

AMERICAN

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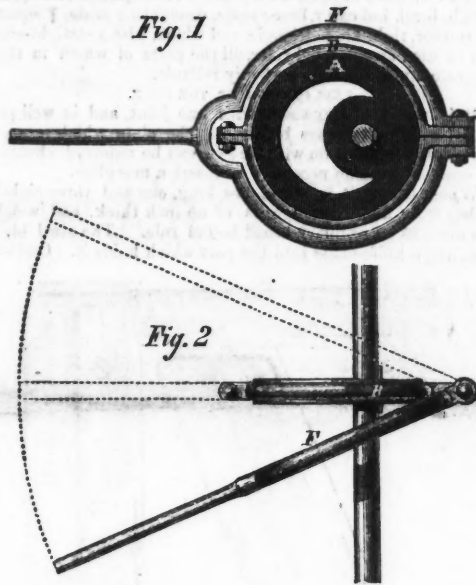
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THE "OSCILLATING OR VARIABLE ECCENTRIC MOTION."

The term eccentric is applied in general to all such curves as are composed of points situated at unequal distances from a central point or axis. The ellipse, (the curve called the heart, which is much used in the traverse motion of spinning frames, and even the circle itself, when supposed to be fixed upon an axis which does not pass through its centre,) are examples of eccentric curves. The object of such curves, that are of frequent occurrence in machinery, is to convert a rotary into a reciprocating, rectilinear motion. The cam known among engineers and machinists as an eccentric, is a plate or pulley, turning on a shaft out of its centre. When keyed upon a shaft, we speak of the two centres as the centro formation and the centro of revolution, by means of a surrounding strap, to which is attached a rod, we get the recip-



rocating rectilinear motion, to the valves of steam engines; the same motion is common to pumps, feed gear of lathes, &c., and familiar to engineers and machinists who know that the degree of eccentricity or extent of throw given by an eccentric is equal to twice the distance between its centres of formation and revolution. The annexed engraving represents an eccentric, with a great improvement, patented by THOMAS KEELER and GEO. S. AVERY, of Danbury, Conn., by which oscillation is obtained. The eccentric or cam is usually keyed rigidly upon a shaft, and the eccentric strap is fitted to work easily upon it; the rod, known as the eccentric rod, is attached to this strap, and gets a steady reciprocating rectilinear motion; but on reference to the accompanying engravings, Figs. 1 and 2, it will be seen that by the attachment of the exterior band, F, the eccentric rod has perfect freedom to swing, while the eccentric cam, A, is keyed firmly to the shaft, and revolves in its true line of motion. Also, by this arrangement, the eccentric rod may be set, if required, at almost any angle to the line of eccentric motion, and still work freely. By this means, marble, wood, etc., may be sawed or cut, of a tapering or angular form, with changing or moving the body being cut; or angular or circular grooves in iron, etc., may be cut or planed with facility. Also, by this arrangement, two or more eccentric rods, B, may be attached to the same eccentric, for driving pumps or independent lathes. Offsets in eccentric rods can be frequently dispensed with, and the improvement is applicable and useful for feed motions, and in many cases which engineers will not be slow to discover. Letters Patent were granted for this improvement April 28, 1868.

Formation of Dendrites.

At a recent meeting of the Royal Geological Society of Ireland, Dr. Emerson Reynolds read a paper "On the Formation of Dendrites," an abstract of which we find published in the London *Chemical News*. He had some years since noticed that when solutions of salts, &c., were placed upon a plate of clean glass, and the glass placed between the poles of a Ruhmkorff's coil, the salts gradually work over the surface of the glass in beautiful moss-like forms, which in many cases

were characteristic of the compound contained in solution—the state of dilution at the same time having some considerable influence. The author proposed to call them "electric cohesion figures." To produce them we will say that a drop of a solution of cyanide of potassium is put in the centre of a plate of glass, which is then placed upon a sheet of tin-foil. One pole of the coil is then brought into contact with the foil (it is immaterial which), and the other pole is placed in the centre of the drop; immediately on passing the current the solution begins to creep over the surface of the glass in moss-like convolutions. The dendritic markings on minerals, the author believed, were formed under a similar condition. He exhibited a beautiful manganous dendrite taken out of the museum. It was a slab of conoidal limestone, and in Dr. Reynolds' opinion illustrated his electrical explanation conclusively. There was originally a flaw in the limestone which was exactly at right angles with the plain of cleavage. Through these flaws, as was evident by the marks, the manganous solution had percolated, and had perhaps ultimately been the means of making the stone part in two, not, however, in the direction of the flaws, but in the plain of cleavage. The dendrites which were formed upon the surface, in this case were produced from the well known fact, that the two surfaces, at the instant of their separation, are in opposite electrical conditions. This phenomenon may be illustrated to a certain extent, by inserting a drop of the fluid into the interstice of a plate of mica, and then, on suddenly parting the plate, the dendritic forms are shown. To fix them, the author dusts some finely dried pigment over the surface of the still moist plate, and then fixes this by some transparent varnish.

SUNSPOTS AND RAIN ONCE MORE—PRICE OF BREADSTUFFS.

If the existence of sunspots has any influence at all on the amount of rain falling, it must be to diminish this amount, rather than to increase it. They who, some five or six years ago, attributed the large amount of rain falling to the fact that the sun was clear of spots, were nearer the truth than those now maintaining that the unusual amount of rain is due to the existence of spots.

To illustrate this let us propose a few simple questions. Is not the first step in the process of rain-forming the evaporation of water from the earth's surface, principally from the ocean? Must not the amount of rain be greater when there is a good deal of evaporation, and *vice versa*? Is not the heat of the sun the cause of this evaporation? Would we have more than half the usual amount of evaporation, if half of the sun's disk were to disappear, and, consequently, half the heat it radiates were to be cut off? Would we then have more than half the ordinary amount of rain? There is no doubt that all these questions must be answered, if correctly, in the affirmative. When, therefore, the number or size of sunspots is such as sensibly to diminish the amount of heat radiated to the earth, evaporation, and the total amount of rain falling over its whole surface, must, of course, be diminished below the normal standard when there are no spots on the sun.

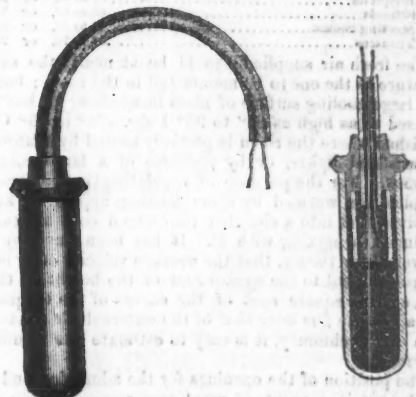
That this is actually the case, becomes every day more and more evident. We have remarked that in France no rain fell after the cessation of the frosts. The spring was entirely rainless, the first rain falling the present month. From Spain, and many parts of the Mediterranean, the same reports are coming in, and finally we hear a complaint from England that not a drop of rain fell for more than a month. No doubt reports will continue to reach us of like or opposite character, proving our former assertion that when we receive double our usual share, (7 inches per month, instead of 3½), we receive a part belonging to others. It is, of course, impossible to estimate the total amount of rain falling, since we cannot have meteorological observatories over the whole of the earth's surface.

Another fact proves, curiously enough, the same theory: It has been observed that the price of corn (which, of course, is in an inverse ratio to the abundance of the crop), was the higher in years when there were many sunspots, and the lower when the sun was free of them. It is evident that the success of a crop—other things being equal—depends on the amount of heat and moisture taken up by the soil. When, now, in accordance with this theory, the sun is spotless, it gives out more heat; more rapid evaporation takes place, and showers succeed each other oftener. When the sun is partly obscured by spots, evaporation is less active; we do not have

that rapid succession of hot sunshine and cool, refreshing showers, which are necessary to the fullest growth of corn and other grain crops. For further proof, we have only to remind our readers of the meteorological peculiarities of those regions where the corn crop seldom ripens, and never gives a good yield.

ELECTRIC FUSE.

We are glad to be able to-day to give an illustration of what we are assured is an improvement upon the fuse in common use. The accompanying figures represent very clearly the construction of the electric fuse. The arrangement of fuse No. 1 is such that it can be used for the explosion either of gunpowder or nitro-glycerine. Great care has been taken to have it made of the very best materials. In order more espe-



cially to insure this, the manufacturers have put the preparation of the fulminating powder into the hands of one of the best chemists of the country. The arrangement is simple. The primer is enclosed in a glass tube. All outside coverings of the fuse are made of gutta-percha, while the two conducting wires, each three and a half feet in length, are insulated by means of selections of the purest quality of that article, thoroughly tested before being made use of. They can be relied on as being of perfect material and construction. So confident are the makers of this fuse, in regard to its perfection, that they have no hesitancy in warranting every one of them. To the users of the electric fuse, this is assuredly a most important point.

In case of fuse No. 2, the gutta-percha cup shown in the engraving is to be used with match-fuse, for the purpose of blasting with nitro-glycerine. The fulminating powder to be used is the same in quality as that used in case of No. 1, and is just as certain not to miss fire. We shall be very glad to learn of the extensive use of this fuse in blasting operations. It seems to possess qualities that should give it place above all others in use. SAMUEL C. BISHOP, of the Bishop Gutta-Percha Company, 115 Liberty street, will furnish any information that may be desired in regard to this very excellent article of fuse.

Ventilation of Public Buildings.

In a paper read by Gen. Morin, Director of the Imperial Conservatory of Arts and Trades, before a meeting of mechanical engineers, in Paris, the opinion is expressed that the different arrangements for getting rid of vitiated air and replacing it by fresh air by means of suction, when well proportioned and well carried out, are more effectual than those which depend exclusively on blowing in fresh air, as the latter do not, in every instance, and at all times, insure the vitiated air being uniformly and continuously expelled. The quantity of fresh air required, whatever may be the height from which it has to be drawn, and whatever the quantity, can be obtained by suction alone, and without the aid of any blowing apparatus, by giving to the inlet openings for the fresh air sufficiently large dimensions, and placing them in positions. Suction can be easily obtained either by means of open fireplaces with chimneys, or similar heating apparatuses, or by means of special fire-places placed at the bottom of the exhausting flues, and acting as auxiliaries when the rooms are large. The air to be removed ought to flow towards the bottom of these fire-places, and, whenever possible, by means of special air-fines leading from openings close to the sources of ventilation. Ventilation by suction through fire-places and chimneys can be adapted to the proportions and arrangements of every kind of room, as it resembles the ordinary and natural ventilation of rooms, and the volume and temperature of the fresh air can be varied as required. It is only necessary to construct at small expense fire-places with thin chimneys and air-fines, which, when completed, cost but little for repairs, and to supply the fire-places with fuel, which any common attendant is competent to do. On the contrary, ventilation by

means of blowing and other mechanical apparatus, necessitates, besides the flues and chimneys common to both systems, the addition of blowing machines and engines with special air-passages, special artisans, engineers, and firemen, and involves an extra cost for keeping up. Besides, this system does not afford the same guarantee as that of suction, against differences of vitiated air, especially in hospitals several stories in height, where it may pass from one room into another through the openings of the discharging flues, when it happens that the pressure and movement of the air of a room are disturbed by openings of doors or windows. There may be special cases where it would be advantageous to use mechanical apparatus in connection with suction; for instance, where the quantities of air to be removed differ greatly, from one day, and from one hour to another, as in the case of St. George's Hall, Liverpool, in which mechanical ventilation exclusively is used, and the quantity of air required varies in the extreme proportion of 1 to 50. The following proportions for the quantity of air required to be supplied per hour for each person are based on the results of a large number of experiments by different observers, and although larger than the rates formerly adopted, are not, in Gen. Morin's opinion, at all exaggerated:

	Cubic feet
Schools, for each child, per hour.....	400 to 500
Schools, for each adult, per hour.....	800 to 1,000
Meeting halls, for each person, per hour.....	1,000 to 2,000
Theatres, for each person, per hour.....	1,400 to 1,700
Prisons, for each person, per hour.....	1,700
Workshops, ordinary trades, per hour.....	2,000
Workshops, unhealthy trades, per hour.....	3,500
Ordinary hospitals, per hour.....	2,000 to 2,400
Hospitals for epidemic cases.....	5,000

The temperature of the air in places abundantly ventilated, and having a continual renewal of air, can be maintained at a higher point than in rooms not well ventilated; but as a general rule the temperature should not exceed the degrees here given without fractions, on both the Fahrenheit and Centigrade thermometer.

	Fahr.	Cent.
Workshops.....	69, or	15
Hospitals.....	61 to 64, or	16 to 18
Schools.....	66 to 68, or	19 to 20
Meeting rooms.....	66 to 72, or	19 to 22
Theatres.....	68 to 73, or	20 to 22

The fresh air supplied should be at nearly the same temperature as the one to be maintained in the room; but if there is a large cooling surface of glass in windows, it has to be increased to as high as 85° to 95° Fahr. (30° to 35° C.), or diminished where the room is partially heated by a large number of artificial lights, or by presence of a large concourse of persons. For the purpose of regulating the temperature, the supplied air, warmed by some heating apparatus, has to be received first into a chamber into which cold air can be introduced for mixing with it. It has been found by practice as well as by theory, that the average velocity of air in the flue is proportional to the square root of the height of the chimney, and the square root of the excess of the temperature of the air in the flue over that of the external air; having the area of the chimney, it is easy to estimate the volume of air extracted.

The position of the openings for the admission and removal of the air is a point of great importance. None of these should be on a level with the floor where they would be obstructed by sweepings and rubbish. All openings for the admission of air, whether warm or cold, should be placed near the ceiling, or at such height that no person may receive the impression of a draft. Openings for the abstraction of air should, on the contrary, be placed generally in the lower part of the room.

The velocity of the vitiated air, in its passage onward, should continually increase through the several passages of the building, which is best effected by the use of a single shaft. On its entrance the air should move about three feet per second, and at its exit about six feet. An excess of 70 to 80 degrees Fahrenheit in the temperature of the discharging shaft over that of the external air, will in most cases produce the required increase of speed; but in theatres, where the passage for air must be complicated, a difference of temperature of 95 to 105 degrees Fahrenheit is required to effect the desired result. When the supply openings are on the side of the room at a considerable height, the velocity of the entering air may be as high as one meter (33 inches) per second without causing inconvenience; but when such openings are in the ceiling so that the air descends vertically, its velocity should not be more than half that just stated.

The suction system has been objected to for causing strong drafts when an outside door is opened, but this may be obviated by adopting suitable proportions, and by warming the ante-rooms and passages leading out of the building. The chimneys of dwellings will generally produce sufficient ventilation, even when there are no fires, on account of the ordinary difference in the temperature within and without. However, this ventilating power may be easily increased by introducing into the chimney a vertical pipe containing a few gas burners. In answer to a query whether it had been found essential to introduce moisture with the air supplied, Gen. Morin remarked that in the plan of heating adopted by him, a small portion of heated air was mixed with the cold air, and it was found there was moisture enough to prevent any sensation of dryness in the air when breathed. In reply to an inquiry whether the system described would answer for ventilating in hot countries where it would be required to cool the supply of fresh air, or whether the points of admitting and discharging air would in that case have to be reversed, Gen. Morin said the Lecture Theatre of the Conservatoire, in which they were then assembled, was ventilated upon the plan described in this paper, and it was found in practice that the room could be cooled in warm weather more readily by drawing off the vitiated air near the floor and admitting fresh air brought from below near the ceiling. In very hot countries it might be found essential to have recourse to a fine spray of water, just sufficient to moisten the surface over which the fresh air had to pass on its way into a room, so as to bring into play the effect of rapid evaporation. All the details of the plans, as applied in the Public School, Rue des Petits Hotels, in the Theatre Lyrique, and in the Conservatoire, were exhibited and explained by the speaker. The uniformity of temperature in the Theatre Lyrique was a striking result. At a trial in November, when the temperature without was 4° C., on the stage it was 19°, in the orchestra stalls 21°, in the boxes, 23°, and in the gallery, 23½° C. This system of ventilation was highly commended by the speakers who followed Gen. Morin.

Practical Letters.

[WRITTEN FOR THE AMERICAN JOURNAL OF MINING.]

Steam Cars on Street Railways.

For about seven years we have had steam cars, falsely called "dummies," on the upper part of the Second avenue railway. They run at double the speed of horses, and at less expense. Not much complaint is made against them, although some horses shy at them. The causes of the shying are not agreed upon; some suppose that the puffing blast is one cause; others that a vehicle going without horses frightens horses that have been hurt by carriages backing against them; others that the high speed frightens them. Horses often see trains running into stations at high speed, after the locomotives have left them, and observations on their behavior in such cases may help to show whether the mere vehicles in motion frighten them. It was observed in England, that horses were frightened by the steam carriages when they ran at high speed, but not when they run at the usual speed of horses. The puffing blast was believed to be the chief cause, and the English steam carriage has avoided it on this account; and so do the real dummies that draw trains down to Canal street, on the Hudson river railway.

From all that I have heard or seen, I believe that cars that run at the usual speed of horses and without noise, and that look like common cars, will rarely be noticed by horses; and that the few that do notice, would at once get used to them, by a little of the mild training recommended by Mr. Rarey; that is, by letting them examine the cars and find out for themselves that there is no harm in them.

It has been doubted by street railway directors whether it is for their interest to introduce these steam cars on their roads. The Second avenue directors talk unfavorably; they say it might have been better if they had not used them, yet they continue their use, and their doubtful talk may be simply to prevent opposition, of various kinds. One of the disadvantages on that road was, that the rails were too light, and had to be replaced by heavier rails soon after the steam cars got actively at work on them; so they state the case. But the case is differently stated to us by an engineer who was invited to design a car for them. He says that the cars were too heavy for the rails; that he designed a little locomotive to draw their cars, and carry fourteen outside passengers, and that the little engine and its load would not have been heavier than a crowded car, and would not have injured the rails more; but as he did not offer to guarantee that this design would work economically, and as the builders of the cars adopted, offered to put on one and run it for sixty days, and take it away if they did not like it, they were persuaded to take the course that seemed to involve no risk, yet which really did involve the risk of a failure of the rails. Had they laid their first rails for heavy steam cars, they would probably have done well in adopting them; or, having laid rails for horse cars, they would have done well had they adopted the light steam car designed for them. And this they seem now to believe, for their last purchased steam cars are mere traction engines that carry no passengers.

Beside the lightness of the rails made for horse cars, there was another difficulty; the higher speed caused greater wear and tear. There seemed to have been excessive economy or rather parsimony, in regard to the employment of engineering talent. In short, the whole case was an engineering blunder; and the fact that it was not a cause of great loss is encouraging evidence in favor of steam, instead of horse-power on suburban and street railways.

As to the cars adopted, they do injustice to the subject. They are badly designed, and badly built. They are geared, so that the engines make two turns to one turn of the thirty-inch driving-wheels. The gearing is noisy, gives a disagreeable motion to the car-body, wears out fast, and is broken by the lurching that sometimes occurs. The engines are exposed, and wear out in a fraction of the time they would last if properly enclosed. There is no proper proportion of power to work; but each engine is injudiciously made so that it can draw double its proper load. To judge by such steam cars what properly designed cars could do, is a sure way to discourage all concerned.

But who is to help the enterprise? Thus far it has been left to inventors whose experience as engineers and constructors has been very limited. Not one street railway company has risked the price of a car. Several have been to locomotive builders, and asked them to build and guarantee; but the builders have told them that it was not their business to guarantee in such cases. The directors, in several cases, have said that they might have to pay too much for permission to use steam, however inoffensive it may be made. The public authorities, very properly, will not license beforehand machines that they know little about.

