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THE ENGINEERING AND MINING JOURNAL.

HENRY W. TROY - DEL. COLLINS & SHUGG, SC.

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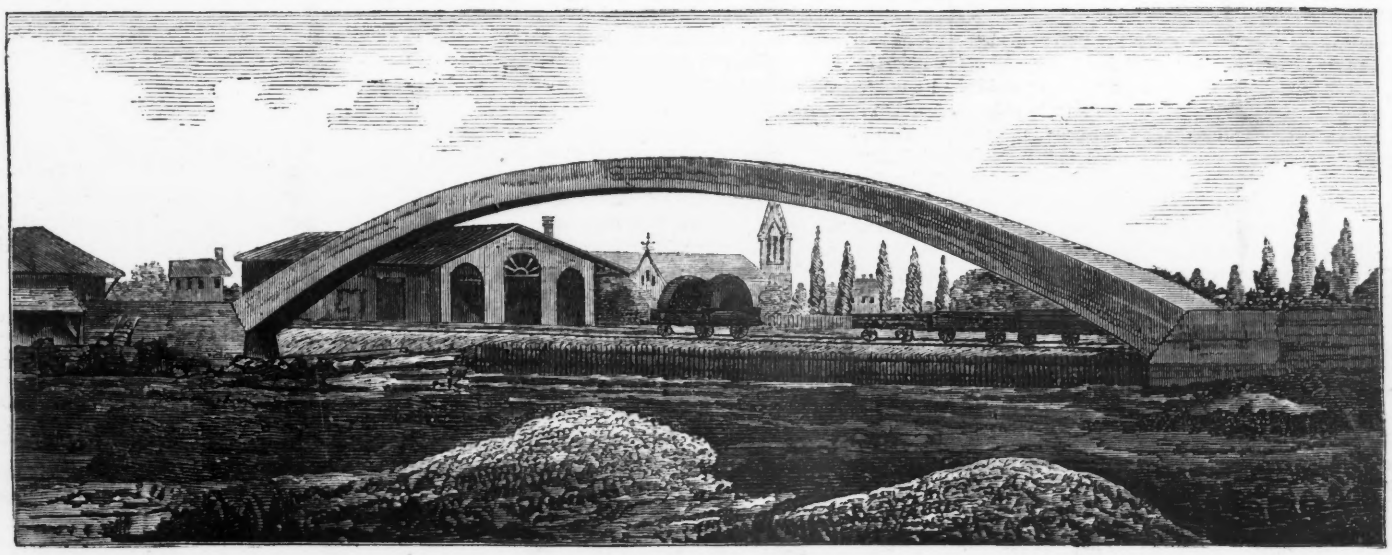
Béton-Coignét.

IT is a familiar axiom that in every case the strength which is available for useful purposes is the existing excess over that which is requisite for the mere support of the structure itself. If the absolute supporting power of the materials of a bridge be sufficient to sustain 100,000 pounds, and the bridge itself should weigh 50,000, the available strength which may be directed to the support of a load is obviously equal to 50,000 pounds. If now, while leaving the form and arrangement of the structure as it was, we double the strength of the material, we shall have trebled its useful sustaining power. This is familiar knowledge, and we recite it here merely for the purpose of calling attention to the importance of securing the utmost possible strength, rigidity, and tenacity in building material. For if the useful effect of a given quantity of the material be greatly increased, the amount of material which is required in any case is lessened in the same rapidly diminishing proportion; more graceful and elegant designs can be employed, and the architect or engineer finds himself untrammelled by difficulties and restrictions which would otherwise remove all possibility of introducing those æsthetic features which are demanded by modern taste and culture. Hence, any process which promises to increase the strength of any of our usual materials for building deserves most serious consideration, and it is therefore no wonder that the attention of almost all architects and civil engineers has lately been directed to the surprising results attained by M. Coignét through his improved methods of forming concrete or béton. Taking the ordinary materials used in the formation of béton, or the finer kinds of concrete, M. Coignét has by his improved processes succeeded not in doubling or trebling the strength of structures formed of it, but in increasing this strength more than fifty-fold, and that, too, by means so simple that it seems surprising that they were never employed before. In testing the value of M. Coignét's improvements, one of two methods may be adopted. The first is the examination of actually existing structures; the second is a theoretical examination of the system and a practical testing of the individual steps of the process. In order to afford full facilities for the former, M. Coignét has caused a test arch to be erected at St. Denis, near Paris, and of this arch we are enabled to furnish our readers with an engraving taken from a photographic view, which, of course, represents the structure as it really stands at St. Denis, and not as it might exist in the mind of some artist who proposed to furnish a sensational sketch. The dimensions of this test arch are as follows:

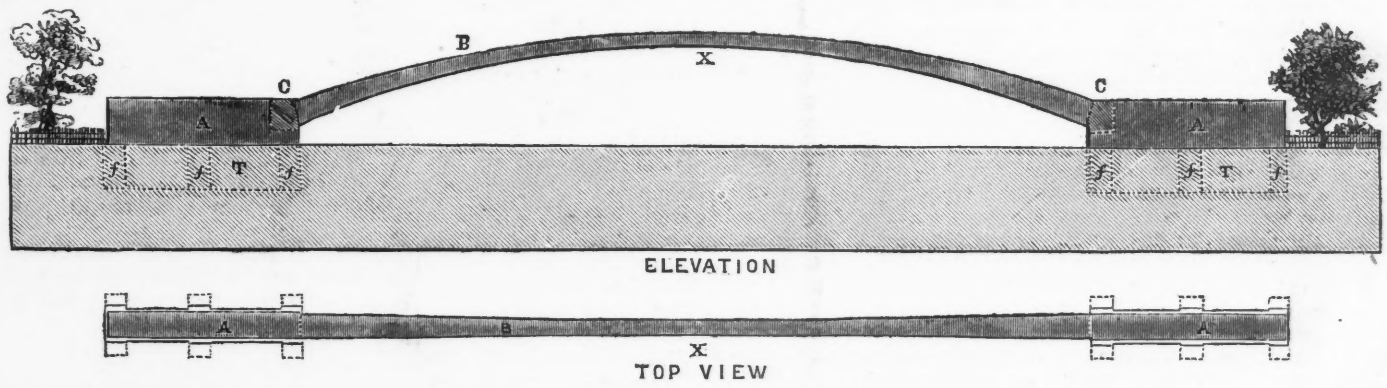
Span,	196 feet
Rise of arch,	19 feet
Cross section at x,	4 feet by 3·25 feet
Cross section at c,	6·5 feet by 6·5 feet
Specific gravity of the material,	2·200
Weight of arch,	260 tons

The arch was constructed in six days, being formed in thin concentric layers. After it had reached what was deemed a sufficient size, it was allowed to remain for five or six weeks, at the end of which time all extraneous supports were removed. This was about four years ago, and to-day it stands uninjured and promises to remain an enduring monument of the skill of its constructor. It is an interesting point to note that the total amount of depression sustained by the centre of the arch after the centring had been removed was barely three eighths of an inch.

Such a test must convince every careful investigator that the character of the béton produced by M. Coignét is vastly superior to that of the ordinary concrete. The next question which occurs is, what is the peculiar mode of preparation which confers upon the new béton its strength and solidity, and is there in this method any thing which justifies the high opinions formed from the practical results? A careful reply to this question serves to exclude the possibility of erroneous conclusion, deduced from results produced by accidental circumstances. In most of the forms of artificial stone which have been brought to the notice of the public, the great defect has been want of sufficient cohesion. The component particles are loosely adherent; they yield to comparatively slight pressure, and, in many cases, they disintegrate by the action of atmospheric influences. As in the famous, or, perhaps, we should rather say notorious, case at Morrisania, they fall to pieces with their own weight before any deterioration has had time to set in. The great object of any process must be to increase the cohesion existing between the particles of the béton or concrete, and to this the whole efforts of M. Coignét have been directed. By bringing the components into actual contact by means of very powerful mechanical pressure produced by simple but effectual means; by excluding all water, which, on evaporation, would leave a porous and cellular structure, and thus diminish the compactness of the resulting mass; and by the careful selection of his materials, a béton has been produced which is capable of withstanding 4000 pounds per square inch. This greatly exceeds the crushing force sustained by any kind of brick, and is equal to that of many kinds of stone. According to the experiments of Bramah, the best granite (Herm) supported a weight of 13,000 pounds per square inch; the poorest (Penryn) 7000 pounds; Craigleeth stone 6000 pounds, and Whitney 2200 pounds.



