHINE.

The object of the invention is an improvement on the beaming frame shaft for holding a number of narrow-ware beams to their place.

Fig. 1 is an end elevation of a winder and of a portion of a beaming attachment provided with the improvements; Fig. 2, an enlarged top plan view of the beaming attachment proper.

Letters of reference indicate thus:—*a*, represents the frame and *b* the winder, from which the warp is to be wound upon a series of beams *i*, arranged on shaft *d*. The shaft *d* is arranged with one end in the stationary bracket *c*, and is provided with a gear-wheel *e*, meshing with pinion *f*, secured on shaft *g*, which latter receives its motion through the driving pulley *h*. The outer end of the shaft *d* is screw-threaded, adapted to be engaged by a tightening nut d^2, and is also provided with a socket.

The frame *a* is traversed by a slot a', and a guide groove or recess a^2, adapted to be engaged, respect-



ively, by the tightening and adjusting bolt and nut and the projecting portion of the bracket c^{11}. The upper portion of said bracket forms the guide and bearing for the forked arm c^{12}, adapted to support the outer end of the shaft *d*. Arm c^{12} is provided with a stop-pin on its outer end, and is securely fastened in said bracket c^{11} by means of a set-screw c^{13}. A spring, c^{14}, is secured on one side of said arm and is provided at its free end with a centering-block, adapted to engage the socket of the shaft *d*. To allow the said arm c^{12}, and its spring c^{14}, to be withdrawn out of the path of the shaft *d* and beams *i*, respectively, the bracket c^{11} is provided with a longitudinal slot.

On the shaft *d* the beams are arranged alternately with a series of sleeves i^1, the end one of which is adapted to be engaged by the tightening nut d^2, whereby all the beams are securely fastened to said shaft and are bound to rotate with the same.

In operation when the warp has been wound on the beams and the latter are to be replaced by empty ones, the arms c^{12} and c^2 are withdrawn after the tightening-nuts c^{13} and c^3 have been loosened.

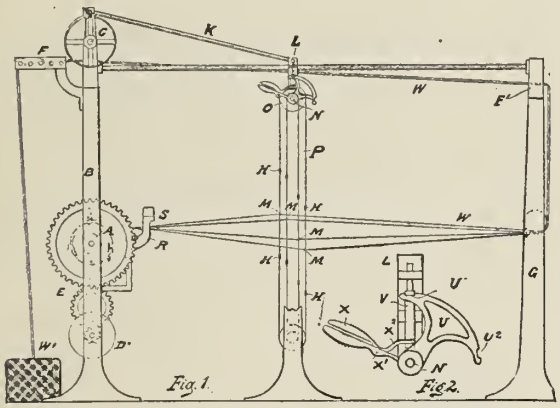
The tightening-nut d^2 is unscrewed from the shaft *d*, and the sleeves i^1 and the beams *i*, are easily slid

off the said shaft. Others are now put in their respective places and the arms c^{12} and c^2 returned to their normal positions, when the machine is again ready for operation.

From the foregoing it can be seen that the beams *i* can be readily put on and taken off the shaft, whereby a good deal of time and labor are saved. By inserting sleeves of different lengths various-sized beams can be used on the same shaft without changing the construction and relative arrangements of the various parts of the machine. (*A. Scheid, of Harrison, and Robert Atherton, of Paterson, N. J.*)

MACHINE FOR DRESSING OR BEAMING COTTON WARPS.

This machine has for its object the dividing or dressing of warp-threads prior to weaving by means of heddles in place of using brushes and other rubbing instruments as heretofore used for the purpose of dividing the warp-threads and thus by the use of this machine retain the major portion of the size deposited on the warp-threads, thereby preserving the strength and weaving qualities of the warp.



In describing this machine in detail, reference is made to the accompanying drawings, in which Fig. 1 represents a side view of which a portion of the center upright is cut away to more clearly show the action of the apparatus. Fig. 2 is a detail illustration.

The beam A, upon which the dressed warp-threads W are wound, is mounted between the uprights B, and driven from the shaft C, through pulleys (not shown), and spur gearing E. The ball W′ of warp-threads is formed and sized in the usual manner and the warp-threads W, conducted over the bars F, F′, and roller G, and pass through mails or loops M, in the healds H, reciprocated in a continuous and suitable manner, so that a "shed" is repeatedly formed by one portion of the warp-threads reciprocating upward and the other portion downward, by which operation the said threads are divided or separated. The reciprocation of the healds H, and the warp-threads W, is accomplished by securing to the rotating shaft C, a crank J, and coupling same by a rod K, to an arm L, mounted loosely upon a shaft N, upon which are secured pulleys O. To the circumference of each is respectively attached a flexible strap P, the ends of which are connected to the healds H, and both kept in tension at the bottom by a similar arrangement of pulleys mounted on a cross rail. Upon the shaft N, is secured a quadrant U, shown by detail Fig. 2, and is prepared with two recesses U′ and U^2, with either of which a sliding V, mounted in the arm L, may engage, so that by the oscillation of the arm L, the quadrant U, is operated and shaft N, rocked in its bearings, thus giving a reciprocating motion to the healds H, and the warp-threads W, by which motion the said warp-threads are automatically and repeatedly divided or separated as they are traveling between roller G, and fixed reed R, through which they pass to the rotating beam A, the warp-threads being by preference kept divided close to the fixed reed R, by a rod S, passing between the threads for the entire width of the warp.

The projection on the bar V, engaging in one of the recesses in quadrant U, may be changed from one recess U′ or U^2 to the other by pressing the lever X hinged at X′ toward the arm of said quadrant. An extension of the lever X^2 being engaged between projections on the said bar, causes the projecting piece on the bar to be raised clear of the notch. Then the said shaft may be turned by the said quadrant until the projection on the bar engages with the recess.

By changing the position of the projection on the bar V in the quadrant U, the motion transmitted to the healds is reversed, that is to say, those warp-threads that formed the top portion of the "shed," now form the bottom, and the bottom threads, the top of the shed, the reciprocating warp-threads meeting in the centre and not crossing each other.

The rising and falling motion imparted to the healds H, is continuous so long as the beam A, rotates, thereby dividing or separating the warp-threads from each other without the intervention of a brush or other rubbing instrument, as now in common use, and which, in addition to separating the threads, more or less removes the size therefrom, thereby reducing the strength and weaving qualities of the warp. (*J. and R. Lister, Keigley, England.*)

THE DENN ELECTRIC STOP-MOTION FOR WARPING MACHINES.

The object of the device is to provide improvements in electric stop-motions for warping machines, whereby a positive action of the circuit-closer is insured at all times and the thread-guides permit slack in the thread without closing the circuit and stopping the machine.

The improvement consists of a conducting strip forming one terminal of the electric circuit, and on which the thread-guides are pivoted, the pivoted ends of the guides having a sliding connection with the strip, and a contacting strip forming the other terminal of the circuit, and provided with an inclined contact surface adapted to be engaged by lower bent ends of guide.

Fig. 1 is a sectional elevation showing the general arrangement of the circuit-closer and the stop mechanism. Fig. 2 is a sectional plan view of one of the guide rails. The spool-frame A, carries the spools B; in front of each vertical row of spools is arranged a rail C, in front of which pass the threads B′, from the spools B, through the eyes D′, and E, of which the latter are rigidly secured in the rail C, while the eyes D′, are each formed on the free end of a thread-guide D, having its pivot end D^2 formed with an elongated slot engaging the pivot H, passing through or secured to a conducting strip I, secured to the rail C, the said conducting strip I forming part of an electric circuit by being connected by a wire J, with a battery F, or other source of electricity; the other wire J′, of the electric circuit connecting with a contact strip K, likewise secured on the rail C, as is plainly shown in Fig. 2. This contact strip K, is in the path of the pivoted thread-guide D.

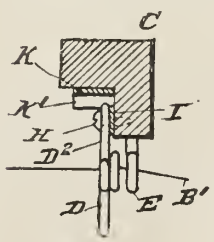


Fig. 1.

On each contact strip K, are formed or secured inclined surfaces K′, each adapted to be engaged by the bent lower end of the next adjacent thread-guide D, so as to close the circuit, the electric connection

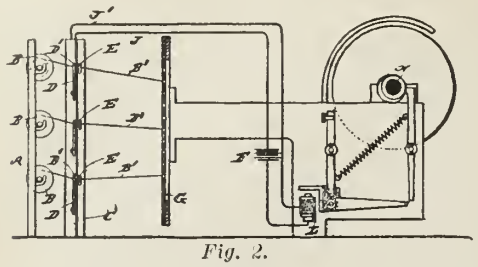


Fig. 2.

being then made between the strips K and I, by the thread-guide D, and the pivot H, together with the wires J and J′, and the battery F. The threads B′, after leaving the spools B, pass through the eyes D′ and E, to the gatherer G, which holds the thread-guides D, in an uppermost position, so that the lower bent end of each thread-guide is a considerable distance away from the surface K′ and the strip K, whereby the circuit remains open.

Now when a slack occurs in one of the threads, then the thread-guide D by its own weight can swing downward to take up the slack, without making contact between the bent end and the spring K. When, however, one of the threads B′ breaks, then the support for holding the corresponding thread-guide in an uppermost position is removed, and consequently, the thread-guide swings downward and moves, with bent end, in contact with inclined surface K′, to close circuit as previously explained, and to cause the machine to stop in usual manner. Now it will be seen when thread-guide D, swings downward, and its bent end moves in contact with the inclined surface K′, then the force of downward swinging of thread-guide D, causes a sliding of the bent end in an oblique direction, it being understood that the elongated slot in the pivot end D^2, of the thread-guide, permits such motion. The bent end does not contact only at one point of the strip K, but comes in contact with a considerable surface of the strip, owing to the sliding connection, so that a closing of the circuit positively takes place, as the contact parts do not oxidize to such an extent as to interfere with the closing of the circuit, owing to the rubbing of the bent end on the inclined surface K′. L, is the electro-magnet, and N, the shaft of the warping machine. (*Globe Machine Works, Frankford, Phila.*)

SELF REGISTERING STOP-MOTION MECHANISM FOR WARPERS.

In the operation of warping, stoppages are made from time to time to correct faults or breakage of the yarn, and thus the proper performance of the warper is very largely controlled by the prior treatment of the warps in the operations of carding, spinning, etc., and when these operations are not properly carried out, the threads will break more frequently in the warping, necessitating stoppages of the machines. To give a record of these stoppages of the warper to the overseer is the object of this device. He, in turn, will thus know the quality of the yarn, and also if the warp-tender is doing a full day's work.

Warpers are usually provided with tight and loose pulleys and a slow speed pulley, the latter being used to start the machine slowly, or to run it at slow speed for a short time in order that the attendant may conveniently repair breakages.

Inasmuch as the slow speed of the warper is not a proper indication of the work, a register is provided in the new warper, operated only when the warper is started at full speed.

Of the accompanying illustrations Fig. 1 is a front elevation of the device as applied to a warper, a sufficient portion of the warper being shown so the device will be understood. Fig. 2 is a right-hand elevation of the apparatus shown in Fig. 1.

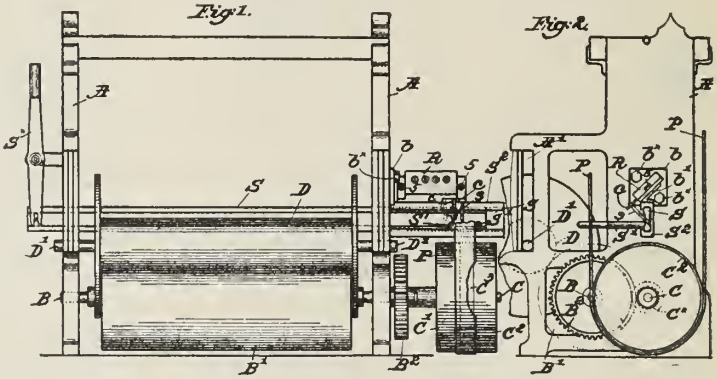
The warper which is chosen for illustration comprises end frames A, of suitable shape to form bearings for a shaft B, provided with a driving roll or drum B′, and a gear B^2, in mesh with a pinion C^x (see dotted lines Fig. 2), on a short shaft C, having thereon fast and loose pulleys C′, and C^2, and a slow speed pulley C^3.

The warp-roll D, rests on drum B′, and its journals D′, are vertically movable in slots or guideways A′, in the main frame.

The end frames A, are slotted to form bearings for a shipper-bar S, movable longitudinally therethrough by means of a shipper-lever S^x, and provided with a belt-fork S′, to engage the power-transmitting belt P, and move it from one to the other of the pulleys, a laterally extended guide or support S^2, for the bar being secured to the frame at the belt end.

Stand *b*, is secured to the end frame by bolts b^x, provided with a laterally extended arm *b′*, having an inclined face as shown in Fig. 2, to which is secured by screws 5, a registering device R.

As shown in Fig. 1, the face of the register has a



series of openings therein, beneath each of which is located a disk, each disk provided with the digits and zero in well-known manner, the complete rotation of one dial turning the next succeeding one through one step.

The spring-controlled actuator for the right-hand or units dial projects at *c*, from the slotted bottom of the casing and is extended in the path of a pin or projection *s*, on the shipper-bar S, the said pin being so located herein that it will engage and move the actuator *c*, into dotted line position, Fig. 1, when the belt P, is moved onto the fast pulley C′, thereby moving the right-hand dial one step or unit.

When the belt is for any reason thrown off the fast pulley, the actuator *c*, returns to full-line position, ready to be again moved when the apparatus is started at full speed.

It will thus be seen that a complete register is kept of the number of times the apparatus has been started at full speed, and also that the belt P, can be moved from the slow-speed to the loose pulley, and vice versa, any number of times without registering. (*Draper Co.*)

TENSION REGULATOR FOR YARN-BEAMS.

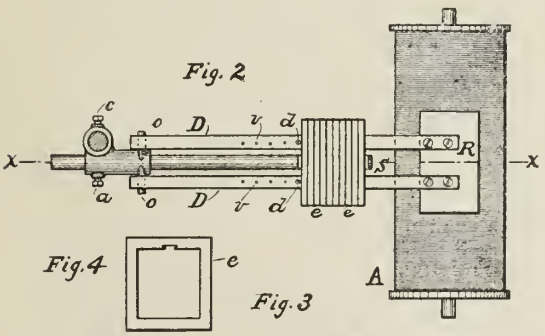
This device relates to machines for dressing yarn preparatory to weaving, and more especially to regulating the tension of the yarn as it is drawn from the yarn-beams in making up the full beam for the loom.

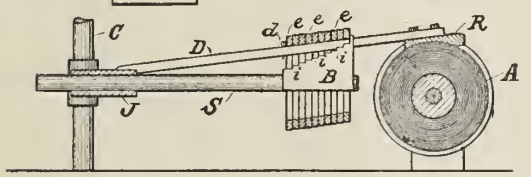
Fig. 1, represents a side elevation of one of the yarn-beams with the tension-regulating mechanism in position. Fig. 2, is a top view of the same parts shown in Fig. 1. Fig. 3, shows a vertical section of the mechanism, taken on line *x-x*, in Fig. 2. Fig. 4, is a front view of one of the frame-weights used in the machine.

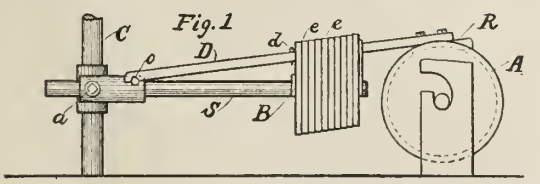
One great trouble in weaving cloth is the thin or light places that occur and produce different shades in dyeing and also otherwise injure the goods. This variation in the cloth is mainly caused by lack of uniform tension on the yarn when it is transferred in the dresser from the beam filled on the warper to the full beam for the loom. When the beam from which the yarn is drawn is full, the yarn turns the beam much easier than it does when the beam is nearly empty, by reason of the change of leverage.

To overcome this trouble is the object of the new device, which consists in applying a friction to the yarn on the beam that shall be reduced automatically as the size of the beam is reduced in unwinding.

Its construction is as follows:—A, represents a yarn-beam in position to be unwound. C, is a standard secured to the floor at a suitable distance from the beam. A socket J, has a hole made through it vertically to slide on the standard C, and a set-screw *c* is tapped in one side of the socket to hold it at any desired height on the standard. Another opening is made through the socket horizontally to receive a bar S, and a set-screw *a* is put in the opposite side of the socket to bear against the bar and hold it firmly. Two







horizontal trunnions *o*, are placed one on each side of the horizontal barrel of the socket J, to receive the rear ends of a double bar D, on the under side of which notches are made to fit on the trunnions *o*. The front ends of the bar D, are secured by bolts to a friction-pad R, that rests on the surface of the yarn on the beam A. The object of the pad R is to make a friction on the yarn and to increase that friction and make it capable of variation.

Weights *e*, in the shape of frames, (see Fig. 4,) of cast metal, are placed close together on the double bar D, and held from sliding back by means of pins *d*, put in holes in the bar. A number of these weights *e*, (represented in the drawings as being ten) are used on the bar at one time, and when the full beam A starts to unwind, all the weights *e* will rest on the bar and cause the full amount of friction; but, as the yarn unwinds and lets the bar D and pad R down, its leverage in turning the beam decreases and it is necessary to lessen the weight on the bar D. This is accomplished by means of a block B, held on the bar S, which has its upper side cut into a stepped form, (see Fig. 3,) arranged to catch the weights *e*, *e*, one after another on the successive steps *i*, as the bar S, sinks down by the unwinding of the yarn from the beam and thus relieves the bar of the pressure of the weights gradually.

As it requires more tension on the yarn to turn the beam as it grows smaller, the weight on the friction-pad will be gradually removed and the friction of the pad on the yarn reduced, so that the same tension on the yarn required to turn the full beam will turn the same when nearly empty. A series of holes *v*, are made in both parts of the bar D, to receive the pins *d*, so that the weights *e*, can be held farther in or out on the bar to lessen or increase the pressure on the pad R, on the yarn-beam, and by loosening the set-screw *a* the bar S can be pushed in or out to bring the block B in proper position with regard to the weights.

When it is necessary to remove an empty beam to put in a full one, the weights *e* can be removed back onto the socket and the bar D taken out, and by loosening the set-screw *a* the bar S can be slid back out of the way. (*Hugo J. Trost, Olneyville, R. I.*)

WARP-COMPRESSOR.

The object of this compressor is to apply pressure upon a warp as it is being wound upon the warp-beam, whereby the warp is wound more tightly and solidly upon the beam; thereby increasing the amount of warp upon the beam, rendering its tension uniform during the process of weaving.

The accompanying illustration shows in perspective view this warp-compressor.

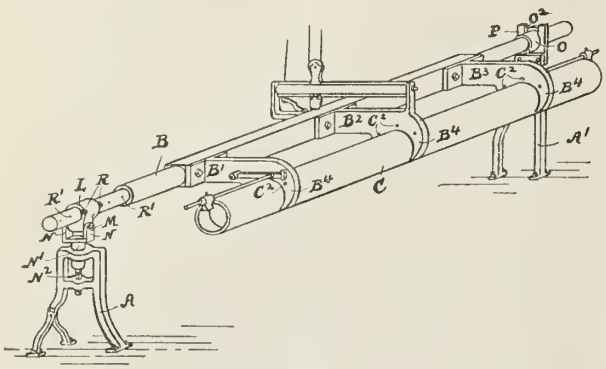
A, A^1, denote stands supporting a rock-shaft B, to which is attached the arms B^1 and B^2 and B^3, having hooked ends B^4, inclosing about two-thirds of the periphery of a pressure-roll C, of suitable length to enter between the heads of a warp-beam and rest upon the warp as it is being wound upon the beam.

The hooked ends B^4, of the arm are recessed to receive friction-rolls, which rotate upon pins C^2, and bear against the periphery of the pressure-roll C, in order to reduce the friction upon the pressure-roll, and enable it to rotate freely within the arms. To the rocking-shaft B, and opposite the central arm B^2, is attached a bracket, and the arm B^2 is provided with an upright arm, between which and the bracket before referred to, is a bar placed transversely to and above the rocking-shaft B, and provided with ways for a sliding block, which traverses along the bar by means of a rotating screw. The upper end of the sliding-block carries a rotating-scored pulley. Attached to the ceiling above the warp-compressor are an eye-bolt and pulley-blocks, containing the scored pulleys.

A weight is attached to one end of a chain which passes over and around one or the other pulleys and around the pulley held in the pulley-block, which is connected by a chain with a lever pivoted upon the previously referred to bracket. From the pulley the chain extends upward, and it has its end attached to

an eyebolt, causing the weight to exert an upward pull upon the sliding-block, which is multiplied by the doubling of the chain.

When the sliding-block is moved along its transverse bar by the actuating-screw, so the pull exerted by the



weight will be applied in a plane between the axis of the rocking-shaft B and the pressure-roll C, it will tend to raise the pressure-roll off the warp; but if the sliding-block is moved along the transverse bar to the rear of the rocking-shaft B, the pull exerted upon the block will tend to rock the shaft B in the opposite direction, and carry the pressure-roll C down upon the warp, so the pressure exerted by the roll C will be received by the warp as it is being wound upon the warp-beam held in supporting-stands beneath the pressure-roll. The chain, as it passes around the scored pulleys, is divided into four sections; two of the sections are connected by a short chain. When the sliding-block is moved forward over the rocking-shaft B, the weight will raise the pulley-block and its lever until the connecting-chain is drawn taut, connecting two of the sections, cutting out one of the sections and that portion of the fourth section below the chain, and causing the entire weight to be applied to the sliding-block. The lever is provided with a curved or cam surface upon its upper side adapted to be engaged by the lower end of the sliding-block when said sliding-block is moved back, causing the lever to be depressed, drawing down the block, and rendering the connecting-chain slack, so that the force of the weight will be exerted upon the sliding-block through the four sections of the chain, thereby increasing the force applied to rock the shaft B, and carry the pressure-roll down upon the warp.

By the above-described method of applying the weight, the force exerted upon the sliding-block is reduced whenever the sliding-block is moved off the lever and when it is not desired to apply pressure to the warp; but the force of the weight is largely increased when the sliding-block is moved back over the lever in position to apply pressure to the warp.

One end of the rocking-shaft B is journaled in a sleeve L, which is pivoted upon a pin M, held in the lugs N, attached to a rotating spindle N', journaled in the stand A, and provided with a screw N^2, engaging a screw-thread in the stand, and the opposite end of the rocking-shaft B, is journaled in a sleeve O, held in a plate P, which is attached to a rotating spindle, journaled in the stand A' and provided with a screw engaging a screw-thread in the stand A', thereby allowing the bearings of the rocking-shaft B to be varied vertically in order to bring the pressure-roll C in the proper horizontal plane to allow it to rest upon the warp.