The directors ought to take the risk. They ought to employ the best designers and builders, and get up the best car they can; then get up another if that be imperfect; and when they have got one that deserves a license, then put it to work, on trial, and ask the authorities to examine it and allow the roads to be stocked with such cars. If there be any improper opposition the public can be made to understand the whole case; and whether the opposition arise from ignorance or dishonesty, it could be overcome. The intimations often made that black-mail will be required, may be true or false; but it is certain that the directors ought not to be kept inactive by the fear of such villainy. Were they liberal they would rather meet such a charge than shun it.

[WRITTEN FOR THE AMERICAN JOURNAL OF MINING.] LESSONS IN MECHANICAL DRAWING—No. IV.

BY T. P. FEMBERTON.

DRAWING TOOLS AND INSTRUMENTS.

There are certain rules and scales that the draftsman requires before he can commence the delineation of any object, as mechanical and architectural drawings have to be made to a scale when the magnitude or number of the parts do not admit of their being drawn the full size. When a machine has been completed, and is about to be sent from the workshop, it is often found necessary to have a drawing made of it that will give a machinist the exact dimensions by which he can build another, in all respects similar to the first. It is the draftsman's office to first sketch the machine as it really is, and then to take it in detail and measure every piece, so that lengths, breadths, thicknesses, diameters, areas, and the position of every part of the machine may be accurately obtained.

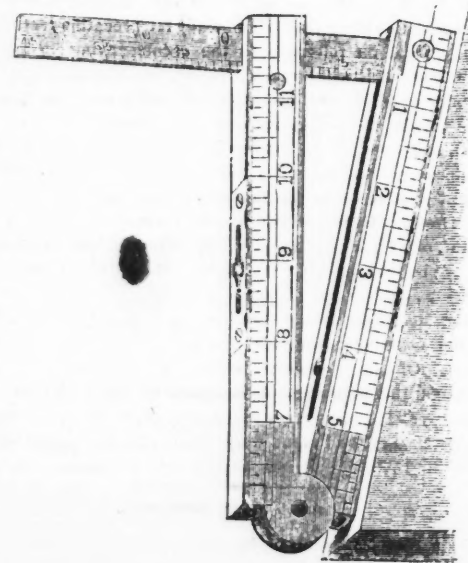
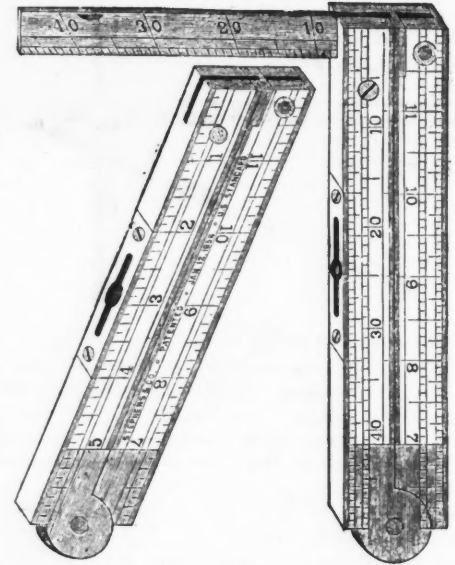
The tools required for this primary operation are found in any machinist's or carpenter's tool chest. They may also be included among the draftsman's implements. These tools comprise a rule, try-square, callipers (inside and outside), spirit-level, plumb, and clinometer or slope-level. Furnished with these, a sketch-book, or paper block, pen, ink, and pencil, the draftsman is prepared to make an accurate sketch of any work, whether it be of wood or iron.

The manner and method of sketching will be described in a future lesson; at present we confine ourselves to the tools used in the operation. We wish, first, to see the student in his study, or drawing office, supplied with all necessary instruments, and with a thorough knowledge of their names and use, before he commences either sketching or drawing. The engravings (which are just half size), illustrate a patented instrument invented by L. C. STEPHENS of Hartford, Conn., which combines in itself a carpenter's rule, spirit-level, square, plumb, level, indicator, brace scale, draughting scale, T square, protractor, right-angle triangle, and which, with a straight-edge, can be used as a parallel ruler, all the parts of which in their separate application are perfectly reliable.

EXPLANATION OF THE RULE.

It is made of boxwood, with one joint, and is well protected with heavy brass binding. The plate which protects the glass, being put on with screws, can be removed, should it by accident become necessary to insert a new glass.

When folded it is six inches long, one and three-eighths inches wide, and three-eighths of an inch thick, and weighs the same as an ordinary broad bound rule. The steel blade folds like a knife-blade into the part which holds it. One side



PATENT COMBINATION RULE.

of the blade is graduated, and the figures 5, 10, 15, 20 to 45, denote the degree of the angles, which are formed by opening the legs of the rule, the blade sliding through the groove in the end of the leg.

When extended to 45 of course the angle is 45, and the

blade has fallen 27 1/2° from a right angle or square. Hence the angles formed by the leg and blade decrease just one-half as fast as the angles formed by opening the legs of the rule increase. The upper edge of the other side of the blade is also graduated into inches and eighths, and numbered 1, 2, 3, 4, 5, 6, the graduations decreasing towards the end of the blade. This scale shows the pitch of the foot. Thus in the cut which represents the rule as a slope-level the angle indicated is 9°, and the pitch of that angle or inclination as shown on the other side of the blade is seven-eighths and one-sixteenth of an inch on a base line of six inches, or one and seven-eighths inches on a base of one foot. By opening the rule 15° the scale on the other side shows a pitch of one and five-eighths inches in six inches, or three and two-eighths inches in a foot.

The utility of these scales will be readily seen by those who have occasion to ascertain the angle or pitch to the foot of any inclined plane. The plumber, for instance, with this instrument can ascertain not only the angle, but the pitch to the foot of any roof.

The inner edge of the leg which holds the glass is also graduated to measure the angles, that are formed by turning the blade in the leg which holds it; this arrangement is especially adapted to iron-planers. These degrees show how much the right-angle is reduced as the blade falls from that position. The machinist desires to reduce a piece of iron to a certain level, but instead of going to the planer to "cut and try" as is usually done, he finds the degree of the angle he wants by applying the instrument to his pattern; then by turning the index of the planer to the proper degree, he can cut the exact angle required. To apply it to a pattern, open the leg which holds the glass (keeping the blade down on the bottom of the groove) until the blade and leg in which it turns fit two sides of it, and observe the degree indicated by the blade. If at 40, then as before explained we know the pattern is just 20° less than the right-angle or square, and to plane a piece of the same angle as the pattern, we place the index of the planer at 20°, the pattern being an angle of 70°, and 70° + 20° = 90° = a right-angle or square. This application of the instrument all mechanics who understand it will greatly admire. The pattern-maker by using this tool saves the machinist considerable labor, both working by the same degree.

The surveyor will perceive its adaptation in the laying of angles. Open the part which holds the level until the end of the blades rest squarely upon the inside of it, and we have a square. In this position it is also a right-angle triangle, and with the mid of a straight-edge can be used as a parallel ruler. One side of the blade is divided into twelfths, also the inside edge of the leg which holds it, which arrangement constitutes the brace scale. Place one point of the dividers on the third inch of the blade (while the rule is in form of a square) and extend the other over to the third inch on the scale of twelfths on the inside edge of the leg, and the distance between the two points of the dividers applied to the scale of twelfths on the rule will give the length of the brace in feet and inches—inches and twelfths on the rule representing feet and inches in the brace.

The adaptation of this instrument to the measurement of height and distance is obvious from the following illustrations: A carpenter goes into the forest to find a tree which will furnish forty feet in length of clear timber. He finds one which seems adapted to his purpose, but a bend or limb near the top leaves a doubt in his mind in regard to it. He now takes the instrument from his pocket and measures off forty feet in any direction from the tree, and marks the point where the measurement terminates; then fixes the leg which holds the level at an angle of 45°, and places the instrument upon this point (taking care to keep it level), then sights along the leg in to the tree, and if the line of sight strikes below the bend or limb, he is safe in cutting the tree. To measure the height of a pole, tree, or house, adjust the rule to an angle of 45°, and recede from the object until a line of sight along the base of the instrument will strike the bottom of the object, and another through the raised leg will strike the top of it; then measure the distance from the point where the instrument stands to the foot of the object, and you have the elevation. (If necessary to elevate the instrument, the height from the bottom of the object must be added to give the true result.)

To measure the distance to any inaccessible object, the width of a river, for instance, lay off a base line of any convenient length, adjust the rule to a square and place the base of the instrument upon the line so that a line of sight from the blade will strike the object, and mark the point upon the line where you commence operations; then change the instrument to an angle of 45°, and move it along the given base line until the line of sight from the raised leg strikes the object as in the former position; then measure the distance from the joint of the instrument to the point previously marked, and you have the distance to the object.

The slotted screw which passes through the end of the leg that holds the level is used in adjusting the square, should it wear so as to require it. With a small screw-driver the blade may be raised or depressed by turning this screw either way. The square is strong, firm, and reliable, there being a heavy metal stop to prevent its going back too far, while it is held firmly in place while in use by a broad metal strap through which the screw passes.

Carpenters, joiners, ship-builders, draftsmen, engineers, and all classes of mechanics, will find this instrument useful in measuring and examining work.

Tenacity of Metals and Alloys.

The following experiments have been made to test the tenacity of metals and alloys, with the annexed results. The tension was obtained by the use of a winch, and measured by a spring balance. The wires used were double, gauge No. 23:

Breaking strain for double wire.

Tin	under 7 lbs.
Lead	" 7 lbs.
Gold	about 25 lbs.
Copper	" 30 lbs.
Silver	" 50 lbs.
Platinum	" 50 lbs.
Iron	" 90 lbs.
Tin-lead alloy	under 7 lbs.
Tin-copper alloy (12 per cent copper)	about 7 lbs.
Copper-tin alloy (12 per cent tin)	" 90 lbs.
Gold-copper alloy	" 75 lbs.
Silver-platinum alloy	" 80 lbs.
Steel	above 200 lbs.

Mining Summary.

Nevada.

Gleanings from Ross Brown's Report.

REDUCTION OF COMSTOCK LODE ORES.

The ores from the Comstock lode are probably the most docile silver ores found in Nevada, and the process used for their reduction is of the simplest kind. After crushing by the stamps, the large boulders being first reduced to a moderate size by hand labor or by Blake's patent crushers, the material as it passes from the battery is collected and settled in tanks to avoid as much as possible the risk of fine particles passing off with the superfluous water. In spite of all precautions, much loss is sustained from this source, experience showing that the most impalpable of the slum is the richest in proportion. Out of 40,432 tons worked at the Gould & Curry mill, 4,431 tons were lost in this manner.

From the tanks the crushed ore is passed to the iron grinding pans, a description of which will be found in preliminary report, pages 76 and 77. The charges vary from 500 to 1,500 pounds, according to the character and capacity of the pans used. In these pans the ore is ground from four to six hours, being in that time reduced to an almost impalpable powder. The mode of treatment varies considerably, some mill men using a variety of chemicals such as sulphate of iron, muriatic and sulphuric acids, &c., while others dispense with them almost entirely. Their object is to assist the reduction of the silver in combination, but much uncertainty exists as to their beneficial operation. Each charge is invariably mixed with a certain amount of salt, varying with the richness of the ore. Towards the end of the process the quicksilver is usually added, the millers of the pans being at the same time slightly raised to prevent the grinding or "flouring" of the mercury. After a sufficient time has elapsed to allow a thorough amalgamation, the pulp is thinned by the addition of water, and revolved in such a way as to allow the amalgam to settle to the bottom. For economy of time this is usually accomplished in large vats called "settlers," especially adapted for that purpose. The refuse matter is then drawn off and treated by various methods of concentration, to be spoken of afterwards. The process is used only for second and third class ores. The Central mill in Virginia, and the Washoe reduction works and Ophir mill in Washoe valley are the only ones adapted to this method, the amount of ore requiring this treatment being but a small percentage of the entire product of the lode.

Some mill men amalgamate in the battery while the ore is being crushed, but the practice is not by any means universal. In fact, the treatment of ores is in a great measure empirical, but little attention being given in Nevada to analytical chemistry, and the adaptation of the working process to the results developed.

CONCENTRATION OF TAILINGS.

Concentration is employed only in the treatment of the "tailings" or sands from which all the metal has been extracted which could be saved in the mill. The tailings are usually turned into the nearest watercourse, (many mills being so situated as to have no facilities for the construction of the reservoirs) and the right to use them rented to other parties. Many plans have been suggested for their concentration, but the one in general use is extremely simple. It consists merely in passing the sands through shallow sluice boxes, the bottoms of which are covered with thick blankets. The fall of these sluices is considerable to prevent packing of the sands, but the stream of water is regulated so as to cover the blankets with a thin sheet only. In this way the heavy metallic particles are retained in passing over the rough surface of the blankets, the lighter sands passing off in the water. After a sluice box has been running several hours, the water is turned off, the blankets washed in a tank of water, and returned to their places. This constitutes the entire treatment. When the tank is nearly full of tailings, it is emptied and the resulting mass, considerably increased in value by the elimination of waste sands, is ground and amalgamated in the manner already described. Latterly this has become quite an extensive branch of our mining business, and it is said to yield a good return on the capital employed. The total value of all tailings saved in this manner was probably about \$200,000 for 1866, which will be doubled for 1867. These figures can only be considered approximations, but they serve to show how small a percentage of the great loss is saved by these means, and how large a yield is yet open for improvement.

LOSS IN THE REDUCTION OF SILVER ORES.

It is suggestive also to mark that the loss of metal, according to assay, foots up \$471,155 17, while the total quantity saved only amounts to \$816,979 62, out of \$1,288,132 79. Of thirty-two lots sent to mill, only two returned over seventy per cent. of the fire assay value; this, too, in one of the best managed companies, and when the mills are boasting of the improvements in their machinery and processes. What must have been the waste during the early days of silver mining, before the present incomplete experience had been attained?

That the present enormous waste of the precious metals by custom and company's mills might be avoided, is clearly demonstrated by the success of the companies which re-work the tailings thrown away by these mills. In the vicinity of Virginia City there are several miles of flumes, all lined with blankets, which require hundreds of men to change every few hours. The tailings thus collected yield a larger profit, according to the cost of their production, than the ores worked in the mills. Nearly one-third of the bullion shipped from Storey county, Nevada, is obtained from the waste of the mills collected in these flumes.

[A careful consideration of this portion of the subject is enough to convince any one of ordinary judgment that the sooner we have a National School of Mines in the midst of our mining regions, so that such an enormous waste can be prevented, the better.]—Ed.

PRICE OF LABOR AND COST OF LIVING.

Miners receive from \$3 50 to \$4 per diem, and blacksmiths, carpenters, brakemen and engineers, from \$5 to \$8. Miti hands earn from \$3 to \$5, according to the responsibility of their positions.

In towns a large proportion of the population board at restaurants or hotels, at rates varying from \$8 to \$12 per week. Many mills are so situated that they are compelled to keep a boarding-house for the men employed, in which case they are usually paid so much a month including their board. This system is the inevitable result of the unsettled disposition of much of our population, who, in spite of oft-repeated warnings, are yet ready to believe that every new mining camp discovered is better than the one in which they are located, and rush to it accordingly, in the hope of making the "big strike" which shall bring them wealth and comfort in a day, instead of winning them by the old well-tried rule of patient industry and perseverance. There are many signs, however, of improvement in this respect, but the number of those who have come to look upon Nevada as a permanent home are very few, indeed. House servants receive from \$30 to \$40 a month. Many Chinamen are employed in this capacity at about the same wages.

PLAN OF THE SUTRO TUNNEL.

The proposed tunnel begins 3 1/2 miles below Dayton, between Corral and Webber canyons. The distance from the mouth of

the tunnel to the Savage Works is a little over four miles, but as the Comstock lode dips to the east, it will be cut 20,178 feet. It will pass through the different ledges in Silver Star and other districts nearly at right angles. Allowing a grade of one inch in 100 feet, or four and four-tenths feet per mile, it will be 1,922 feet below the floor of the Savage Works. The topography of the country is admirably adapted for sinking shafts, four of which are proposed to be put down. They will not only supply the tunnel with fresh air, but will greatly expedite work, as drifts can be run each way after reaching the grade of the tunnel. The distance of the first shaft from the mouth of the tunnel is 4,070 feet; depth, 443 feet; second shaft from first, 5,150 feet; depth, 980 feet; third shaft from second, 4,060 feet; depth, 1,436 feet; fourth shaft from third, 4,654 feet; depth, 1,360 feet; from fourth shaft to Comstock lode, 2,244 feet; depth, 1,942 feet. These are convenient distances for working and ventilation. The mouth is about one and a half mile from Carson river, and 150 feet above high water mark. There is a gradual descent for about one-third of a mile, in which a fall of 100 feet is obtained, giving sufficient area for dumping and mill sites.

The vertical section of the tunnel through rock not requiring any support is a circle 12 feet diameter, with offsets 3 1/2 feet from the bottom, about one foot wide, which support the superstructure of the railroad track to be used for removing ore and debris from the mine. The space under the superstructure is for drawing the water from the lode. Where timber supports are required to sustain the adjacent rock, the top is level, and 10 feet wide, clear of the framing; height eight feet to the bottom of the timbers supporting the railroad, where it is 12 feet wide in the clear. Below this there is a triangular space, three feet seven inches in depth, forming the water-way.

THE SAVAGE AND REESE RIVER MINES.

The Savage, Morgan and Munsey, Diana, Providencia, Whitelash, Union, Troy, Buel North Star, and many others in the neighborhood, have been extensively mined, and at times have been productive. A description of each, where all are so much alike, would be exceedingly tedious. It may be remarked that those mentioned, as well as others, are within an area of a few hundred yards square, and that in the district are several miles of area of equally good ground, judging from the slight developments made upon the surface, and where undoubtedly as good mines could be opened as those mentioned. In the great mining enterprises of Virginia and Gold Hill in western Nevada, where in the last six years near \$79,000,000 have been taken from the mines, there exists but one grand lode, the Comstock, which is divided through its length into a great number of claims, or mines, many of which return largely to their owners, while some return nothing. This has been the most productive vein in the world. In the Reese River district such a gigantic lode has not been found, but there extends a belt some six miles in length and half a mile in width, in which are innumerable veins, such as here described, of highly concentrated ore, easily and cheaply mined. From a few mines upon this belt there were produced in the last month \$100,221 87. There appears to be room for many times the present mining operations, with the same proportion, yet the resulting figures are so great that one scarcely ventures to make the calculation. An increase based upon a full development of all the mines of known value would amount to several millions of dollars monthly, from an area not exceeding fifteen square miles, the utmost capacity of the district. Upon a close examination of the ground the conviction is irresistible that there will be a greatly increased production within a few years. A full development of the district awaits the coming of the railroad, with capital, labor, and cheap subsistence.

THE KEYSTONE MILL—EXPENSES OF REDUCTION—TAXATION.