BÉTON BRIDGE, AT ST. DENIS, NEAR PARIS.



A Submarine Steamship.

ACCOUNTS of a new plan for building war-vessels are given in the German papers. Otto Vogel proposes to construct a submarine steamship, and the Berlin *Borsen Zeitung* asserts that the Prussian Admiralty has approved of the plans submitted for inspection. The vessel, covered with strong plating, is entirely below the surface of the sea, with the exception of the deck, which is surmounted by a vaulted iron roof of immense strength. It is said, however, that besides all the advantages of such men-of-war, the new ship may be entirely submerged, and in this position is so completely under command that it can outweather a storm or attack an enemy with submarine cannon and torpedoes. Mr. Vogel is now engaged in constructing a large model, twenty-four feet in length, which will soon be finished.

THE plan of the East River Bridge as proposed by Mr. Roebling has already met with the approval of the Board of United States Engineers, appointed to examine it by the Government, and has been fully adopted by the Board of Consulting Engineers. The bridge proposed by Mr. Roebling, a steel wire cable suspension-bridge, is to be 1600 feet between the towers, 135 feet above the water.

The Roads of New-York Central Park.

BY WILLIAM H. GRANT, SUPERINTENDING ENGINEER.

THE art of road-making is quite a venerable one from its antiquity. It would scarcely be a figure of speech to say it was "as old as the hills;" for, if we may believe the geologists, hills, mountains, and valleys have been formed within quite a recent period—are, in fact, still in process of formation. However this may be, the transformation of the surface of the earth, from its primeval condition to its present rugged character, doubtless lies at the bottom of the business, and has been the chief provocative to the practice of the "art and mystery" of road-making. It is quite certain that, from an early period down to the present day, whether from the "upheavals," "depressions," and "denudations" of geologists, or other moving causes, there has been a constant necessity in the intercourse of mankind for making rough ways smooth, and crooked ways straight, and that there has been but little rest for the hand of man, through many successive generations, from road-making labors.

It would be natural to suppose, that from long practice the art would have made such advances ere this, as to have precluded the saying of much that is new or instructive in regard to it; that the multiplication of examples, experience, traditional knowledge, treatises, and theories, had been such as to make it really a work of supererogation to attempt to add any thing more upon the subject. Still the subject has not been exhausted, and this arises from the fact that varying necessities and circumstances are constantly occurring, requiring new adaptations and new applications in the channels of human intercommunication, and the art that applies to them must therefore be progressive and subject to improvement, like most kindred arts of human origin.

A reference to past experience, ancient as well as modern, is useful to the road-maker of the present day, but it will not meet fully the requirements that will be made upon him. The supposition may be plausible, that whatever is old and long-tried is the safest guide to follow; but something more than precedent and routine must be looked to to meet the present and future demands of the art. Whoever sets about the work and attempts to carry it out practically, on any considerable scale, will be met by these considerations; he will find that, with all the light of the past, except that which is reflected from sound general principles, he must rely very much upon his own resources, cultivated judgment, and skill, for success. The conditions of the problem are too variable to be governed by fixed and uniform rules. Expediency, feasibility, special adaptation, questions of cost and materials, influence of climate, and various other matters, will, in turn, singly and in combination, arise to be passed upon. The road-maker who is not prepared to deal with them judiciously, without recourse to the rule and plummet of precedent, will often be sorely perplexed. If he is inclined to rashness, he will probably escape from the dilemma, for the time, by committing a blunder. If he takes the more prudent course, he will retrace his steps from unsafe ground until he acquires the means of obtaining a surer footing. Modern treatises upon road-making contain much that is valuable and indispensable; but, at the same time, they reveal a great contrariety of opinions, practice, and results, that have been found, after a good deal of attention given to the subject, to adapt them rather to the closet of the student than to the field of the practitioner.

The writer does not, of course, expect here to supply a desideratum in these matters. Allusion is made to the facts as they have been found to exist, in order to direct attention to necessary principles and resources that have been very much neglected; beyond this he has not the presumption to attempt to do more than to give a description of his own practice (which has occurred under circumstances more than ordinarily favorable), to pass for whatever it may be worth.

The scale upon which the Park-roads have been constructed, and their general object, has been favorable for testing, in a thorough manner, some of the principal modes of road-making in vogue, and for perfecting, beyond ordinary practice in this country, many of the details of the work. It was proper that these roads should be of a superior description in all respects, and that no efforts should be spared to adapt them, in the most complete manner, to the end designed. It was not only essential that this should be done as to mere external appearances and accessories, but that they should be fitted for durability, safety, and easy practical maintenance. These considerations, combined with the endeavor to pursue the soundest economy, and to avoid hasty and ill-considered expedients, have governed their plan and execution. No extravagant or lavish notions have been indulged in, nor have means been misapplied in experimenting. The expenditure incurred, though large, could not have been wisely less, so far as the actual service and permanency of the work is concerned. If it had been less, it would not have been conducive to economy in the end.

Much of the cost of the roads was, of course, for the grading of the bed over expensive ground, peculiar to the locality, and a good deal was owing to their unusual widths as compared with other roads, but for the superstructure no more cost has been incurred, proportionably to the width, than is frequently expended on roads of an inferior character; for, although it has been found by experience that it is not as easy a matter to make a good road as is popularly supposed, yet it is believed that the difference in cost between a good road and a poor one, made as the latter frequently are made, need be but very little. Cases could even be cited in which it has been painfully evident that more money and hard work had been expended to accomplish a failure than would have been needed to ensure a perfect success. One reason for this has been found to be the desire on the part of the public to make cheap roads, or what are fallaciously supposed to be cheap roads, by the employment of cheap materials and cheap labor; and another is the prevalence of the idea that every man may be his own road-maker, and that all necessary knowledge of the art "comes in some way by nature." Incompetent and unfaithful agents are employed, and the result is too frequently found to be, that the road falls into the large class of very "common" roads of the country, is a vexation and an annoyance, and, in the end, quite the reverse of a cheap one.

There is doubtless a modicum of truth in the charge that is sometimes made against men who have pursued with enthusiasm a specialty in any department of art, and closely devote time and study to it, that they are prone to attach undue importance to the results of their investigations, and to proportionably distrust the abilities of those who have not, in like manner, qualified themselves for the duties they undertake to perform; but if this is the case, it must in fairness be conceded that there is some extenuation for it in the striking examples of ill-success by inexperienced persons that are so frequently brought to their attention.

In connection with this point, it is to be remarked that there is a singular inconsistency exhibited by many persons in the selection of agents for the performance of various professional duties. A man, for instance, who needs the services of a physician or a lawyer, seeks among those professions one whose science, skill, and general reputation are well attested by previous success, or whose initiatory training has been such as to give a well-grounded assurance that he will ably discharge the duties of his office; but when it comes to the selection of agents for the performance of many other duties, that have required an equal degree of study and practice to become proficient in them, the same individual will be found to depart from the rule, to relax his judgment, and take up with the services of those whom he knows, or easily might know, have been imperfectly or not at all fitted for the duties they undertake to perform.

It is a matter of surprise that this want of discrimination is so often manifested by men of a high order of business qualifications, who, when they step aside from their routine occupations, in which they have been uniformly successful, and undertake other enterprises, seem to act upon a maxim at variance with all their previous habits. Examples of this kind could be cited, but they have so frequently occurred that most observant persons will recall them in one form or another. Many remember them, as the writer has reason to know, to their cost, and have grown wiser by dearly-bought experience. In regard to engineering work, there is an old prejudice—not entirely worn away—founded upon errors committed, or supposed to have been committed, by the early engineers of the country, when the profession was in its infancy. The child has grown (in scarcely fifty years*) to vigorous manhood, and it is time that the shortcomings of juvenility should no longer be the test of a profession that is now ripe in years, and—to those "who have eyes to see"—pretty thoroughly established in character.

We do not claim for the profession that it has advanced to a stage of infallibility, or that it does not commit some errors—about the same as other professions—no more, no less; but we would make a passing suggestion for the benefit of those in whose minds any lingering antiquated impression remains, affecting, what we conceive to be, the well-earned status of the profession at this period of the nineteenth century.