The sleeve O is capable of sliding on the shaft B and being withdrawn from the circular hole in the plate in order to allow the end of the rocking-shaft B to be lifted through the opening O^2, causing the sleeve L, to rock on the pin M, raising the rocking-shaft B, in an oblique position, and balanced by the weight in order to allow access to the warp-beam. The rocking-shaft B, is also capable of being moved endwise in its bearings in order to bring the arms B', B^2, and B^3, over the warp-beam, and when adjusted in position it is held by the pins R, the shaft being provided with a series of holes R', to allow the adjustment of the shaft. (*David McTaggart, Worcester, Mass.*)

RISK'S INDICATOR FOR WINDING AND WARPING MACHINES.

This device is clearly shown in the accompanying illustrations of which Fig. 1 represents a view of the combined alarm and indicator in front elevation and attached to a portion of a warper-frame; Fig. 2 is an end view of Fig. 1.

Letters of references indicate thus:—*a*, represents the reel-carrying shaft of a warper, supported in roller-bearings *b*, arranged on frame *c*, to which is secured a bracket *d*, provided with horizontally-arranged lugs *d'* and d^2, arranged in vertical alignment with each other and provided with perforations forming bearings for the spring-controlled rod or spindle *e*, slidingly arranged in said bearings and limited in its downward motion by a collar *e'* secured thereon, coming in contact with the lug d^2. The spiral spring e^3, controlling the said rod or spindle *e*, surrounds the same and bears with its lower end against the collar *e'*, while its upper end engages the under surface of the lug *d'*. Spindle *e* is provided at its lower end with a shoe e^2, which when in normal position rests upon and engages the projections *f'* and f^2 of the lever *f*, fulcrumed at f^3, to the lower portion of bracket *d*. To the forward end of shoe e^2 is secured, by means of wire *g*, a hammer *g'*. On the frame *e* is also secured the horizontally-projecting bracket *h*, adapted to receive and support the stub-shaft *i*, upon which is revolubly arranged the graduated gear-wheel *k*, meshing with a worm a^2 on the reel-shaft *a*. On one end of the stub-shaft *i*, and in front of the graduated gear-wheel *k*, is arranged the gong *l*, in alignment with the hammer *g'*. Projecting from the surface of the graduated gear-wheel *k* and rotating with the same is a pin *k'*, adapted at certain intervals, when said wheel is in rotation, to engage the outwardly-projecting end f^4 of the fulcrumed lever *f*, thereby turning the same upon its fulcrum f^3 and causing the projection *f'* to raise the shoe e^2 and spindle *e*, against the action of the spiral spring e^3, which, upon the pin *k'* becoming disengaged from the projecting end f^4 of lever *f*, causes said shoe and lever to immediately return to their normal positions. This movement produces a sudden jar and causes the hammer *g'* to strike a sharp blow against the gong *l*, thus sounding the alarm.

The graduations on the gear-wheel *k* may be of any desired denomination and scale, and to assist in the correct reading of the same a pointer or indicator *m* is secured to the upper portion of the bracket *d*, projecting outward across and having its point directly in front of and in a convenient position near the graduation in said wheel.

The relative speed of the gear-wheel *k* to the shaft *a* must be such, that one revolution of the said gear-wheel corresponds to the winding on or off of a specified length of warp, but it will be manifest that a shorter length may be indicated by the gong by simply inserting a series of pins at certain specified intervals in the said gear-wheel, and which pins are adapted to operate the striking mechanism in a manner similar to the pin *k'*.

The gear-wheel *k* can also be rotated in the opposite direction—that is to say, the pin *k'* will strike against

the upper surface of the projection f^4 of the fulcrumed lever f—and in that case its lug f^2 will force the shoe e^2 upward and the hammer will strike the gong l in its return movement. This is an important feature of the new mechanism, *i. e.*, that the striking mechanism can be operated having the reel-supporting shaft rotating in either direction, since in older mechanisms where the reel-supporting shaft is arranged to rotate only in one direction, frequent breakage is caused by reversing the rotation of said reel-supporting shaft. (*B. Eastwood, Paterson, N. J.*)

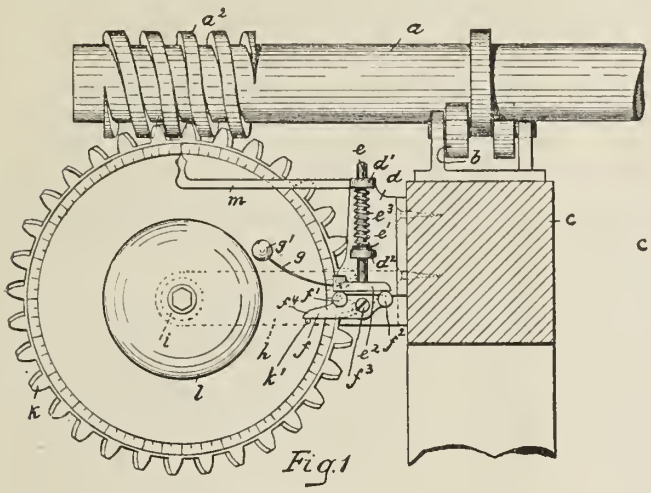


Fig. 1

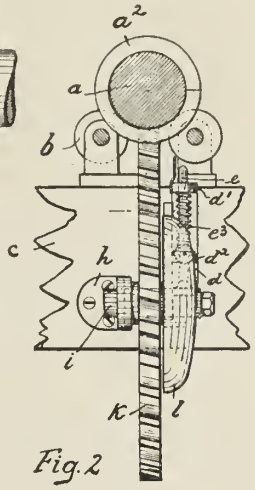


Fig. 2

ATWOOD'S REEL.

The advantage claimed for this reel is that it can be readily and quickly increased or diminished in size as may be required by the size of the skein of yarn.

All of the arms are shifted together uniformly outward and inward, thus the reel is kept at all times balanced.

Fig. 1 represents a view of the swift or reel looking toward the end of its spindle or gudgeon, the several arms being shown in a position about midway between their inward and outward adjustments. Fig. 2 is a face view of one of the hub-sections, showing the position of two pairs of arms relatively thereto. Fig. 3 is a face view of the other hub-section, showing the location of the different tangential grooves therein, the arms being removed.

The reel is provided with three pairs of arms A, A', A^2, each arm being provided at its outer end with a laterally-extended skein-support B. The several pairs of arms are located in different planes so as to enable them to pass each other freely at the hub of the reel, the said arms being adapted to be extended and withdrawn by a rack-and-pinion connection. Each of the arms is provided with a rack a, extending from the end of the arm opposite the skein-support to a point a short distance from the skein-support, the racks of each pair of arms being upon the adjacent sides of the side arms. These sets or pairs of arms are guided in their outward and inward movement by grooves in the hub-sections C, C', which grooves are so arranged as to keep the several pairs of arms at about sixty degrees apart.

The grooves in which the pair of arms A run, are formed by the two sections C, C', and are denoted by c, c'. The arms A', pass through grooves in the hub-section C, the said grooves being denoted by c^2, c^3. The grooves in which the arms A^2 slide, are denoted by c^4, c^5 and are located in the hub-section C'.

The spindle or gudgeon of the reel is denoted by D, and the hub-section C is secured against movement thereon.

On the spindle D is loosely mounted a sleeve, having a pinion of sufficient width to extend across the plane of the three sets of arms A, A', A^2. Beyond the end of the hub-section C' this sleeve is provided with a suitable operating-wheel or knob F, consisting of a flat disk having its edge curled or crimped over to form a convenient hold for the hand. This operating-wheel F is also free to rotate independently of the spindle D.

The hub-section C', is held interlocked with the hub-section C by means of a flexible washer which is held in frictional engagement with the operating-wheel F by means of a nut and a jam nut, having a screw-threaded engagement with the end of said spindle D. This spring-washer serves the double function of holding the two hub-sections together and also applying friction to the operating-wheel F, whereby the arms may not be extended or contracted unless positively operated. The grooves in the hub-sections C, C', are so arranged that they will cause the adjacent racks in each set of arms to engage the pinion upon opposite sides thereof. It will be seen that the inner sides of all of the grooves are necessarily tangential to the pinion, also that the pinion turns upon a so-called "dead-spindle" when it is desired to adjust the arms outwardly or inwardly.

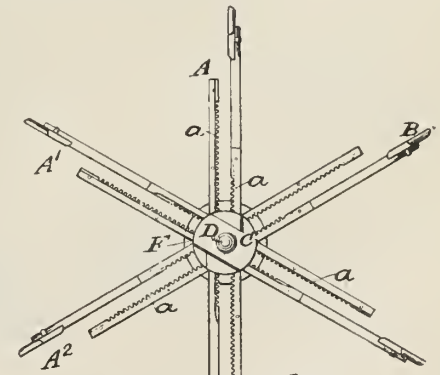


Fig. 1.

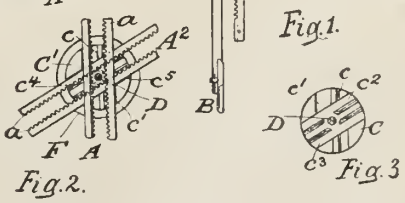


Fig. 2.

Fig. 3

The manner of securing the skein-supports to the ends of the arms is as follows:—The skein-support B is of metal, and a ferrule is formed by striking half out of each side of the body of the support. The arm is

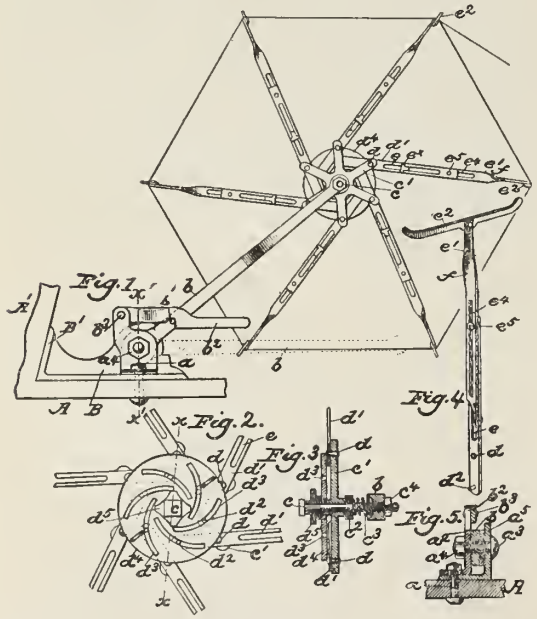
bifurcated at its end, and the skein-support is forced between the bifurcated ends of the arm, and the ferrule passes around the exterior of the bifurcated ends and holds the support snugly in position.

It will be seen by explanations given that the swift or reel may be adjusted to any required size very quickly and easily by turning the operating-wheel or knob F, and when adjusted will stay in such position until positively changed. (*Orlo Atwood, Stonington, Conn.*)

LORD'S REEL AND SUPPORT.

The object of this device is to be able to use any size or length of skeins of yarn in machines for winding the same on spools and what is accomplished by having the arms of the reel constructed so that they can be adjusted to suit the size or length of the skein of yarn required to be wound. There is also a tension added to the reel, which can be adjusted to suit the winding of any kind of yarn (either more or less tight or loose).

This reel and support consists of a series of metallic arms which are pivoted on a disk or spider having restrained rotation on a stud, and said arms each have at their inner ends and between their fulcra and the stud a pin which enters each, a separate spiral slot in a plate which may be rotated more or less on said stud at the side of the said disk or spider, the spiral slots acting on the pins of the arms to simultaneously turn the latter on their fulcra to enlarge or contract the effective diameter of the reel, and a nut



screwed upon the threaded hub of the disk or spider and acting against the slotted plate holding the same in any position in which it may be left.

The stud supporting the reel is mounted on an arm pivoted on a foot-casting adapted to be secured to a rail of the spooling machine, the said arm having combined with it means for holding it in proper working position, yet permit it to be thrown or drawn down away from adjacent reels when the yarn of that reel may need attention.

Of the accompanying illustrations, Fig. 1, in side elevation, represents such an improved reel mounted on a rail of a spooling machine; Fig. 2, an enlarged detail showing the slotted plate, disk or spider and parts of the arms pivoted thereon, and the locking-nut; Fig. 3, a section of Fig. 2, on the line x-x. Fig. 4, shows one of the reel-arms enlarged; and Fig. 5 is a section in the line x'-x', Fig. 1.

The rail A, commonly extended from one to the other end of a spooling machine, has attached to it by a suitable bolt a, a foot-plate B, having a heel B', to fit the back A', of the rail.

The bolt enters a web of the foot-plate and also an ear of a stationary washer a^2; an upright flange of the foot-piece (see Fig. 5) holding a bolt or stud a^3, one end of which is passed through the said washer, where it has applied to it a nut a^4.

The bolt is surrounded by a washer a^5, and serves as a fulcrum for the reel-carrying arm b, the setting up of the nut causing the arm to be held with a measured friction, which may be enough to hold the arm in any position in which it may be left, either up or down, as in full or dotted lines, Fig. 1. The arm b, is provided with a pin b', which is adapted to be engaged by a latch b^2, pivoted at b^3, on the washer a^2.

When the latch engages the pin, as in full lines, Fig. 1, the arm is locked in its elevated position, but when the latch is disengaged from the pin the arm may be turned down more or less to lower the reel mounted on it. The upper end of the arm b, has screwed into it the threaded end of a bolt c. The bolt enters the hub of a disk or spider c', and a friction-washer c^2, and a spiral spring c^3, and is screwed into the disk, the threaded end of the bolt receiving a set-nut c^4, to lock the bolt in place.

The bolt may be screwed into the arm b, to compress the spring c^3, more or less, and cause it to act on the washer to make the latter exert more or less of a restraint on the hub of the disk and restrain it from rotating except after a predetermined amount of strain on the yarn. The spring and washer thus act as a tension device for the reel.

The disk has pivoted upon it at d, a series of arms d', having at their inner ends each a like pin d^2, which enters one of a series of spiral slots d^3, in a plate d^4, mounted on the extended hub of the disk c^1, the said hub being threaded and receiving a locking-nut d^5, which may be made to lock or unlock the plate, the latter when unlocked being free to be moved on the hub in one or the other direction to cause the arm to assume a more or less radial position with relation to the disk which constitutes the hub of the reel, such movement of the plate expanding or contracting the reel. The reel-arms d' have combined with them extension-arms e', suitably connected thereto and provided at their outer ends with skein-holders e^2. A series of these arms d^1, e^1, and skein-holders e^2, make up the reel.

The rear ends of the arms e^1, are shown as provided with a **T**-piece ex, and so bent as to enter the slots e, in the arms d', and the arms e', are shown as slotted at e^4 to receive a screw e^5, inserted in the arms d'.

The arms may be lengthened and shortened at will by loosening the screws e^5, and all of them may be simultaneously inclined more or less quickly to take off a skein or to adapt the arms to the size of the skein applied. The arms e', near their outer ends, have given to them a quarter-twist, as at f, so as to turn to the proper angle the skein-holders.

The disk d^4 has ears or thumb-pieces 10, which may be engaged easily when the disk is to be turned to enlarge or contract the skein-holding arm. (*C. S. Lord, Winooski, Vermont.*)

MISCELLANEOUS.

IMPROVEMENTS FOR THE MASON LOOM.

The same have for their object *first*, to provide the loom with devices by means of which the breakage of warp-threads may be reduced to the minimum, and *second*, to provide means that the loom be quickly stopped not only when the filling is broken or exhausted but also when the shuttle fails to enter the shuttle-box.

The strain upon the warp-threads is equalized and reduced by means of an improved back-bearing for the roll over which pass the warp-threads on their way to the harnesses, the said roll being free to yield whenever undue pressure is brought upon the warp-threads.

For stopping the loom quickly the same is provided with a compound brake which acts upon the brake-pulley of the loom, both when the shuttle fails to enter the shuttle-box and also when the filling breaks or is exhausted.

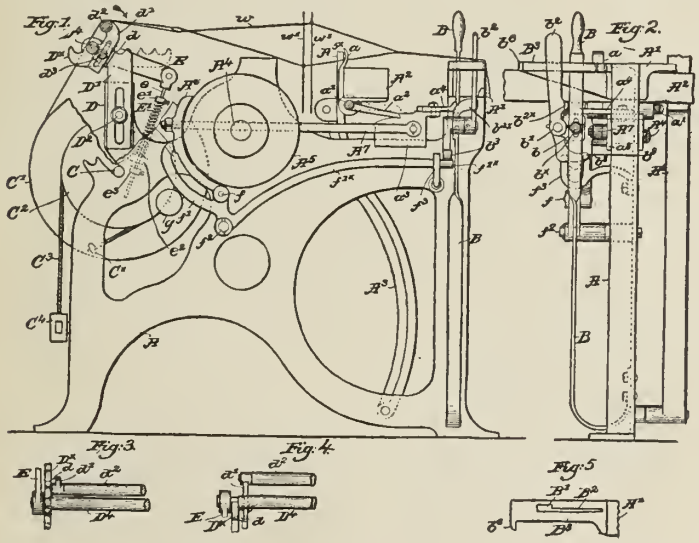


Fig. 1 represents in side elevation a sufficient portion of a loom with the improvements added to enable anybody to understand the same clearly; a portion of the loom-frame being broken out to better show some of the parts. Fig. 2 is a detail showing the left-hand front corner of the loom with the shipper-handle B, knocked off and in the act of moving from the left to the right. Fig. 3 is a detail, in plan view, of the warp-thread support; Fig. 4 a face view of the parts shown in Fig. 3, and Fig. 5 is a plan view of the shipper-handle holding-plate.

A, indicates the loom-frame, having a breast-beam A′, and containing a crank-shaft A^4, having cranks, (not shown) which are attached to the lay-swords A^3, having the lay-beam A^2, and reed A^5x, the lay having a binder-finger a, which acts upon the binder (not shown) of the shuttle-box, said binder-finger being connected to the rock-shaft a', carried by the lay and having a dagger a^2, adapted, when lowered into its full line position, Fig. 1, by the absence of the shuttle, to meet a notched frog a^3, provided with a finger a^4. The warp-threads w are controlled by heddles w', connected to harness-frames.

The crank-shaft A^4 has upon it at one end a suitable brake-pulley A^5, the periphery of the brake-pulley being adapted to be acted upon by a brake-shoe A^6, connected by a rod A^7, with and to be moved by the frog a^3, when the latter is moved by the dagger.

The loom-frame at its rear end, has bearings to receive the journals C of the warp-beam C′, which have at one end a let-off, shown as a pulley C^2, over which is extended a rope C^3, one end of which is attached to the frame at Cx, and the other end to a weighted lever C^4.

The loom-frame, at its rear end, is also provided at each side with guideways D, (only one of which is herein shown) in which are mounted stands D′, adjusted by means of bolts D^2, passing through slots in said stands. The upper end of each stand is provided with a laterally extended arm Dx, having a series of open-top bearings for the reception of a shaft D^4, extended from one to the other of said stands across the loom, and adjustable by placing it in one or the other of the bearings referred to. The stand is also made reversible, as shown by dotted lines in Fig. 1, to increase the range of adjustability.

Fast at one end on the shaft D^4, is an arm E, supported at its outer end in a yielding manner by a rod e, jointed to said arm and provided with a collar e', resting upon a spring E′, supported by lug e^2, on the frame work, and shown by dotted lines, Fig. 1, is an adjustable stop e^3, secured to said rod below said projection acting to limit the upward movement of said rod and its lever. The shaft D^4 also has attached to it, between the stands D′, arms d, to receive the slotted carriers d', between which is mounted the whip-roll d^2, said carriers being connected to said arms by bolts d^3, to enable the whip-roll to be adjusted up or down with relation to the shaft D^4.

In the normal operation of the loom the let-off is such as will enable the beam C′, to turn and give off the warp as the latter is taken up in the weaving of the cloth. Frequently, however, a sudden increase in the pull or tension upon the warp would break the warp before the heavy beam could rotate to relieve it.

By means of the present improved construction of the loom, however, by mounting the whip-roll d^2 on the spring-controlled or yielding carriers referred to any sudden pull or tension upon the warp will simply turn the said roll down more or less in the direction of the arrow and about the axis of the shaft D^4, to effect a temporary relief and thereby save the warp. The tension of the spring E′, or the length of the carryiny arms d', may be varied for different grades or sizes of warp or fabric woven, to enable said yielding whip-roll to move when necessary to relieve sudden tension or pull on the warp.

The loom has suitably connected to it the spring-shipper-handle B, adapted to enter a notch B′, in the slot B^2, of the shipper-holding plate B^3.

The shipper-handle has attached to it by a bolt bx, a bearing-block b, in which is journaled a rock-shaft

b', upon one end of which is fixed a handle b^2, and upon its other end a toe b^3.

The brake-shoe A^6 is jointed at f, to an auxiliary brake-mover f' pivoted at f^2, and having an arm f'^x held in a suitable guide f^3, fixed to the frame, and in a position to be acted upon by the toe b^3 referred to.

Assuming the shipper-handle B to be in the notch B′ and the loom weaving regularly, should the shuttle fail to enter the shuttle-box, the dagger a^2 will fail to be lifted and will meet the frog a^3, and move the same, causing the finger a^4 on the frog to throw the shipper-handle B out of the holding-notch B′, such movement of the frog also acting through the rod A^7, which herein constitutes one form of main brake-actuator, to draw the brake-shoe A^6, firmly against the brake-pulley. As soon as the shipper-handle B is disengaged from its holding-notch, as described, it springs to the right, Fig. 2, to throw off the power, such movement of said shipper-handle causing the toe b^3 carried by it to slide onto the outer end of the arm $f'x$ referred to, and depresses said arm, causing the auxiliary brake-mover f', to act against the brake-show A^6, and increase the pressure with which the same is pressed against the brake-wheel A^5, to more quickly stop the loom. The movement of the shipper-handle is thus utilized to supplement or assist the main brake-actuator. The toe b^3, and the handle-lever b^2, during the movement described are prevented from turning by contact of the handle or lever b^2, with the stop b^{2x} on the bearing-block b, on the shipper-handle.

In case the filling fails, the filling-fork (not shown) will act and will release the shipper-handle, as described, letting the toe b^3, act upon the outer end of the auxiliary brake-mover, to brake and thereby quickly stop the loom, the rod A^7, at such times not coming into action, the brake being applied solely by the auxiliary brake-mover.