The Keystone mill, at Austin, may be taken as a sample of its class, from its arrangement, construction, and cost. It was built 1865, by Mr. A. L. Page, its chief owner and manager, with several additional buildings, as residence of superintendent, stables, blacksmith shop and store-house, all of brick, at a cost of \$91,830. The mill is divided into four rooms or divisions: 1st, boiler and engine room; 2d, battery room; 3d, furnace room; and 4th, amalgamating room. The first three occupy the front, and the last is in the rear of the battery room. Their dimensions are as follows: engine room, 45 feet deep by 25 feet front; battery room, 45 by 35; furnace room, 50, by 140; and the amalgamating room, 45 by 35—making a total frontage of 200 feet with a depth of 90 feet. The engine is of 60 horse power. There are 20 stamps of 750 pounds each, drop eight inches, and 78 times each minute. There are eight reverberatory furnaces with hearths 11 by 13 feet; 15 pans or tubs, five feet in diameter; six settlers, six feet in diameter; with retorts, smelting furnaces, &c. The total amount of freight hauled from California for this mill as machinery, lumber, and material for building, was 140 tons, at a cost for freight of nine cents per pound from San Francisco. (The price now is six cents.) The cost of the machinery in San Francisco was \$18,000, and the total cost, as stated, \$91,830. It crushes dry, roasts and amalgamates, producing bars of bullion at a cost to the mill of \$25 per ton. For stamp work it charges \$45 per ton, and agrees to return 80 per cent. of the assayed value of the ore. Twenty tons of ore can be reduced in each 24 hours. Four cords of wood are used per day in making steam for the engine and for heating the pulp in the pans, and eight cords for the roasting furnaces. Wood usually costs \$7 per cord. Salt, of which a considerable quantity is used in chloridizing the ore, is furnished from the large fields in different parts of the State, at from \$30 to \$40 per ton. About 200 pounds of quicksilver is used at each charge of a pan, but varies with the amount of silver in the ore. The quicksilver costs 60 to 75 cents per pound; about one per cent. of it is lost. The wages paid are, for amalgamator, \$10 per day; first engineer, \$8; second engineer, \$6; fireman, \$6; blacksmith, \$7; carpenter, \$6; pan attendants, roasters, and battery feeders, \$4 each.

The expenses attending the production are: first, mining the ore, exceedingly variable; second, hauling to the mill; third, the State tax of 1 1/2 per cent. upon ore after deducting \$40 per ton; fourth, cost of milling, \$45 per ton; fifth, internal revenue tax on bullion of 1/2 of one per cent.; melting and assaying, one per cent.; and transportation to San Francisco, three per cent.—making a total tax of six and a half per cent., besides the cost of mining, hauling, and milling. To these are to be added the income tax, the many stamps used on receipts, certificates, checks, &c., incident to the constant handling and exchange of valuable property, the customs and revenue tax levied on machinery, raw and manufactured material, of which the miner is a destructive consumer. Thus it will be observed how disproportionate are the taxes imposed upon the miner, compared to other occupations; the tax being both upon what he produces and what he consumes, while he is without the protection given to others. A tax on iron may be added by the miner to the price of the iron, but a tax on silver is never returned, and the silver miner pays the two taxes. All taxes are paid in currency, but estimates are also made in currency when taxes are so paid. The business throughout the State, with the exception of Pahranaagat, is carried on in coin, estimated at par, and all expressions of money used in this report mean coin, unless currency is expressly mentioned.

THE MURPHY MINE AND MILL.

The Murphy is the only developed productive mine in this neighborhood, and its success has given celebrity to the district. It was located by G. H. Willard, John Murphy, Jo. Patty, and others, in 1864, and is 1,000 feet in length. Its course is north and south, dipping to the east at an angle of 46°, and the lode is

about 20 feet in thickness. It has been developed by an incline 130 feet in depth, from which levels have been run and ore extracted, worth about \$130 per ton. It appears from the working that the ore is not continuous throughout the vein, but exists in chimneys of one to seven feet in thickness, and from 100 to 150 feet broad, with nearly a corresponding interval of barren rock. These chimneys are inclined, having a dip to the north of about 30°. Although much valuable ore has been extracted, a map of the mine, showing its whole size and the excavations made, indicate that but a small portion is touched. There are 41 men employed in the mine, working eight hours each, at \$4 per day, and keeping up the labor without intermission. The miners are usually natives of Cornwall, England. The hoisting of water and ore is done by steam power.

The Murphy mill, belonging to the Twin River Mining company, is a substantial structure of stone, having 20 stamps and corresponding machinery, driven by an engine of 95 horsepower. The ore is brought from the mine, a few hundred feet distant, in cars. The first process is to pass it through a Blake's rock breaker, which will in a few hours break sufficient rock into fragments of less than a cubic inch in size to supply the stamps 24 hours. This effects a saving of \$2 per ton in the cost of crushing the ore. From the breaker the ore is placed upon a large pan or dryer, which is heated by the gases passing from the roasting furnaces to the smoke-stack, and is thoroughly dried. It is then ready for the stamps. Of these there are 20, weighing 850 pounds each, and they crush 16 tons per day fine enough to pass through a No. 60 screen, or a screen with 3,600 holes to the square inch. Falling from the screens into a tight bin, it is removed into cars standing on a track passing over the tops of the roasting furnaces, of which there are eight, capable of roasting 16 tons in 24 hours. Seven to nine hundred pounds of ore mixed with a certain quantity of salt, according to the composition of the ore, varying from eight to fifteen per cent., constitute a charge, and this is roasted from five to seven hours, being constantly stirred. It is then taken to the amalgamating room, in which are six pans, taking one ton of the roasted pulp, now mixed with water, at a charge. Here the silver, which in the furnaces was changed from its native condition to a chloride, is again changed to metallic silver, and is amalgamated with quicksilver. The pulp is agitated and ground by revolving iron mullers for about six hours, when it is drawn off into settlers, of which there are six, where more water is added, and, after several hours' agitation, the quicksilver bearing the silver is then drawn off, the pulp allowed to run to waste, and the silver taken out. This, after being strained and pressed in leather bags, exhausting the quicksilver as far as possible, is placed in a close retort, and the remaining quicksilver expelled by heat. The crude bullion remaining is then taken to the smelting room, where it is melted and run into ingots, ready for the assayer and for commerce. The establishment is very complete, and presents an imposing appearance. The officers of the company having charge and carrying on the works, are R. B. Canfield, general agent; H. M. Grant, book-keeper; H. Richards, mining superintendent; Chas. V. Baesler, assayer; and Alonzo Moroe, engineer. In working the mill at full capacity, 41 men are required. Besides those in the mine and mill are blacksmiths, ore sorters, and wood choppers, making 100 men employed. In one month 417 tons of ore were milled, producing \$36,865. The assay of the ore was over \$100 per ton. At the present date the mill is working to its full capacity, and better results than formerly are obtained.

CHARACTERISTIC TELEGRAPHY.

It should also be mentioned, as a characteristic illustration, that operators have an individuality of style or manner as distinctly marked as the differences in cirography. For example, a message is being received at the office in San Francisco from the office in Carson. The superintendent standing by, asks, "Who is that at the instrument at Carson?" The operator replies, "Jones is at it now. Thompson was at it a few minutes ago." Presently he adds, "Smith has it now." How does he know all this? Neither Jones, nor Smith, nor Thompson has mentioned his name, or said a word on his own account, and yet the fact of each change is perfectly clear to the operator at San Francisco. He knows the style of each man. One makes long dashes and quick dots; another runs a race between dots and dashes; the third is sharp, clear, and methodical. Each has his individual characteristics, which have become as familiar as the tones or modulations of his voice to the ear, or his handwriting or face to the eye. The language of sounds is even considered less liable to error in many offices than that of written signs, and has been of late very generally adopted.

LEGALIZATION OF TELEGRAPHIC MESSAGES.

The Legislature of California, by an act passed April 18, 1862, legalized messages transmitted by telegraph in their relation to instruments and acts of law. This act introduces a new feature in the business of telegraphing, a feature not only novel in its conception and application, but of incalculable importance to the civilized world.

Appropriate provision is made to secure the public against dishonesty and fraud on the part of the operators and other employees. Penalties are imposed for divulging the contents of messages, changing the sense or meaning, knowingly sending false or forged messages, appropriating information to private uses, wilfully neglecting to send messages, or postponing or sending them out of order. Also against fraud by any person whatsoever who may open seals of messages addressed to any other person, read dispatches by means of any machine or contrivance, bribe telegraph operators to divulge the contents of messages, damage the line, or otherwise attempt to cut off communication. But the great feature of the law is that contracts by telegraph are deemed to be contracts in writing, and the signatures thereto are valid in law. Notice by telegraph is actual notice. Power of attorney or other instrument in writing, duly acknowledged and certified so as to be entitled to record, may, together with certificate of acknowledgment, be sent by telegraph, and the telegraphic copy or duplicate has *prima facie* the same effect in all respects as the original. Checks, due bills, promissory notes, bills of exchange, and all orders and agreements for payment or delivery of money or other thing of value may be made or drawn by telegraph, with full force and effect as if written. Persons indicted on oath for, or accused of, any public offense, may be arrested and imprisoned upon warrant issued by any competent officer, properly indorsed and directed to such officer as may be legally authorized to make the arrest. Writs or orders in civil suits or proceeding may also be transmitted in the same way. All these provisions are carefully guarded so as to avoid any infringement upon individual rights, while they tend materially to promote the public convenience and welfare.

GOLD AND SILVER.

California.

Alpine County.—The *Miner*, May 9, says: Mr. J. Winchester, main owner of the Globe claim, on the Hercules lode, near Monitor, procured the services of B. Pilkington, Esq., and had a very accurate survey made of the mine and its surroundings. We had the pleasure of examining a topographical map of the work, and only wonder that all companies do not get a thoroughly digested plan of their properties, before expending too much money in running for, often they know not what. Mr. N. Graff received this morning from the Merrimac company, of New York, a letter, accepting the proposition of the Winchester company, of Monitor, made some time since, to go into the Winchester

tunnel and run it to the lode, and thence drift along the lode to their own ground, which is on the lode adjoining the Winchester. Authority is given Mr. Graff to let a contract, which, we understand, he intends to do immediately. The I X L mine is now in condition, it is thought, to justify the erection of a small mill at the works, there being ore enough on hand and in sight to make it pay. The same paper, May 2, says: Mount Bullion tunnel is now about 278 feet in length and going in at the rate of from twenty to twenty-five feet a week. L. L. Lewis, Superintendent of the American Tunnel and Silver Mining company, has repaired the flume and set the pump agog to drain the mine of the company. It is thought that something may turn up without a great deal of expense, to encourage the resumption of work and complete the opening of this mine. All agree, who have seen the Morning Star mine since the strike in the lower levels, that it looks better than ever before. The ore is easier broken down than in the upper levels and can be mined to better advantage. A large body of fine ore is now in sight and being taken out. The Pittsburg Tunnel company have cut another lode, and have a three foot vein of ore that looks like pay stuff. The company have telegraphed to purchase the Whiteside's mill at a certain price. The Schenectady company, owning the Tarshish mine, owing to a disagreement among the members at the home office, will not be able to start up for some time.

Nevada County.—According to the *Transcript*, of May 12, W. C. Halston has sold a one-fourth interest in the Eureka mine, Grass Valley, to Andrew J. Pope, for \$20,000. At this rate the value of the mine would be \$800,000. It was purchased several years ago from Frelot for \$450,000. Thos. Allen is working near Rock creek twelve men, and making from twelve to fifteen dollars per day to the hand. The new sulphuret reduction works being erected by a French company at Canada Hill, are expected to be ready for work in ten days. It is estimated that their establishment cost at least \$60,000, but even at that price, if it does what is claimed for it, it will be a good investment. Within the next month the new process will be tested. The Grass Valley National is informed that the Illinois and Wisconsin company are taking out some very rich rock at the present time. The mine is now being worked under contract by a company of experienced miners. The Hope gravel company have about completed their hoisting works, which they purchased of the Old Alta company and removed to their ground. By the middle of next week a 12-inch pump will be started with a sufficient power to raise water from the mine in immense volumes. A crushing of fifteen loads of quartz from the Inkerman mine has just been cleaned up at the Gold Hill mill. The yield was only \$51 10 to the ton. The Grass Valley Union says the rock now coming out of the shaft looks as well, if not better, than that just crushed. Within the last month, says the *Transcript*, we learn from the best sources, that the treasure yield of the county has considerably increased. A large number of claims which were shut down in consequence of the deep snows and heavy storms, are now being worked. The next five months will be the best of the mining season. The reduction of water rates by the South Yuba Canal company will induce many new companies to commence work, and encourage those now at work to continue. Every dollar saved by the reduction will be a clear gain to miners and a benefit to the mining interests of the county. This winter the snows in the mountains are unusually deep, and as a consequence the reservoirs and ditches will be kept full until very late in the season.

Kern County.—The quartz mining interest of Kern County presents a more flattering prospect than they ever have at any time since the discovery of quartz within its borders. The *Havilah Courier*, April 25, says of the St. John mine at Sageland, which is one of the most productive quartz mines in California: Since the mill began to crush quartz, with the exception of about six weeks stoppage for repairs, the mill has been turning out from \$3,000 to \$5,000 per week. On the 6th of the present month, Superintendent Taylor made one shipment of 112 lbs. of bullion, the result of two week's run. The Burning Moscow mine, situated in the New El Dorado district, is now being worked with energy by its present owners, Messrs. Hammel & Decker. They are at present running a tunnel from which they take on an average 15 tons of rock per day, which prospects from \$50 to \$70 per ton. In addition to the St. John 12-stamp, and Dockweiler & Co.'s 5-stamp mill at Sageland, there are one or two other quartz mills in process of construction in that rich auriferous district. Rodgers, Keeney & Bridger are pushing their 10-stamp mill to completion with energy, and within a very short time they will be crushing rock from their mine—the Gold Hill lode. This is probably one of the most extensive and richest lodes in the county. The Gold Hill Co.'s mill will probably be in running order by the 1st of May. We also learn that Stearns, Low & Co. are preparing to erect a 10-stamp mill on the Esperanza lode, in Kelso Valley. This lode is a recent discovery, but it is said by judges to be immensely rich.

Trinity County.—We hear most flattering accounts from the various mining districts of this county. The *Journal*, May 2, says: Although the long tedious winter delayed the commencement of mining operations nearly two months, the lost time will be regained, for water will hold out much longer than in ordinary seasons; and, generally speaking, more can be accomplished in one long summer day at mining than two of the winter season. Never since the settlement of this county by Americans did high mountains hold such a covering of snow on May-day as now. These are the fountains from which the miner receives the needed element for successfully prosecuting his avocation. Several new mining enterprises, commenced last year, now completed, will add largely to the gold yield of the present season. The ditch of Taylor & Frey, from Grass Valley creek, extended a mile further, will cover a range of diggings known to be rich. The claims in Laing gulch, one mile below Lowden's, have heretofore yielded many a handsome nugget for trifling work done with a small supply of water. The ditch will be in operation soon, and furnishes water for the entire year. The Weaver Creek Fluming company have commenced operations. The work of laying the flume will commence as soon as the water falls sufficiently to permit it. This is one of the most extensive mining undertakings ever inaugurated in the county. Henry C. Witt, who located the claim under the McGillivray ditch, says that the prospects in that new mining locality are very cheering.

Toolumne County.—The Garner mine is looking well. A well defined vein from three to four feet thick, and of very rich rock, has been struck on the north side of the river. The mill is about finished, and is splendid as regards water power advantages. The bed of Rattlesnake creek, between Kirkwood's and Oak Flat, is being worked by Lewis Smith & Co., who are making good wages. It has been worked ten or twelve times before, always paying well. It is a sort of natural bedrock flume, and will continue to pay yearly as long as there is any mining done at Big Oak Flat. At Deer Flat, one mile from Big Oak Flat, there is a little placer mining being done. Mr. Snow has leased his partner's interest in the Cosmopolite mine, and is working the mine on his own account. Mr. Hiskey, of Nevada, has agreed with P. M. Bacon, to take the Old Star mine near American camp, and prospect it till June, and if he finds the lead extensive enough, to lease the same and give bonds to pay Mr. B. eighty per cent. fire assay, of all gold taken out. The rock assays as high as \$5,000.

Sierra County.—Owing to the unusually long winter, provis-

ions became scarce in Alleghany and other parts of the county. Some miners in the out-of-the-way camps have been obliged to quit work for want of "grub." Some of the citizens of Alleghany were obliged to pack their provisions from Forest City, where the stock was becoming scarce. We learn that several teams are on their way up with food for that market. The Union claim at Gibsonville is said to be paying splendidly. For one week's work it divided \$150 to the share in profits.

Calaveras County.—Brackett & Co. have got their new mill fairly to work, pounding gravel from their claim in Chili Ridge. It contains a battery of five stamps, propelled by means of a hardy-gurdy wheel, with 250 feet fall for the water. The mill works well in every part. Some magnificent gold-bearing quartz rock, from Washington district, was shown to the Editor of the *San Andreas Register*. It was from Smith's mine.

Inyo County.—A Mr. Piña has written from Owen's River to his friends in Los Angeles, advising them to emigrate to that locality immediately, as very rich gold quartz mines have just been discovered there. A party is reported to have cleaned up in one week's run of an arastra, \$4,000. Information in regard to the existence of the gold was obtained from an Indian, who was given 300 pounds of hard bread.

Napa County.—The *Register* says: We have been shown some very fine specimens of cinnabar, brought from the Star Co.'s claim at Pine Flat, near the Sonoma county line, by R. T. Montgomery, which compare favorably with the best we have ever seen. Prospectors have been at work for several weeks, and recent developments leave little room to doubt that a well-defined ledge of ore has been struck.

San Bernardino.—The *Guardian*, of May 2 is informed that there are about forty miners at work in the placer diggings in Holcomb Valley, and are realizing from two to six dollars a day. Water is in abundance for all mining purposes; game is found in the hills skirting the valley, and plenty of fish can be had at the head of the Santa Anna river. The indications are favorable for a very prosperous season.

Amador County.—The owners of the Kennedy mine, near Jackson, have decided to erect a twenty stamp mill near their shaft. Work will be commenced on it immediately. There are five quartz mills running, 120 stamps, in the immediate vicinity of Jackson. A little more than two years ago there was but one quartz mill, with twenty stamps.

Placer County.—Preparations are being made to resume operations on the Dutch Flat shaft. Kidder & Co. are now engaged building a new telegraph, and extending their pipe, in order to enable them to obtain the pressure necessary to work their claims in a still more advantageous manner.

Montana.

A correspondent writes in the *Post* to give the public a correct statement of Mr. Esler's operations. He says: "It is now well known to the public that Mr. Esler has failed so far as his business affairs are concerned, and has had considerable difficulty with his employees. The impression may perhaps go abroad that the furnace is a failure. Such is not the case, and it is now my object to disabuse the public mind, and put the Esler Argenta affair in its proper light. In the first place, Mr. Esler commenced this furnace in the early part of winter, when it cost him about one-third more to get the material on the ground and to build the furnace than it would have cost at a more favorable season, and without sufficient capital. He was so sanguine of success that he expected in a short time after the furnace would commence operations that he would be able to liquidate all debts; and so he would, had it not been that old debts and unlooked for difficulties came against him. Huge lumps, lump after lump, of silver went to Virginia and were in turn gobbled up by hungry creditors till the patience of his hands was exhausted and there was a general revolt; and the last cupell was seized upon by the employees and divided *pro rata* among them. And just here is an item worthy of note: That division paid 55 per cent. of all the arrearages for wages to the employees. The feeling became so intense against Mr. Esler that he sold the furnace to Capt. Guyer and let on a prospecting tour with barely a sufficient outfit. Mr. Guyer proposes to run the furnace, but up to the present writing has been unable to procure a smelter and other necessary help. These requisites will, however, soon be obtained. Now let us see whether Mr. Esler's furnace has been a success. He erected two smelting furnaces and one cupell under the same roof, at a cost of \$7,000. The cost of running them for seventy-five days was \$4,000, or including a large supply of coal on hand, and held over, \$5,000. During that time he took out \$14,000 worth of silver bullion, besides a large lot of lead, some of which is yet rich in silver, so that the cost of building and running the furnace for seventy-five days was about \$12,000, paying for itself and all costs of running it, leaving a net profit of \$2,000. Leaving out the cost of building there is a profit of at least \$3,000. These are not the exact figures for we have used round numbers, but if any one desires the exact figures we are prepared to give them. We have our information from various reliable sources, all agreeing, but when called upon we will give Mr. Fred Hollers, the head smelter, for authority, who has been with Mr. Esler from the time he began the furnace till he started out prospecting. Mr. Hollers has kept a strict account of all the expenses of building, running the furnace and of the amount of bullion taken out, and his statements are in substance as above, and can be relied on. His failure, if indeed it can be termed a failure, is attributable to those creditors who closed in on him when he was achieving success. Mr. E. was working out successfully for us one of the greatest problems of our quartz country, and we think the pressure was ill-timed, and prejudicial to the best interests of all concerned. He did not fail, however, in achieving for the country a glorious result. He proved that men of small means can build furnaces and make them a success, and we must call him a public benefactor, and believe that he will yet rise above these difficulties. We hope so at least. We might mention an almost similar affair that was attempted on Col. N. E. Wood, at Bannack. He has been persevering against all difficulties and discouragements. Two attachment suits were commenced against him, but the Colonel could not be pulled down. He cleaned up last week over \$2,000 worth of gold bullion, and settled up the suits, the parties paying all costs. He had once concluded to wind up, but better determination prevailed and he is going on, and will be triumphant. It will not be another month before Col. Wood will have paid up thousands of dollars of old company debts, and stand free and independent before the community. With ordinary luck his little mill will average \$2,000 per week, at a cost of not over \$400 or \$500.