We are aware that there are persons, tolerably well informed, who, from a habit of looking only in one direction, and that, far, very far backward, have wrought in themselves a strong conviction, that to undertake a piece of work requiring the employment of an engineer, is to embark in a career of extravagance and to incur an unknown outlay. An engineer's estimate is to them almost synonymous with an ascending series of expenditures ending only with exhaustion, and his plans are regarded as ingenious refinements upon the old-fashioned ways of doing things that are inconceivable or useless. The impression cannot be eradicated with such persons that an engineer cannot study or practice economy, whatever else he may do; his work, if perchance it turn out well in other respects, cannot, in any event, be a success as to cost — in other words, cannot be cheap. We say that this is simply a mistake. The profession has got beyond it. It is no longer the practice of the engineer; it is the malpractice of the pretender. The speed of the ocean-steamer, the locomotive, and the electric-telegraph have advanced things somewhat. We are no longer in the past. A glance at the progress that has been made, within a very few years past, reveals greater achievements and successes and more substantial improvements, than any previous page of history can show. If there is any basis that is fundamental and has become well established in the business of the civil engineer, it is that his is the art of attaining with certainty the greatest ends with the least and most economical expenditure of means. This applies, not only to scientific and mechanical means, and the judicious selection and use of materials, but to the economic use of manual labor, in all its applications to the varied forms of construction, and to the immediate, as well as remote, moneyed economy of the work. The engineer knows this, feels it, and practices it at every step; it is a part of his education, and becomes a part of his nature; he never rushes upon a work without first carefully examining it, measuring, weighing, and sounding it, and bringing out its contingencies; he "counts the cost," lays securely his foundation, and then, if he is a true engineer and not a superficial pretender, he rarely fails in his superstructure. It is his peculiarity of looking into things deeper than inexperienced persons that is frequently the cause of creating doubts in the minds of others. It is his business to look on the worst side of any cases submitted to him, to develop hidden and unlooked-for difficulties, to point them out, represent them truly, and to devise the means to meet them. This is a duty, not always the most pleasant, but nevertheless a duty that he cannot shrink from. It is not agreeable to be always looking for defects, and investigating chances of failure, and probabilities of ill-success, especially when they are not wanted to be seen, and he can only find his compensation for it in the assured result that in the end obtains. He is not content to place himself in the position of a trader who seeks to speculate upon a small (perhaps borrowed) capital, and must have quick returns or become bankrupt; but looks to the more slow and substantial reward that grows out of ultimate, well-demonstrated, and acknowledged success. If this comes in the end, well and good; if not, he has at least the satisfaction of knowing that he has not yielded to a culpable weakness and glossed over his work for a transient object, and at the expense of future mortification.

But this is a prolific theme that is leading to too great expansion in this place, and we take leave of it for matters more immediately pertinent.

[To be continued.]

* NOTE.—The earliest engineering work of any account in this country was the Erie canal. When this was commenced the state of the profession was such that we had to import engineers (one at least) from abroad, to participate in its construction. Our engineers were land-surveyors merely, without experience, and with but little preparatory knowledge of the art, except what was drawn from good common-sense and sound judgment.

Since that period it is gratifying to be able to state that we have repaid the loan of whatever professional aid we received, by sending abroad many American engineers, in compliance with invitations, who have done us much credit by their works and inventions.

A New Era in the Coal Trade.

TO THE EDITOR — SIR: On Saturday last the trial trip of the iron screw steam collier *Rattlesnake*, built for and owned by the Pennsylvania, New-York, and New-England Steam Navigation Company, of Philadelphia, was made, and may be said to have fairly inaugurated a new era in the coal-carrying trade. The *Rattlesnake* is the first of a fleet of thirty steam colliers to be built for this Company. These steamers will work an entire change in the transportation of coal between the great entrepôt at Richmond and New-York, Boston and New-England ports, proving of undoubted advantage to producer, shipper, and consumer. The initiatory trip of the *Rattlesnake* is, therefore, well worthy of notice, attracting, as it has, the attention of the leading men of the trade, as well as that of the managers of the great coal-feeders, the Reading Railroad and the Lehigh and Schuylkill Navigation Companies.

The object of the new Company is to secure an economical and expeditious mode of transporting coal by sea, thus overcoming the disadvantages so long labored under from the collier schooners. The latter method was slow, precarious, of limited capacity, and of a highly arbitrary character, so far as the freight tariff was concerned, occasioning both great irregularity of supply and consequent fluctuation of price. The advantages of the steam collier system have become so manifest in England lately, as to induce the formation of several companies for that object, all of which are now in successful operation. The claims of these companies for success are based upon a precisely similar state of facts as at present exist in this country, and the arguments in favor of steam coal transportation identical in England and America. These are as follows, and are certainly pertinent. By the adoption of steam colliers we secure a steady supply of coal; a lower range of prices, with less fluctuation; less injury to the quality of the article from exposure and breakage; and, lastly, a saving of interest upon capital to large consumers, arising from the avoidance of the necessity of keeping large stocks on hand. The following statistics of the amount of coal shipped to New-York and New-England from Pennsylvania show at a glance the necessity for just such a facility as this new Company affords: Nearly all the coal shipped to these points is from Pennsylvania, and amounts to 9,000,000 tons per annum, of which 3,500,000 goes to New-York, and the remaining 5,500,000 tons to ports on Long Island Sound and further East. The coal product of Pennsylvania and Maryland for 1867 was over 16,000,000 tons, and is increasing at the rate of 2,500,000 tons, or 15 per cent per annum. Railroad transportation is too expensive and the supply can only be kept up by sea; and right here is where the steam collier system comes in.

FREIGHT CHARGES.

Hitherto the freight charges on coal have fluctuated widely, generally running up when the price of coal declined. Opening in the spring from Philadelphia to Boston at from $4 to $4.50 per ton, dropping to $3and $3.25, and sometimes, but rarely, to $2.50 and $2, the advance commences about July 1st, and is maintained until the shipping season closes. We have thus a cost of transportation to Eastern ports of almost, if not quite, *four fifths* the cost of the article transported at the point of shipment! The schooners engaged in the carrying trade are of a capacity of 150 to 300 tons; the steam colliers of 600 tons. The steam collier can make *four trips* to the schooner's one, and in the following estimate can realize a correspondingly increased profit: A schooner with a cargo of

250 tons at $2.50, averaging twenty-two days to a trip, will clear about $192; at the rate of one and a half trips per month, and her average monthly earnings will be $261—this includes insurance and depreciation of vessel. The steam collier will make four trips per month, and in that time transport eight times the amount of coal carried by the schooner, carrying as she does 600 tons per trip at $1.70 per ton. Such, briefly, are the advantages, in a pecuniary point of view, manifest in the steam collier system.

HISTORY OF THE COMPANY.

The record of the rise and progress of this Company is of interest as an evidence of the pluck and persistency of the American coal-shipper. Nearly eighteen months since Mr. W. D. Crane, of the firm of W. D. Crane & Co., of Philadelphia and New-York, issued a prospectus of the proposed organization, which was submitted to a number of prominent gentlemen, among whom was John Tucker, Esq., of the Reading Railroad Company, who, with others, recognized the great advantages to be gained by the project, and has since given it his constant support and assistance. Obstacles, however, arose, or were thrown in the way of the enterprise. The fear that satisfactory arrangements could not be made with shippers at the great entrepôt at Richmond; difficulty of securing wharfage at Boston, and lack of coöperation upon the part of Eastern railroad companies; all these and many more obstacles were interposed, all of which have been happily surmounted by the energy of Mr. Crane, and the Company has now launched and tested the initial vessel of a fleet of *thirty* iron screw steam colliers, each capable of transporting 600 tons of coal per trip, and has a large subscribed capital to sustain and perfect the enterprise. The stock of the Company is generally held by Philadelphia, New-York, and New-England capitalists, who have justly the greatest confidence in the success of the enterprise. Every thing now promises finely, and arrangements have been made with shippers at Richmond. Boston encourages the enterprise, while the Boston and Providence, Providence and Worcester, Boston, Lowell, and Nashua, Boston and Maine, Eastern Boston, Hartford and New-Haven, and other Eastern roads, will facilitate to the utmost the objects and efforts of the Company. Mr. Crane has devoted time, energy, and capital to the success of his scheme, has corresponded freely with the English shipbuilders as to the best style of vessel to be adopted, and has given the contract to Messrs. Reaney, Son & Co., of Chester, Pa., who have produced in the *Rattlesnake* the best, most capacious, and most satisfactory style of steam-vessel for the purpose desired. The care taken by Mr. Crane in the style of vessel to be chosen is fully shown by the following statement, which explains itself, and, at the same time, the decided superiority of the American collier steamer over the same class of vessel in England:

COMPARATIVE STATEMENT OF ENGLISH AND AMERICAN STEAM COLLIERS.