To release the brake and start the loom, the operator moves the handle-lever b^2, to the left, Fig. 2, about its pivot b', to move the toe b^3 to the right or from the end of the arm f'^x, relieving the latter and permitting the brake-shoe to be drawn by the weight of the counter balance g away from the brake-wheel, after which the shipper-handle B is moved back to the left, and engaged and locked in the holding-notch B′, in its holding-plate.

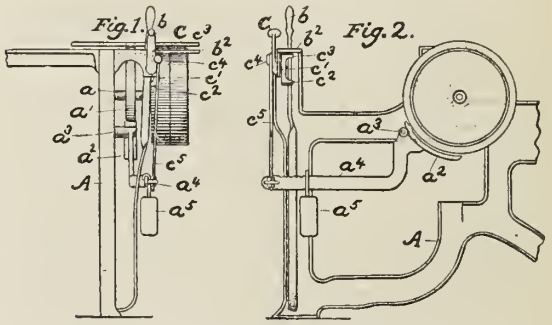
The holding-plate is shown provided with an outer projection or stop b^6, to throw the handle-lever b^2, into its proper vertical position against the stop b^{2x}, on return or outward movement of the shipper-handle, to thereby cause the toe b^3, to assume proper position with relation to the arm f'^x, after passing the latter, in order to be in readiness for a subsequent braking movement when the shipper-handle is released. (*Mason Machine Works.*)

THE MASON BRAKE MECHANISM.

In the operation of looms it is necessary that the brake be automatically applied when the shipper is automatically knocked off to stop the loom for breakage of a thread. It is necessary that the brake be automatically released when the shipper is again moved to start the loom, and it is again further necessary that some means be provided for releasing the brake when the loom is stopped, in order that it may be moved more or less by hand, as is found necessary by the operator in placing the loom in condition for further operation.

Prior to the present improvement a suitable brake-controlling member has been employed which is automatically moved to apply the brake when the shipper is automatically moved to stop the loom, and which is also automatically moved to release the brake by return of the shipper to running position; but independent devices have been required for releasing the brake when the loom is stopped to permit movement of the loom by hand.

There never has been constructed a single brake-controlling member capable of automatically applying



the brake when the shipper is moved to stop the loom and capable of automatically releasing the brake when the shipper is restored to running position, and, further, having an independent movement to release the brake while the loom is stopped.

The new device comprehends in its construction a brake mechanism having a single controlling member which may be made to fulfill the three functions before enumerated.

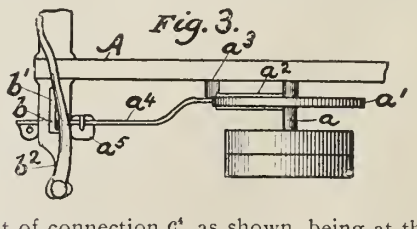
Fig. 1 is a front elevation of a part of one end of a loom, showing the mechanism necessary to enable the novelty of the new device to be understood; Fig. 2 is a right-hand end elevation of the parts shown in Fig. 1; Fig. 3 is a top or plan view of the parts shown in Fig. 2; Fig. 4 is a detail showing the controlling member, Fig. 1, on an enlarged scale; and Fig. 5 is a sectional detail to be referred to.

A, is part of one of the end frames of a loom; a, the crank-shaft; a', the brake-wheel; a^2, the brake or brake-shoe pivoted at a^3 and provided with the lever a^4, notched to receive a suitable weight a^5; b, the shipper-lever, moving within the notched slot b' in the holding-plate b^2.

Depending from the holding-plate b^2, is shown a bracket b^3, (see Fig. 5) recessed at its lower end to receive the short shaft c of the brake-controlling handle or member C, said shaft c being retained in its proper position in said recess by a cap b^4 and pin b^5.

Upon the shaft c, at its end opposite the member C, is provided a yoke-like portion c', the opposite ends of which constitute stops or lugs c^2, c^3, which, in the normal or running position of the shipper, are both in contact therewith at its inner edge.

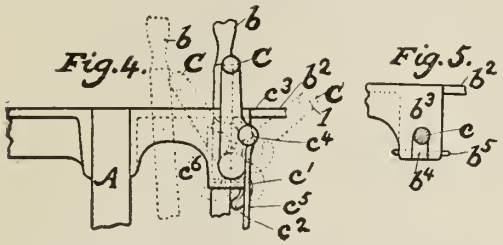
Referring to Figs. 1 and 4, the member C is shown as provided at its outer edge with an ear, to which is jointed at c^4 one end of the lifting-rod c^5, connected at its lower end to the free end of the brake-lever a^4,



the point of connection c^4, as shown, being at the right of the vertical or dead-center, so that the normal tendency of the weight a^5, is to turn the member C to the right into its extreme dotted position 1, Fig. 4, and thereby drop the brake-lever and apply the brake,

this tendency being resisted by the stop or lug c^2, resting upon the shipper-lever in its notch in the holding-plate.

When the shipper is knocked off either automatically or manually, to effect the stopping of the loom, it at



once springs in usual manner to the left into its dotted position shown in Fig. 4, and thereby permits the weight a^5, to turn the controlling member C into its extreme right-hand position and quickly apply the brake and stop the loom.

If it is desired to release the brake while the loom is stopped, and with the shipper-lever b still in its extreme left or dotted position, Fig. 4, the operator, by throwing the controlling member C, from its dotted position 1 toward the shipper into its extreme left-hand or dotted position, lifts the brake-lever a^4 and its weight, and releases the brake, such movement of the controlling member carrying the point of connection c^4, of the lifting-rod c^5, into the position at the opposite side of the vertical or dead-center line, so that the action of the weight a^5, is now to hold the brake released.

In the present instance there is provided a suitable stop-plate c^6, (shown in dotted lines, Fig. 4) against which the stops or lugs c^2, c^3, on the controlling member may contact to limit the movement of the controlling member in either direction.

But a single hand-controller is employed, which directly or immediately operates or controls the brake. That is, the brake is applied by movement of a single hand-controller, and is also released by movement of said single hand-controller.

By means of the new mechanism, it is possible to provide a single hand-controller to automatically apply the brake when the shipper is released, to automatically release the brake when the shipper is moved into supporting position, and which may be manually moved to release the brake without starting the loom, the term "shipper" as herein used including any device by which the starting and stopping of the loom is effected.

If the operator wishes to stop the loom by hand without applying the brake, he will by one movement throw the shipper and the brake-controlling member to the left into their dotted positions, Fig. 4. (*Mason Machine Works.*)

CLUTCH-OPERATING MECHANISM FOR CROMPTON LOOMS.

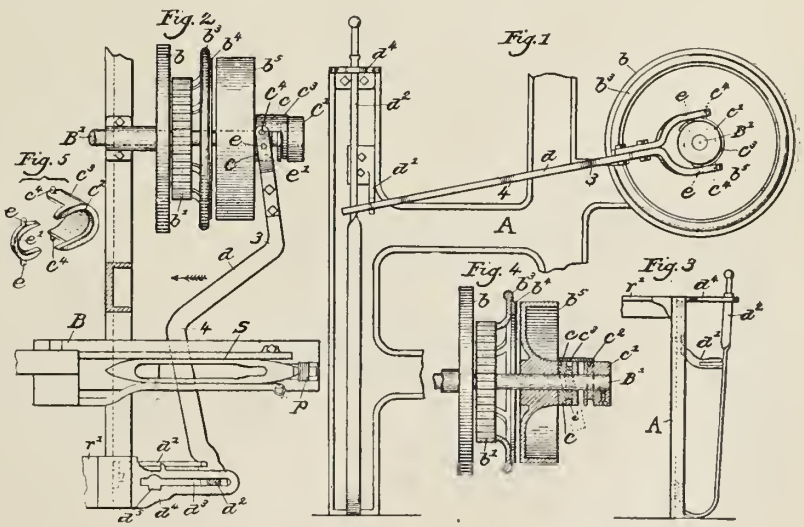
Heretofore two pulleys have been run on a loom, a tight and a loose pulley; but as it always takes time for a belt to shift from the tight to the loose pulley, three or four picks are lost before the loom would stop, and besides, the weaver had "to pull back" for as many picks as went in after the filling broke. To overcome all this trouble is the object of this clutch-operating mechanism, since by means of it as soon as the shipper-handle is released it at once forces the pulley from its friction, stopping the loom instantly. The clutch thus to be described operates this kind of a friction pulley.

Fig. 1 shows in end elevation a sufficient portion of a loom equipped with the device to enable the latter to be understood. Fig. 2 is a top or plan view of the parts shown in Fig. 1, together with a portion of the lay, showing the shuttle and picker-stick. Fig. 3 on a reduced scale, is a partial front elevation of the parts shown in Fig. 1. Fig. 4 is an enlarged vertical section of the clutch mechanism, Figs. 1, and 2. Fig. 5 is a perspective detail showing the two coöperating expanding-yokes.

The loom-frame is indicated by A, the breast-beam by r', the crank-shaft by B′, and the lay by B.

The shuttle S and picker-stick p, are shown only partially in Fig. 2.

Upon the crank-shaft B′ is made fast a brake-wheel b, and next it a toothed gear b', said gear having made as part of it the hand-wheel b^3, having at one side a ring-like face b^4, of leather or other suitable friction material, adjacent which is arranged the rim edge of the belt-pulley b^5, loose on the said shaft. Outside the hub of the belt-pulley b^5, is a grooved collar c', fast on the end of said shaft. The collar c' is grooved to receive the inturned flange c^2 of the semicylindrical hood-like clutch member c^3, provided with oppositely arranged pivots c^4, to which is jointed the forked end of the lever d, supported near the breast-beam in a suitable forked support d', and itself forked at its free end to straddle the shipper-lever d^2, arranged at the end of the loom and shown as of spring material attached to the loom-frame at its lower end and by its



own resiliency tending to normally remain in its outermost positions, Figs. 2, and 3, the said shipper working in the usual slot d^3 in the catch-plate d^4, the latter being provided with a holding-notch d^5. (See Fig. 2.)

The forked end of the lever d, close to, but inside the pivots c^4, is perforated to receive the oppositely arranged pivot projections e, on the yoke-like member e', Fig. 5, arranged to travel in the groove of the extended hub c of the pulley b^5, the said yoke-like

member e' and the member c^3, (both shown in Fig. 5,) constituting "clutch-actuating members."

When the loom is at rest, with the parts in the positions Figs. 2, 3, and 4, the pulley b^5, travels loosely on the shaft B'.

To start the loom the operator throws the shipper-handle to the left, Fig. 2, into the holding-notch d^5, such movement of said shipper acting to turn the lever d in the direction of the arrow, Fig. 2, about its fulcrum-pivots c^4, on the stationary hood-like member c^3, causing the pins e, in the member e', to slide the said member and the pulley b^5 to the left, Figs. 2 and 4, until the edge of the pulley-rim meets the friction-face b^4, of the hand-wheel, frictional contact of the two imparting to the hand-wheel and the crank-shaft the rotary motion of the pulley and starting the loom.

To release the clutch and stop the loom, the operator throws off the shipper, as usual, the resiliency of the latter throwing it to its extreme position at the right, Fig. 2, and returning the lever d, to its original position, withdrawing the driving-pulley from frictional contact with the face of the hand-wheel.

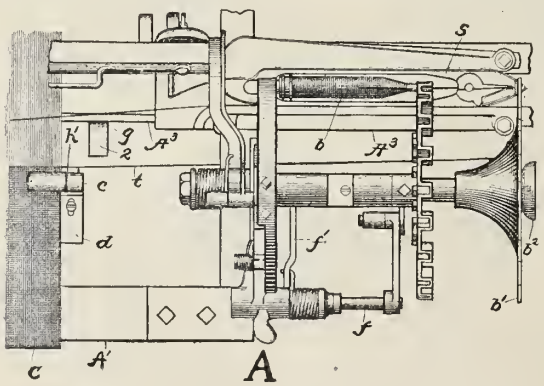
It will be noticed that the lever d, is given an angular or reversed bend at its middle to clear the vibratory movements of the usual picker-stick p, said lever, Fig. 2, being bent to the left at 3, and again back to its normal direction at 4.

The clutch-controlling lever d is supported at one end by the clutch parts and at its opposite end by the support d', and is loosely connected with the shipper-lever. (*Crompton and Knowles Loom Works.*)

FILLING CUTTING DEVICE FOR NORTHROP LOOMS.

The object of this device is the production of simple means for cutting the filling-thread at a predetermined point close to the selvage and between it and the point of attachment of the end of the filling.

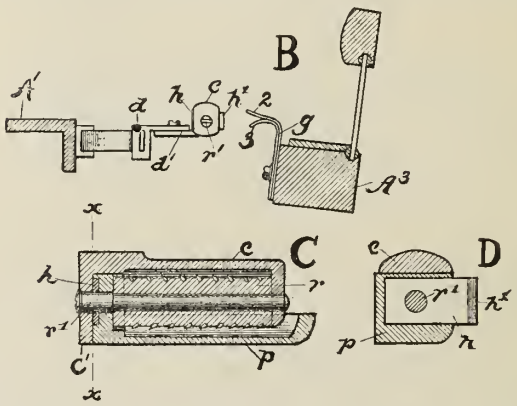
Of the accompanying illustrations Fig. A is a plan view showing a sufficient portion of the loom-frame, lay, and filling-feeder to be understood with the new device applied thereto, the lay being shown as back. Fig. B is a view, partially in section, transversely to the lay, showing the filling-cutter and guide. Fig. C



is an enlarged sectional view of the temple-head, showing the manner of attaching the filling-cutter. Fig. D is a transverse section thereof on the line x-x, Fig. C.

A indicates the loom-frame, A' the breast-beam, b a filling-carrier, b^1 the filling end supporting-plate, b^2 the holder for the end, f the stud, and f^1 the pusher to transfer a filling-carrier from the feeder, S the self-threading shuttle, and A^3 the lay, having the bottom of its shuttle-box cut through for the discharge of the spent filling-carrier from the shuttle.

When a fresh filling-carrier is inserted in the shuttle, the latter is thrown across the lay, the filling t leading from the end holder b^2 around the supporting-plate



b' to the selvage of the cloth C, as in Fig. A. Unless the end is severed positively, it will be broken as the cloth is wound on the roll, leaving a long end.

This positively severing of the end is accomplished with the new device, providing a cutter to positively sever the filling end at a predetermined point close to the cloth-selvage, a guide or holder coöperating to bring the filling into proper position.

The breast-beam A', has adjustably secured thereto a stand d, to which stand is connected the temple-shank d', its head having, as herein shown, attached to it a blade h, provided with a vertical cutting edge h'.

Referring to Fig. A, it will be seen that the edge of the cutter is located adjacent the selvage and at one side of the filling end t, so that by bringing the latter against the cutter the said end will be severed close to the selvage.

Figs. C, and D, show convenient means of securing the cutting-blade h to the temple-head, comprising the cap c and pod p, the upright wall of the latter at the outer end of the roll r being recessed transversely to receive the blade. The end c' of the cap extends over the side of the blade, and the roll-stud r' is extended through a suitable hole in the blade.

In order to positively press the filling end against the edge of the blade, there is mounted on the lay a guide g, (shown in Fig. B as having its upper ends 2-3 diverging toward and to engage the filling on the side opposite the blade as the lay moves forward), so that the filling end is pressed against the upright edge h', of the blade and severed.

Should the filling end not be severed at the first engagement with the cutter, one or two successive engagements therewith will sever it without fail close to the selvage.

The temple makes the simplest and most effective holder or support for the cutter or blade h, as it is in the proper position with regard to the point at which it is desired to cut the filling end. (*Draper Co.*)

FILLING-CARRIERS FOR NORTHROP LOOMS.

In Northrop looms, the filling-carriers are held in a revolving filling-carrier feeder. The said filling-carriers, due to the jarring of the loom in rapid operation, are liable to rotate in the feeder and wind or unwind the filling, which is apt to be injurious to the operation of the loom. To obviate the turning of the

filling-carrier in the feeder, the Draper Co. in their latest make of "automatic" looms provide the head of the carrier with a transverse slot and the feeder with

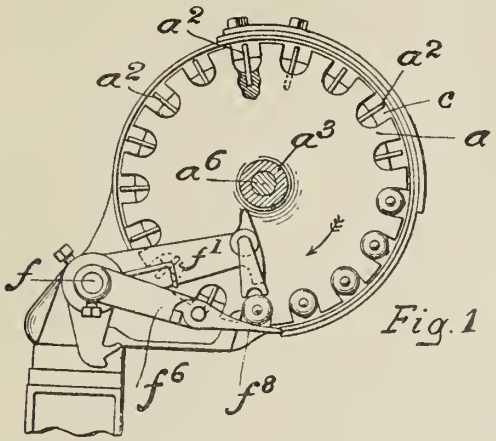


Fig. 1

a series of radial guides which receive the slotted heads of the carriers. They also shaped the heads of the carriers so as to present two secant surfaces, which surfaces, when the carriers meet and are being pushed together, act one on the other to prevent any rotation of the carriers.

Figure 1 shows a portion of a filling-carrier feeder, together with a pusher, with the present improvements added; Fig. 2 shows the filling-carrier on a larger scale; Fig. 3 shows a part of a shuttle with part of a filling-carrier therein.

The filling-feeder has the notched head or disk a at one end of a sleeve a^3, mounted on a stud a^6, said notched head or disk running inside the stationary flanged ring or plate c, and the pusher f', mounted on stud f. Arm f^6, is connected to the hub of the pusher and carries the tip-supporting device f^8.

The shuttle A, has jaws A′, one of which is represented in Fig. 3, and the bridge A^2.

In the head or disk a, and in each one of its notches a guide a^2 is placed, said guides being so located therein that when the filling-carriers B are being put into the feeder the slots B′ in the heads of the carriers

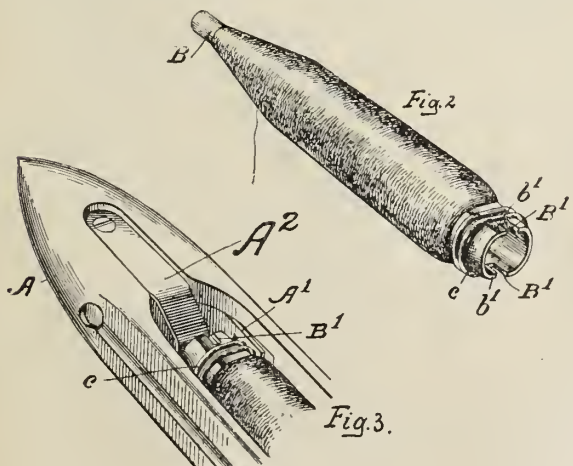


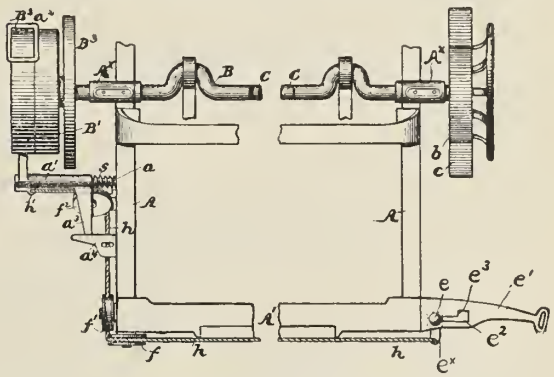
Fig. 2. Fig. 3.

will embrace each one of said guides, thus preventing any liability of the said carriers from being rotated while in said feeder or while being removed from said feeder by the action against it of the end of the pusher f'. The head of the filling-carrier is so shaped that it presents two flat or secant surfaces b', and when a carrier is removed from the feeder one of these flat sides tends to and does contact with the flat upper side of a carrier then in the shuttle, so that the carrier as put into the shuttle cannot turn or rotate at all, due to the pressure of one carrier against another.

It will be noticed that the flattened sides of the head of the filling-carrier, as the latter is removed by the pusher from the feeder into position between the jaws of the shuttle, strike the flattened face of the abutment, connected with the shuttle and having its free end located between the jaws A′, said flattened surface by its contact with said abutment materially aids in preventing the accidental slipping or sidewise motion of the filling-carrier. (*Draper Co.*)

LOCATING SHIPPER-HANDLE IN COTTON LOOMS AT THE OPPOSITE END OF BELT-PULLEY.

In looms as now most commonly used it is customary to locate the belt-fork or shipper and shipper-handle at the same end of the loom, but at times it is desirable to locate the shipper-handle at one end of the loom



and the belt-fork or shipper at the other end, and it is to this latter class of looms that the present improvement relates.

The accompanying illustration shows sufficient portions of a loom to understand the device.

A is the loom-frame; A′ the breast-beam; B the crank-shaft for operating the lay, it being in bearings A^x. The shaft C carries at one end the fast pulley B′, a loose pulley B^2, and a brake-pulley B^3, and at its other end it has a pinion b, which engages a toothed gear c, fast on the usual lower or cam-shaft. (Not shown in the illustration.)

Extended from one end of the loom is a plate e', having a notch e^2 and shoulder e^3, said notch receiving the upper end of a shipper-handle or lever e, which has, as shown, a projection e^x, to which is secured a flexible connection h, extended across to the opposite end of the loom and about suitable sheaves f, f', f^2, the opposite end of said flexible connection being attached to an ear h' of a sleeve a', fitted loosely over a stud a, projecting from the loom side, a spring s being shown as interposed between the said sleeve and loom side, said spring normally acting to move the sleeve to the right on said stud, as shown in the drawing, and cause the belt-fork a^2, to put the usual belt controlled by it, but not shown, onto the loose pulley B^2.

When the shipper-handle is moved so that it engages the shoulder e^3, the flexible connection draws

the sleeve in the direction to cause the belt-fork to put the belt on the fast pulley. When the weaver springs the shipper-handle out of engagement with the shoulder or when the handle is sprung out by means of any usual loom-stopping mechanism, the expansion of the cam, acting with the spring of the shipper-handle, effects the transfer of the belt to the loose pulley. (*Draper Co.*)

SCOTT'S LAPPET-LOOM.

The lappet-needles of this loom are each independently connected to one of the hooks of a jacquard.

The lappet ends are brought to the needles from a creel or bobbins, or from beams, and each end is passed over two tension-rods, one of which is carried at each end by a bell-cranked lever, and through a lingo or heddle between the rods, the said lingo being raised by the same hook which raises its corresponding lappet-needle in order to slacken the tension on the lappet end when it is raised, each end having thus a separate tension.