A correspondent writing from Silver Star District, May 15th, says: Bates & Trivitt's mill is now crushing rock from their claims on the Iron Rod lode with splendid results, as the big, bright buttons of retort testify. They are down on the discovery claim 70 feet, with a four foot crevice of rich ore. In the shaft on the west end of the lode a "horse" was encountered which nearly closed the crevice for a time; but now, at a depth of 104 feet, it has opened out to three feet of quartz. Around and near the Iron Rod are numerous other lodes, prospecting well, but poorly developed as yet. About half a mile north from the Iron Rod is the Toland (silver) lode, with one shaft of 150 feet, and another of 75 feet in depth. The crevice varies in width from one to two and a half feet, of splendid looking ore, some of which assays as high as \$800 per ton. Mr. T. Salsbury, superintendent of the mine, sent several tons of the rock to Argenta a few days ago to

have it tested by furnace. The return is anxiously looked for. Half a mile north again is the Governor Chase lode, also silver, some of the rocks prospecting well in gold. There is a twelve foot shaft on the lode, which discloses a four foot crevice filled with beautiful ore, containing some galena, and from which silver can be smelted by a common fire. Three hundred yards further on, and opposite the Governor Chase, is the discovery shaft on the Philadelphia lode. Its depth is 25 feet, and shows a crevice of three feet, containing a goodly amount of very rich rock. A mile more and you come to the celebrated Green Campbell lode, with an 80 foot shaft and 6 to 10 foot crevice of rock, which averages \$40 per ton in the two arastras that are now running night and day, and I suppose will continue to do so till the advent of a mill gives them their quietus. The Butte, the Victoria, the Tom Benton, and the Broadway are all fair prospecting lodes, with crevices varying from 8 to 20 feet in width. The latter lode was discovered some two years ago by Mr. J. C. Taylor, who sold to Clarke & Kirby and the late John S. Rocktellow. Clarke & Kirby intend putting a mill on it this season. The crevice, which is 10 feet wide, contains a great deal of rich dirt and quartz. Mr. Taylor has lately made an extension on the Broadway, east, that bids fair to equal it in width and richness. Nearly every lode in this district that is developed to any extent has proven better as the prospector descends on it.

A correspondent writes from the Crow Creek mines: The quartz mines in the vicinity of Radersburg are made up of 28 ledges, discovered by six different prospecting parties, the first lode having been discovered by J. A. Cooper and George Beard, on the 12th day of June, 1866, and named the "Blipp." Among the principal ledges, the Leviathan, Johnny Keating, Twilight, Night Hawk, Ulta, Marine, Ohio, Iron Clad, and Robert E. Lee. All have heard of the surprising richness of the Leviathan lead, discovered but a short time since by Messrs. Blacher, Oldman and Keating. Five hundred dollars has been found in one pan full of its rock, and some of the most beautiful tree gold specimens ever found in the Territory have been taken out. The crevice is from six to twelve inches in width, and a shaft is now being sunk for the purpose of fully testing and developing the lead. The Twilight is also a fine lead, its rock having paid \$40 to the ton in an arastra, until a depth of 20 feet was attained, when the lead capped. The R. E. Lee has paid, on average rock, \$23 60 to the ton. Upon the Ohio, an incline 40 feet in length has been run, at the end of which the ledge is four feet in width, and is almost completely filled with sulphurets of iron. It has "panned out" \$40 to the ton. The Keating lode is one of the best in the district, and has a shaft sunk upon it to the depth of 95 feet, and a tunnel 200 feet in length, for the purpose of draining off the water which has become troublesome. We understand that it is in contemplation to erect a mill on one of the ledges above mentioned at no distant day. Another correspondent writes of the Placer mines: They lay no claims to being "big," but content themselves with yielding from \$8 to \$20 per day to the hand. The three ditches cannot begin to supply water to all the diggings. Potter completed his ditch last week. It is about seven miles in length and will carry 1,000 inches of water. Another ditch brings 500 inches of water to the mines, while a third supplies 300 inches. There are many rich bars in the vicinity, some of which will prospect from 25 cents to \$1 50 to the pan. Some of the quartz in this vicinity will also compare favorably with any in the Territory. A shaft, 27 feet in depth, has been sunk on the celebrated Leviathan lead, showing a crevice three feet and six inches in width. No more rich pockets have been found, but still the rock is of an excellent quality. The Radersburg people are all in good spirits, and believe that their camp will before July be the liveliest in the Territory, if, indeed, it is not already. Some claims which are paying from \$10 to \$12 per day to the hand, would readily pay \$30 with a sufficient supply of water. A correspondent writes from Diamond City that during a ten hours run McGregor, Thomas & Co. cleaned up from their claim in Confederate Gulch over eighteen hundred dollars in clean, coarse gold. This amount, he continues, was taken out by only five drifters from two sets of timbers—that is, from a space of ground twenty feet long and three and a half feet wide. The entire amount of dirt from which this gold was washed did not exceed seventy cubic feet. This is the largest run from unselected, average dirt yet made in the main channel of Confederate Gulch. Hon. N. C. Boswell, of Reynolds City, reports that the mines in the immediate vicinity of that place are as productive this season as they have been at any time since their discovery. He reports nine best rock flumes in operation or in course of construction in Elk creek, all of which, except two, are on bed rock, and are doing well, producing for their owners from an ounce to fifty dollars a day to the hand. The supply of water in Elk creek is abundant, and there is no apprehension of having to suspend work during the summer. The mines at Bilk and Billy Weasel gulches will produce a large amount of gold this season. Ditches are constructed from Big Weasel to these gulches, and there will be no lack of water for mining purposes. The Post, May 29, rejoices at having seen nearly one hundred and fifty pounds of pure gold, in huge blocks, the product of Montana mining. It says: The First National Bank on Wednesday cast gold bars, which weighed 1,682 oz., of the value of thirty-one thousand and forty-seven dollars in gold coin, equivalent to forty-five thousand dollars in currency. We agree with the Post that such substantial evidences make the reader feel very kindly towards Montana.

New Mexico.

The Santa Fe Gazette, May 9, says: We were shown on Monday of this week, by Maj. Magruder, two nuggets of gold of large size, which he brought from the Placer mines for shipment to the east. About ten days since he made another shipment of a nugget of half the value of the two of which we now speak. The result of sixteen days' run of the mill at these mines has been between twenty-three hundred and twenty-five hundred dollars, or about one hundred and fifty dollars a day. This is a good yield considering the imperfection that is said to exist in the machinery now used by the company. Upon the erection of another mill, the machinery of which is already at hand, it is confidently anticipated that the yield of gold will be sufficiently large to be exceedingly remunerative to the company, and that the product will thenceforth be permanent. C. E. Cooley, Esq., of Puerto or New Placeres mines was also in the city on Monday. He had with him specimens of gold from these mines. The only machinery in use there as yet for crushing the quartz is the arastra, which is exceedingly primitive in comparison with the quartz mills of modern invention. It, however, answers the purpose for which Mr. Cooley intended the one he put up, and that is, to test the value of the ore. We are assured that the tests which have been made are entirely satisfactory and prove the ore to be of great richness. There is on this claim a smelting furnace for reducing copper. The furnace is said to operate well and turn out large quantities of copper daily. Gulch mining is now being carried on quite extensively and profitably on the Tuerte grant. Several experienced miners from Arizona are employed there in this kind of mining, and we are told, are making good wages, notwithstanding the scarcity of water. Capt. Santiago L. Hubbell, who was in the city last week, informs us that several claims have been taken up on the Magdalena mountains, a few miles west of the town of Socorro, in Socorro county, and companies organized to work the claims. These ores are of gold, silver and copper. The specimens which the Captain had with him were apparently very rich, and we have no doubt will prove to be so

when they shall have been fairly put to the test. It is claimed that these ores will pay from six to eight hundred dollars per ton. In consequence of the snow work has not yet begun at the Moreno mines, but there is a large number of men—several thousand—waiting for the opening of the season to commence operating claims already opened and to prospect for new ones. We mentioned two weeks ago the fact that M. Rosenbaum, of La Mesilla, had passed through this city for the east, taking with him fifty pounds of gold from the Pinos Altos mines. Altogether we regard our mining prospects for this season as by one hundred per cent. more promising than they have ever been before, and a continued application of intelligent industry and of capital will in a few years place us in the foremost rank of all the mining districts in the country.

Illinois.

It is remarkable how much the spirits of the departed are interested in the treasures of this world. It would almost appear as though, having neglected to lay up treasures in heaven, they desired to be instrumental in laying them up on earth. We, not long ago, had to chronicle an attempt at spiritual mining for buried Spanish treasure in Connecticut, and now it becomes our duty, as recorders of the events of the day in mining, to give place to an account of "an excitement akin to the gold fever excitement about California years ago" which has been for some time disturbing the rural district of Calhoun county, in the State of Illinois. The Jacksonville Journal says: "Parties are busily engaged in the Silver creek and Panther creek digging for fabulous quantities of gold said to have been buried in that neighborhood many years ago by the tribe of Indians who lived there on the eve of their departure to the far West. Hunting and fishing parties of the same tribe of Indians have, for the past two winters, camped near the spots where the treasures are said to be buried, and these spirits avow that they have succeeded in finding the treasure, but a number of reliable Boston spiritual mediums, having been applied to by interested parties, state, on the honor of a 'spirit,' that the Indians lie about it, and that the treasure is still buried in the deep bosom of the earth. While the question of the veracity is being discussed between the red spirits and the white spirits with great bitterness, the Calhounites are attempting to solve this Gordian knot by means of spades and pickaxes, with what success we have not been able to learn."

Minnesota.

Col. Tindall on the Vermillion Mines.

EDITOR OF THE AMERICAN JOURNAL OF MINING:

SUPERIOR CITY, Wis., June 8, 1868.

I have just read a statement in your paper, of May 20, copied from the Superior Gazette, in regard to the large yield of gold and silver taken from ore at Vermillion Lake. I will here state that there is not one line of it which is not a misstatement and exaggeration.

The largest yield of metal taken from sample ore, at Vermillion, was \$150 per ton; all other ores tested by me yielded from \$10 to \$100 per ton. The ores are all sulphurets, no free gold or silver has been discovered in that district as yet, and there is no chance for making money there except by the outlay of capital, and any rush to that region would be the height of folly.

Please publish this in your valuable paper, as it may prevent many persons from losing who are not able to spend money in such a risky business, who might be induced to do so by flaring accounts published in newspapers. Yours, etc.,

H. TINDALL.

Dakota.

The Sweetwater Mines has the following items: An extensive salt spring has been discovered at a point some ten miles distant from South Pass City, one capable of furnishing large quantities of the indispensable article. A party of twenty persons have arrived from Cheyenne, and among them we notice the name of the following gentlemen: John Morris, Harvey Willis, John Churchill and E. A. Slack. They were about 20 days on the road, and had a very pleasant trip generally. No Indians, or sign of them, were seen. The entire outfit are in good health and spirits. There is no mining news of any importance in the Mines.

Oregon.

The Corvallis Gazette, of April 4th, says that the Nehalem Coal company have made valuable discoveries of coal at Nehalem river, some seven and a half miles from the mouth of the river. Specimens of this coal having been sent to San Francisco, it is found to rank high as to quality, and appearances indicate large quantities. The articles of incorporation have been filed with the Secretary of State, and arrangements for working the mines, completed. F. A. Chenoweth is President, and A. Sharples Secretary of the company.

Mexico.

A correspondent of the San Francisco Bulletin writes from Acapulco: A Scientific Commission has been engaged for a couple of months in surveying the road between this city and Mexico, a road which after having carried Mexican specie to the galleons of the Manila trade, and the riches of East India to the wealthy Spaniards residing in Mexico, has been permitted to become almost intransigent, while enormous blocks of granite, serpentine and sandstone are lying along the road since 1820, intended to be used in the construction of bridges across the Rios Mescala and Papagayo. The report of the above commission makes it likely that the old road from here to the Rio Balzas will be abandoned, because a much better one has been discovered from the Farellon Mountain (distant one league from here) to the Hacienda de Benavista (32 leagues), via Jalitanquis, passing the Peregreto river at a point called Puente Viejo, or old bridge. Old Gen. Bravo in 1843, and Gen. Alvarez in 1856, made Acapulco a port of deposit, and set money aside for repairing this old Spanish road, but since then nothing has been done, and we have even lost those mercantile privileges we used to enjoy. Of more vital importance for the whole country is the new plan to open the River Mescala to navigation from its mouth to Las Balzas, which name it takes when increased in volume by several tributaries. The sources of the Mescala are in Tlascalala, where the river is called Atoyac, and crossing the States of Puebla, Mexico, Guerrero, and Michoacan, its whole length is 181½ leagues of 5,000 Spanish varas. The river has no serious obstructions, only rapids, which can easily be removed by the blasting of a few rocks, and though Zacatula, at its mouth, is but an indifferent port, on account of the shifting sandbanks, Petacalco can be easily made a place of secure anchorage for all vessels trading in those regions by digging a canal through the delta, and thus opening the interior of the above States to the outside world. Besides the great variety of precious timber and dye woods growing on both sides of the river, the mineral wealth of those parts is really fabulous, and I think it will interest your readers if I mention a few of its mining districts: Near Tlalcoztitlan there is a sulphur and an ochre mine; the Cerro del Limon abounds in silver, lead, and iron; the district of Guadalupe and Tepantitlan are famous for their gold, copper, and silver mines, that of Santa Barbara having given 13 marks per carga; in the Cerro de Huanuchil cinnabar has been found as abundant and rich as that of Almaden, and the mining districts of Acuchitlan, Coyuca, and Zirandaro are as famous for gold and silver as the neighborhood of Pizandaran for its copper veins, which yield 50 per cent. of pure metal, while the El Gallo mines have yielded silver in profusion. All these rich minerais, which used

to contain thousands of industrious miners, are now mostly deserted, because mining requires peace as well as other industries. I have always been astonished that none of your enterprising merchants has ever thought of taking this important matter in hand, get a monopoly from the Government for establishing a steam line up and down the river, and thus open first rate returns to your mercantile fleet, besides new markets for your home industry.

Canada.

The news from the Madoc mines to the 6th inst., as chronicled in the Mercury, is as follows: The firm of Daniels, Scott & Taylor have dissolved partnership, and their mill at Eldorado has been sold to the Merchants' Union company, and is shortly to be removed to Madoc. Mr. Taylor has resigned his position as manager at the Richardson mine, where operations are suspended for the present, the workmen being paid off and discharged. Some tons of their ore have been sent to the Bay State mill, to be tested there by the process adopted by Dr. Otway. The results of the practical working of this system are awaited with great interest and much confidence by many, who believe that his method of treatment will turn out to be best suited to the reduction of the ores of this district, which so far have been too refractory to yield, at the other mills, a sufficient satisfactory approach to the returns obtained from the more careful assays upon a smaller scale. At the Barry mine mill, work is also suspended at present, the machinery having proved to be defective. It is expected that stamps will have to be substituted for the grinding process which was adopted there in the first instance. Gold has been found on lot No. 6 in the second concession of Elzevir. Ten acres on the lot at a distance of about half a mile northwest from the Barry mine have been purchased from Mr. Barry by Messrs. Coe & McPherson, who have commenced to prospect, and have been rewarded by finding some very satisfactory "shows." The Union mining company, of Toronto, who own a portion of the Moore farm, have now advanced their tunnel about sixty feet into the hill, and have come across two very promising veins of gold-bearing quartz, considerably mixed up with copper. The character of the rock, for the last twenty feet, has considerably changed, bearing strong mineral indications, and some of the ore now being got out will be sent to the Bay State Mill to be tested by Dr. Otway. A new contract has just been let by the managing director, Mr. T. S. Chandler, and work will continue to be carried on day and night.

COPPER.

Michigan.

Notwithstanding the unprecedented depression of copper mining interests on Lake Superior, there is a scarcity of laborers in the three copper districts. The Portage Lake Gazette of the 4th inst. says: "In this district our mining men experience some difficulty in obtaining men, even at an advance of several dollars per month over last winter's prices. The men employed at the Franklin struck for higher wages this week, but the company persistently refused to grant an advance on the prices they had been paying, and the men are now again at work at the old rates. A strike is also reported at the Calumet and Hecla; what the result has been we have not learned. The mines that have paid and are paying currency and sight drafts, command laborers more readily and at cheaper rates. The prices paid surface laborers ranges from \$36 to \$42 per month." From the same paper we learn that the Holyoke Mining company are still extending their openings with a small force. The directors lately called in an installment of \$1 per share, and are determined to thoroughly examine their valuable property. . . . The Isle Royale at present employs but a small force, and it is the intention of the management to still further reduce the force by stopping the stamp mill as soon as the supply of rock now on hand is stamped. Their force is and will be employed in extending the openings in the mine. The product of the Calumet mine for the month of May is reported to be 123 tons stamp, and 12 tons barrel work. The actual running time at the Hecla stamp mill during the month of May was 17 days 10 hours, and produced 157 tons stamp material. The product of barrel copper is reported to be 7 tons. The following products for May are reported: Franklin mine.—Mass, barrel and stamp, 80 tons, 523 lbs. Quincy mine.—Stamps, 61 tons, 524 lbs.; mass, 4 tons, 1,614 lbs.; total, 66 tons, 524 lbs. Pewabic.—Mass, barrel and stamp, 57 tons, 676 lbs. Ogima mine.—Mass 1 ton, 320 lbs.; barrel, 3 tons, 834 lbs.; stamp, 8 tons, 766 lbs. total, 12 tons, 1,920 lbs. Knowlton mine.—barrel, 4 tons, 830 lbs.; stamps, 10 tons, 1,074 lbs.; total, 15 tons, 404 lbs.; Evergreen bluff.—Mass, 5 tons, 980 lbs.; barrel, 11 tons, 1,290 lbs.; stamp, 10 tons, 1,160 lbs.; total, 27 tons, 1,340 lbs.; Hancock mine.—Barrel, 4 tons, 1,950 lbs.; stamps, 16 tons, 1,780 lbs.; total, 21 tons, 1,780 lbs. Hoag & Brothers.—Stamps, 19 tons, 1,488 lbs. From the Ontonagon Miner, of the 6th inst., we learn that the Minnesota mine is developing in the workings on the South Bluff a most excellent vein, heavily charged with copper. We also learn that the National continues to produce mass copper in quantities. The stamp mill is in full operation, and it is thought that the product will run close on to 40 tons, with less than fifty miners.

Arizona.