	ENGLISH.	AMERICAN.	REMARKS.
Length,	149 feet.	160 feet.	
Breadth,	28 "	28 " 10½ in.	
Depth,	15 " 3 inches.	12 " 6 "	From base line.
Area,	296 square feet.	277 square feet.	Midship section.
Displacement—			
Light,	478 tons.	315 tons.	
Laden,	897 "	915 "	
Draught,	12 feet.	11 feet.	
Engines,	2.	1.	With surface condenser and adjustible cut-off.
Diameter,	27 inches.	34 inches.	
Stroke,	24 "	28 "	
Boilers,	1 tubular.	1 tubular.	
Area of Grate,	49½ square feet.	49½ square feet.	
Number of Tubes in Boiler,	288 5½ ft. by 2½ in.	190. 3 in. by 7 ft.	
Heating Surface in Tubes,	1036 71-100 sq. ft.	1044 4-100 sq. ft.	
Diameter of Screw,	8 feet.	9 feet.	
Pitch,	12 "	14 "	
Revolutions,	90 per minute.	80 per minute.	Estimated for average at sea fully laden.
Pressure of Steam,	12 pounds.	35 pounds.	
Knots per hour.	8 knots.	9 knots.	Estimated for average speed fully laden.
Weight of Iron in Hull,	155 tons.	153.89 tons.	
Surface in Hull.	7011 square feet.	6566 square feet.	
Average weight per square foot of Hull,	49½ pounds.	52½ pounds.	Equal to 6 per cent in excess.
Weight of Machinery, Carpenter-work, and Outfits,	323 tons.	161 tons.	

TRIAL TRIP OF THE RATTLESNAKE.

The *Rattlesnake* was launched at Chester, Pa., some weeks since, and proceeded on a trial trip down the Delaware River from Philadelphia on Saturday afternoon last, under the command of Captain Gallagher. A number of prominent citizens of the "three great cities" were present, among whom were Henry C. Carey; Dr. Thomas Evans, of Paris; John Tucker, of the Reading Railroad Company; Mr. Hinckley, Philadelphia, Wilmington, and Baltimore Railroad; and Mr. Felton, of the Lehigh Navigation Company. The gentlemen present were well satisfied with the character and quality of the vessel, and but one opinion was expressed as to the success of the enterprise and the benefits to be derived from it by all classes of coal-consumers. The trip occupied about three hours, and the guests of the Company were handsomely entertained at the usual collation, which, however, in this case, was provided with particular elegance and liberality.

DIMENSIONS.

The *Rattlesnake* is 160 feet in length, 29 feet beam, 12½ feet hold from base line; area, 277 square feet, midship section; displacement, light, 315 tons, and laden, 915 tons; draught, 11 feet. She has a 34-inch cylinder engine, with 28-inch stroke; one tubular boiler, with a grate-bar area of 50 square feet; diameter of screw, 9 feet, pitch 14 feet at sea and laden. She will make 80 revolutions per minute with 35 pounds pressure; average speed, 9 knots. She has 7 iron keelsons, with water bottoms over all, and her cargo is contained in three water-tight compartments—225 tons aft, 200 tons midships, and 175 tons forward. An extremely ingenious hoisting apparatus affords unusual facilities for the discharge of cargo, raising four tons per minute from the three hatches. The best judges pronounce this ship a decided improvement upon the Glasgow-built colliers.

BENEFITS OF THE SYSTEM.

The advantage of this new system of coal transportation will be directly felt by all classes of coal-consumers in the East, but particularly by the poorer and middle classes. It is upon this portion of the community that high freights and long passages, strikes and delays of all kinds in the coal business, fall with extreme hardship. The advance of a dollar per ton on freight results in an overcharge of two or three dollars more to the poorer consumer who purchases by the single ton, while a manufactory idle for want of fuel entails upon hundreds idleness and want which they can ill support. A regular and unvarying freight tariff, combined with certain and regular trips, as offered by the Steam Collier Company, will prevent much suffering of the kind alluded to and benefit all. No enterprise of the day deserves or has received more cordial support. We shall watch the further movements of this Company with interest, and chronicle the arrival of the new ships of the fleet with pleasure.

PHILADELPHIA, June 21st, 1869. ANTHRACITE.

The Desilverization of Lead by Means of Zinc.

BY H. B. CORNWALL, ENGINEER.

IN districts yielding lead ores and fuel in reasonable abundance, no more rational means of treating silver ores containing sulphur, antimony, lead, and the other constituents that enter into the composition of our own so-called "refractory ores," is known than to smelt the precious ores with the lead ores, producing an argentiferous lead. The samo product is largely obtained by smelting simple galenas, most of which contain small and varying proportions of silver. It is then necessary to separate the silver from the lead, and for centuries the only means employed for this purpose consisted in subjecting all of the lead to cupellation. So great was the loss of lead in this process, both by volatilization on the cupelling-hearth, and loss in the subsequent reduction of the oxide of lead to the metallic state, that lead containing less than twenty ounces of silver to the ton could not be treated profitably, while forty ounces was the usual limit for paying operations.

Much of the lead obtained from English ores contains considerably less than this, and the desire to extract the silver profitably from it led Pattinson to the invention of his well-known crystallization process, in the year 1833. By this process, lead containing only three ounces of silver per ton can be successfully treated, while the lead resulting from the operation is of the best quality, superior to much that resulted from the old process of reducing the oxide of lead from the cupellation. This process spread rapidly through England, and was almost universally adopted in German works before the year 1850. Soon after this, in the year 1851, Alexander Parkes, an Englishman, patented the process called the Parkes process, which depends upon the peculiar behavior of zinc with alloys of silver and lead. He had observed the fact—noticed also before by Karsten—that zinc, when melted with argentiferous lead, combines with the silver, and, on being left at rest, rises to the surface of the lead, carrying the silver with it, and forming a crust which can be almost completely removed, leaving the lead with only a small amount of zinc and very poor in silver. This behavior seemed to afford a means of desilverizing lead still more advantageous than the Pattinson process. Parkes's process is described substantially as follows in the *Mechanics' Magazine*, for 1852, No. 1482:

The amount of zinc to be used varies with the richness of the lead, as shown in the following table:

OZS. SILVER PER TON.	LBS. ZINC REQUIRED PER TON.
14	22.4
21	33.6
28	44.8
etc.	etc.

The lead is melted in a Pattinson kettle, the zinc added, and the whole thoroughly stirred, after which the zinc is allowed to come to the surface and is taken off. To free the lead from the traces of zinc remaining in it, it is run off into a reverberatory furnace, and kept at a moderate heat until the zinc is oxidized, when the lead is tapped off, leaving the zinc oxide. For three tons of lead, about two or two and one quarter hours' heating is sufficient. The alloy of zinc, lead, and silver is heated in an iron kettle with a perforated bottom, so that most of the lead may melt and run off. This lead is reserved, to be added to fresh lead in a succeeding process, in order to obtain the silver which it still retains. The concentrated alloy of zinc and silver is then heated sufficiently to oxidize the zinc, which is dissolved with hydrochloric or sulphuric acid, and the remaining silver is treated in the usual way. The concentrated alloy might be distilled in a retort, the zinc passing off, and leaving the silver with a little lead.

Such was Parkes's process in its early stages, and extensive experiments were carried on with it at various works and in various ways. Experiments at the Friedrichshütte, near Tarnowitz (*vid.* Karsten's *Archiv.*, Vol. XXV., p. 192), fully established the fact that the zinc does remove nearly all the silver, leaving also but little zinc in the lead, while the labor required and the loss of metal were less than in the Pattinson process. In spite of these favorable results, the process was generally abandoned, owing to the difficulties experienced in removing the zinc from the lead, which was not otherwise fit for general use, and in separating, without too great loss, the silver and lead from the rich zinc alloy. Successful use was made of the process, according to Montefiore Levy, at Carmartenshire, in South Wales, in the following way: About six tons of lead were melted in a large iron kettle and zinc in the proportion of one per cent, for lead with fourteen ounces of silver to the ton, was melted in a small kettle and then poured into the melted lead. The whole was stirred for four or five minutes, left at rest for five minutes more, and then the zinc crust was removed with a perforated ladle. This crust was heated in clay retorts just up to the melting-point of lead, when that metal ran out into basins, leaving the argentiferous crust behind. This was then subjected to distillation in small clay pots, having a hole in the top for the introduction of the charge, one in the side to allow the zinc vapors to escape into a condenser, and a third hole in the bottom for the removal of the silver residue. The condensed zinc was used again, while the silver was cupelled with a little lead. To refine the desilverized lead, it was placed in a low-arched, reverberatory furnace, and brought to a dull red heat, with closed doors; the doors were then opened, and the oxide of zinc removed as fast as it formed. Care was taken to keep the temperature only high enough to oxidize the zinc, without oxidizing too much lead. The quality of the refined lead was excellent. Nevil states that, in his works, the loss of lead was one per cent, while three fifths of the zinc employed was lost, and decidedly more silver was obtained than by the Pattinson process.