The bell-crank levers which carry the tension-rods are connected by cords to the slay so that as it beats up, the said tension-rod is depressed, (because all the needles pass under the woven fabric) and as soon as the slay returns and the needles rise again the tension-rod is returned by springs to its former position and takes up the slack.

The accompanying illustration is a diagram showing the independent lappet-needle and course of the lappet end thereto, and also illustrating the tension device or arrangement for tightening and slackening the lappet end.

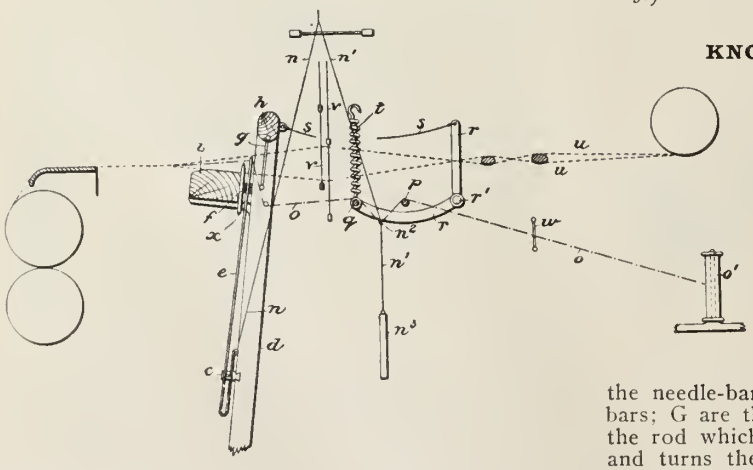
Loom-frame and slay-frame are of ordinary construction. *c*, is the grid fixed to the slay-sword *d*, through which grid each of the lappet-needles can freely and independently rise.

This grid is dovetailed in the slay-sword *d*, so as to be capable of movement endwise and thereby impart side motion or "slue" to the points of all the lappet-needles *e*, simultaneously.

f, is the needle-bar or rail (adapted and arranged to receive endwise motion), through which the needles *e*, can freely rise.

g, is the reed. *h*, is the hand-rail. *i*, is the slay.

Means are provided for imparting to-and-fro motion to the needle-bar by means of ordinary weighted



cords or straps operated by two eccentrics situated on the outside of the loom.

n, is a cord or connection from each needle *e* to the hook of a jacquard machine—a separate and independent cord *n* being brought from each needle *e* to a separate and independent hook in such apparatus, or several of these cords *n* may be connected up to one hook in such apparatus.

n', is a separate cord connected to the same hook as the cord *n*, and carries an eye n^2, through which the lappet end *o* is led on its way from the reel or bobbin *o'* to the needle *e*, and this cord *n'* carries the lingo n^3.

Thus each lappet end *o* is independently led through an eye n^2, independently connected, together with its corresponding needle *e*, to the hook of the jacquard, and by passing this end *o*, over two bars or supports *p*, the lingo n^3 causes a depression in the end *o*, while directly the jacquard simultaneously lifts the cords *n* and *n'*, the eye n^2 is correspondingly raised with the needle to which it guides the lappet ends *o* and thus slackens the latter corresponding to the amount of rise imparted to the said needle and again simultaneously takes up the slack when the needle falls. In order to again slacken the lappet end *o*, at the moment when the needle goes under the fabric at the "beat-up," the whole of the lappet ends are passed over the bar or support *q*, which extends across the loom to include all the warp ends (and passing under all the lappet ends *o*,) and is carried at each end by the bell-crank-levers *r*, pivoted at *r'*, to the frame of the loom. *s*, is a cord from the slay-frame to the free end of said bell-crank levers *r*, at each end of said bar *q*, the length of this cord *s* being such that same only tightens just before the needles *e* pass under the fell of the cloth, and thus it will readily be seen that the bar *q* is lowered, and thereby slackens the whole of the lappet ends *o*, while on the return movement of the slay-frame the spring *t*, connected to the bar *q*, lifts the same up as the cord *s* is slackened, and thereby takes up the slack in the ends *o*, caused by the rearward movement or return of the slay as the needles come from under the fell of the cloth.

u, are the warp ends, controlled by the harness-frames *v*, to produce a plain cloth, or the warp ends may be guided or controlled in any other desired and suitable manner.

w, is a coarse reed through which the lappet ends *o* are guided and kept separate as they come from the reel *o'*, or from any other suitable device, creel, bobbin, beam, or the like.

x, is a false reed ordinarily used in lappet-weaving machines for guiding the shuttle. (*D. Scott, Manchester, Eng.*)

KNOWLES LAPPET MOTION.

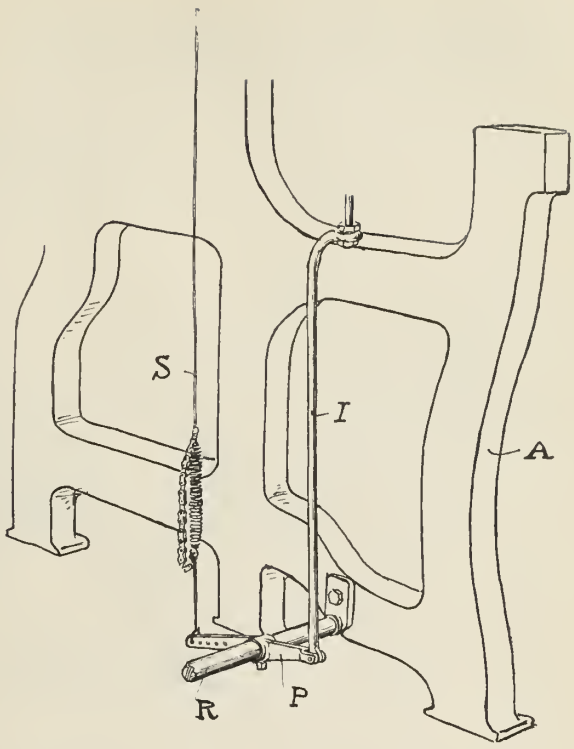
The Knowles lappet motion is made to be attached to any loom and can be operated either by a head motion or by a cam on the bottom shaft. The cuts here shown represent a lappet motion operated from a head motion, and can be best understood by the following lettering.

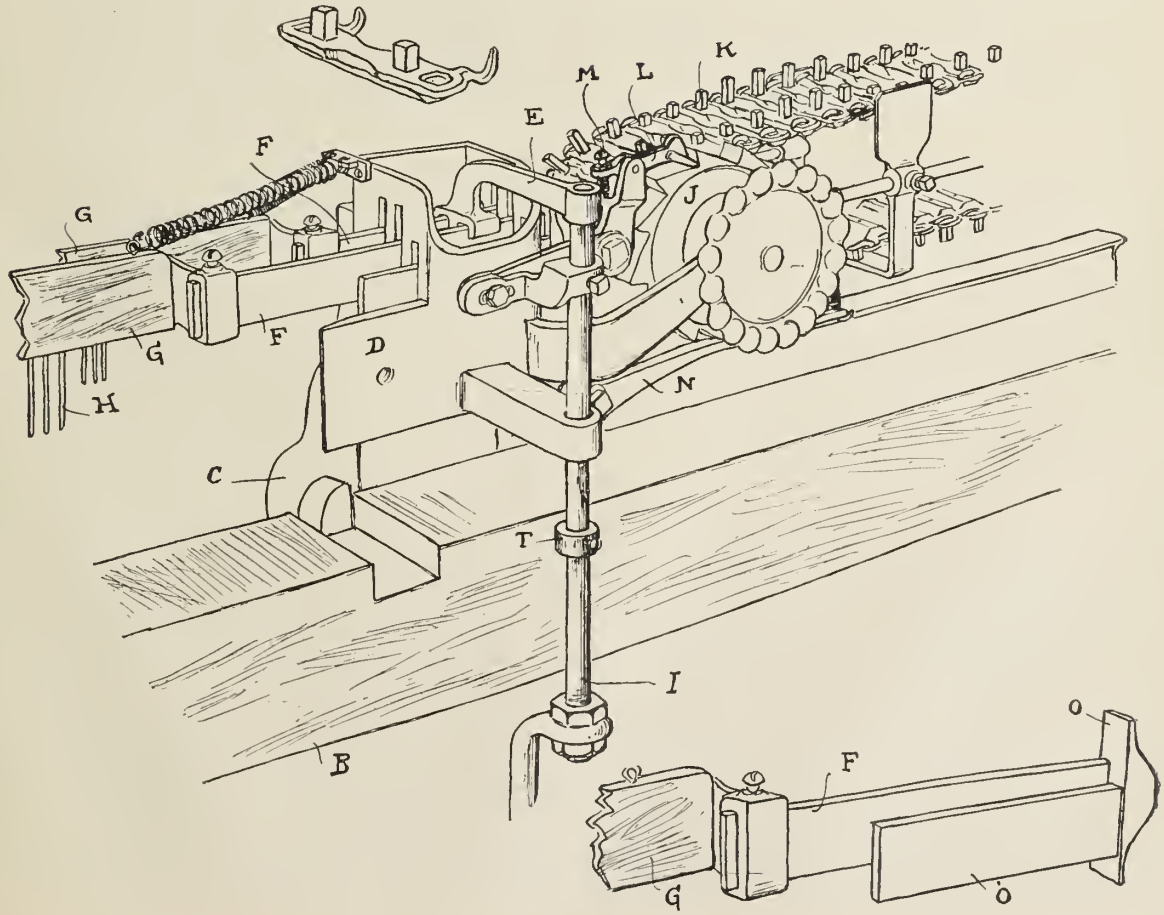
A represents the loomside; B is the lay-wood; C is the end of the lay-sword; D is a casting which is fastened to the lay-sword and is the stand for the lappet parts; E is a brass casting which serves as a run for the ends of the needle-bars; F are the steel ends of the needle-bars; G are the needle-bars; H are the needles; I is the rod which pulls the needles down into the shed and turns the pattern-chain; J is the pattern-chain-drum and ratchet; K is the pattern-chain; L is the pawl which turns the chain-drum; M is a screw in the back of the pawl which prevents the pawl from turning the drum too far; N is a lock-lever which

also prevents the chain-drum from being turned too far; O is the run on which the pins in the pattern-chain slide; P is a lever on the rocker-shaft R; S indicates the wire and chain which connects the lappet motion to the head motion, and T is a collar on the rod I, which prevents the rod from having too much motion.

A lappet motion is used for putting trailing designs into cloth, the lappet yarn passing through the needles H, and the needles being pulled down into the shed by means of the head motion or cam, and being forced out by a spring on the rocker-shaft R. The length of pins required for each pick of the lappet design are screwed into the bars of lappet-chain in succession, and as the chain-drum is revolved by the pawl a new pin is brought against the run O every pick and as the needle-bars are kept against the back of the run O by springs, the needles are moved to correspond to the change in length of the pins in each successive bar.

In order that the lappet-needles may not interfere with the passage of the shuttle across the race, the reed is set back and a false reed or pin-bar is used as a guide for the shuttle, the lappet-needle being between this pin-bar and the reed. The pin-bar is controlled by a cam on the breast-beam, being forced down out of the way when the lay beats up and allowed to rise into place when the lay moves toward the back center. The wire S is adjustable so as to vary the depth to which the needles are forced into the shed. (*Crompton and Knowles Loom Works.*)





REVERSING MECHANISM FOR KNOWLES CARPET LOOMS IN CONNECTION WITH THEIR FILLING STOP-MOTION.

In these looms considerable power is necessary to move the lay to its rear position when the loom is stopped.

Referring to the drawings, Fig. 1 is an end view, looking in the direction of arrow *a*, Fig. 2, of a loom

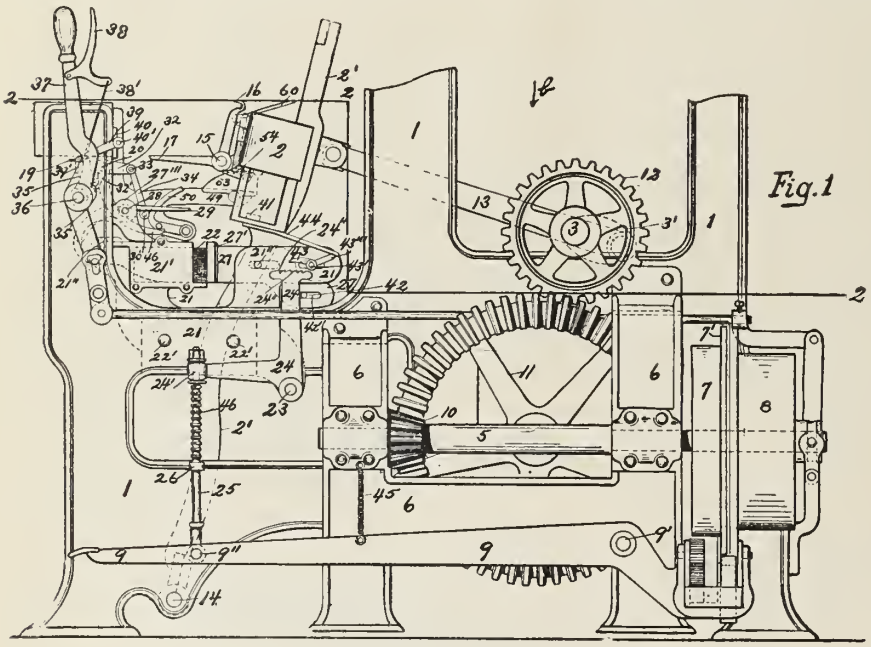


Fig. 1

provided with the new mechanism. The shuttle-boxes and operating mechanism are not shown. Fig. 2 is a sectional plan view of portions of the loom shown in Fig. 1, taken on line 2-2, said figure, looking in the direction of arrow *b*. Fig. 3 is a side view of the filling stop-motion. Fig. 4 is a plan view of the parts shown in Fig. 3, looking in the direction of arrow *c*. Figs. 3 and 4 are shown on an enlarged scale; and Fig. 5 is a sectional view taken at a point indicated by line 5-5, Fig. 2, looking in the direction of arrow *d*, same figure.

Numerals of references indicate thus:—1, the loom side; 2, the lay; 3, the crank-shaft; 4, the bottom shaft; 5, the pulley-shaft; 6, the pulley-frame; 7, the friction-pulley, provided with a friction-face 7′, with which the driving-pulley 8 is moved into or out of contact to start or stop the loom by the ordinary shipping mechanism.

Combined with the friction-pulley 7 and driving-pulley 8 is the reversing mechanism. The lever 9 of the reversing mechanism is hung on a stud 9′ in the pulley-frame 6 and operates the reversing mechanism.

A beveled gear 10 is fast on the pulley-shaft 5, and drives large beveled gear 11 fast on the bottom shaft 4. The beveled gear 11 meshes with and drives gear 12 fast on the crank-shaft 3. Connector 13 connects the crank 3′ and the crank-shaft 3 with the lay 2, the lay-sword 2′ of which is pivoted at its lower end on a pin 14 in the lower part of the frame 1. In front of the lay 2, is the protector-rod 15, fast upon which at each end of the loom is the binder-finger 16 and the protector-dagger 17. The binder-finger 16 is adapted to bear against the shuttle-binder of the shuttle-box, (not shown) and if the shuttle is not properly boxed in the operation of the loom, the binder will hold the finger 16 out and cause the dagger 17 to strike the knock-off lever 19 and stop the loom.

In Figs. 3 and 4 are shown, on an enlarged scale, a side and plan view of the filling stop-motion. Referring to said Figs. 3 and 4, 18 is the breast-beam, under which extends the knock-off rod 20, which has bearings in the ends of the loom. 46 is a finger or arm projecting from a collar 47, secured on the knock-off rod 20 by set-screw 48. Stand 49 is secured to the rear face of the breast-beam 18 and extends inwardly and has a knock-off arm or finger 50, pivoted at one end on a stud 51 at the lower end of said stand 49, and provided with a knob or projection 50′, adapted to rest on the finger 46. Secured to the horizontally-projecting end of the stand 49 by a bolt 52 is a shoe or track 53, on which is adapted to rest and travel, as the lay moves, the horizontal bent end 54′ of the dagger 54, which is pivoted at its inner end on a bolt 55 in the lower end of the stand 56, bolted to the lay 2. A connecting-rod 57 is pivoted at one end to the dagger 54 and its other end to the crank-arm 58 on the shaft 59, which has bearings in said stand 56 at the front of the lay. The shaft 59 carries the feelers 60, secured thereto by a hub 61 and set-screws 62. The feelers 60 extend over a transverse slot 63 cut in the top of the lay, and in case they are not held up by the filling, they will drop into said slot to automatically stop the loom by means of the filling stop-motion above described, for the forward motion of the lay will cause the end 54′ of the dagger 54, which is dropped by the lowered position of the feelers 60, to strike against the end of the arm or finger 50 and force down said arm and cause the stud 50′ thereon to move back the finger 46 on the knock-off rod 20 and revolve said rod to stop the loom, and automatically operate the reverse mechanism.

A stand or frame 21 is secured to the loom side 1, by bolts 22′, and contains the rubber-bunter pocket 21′, in which is secured the rubber-bunter 22. Hung on a stud 23 in the lower part of the frame 21 (see Fig. 1) is the angle-lever 24, which is connected to the lever 9 of the reverse mechanism by the rod 25, which extends at its upper end loosely through a hub 24′ on one end of said lever 24. The other end of the rod 25 is pivotally attached at 9″ to the front end of the lever 9. An expansible spiral spring 46 is mounted on the rod 25 and bears at its upper end against the hub 24′ of the lever 24, and at its lower end against a collar 26 on the rod 25. The spring 46 is of sufficient tension to communicate motion from the angle-lever 24 to the lever 9, and thus furnishes a yielding connection between said lever 24 and lever 9, and not a rigid connection.

Attached to the inside of the frame 21, by bolts 21″, is a sliding frame 27, which is provided with a projection or lug 27′, (see Fig. 2,) which extends in front of and in contact with the rubber-bunter 22. Said frame 27 at its front upper portion is provided with a hub 27‴, in which is mounted a shaft 28, on which a dagger 29 is loosely supported at one end, to move in-

dependently of said shaft. The hub 30, of a finger 30', is fast on the shaft 28, and said finger 30' extends under the dagger 29 and acts to raise said dagger at the proper time. The inner end of an arm 32 is fast on the knock-off rod 20. Said arm 32 carries a stud 33, to which one end of the connector 34 is attached. The other end of said connector 34 is attached to a stud 31' in the hub 31, which is fast on the shaft 28. The arm 32 is also provided with a rearwardly-extending forked end 32', (see dotted lines, Fig. 1, and also Fig. 5,) which is pivotally attached to a stud 35' in finger 35, loose on shipper-rod 36, which is provided with the shipper-handle 37, carrying the auxiliary handle 38 hung thereon.

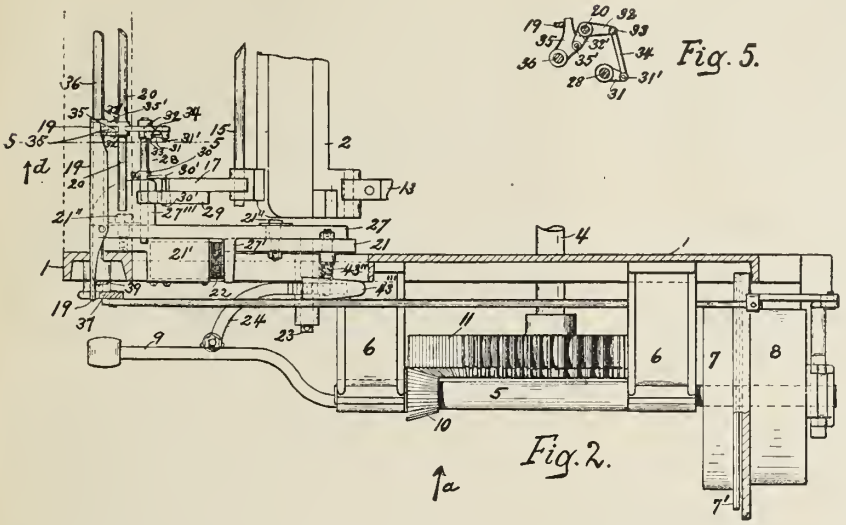


Fig. 2.

Fig. 5.

A connector 38' connects the auxiliary handle 38 with the finger 39, hung on a pin 40', fast in the stand 40. The finger 39 has a face 39', which is in contact with the outer end of the knock-off lever 19, so that when the operator grasps the auxiliary handle 38, in connection with the shipper-handle 37, to start the loom, the knock-off lever 19 will swing its inner end against the finger 35, loose on a shipper-rod 36, and cause the dagger 29, through forked end 32', arm 32, and connector 34, to be raised out of the path of the block 41, which is fast on the lay 2, as the lay beats up. After the first pick of the lay, the filling will be under the feeler-wires and hold said wires up in the usual way to prevent the operation of the stop filling motion and the engagement of the dagger 29 with the block 41. A pin 42 is secured in a slot 42', in the inner end of the sliding frame 27, (see Fig. 1) and as said frame 27 moves forward, the pin 42 will engage the angle-lever 24 and move said lever forward to communicate motion, through spring 46, to the lever 9 of the reverse mechanism. The pin 42 also acts as a stop to limit the backward motion of the lever 24 when released by the pawl 43.

In the stationary frame 21 is secured a stud 43', on which is hung a pawl 43. A spring 43" (see Fig. 2) is coiled around said stud 43', and acts to cause the pawl 43 to engage the teeth or notches 24" in the upper end of the upright arm of the angle-lever 24, to hold said lever in its forward position on the return of the sliding frame 21. The pawl 43 has a rearward extension or heel 43'", which will be engaged by the end of the arm 44, secured upon the under side of the lay, upon the rearward motion of the lay, to disengage the pawl 43 from the teeth or notches 24" in the upper end of the lever 24, and allow said lever to return to its upright position. (Shown in Fig. 1.)

From the above description, in connection with the drawings, the automatic operation of the reverse mechanism on the breaking of the filling, and the operation of the filling stop-motion mechanism will be readily understood.

The operation of the filling stop-motion (shown in Figs 3 and 4) causes the knock-off rod 20 to rotate, and through finger 35, operated by forked arm 32', the knock-off lever 19 to operate, to move the shipper-rod 36 and stop the loom on the forward beat of the lay. The rotation of the knock-off rod 20 in the operation of stopping the loom allows the dagger 29 to drop down, the lifter-finger 30' being lowered by the rotation of the shaft 28, through connector 34 and arm 32, so that as the lay moves forward the block 41 will engage the end of the dagger 29 and cause the sliding frame 27 to move forward and compress the bunter 22, and the pin 42 on said frame 27 will engage the angle-lever 24, and rock said lever 24 on its pivot-pin 23, and through the spring 46 move down the front end of the lever 9 and bring into action the reverse mechanism mounted at the opposite end of said lever, to cause said reverse mechanism to operate, and move the lay to its rear position, as shown in Fig. 1.