The Miner, May 2, fears that although the copper mines near Aubry City, Williams' Fork, are producing rich ore, that work will have to stop entirely, or be greatly retarded, owing to the hostile attitude of the Indians of that region.

Newfoundland.

In his annual report to the Colonial Office, the Governor of Newfoundland says: "In the past year the exportation of copper ore of a very superior quality was commenced, and at this time more than 2,000 tons have been shipped. On my recent visit to Labrador and parts of the north-east coast of Newfoundland, I stopped at Tilt Cove, in Notre Dame Bay, for the purpose of seeing a mine, which is now in most successful operation, and which I trust is only the first of many which will soon be worked with profit to the proprietors and great advantage to the population, in affording new employment, which is often so sorely needed in the winter season. I was much interested in what I witnessed. The quality of ore is said to be equal to the best known from any other place. The fine kinds are worth as much as £20 per ton, and the average value of the sales of shipments to England is equal to about £10 per ton. Before the end of this year it is expected that a quantity worth from £30,000 to £100,000 will be shipped, and the ore now being extracted is even better than that first obtained. One hundred and seventy men and boys are on the time list, and about 500 people altogether now reside at the settlement, which was not in existence three years ago. Some of the men make as much as £17 per month, the average being from £10 to £12. Seventeen of the men employed, including the captain of the mine, are Cornish miners, but the remainder are Newfoundlanders. I spoke to several, and found them well pleased with their position and circumstances, which are, indeed, greatly preferable to those in which they had frequently been placed in seasons when the fishery had been unsuccessful, and their subsistence depended wholly on its result. If, as I believe will be the case in a very short time, many other mines equally productive should be worked, it will scarcely be possible to over-value the beneficial effect of this new industry upon the circumstances of the laboring population."

MARKET REVIEW.

FRIDAY EVENING, June 19, 1868.

Gold and Silver Stocks.—Colorado stocks continue to advance in price, one or two kinds excepted, but the transactions are limited.

Table of Gold and Silver Stocks with columns for Bid, Asked, and various stock names like Alameda Silver, American Flag, etc.

Copper Stocks.—Davidson continues on the upward course, and to-day, according to report, holders were asking 75 cts. Quotations range:

Table of Copper Stocks with columns for Bid, Asked, and various stock names like Caledonia, Canada, etc.

Petroleum Stocks.—Sales of Rynd Farm are reported to-day at 12@16c.; United States at \$2, and Pithole Creek at 90c. Prices range:

Table of Petroleum Stocks with columns for Bid, Asked, and various stock names like Bemis, Buchanan, etc.

Miscellaneous Stocks.—Delaware, Lack & W. R.R., 98; Moposa, U. S. 5-20s, 1864, coupon, 115@113 1/2; U. S. 5-20s, 1865, coupon, 110 1/2@110 1/4; U. S. 5-20s, 1866, coupon, 111 @111 1/4; U. S. 5-20s, July, 1865, coupon, 112 1/2@113 1/2; U. S. 5-20s, July, 1867, coupon, 113 1/2@114; U. S. 5-20s, July, 1868, coupon, 109 1/2@109 3/4; U. S. 10-40s, coupon, 106 1/2@106 3/4; U. S. 7-20s, July, large, 109 1/2@109 3/4.

Government Stocks.—The market is quite active, and prices are firm at the following rates:

Table of Government Stocks with columns for U. S. 5-20s, 1861, coupon, etc.

Foreign Exchange is somewhat active, and rates are steady at the following figures:

Table of Foreign Exchange with columns for London, Paris, Hamburg, etc.

Gold opened to-day at 140 1/2, and closed at 140 1/4. American silver is in moderate request at 3 1/2 @ 3 3/4 below the price of gold, and Mexican dollars at 103 1/2 @ 103 3/4 in gold.

The money market shows no change from the late extreme ease. The banks perhaps show less anxiety to put out balances, but borrowers of good standing find no difficulty in supplying their wants at 3 @ 4 per cent.

The exports of specie from the port of New York for the week ending June 13 were:

Table of Exports of Specie with columns for Total for the week, Previously reported, etc.

Total since January 1, 1868, \$43,712,627. Copper has been very dull. Forced sales to the extent of three to four hundred pounds Lake Copper have been made at 22c. and a shade below, but it is difficult to buy at this price.

The English market is quiet at 47 1/2 for Chili pig. Tin entirely nominal at 24c. gold for Straits, 27 1/2 c. for Banca, and 24 1/2 c. for English.

The London market is dull at 49 1/2 for Straits. Spelter unchanged. Nonmetal quotations for Silicious 6 1/2 @ 6 3/4 c. gold. Lead is dull; 100 tons ordinary Spanish sold at 6 1/2 c. gold.

Petroleum is quiet at 16 cents for crude, and 32 cents for refined, in bulk. The following tables show the amount received and exported to June 16 since Jan. 1:

Table of Petroleum Receipts and Exports with columns for Received since January 1, Export since January 1, etc.

THE IRON TRADE.

New York, Friday evening, June 19, 1868. Scotch pig iron is in moderate demand, and prices a shade lower. We note sales 355 tons Coltness at \$41; 350 do. Glengarnock, \$38 50@39 50; 100 do. Summerlee, \$39, all ex ship; and 40@50 do. in lots from yards, at \$40 for Eglington, and \$42 for Gartsherrie. American pig iron is in moderate request. Since last report the sales have been about 700 tons at \$38 for Allegheny; 600 tons Grey Forge, at \$34. Old rails are in good demand, and prices are high. All the surplus stock on the other side has been worked off, and the supply here is very meagre. Sales of double headed rails were made at \$48@50. In scrap the sales look up about 200 tons from vessel and ships, at 45 for ship. Bar from store, continues inactive, and prices are nominally unchanged—a sale of 50 tons Belgian refined, No. 3, sold ex ship at \$81, cash.

Boston, June 17, 1868. There is a steady demand for Scotch pig iron, with sales at \$42@44 per ton for Gartsherrie and other brands No. 1. The demand for American pig is also steady, and sales have been made at \$40@45 per ton. Bar iron is firm, and has been in fair demand, with sales at \$85@90 for common English and American, and \$95@100 per ton for refined. Russia sheet iron is firm at 13@14c. gold; but no sales of any importance have transpired. Imports of pig iron from Jan. 1 to June 13:

Table of Iron Imports with columns for From Great Britain, Coastwise ports, etc.

LEHIGH VALLEY IRON TRADE.

The following table shows the amount of Pig Iron transported over the Lehigh Valley Railroad for the week ending June 13, 1868, and for the season to that date.

Table of Lehigh Valley Iron Trade with columns for From, Tons, Total.

Table of Glendon Iron Co. and Other shippers with columns for Tons, Price.

LAKE SUPERIOR IRON TRADE.

Receipts of Ore and Pig Iron at Marquette, up to and including Saturday, June 6, 1868, by the Marquette & Ontonagon Railroad.

Table of Lake Superior Iron Trade with columns for Previously Reported, For week end'g, Total.

Table of Morgan Iron Co., Greenwood Iron Co., etc. with columns for Tons, Price.

MARKET PRICES.

Duty.—Bars, 1 to 1 1/2 c. per lb.; railroad, 60c. per 100 lbs.; boiler and plate, 1 1/2 c. per lb.; sheet, hand, hoop and scroll, 1 1/2 to 1 3/4 c. per lb.; pig, \$9 per ton; polished sheet, 3c. per lb. Payable in gold.

STORE PRICES.

Table of Store Prices with columns for Anthracite, English, etc.

STEEL.

Table of Steel with columns for English, cast, English Spring, etc.

PIG IRON AND BLOOMS.—The Commercial says: "A moderately active business is maintained in crude iron. Consumption is large considering the advanced period of spring trade, and, with greatly diminished receipts and reduced supplies in first hands of leading standard medium grades of forge irons, the tone of the market for this description is decidedly firmer, and, as fully two-thirds of the furnaces in the Mahoning and Shenango valleys have been compelled to blow out, in consequence of a strike of coal miners for an advance of wages, but we agree supplies of raw iron may be expected for the next two months from that important district of supply.

In fine iron a very fair business is doing in forge descriptions, but in foundry grades the demand continues remarkably light, and with ample supplies prices are weak. We are quoted the following sales:

Table of Pig Iron and Blooms with columns for 200 tons Open Gray, 100 tons Medium, etc.

COKE SMELTED.

Table of Coke Smelted with columns for 183 tons Ohio coke, 75 tons Allegheny, etc.

ANTHRACITE.

Table of Anthracite with columns for 40 tons No. 1 Foundry, 30 tons, etc.

CHARCOAL.

Table of Charcoal with columns for 100 tons No. 2 Forge fine iron, 250 tons No. 2 fancy brand, etc.

IRON.—The market for pig iron is in the same dull and lifeless condition on that characterized for some time past, but there is no disposition to press sales or to grant concessions. Malleable iron is also dull. We quote:

Table of Iron with columns for No. 1 foundry, per ton, No. 2 foundry, per ton, etc.

COLD BLAST.

Table of Cold Blast with columns for Tennessee, Missouri, etc.

BLOOMS.

Table of Blooms with columns for Missouri, Missouri "Maramac", etc.

BAR IRON.

Table of Bar Iron with columns for Common, per pound, Charcoal, per pound, etc.

SCRAP IRON.

Table of Scrap Iron with columns for Cast, per 100 pounds, Wrought, per 100 pounds, etc.

SHOES.

Table of Shoes with columns for Horse shoes, per keg of 100 pounds, Mule shoes, etc.

ROSTON, OHIO, JUNE 11.

The Register says: "The metal market exhibits no signs of activity. Inquiries either for foundry or forge descriptions are exceedingly limited. No transactions outside of our quotations have been made. Prices, however, remain weak. We quote: Mill, hot blast, \$36 00@37 00; Foundry, hot blast, \$38 00@39 00; Cold blast, \$38 00@39 00; Bituminous forge (Belmont), \$37 00. "Nearly all the furnaces in the county will be in operation this week. In addition to the significant fact that the production will be vastly increased this year, there seems to be a spirit among the iron men to turn out a better quality of metal. In this respect quite all the furnaces will improve. "Monitor Furnace makes excellent iron. We have noticed specimens of its production that are not surpassed in the country. "Bar iron continues dull at 3 1/2 @ 4 c. One of the mills is running full-hand. "Rails are in fair request at \$5."

THE COAL TRADE.

In consequence of the shipping difficulties at Philadelphia, there is much Schuylkill coal being thrown on this market, and most of it is being sold for a song. For this reason trade in other kinds of coal is dull. There is little or nothing doing except on former contracts. The break which occurred about six days since in the Delaware and Raritan Canal, at the ton mile level, has, we understand, been put in repair, and boats will be passed to-night for the first time. There is an accumulation of some ten miles of boats on the canal, which is sufficient to supply New York with coal for three months. This does not auger well for the trade hereabouts, or some time to come, unless dealers wake up to the fact that a few weeks only will be allowed them to lay in their stocks, and make a general attack on the market. We have often called to mind the fact that coal is now selling far below a fair profit, and that in a very short time it must advance. Dealers do not apparently realize the fact that we are some 1,000,000 tons in arrears of a supply to consumers, and that this great amount will all be sought after in

the space of ninety days. We are confident that some one will fall short, for our shipping facilities, great as they are, cannot supply all at once.

Freights remain unchanged; vessels are a little scarce and rates are firm. The 63d Scranton sale will be found advertised in our columns. To take place on Wednesday next, the 24th inst. Forty thousand tons of the usual sizes are on hand. We anticipate an advance upon the prices obtained at the last sale, for the reasons we have expressed above.

Our Boston correspondent states that trade in that city is fair and the demand general. Prices, Lorberry, \$4 10; White Ash stove, \$4 10 to \$4 25; White Ash egg, \$3 90 to \$4 00; Cumberland George's Creek, \$4 35, with short supply. From Philadelphia we learn that vessels have arrived within the past three days; that the "trimmers" have given up the strike and gone to work; that the "heavers" still hold out, and that generally it is very difficult to ship coal. Freights are a trifle lower, say \$2 50 to \$2 60. Some shipments are being made on the new "Bill of Lading."

The laying of the track of the Lehigh Valley Railroad between this place and Pittston, is in statu quo just now, the company having exhausted their supply of iron. It is said, however, that work will be resumed about the 1st of June, when a new supply of iron can be obtained sufficient for completing the track to this place. It is now laid from Pittston to near Gardiner's Ferry, a distance of some five or six miles, and with the increased facilities which canal navigation now affords, it is expected that the work will be pushed forward with sufficient vigor to reach Tunkhannock in time for a 4th of July excursion.

Nesquehoning Valley Branch of the Lehigh and Susquehanna Railroad has, we understand, been located, and will be pushed through to Mahanoy City at an early day. This road will run through what is known as the Nesquehoning Valley, and is the very shortest route to Mahanoy, being about fifteen miles shorter than the Mahanoy Branch of the Lehigh Valley Railroad. The completion of this branch road will give the Lehigh & Susquehanna (L. C. & N. Co.) access to the extensive tonnage from the Mahanoy coal region.

The completion of this road will also eventually (perhaps in a few years) do away with the Mauch Chunk & Summit Hill Gravity Railroad. The mountain between Panther Creek Valley and Nesquehoning Valley has almost a complete tunnel through it, and can be finished at comparatively little expense. Through this tunnel can be reached the Lehigh Coal & Navigation Company's mines in Panther Creek Valley, and the inclined planes and gravity road be dispensed with as an outlet to those mines.—Gazette.

The Wilkesbarre Record says the project is again revived there of building a railroad from the coal region to connect with the Erie road at Hawley. A meeting was held on Saturday to consider the plan matured by George R. Stearns, of New Jersey, which has the concurrence of the Erie Directors. The distance from Wilkesbarre to Hawley is fifty-four miles.

It is reported that Messrs. Mitchell & Swayer have leased a tract of eight hundred acres of coal land above the Butler mines, in Pittston, supposed to be in the interest of the Lehigh Valley Railroad. It is a wise move on this company.

J. H. Hollenback, Esq., has an offer of one thousand dollars an acre for his property on Mill Creek. He has another offer which he thinks better, but we do not know the terms, and doubt it is being better than cash. If the Lehigh Valley company wishes to build shops near Wilkesbarre, they can not get a location equal to this tract of Mr. Hollenback's on their road near the canal.

Boston, June 17, 1868. In English Cannel the sales have been at \$20 per ton, but the demand is quite limited. Sydney has been selling at \$3 25 per ton, and Victoria at \$7 50@7 75 per ton. Cumberland is in steady demand, with sales at \$3 25 per ton; \$4 25 delivered in Georgetown, and \$4 75 in Baltimore. In Anthracite there have been sales at \$6@6 50 by the cargo, and \$7@7 50 per ton in retail lots.

PHILADELPHIA, June 17, 1868. The market continues dull, and the prices which we print elsewhere are barely sustained.

The following table exhibits the quantity of Coal passed over the following routes of transportation for the week ending June 13, 1868:

Table of Coal Transportation with columns for 1867, 1868, Inc. or Dec.

Report of Coal Transported over Lehigh Valley Railroad and Canal for the week ending June 13, 1868, compared with same time last year:

Table of Coal Transported with columns for SHIPPERS, Week, Total, Grand Total.

From MATCH CRANK, Summit Mines, Room Run Mines, etc.

WYOMING REGION, Franklin Coal Co., Audenried, etc.

Central Coal Co., Morris & Essex Mutl, Chauncey Coal Co., Hillman & Son, etc.

Bowlky, Price & Co., Mineral Springs, Valley Coal Co., Enterprise C'y, J. H. S., etc.

G. B. Linderman & Co., Washington Coal Co., West Pittston, John Horton, etc.

Shawnee, Consumers Coal Co., Harvey & Bro., Wyoming Valley, etc.

Henry Colliery, New England, Del. & Hudson C. Co., Other Shippers, etc.

Total, 4,677, 126,223, 6,100, 45,292, 171,425.

FROM R. M. REGION, N. Y. & L. [T. H. & Co], Honey Brook Coal Co., Ger. Pa. Coal Co., etc.

Spring Mountain, Coleman W. T. C. & Co, B. Meadow, John Conner, etc.

Lehigh Zinc Co., Spring Brook, Other Shippers, etc.

Total, 9,931, 199,793, 2,673, 17,530, 217,323.

HAZLETON REGION, Central Coal Co., Ashburton Coal Co., Mt. Pleasant [Halsey], etc.

Hazleton (A. P. & Co), East Sugar Loaf, Mount Hall, Latimer (A. P. & Co), etc.

Stout Coal Co., Harleigh Coal Co., Ebervale Coal Co., Jeddo (G. B. M. & Co), etc.

Wholesale (J. C. Co.), Highland, Cross Creek (C. B.), C. J. Ridge [S. W. & Co], Buck Mountain, etc.

Other Shippers, Total, 23,811, 527,075, 10,249, 86,436, 608,81.

Table with columns for U. Lehigh Region, Mahanoy Region, and Grand Total, showing tons and values.

Lehigh and Susquehanna Railroad, Week ending June 13.

Table showing weekly and total tonnage for various regions including Wyoming, Upper Lehigh, and Hazleton.

Table for Schuylkill Coal Trade, showing tonnage by railroad and canal for week ending June 19, 1868.

Table for Cumberland Coal Trade, showing tonnage by railroad for week ending June 13, 1868.

Statement of Coal

Table comparing coal shipments for 1865, 1867, and 1868, showing tons and values.

Cumberland Coal Trade

Table showing coal shipments from Cumberland and Pa. R.R. via Cumberland and other routes.

By C. & O. CANAL.—There were despatched from this port, during last week, 16,923 08 tons of Coal, forwarded by the following companies:

Table listing coal companies and their respective tonnage, including American, Borden, Central, etc.

Prices of Coal by the Cargo.

Table showing prices for coal at New York, Philadelphia, and other locations, including Schuylkill R.A. and Seranton Coal.

Prices of Gas Coals.

Table showing prices for gas coals at various locations like Pittston, Lackawanna, and Lehigh.

Prices of Foreign Coals.

Table showing prices for foreign coals such as Westmorland, Despard, and Newburgh.

Coal Freights

Table showing freight rates for coal from Philadelphia and other ports to various destinations.

Freights on Coal Sea-borne from Port Richmond, Philadelphia.

Table showing sea-borne freight rates for coal from Philadelphia to various ports.

Freights on Coal Sea-borne from Port Richmond, Philadelphia.

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Table showing sea-borne freight rates for coal from Philadelphia to various ports.

Rates of Transportation to Tide Water.

Table showing rates for transportation to Port Richmond and Philadelphia.

Table showing rates for transportation to Elizabethport.

Table showing rates for transportation to Port Johnson.

Table showing rates for transportation to Hoboken.

Table showing rates for transportation to Port Richmond via canal.

Table showing rates for transportation to New York.

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Table showing expenses from Manch Chunk to Jersey City for re-shipment.

Table showing provincial freights to New York and Boston.

Table showing foreign freights to New York and Boston.

New York Imports of Metals, &c.

Table showing import quantities and values for various metals like Anvils, Brass Goods, etc.

BOSTON STOCK MARKET.

Table showing stock prices for mining stocks in Boston as of June 19, 1868.

SAN FRANCISCO STOCK MARKET.

Table showing stock prices in San Francisco, including Gold & Curry, Savage, etc.

The Contra Costa Gazette, of recent date, says:—We have from time to time noticed the progress made by the Pacific Coal company, who have been engaged in sinking a shaft on the Marsh Ranch, near Mount Diablo, for the purpose of obtaining coal, and we are now glad to be able to announce the gratifying result of their enterprise.

Working Inclined Planes.