Notwithstanding this testimony in its favor, the zinc desilverization process remained in obscurity until 1866, when certain continental furnace-proprietors were induced to try it again, owing to the difficulty they experienced in obtaining the strong workmen necessary for the Pattinson process. Their experiments resulted in the easy surmountal of the difficulties which had been previously met with, and since then the process has been taken up in several of the most important European lead-works, and seems likely to establish itself as the most successful method of separating small proportions of silver from lead. In view of the importance which the smelting of silver ores with lead must some day assumo in our Western districts, it is believed that a full description of the latest improvements and experiments made on this subject will be of interest, and the zinc-desilverization process will, therefore, form the subject of two or three articles.

The operations will be described in the following order:

1. Desilverization of the argentiferous lead.
2. Refining the desilverized lead for the market.
3. Separation of the silver from the zinc alloy, with the methods of utilizing the lead and zinc in the latter.

[To be continued.]

Gun-Cotton, as Used in Mining and Quarrying.

IN view of the general interest now taken in the subject of explosives in this country, the following exhaustive report from a late number of the London *Colliery Guardian* cannot prove other than very interesting to all having to do with such matters. The report runs as follows:

In February, 1864, a committee was appointed to inquire into the properties of gun-cotton as a substitute for gunpowder for naval, military, and civil purposes, and a report from the committee has just been issued from the War Office: The applicability of gun-cotton to civil engineering being one of the points to which attention was directed in the instructions approved by the Secretary of State for War for the guidance of the committee, it was suggested by Mr. Sopwith, a member of the committee, that a series of experiments on the use of gun-cotton in mines and quarries should be made on the property of Mr. Beaumont, M.P., who had been kind enough, at his instance, to offer them every facility for the purpose. The mines are known as the W. B. lead-mines, and are situate in the neighborhood of Allenheads, in the county of Northumberland. The following points in relation to the comparison to be instituted were fixed upon as of primary importance: 1. The probable cost of the two materials. 2. The circumstances relating to carriago and storage. 3. The relative quantities of the two materials representing equal force. 4. The relative convenience of application in actual use in mines. 5. The relative efficacy of certain defined proportions of each. 6. Any differences in the mode in which explosive force is exerted. 7. The comparative results in rocks of different composition or hardness. 8. The nature and effect of the gases evolved by gunpowder and gun-cotton respectively. 9. The application of machinery as compared with hand-labor in boring holes preparatory to blasting. 10. The comparative effect as regards the separation of large masses of rock.

The proceedings of the committee occupied four days. The greater part of the time was spent in making experiments in the mines, but one morning was occupied in blasting operations in a limestone quarry, where the effect of each discharge could be observed at the moment of explosion; and part of the time was devoted to hearing the opinions of experienced practical miners on the subject. Subsequently, in September, 1865, further experiments were made by Mr. Sopwith and Mr. Abel with gun-cotton prepared from pulp, which was used in both the granulated and the compressed forms, and later still, in February, 1869, the same gentlemen conducted further investigations, using compressed gun-cotton, fired by means of detonating primers. In reference to the last-named trails, Messrs. Sopwith and Abel report as follows:

In a series of experiments made in 1865 in mines and quar-

ries at Allenheads, the great convenience of using compressed gun-cotton, and also the great amount of explosive force which it exerts, were made fully apparent to all who witnessed these trials, which were made both undergrnnd and in the open air. This in a great measure had been done in the preceding year, when several members of the Gun-Cotton Commission appointed by Government in 1864 visited Allenheads, and by permission of W. B. Beaumont, Esq., M.P. (the owner of the mines), had every facility for viewing the practical application of this new explosive material to mining and quarrying purposes. In 1865 the object of the experiments was to exhibit the use of pulped gun-cotton converted into highly compressed masses, in which condition it is now extensively used in many mines and quarries. In the present year the series of experiments now to be described have especial reference to a new and extraordinary development of power, which is most important as a means of blasting rocks in mines or qnarries. This increase of power is obtained by employing a detonating substance to explode the gun-cotton, instead of, or rather it may be said, in addition to, the ordinary fuse. The mode of operation is as follows: The detonating substance is placed in a tin tube of the dimensions shown in the annexed wood-cut, and it occupies in the inside of the tube the space from A to B. On this at C is placed a small plug of gun-cotton, and the rest of the tin tube from C to the open end at D is empty. Before leaving the manufactory a small piece of paper is pasted on the end merely to prevent any thing falling into it, and this paper, so long as it remains, serves to distinguish the charged or useful "primers," as the tin tubes are called, from empty tubes. It is in this form that the detonating "primers" are supplied from the manufactory at a cost of about 12*s.* per hundred; probably when more extensively used the price will not exceed 1*d.* each. These "primers" are in fact large percussion-caps, and are to be handled with care, as also to be protected from fire and from all violent concussion. They explode with some violence when ignited, or if struck a violent blow, but with reasonable care are quite harmless, as much so as ordinary percussion-caps for fowling-pieces. They may not only be safely handled, but may be thrown about with any freedom short of actual and intentional violence. Even when thrown on the ground, or allowed to fall from a height of twenty or thirty feet, they are in no way affected by such usage. (In recommending the use of a new explosive apparatus to those who have not an opportunity of receiving personal explanations, it is proper to state the necessary amount of precaution as well as the practical freedom from danger.) When the primer is to be used, the paper cover at D is removed and an ordinary fuse is then inserted, so as to be in contact with the gun-cotton at C. The tube is made large enough to receive an ordinary fuse, and as soon as the insertion has been made, the tube is pressed close to the fuse by a pair of common pliers. This preparation is most conveniently done before entering a mine, but there is nothiug to prevent its being done in a mine or quarry at any time. The charges of compressed gun-cotton are made with a circular hole to receive the fuse. Into this hole the small end of the tin primer is inserted, instead of the fuse; and this is the only difference in the mode of firing as compared with the usual mode of exploding gun-cotton with a fuse. It is important to observe that when the primer is thus used for blasting, it is not necessary to fill up the hole by any "stemming" or "tamping;" the hole may be left perfectly open, and those who know how often accidents occur in the process of "stemming" or "tamping" will at once appreciate the saving of time and the amount of personal safety thus obtained. In the case of failure of explosion, accidents often occur from the miners attempting to remove the "stemming" material. All this is avoided, as, after a proper interval of time, the fuse, with the primer attached, can be safely and easily withdrawn from the open bore-hole. In the experiments uow to be recited, some loose sand was put in and slightly pressed with a wooden rod. This, however, may be entirely dispensed with. In preparing the bore-holes for the experiments, it was a special object to place them in positions of strength far beyond what would be attempted in the case of ordinary explosion by gunpowder. There were two series of experiments: I. In very hard limestone underground; in Allenheads Mines. II. In the same stratum of limestone, at the surface, at Thorngreen Quarry.

I.—ALLENHEADS MINES.

No. 1. A hole of fifteen inches in depth had been bored in the curve of an arch of very hard limestone-rock, nearly one inch in diameter. Nine inches in length of cylindrical gun-cotton (compressed) $\frac{7}{8}$ in diameter, were used, the weight being 2·6 oz. The rock surrounding the hole was carried away to the depth of six inches. The miners present stated that no useful effect would have been obtained from gunpowder, or, to use their own expression, "It would not have been touched by powder;" in fact it was what miners call "a strong hole," and purposely made stronger than usual. The memorandum of the intelligent mine inspector who was present is as follows: "Six inches left in bottom of hole; too strong; the result very fair under the conditions."

2. A 12-in. hole. The rock very unsound, bored at an angle of 45° to the face. Charge=four inches of one inch diameter (=2·48 oz.) The rock much split and shattered, but not thrown off. The hole itself was widened and much broken off.

3. A 14-in. hole in very hard sound rock, bored in the crown of an arch at an angle of 45° to the face of the rock. Charge, six inches of $\frac{7}{8}$ inch diameter=1·78 oz. The rock much split and partially detached, and, on a further trial with a fresh charge of same quantity of gun-cotton, was cleared away to within four inches of the bottom of the hole; ten inches of rock having been removed.

It must here be observed that the re-charging of unsound holes is a new feature, for neither gunpowder nor gun-cotton, when used in the ordinary manner, would have accomplished such results as were obtained.