The forward motion of the lay will release the pawl 43 from the arm 44 and allow said pawl to engage the teeth 24" in the upper end of lever 24 and hold said lever in its forward position to operate the reverse mechanism, while the sliding frame 27, by the expansion of the bunter 22, will return to its rear posi-

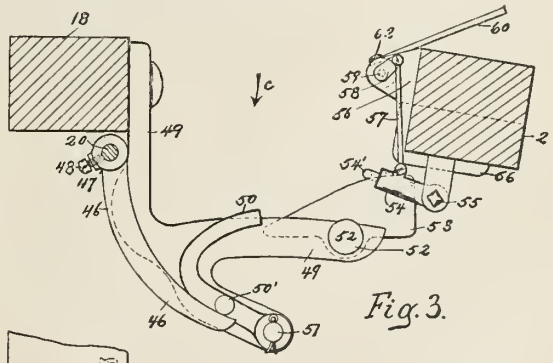


Fig. 3.

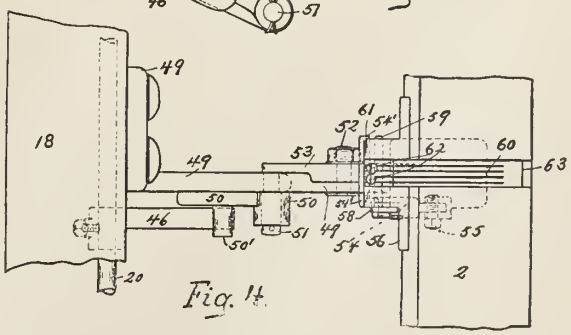


Fig. 14.

tion immediately as the lay starts to move back. The continued backward movement of the lay causes the arm 44 to engage the heel 43‴ of the pawl 43, and disengage said pawl from the teeth in the lever 24, as before described, to allow said lever to return to its upright position through the action of spring 45.

It will be understood that the forward movement of the sliding frame 27 is very slight, but is still sufficient to communicate, through angle-lever 24 and spring 46 on the rod 25, sufficient movement to the front end of the lever 9 to bring into operation the reverse mechanism supported on said lever. (*Crompton and Knowles Loom Works.*)

BARDSLEY'S LENO-MOTION.

In weaving leno fabrics it is necessary, in order to facilitate the crossing of the warp-threads, that certain of the said warp-threads should be given a half-and-return movement during the cross-weaving—that is to say, during the cross-weaving it is necessary to give to certain of the harness-frames and the warp-threads which are controlled thereby at the time of each shed formation a half-and-return motion, that is, a movement which shall carry such warp-threads from one extreme plane of the normally open shed to an intermediate or middle point and then back again to the original plane. When not concerned in cross-weaving, the same harness-frames and their warp-threads are required to be given a full motion—that is, to be moved like all the other harness-frames and their warp-threads—namely, from one extreme plane of the shed to the other extreme plane thereof.

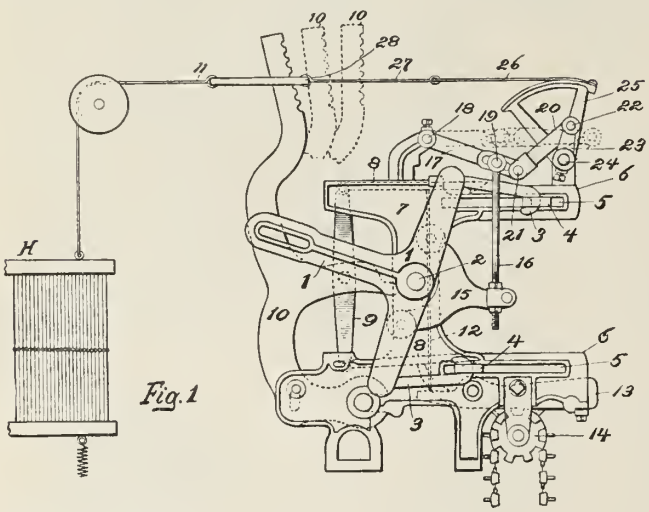


Fig. 1

The object of this invention is to provide devices of simple and convenient character capable of being applied readily to dobbies such as now are in extensive use and fitted to operate in connection with the parts of the said dobbies to occasion the half-and-return movement of the required warp-threads during the cross-weaving without interfering with the capacity of the usual parts of the dobbies to produce a full movement of the same warp-threads from one extreme plane of the shed to the other thereof, when the cross-weaving of the said warp-threads is to be superseded by other kinds of interweaving thereof for the time being.

Fig. 1 shows in side elevation a well-known form of dobby having applied thereto the said embodiment of the invention and certain of the harness-frames which are operated thereby, with the intermediate connections. Fig. 2 is a view in plan of the parts which are represented in Fig. 1.

1, is the usual actuating-rocker of the dobby, it receiving movement in customary manner from the mechanism of the loom to which the dobby is applied. 2, is the rock-shaft on which the said rocker is fixed. 3, are the connectors, which transmit movement from arms of the said rocker to the lifters. 4, are the usual lifters, they moving in slots 5, in the horizontally-extending portions 6, of the frame 7, of the dobby. 8, are the hooks engaged and actuated by the lifters 4.

9, are the lever-connectors, having the hooks 8, pivotally connected with the upper and lower ends thereof, and each lever-connector being pivoted upon an outwardly-projecting portion of one of the harness-actuators or harness-levers 10. 11, are the connections or cordings which serve to transmit movement from the said harness-actuators or harness-levers 10, to the harness-frames H.

12, are the needles, and 13, the pattern-fingers or levers. 14, is the pattern-cylinder.

15, is an arm or extension attached in accordance with the present invention, to the rocker 1. 16, is a connecting-rod that is actuated by the said arm or extension 15. 17, is a swinging arm pivoted at 18, to the dobby-frame 7, and which has the upper end of the connecting-rod 16, pivoted thereto at 19. 20, is a second swinging-arm, one end of which is joined pivotally at 21, to the swing-arm 17, while the other end thereof is joined pivotally at 22, to the arm 23.

24, is a rock-shaft upon which the arm 23, is made fast. 25, is an arm that also is made fast upon the rock-shaft 24, the said arm 25, having a curved upper end that is concentric with the rock-shaft 24. 26, are straps which are connected at their outer ends to the said curved upper end of the arm 25, the inner ends of the said straps 26, having connected thereto wires 27, which are engaged with elongated loops or links 28 that are connected with and form part of the harness connections or cordings. The harness-actuators or harness-levers of those harness-frames which are required to have at times the half-and-return motion are passed through the said elongated loops or links 28.

When operated by the engagement of their connected hooks or hooked jacks with the usual lifters 4, so as to receive their full length of stroke outward, the said harness-actuators or harness-levers, in consequence of their engagement with the outer ends of the links 28, serve to transmit to their harness-frames the full-length movement that carries the warp-threads from the lower plane of the shed to the upper plane thereof. Thus, whenever an outward movement of one of the said harness-actuators or harness-levers is called for by the indicators on the pattern-cylinder, the movement of the said harness-actuator or harness-lever which results from the actuation of the latter from one of the usual lifters 4, gives to the connected harness-frame its full motion and highest position. While the harness-actuator or harness-lever remains in its outer position, it supersedes the action of the oscillating arm 25, upon the said connected harness-frame. This it does by reason of its engagement with the outer end of the elongated loop or link 28, and by reason of the further fact that the arm 25, which may be termed a "half-stroke lifter," has only half the extent of traverse that the usual lifters have.

Whenever the outward movement of one of the said harness-actuators or harness-levers is not called for, the latter remains stationary in its innermost position. The length of the opening in the elongated loop or link 28, permits the said loop or link and all of the connec-

tions intermediate the arm 25, and the harness-frame to move in unison with the said arm 25, which is fast upon a rock-shaft 24, having a second arm 23, also

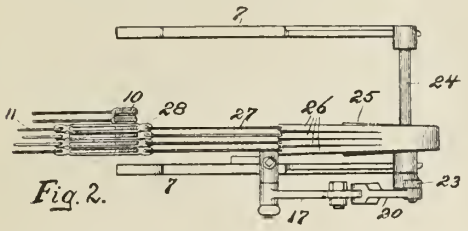


Fig. 2.

made fast thereon, this latter arm having joined thereto the swinging arm 20, and the latter in turn being pivotally connected with a second swinging arm 17, from which last a connecting-rod 16, extends to an arm or extension that is provided upon the rocker 1.

As the rocker oscillates it swings the arms 17 and 20, carrying the pivot 21, by which such arms are joined together above and below the line passing through the pivots 18 and 22, by which such arms are joined to the dobby-frame and the arm 23. It follows that each swinging movement of the rocker 1, in either direction occasions a complete oscillation of the rock-shaft 24, and arm 25, and the required half-and-return movement of the harness-frames, the links 28, playing back and forth relatively to the retracted harness-actuators or harness-levers. In other words, while an ordinary lifter is occupied in making a complete traverse one way, the half-stroke lifter—*i. e.*, arm 25—will make its complete one-way traverse and return.

The elongated links 28, permit play of the harness connections or cordings relatively to the harness-actuators or harness-levers when the latter are in their innermost or retracted position, and thus enable the said harness connections or cordings to be moved by the oscillating arm 25, and given the desired half-and-return movement without occasioning movement of the said harness-actuators or harness-levers. At the same time whenever one of the harness-actuators or harness-levers is actuated, it being moved outward by reason of the engagement of the lifters with its connected hooks or hooked jacks, the said harness-actuator or harness-lever acts upon the outer end of the corresponding loop or link and thereby operates to occasion the full movement of the harness-frame.

The invention will be employed in connection with certain only of the harness-actuators or harness-levers pertaining to a dobby. The remaining harness-actuators or harness-levers will be operated in customary manner to communicate full-length movements to their connected harness-frames. (*Crompton and Knowles Loom Works.*)

LOOM FOR WEAVING PILE FABRICS.

In this loom the body or backing of the pile fabric is woven in the ordinary manner and the threads composing the pile-surface are introduced as warps.

Use is made of distenders, in the form of thin blades passing through the reed at intervals and supported by a frame and harness similar to the heddles of a loom, and these distenders project beyond the point where the picks are knocked up to place and the cloth fabric produced, and the parts are so made and the movements so arranged that the distenders are carried downwardly and rest upon the shuttle-rail of the lay at the same time the pile-warps are elevated, so that a distending-thread is laid across the distenders between them and the pile-warps, and when the shed is changed the pile-warps are carried down, leaving loops over the distending-threads, which distending-threads are supported by the distenders, and then a pick, is interwoven in forming the body or back of the fabric after the distenders have been raised, and as the weaving progresses, the distending-threads slip off the ends of the distenders and the fabric is complete, ready for the distending-threads to be pulled out in completing the fabric, or the pile-loops may be simultaneously cut as the distending-threads are drawn out.

Fig. 1, is a diagrammatic view showing part of the lay, breast-beam and heddles and with the distenders raised for the shuttle to pass beneath. Fig. 2, is a similar view with the distenders depressed and resting upon the shuttle-rail of the lay for the shuttle to pass over the distenders. Fig. 3, is an elevation, and Fig. 4, an end view, of the frame in which the distenders are sustained; and Fig. 5, represents the fabric by an enlarged diagrammatic section, and Fig. 6, represents a modification in the fabric.

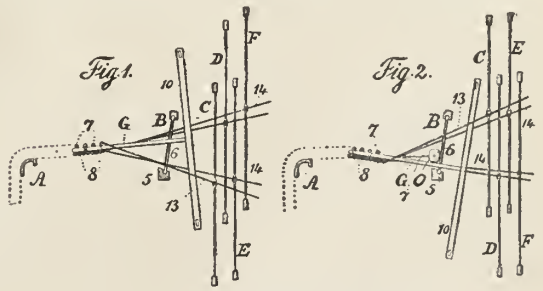
A, is the breast-beam around which the woven fabric passes and is wound upon a suitable cloth-beam. B, is the lay made with a shuttle-rail 5, and with a reed 6.

Usually two shuttles are used; one for laying in the distending-threads 7, and the other for laying in the filling-threads 8, which form the backing of the fabric. C, D, E, and F, indicate heddle-frames.

Heddles C, and D, show the raising and lowering of the warps that are used in making the pile-loops and the heddles E, and F, manipulate the warps in the weaving of the body or back of the fabric.

The distenders G are in the form of thin wires or springs, of a width to correspond to the length of loops forming the piles of the fabric, and each distender is made with a vertical bar or **T**-head 10, at the ends of which are slots or eyes for cords or wires by which such distenders are held within the frame H, and the vertical bars of these distenders are of sufficient length for allowing the warps to be raised or lowered by the harness, the warps passing between the vertical bars of the distenders.

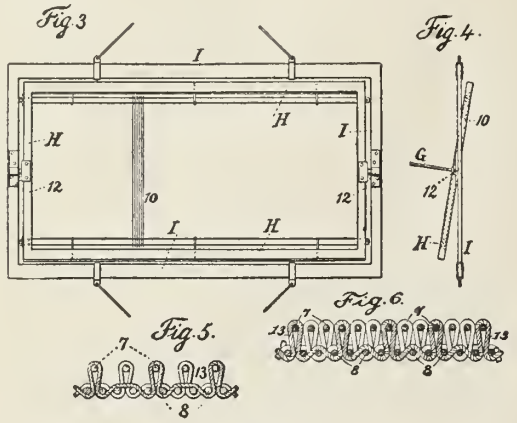
It is not necessary to have as many distenders as there are wires in the reed, as the weaving is reliably performed when there is a distender to every three or four wires in the reed, and the distenders G pass through the reed and are of sufficient length to reach beyond the cloth-making point, so as to support the desired number of pile-loops in the woven fabric before the distended pile-loops pass beyond and separate from the ends of the distenders as the weaving progresses. These distenders are raised when the shuttle or shuttles are to pass beneath them, and they are depressed and lie substantially upon the shuttle-rail when the shuttle is to pass above them. Hence they are sometimes in line with the woven fabric and sometimes at an angle to the same, and to give freedom of movement to the parts, the frame H is pivoted at its ends to the frame I, to which the ordinary straps or



cords are applied in the harness-mechanism for raising or lowering the frame I, and as this movement takes place, the frame H and the vertical bars 10 of the distenders G, swing upon the pivots 12, so as to allow the parts easily to assume the proper positions as the

distenders stand at different angles to the woven fabric.

When the loom is in operation, the picks 8 are thrown in at the proper time from a shuttle or shut-



tles passing below the distenders G, so as to weave the body or backing of the fabric, and when the picks 8 are laid in position by the shuttle the distenders G are elevated for the shuttle to pass beneath the same, and when the pile-loops are to be formed the distenders G are lowered, so as to rest upon the shuttle-rail, as seen in Fig. 2, for the shuttle O to pass over the same and lay in a thread 7 between the top edges of the distenders G and the warp-threads 13, from which the pile of the fabric is made, and when such warp-threads 13 are depressed and the distenders G raised, a pick 8 is to be laid into the body of the fabric to confine and hold the loops of the plush or pile fabric, and the pile-warps are again raised and the distenders depressed for laying in another thread 7, for distending the loops of the pile.

The distenders are substantially in the plane of the upper shed while the backing is being woven, and in substantially the plane of the lower shed when the distending-thread for the loops is laid above them.

It is advantageous to employ two or more heddles for manipulating the warps from which the pile-loops are made, so that such loops may be woven alternately between the picks forming the body of the fabric, as represented in larger size in Fig. 5, the threads of the warp forming the pile-loops passing up between one pick and the next and around the distending-thread 7, and, passing beneath two picks and over two other picks in the body or backing before being again carried up to form another loop in the pile fabric.

It will be apparent, that, as the weaving progresses the distending-threads 7 pass off the ends of the distenders G progressively, and they remain in the loops of the pile fabric and they may be drawn out at any time, as desired, and where the pile-loops are to be cut any suitable blade may be drawn in for cutting such loops as the distending-threads are drawn out, the cutting-blade being connected with a distending-thread so as to be drawn into each loop in succession as the distending-thread is drawn out.

The warp-threads 14, that are interwoven with picks 8 to form the backing of the fabric, may be of any desired character and number. They are not represented in Fig. 5, to avoid confusion. Three picks may intervene between the pile-loops, as seen in Fig. 6, instead of the four shown in Fig. 5. (*C. Coupland and F. Pearson, Seymour, Conn.*)

McMICHAEL'S SMASH PROTECTOR.

Fig. 1 is a cross sectional view of this smash protector, showing the lay as moved forward, but with the reed as in locked position. Fig. 2 is a cross sectional view of the lay and some of its equipments, showing the lay as moved forward, and the reed as in unlocked or released position.

Of the letters of reference in illustrations *a* designates the breast-beam, and *b* the lay of the loom. *c* is the reed, and *d* the upper, and *e* the lower bar of the same. The bar *d* is pivotally supported so that the lower bar may be swung backward and forward when permitted to do so.

The reed will be locked against swinging motion in the latter part of its forward movement, when acting to beat up the filling, and also manifestly in the first part of its backward movement; and it will be unlocked in the first part of its forward movement, and the last part of its backward movement, so that it can swing upon its pivotal support in case it meets with an obstruction, such as a lodged shuttle in the shed. *f* designates a holding-bar which can move to a limited extent backward and forward on an offset *g* formed on the lay, and when moved forward may rest with its forward side or face against the lower bar *e* of the reed, and hold the latter in place, as shown in Fig. 1; and when the said holding-bar is moved back the lower bar *e*, may be free to swing backward, as represented in Fig. 2.

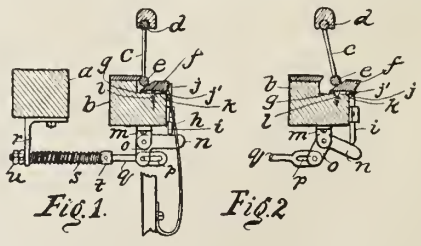
h designates springs having one of their ends secured to some convenient part of the frame of the machine, while their free ends are arranged to bear against the rear side or face of the holding-bar to maintain the same in place against other than undue pressure.

To hold the reed rigidly in place, a vertically movable locking-bar *i*, on the back side of the lay, is provided.

The upper forward edge of the locking-plate is bevelled, as at *j*, so as to provide for reeds of different size.

j' designates a plate secured to the lower side of the holding-bar, and transversely through this plate are formed slots *k*, to receive the shanks of headed screws *l*, the slots *k*, not being sufficiently large to permit the heads of the screws passing through the same. By this means the holding-bar is kept on the lay, and guided in its movements backward and forward.

To move the locking-plate vertically in proper time, elbow-levers are fulcrumed on brackets *m*, secured to the bottom of the lay. Said levers being arranged so that the lower edge of the rocking-plate may rest upon the substantially horizontal arm *n* of the said lever, whereas the other arm *o*, of the said lever is pivoted in a slot *p*, formed in the inner end of a rod *q*, which at its outer end passes through a hole formed in a bracket *r*, secured to the breast-beam. A spring *s*, surrounds the rod *q*, and is arranged between a collar *t*, on the said rod and the bracket *r*, so as to operate



normally to press the said rod inward and operate the elbow lever with a tendency to raise the rocking-plate. Nuts *u*, are turned upon the outer end of *q*, to prevent its disengagement from the bracket *r*.

In the operation of the device when the lay moves back, the rod *q* will be made to act upon said elbow, and move it from the position in which it was shown

in Fig. 1, to that in which it is represented in Fig. 2, allowing the locking-bar to drop and release the holding-bar, thus unlocking the reed. When the lay moves forward, the operation just described will be reversed and the parts will be moved from the position in which they are shown in Fig. 2, to that of Fig. 1, raising the locking-bar and locking the holding-bar and reed in place, so that the latter can act to beat up the filling. It will be understood that the reed will not be swung back, as shown in Fig. 2, unless an obstruction like a shuttle in the shed is met with as the lay moves forward, in which case the reed will be released and swing back, thus preventing a "smash." (*Woonsocket Machine and Press Co.*)

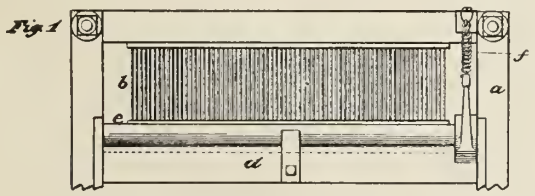
POEHNERT'S SMASH PROTECTOR.

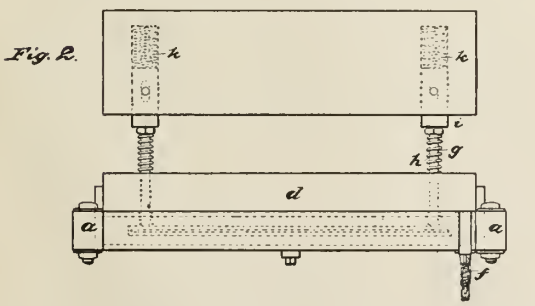
Fig. 1, is a front view of those parts of a loom to which this protector more particularly pertains; Fig. 2, is a top view of such parts; Fig. 3, is a view of the same in vertical section.

The object and purpose of the improvement is the prevention of injury to the parts of the loom and to the cloth which is being woven therein, if a shuttle or other obstacle is caught accidentally between the reed and the warp-shed in the beating-up motion of the lay.

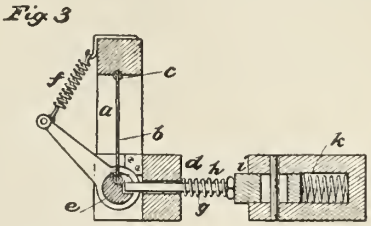
Letters of references indicate thus: *a*, denotes the lay as a whole, which has in practice the ordinary reciprocating or vibratory motion, and *b* denotes the reed which is not fast in the lay, as is the more common practice, but its upper edge is rather loosely seated in the groove *c*, formed in the underside of the cross-piece which connects the two vertical arms of the lay. The lower edge of the reed is held in place between the cross-piece *d* and the reed-confiner *e*, which is in a general sense a roll with trunnions at the ends journaled in the upright arms of the lay and having some rotary motion.