Within the last few years barrels of rolled hoop iron have been substituted for ropes on some of the inclined planes in America, and have been found to work well, presenting more durability and being less expensive than ropes.—Engineering.

AMERICAN Journal of Mining.

WESTERN & COMPANY, PROPRIETORS.

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Mr. T. P. FENDERTON is Editor of the Mechanical Department and Agent for the JOURNAL OF MINING.

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NEW YORK, SATURDAY, JUNE 20.

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THE BESSEMER PROCESS.

Many people are talking, now-a-days, of this new process for the manufacture of steel; but few understand what is its peculiar nature. In pursuance of our general policy, to give our readers, from time to time, plain and popular descriptions of the scientific novelties of the day, we propose to describe briefly, the apparatus and process of BESSEMER, which is revolutionizing the industry of steel.

Steel is a compound of iron and carbon, standing in the series between wrought-iron and cast-iron, the former having less carbon, and the latter more, than steel. An old authority gives the contents of carbon in different classes as follows:

Pure refined iron contains.....	0.00 per cent.
Soft cast-steel ".....	0.53 "
Common cast-steel ".....	1.00 "
Harder cast-steel ".....	3.33 "
White cast-iron ".....	4.00 "
Mottled cast-iron ".....	5.00 "
Black cast-iron ".....	8.00 "

The old-fashioned way of manufacturing steel—the so-called blister steel—was to first produce a refined iron, and then cause the bars to re-absorb the necessary quantity of carbon in the converting-furnace, where they were treated, embedded in charcoal for at least a fortnight. The cost of a process which required so long a period for its completion, was, of course, considerable; and, when complete, it was hardly satisfactory. The quality of the steel thus produced by cementation was not perfectly uniform and trustworthy. It was found necessary to re-melt the product of the converting-furnace in crucibles, and, under the name of cast-steel, the result of this second process was brought into market. The fine qualities of cast-steel are acknowledged. No one claims that modern improvements have effected much advance in those points. But the very high price of cast-steel excluded it from many applications, for instance, for purposes of construction, in ship, bridge, and railway building, where certainty and uniformity in the material are necessary. The costliness of cast-steel as compared with bar-iron or even common steel is quite explicable when we consider that it takes about twenty tons of coal to melt one ton of steel. It is evident that any process which will supersede the converting-furnace and the steel furnace, and produce in a short time, direct from the pig, steel of fine and uniform quality, must be a great advance on the cumbersome and roundabout method of the past.

The manufacture of steel by puddling was an attempt in this direction, and relatively a very successful one, though its success is now eclipsed by that of the Bessemer process. It was (and is still) carried on in furnaces very similar to iron puddling-hearths, and up to a certain point, the process is but slightly different from the puddling of iron, for the manufacture of bars. Remembering that wrought-iron contains less, and pig-iron more carbon than steel, the reader will easily comprehend that the same process of decarbonization and refining which produces wrought-iron from pig, might, if stopped short of its final result, produce steel from pig.

This is the rationale of the manufacture of puddled steel, reduced to its simplest terms, and stripped of many subordinate, but essential principles. It naturally follows, that steel-puddling is a shorter process than iron-puddling, but the ne-

cessary fluxes, the fine quality of pig required, and the high degree of skill and fidelity demanded of the workmen, (since the success of the process turns entirely on checking the puddling at the proper moment—to be determined by the judgment of the puddler), together with the fact that failures periodically occur and occasion loss of time and material, render the manufacture more costly than would at first appear. The steel is not of the best quality, though it may be refined and improved. Being much cheaper than blister steel, it commanded at once a large market for many applications.

The introduction of puddled steel in 1850, marked an era in the steel manufacture, as the statistics of that industry show. The manufacture of steel in France, for instance, was increased ten-fold between the years 1847 and 1857, mainly from this cause. Nothing else can parallel this enormous development except the rapid spread of the Bessemer method.

But, while the puddling process greatly simplified and extended the production of steel, it required much skilled labor and considerable expense, and the great desideratum of a uniform, certain and controllable result was still, to a certain extent, wanting.

The Bessemer process may be briefly described as follows: Pig-iron (which contains, on the average, about five per cent. of carbon) is melted in reverberatory furnaces, and the fluid metal is run into a converting vessel, where it is freed from carbon by the application of a strong blast. The carbon unites with the oxygen of the blast at an intense white heat, and, in eight or ten minutes, a mass of from five to ten tons of molten iron is entirely decarbonized. A quantity of iron containing the exact percentage of carbon necessary to transform the whole mass into the requisite quality of steel is now poured into the vessel; and this combines so readily and perfectly with the refined iron that in ten minutes more the process is complete, and the contents of the converter are poured into the casting ladle, to run into an ingot of steel.

The advantages of this plan are obvious. It saves time, fuel and labor; it is not dependent upon the manual dexterity of workmen; it admits of operations on a vast scale; and, while it would be, perhaps, too much to claim that an absolute control of the result is obtained, there is at least no doubt, that the Bessemer converter more nearly puts that control into the hands of the metallurgist than any other apparatus yet invented. Already the spectroscope has been used with success, as a means of determining with scientific accuracy the stages of the process; and we are not far from a complete power over the details of a manufacture, which has hitherto been largely a matter of blind empiricism or chance.

A glance at the old and tedious method of making steel, will help us to measure the great progress thus accomplished. The former plan embraced (1) smelting of the ore and the production of pig; (2) remelting, puddling, and rolling into bars; (3) slow conversion by cementation into blister steel; (4) remelting and casting. The second, third and fourth of these operations are now replaced by a single cheap, rapid and thorough process. It is scarcely possible to measure the influence of such a change. The present production of Bessemer steel exceeds ten thousand tons per week! It is one of those causes, deeper than wars and dynasties, which transform the conditions of universal civilization. We are entering upon the Age of Steel.

MISCELLANEOUS MINERALS OF THE PACIFIC COAST—COPPER, IRON, & COAL.

We find one of the most elaborate and interesting sections of the report upon the mineral resources of the States and Territories west of the Rocky mountains, to be that devoted to the miscellaneous minerals of the Pacific coast. Instead of merely giving a list of all the minerals of the country, with the localities in which they are to be found; it was thought, by the writer of this valuable chapter, to be more in accordance with the character of the report, that selections should be made of the best known, and the most important minerals, and the attention confined to the statement of a few facts in regard to them. These statements are by no means claimed to be complete in detail, though it is thought that sufficient data are given in order to enable the reader to draw very just conclusions in regard to the extent and variety of the miscellaneous mineral resources of the western slope of the Rocky mountains. At the outset, the writer says, in substance, that he finds great difficulty in selecting from the great mass of material in hand, all of it interesting in detail, such portions as will convey, within the prescribed limits, the necessary information in regard to the extent, nature and development of the minerals of the coast, exclusive of gold, silver and quicksilver. The first place has been, very properly, given to the consideration of copper. Before speaking of the mines that have been discovered and opened, and the copper-smelting works that have been erected, a few words are said in regard to the present depressed state of the copper interest. As in the Pacific States and Territories, copper mining is in its infancy, it becomes, of course, to them, a matter of vital importance whether there is to be a rise in the value of copper. Should such be the case, then copper mining enterprises that have been seriously crippled might hope for a prosperous future. Upon this question the report very considerably remarks:

"Reference to some of the causes which have thus crippled the development of this source of wealth affords the best means for judging whether such reduction is likely to be permanent, or of

merely temporary duration. India, for the past quarter of a century, has absorbed all the ingot copper sent there from all parts of the world. Many of the wealthy natives in the distant interior of that country, hoarded these ingots as treasure, and they passed as currency among them. The importations of gold and silver since the discovery of those metals in California and Australia, together with the extension of railroads and other features of European civilization in Asia, have almost entirely abolished this custom. The precious metals have superseded copper in the business of its semi-barbarous people. This change has not only caused a stoppage in the demand for copper in what was formerly the best market for its disposal, but thousands of tons, the accumulations of years, have been brought out from hiding places to be exchanged for the precious metals. It will require years to absorb the present supply of copper in India by the manufacturers of that country, particularly as most of the utensils and ornaments made of that metal used by the people are imported from Europe or the United States. The increasing supply of ores from Australia, Cuba, Chili, Africa, Europe and the United States, before the revulsion in India was severely felt, had already begun to exceed the demand; and, of course, this excess has greatly increased since, giving the control of every open market to those countries where it can be mined and melted at the lowest cost. The increase in the number of vessels built of iron in Europe, and the decline in ship-building in the United States, have curtailed the demand for sheathing, which a few years since was the chief use to which copper was applied in this country. Another cause for the decrease in the demand for copper arises from the substitution of cheaper metals in the manufacture of articles formerly made of copper, and the introduction of processes for depositing copper on other metals by electricity, by which a mere film of the dearer metal gives the cheaper one the appearance, and causes it to serve most of the purposes of the other."

The above are thought to be among the leading causes of the present low prices of copper. They seem to be causes that are deep-seated in their nature—that strike at the very root of things. There are features about them that indicate that they will be lasting, rather than ephemeral. Under such circumstances, it is clear that the future prospects of copper mining upon the Pacific coast are by no means the brightest. The copper ores of California, it is said, are unable to compete in the European markets with those that come from the mines of South America, Africa, and Cuba. It is, however, to be hoped that with the gradual cheapening of the price of labor, the time is not far distant when, instead of the shipment of copper ores to distant ports, they may be smelted at a reasonable rate of profit near the mines that produce them. Until then, we can hardly look for real prosperity in the field of copper mining.

The report speaks very favorably of the steps that are being taken in the development of the iron industry upon the Pacific coast. The recent discoveries of deposits of coal good for smelting purposes, have directed the attention of capitalists to this most important branch of manufacture, and the Oregon Iron Works upon the Willamette river, which commenced successful operations in the summer of 1867, has been one of the beneficial results therefrom. With all the raw material necessary for home production, it is certainly to the interest of those States that, as soon as possible, they manufacture their own iron. In speaking of the consumption of iron in the inland districts, the report says, what seems to us very much to the point:

"The demand is limited by the difficulty in supplying it. The cost of erecting smelting works on a scale sufficiently large to supply the great demand, need not exceed a few thousand dollars. The profits of such an establishment located among the mines, or on the line of a railroad connected with the mining districts, if properly conducted, would be remunerative. It is strange that with such facts patent to capitalists, works of this kind have not been established at points where materials and facilities are known to exist for carrying them out to advantage."

In regard to the discovery of mines of coal, their character, development, and present condition, the report gives that attention that the important nature of the subject demands. The general conclusion arrived at is:

"That the coal deposits west of the Rocky mountains, though yielding an inferior quality of coal, are quite extensive, and furnish such promise of improvement as to justify the belief that the supply will be sufficient in the future for the demands of all branches of industry on the Pacific coast."

Coal mining, though still in its infancy, has exerted already a very beneficial influence upon the manufacturing interests of the country. The discovery of the California coal mines, with their development, has caused a reduction in the price of coal, during the past ten years, of \$20 per ton. While at the present time the average price is \$16 per ton; in 1857 imported coal sold at the rate of \$35 per ton. In speaking of the present condition and future prospects of the California coal mines, it is remarked:

"That it has not been a remunerative business to the capitalists who have engaged in it, owing to inexperience in the working of the mines, injudicious management, the high cost of roads to navigable waters, and the difficulties to be overcome in creating a market where the best imported coals had been so long in use. All these obstacles to success are gradually disappearing, and it is believed the coal interests in California will, in time, pay a fair percentage upon capital invested in it."

THE VERMILLION MINES.

We published in the JOURNAL OF MINING of May 30th some statements in regard to the Vermillion mines in Minnesota, for which the Superior (Wisconsin) Gazette is responsible. The statements appeared at the time to be so untrustworthy that we felt compelled to remark editorially as follows:—"We hope none of our readers will be so foolish as to get excited over the statements printed above." As proof that we were entirely correct in our conclusion, we need only refer our readers to a letter from Col. H. Tindall, which appears in another column. While local newspapers are more devoted, it seems, to getting up a mining fever than to a conscientious regard for truth, it is very satisfactory to know that Col. Tindall's discountinances all such efforts. It is certainly most commendable in him that he should thus, in a very few words, give the facts in the case. It is clearly his wish that the growth of mining industry in Minnesota, if it is to be at all, be real, not ephemeral. The real truth of the matter in regard to this Vermillion district seems to be this. Attention was called to

the presence of gold and silver in the year 1865. Geological investigations have shown that quartz veins, cutting through talcose slate, are pyritical. The pyrites of these veins are both auriferous and argentiferous. The results of numerous assays have given widely different results. One authority gives results varying from about \$7 to \$69 per ton. While Col. Tindell writes us that the results of his assays vary from \$10 to \$100 per ton. Still another series of assays give results varying from \$10 to \$35 per ton. Perhaps, upon an average, these Vermillion district mines contain \$25 per ton of precious metal. We wish all success to Vermillion district, but must venture the opinion, that as long as there remains difficulty in reducing Colorado pyrites gold and silver ores worth several hundred dollars per ton, profitably, no very great prosperity can attend the working of these obstinately reduceable sulphuret ores of the Vermillion mines, containing only \$25 per ton of gold and silver; and that, too, making any allowance, if necessary, in favor of the latter as regards cost of living and labor. With the discovery of richer mines, which is by no means impossible, the region may eventually attain that distinction, that local newspapers would fain give it at the present moment.

Loss of Life in English Collieries.

Says the *Colliery Guardian*: "The loss of life arising from colliery accidents is lamentably large." It seems, indeed, to be so large as to have attracted the attention of Parliament, who are now agitating the question as to the propriety of a Royal Commission to oversee matters and things. We learn that in 1865 and 1866 colliery accidents occurred to such an extent as to involve the loss of 2,468 lives. English coal mines seem to fill about as many graves as American railroads. We fear, however, that unless Parliament is more prompt to act upon humanitarian questions than Congress, the application of the remedy lies a long way off. Let us hope that in the future working of our coal mines to deep levels, skill and good management will act together so harmoniously and effectively that they will not be converted into huge black charnel-houses—and that, too, for the living, rather than the dead!

Horse Flesh at a Discount.

It is well known that for years horses have been extensively used upon the various underground levels of the British coal mines, for the purpose of hauling coal to the main shaft. We learn that this exceptional use of the animal is likely soon to come to an end. It is being found out by the English mine owners and mining engineers that, with the introduction of endless wire ropes, steam-power can serve their purpose quite as well as horse flesh; not only as well, but it is also shown that there is a saving of both time and money. It would be a grand thing for humanity if steam-power and wire ropes could be made to take the place of human, as well as horse flesh, in those pits of fire-damp and death.

Something New.

We understand that a certain scientific editor, now travelling in the Western States and Territories, collecting information as regards some of the sources of our national wealth, has come into the possession of a fine fortune. Though we can hardly call him a millionaire, we feel justified in intimating that he has been given a daughter as heiress. We congratulate him, that while gathering statistics on one side of the continent, he has been successful in adding thereto on the other.

EDITORIAL CORRESPONDENCE NO. III.

THE TRANSIT—PANAMA—DE BELLO GALLICO.

OFF ACAPULCO, May 22, 1868.

The transit of the isthmus, interposed as it is between the scenes of two great and busy cities, New York and San Francisco, impresses the traveller like a dream. The shining, half-naked negro porters of Aspinwall; the stately Creole women, with their baskets on their heads, their trailing skirts, and their chemises slipping from their polished shoulders in true fashionable style, only more gracefully; the miraculously lean haggard curs of the same locality—all body, too, and no legs, and making one imagine that when the hidalgos of Castile blent their proud blood with the native race of the isthmus, their high-bred dogs, emulating their example, must have intermarried with the Chagres alligators; the coral reefs, the coconut trees and the quaint architecture of the houses; all these and many other features, give one the immediate and proud consciousness that he is in a foreign land. The sight of the Colombian flag, and the diminutive and dirty soldiers of New Grenada, standing guard at various unnecessary points, completes the foreign effect.

The trip across the isthmus by the railroad is just long enough to be charming and not tedious. The brilliancy and luxuriance of the tropical forest are refreshing indeed to eyes that have for days only watched the monotonous sea running through its limited gamut of color—blue, green, leaden, blue and green. The Chagres flows sluggishly, for a considerable distance, alongside; we keep a sharp look-out for alligators, and think of the old times (not so very old, either) when travellers "poled" their flatboats up that river of death, through rank, malarious swamps, and then took the toilsome journey to Panama on mule-back. Now we spin along in the

cool, many-windowed cars, with their cane-bottomed seats, and look gaily out upon the bright bowers that have so often been sepulchres, and chatter: "They say every cross-tie on this road cost the life of a man." "Why, Mr. —, how you talk!" "Yes, ma'am, it is true; they tried every nation in the world; whole ship-loads of Irish and Germans, swarms of Chinese; but they died off like sheep; and those that didn't die, committed suicide. It was the pig tails that developed a taste for hari-kari, and cheated the company by taking pay in advance." "Well, who did build the road, then?" "The Jamaica niggers, ma'am." It was long a problem of the gravest difficulty, what was the earthly use of a Jamaica nigger. That question is at last answered. We need not despair of anything in nature now. Doubtless sand-lilies, and crocodiles and members of Congress and other things lazy, or malicious, or both, have their uses too! Pleasant idea that, about these ironwood cross-ties! Just fancy yourself, rattling away at this pace over dead men!" etc. etc. There is nothing that awes us so much as the death of one person; there is nothing that affects us so little as the death of a great many.

At Panama, two or three of us remained on shore after the remaining passengers had gone on board the Pacific steamer, and spent a few hours in rambling through the town, joining our companions before they sailed by means of the company's tug which was employed in towing out to the great steamer the lighters used for the transferral of the baggage and fast freight. It was Sunday afternoon. The churches, of which Panama has a good many—huge massive, dilapidated Spanish edifices—were all closed. The streets were quiet, though half the shops were open. In one of them we saw a *paiete* apparently making purchases. A boy was hurrying along, with a game-cock under his arm, towards the cock-pit, which is nothing less than the ancient Spanish citadel, now a ruin devoted to the characteristic national pastime. The great arena of Rome is now a church; the fortress of Panama is a cock-pit. *Omnia mutantur*. As we passed by, not choosing to keep our first Sunday on shore in such a manner, we could see the heads of the spectators, gathered in the amphitheatre, and waiting for the sport to begin. The charge for admission to one of these exhibitions is about ten cents; but considerable sums are lost and won in betting on favorite chickens. One of our company, an old cruiser in these parts, tells a story about cock-fighting, which we fear is not new, and know is not true; but as he says it is so old as to be virtually new, and so good as to be virtually true, we accept the yarn, and herewith reel it off again.

It seems there was an American ship at Panama, once upon a time; and the boys thought they would show the natives a thing or two in cock-fighting. They had on board a bald eagle, which they transformed, by clipping of wings and ruthless pulling out of tail, into a most ungainly, deformed and pusillanimous chicken. This nondescript animal was entered for a fight. The game cocks have a way, when first placed in the ring, of crouching and "pointing" at each other. Then they advance across the intervening space, and, meeting in the center, with heads erect, and fury in every movement they fly at one another, each endeavoring to drive his long steel spur into the head or breast of his adversary. On this occasion the veritable gamester, victor in many a well-fought scrimmage, began his usual tactics, while his clumsy adversary nestled quietly where he had been placed, and paid no attention to him. Anticipating an easy victory, the joyous rooster now advanced without ceremony, and delivering one or two smart blows, somewhat damaged the aquiline features of the foe; whereat old Sleepy, without taking the trouble to rise, quietly reached out a claw, caught the frisky warrior, and pulled off his head! This was unscientific, but conclusive. (The way in which the American eagle, though sadly clipped and crippled, finally put claw on the cavalier game-cock of Rebellion, was suggested as a parallel by one of our number, who is nothing if not patriotic; but we decline to spoil a fine story with a moral.)