4. A 22-in. vertical hole, in very hard rock. Charge, three inches, $\frac{7}{8}$ in diameter, and four inches of one inch diameter, together=3·37 oz. The rock shattered a great deal; the mining results very good. This shattering and splitting of the rock extended to a distance of four feet on both sides of the hole.

5. An 18-in. hole, driven at 45° angle to the face. 2·6 oz. of gun-cotton used; rock cleared away to within four inches of the bottom of the hole, much shattered. The inspector's report is: "Good; three inches of hole left."

6. A hole 19½-in. deep, driven at an angle into face of the rock; about three feet of rock in front of the upper part of the hole. The charge 3$\frac{7}{8}$-in. diameter and 1-in. of 1-in. diameter (=1·51 oz.) The rock was shattered in front of the hole, and the latter was broken across and opened up into a cavity in the rear; about one half of the hole was left in the bottom, and a further experiment was tried with 2-in. of 1-in. diameter (=1·24 oz.) The rock was broken up a good deal more, but not thrown off.

7. A 21½-in. hole, horizontal in vein; the rock variable in structure, and full of cavities. The face of rock 2½-ft. from hole on two sides. Charge 9$\frac{7}{8}$ in. diameter (=2·6 oz.) The rock was much cracked, especially beneath the hole. A second similar charge was exploded in this hole; the rock was greatly shattered and split in all directions.

8. A 20-in. hole, going sideways into the face of the rock, at an angle of abont 45°. There was about one foot of rock in front of the mouth of the hole. Charge 9$\frac{7}{8}$-in. diameter (=2·6 oz.) The rock was torn open in all directions, a result which was pronounced to be very satisfactory by all of the miners present, and in the inspector's notes it is called an "extraordinary good result."

9. A 23-in. hole in soft, unsound material, in the crown of an arch. Charge=4-in. of 1-in. (=2·48 oz.) The charge was not fired, owing to some defect in the mining fuse. The partly-burnt fuse and primer were safely taken out of the hole, and a fresh primer and fuse inserted in a 1-in. charge were introduced, making the total charge =3·1 oz. The rock was pulverized all around the hole, but not much useful work was accomplished.

10. A 21-in. hole, driven at a sharp angle into vein in an exceedingly strong place near the floor of a drift. It was emphatically stated that this hole could not have been attempted with gunpowder. The fuse went out after having been partly burnt. The primer was withdrawn, and a new one, in another 1-in. charge, was introduced, making the total charge 3·72 oz. The rock was much shattered in all directions.

11. A 11½-in. hole into face of hard limestone drift. Charge =6-in. of $\frac{7}{8}$" diameter (=1·78 oz.) The rock was blown away in front of the hole to a depth of nearly six inches. The inspector reports of this hole "very good, having split the side considerably."

Some further experiments were tried, from which a detailed description would convey less idea than a clear view of the general results. In stating these, we prefer to take the observations of the mining inspector, whose great experience of such matters enabled him to form a correct judgment. He states that previous to the experiments being made he had been fully satisfied as regards the superiority of gun-cotton, as compared with gunpowder, for mining purposes, and more particularly so where the rock is hard, and the workings confined to drift levels, etc. In such cases, he states, much less drilling is required for the removal of a given qnantity of rock than by gunpowder, and this constitutes an important element of mining economy. The superiority of gun-cotton, he states, has been proved in practice, particularly in the works of the Blackett Level, where gun-cotton has altogether superseded gunpowder. This being the case, when he arranged the holes for this series of experiments, he had them purposely drilled very strong, not only stronger than ordinary gun-cotton holes, but considerably stronger, with a view to test the powers of the process for the illustration of which these experiments were made. Owing to these circumstances, some of the explosions failed to produce any thing like so satisfactory a result as would undoubtedly have been accomplished if less had been attempted. Nevertheless, he adds, where any nnforeseen obstructions made their appearance, the rock, by means of the detonating gun-cotton, was, to use his own words, "most wonderfully torn and broken up, fully proving to me that gun-cotton is much more powerful when exploded by the detonating primers than when fired by an ordinary fuse."

II.—THORNGREEN QUARRY.

1. A 12-in. hole was driven vertically into hard limestone. The charge=5 in. of 1¼-in. diameter (=3·1 oz.), no tamping used; the rock was opened up radially in all directions, to distances ranging from three to four feet. Large, wide, and deep rents were made in the rear of the hole, in a line with the face.

2. A 12-in. hole; charge 1¼-in. diameter (=3·1 oz.) The rock was rent open in several places up to the face.

3. Charge=3·1 oz. The rock was opened up to the face in several places, one wide rent and many cracks; it was also split up and shattered up to a joint at right angles to the face, at a distance of four feet from the hole.

4. A 24-in. hole bored vertically from a horizontal surface at 4½ ft. from one face, and 2½ ft. from the other, the rock being fast on the other two sides. The height of the rock from the floor of the quarry was 2 ft. 5 in. The charge 7 in of 1⅛ in. (=4·34 oz.) The entire block of rock was broken up level with the ground, and several of the fragments were scattered. This hole has been pronounced enormously strong it could not have been attempted with powder, and the work done was magnificent.

5. A 17½-in. hole, bored vertically; distance of the hole from the face of the rock, 2 ft. 6 in. The rock was fast on the other three sides. There was a joint in it about 16 in. from the hole on each side. Charge=3 in. of 1⅛ in. diameter (=1·85 oz.). The rock was shattered all around the hole, and cracked in several directions; it was removed off round about the hole to a depth of four inches. A second charge of 3·70 oz. was inserted with loose tamping of ashes over it. It opened up the rock to a distance of six feet in a line with the face, and large splits were formed up to the latter.

6. A 25-in. vertical hole in very sound rock, five feet from one face and four feet nine inches from the other. The rock was fast on the other two sides; charge 4·3 oz. of 1⅛ in. diameter, with loose tamping of ashes. The rock was opened up in wide rents to both faces, one split of the rock extending fully six feet down the side; cracks also extended in all other directions to a distance of from four to nearly six feet.

7. A 20-in. hole bored in a horizontal position about four feet from face, in line with the hole, and three feet from the floor of the quarry. The rock was fast on two sides, and the height above the hole about ten feet. Charge 4·96 oz.; it was not found possible to insert the charge further than within three inches of the end of the hole. Some clay was pushed in with a wooden rod over the charge. The entire superincumbent mass of rock was observed to be lifted, and was much shaken; the stone was broken up for several feet all round the hole, and a large crack extended at least six feet upward.

8. A 28½-in. hole, in a position similar to that described in No. 6, and at the same distance from the face. Charge 6·2 oz. (=1⅛ in.) The rock was broken up all round the hole, and cracks radiated from it to a distance of five feet.

9. A 26-in. hole, in similar position to No. 8. Charge 9·4 oz. (=1⅛ in.) A long wide split was produced in a line with the face, and the rock was split to considerable distances in all directions, radiating from the hole.

10. A disc of gun-cotton, weighing 18 oz., was placed on the centre of the upper surface of a perfectly sound slab of limestone rock which was lying on the floor of the quarry It measured nine feet in length, from four to five feet in width, and its average thickness was about twelve inches. This mass of stone was instantly broken into seven large pieces, and the portion immediately beneath and round the disc was shattered into small fragments.

11. A disc, weighing 18 oz., of gun-cotton was inserted into a natural crevice or joint, extending vertically up the entire height of the rock in the quarry. The joint was three feet distant from the face, in line with the joint. The explosion violently shook the entire mass of rock, which was divided from the main body by the joint. The movement of this large mass at the moment of explosion was very perceptible. The crevice itself was considerably widened, and a large block of rock near the base was pushed forward one inch from beneath the superincumbent mass.

A charge of 17 oz. of gun-cotton was made up by stringing, together some mining charges; this was inserted into the crevice which had been widened, as already described, at a distance of five feet from the ground. Its explosion caused the entire mass of rock to move, extended the width of the crevice, and threw off considerable portions of the surrounding stone. It was evident from this result that if two of the 18-oz. discs of gun-cotton had been available, their explosion in the crevice would have had the effect of throwing down the entire enormous mass of rock.

The experiments in this quarry were witnessed by the mine inspector, whose opinions have been already stated. In expressing his opinion, he states that the results effected in crevices of rock at Thornhill Quarry, as well as on the surface of large tables of limestone, quite exceeded any thing he had ever seen, and was quite beyond what he could have credited had he not been an eye-witness thereto.