This reed-confiner is held in a position to confine the lower edge of the reed between it and the cross-piece *d*, by means of the reed-confiner spring *f*; but,





so far as the action of the spring *f* is concerned, if the reed in its beating-up motion strikes a shuttle or other obstacle in the warp-shed, the backward pressure thus put upon the reed readily overcomes the opposing pressure of this spring, the reed-confiner rolls backward, and the reed is wholly released from its seat, remaining hanging loosely upon the warp-shed; but if the reed properly seated in its place is carried by the beating-up motion of the lay substantially beyond the point where it must meet a shuttle, if one is acci-



dentally lying in the warp-shed, then the reed is locked in place in order that it may properly beat up the filling thus:—*g* denotes reed-confiner locks, which are simply pins having some back-and-forth motion, being loosely held in openings in the cross-piece *d*, prepared for their reception, and for the most of the time held out of contact with the reed-confiner by means of the springs *h*, the said pins being allowed play between the bunter *i'* and the reed-confiner *e*, the spring *h* bearing against the cross-piece *d* at one end, and the head of the pin at the other to retract the confiner-locks.

Just as the reed is about to beat up a pick into its place, as a part of the piece of cloth that is being woven, these reed-confiner locks strike the bunters *i* and are thereby forced forward into the sockets *e'* in the reed-confiner. In such position they lock the reed firmly in its place to accomplish its normal and proper beating-up function, the springs *k* permitting necessary beating-up motion of the lay, but holding the reed, nevertheless, locked in place.

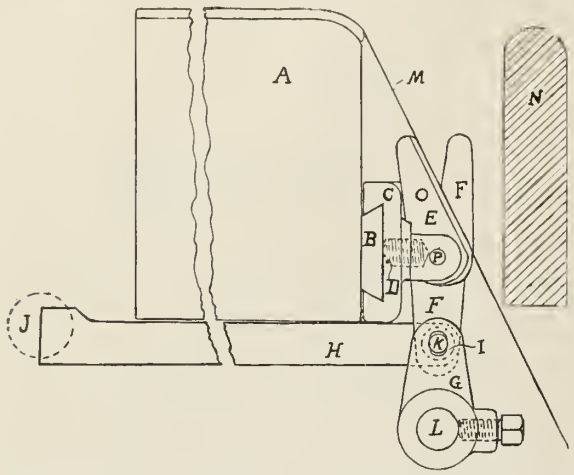
When the reed retreats in the backward motion of the lay, and the locks *g* cease to have contact with the bunters *i*, the reed-confiner is unlocked and remains unlocked until another beating-up motion of the lay again brings the locks *g* into contact with the bunters *i*, which have just been spoken of as though they were practically rigid and stationary. As a matter of fact, they rest against springs *k*, which are considerably stouter (that is, resist compression with greater degree) than the lock-springs *h*, so that the action so far described will take place if everything goes on as it should, but, if for any reason the locks *g* should not properly enter the sockets *e'* in the beating-up motion of the lay, then these springs *k* will permit the bunters *i* to retreat and so prevent breakage of the parts of the loom. (*Edward Poehnert, Rockville, Conn.*)

THE KNOWLES CLOTH SEPARATOR.

This cloth separator is used for cutting fringes, separating cloth when a center selvage is used and so on, while the cloth is on the loom and before it is wound upon the cloth-roll. The accompanying diagram will clearly explain its method of operation.

A indicates the breast-beam of the loom; B a way screwed onto the breast-beam and extending the length of the beam; C is a casting which slides on the way B, and can be fastened to it by means of the screw D; E is one part of the shear and is bolted fast to the casting C; F is the other part of the shear and is fastened to the part E by the screw P; G is the arm which is connected to F by the pin K, and is fast upon the shaft L; H is the rod which is fastened to the stud I, this stud being a part of an arm similar to G but placed at the end of the rocker-shaft L; J is the protector-rod which when the lay comes forward strikes against H, rocking the shaft L and the arm G, thus

closing the shear F upon E and cutting the cloth M which is between the shear. When the lay returns to the back center the shears are opened by means of



a spring (not shown). N is a board which extends the width of the breast-beam and is held in place by a pair of brackets which are not shown in the illustration. (*Crompton and Knowles Loom Works.*)

ZUPPINGER'S CLOTH SEPARATOR.

The object of its construction is to produce a cutter which will not cut into the edges of the cloth, the purpose being to produce a cutter having a wide portion provided with slits in which the adjacent edges of the strips of cloth may enter, with the cutting-edge between the widths of cloth.

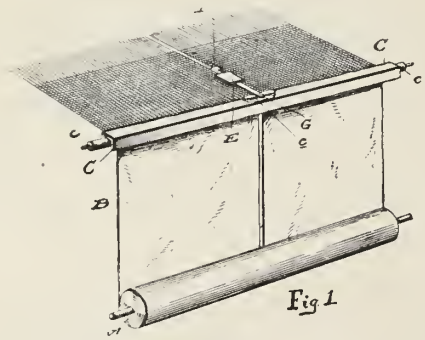


Fig 1

Of the accompanying illustrations, Fig. 1 is a perspective view of a cloth-roll on a loom, showing the protection-rail and the cutter carried on the edges of the cloth. Fig. 2 is a perspective view of the cutter removed.

A designates a cloth-roller of a loom; B the double widths of cloth wound thereon; C the protection board covering the roller *c*; and D is the cutter which is secured to a flat metallic member E, which is provided

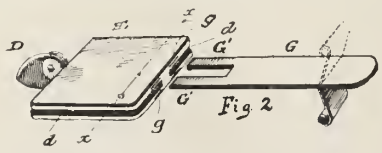


Fig 2

with the slot *d*, extending from the two side edges into the cutter.

G is a sliding member having the bifurcated end G' securely fitting the apertures *g*, and the L-shaped portion at its other end, which is designed to abut against the protection-board, or in case no protection-board is used then to bear against the roller *c*. The adjacent edges of the widths of cloth engage in the slots *d*, and support the cutter, while substantially L-shaped portion bears against the protection-board or roller. When being used in connection with the former, the portion G, has the L-shaped portion upturned, and when in use with the roller downwardly turned.

It will be readily seen that a cutter constructed in accordance with the thus given directions will prevent the sides of the cloth being cut into, in case the work does not run straight. (*John Zuppinger, Phila.*)

BOSWORTH'S AUTOMATIC PICK-COUNTER.

In weaving, a certain number of picks are thrown by the shuttle to produce cloth of a given weight. The number of picks are determined in a given space—say one inch of cloth—by the speed at which the fabric is fed through the loom with reference to a given speed (picks per minute).

The object of the counter is to provide a simple device, and one which is contained in small compass, by means of which the number of picks being woven into a certain fabric may be determined at any time.

To produce this result a dial is employed, having a moving hand connected to a pawl-and-ratchet device in such a manner that the hand is caused to move one space or point each time the shuttle of the loom is operated. In connection with this pawl-and-ratchet device, there is employed a trip-wheel connected with the moving fabric in such a way as to move continuously therewith and automatically start and stop the ratchet device, so that the counting shall take place at certain predetermined points and continue for a predetermined interval, so that the number of picks or threads which go into a certain length of cloth shall be accurately counted at stated intervals during the operation of weaving said fabric.

Fig. 1 is a front view of the dial; Fig. 2 is a rear view of the same showing the ratchet-wheel and trip-wheel; Fig. 3 is a side elevation, partly in section, of the same.

Letters of references indicate thus:—*a* represents the dial, which is numbered from a normal or starting point marked zero with as many numbers as desired. Supported in front of the dial, (covered with a glass) is a hand *a'*, which is mounted on the projecting end of an arbor a^2, which passes through the dial and is supported in a frame at the rear of said dial. To this arbor there is rigidly connected a ratchet-wheel a^3, which has as many teeth in its periphery as there are numbers on the face of the dial, each tooth corresponding to one space or point on the dial. There is also mounted on the arbor a spiral spring, one end of which is connected to the frame and the other end connected to the ratchet-wheel or arbor, so that as the hand is moved from the zero or starting point, the spring is wound up and tends to restore the hand to its normal position when released.

Pivoted on the arbor a^2 adjacent to the ratchet-wheel is a vibrating-lever *b*, which carries a pivoted spring-actuated pawl *b'*, adapted to engage the teeth of the ratchet-wheel, the pawl being constructed with a laterally-extending pin b^2 which projects entirely through the pawl, so as to engage the ratchet-teeth at one side of the pawl and form a projection at the other end to be engaged by a trip-wheel. Adjacent to the pivoted pawl *b'*, on the lever, is a holding-pawl b^3, which is pivoted to the frame in such a manner as to engage the teeth in the ratchet-wheel to prevent the

same from returning by the action of the spring a^4. The holding-pawl b^3 is provided with a laterally-extending projection b^4, which stands in line with the pin b^2 on the pawl b', and sufficiently removed therefrom so that they will not contact in the ordinary operation of the lever-pawl in operating the ratchet-wheel.

Adjacent to the ratchet-wheel and journaled loosely on the arbor a^2, a trip-wheel c is formed, with a portion c' of its periphery depressed so that it stands substantially coincident with or within the bottoms of the ratchet-teeth in the ratchet-wheel. The remaining portion c^2 of the wheel-periphery is formed coincident with or slightly larger than the outer ends or points of the teeth of the ratchet-wheel. The projection b^2 in the operating-pawl b' extends over the depressed portion of the periphery of the trip-wheel and is adapted to be engaged and moved outward by the portion c^2 of said wheel, which acts as a cam-projection and support for said pawl, so that, when the pawl is engaged thereby it may still vibrate with the lever, but shall not engage the teeth in the ratchet-wheel.

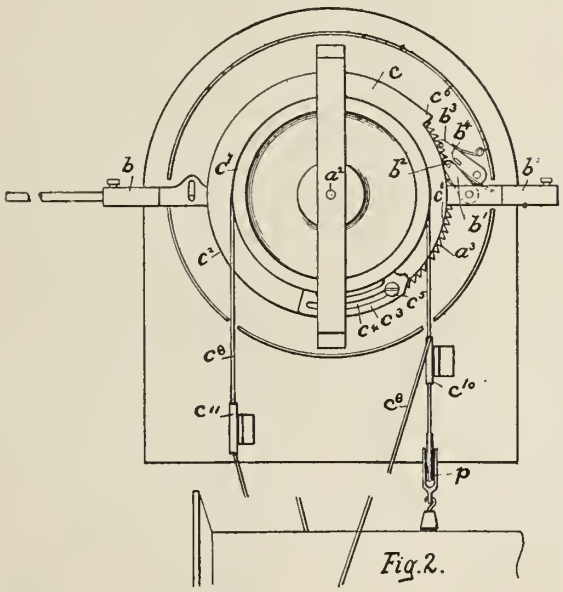


Fig. 2.

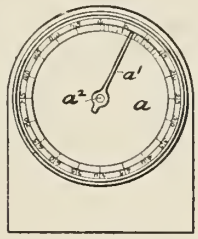


Fig. 1.

Fig. 3.

The trip-wheel is made to revolve continuously at a speed corresponding to the speed of the fabric through the loom, while the vibrating-lever b is connected so as to vibrate each time the shuttle of the loom is operated. The depressed portion of the trip-wheel corresponds in length to a certain length of cloth, so that the number of vibrations which the shuttle makes in this space will represent the number of picks or threads which are woven into a certain length of the fabric.

To provide for adjusting the space during which the ratchet-wheel will operate, the trip-wheel is constructed with an adjustable segment c^3, which is pivoted on the arbor and has a periphery corresponding to the enlarged periphery c^2 of the trip-wheel. The end of this segment is beveled off to form a cam-face to engage the pin or projection b^2 in the operating-pawl b', and is further provided with a slotted opening c^4, concentric with the periphery of the wheel, and a clamp-screw c^5 in the wheel passes through said slotted opening, so as to hold said segment in different positions of adjustment. The trip-wheel c is further provided with a cam-projection c^6, which extends outwardly from the enlarged periphery c^2, and is adapted, as the wheel is rotated, to move the operating-pawl b' farther away from the ratchet-wheel and cause it, through the agency of the projection b^2, to engage and move the holding-pawl b^3 so as to entirely disengage the ratchet-wheel and permit it, through the agency of the spring, to return to its normal position.

For imparting motion to the trip-wheel c, a grooved pulley c^7 is employed, which is connected rigidly to said trip-wheel and over which passes a cord or belt c^8, said belt passing over guiding-pulleys or sheaves c^9, c^{10}, c^{11}, and thence around the beam on which the fabric or the warp is wound or unwound, a weighted pulley p being provided between two of the guiding-pulleys to take up the slack, as shown in Figs. 2 and 3.

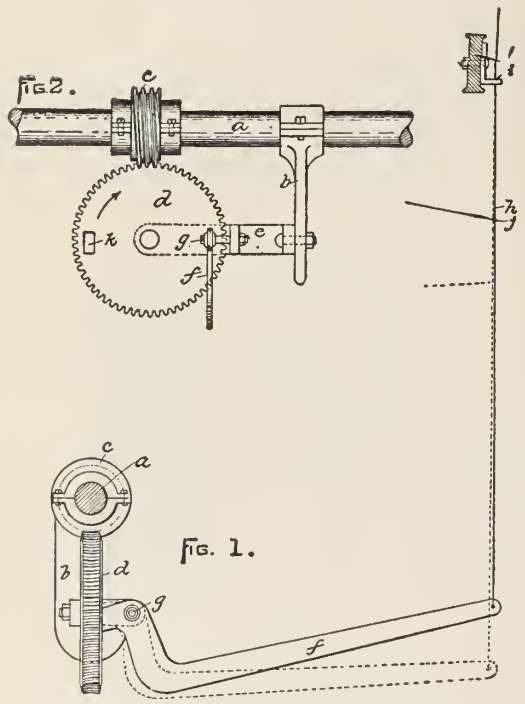
The operation of the device is thus:—The loom being set to feed the fabric at a speed to produce a certain number of picks to the inch, is started with the hand a' at the normal or zero point, and the operating-pawl b' engaging the ratchet-wheel at the beginning of the depressed portion of the trip-wheel. When a number of points on the dial are counted off corresponding to the number of picks, the movable segment of the trip-wheel is secured by a screw c^5 in a position to disengage the pawl, the depressed portion of the periphery of the trip-wheel being thus limited to correspond to a certain length of fabric—say, one inch. Each time the trip-wheel makes one revolution, therefore, the dial-hand will be moved through the operation of the vibrating-lever, pawl and ratchet-wheel, a number of points corresponding to the number of picks woven into a given space, when it will be thrown out and remain in the position counted until the trip-wheel makes a complete revolution, when, by the cam-projection c^6, both pawls will be disengaged from the ratchet-wheel, and the wheel and hand returned to their normal positions by the springs previously referred to. This counting of the number of picks to the inch will take place at certain predetermined intervals, depending upon the diameter of the trip-wheel, and may be made to correspond to any length of cloth desired—say, for instance, ten or twelve inches.

The operator is thus enabled to determine at any

time by the dial, just how many picks are being placed in the fabric, and if a greater or less number than the one desired appears then the loom is regulated to secure the proper number. (*Harvey W. Bosworth, Urbana, O.*)

LANCASTER'S PICK-MEASURING DEVICE.

The object of this device is to indicate upon a glance at a piece of cloth, (whether in the loom and in the process of weaving, or after it leaves the weaver's



hands, and when undergoing inspection in the course of finishing and delivery) the number of picks it contains in a given length.

Fig. 1 is a sectional side view showing only so much of a loom as necessary to give to the reader a clear view of the construction and mode of operation of the device. Fig. 2, is a front view of the same.

A, designates the crank-shaft of a loom by which the lay is operated, and *b* designates the center bearing of the said shaft.

C, designates a worm on the crank-shaft *a*, which meshes with and operates a worm-wheel *d*, arranged to turn in suitable bearings connected with bracket *e*, supported from the centre bearing *b*, or other stationary part of the loom-frame.

F, designates a lever fulcrumed as at *g*, at a suitable point and upon a suitable part of the loom, and provided at the end of its longer arm with a wire *h*, which extends up in front of the harness, (not shown) and through a suitable guide *i* on the top of the loom-frame. The said wire is provided at the shed point with a mail or eye *j*, through which passes a thread contrasting in color or other visual character with the threads or yarns being woven into the goods, and which thread extends in the direction of the warps. The opposite end of the lever *f* bears against the face of the worm-wheel *d*, which, at a suitable point in the path of the end of the lever, is provided with a slot or depression *k*, into which the end of the lever, in contact with the worm-wheel, may fall at each revolution of the said wheel, drawing the wire *h* and thread carried thereby down, during one or more picking operations, depending on the length or extent of the slot or depression *k*; the wire *h*, being raised by the shorter arm of the lever *f*, riding out of the depression *k*, formed in the face of the worm-wheel *d* upon the extreme outer face, and so raising the longer arm of said lever against the gravity thereof, and subsequently the wire. The continued revolution of the wheel causes the end of the slot to act against the lever and move it so as to elevate the wire, which so remains until the slot comes round again.

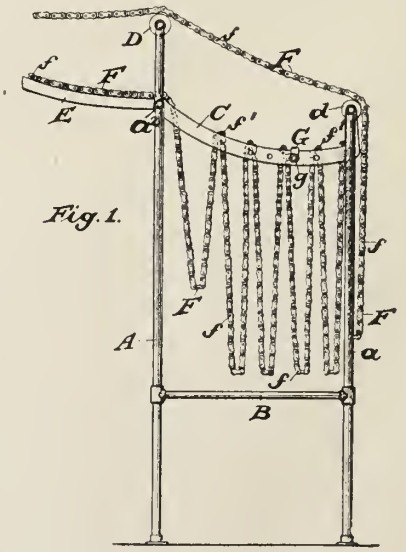
The construction and arrangement of parts as herein shown are such, that the worm-wheel *d* will be moved to the extent of one of its teeth at each revolution of the crank-shaft *a*, and while the end of the lever *f*, adjacent to the worm-wheel rides on the face of said wheel, the colored thread controlled by the wire *h*, will float on upper side of the goods as woven, and when said end of said lever drops into the slot or depression the colored thread will be drawn down and woven into the cloth for two picks and show on the back of the goods.

Calculating now, for example, that the worm-wheel has sixty teeth, and that each tooth represents a pick, the colored thread will thus float on the face of the cloth for fifty-eight picks, and on the back for two picks. From explanations thus given, it will be readily seen that any measure for any number of picks per inch required, can be readily made. The measure so obtained can be laid upon the goods along the line where the colored thread is woven in, so that the attendant can tell at a glance whether the requirements as to picks per inch are being met by the weaver. (*John Lancaster, Dover, N. H.*)

LUTTON'S PATTERN-CHAIN SUPPORT.

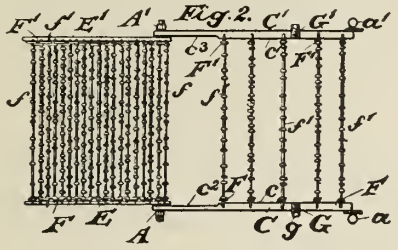
The object of this chain-support is to form a rack to hold a long pattern-chain and keep it straight.

Fig. 1 is a view of the support in side elevation showing the position of the chain thereon. Fig. 2, is a top plan view, partly in section. Fig. 3, is an enlarged view in detail, in side elevation of the supporting rails; and Fig. 4, is a top plan view of the same.



The support comprises four standards, those at the rear being denoted, respectively, by A, A', and those at the front being denoted by *a*, *a'*, the standards being

connected by low-down girders B, and at their upper ends by the chain-supporting rails C, C', which extend,



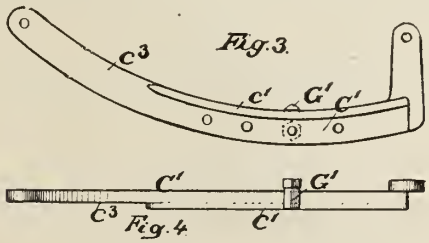
respectively, from the rear standard A, to the front standard a, and from the rear standard A', to the front standard a'.

The rear standards are taller than the front standards, and carry at their upper ends rollers D, for the reception of the links at the opposite edges of the pattern-chain. The side rails C, C', from their connection at a^2, with the rear standards curve downwardly and forwardly to a point between the front standards a, a', and thence extend upwardly to the tops of the standards a, a', to which they are connected, and are there provided with rollers d, for the reception of the links at the opposite edges of the pattern-chain.

The supporting-rails C, C', are each provided with inwardly-extending flanges c, c', along which the ends of certain of the cross-rods of the pattern-chain ride, the said flanges c, c', being cut away, as shown at c^2, c^3, for a short distance from the rear standards, sufficiently to permit the cross-rods of shorter length to drop through.

To the rear of the standards A, A', and forming a continuation of the side supporting-rails C, C', at their rear ends, are supports E, E', sufficiently near together to retain the ends of the shorter, as well as the longer, cross-rods thereon during the passage of the chain from the roller or wheel (not shown) where the chain is brought into action.

The series of side links of the opposite edges of the pattern-chain are denoted, respectively, by F, F', the shorter cross-rods, which form the greater portion of the chain, by f, and the longer cross-rods, which are



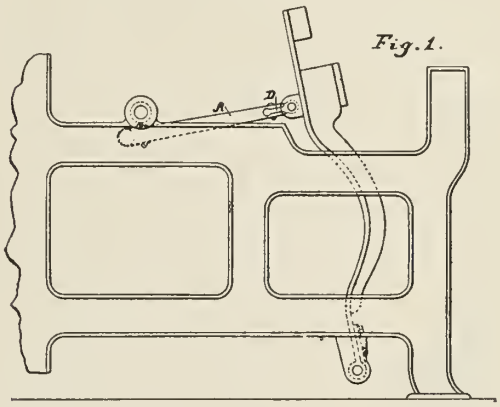
inserted at intervals throughout the length of the chain by f'.

As the chain travels along down the guides E, E', to the point where the supporting side rails C, C', are located, the shorter cross-rods f, are dropped between the cut-away portions c^2, c^3, of the flanges on the side rails, while the longer cross-rods f' are carried along the past cut-away portions c^2, c^3, thereby holding the chain suspended at intervals and in such a manner that it will not be liable to become kinked and the cross-rods will not be liable to become displaced. As it passes off the ends of the flanges c, c', at the front, the chain is directed up and over the rollers d, thence to the rollers D, and thence to the roller or wheel (not shown), where the chain is brought into action.