The streets of Panama are narrow, but clean. The drainage appears to be good. We saw an excellent sewer in process of construction. The buildings are of stone, and almost invariably provided with arcades on the outside. We passed along in a brisk rain, without serious inconvenience, being protected by the arcades and projecting roofs. There are one or two really fine hotels in the town; and a large number of French, English, and other wholesale houses. Panama and Aspinwall being free ports, the former is a great national *entrepot* of commerce. It is said to have developed and improved a good deal since the railroad was finished; but one rather wonders that it has not grown still more rapidly.

The real old city of Panama is some distance from that portion which is now inhabited. It is nearly a ruin. The present city is surrounded with a heavy wall, many parts of which are still in good preservation. The ramparts are wide enough, along the sea-front, to afford a fine carriage-way. We walked partly around the city, following the wall. The barracks stand close by, and the cells for prisoners are in the city wall itself. In the barrack-yard is a large heap of shot and shell thrown into the city by Bolivar, when he bombarded it from the heights on the north. Time and change and violence have spent their force upon old Panama. Now she rests like a battered ship, come safe to haven, and preparing for a new and more prosperous voyage. Her best days are yet to come.

Scientific Meetings.

AMERICAN STATISTICAL AND GEOGRAPHICAL SOCIETY.

THE COAST OF BRAZIL, ITS GEOGRAPHY, GEOLOGY, NATURAL HISTORY, ETC.

PROFESSOR HARTT, of Vassar College, Poughkeepsie, and late Geologist and Naturalist of the Agassiz Expedition to Brazil, delivered a discourse on the above subject, recently, before the American Statistical and Geographical Society. He began by saying that in the expedition of 1865, with Professor AGASSIZ, he was so deeply interested in some things which he observed in South America, that he resolved to return thither, and, accordingly, last summer he re-visited Pernambuco, and surveyed the coast line, and looked somewhat at the interior of the country. In tracing the physical geography of the country, as depending upon its geological structure, the Professor brought forward many points of interest. The mountain ranges along the eastern coast of Brazil were composed, he said, of stratified granite almost the same as that of Manhattan Island, and formed probably in the Eozoic age. Gold and diamonds were to be found in large quantities, but mining for the former had been almost abandoned, in view of the more profitable character of diamond explorations. The crude manner of the natives in pursuing mining operations was next described in a very interesting manner. Some of the specimens of gold were nicely crystallized, and others greatly mashed up by glacial action. There was, thought the Professor, a vast amount of unworked treasure still to be developed. There were the best evidences of the existence of great coal beds in Southern Brazil, in fields which have only recently been opened. Strange to say, Brazil, with this great coal bed, had been importing coal at great cost. On the coast there were, as was the case in North America, no traces of the Jurassic period. At the end of the Chalk period, during which there were great geological disturbances, the ground sank, perhaps, 3,000 or 4,000 feet, and was covered by water. When the land arose again it was elevated above its present position, as shown by the best evidences. The remainder of the discourse was devoted to a description of the reefs along the Brazilian coast, and an account of their origin. The coral reefs particularly engaged attention. They are called by the natives *chapeirao*, and belong to a different province of zoology than those of the West Indies.

It was late when this point had been reached, and the further elaboration of the subject was deferred until a future day. A vote of thanks was offered at the close of the lecture to the learned Professor.

Original Papers.

[PREPARED FOR THE AMERICAN JOURNAL OF MINING.]

SMOKE OF SMELTING WORKS—No. III.

BY L. H. MITCHELL, M. E.

In my last paper, the injurious effects of the smoke of the metallurgical works at Swansea, St. Helens, Frankensharn and Oker, were discussed at some length. There are several other cases that present some points of considerable interest. The smelting works at Altenau, for instance, are situated in one of the villages of the Hartz mountains, and surrounded with woods. The noxious influences of the smoke upon the timber are readily seen, even though they are not very widely extended. The roasting of the matt and also of pyritical copper ore in heaps in the open air are thought to be the chief causes of injury, though it is allowed that when the blast-furnaces are in action some share of the blame should rest upon them. The destruction of, or injury to vegetation, shows itself for the most part down the valley, that is, in a northerly direction from the works, and more especially upon the left, or west side of the valley. This results from the fact that the most of the furnaces are situated upon that side, and also the area in which the heaps of copper pyrites are roasted.

In case of many other works that were visited, where lead ores containing sulphur, or zinc blende, was roasted, the noxious influence of the smoke was particularly seen upon the trees, though for the most part it did not appear to have extended its influence a great way from the works. This noxious influence showed itself to be the greatest, perhaps, at Stollberg, in the neighborhood of the great lead works of Muensterbusch, and also of some zinc works situated near by. In the vicinity of the works at Oberhausen, Berge-Borbeck, Holzappel, etc., it was noticed that the trees had been attacked, and also that the vegetation of the neighboring fields had been somewhat injured. At other places it was found out upon inquiry, that complaints had been made of the evil effects of the smoke of works, and, moreover, that the parties had received compensation. This has taken place even at works where no sulphurous ores were roasted, as, for instance, at those near Moresnet, Muehlheim, and St. Leonard. At the last mentioned place, a suburb of Lnetlich, where there are a great many other manufactories that give forth smoke; the complaints have, in the past, been very violent. It is thought, however, that in this case it is not so much the peculiar evil influence of the smoke itself that lies at the bottom of these complaints, as it is the great inconvenience of the dusty matters that are carried away with the smoke from the various works.

At the copper works at Stadtbergen, the injury that was formerly caused was found to be quite peculiar. At that place the copper was extracted by the wet way. The residues were thrown away. It was afterwards found that rain water, in trickling through the mass that had been thrown away as useless, took up copper vitriol and thereby poisoned the waters of a brook flowing by. This has of late been prevented. By means of dams, small ponds have been con-

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structed. The rain water, impregnated with copper vitriol, is caught in these ponds, and the copper precipitated from the liquid mass by means of metallic iron. The acid solution containing iron, which is the result of that treatment, is then neutralized and freed from its iron by means of lime.

Having considered the evil effects of the smoke of smelting works upon the vegetation of the lands lying near by, both from a theoretical and a practical point of view, it will be sufficient for my purpose, now, in the second place, to point out the means used, in order to render harmless the smoke charged with poisonous gases and volatile matter that passes off from metallurgical works. Of all means that have hitherto been employed in order to render the smoke uninjurious, the construction of canals and chambers is the most common. By many German, Belgian, and English smelters, it is considered the most effective; while many, look upon it as the only really practical method.

First of all, of course, these canals and chambers bring about a precipitation of the greater part of the solid particles that are contained in the smoke. This gives, however, opportunity for the condensation of the sulphurous acid, and also the sulphuric acid that has been produced by means of the combined action of moist air and basic oxides upon the former. It would seem, then, that in case of lead works, often times canals and chambers fulfil a double purpose. They are of use first, in saving matters that have been volatilized, and that are yet sufficiently metalliferous to pay for subsequent metallurgical treatment; and secondly, they lessen quite materially the amount of injury liable to be done by the smoke upon the surrounding vegetation. Upon nearly all of the works visited, therefore, canals and chambers were found; though of course, they differed very much in regard to size and manner of construction. Very many different methods of construction have been given to chambers; but, it is said, that investigations, thus far, do not show which is the most advantageous. As, in part, at least, a necessary adjunct to canals and chambers, the high chimney must be mentioned, since without this the necessary draft could not be obtained.

TO BE CONTINUED.

Manufacturing and Mechanical Notes.

No. XXIV.

The great business improvements that are constantly going on in New York City exhibit a steady progress in mercantile interests. Buildings, in large numbers, with new substantial fronts, are taking the place of old ones. Broadway is receiving a new pavement, and the postoffice has had some addition in the shape of another story, since the Government has taken a new lease of the old church for five years. There have been improvements also in many stores, among which we may mention those at the corner of Liberty and Nassau streets. We noticed in this locality the store, occupied by one of our most active tradesmen, who formerly transacted business in Pearl street. This store attracts considerable attention, and many pedestrians in their walks to and from the postoffice, pause in their haste to admire the numerous specimens of mechanical industry that are on exhibition in the large windows. Our readers cannot fail to recognize the store we allude to, for, here elegant models and emblematic signs of eagles, horses, and ploughs, shine in gilded effulgence, while above them all, towers a splendidly carved representation of the Goddess of Liberty. These emblematic signs, weather-vanes and models, are frequently placed at such a height from the eye that few observers are aware of the good mechanism and art that have been displayed in their construction of late years. Many of them are beautiful in design and workmanship, and their present proximity to mother earth allows the visitor to examine and criticise their merits, ere they take their high position, where they are to become the indicators of wind and weather.

Messrs. CRISHING & WHITE, who are the pioneers in the manufacture of these emblems, ornaments, weather-vanes, &c., have lately exhibited much skill as mechanical and artistic draftsmen. Over eighteen years ago Mr. A. L. JEWELL commenced the business at Waltham, being the first to start the business. It has been continued by the same workmen and his successors, Messrs. CRISHING & WHITE, who, with the experience that has been brought into the business, have built up a department of mechanical industry which is daily receiving more public notice and appreciation. The weather-vanes are made of copper, the letters and balls of composition, copper, and brass. The spires are wrought iron, with steel spindles, turned and true. The firm manufacture seven sizes of spires, and points of compass—the letters varying from two to twelve inches, and the balls from two to twenty inches. The gilded articles are so finished that they will keep bright many years. This is as it should be, for a weather-vane is a thing that will last, if made properly. The works of the WALTHAM WATCH MANUFACTORY have some fine specimens of weather-vanes, manufactured by Messrs. CRISHING & WHITE. These buildings are well-known, and admired not only for their generally handsome appearance, but also for the taste displayed in the more ornamental parts of the structures. "Decorating the landscape can only be done by grading, trees, hedges, walls, and fences—all well enough in their way, but some of them slow, all expensive, and amounting to but little unless tastefully done and carefully kept. A neat ventilator and vane can be had for a small sum of money, and will make more show than ten times the amount expended in any other way, besides giving ventilation, which is really important to the safety of grain and hay, as well as to the health and comfort of animals, and display some taste and refinement."

Poisonous Ice Pitchers.

The lining, or inner chamber, of the greater part of the ice pitchers in common use is made from two different metals or alloys. As it is necessary that the bottom should be quite strong, to resist the blows from the ice when carelessly thrown in, this part has been made of nickel silver, copper, or other hard metal, while the sides of the chamber are generally made of britannia or "white metal," the two parts being soldered together and then silver-plated. The corrosion of this lining

and solution of the metals in water naturally results from this mode of manufacture; because these different metals, in contact, under water, form a galvanic arrangement. If a silver coin be placed above the tongue and a piece of zinc below, allowing the edges to come in contact, a metallic taste will be perceived in the mouth, from the galvanic action and solution of one of the metals. And the action is similar in these linings, only that it is not so violent at first. Several of these linings, made as above and in common use, have been examined; some of them are very badly corroded, and it is noticeable that the solder has been first attacked. In one of these a nearly pure water was left for several hours that the effect might be noted. In one hour the water contained traces of lead and copper. In four hours the water contained 0.7 grain of lead and copper. In twelve hours the water contained 1.6 grains of lead and copper. In twenty-four hours the water contained 3 grains of lead and copper. And, with a natural well water, this action is still more energetic. Metallic poisoning is one of the greatest enemies we have to contend with in the struggle for life, and it is common knowledge that lead and copper are highly poisonous and accumulative.

Professor S. DANA HAYES, of Massachusetts, after analyzing some water that had been standing in an ice pitcher, which was constructed from one piece of metal, found that at the expiration of forty-eight hours the water did not contain a trace of metal. It was then boiled in the lining for an hour, and analyzed twice during that time, but it was still perfectly free from metals of any kind. It appears evident therefore that ice pitchers without seams or soldering are decidedly the safest, as no galvanic action occurs.

Appleton's New Book Factory.

Messrs. Appleton & Co., the well-known publishers have recently erected one of the largest book-making establishments in the world. The buildings are located in Brooklyn, N. Y. and cover an enclosed area of over one and a quarter acres. The works have a frontage of 200 feet on Kent avenue, 252 on Hewes street, and 193 on Penn street. There are remarkable precautions adopted on all sides against fire. The partition-walls between all the rooms are of brick, and the doors opening into them from the hallways are of massive iron; so that, in case of fire, any one part of the building can be isolated from all the rest. On each floor is a fire-plug with hose ready for attachment.

In the centre of the ground, enclosed by the buildings, stands the engine-house, where the motive force is supplied by a splendid engine of 80 horse-power.

Flexible Slate Roofing.

This material is manufactured in rolls containing one hundred square feet; it is said to be applied with less trouble and expense than other roofing materials now in use. Each square, when in rolls, weighs about fifty pounds, and when nailed down and slated, about one hundred pounds, thus obviating all difference from heavy roofing. It is adapted for any grade of roof; and for eavetroughs, valleys, hips and saddles. No cold is severe enough to crack, and no natural heat will cause it to run or spread. It is also fire-proof, equal or superior to tin, and the expansion or contraction, either by heat or cold, will not cause the nails to start, the elasticity being sufficient to obviate all difficulties in this respect.

The Mason Manufacturing Company.

The works of this company are located in Springfield, Mass. The foundry heretofore operated by Mason, Ladd & Co. has been purchased by them. They have recently received an order for castings and iron-work for 6-0 freight cars for the Central Pacific railroad. They have already furnished iron-work for 1100 cars on this road.

The Collins company, at Collinsville, Ct., was organized in 1835, and continued the manufacture of axes, &c., at Collinsville, Canton, begun by D. C. Collins & Co. in 1826. The shops of the company are 23 in number, and would, if put together, make a building 1 1/2 miles long and 25 feet wide. The annual consumption of coal is 10,000 tons of Lehigh and 20,000 bushels of charcoal; the number of hands employed is 500 to 800, and the daily product 5,000 tools—axes, adzes, hatchets, sledge hammers, matchets, &c., &c. The manufacture of matchets, for use in Central and Spanish America, was begun in 1845, and the product of these was increased from 1,000 dozens to 18,000. In 1860 the company began to manufacture ploughs under F. Smith's patent, and have since turned out over 50,000. These mammoth works are supplied in dry weather with water from a reservoir in Otis, Mass., which covers 1,050 acres, and can discharge through the aqueduct 8,000,000 cubic feet of water in 24 hours.

LEGAL INTELLIGENCE.

Alleged Frauds in Mining Stocks.

COMMON PLEAS—SPECIAL TERM.

[Before Judge Barrett.]

John Sendorfer vs. Jerome B. Chaffer and others. The plaintiff in this case, owning five-ninths of certain mining property in Colorado, bought out of one Buckmiller the other four-ninths for \$100,000, paying part down, and giving notes and a trust deed of the whole property as security for the balance. He then came East and formed a company. As the trust deed expired in May, 1867, he placed a portion of the stock of the company (the total being \$1,000,000) in the hands of a party here to sell and raise money to pay off the trust deed. In December he, as he says, by the persuasion of the defendant Chaffer, that his former agent was neglecting his interests, placed 14,000 shares of the stock (nominally \$50 per share) to be disposed of by them, they to return him \$20 per share, or if they got \$25 per share, \$21 50. If they could not dispose of it, then they should return the stock to enable him to raise money to meet his debt to Buckmiller. They did dispose of it, and plaintiff charges that they not only neglected to do so, but purposely avoided to do it to embarrass him and compel him to make terms favorable to them. A change in the denomination of the stock was made about this time from \$50 to \$20, and the number of shares increased, the 14,000 becoming 35,000 shares. About the beginning of May, the plaintiff, under, as he claims, the pressure brought to bear on him by the defendant, entered into a new arrangement with them by which they were to take the stock, paying him \$100,000, and paying the debt to Buckmiller, which then amounted to \$2,000; that they actually paid Buckmiller but \$66,000, and took an assignment of his trust deed, and paid him \$42,500, entering into a new contract to pay \$57,500 for 8,122 shares which they had not then accepted. That all this time the mine was paying one per cent. per month, and that these arrangements were for the advantage of the defendants, and forced by them on the plaintiff through the advantage they had obtained by his trust in them. He therefore asks that all these contracts be examined by a Court of Equity, and that the defendants be compelled to account to him as his trustees, for all they could have obtained had they acted in good faith by him.

On the other hand the defendants say, that they never asked him to entrust his business to them. That after he had done so they were unable to sell the stock at the price he desired; that they made every effort to do so; and that subsequent arrangement was

a fair and honest one, and better for the plaintiff than he could have made except with them; that they did take the trust deed in their own name, but only to secure the plaintiff's performance of his contract, and as soon as that was done surrendered the notes and cancelled the deed; and that in everything they have acted with the greatest fairness towards the plaintiff.

Patent Claims.

Interesting to Miners, Millmen, Metallurgists, Oil-Men, and Others.

78,456.—FURNACE FOR ROASTING ORES.—Edward P. Hudson, New York City.

I claim forcing heated air or oxygen, in addition to the products of combustion, through ores, for the purpose of removing sulphur, phosphorus, and similar injurious substances therefrom, substantially as herein specified.

Also, the chamber or reservoir, h, below the bottom of the fire chambers or flues, with a passage or passages, h, at or near the base thereof, through which air is forced and heated by the roasted ores therein, and in turn cools the said ores ready for withdrawal, substantially as herein specified.

Also, introducing air, in excess of that required for combustion, but regulated by quantity, into the ores, through the fire-chambers, over the fires, so as to be heated thereby, before passing through the ores, substantially as herein specified.

Also, the arrangement of one fire chamber higher than the other, substantially as and for the purpose herein specified.

78,468.—ORE SEPARATOR.—R. C. Morton, West Lubeck, Me.

I claim, 1st, The series of lever or hinged plungers, C C' C'', etc., acting upon the series of cells, D D' D'', substantially as shown and described in combination with the corresponding compartment tray, H, all as and for the purpose set forth.

2d, The adjustable bars, s, substantially as shown and described, in combination with the rollers, d, and cams, e, of the shaft, h, all as and for the purpose set forth.

3d, The lever cocks, k, substantially as shown and described, in combination with the box, G, slide, E, and plungers, all substantially as shown and described and for the purpose set forth.

4th, The bar, A, rubber springs, j, plates, f, and lever plungers, all constructed and operating substantially as shown and described and for the purpose set forth.

5th, Tray, H, having partitions, n u u, substantially as shown and described, in combination with a series of plungers and a series of cells, D D' D'', all as and for the purpose set forth.

78,577.—MANUFACTURE OF PLATES OF COMBINED STEEL AND IRON.—James Park, Jr., Pittsburg, Pa.

I claim giving a welding heat to the iron or fibrous metal side only of the ingots, in the manner hereinbefore described, and then uniting these surfaces by welding them together, either with or without an interposed layer of wrought iron or other fibrous and malleable metal, substantially as hereinbefore set forth.

78,760.—RETORT FOR CONCENTRATING SULPHURIC ACID.—J. D. Perlin and Joseph Saunders, Brooklyn, N. Y.

We claim providing a retort with a projecting pipe or spout, a, and with a pipe, B, substantially as described, so that communications between various retorts can be established, as herein specified.

78,786.—PROCESS OF COMBINING WROUGHT AND CAST METAL.—Edward L. Brown, Philadelphia, Pa.

I claim, 1st, Preparing wrought metal for combining it with cast metal for castings of all descriptions, where great strength of any kind is required, by first thoroughly coating it, by galvanic action or other process, with nickel, or any other metal or metals, alloys of metals, or metallic or mineral substances, or their alloys, not easily oxidizable and very difficult to fuse, and which will melt, or whose point of fusion is at a higher degree of heat than the molten cast metal to be poured about it, the whole substantially as above described.