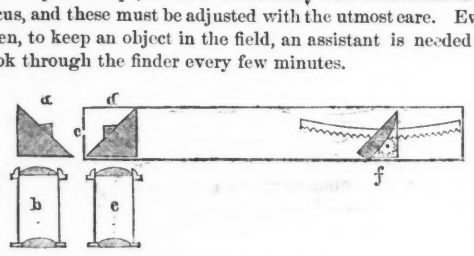
From a careful observation of the manner in which these extremely violent explosions effect the shattering, displacement, or removal of rock, it appears that the efficiency, as compared with gunpowder or gun-cotton exploded in the ordinary manner, is much greater in very hard rock than in softer strata, or when employed in displacing the matrix of veins; but this is the very circumstance to which we are desirous to call attention, as being preëminently the conditions under which we consider that the use of the detonating primer is likely to effect a material economy in the working of mines. Nothing can be more safe or convenient in ordinary handling than the compressed gun-cotton as now prepared for sale by Messrs. Prentice & Co., of Stowmarket Powder Works. Nor can we imagine an explosive apparatus of such great power as is obtained by the use of the detonating primers, to be more safe and convenient for use. As an illustration of the different results obtained by the use of the primer as compared with the explosion of gun-cotton by an ordinary fuse, it may suffice to mention that the following illustration was used at Allenheads: A disc of gun-cotton weighing one ounce was laid upon a large slab of sandstone

fired by means of the ordinary fuse; it merely ignited with a sudden burst of flame, without much noise, entirely without violence, and quietly burnt away in abont thirty seconds, doing no injury whatever to surrounding substances; but when the same quantity of gun-cotton of the same quality was laid on the same stone, and fired by means of a detonating primer as already described, the whole mass instantaneously exploded with a report as loud as a cannon, and with an amount of destructive energy which could with difficulty be understood by any who had not quietly seen and carefully examined the result. Not only was the stone shattered and broken into many pieces, but those portions of it which were immediately under the charge were literally ground and crushed into sand. Such is the enormous difference produced by merely using the detonating primer; an increase of power which merits the attention of all who are concerned in the economy of mining operations.

A New Form of Spectrum Telescope.

BY PROF. EDWARD C. PICKERING.

DURING the past five years, the spectroscope has revealed so much that is new in astronomy, that no large telescope is now considered complete without one. To obtain the spectrum of a star or other object, the telescope is pointed toward it, when, on removing the eye-piece, we perceive a brilliant spot of light at the focus. If now this spot is received on the slit of a common chemical spectroscope, its spectrum becomes visible. The image of the star is, however, so small that it covers but part of the slit, and consequently the spectrum takes the form of a narrow line of colored light. To widen this line, a cylindrical lens, with a horizontal axis, is interposed between the focus and the object-glass, which spreads out the light in a vertical direction, while it does not affect it horizontally. A bright line of light is thus formed, and the spectrum appears as a broad band, in which the dark lines are visible. This is substantially the form of instrument in common use, but it will readily be seen that it has several serious defects, especially when applied to a small telescope. In the first place, the weight of the spectroscope is so much greater than that of the eye-piece it replaces, that the balance of the instrument is destroyed, while the increased length renders observation more difficult. Again, to bring an object into the field of the spectroscope, a finder is necessary with cross-hairs in its focus, and these must be adjusted with the utmost care. Even then, to keep an object in the field, an assistant is needed to look through the finder every few minutes.



The instrument represented in the accompanying diagram is designed to overcome these difficulties. It is a reflecting spectroscope, resembling that at Kew, in which the light traverses the instrument twice undergoing reflection at the end of the tube. In front of the slit *c*, two right-angled prisms are placed, one large, the other small, cemented together. Rays falling on the centre of the large prism pass through both unobstructed, and into the slit; all others, however, undergo total reflection, and pass into the eye-piece, *b*. The latter, therefore, forms a diagonal eye-piece, in which, however, the small prism produces a dark spot in the centre of the field of view. The object of this eye-piece, which may be attached to any spectrum-telescope, is to replace the finder, and also to enable the observer to examine an object without removing the spectroscope. To use it, suppose we wish to obtain the spectrum of a nebula. The telescope is pointed approximately in the right direction, and looking through *b*, we see the nebula somewhere in the field; now bring it to the dark spot mentioned above, when it at once disappears, and we then know that its light is all falling on the slit of the spectroscope. The second surface of the small prism is curved so that it acts like a cylindrical lens. The light, after passing *c*, traverses a second compound prism, *d* and then falls on a 30° prism, *f*. After passing the first surface of this prism, it appears to radiate from a point above the slit. This point is taken as the centre of curvature of the second surface of the prism, which is silvered. A speculum is thus formed by which the light is thrown back, and returning to *d*, is viewed by the eye-piece, *e*. Owing to dispersion, a small part only would be lost by passing through the small prism. As the refrangibility of the light increases, the angle of incidence on *f* must be increased, and at the same time its distance from the slit must be diminished. These effects are produced together by making *f* move along a curved rack by a pinion, as in the figure. For making measurements, a vernier is attached to the prism, and a graduated scale to the frame, or a pencil to the former, and paper to the latter, in which case a drawing may be made of the spectrum without removing the eye from the instrument. If desired, the dispersion could be increased by increasing the angle of *f*, and preventing the loss of light by reflection by cementing a more acute prism of crown glass to its front face. In this case, as the flint glass is entirely protected from the air, the densest kind may be used without fear of tarnishing.

During the last total eclipse the gaseous nature of the solar promontories was conclusively proved by the spectroscope, and although it is now found that these objects can be observed on any clear day, yet their fainter lines would probably be visible only during an eclipse. This instrument is especially suited to such observations if it is turned one half over, so that the two eye-pieces shall lie on opposite sides of the telescope. One observer, looking through *b*, would study or measure the promontories as with a common telescope, while a second person looking through *e* would observe their spectrum. One telescope thus takes the place of two—an important consideration when, as often happens, all instruments must be carried several hundred miles, and the time of observation is limited to a few minutes. By adopting the method of drawing the spectrum mentioned above, not only is an assistant to record the observations dispensed with, but after the eclipse, the spectrum of other substances may be compared with that of the promontories by placing them successively in front of *c* before removing the paper.

The above instrument was described at a recent meeting of the American Academy, but as their proceedings will not be printed until after the approaching solar eclipse, it is published here for the consideration of those intending to observe this most imposing astronomical event.

Interesting Submarine Operations.

OUR readers will no doubt be interested in a brief account of the submarine operations now in progress in New-York Bay. We are indebted to the *Insurance Monitor* for the following facts:

The ship *Figlia Maggiore* was recently sunk by the steamer *Russia* just off Castle Garden, where she now lies submerged to the tops of her lower masts. Fifteen minutes after she went down, the Atlantic Submarine Wrecking Company had a steamer on the spot to give such aid as might be possible. The wreck is in the charge of the consignees—Slocovitch & Co.—who have had seventy men at work from dawn until dark, stripping her of rigging, and making preparations for the discharge of her cargo, which, it is feared, is very much damaged, but none has been lost except some shoals of corks floating over the bay, a prize for speculating boatmen. Alongside of the sunken craft lies the *Lackawanna*, on board of which is the air-pumping apparatus; on the east lies the *Ida Grant*, with steam-engines for elevating purposes. The *Jane* sloop is the freight receiving vessel, and also the resting-place of those who stay by the wreck all night. For some days past, divers have been engaged in striving to get at the cargo, but owing to the vessel being sunk in a swash, where two tide-ways meet, their task has been an arduous one, as every particle of it has to be broken out and slung, fathoms beneath the water's surface, by men who carry one hundred and thirty-six pounds more than their own weight, in order to keep them below. The tide also is a great hindrance to the operation, to obviate which bulkheads are to be built around the vessel. The dress of the divers is a rubber garment, covered with canvas, extending from neck to the feet, on which are heavy boots with leaden soles, weighing eighteen pounds each; on their heads they wear helmets with three latticed windows, one in front and one on each side. From its top is a rubber pipe connected with the air-pump on the *Lackawanna*, at which two men work all day long. The slightest inattention to this pneumatic machine would be fraught with the direst results to the diver below. At the back of each diver's helmet is another pipe, for the escape of foul air. Over the men's shoulders are fixed broad brass collars, attached to which, before and behind, are two weights, forty pounds each. Around the diver's body is a rope, or life-line, which is held by a man perched in the cross-trees of the *Figlia*. The diver is lowered down, and has to grope his way in the vessel's hold until he finds some movable article, to which he hooks on the tackle in his hand, and it is hoisted up by the steam-engine on board the *Jane*. The divers say they are knocked over very often by pieces of loose cork, but they sustain no injury. They are also swept through the vessel's hold by the undercurrent with fearful rapidity, but fortunately escape hurt. Truly, nerve, judgment, nautical skill, and courage are requisite in a good diver. Their average wages are $250 a month, and there are but twelve divers in New-York. The vessel will not be raised in less than three or four weeks, and the cost of the whole affair, discharging, raising, and repairing, will be at least $150,000.