In order to retard the downward sliding of the longer rods and the consequent tendency to slip off the ends of the flanges c, c', before the previously-released loop is drawn up over the rollers d, there are provided beveled or rounded faced stops G, G', which uprise from the upper faces of the flanges c, c', in such a position that the ends of the longer cross-rods f', will be forced to ride over them during their travel. These stops G, G', are secured to the side rails by screws g, extending through depending flanges on the stops at the outside of the supporting-rings. (*William J. Lutton, Paterson, N. J.*)

PITMAN FOR LOOMS.

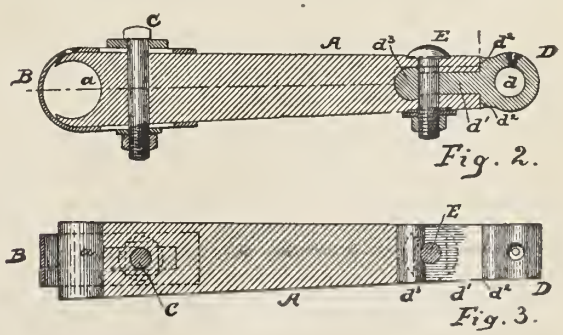
Heretofore these pitmans or connecting-rods, as used for connecting the crank-shaft with the lay, have been constructed of wood with a semi-circular notch



in each end to fit the crank-pin on the shaft and the wrist-pin on the lay, respectively, the pitmen being held to each pin by a **U**-shaped strap of leather or metal straddling the end of the pitman and fastened by a transverse bolt. The constant and severe shock produced by the successive thrust and pull tends to split the ends of the pitmen, necessitating frequent repairs. The new pitman aims to overcome this difficulty and expense.

Fig. 1, is an end view of so much of a loom as is necessary to illustrate the appliance of said pitman to it. Figs. 2 and 3, are side and top views of a pitman, partly in section.

A is the wooden body one end of which has the notch a, strap B, and fastening-bolt C, whereas the



other end is provided with a metallic knuckle D, having an eye d for the wrist-pin or crank-pin, and a cen-

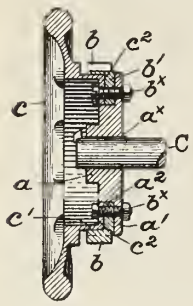
tral flat shank d', which is received in a slot or narrow gain cut in the end of the body A. The shoulders d^2 on each side of the shank abut against the end of the body A. The shank d' is provided with an enlargement d^3, which fits a corresponding enlargement of the gain in the body A. Bolt E passes transversely through the end of the body A, and the shank d', and clamps these parts firmly together. A similar knuckle may also be used at the other end of the pitman. (*R. H. Livesey and W. Squire, Fall River, Mass.*)

LOOM-GEAR.

In the majority of looms as now constructed, the fast and loose pulleys are mounted on one end of the crank-shaft and the crank-shaft gear and hand-wheel at the opposite end, the hand-wheel being usually required in order to insure the safety of the operative.

Such gears are usually cast in one piece with the hand-wheel and keyed to the shaft with the gear-hub close to the shaft-bearing, the key being driven home from the outside, and when the gear has to be removed, it is effected by the aid of a forcing apparatus, the operation usually resulting in the breakage of the hub by forcing it over the key, and the whole casting must be thrown aside.

It has been proposed to make the gear and hub detachable, keying the latter to the shaft and securing hub and gear together by bolts; but when such gears have been used, they have either been applied to the crank-shaft inside the pulleys, which serve as a guard, or else the hand-wheel has been keyed to the shaft outside the gear. In the former case the pulleys must be removed to detach the gear, and in the latter case the hand-wheel has to be forced off over the key, breaking the hand-wheel.



In the at present to be explained gear all of the foregoing objections are overcome by making the hub, gear, and hand-wheel in three separate pieces or castings, securing the gear and hand-wheel together and to the hub by suitable bolts, the hub alone being keyed to the crank-shaft. In this way the hand-wheel and gear may be removed from the hub together or separately for any needed repairs, and a guard is always present for the gear.

The accompanying illustration is a vertical sectional view of this loom-gear.

C, indicates the crank-shaft of a loom, running in proper bearings of the loom-frame.

The hub a, having a disk-like body a', is permanently attached to the shaft beyond the loom side by key a^x, the body being annularly shouldered on its outer side at a^2.

A ring-gear b is provided with a web b', apertured to snugly fit over the shoulder a^2 of the hub-body to which it is detachably secured by bolts b^x.

The hand or balance-wheel c is formed on an annular body c', having at its inner end an inturned flange c^2, which slips over the shoulder a^2, the flat face of the wheel-flange c^2 resting against the flange b' of the gear. The bolts b^x are extended through the adjacent flanges of the gear and wheel into the hub-body, rigidly securing the three parts together to operate as a single casting.

By the construction described a very firm and strong connection is effected between the parts, the hub by its shoulder a^2 providing a common support for the gear and wheel, while the latter effectually guards the gear and prevents accidents to the operative.

As the hub and balance-wheel will under ordinary circumstances last as long as the crank-shaft itself, it is only necessary to renew the gear when worn out, or to turn it relatively to the hub to present new teeth at the points of greatest wear. (*Andrew F. McCann, Fall River, Mass.*)

PILE-WIRE FOR LOOMS.

Fig. 1 represents a side elevation, and Fig. 2 is a top view of the same.

A, represents a pile-wire provided at its end with a longitudinal groove a, or with a longitudinal grooved holder applied to the end of the pile-wire. The grooved portion of the pile-wire or holder serves for receiving the base of the cutting-blade B, by which the pile of the fabric is cut as the pile-wire is moved transversely across the loom.

The cutting-blade B is provided with a downwardly-slanting sharpened edge b, which extends from the widest portion of blade to the innermost point of the same, the straight base of the blade being blunt, so as to firmly rest throughout its entire length in the groove of the pile-wire. The outer end of the blade is made tapering and bent up to form a guard b', that is usually employed in pile-wires of this class, so as to produce the glancing off on the reeds and prevent injury to the same. The outer end of the pile-wire or holder is provided with a side recess d, which extends under the bottom of the grooved end, the pile-wire or holder being thickened along the opposite side, so as to reinforce it at the outer end and make up for the diminished strength caused by the recess. To the body of the cutting-blade B, at the widest part of the same, is riveted, by a rivet C' having a square shank, a flat spring C, made in shape of an **L**, that extends into the side recess d of the wire or holder, said spring being provided at its lowermost free end with a laterally-extending heel or shoulder that springs in below the blunt base of the cutting-blade and serves thereby to lock the cutting-blade firmly to the holder, so as to prevent the release of the blade from the pile-wire.

Owing to the square shank of the rivet C', the position of the locking-spring C on the blade cannot be changed, and hence the locking-spring will always engage in the side recess of the pile-wire or holder. The cutting-blade can be readily inserted into the

Fig. 1.

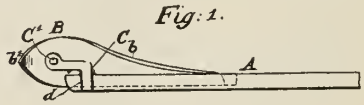
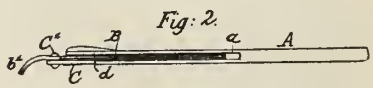


Fig. 2.



pile-wire or holder by slightly lifting the locking-spring and inserting the blade in the groove of the pile-wire and sliding it inwardly until the locking-spring has passed over the outer end of the pile-wire and is in line with the side recess of the same so as to engage in it. For detaching the cutting-blade the locking-spring is lifted out of the recess, upon which the cutting-blade can be removed from the grooved end of the pile-wire. Instead of grooving the holder or the pile-wire after making the same, either may be cast with the groove in it.

The advantages of this pile-wire for looms are, first, that a stronger cutting-blade is obtained, as the body of the same is not weakened by slits or recesses,

as has been the case in similar pile-wire constructions heretofore in use; second, that the cutting-blade can be used for a greater length of time, as it can be repeatedly sharpened down to the edge of the locking-spring without weakening the body of the blade, and third, that the cutting-blades can be quickly inserted and readily removed from the pile-wire or holder whenever they have to be sharpened. (*G. Segschneider, Assignor to J. Waring, Yonkers, N. Y.*)

THE ALTEMUS METHOD OF GEARING FOR TRANSFORMING UNIFORM ROTARY MOTION INTO DIFFERENTIAL ROTARY MOTION.

This method of gearing is specially applicable to winding machinery, although it can also be applied to

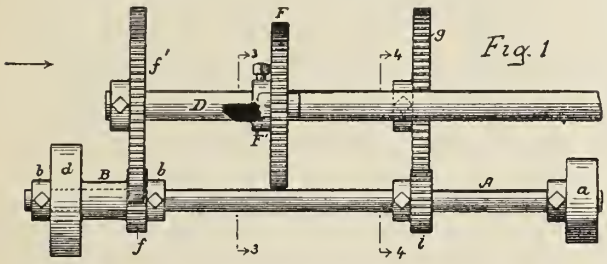
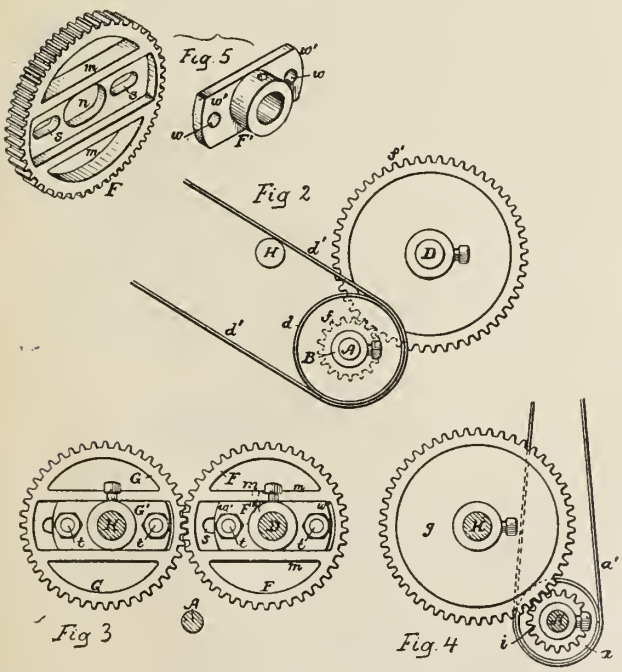


Fig. 1

spinning machines or machinery generally in which it is desirable that a shaft shall move faster at one time than at another, or faster at one part of each revolution than at another part of the same revolution.

Fig. 1, is a side view of this method of gearing. Fig. 2, is an end view looking in the direction of the arrow in Fig. 1, but showing only the primary pair of gears,



the others being omitted in order to avoid confusion. Fig. 3, is a transverse section on the line 3-3, Fig. 1, but showing only the second pair of gears. Fig. 4, is a transverse section on the line 4-4, Fig. 1, showing the final pair of gears; and Fig. 5, is a perspective view illustrating, detached from each other, the two parts of an adjustable eccentric gear-wheel constituting part of the gearing.

Letters of references indicate thus:—A, represents the shaft to which the differential rotary motion is to be imparted; this shaft having a pulley *a* from which power is transmitted by a belt *a'* to another shaft, or said shaft A may be furnished with a series of such pulleys *a*, so as to transmit the differential rotary motion to a number of independent shafts.

Turning loosely on the shaft A, but confined longitudinally thereto by collars *b*, is a tubular shaft B, which has a pulley *d*, for the reception of a driving belt *d'*, the latter serving to impart uniform rotating motion to said pulley *d*. The tubular shaft B, is also provided with a spur-pinion *f*, which meshes with a spur-wheel *f'*, secured to a countershaft D, to which is also secured the hub of an adjustable eccentric spur-wheel consisting of a toothed section F and a hub section F', the toothed section of this wheel engaging with the similar section G, of another adjustable eccentric spur-wheel having a hub section G', which is secured to a second countershaft H parallel with the shaft D, this second countershaft having a spur wheel *g* which meshes with a spur pinion *i* secured to the shaft A. It will thus be seen that uniform rotating motion is transmitted from the tubular shaft B to the countershaft D, and differential motion from the latter shaft to the countershaft H, this differential motion being in turn transmitted from the shaft H, to the shaft A, and the character of the differential motion being governed by the eccentricity of the wheels F and G. The toothed portion of either of the wheels F or G is adjusted radially in respect to its shaft so as to vary the extent of its eccentricity as may be desired, the toothed portion of each wheel having a cross bar *m* in which is an elongated opening *n* for the passage of the shaft, and two elongated openings *s*, for the reception of the bolts *t*, whereby the toothed and hub portions of the wheel are secured together, said bolts passing through openings *w* formed in laterally projecting wings *w'* on the hub. By making both of the wheels F and G adjustable, the two wheels may always be maintained in proper relation to each other, whatever the extent of their eccentricity, without any movement of either of the shafts D or H from or toward each other. Owing to the character of the gears *f*, *f'* the countershafts D and H rotate at a much lower speed than the driving shaft B, the gears *g* and *i*, however, restoring the initial speed to the shaft A, so that the latter shaft may make a number of turns in changing from its lowest to its highest speed, or vice versa, as is necessary in many classes of machines in which differential motion is desired. (*W. W. Altemus & Son, Phila.*)

AN INGENIOUS APPARATUS FOR REMOVING WRAPPING-CORD FROM YARN CHAINS.

After bleaching or dyeing it is necessary to remove the wrapping-cord, as previously to said processes wound spirally around the chain. This has heretofore been effected in various ways, one of which is to unwind the cord upon a suitable receiver as the chain is moved longitudinally.

In the new apparatus the wrapping-cord is removed by severing the cord with a suitable cutter as the chain is moved longitudinally.

Fig. 1, in side elevation, represents an apparatus for removing the wrapping-cord embodying the present improvement; and Fig. 2 is a left-hand front elevation thereof.

A suitable frame, comprising upright sides A, and cross-girths a, a', is longitudinally slotted at its upper end at a^2, Fig. 1, to receive the journals b^x and c^x of two rolls B and C, between which the yarn chain C^x is passed as it is drawn over a guide-roll R^x.

The wrapped chain in the form of a loose coil, as at R, Fig. 1, is passed over an over-head pulley R^{10} and then down between rolls R^{12}, near the floor, after which it is passed several times around the drums R^2 R^3 and led over a guide-roll R′ to and between the presser or friction-rolls B and C.

At the front of the apparatus an upturned guide-bracket D is secured to the cross-girth a, the said bracket forming an obstacle to separate the chain, which is halved as it is drawn along with the guide in the center.

A thin cutting blade or knife f, having lateral ears or projections f' to slide in the guides a', is secured to or forms a part of a carrier f^x, shown as a rod pivoted at its lower end on a crank-pin f^2, projecting from the inner face of a sheave or pulley f^3, fast on a shaft f^4, rotatably mounted in a bearing a^3 on the inner face of one of the side frames A, rotation being imparted to the pulley f^3 by a belt or band f^5, from drum R^2. The

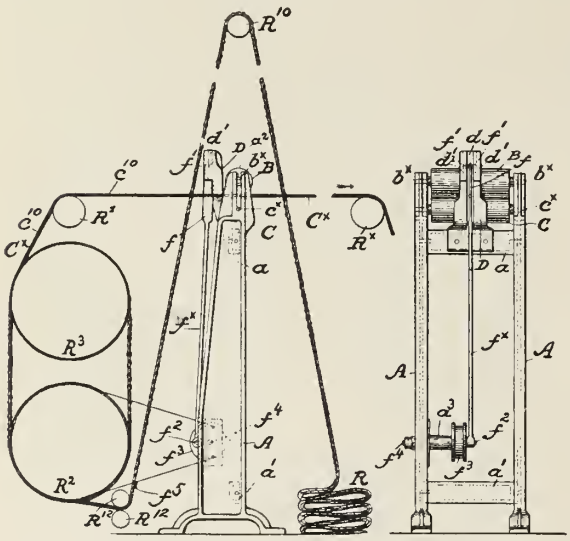


Fig. 1.

Fig. 2.

free end of the wrapped chain is divided and the divided parts pass along at each side of the bracket D, with the knife or cutter f between said parts, and the apparatus is set in operation.

Rotation of the sheave or pulley f^3 gives a reciprocating motion to the knife, as well as a slight back-and-forth movement in the direction of the length of the chain, the outwardly-turned edge of the knife acting upon the spiral coils of the wrapping-cord c^{10} and severing them as the chain is drawn along through the apparatus past the knife or cutter, the presser-rolls B and C preventing the unwrapped chain from spreading as it leaves the knife.

The numerous yarn ends composing the chain lie in parallelism without twisting or crossing each other, so that they will not be cut by the knife, but will divide into two parts at the knife and will pass along at each side thereof while the cord c^{10} is severed in short lengths or pieces which will drop off or be dislodged in the subsequent separation of the chain into its component yarn ends. (*Draper Company.*)

BOBBIN FOR SILK WEAVING.

The object in the construction of this bobbin, is to wind a wire around said bobbin, so that the silk when drawn off will have less friction compared to plain bobbins, the thread only touching the wire instead of the wooden part of the bobbin. Fig. 1 is a side view, and Fig. 2 a view of the complete bobbin and cop illustrating the delivery of the thread therefrom.

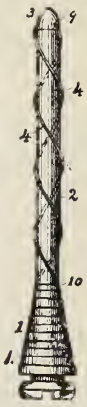


Fig. 1.

This bobbin is composed of the following parts: The head 1, having a spindle-hole through its axial centre; the tubular stem or shaft 2; the conoidal or rounded tip 3, closing the end of the tube; and the wire or strands 4, connected with said tip and head thus forming a plurality of guards or external ridges spirally about said tubular shaft.

The head 1 is provided with an end that fits the lower end of the tube 2, and a shoulder against which the end of the tube is seated, so that when said parts are glued and forced together a firm and rigid attachment is produced.

The tip 3 is made solid, and is shaped with a rounded or conoidal top and a projecting shank or tenon that fits the interior of the shaft tube 2, and a shoulder that matches the end thereof so as to present a smooth and flush exterior surface.

A transverse hole 9, is formed through the tip 3, near the base of the conoid and a small wire or smooth strand 4, is passed through said hole, the wire bent downward along the shaft and wound spirally about the cylindrical surface thereof; the two spiral strands occupying diametrically opposite positions on the circle. The ends of said spiral strands are securely fastened within the interior of the head 1, or to the end of the shaft 2, where it is connected with the head.

By constructing and combining the parts in the peculiar manner shown and described, there is thus produced a durable, efficient and highly advantageous bobbin that can be manufactured with practical facility and economy.

With the bobbin constructed as described, they can be made of much greater length than those ordinarily used for silk weaving, and are able to hold a much greater quantity of filling in a single cop, while affording a free and uniform delivery of the thread from commencement to finish of the cop, without liability of frequent stoppages of the loom or the making of waste in weaving. This bobbin is of especial utility in using double ends, or two-thread silk in the cop, the liability of the threads separating as they run off being overcome thereby, since the plurality of opposite spiral-guards raise the unwinding silk from the body and

Fig. 2.

prevents the thread from closing its coils about the cylindrical surface and creating sufficient frictional tension to break the thread as it is drawn off, by the sudden action of the shuttle when thrown across the loom. (*Frank Stone, Worcester, Mass.*)

FISHER'S BOBBIN.

Generally, as heretofore constructed, bobbins have been formed of wood or similar material, thus not only heavy but also liable to split and crack, so as to catch the yarn or threads and break them. These, as the in-

ventor of the new bobbin claims, are serious objections, and it is the object of the invention to provide a bobbin which shall obviate these disadvantages without adding to the cost of manufacturing the same.

Fig. 1 is a perspective view of such a bobbin in the process of construction, and showing the manner of connecting the end of the strip which forms the peripheral flange or base. Fig. 2 is a side view of a finished bobbin.

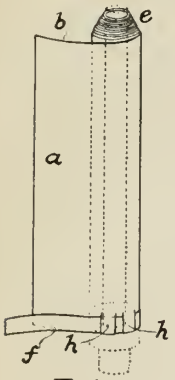


FIG. 1.

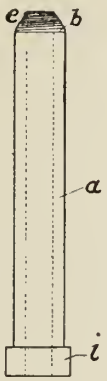


FIG. 2.

The manufacture of these novel bobbins is done thus: A long strip (*a*) of stout Manila paper or other equivalent fibrous material suitable for the purpose is supplied. One edge of the strip is cut at a slight angle to the other edge. Both sides of the strip are coated with a proper cementing compound, such as silicate of soda, sizing, or other desirable cement, and one edge placed upon a suitable mandrel. (Indicated by dotted lines in Fig. 1). The strip is wrapped and wound upon the latter, and each convolution of the same is pressed closely upon the preceding one, so as to form solid walls. As the body of the bobbin is being formed the edge *b*, retreats spirally from the end, so as to form, when finished, a beveled end *c*. The loose edge is then tightly cemented down so as to form a smooth tube or body, and the latter may be dried and coated with shellac varnish or its equivalent; but generally before coating the bobbin with shellac, the strip *f* is added to form a peripheral flange or base.

The inner end of the strip is secured as follows: Several cuts or incisions are formed in the last convolution of the strip *a*, extending up from the lower edge. Then under the flaps *h*, *h*, thus formed the end of the strip *f* is cemented, and the said strip is wound on the end of the bobbin and forms, when completed, a base or peripheral flange *i*.

After the loose end of the strip *f* has been cemented down, the whole completed bobbin may then be coated so as to provide a smooth polished surface.

A bobbin constructed in accordance with the foregoing is exceedingly tough and durable, is not liable to crack or break, and possesses the highest degree of efficiency for the purposes for which it is intended. (*James C. Fisher, Lawrence, Mass.*)

BLACKBURN'S BOBBIN.

The object of constructing this bobbin, is to so construct a bobbin of large size as to decrease the weight of the same without impairing its efficiency.

Fig. A, is a sectional view of this new bobbin. Fig. B, is a side view, on a smaller scale, of the parts of said improved bobbin; and Fig. C, is a view likewise on a smaller scale, and illustrating the bobbin with the textile covering removed from the lower portion of the same.