2d, The production of castings strengthened by the introduction of wrought metal coated with a metal, alloy of metals, or substance less fusible than the cast metal, substantially as above set forth.

Special Scientific Brevities.

There is no absence of coal in the great West, out of which new states are being coined. In the Laramie plains the coal beds are from five to eleven feet in thickness, and occupy a basis of about five thousand square miles. In Colorado, along the Eastern base of the mountains, north of the Arkansas river, beds of solid lignite extend over many thousand miles of territory. They are the remains of extinct forests, and show that oaks, hickories, lindens, maples, buttonwoods, buckthorns, poplars, and magnolias, have flourished there. The beds are younger than the anthracite beds of Pennsylvania, belonging to the geological period immediately preceding the present. There is no other fuel of any kind, either under or above the surface, in the region where these beds are found.

A patent has been taken out by Mr. W. Baker, of Tipton, England, for the manufacture of iron. His description states that in conducting the puddling process according to this invention, the cast-iron to be puddled is introduced into the bed of the furnace without any admixture of hammer slag, or flux, but the hammer slag, or other flux, is put into the part of the furnace situated beyond the flue ridge, where it becomes melted simultaneously, or nearly so, with the iron in the bed of the furnace, but is separated from the said iron. The puddler stirs the iron with his rabble, or puddling tool, until the evolution of gas from the melted iron has ceased, or nearly so, when the melted hammer slag, or flux, is admitted to the bed of the furnace. The melted iron and melted hammer slag, or flux, are then mixed or worked together, and the puddling is completed in the ordinary way.

Professor Botger, inquiring into the cause of the action of distilled water on lead, has found it to be due to the presence of carbonate of ammonia, and not, as is usually ascribed, to the air dissolved in the water. After having been boiled for a time, distilled water will not attack the lead until after a considerable exposure, when a reabsorption of ammonia and carbonic acid from the air, where they are always present, may be supposed to have taken place. Botger has further found that the alloying of the lead with a small amount of tin protects the former from being acted upon, and this fact suggests the advantage of purposely introducing a little tin into the metal from which lead piping is to be manufactured.

Copper and iron may be smelted together in almost all proportions, but it appears to be doubtful whether any homogeneous alloys can be produced. A small quantity of iron, added to bronze or brass, causes a considerable increase in tenacity. Malleable iron or steel, containing copper to the extent of 1-45 or 6-5 per cent., shows symptoms of red shortness, which become decided with a larger quantity.

A one-horse power paper steamboat is being built at Ballston, N. Y.

Ordit about Minerals, &c.

On the 11th, Marquette, Michigan, was visited by a terrific conflagration, which destroyed all the shops and stores in the town, all the Government, State, and Municipal buildings, the bank, the railroad depot, docks, machine shops, and several private residences. The loss to the Marquette and Hay de Noquet railway company cannot be less than \$500,000. The total loss by the conflagration will reach at least \$1,500,000—probably more. The insurance was comparatively small.

The citizens of Nevada and California have organized a company to build a railroad from a point on the Central Pacific Railroad at Humboldt river, Eastern Nevada, to the head of navigation on Colorado river, connecting with the line of the Southern Pacific Railroad, with a capital stock of \$1,500,000. The length of the road will be about two hundred and fifty miles.

Scarcely a league from San Juan Teotucaban, and two leagues from the City of Mexico, there exist two colossal pyramids consecrated in former centuries to the worship of the Sun and Moon. They stand on a line almost parallel, and are less than a mile apart. Their elevation is said to be fully if not more than 450 feet.

The mining engine intended to be run in the mines of the Lehigh Coal and Navigation Company, at Summit Hill, an account of which we gave a few weeks since, has proven itself, according to the Manch Chunk Democrat, a complete failure. It has been re-shipped to the builders at Philadelphia.

The Camden and Amboy Railroad company have ordered a thousand tons of steel rails from Sheffield, in England, which are now in process of delivery. More than a mile of these rails were laid near Bordenstown, on this road, about a year ago. These show no signs of wear as yet.

Coal has been struck in Minonk, Woodford county, Ill., at a distance of 314 feet below the surface of the earth. The vein is four feet thick, and the coal of a superior quality.

A San Francisco paper pronounces the Garrahan Quicksilver Land Claims, now before Congress, a fraud, and shows by the records that it has been so declared by the United States Courts in California.

The Albertine Oil Works at St. John's, N. B., have suspended operations on account of the excise duty, and 350 hands have been thrown out of employment.

During the month ending May 15th, the exports of rails from Cardiff, South Wales, to New York, were no less than 8,208 gross tons, and from Newport, 7,885 tons.

A quicksilver mine has been discovered near Redwood, San Mateo county, Cal.

All Sorts.

The Mineral Point (Wis.) Tribune reports two accidents by the caving in of mines. Mr. William Embler was drifting in a shaft when the rock fell, burying him under it.

It is a curious fact, that while seasons of destitution and distress tend to lower the number of births and marriages in a community, they also lower the death rate.

Mr. Frederic Harrison, in an essay on the Transit of Power in the London Fortnightly Review for April, tells this good anecdote. He was the other day exploring a coal mine, and endeavoring to ask some grimy bare colliers, hewing away in the dim air, what was that part of the workings.

An editor in Alabama having read an article in Hall's Journal of Health, advising that husband and wife should sleep in separate rooms, says: "Dr. Hall can sleep when and where he chooses, but for himself he intends to sleep where he can defend his wife against the rats and all other nocturnal foes as long as he has got one to defend."

There are now three hundred men at work on the Dubuque and Sioux City railroad between Iowa Falls and Fort Dodge.

Special Notices.

Patents.

Mr. WILLIAM McNAMARA publishes a card in another column, signifying his readiness and ability to secure patents on new inventions, and give advice thereon.

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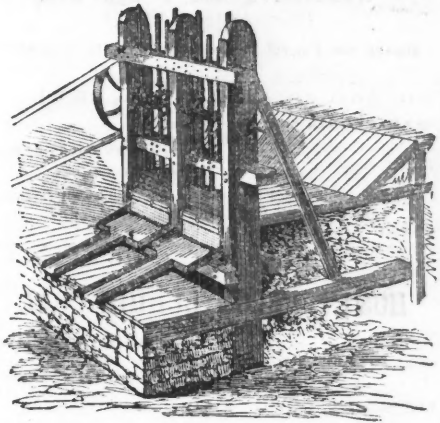
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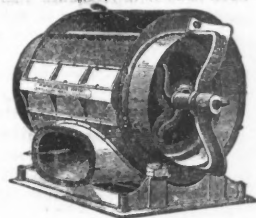
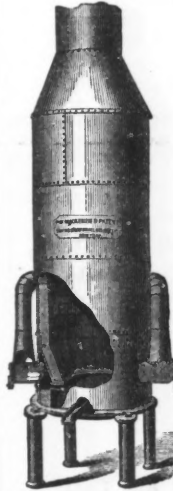
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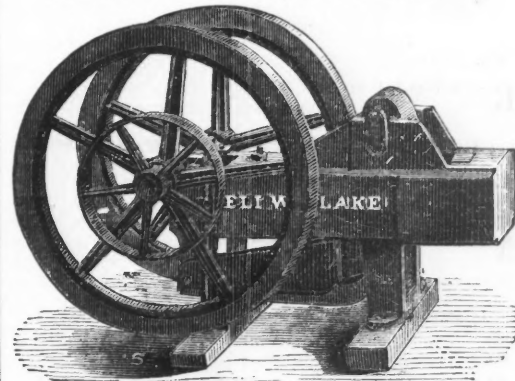
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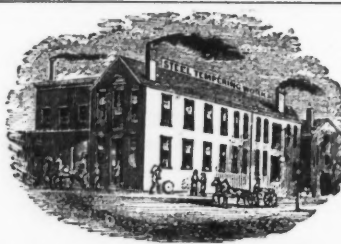
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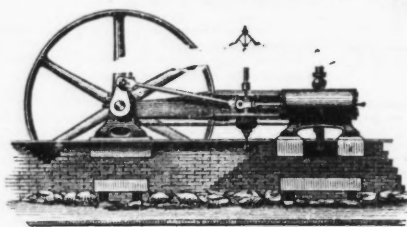
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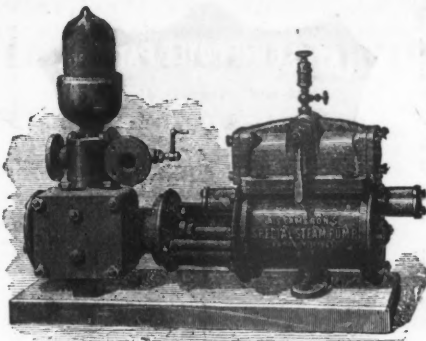
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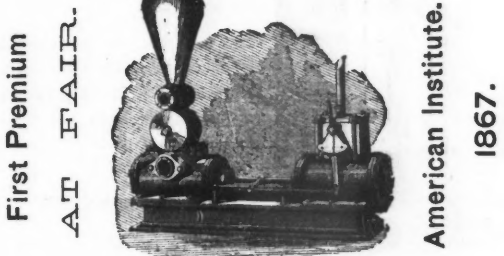
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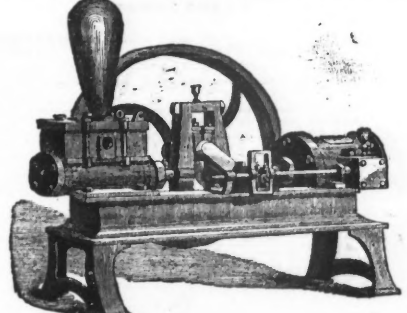
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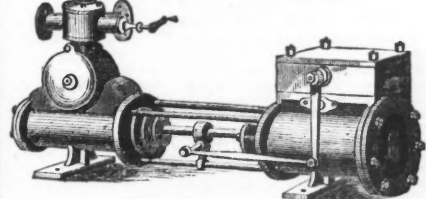
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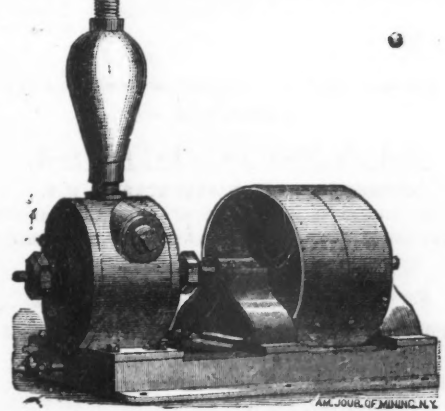
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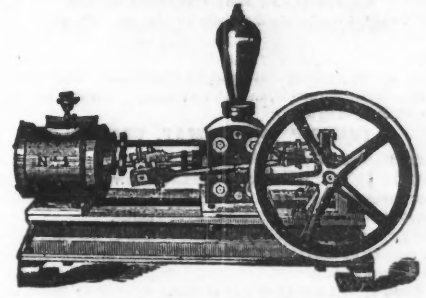


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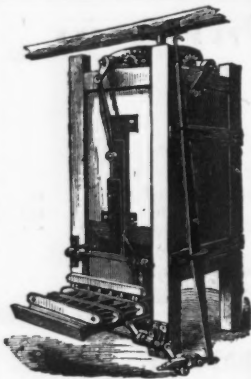
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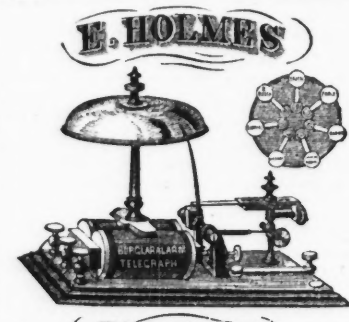
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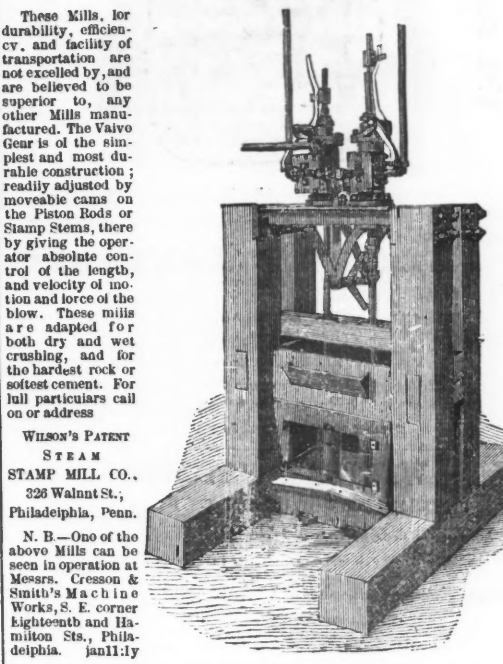
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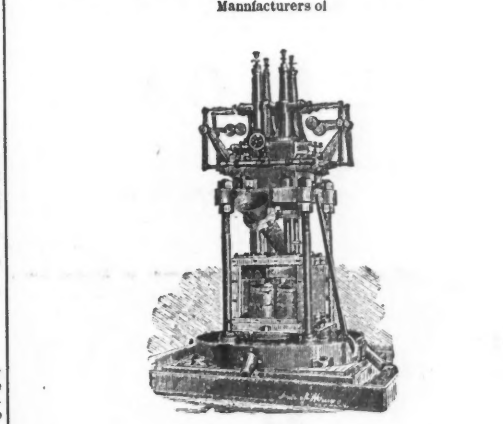
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CHARLES SCHENCK, a resident of Pah-Ranagat Silver Mining District, and County Surveyor of Lincoln county, Nevada, begs leave to inform the mining public, that he is able and ready to give true and valuable information about mining property in this District.

Address CHARLES SCHENCK, M. E., Hiko, Pananagat District, Nevada. References—Wm. A. Smith, Esq., 25 and 27 Nassau street. Prof. Harper, New York, etc. oct12, '67-'68

ADELBERG & RAYMOND, MINING ENGINEERS AND METALLURGISTS, 90 BROADWAY, N. Y.

Mines, Miners Lamps, Machinery and Metallurgical or Chemical Works examined and reported upon. Advice given to miners, chemists and manufacturers. Assays and analyses made. Competent Engineers furnished to companies individuals 5-3:4p

R. P. ROTHWELL, MINING & CIVIL ENGINEER AND METALLURGIST, From the Imperial School of Mines, Paris, Member of the Geological Society of France, &c.

OFFICE, WILKESBARRE, PA. Having had a large practical experience in Europe and this country is prepared to examine and report on all kinds of Mineral property, superintend Mines and Metallurgical Works, Assay Ore. &c. 18:2:4p

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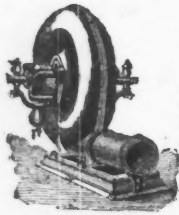
GEO. W. MAYNARD, PROFESSOR OF MINING and METALLURGY AT THE RENSSELAER POLYTECHNIC INSTITUTE, TROY, NEW YORK.

Reports, Consultations, Assays. Special attention given to Metallurgical Operations. Jan 18:1y

CASUALTY INSURANCE.

Considering the great number of insurance companies, and the almost innumerable throng of gentlemanly insurance agents, and further remembering how the press by daily, weekly, and periodical notices has poured out its libations of praise in honor of insurance, our readers will perhaps accuse us of assurance in meddling with a subject which is so well represented by live men and dead letters. But we can inform our readers that we are interested in the subject, and if all of them had been in a hospital with broken limbs, as it was once our misfortune to be, and then too away from our home, friends and relatives, they would hasten their steps to the Casualty Insurance Company's office, and regard the association as a philanthropic and useful organization. Cast a glance at the dangers in our mills, factories, workshops, on our railroads, steamboats, and conveyances generally. Inspect the hospitals, poorhouses, and asylums of our land. Go, reader, and visit the toiling clerk or industrious mechanic on his bed of pain; see a sorrowing wife and family who are suffering still further for pecuniary aid and the means of support that accident has rendered necessary—do this and then tell us not to be silent on insurance and the benefits resulting therefrom.

We have but to turn to our long list of advertisements, in order to be reminded of the great number of miners, mechanics and operatives who are all employed in mechanical operations, and who are liable at any time to accident that will deprive them of health, work, and thereby their means of support. And yet it is a fact, that this very class of men are generally improvident, and take no special care in regard to future needs. Now in view of accidents or casualties that are "ills that flesh is heir to," that lie in wait for humanity from the cradle to the grave, we can only say that a wise man will protect himself against such fatal or serious consequences—from distress to his family in the event of death, and to himself and family if he be disabled from the discharge of his ordinary duty. Allowing the necessity of insurance, what are the immediate benefits therefrom, and where can accidental insurance be effected? These inquiries are easily answered. If accident cause disability, a liberal weekly compensation is allowed as long as the patient is incapable of transacting business that will give him means of livelihood; if a person's life is lost, a large sum is given to the family, who, if they ever require pecuniary assistance, will require it then. In short, by the payment of a few dollars, any one can insure the receipt of thousands, in case of death by accident, or a certain sum each week while disabled. For instance, the UNITED STATES CASUALTY COMPANY, which is a MUTUAL ACCIDENT COMPANY, insures against accidents of every description. This Company issued its first policy April 13th, 1866. The cash capital is now about \$100,000, with a large surplus, and the Company is purely mutual, as it pays dividends to all its policy-holders. This dividend is declared after ample reservations, in order to provide for all future contingencies. Thus the mutual feature of this Company—the only Mutual Accident Company in America—it will be observed, offers to policy-holders the best inducement of all in the United States. Under the general accident risk, five dollars will secure a policy granting Insurance for one thousand dollars in the event of death by any description of accident, with five dollars per week compensation for any injury causing total disability from business. We can confidently refer our readers to EDMUND C. FISHER, the President of this Company, and a gentleman who we know is thoroughly acquainted with all Insurance business, and also to HENRY D. WALKER, General Insurance Agent, who is the Actuary for the American Mutual Life Insurance and Trust Company, chartered in 1847, and now possessing a capital of about \$600,000. HON. BENJAMIN NOYES is its President.



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Your obedient servant,
WILLIAM H. SEWARD.

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700 ACRES OF LAND, with all its equipments, consisting of two Steam Engines—one of 10 horse power, and the other of 25 horse power; Pumps; two round Buddies, 16 feet diameter; three Washers with Rocker and Sluice Boxes; buildings for Office, Store and Superintendent; a large Boarding House, Barn, Stables, Blacksmith Shop, and about 20 small Houses for Miners, &c.

This Mine is known as one of the most valuable in this country, and sufficiently developed to a depth of upwards of 100 feet, so as to justify extensive operations. The Vein is composed of argillaceous slate, and forms an auriferous bed of from 10 to 12 feet in thickness, carrying very rich string veins of free gold in its center. Thorough and reliable examinations and reports have been made by Prof. Chas. T. Jackson, of Boston; Prof. Geuth, of Philadelphia, and the late Prof. Haessler, who all agree and represent this mining property of great intrinsic value. Terms to be made known on the day of sale. For further information as regards reports, &c., &c., apply to
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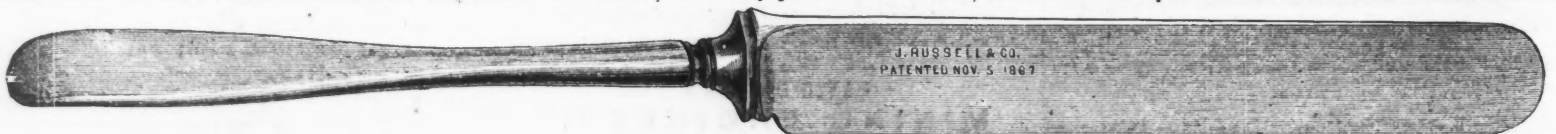
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