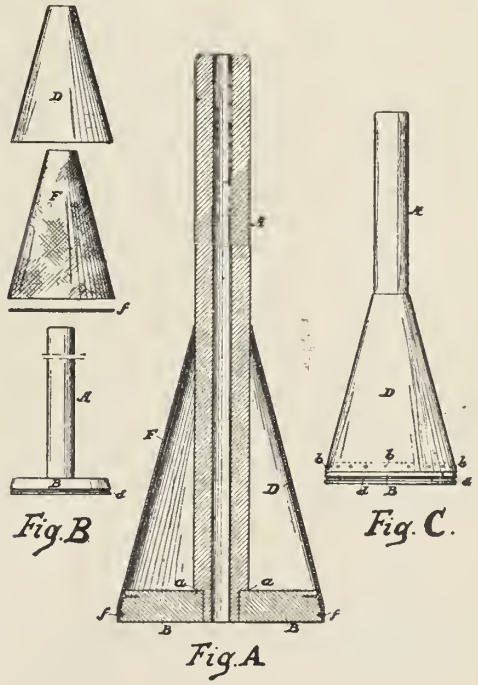
The bobbin is composed of a central tubular wooden stem A, reduced in diameter at its lower end so to form a shoulder *a*, the reduced portion of the stem being adapted to a central opening formed in the wooden base B of the bobbin, in which it is firmly retained by glue or other cement, the shoulder *a*, resting firmly upon the top of said base.

Surrounding the lower portion of the stem A and fitting snugly to the periphery of the upper half of the base B, is a sheet-metal cone D, the upper end of which fits snugly against the stem *a*, while its lower portion is secured to the base B, by means of nails or pins *b*, as shown in Figs. A, and C.

The periphery of the base B is flared to accord with the flare of the cone D, and in the lower portion of the base, beneath the lower edge of the overlapping metal cone, is formed a peripheral groove *d*.

Surrounding the metal cone D and securely cemented or otherwise united thereto, is a conical textile envelop F, composed of an available fabric which extends both above and below the metal cone, the projecting upper portion of the envelop being united to the outer face of the central wooden stem A of the bobbin, while the projecting lower portion of said textile envelop F, is caused to enter the groove *d* in the wooden base by the pressure of a confining wire ring or wire band *f*. By this means the textile envelop is firmly secured in its place, and the sheet-metal cone is entirely inclosed, so that the yarn wound upon the bobbin can never come into contact with said sheet-metal cone, and hence cannot be stained by rust or otherwise injured by such contact.

The use of the hollow sheet-metal cone in order to form the flaring lower portion of the bobbin, renders the latter much lighter than the usual solid wooden bobbins, while the use of wood for the central stem



and base of the bobbin, renders said bobbin preferable to one made entirely of sheet-metal by reason of its less weight and cost, and by preventing injury to the yarn, which is likely to result from contact with said sheet-metal surface, the latter being liable to oxidize in the damp atmosphere of a mill, or by reason of the wetting of the bobbin in some of the various processes of manufacture in which it is to be used. (*R. Blackburn, Nottingham, England.*)

SPOOL HEAD.

In this spool the heads are secured upon the shaft in such manner that they cannot be removed or become loose by accident or by the wear incident to their use, thereby producing a more durable spool, which will save much of the loss in material and time which has heretofore been occasioned by the breaking down of the spool when in use.

The construction of this spool is best described by referring to the accompanying illustrations, of which Fig. 1 is a side view of this spool; Fig. 2 shows a detailed section of one end thereof, showing one of the heads and means for attaching the same to the shaft; and Fig. 3 is a section at the line *x*-*x*, of Fig. 2.

Referring in detail to the drawings, A represents the shaft, made of wood, and having passed through each end thereof a hard-wood plug B. The heads C are circular and slightly cup-shaped, so that their inner sides may afford guidance for the rope or yarn run upon the spool. These heads have formed therewith

Fig. 1.

the sockets or ferrules D, the outer diameters of which are the same as the diameter of the shaft.

In securing the heads upon the shaft the ends of the latter are turned down so as to fit within the sockets, as clearly shown in Fig. 2, and when the heads are placed upon the shaft, the pin E, a portion of which is threaded, is passed through a suitable opening in each of the central openings in each of the heads and threaded into the shaft, the spindle F projecting from the head to serve as a trunnion upon which one end of the spool may turn.

To prevent the withdrawal of the pin or the head, a rivet G is passed through the ferrule or socket and through a hole in said pin just in the rear of the hardwood plug B, so that neither the pin can be turned to back it out of the shaft nor the head drawn from off the end thereof, the plug serving the two-fold purpose of adding stability to the rivet and preventing the loosening of the pin within the shaft by sidewise strains.

A spool constructed in accordance with this improvement will have little or no tendency to wear, and consequently the head and spindles cannot be withdrawn accidentally, which is of great advantage in that it prevents the loss which has heretofore been occasioned by the breaking down of spools when in use.

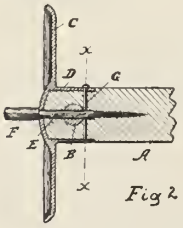


Fig 2

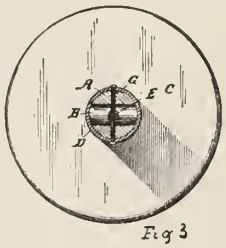


Fig 3

One of the principal advantages of the improvement is, that a perfect spool is produced at little or no increase of cost over the old method of manufacturing said spools. (*J. E. Dingman and S. Klingin, Little Falls, N. Y.*)

GRADUATED YARN TEMPLET.

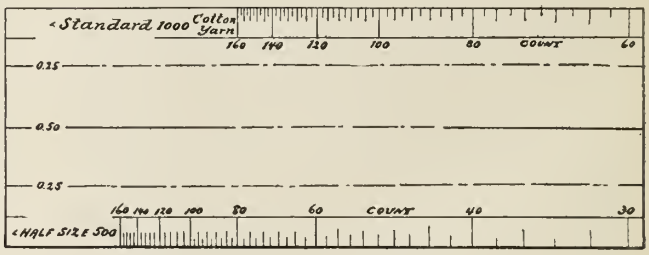
The object of this measure is to produce a graduated templet, by which the number of threads or counts of a piece of cloth per inch being ascertained, the size of a piece to be cut to weigh, to find the number of yarn of which the cloth is woven, will be plainly indicated thereon.

Referring to the accompanying illustration, the space between the divisions on the top side of the templet marked "standard," are so proportioned that a piece of cloth cut of the full width of the plate and of the length between the left end of the plate and the mark indicated by the count or number of threads per inch in the piece, will contain a given length of yarn.

For example, a piece of cloth of full width of the plate—of, say, 100 picks or counts to the inch—cut to the length of the left end of the plate to the line marked "100," will contain the same number of yards of yarn as a piece of cloth of the full width of the plate of 80 picks or counts to the inch, cut to the length between the left end of the plate and the line marked "80" will contain, and consequently either piece of cloth may be put on the scales and weighed the same as so much yarn and the number of the yarn ascertained.

In graduating the scale marked "standard," for cotton yarn or spun silk, the number taken for standard is 1,000. The length of yarn contained in each of the various samples cut as above directed is 120 yards, and if a sample cut to the measure indicated by the number of picks or counts per inch weighs 25 grains, this number divided into 1,000 equals 40, which is the number of the yarn, and if it weighs 20 grains, 1,000 divided by 20 equals 50, which is the number of the yarn in that case.

In making the templet for woolen cloth the proportional graduation of the scale is the same as that used for cotton; but the plate itself is made narrower in proportion to the difference in weight of the two materials. This proportion is as 500 to 525—that is, the plate would be one-twenty-fifth narrower than the plate given for cotton, and the results would be given in "runs" instead of numbers.



For worsteds the templet can be taken just as it is for cotton, but the "standard" number, instead of being 1,000, as in cloth, will be 1,500, and this number divided by the number of grains the piece weighs, indicates the number of the yarn. For example, if a piece of worsted measured and cut to dimensions according to the count of threads to the inch, as above, weighs 75 grains, 1,500 divided by 75 equals 20, the number of the yarn in the sample.

In making the templet for raw silk, or silk in the gum, the plate is made narrower than for the cotton, in the proportion of 100 to 120, or one-sixth narrower, and the graduations are made the same as for cotton. As a sample large enough to cut full width of the plate and of the necessary length cannot always be had, there is provided an arrangement of proportional divisions on the other side of the plate marked "half-size,"

by which, if a sample is as wide as the plate, but not long enough to reach up to the line indicated by its number of threads per inch on the standard side, it can be cut by the side of the scale marked "half-size," and the number to be divided by the weight in grains will be 500 instead of 1,000; and if a sample is long enough to reach the required mark, but is too narrow to reach across the plate, it can be cut to the middle mark "0.50" length-wise of the scale and the result of the grain-weight divided into 1,000, divided by 2 or halved, will give the number of the yarn. A line marked "0.25" is for a quarter-sized sample, and the result is divided by 4. Still another line is provided for one-eighth size, the result to be divided by 8. With these lines a very small sample can be used.

In making a count of the threads per inch in the cloth to ascertain the desired size to cut a sample, as it is the area and not the mere length that counts in weighing, the warp-threads should be counted as well as the filling, and if they differ the average of the two counts should be used. For example, if the warp has 80 threads per inch and the filling 92 threads, the average, 86 threads, is the number to be used as the "count" of the goods. (*A. Schaer.—Draper Co., Manuf.*)

GRADUATED CLOTH-WEIGHT TEMPLET.

The object of this templet is to produce a gage so divided by lines that a sample from a roll of cloth cut to a certain dimension indicated by the division on the plate bearing the same number that the cloth is inches in width, will give the number of yards per pound of the cloth in the roll, by weighing the samples.

The templet, as seen by the accompanying illustration consists of an oblong piece of sheet metal A, cut to a given width and divided by lines into spaces on each side or edge, the spaces between the lines on the lower side *c* being equal to each other, but only one-half the width of the spaces on the upper side *a*, marked "standard," which are also equal to cach other and are numbered by tens up to sixty or higher. These lines represent the width of the cloth, in inches, to which the sample belongs that is to be tested—that is, they indicate the length the sample must be cut to for weighing.

For example, a merchant receives a sample of cloth which he is informed is forty inches wide.

He takes the sample and cuts it to the width of the

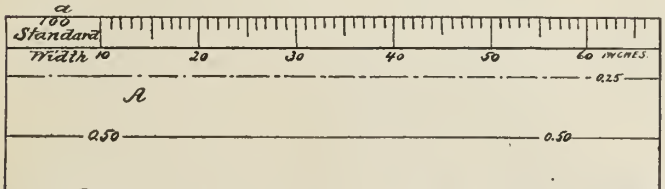


plate A and the length from the left end to the line on the *a* side of the plate marked "40." The piece cut to these dimensions is then weighed on grain-scales, and the number of grains the sample weighs—suppose it is twenty grains in this case—is divided into one hundred, the standard number, and the result, five, is the number of yards to the pound that the cloth weighs.

The standard number, one hundred, according to the width of the plate and of the spaces between the lines, has been calculated, to produce a given result.

If the templet were twice as wide, the standard number to divide the number of grains in weight into would be two hundred, and any change in the widths of the spaces between the lines would neccssitate a change in the standard number, or a second operation of dividing or multiplying of the result. This is illustrated in the lines on the *c* side of the plate and the proportional lines marked "0.50" and "0.25."

Sometimes the sample available is not large enough to cut to the "standard." Then the proportional divisions can be used. For example, if a sample is as wide as the plate, but not long enough to reach the line the width in inches of the cloth requires, it can be cut to the line of the same number on the *c* side of the plate, which are one-half the width of those on the *a* side, and when weighed the weight in grains divided into fifty.

If the sample is not so wide as the plate, but is long enough to reach the line of the width in inches on the *a* side, it can be cut to the width of the line marked "0.50" in the middle of the plate. Then the resulting weight can be divided into hundred and the result divided by two; or by means of one operation divided into fifty and the number of yards per pound found.

Other proportional lines marked "0.25," &c., are made, and it will be readily seen that by use of these lines samples of very small size and most any shape can be utilized.

Of course the full standard size of sample, when it can be had, will give a more accurate result than can be obtained with smaller samples. (*A. Schaer.—Draper Co., Manuf.*)

CLOTH AND YARN CALCULATING RULE.

Its object is to provide mechanical means for solving certain questions that arise in manufacturing textile fabrics, that solved in the usual way, require a great deal of figuring and calculating on the part of both the manufacturer and the dealer.

One of these questions, for instance, is:

If a dealer wants cloth of a certain width and number of yards to the pound, what number of yarn and how many picks to the inch in weaving will make the goods?

Another question is:

Having goods of a certain width and number of yards to the pound and number of picks to the inch, what is the number of the yarn?

And having yarn of a certain number, what must be the number of picks per inch to make goods of a certain width and weight?

These and many like questions that usually require elaborate calculations, with all their liability to error, are correctly solved with a single movement of the device, shown in the accompanying illustrations, of which Fig. 1 shows a top view of the calculating-rule closed. Fig. 2 represents the same open, as when it is in use.

This calculating device consists of a rule A, of any convenient length, having a dove-tailed groove made in the center of its width and extending the whole length of the rule. A strip *a* is fitted to the slide in the groove after the manner of slide-rules. This rule then has four lines of divisions made on it, designated as 1, 2, 3, 4, in the illustrations. Lines 1 and 4, are made on the rule proper at each side of the groove, and lines 2 and 3, are made on the slide *a*. The space made by the divisions on the lines 1, 2, 3, commence largest at the left hand and decrease in logarithmic proportion as they go to the right, and when the slide *a*, is closed in the rule the divisions on the lines 1, 2, 3,

FIG. 1.

exactly agree with each other; though line 1, is numbered 2, 3, 4, while the same divisions on the slide *a*, are marked 20, 30, 40, and so on, the figures in the middle of the slide serving for lines 2 and 3, on each side of them. The line 4, of divisions are also made in logarithmic proportion, but increase in

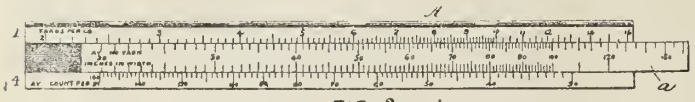


FIG. 2.

the opposite direction to the other lines, and when the slide *a*, is close in, No. 40 on the slide is opposite No. 99, on the line 4. Line 1, of the divisions is marked on the rule as "No. of yards per lb.," and line 2 is marked on the slide "Av. No. of yarn." Line 3 is also marked on the slide as "Inches wide," and line 4 is designated on the rule as "Av. count," (or average picks per inch,) which means that as the number of picks per inch of the filling may not be the same as the number of threads per inch of the warp the average of the two is taken as the average count.

If the one was eighty threads to the inch and the other eighty-six threads, eighty-three would be average count. The same remark applies to the "Av. No. of yarn" marked on line 2 of the divisions.

How to use the rule to solve the following questions: If the cloth is forty inches wide and the average count per inch eighty, move the slide *a*, so that 40 on line 3, is opposite to 80 on line 4, and opposite of yards per pound the cloth will be. If the yarn is No. 30, cloth will weigh three and seven-tenths yards per pound. If the yarn is No. 60, the cloth will run seven and four-tenths yards per pound. And the reverse process is also correct.

If the cloth weighs four and nine-tenths yards per pound and the yarn is No. 40, bring 4.9 on the line 1 opposite 40 on line 2, and opposite any width of cloth on line 3 will be found on line 4 the number of count per inch necessary to make the goods. If the count is 100 per inch on line 4, the width will be thirty-two inches on line 3. If the count is 75, the width will be forty-nine inches.

And if the number of the yarn is 80 on line 2 and the count is 60 on line 4 and they are placed opposite each other, then opposite any width on line 3 is the number of yards per pound on line 1.

These examples are but few of the many in which, by the use of the rule, calculations can be quickly made. (*A. Schaer.—Draper Co., Manuf.*)

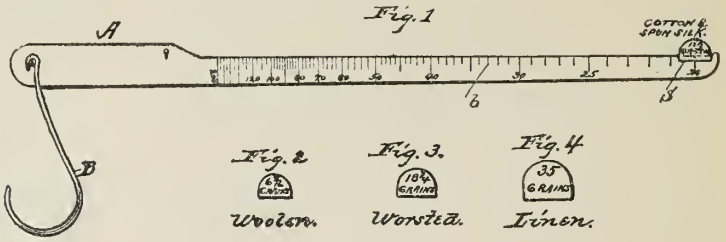
SCALE-BEAM FOR ASCERTAINING THE COUNTS OF YARN.

Heretofore the ordinary way of obtaining this number has been, to reel off one hundred and twenty yards of the yarn to be numbered, and then weighing this sample on a grain-scale, and, by calculations based on the number of grains the sample weighed, find out the number of the yarn.

The object of the new scale is to facilitate the operation of finding the number of the yarn and lessen the liability to make mistakes. This is accomplished by graduating the scale-beam for weighing the yarn into divisions so proportioned and numbered that the mark indicated by the sliding pea on the beam will indicate the number of the yarn, so that it can readily be seen at a glance without making any calculation, thereby saving time and avoiding the liability of making mistakes.

Fig. 1 represents the scale-beam with its proportional divisions and a pea of the right weight for cotton yarns or for spun silk. Figs. 2, 3, and 4, represent peas of the proper weight to use on the same scale-beam for woolen, worsted, and linen yarns, respectively.

The scale-beam A is made of aluminium, as the lighter it is, the more quickly it will turn on its pivot and the more accurate the weight will be. B is the hook upon which yarn to be weighed is hung. The divisions *b*, on the scale-beam A, start from twenty, although they may go down to ten or five for very coarse yarns, and go up to two hundred or higher for very fine yarns, and are so proportioned to each other



that if a hank of one hundred and twenty yards of cotton yarn or spun silk is hung on the hook B, and balanced by the pea for those materials, the number indicated by the middle mark on the pea S, will be the number of the yarn.

Cotton and spun silk are of the same class-number that the same pea answers for weighing both.

For other yarns,—as, for example, woolen, worsted and linen—peas are provided having the same proportional weight to the pea used for cotton and to each other as the class-numbers of those materials have to cotton and each other, which proportions are closely approximated in the following weights.

For cotton, twelve and one-half grains; *woolen*, six and nine-sixteenths grains; *worsted*, eighteen and three-fourths grains; *linen*, thirty-five grains. These weights may all be used on the same proportionally-divided scale-beam with the same length, one hundred and twenty yards, of the different yarns and the number of each yarn will be the number that the weight or pea indicates when the scale is balanced.

By cutting a sample of cloth to a size proportioned to its count of threads or picks per inch, so as to contain one hundred and twenty yards of yarn, it can be weighed on the scale and the number of the yarn in the piece shown, the same as in the case of the yarn above described. (*A. Schaer.—Draper Co., Manuf.*)

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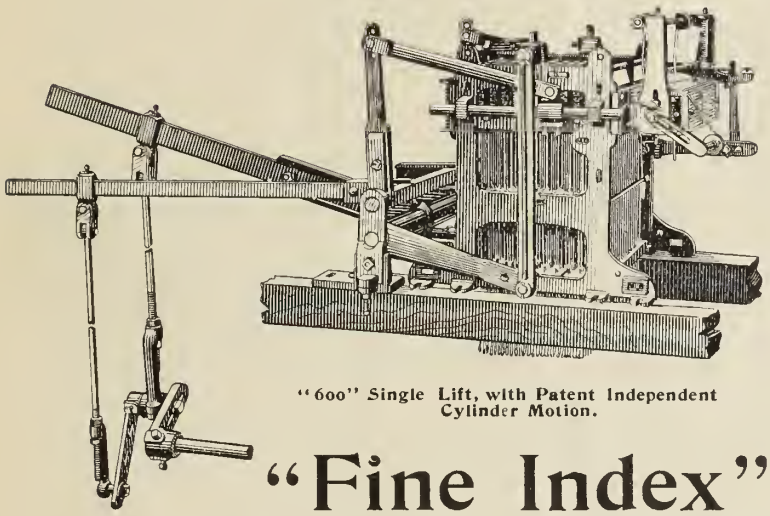

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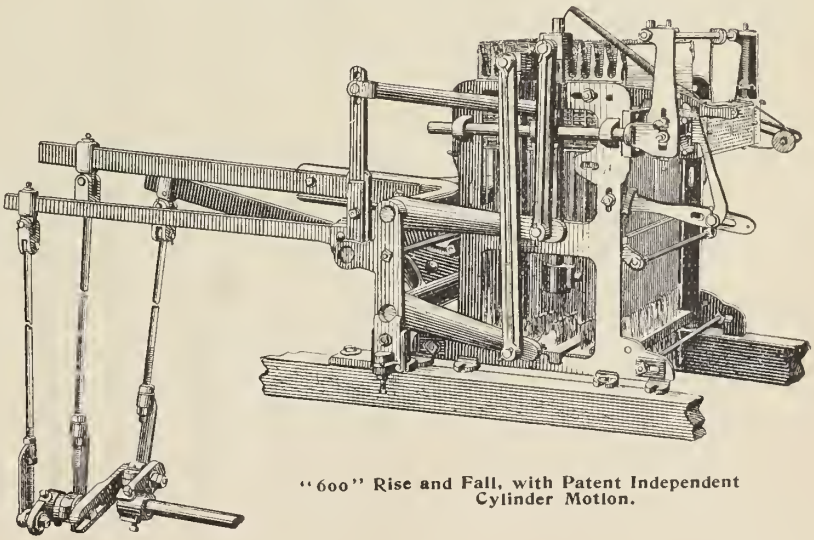

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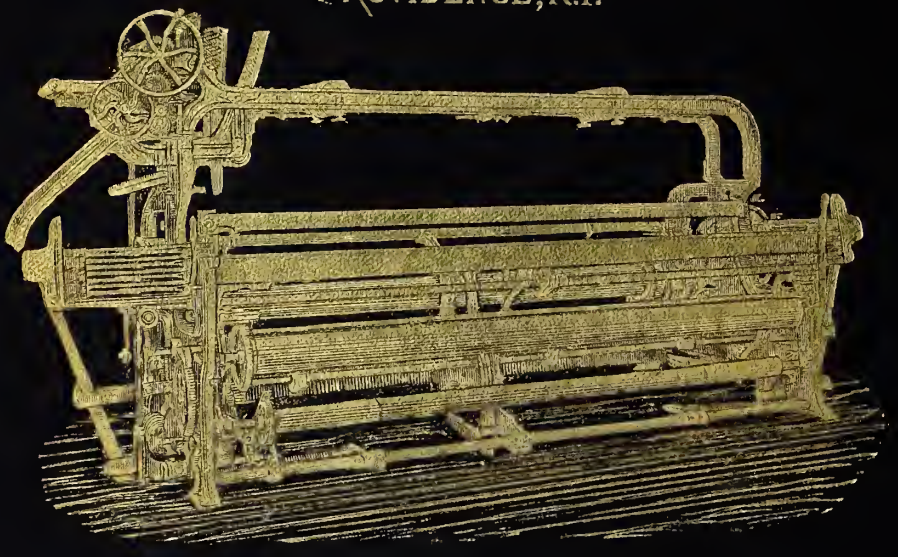

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