Method for Increasing the Flow of Wells.

M. DONNET, an engineer of Lyons, proposes to increase the flow of wells by closing the mouth as perfectly as possible, by means of a sheet-iron bell, through the top of which the tube passes which is attached to the pump. When the pump is worked, if more water is withdrawn from the well than naturally flows into it, the water-level is lowered, and a diminntion of pressure is produced on the surface; this causes an increased supply of water to come in from the springs which feed the well. Indeed, since this increased flow enlarges the channels of supply, the total delivery of the well is permanently increased. Experiments made at the *Exposition Universelle* by a government commission have fully confirmed the value claimed for Donnet's improvement. At Lyons, a well which yielded ordinarily only 400 liters per minute was made to give regularly more than 1200 liters by the use of Donnet's apparatus. The same result was obtained at Rheims. If the water-level is very variable, the pump may be placed immediately above the cover, with the valves always accessible. The experiments thus far made prove that there is generally quite an advantage in this improvement on the score of economy in motive power. It is based on well-known principles of science, and furnishes a simple solution to the question of the supply of water by wells, permitting their size and depth to be diminished, and regulating their yield at pleasure.—*College Courant.*

REVIEWS.

Power Without Fuel: An Investigation of the Means by which it may be Obtained from the Natural Sources. By JAMES S. BALDWIN. New-York: W. H. Winans & Co.

THE main idea on which this investigation is founded is the fact that when liquids are heated far above their boiling-points, a small increase in temperature will produce a much greater augmentation of expansive force than the same increase would produce if started from a lower heat. To heat water in a closed vessel from 212° to 248° Fah. will produce an increase in the pressure of its vapor of fifteen pounds per square inch; but if the same number of degrees of heat be added to water previously heated to 473°, bringing it to 509°, the expansive force of the steam will be raised from 35 to 50 atmospheres; 15 atmospheres, or 225 pounds to the square inch, in place of 15 pounds in the former case. Two vessels of water, in which such a difference of temperature was maintained would, when connected by proper machinery, exert their difference of pressure and drive the machinery, the force developed increasing in proportion to the distance above the boiling-point.

The writer of the above pamphlet, however, does not mention the case of steam, which we have only introduced for explanation. He purposes to use liquefied carbonic acid, the boiling-point of which is 112° below zero, Fah. The common temperature of the air is so far above the boiling-point that a small increase in temperature affects it more than it does water at 500°.

The increase in pressure of liquid carbonic acid is represented in the following table (not borrowed from the pamphlet):

DEGREES FARENHEIT.	PRESSURE IN ATMOSPHERES.
120	74
116	68
100	62
90	56
80	49
70	44
60	39
50	34
40	30
30	26
20	22
10	18
0	13
—10	12
—20	10
—30	8
—40	6
—50	5
—60	4
—70	3
—80	2½
—90	2
—100	1½
—112	1 — Boiling-point.

It may be seen from this table that the liquid carbonic acid behaves like water—at low temperatures, the tension of its vapor is, for the addition of ten or twelve degrees, only raised one half an atmosphere, or seven pounds per square inch—less than a pound per degree—while, at high temperatures, the same difference of 10° gives a difference of six atmospheres, or ninety pounds per square inch. This high temperature, however, is, in the case of the liquid carbonic acid, only the common temperature of the air, and herein lies, according to the writer of the above pamphlet, the advantage. It will not be necessary to use any fuel at all: two vessels are to be used, and one is to be heated by the sun's rays, or cooled by some means, so as to keep up a difference of only 10°, or thereabouts.

The writer acknowledges the practical difficulties connected with his plan. They are: the great strength required to stand pressures of one thousand pounds per square inch, making all the apparatus very heavy and dangerous; the obstacles these thick metallic plates offer to the transmission of slight differences of temperature; the expensiveness of the liquefied carbonic acid gas, etc. But he suggests means to overcome these difficulties, for which, however, we have not space, and we must recommend the reader interested in the subject to the pamphlet itself. The greatest difficulty we foresee in this device is to cause an engine to work well where there is a constant back-pressure on the piston of some seven hundred or eight hundred pounds to the square inch, while it is driven by the comparatively slight excess of some eighty pounds.

On the title-page of this pamphlet we find the following remarkable note:

"The right is reserved to patent in the United States any of the plans herein described, not already patented. None of them, however, will be patented in any European country; they will be free to all who may there choose to employ them."

This is evidently a bait to European inventors. The writer of the pamphlet has clearly no intention of troubling himself with the exceedingly expensive experiments connected with the development of his ideas, but wants others to go into it, reserving for himself the United States patents, if the labors of others give some practical shape to the subject. If we are not mistaken, it is the same party who has taken out a few patents concerning the manufacture of carbonic acid gas, and the use of the liquefied gas, which bear in their specification the stamp of inexperience. He never troubled himself about the practical execution of the things patented; and it is a great defect in our patent system that an American inventor is not obliged to bring his ideas into practical shape within a certain time: it is the law in France, and also in regard to foreigners who take out patents here. This defective feature has permitted very many patents to be secured on mere ideas, the patentee doing nothing further than to watch for infringements and prosecute them. Worse even than this is the system of reissue, by which an inventor may change a patent which in its original form does not enable him to prosecute some manufacturer. The reissue may be arranged in such a way as to make the poor manufacturer guilty of infringement; and as the date of a reissue is made to conform to the date of the original patent on which the reissue is founded, cases have occurred where an inventor obtained a patent dated back so far that he could prosecute a manufacturer whose business had for several years been firmly established.

MINING SUMMARY.

Nevada.

THE COMSTOCK MINES.

FROM the review of the San Francisco Stock-market for the ten days ending June 10th, published in the *Commercial Herald*, we take the following statements: The Annual Meeting of the Cholar-Potosi Company was held on June 7th. During the fiscal year under review, 26,734 tons of ore were extracted—13,292 tons coming from the eight-hundred level. The shaft has been carried to a depth of three hundred feet, from the eight hundred to the eleven-hundred level. From the Secretary's report we take the following:

RECEIPTS.

Bullion product	$819,479
Sale of tailings	15,061
Assessment	90,000
Miscellaneous items	18,187
Cash in treasury May 1st, 1868	127,683
Total	$1,100,410

DISBURSEMENTS.

Crown Point mine, labor and supplies	$287,853
Mine improvements	9,265
Working 25,833 tons ore	321,668
Legal expenses	4,815
Taxes	10,229
Assaying	7,555
General expenses Gold Hill and San Francisco offices	28,045
Virginia and Truckee Railroad subscription	18,750
Dividends to stockholders	360,000
Miscellaneous items	9,550
Cash in treasury May 1st, 1869	42,680
Total	$1,100,410

The ore statement for the past year shows that 25,8324 tons were reduced, yielding $845,627, or an average of $32.73 per ton, as follows:

	Tons.	*Average.*	*Amount.*
Rhode Island mill	17,685	$30.93	$546,959
Outside mills	8,148	36.51	297,641
Assay grains	....	....	1,027
Totals	25,833	$32.73	$845,627

The average cost of working the ore for the past year was $11.66, and for mining, $9.80—making a total cost of $21.46 per ton. The assets of the Company on the 1st of May were as follows:

ASSETS.

Cash on hand May 1st, 1869	$42,679.76
Rhode Island mill	60,000.00
Mine improvements, building, etc.	80,000.00
Stock on hand at mine	33,282.38
Stock on hand at mill	27,909.74
A. and P. S. Telegraph Company	493.75
Virginia and Truckee Railroad	18,750.00
Totals	$263,115.63

The only liability against the Company, May 1st, 1869, was $56,250, being balance of subscription ($75,000) to the Virginia and Truckee Railroad Company. The annual ore statements for the past five years compare as follows:

	Tons worked.	*Milling per ton.*	*Yield per ton.*	*Mining per ton.*
1864-65	3,766	$20.00	$36.60	$15.00
1865-66	18,258	15.09	37.73	8.87
1866-67	34,750	14.97	35.91	7.50
1867-68	25,964	13.36	33.35	9.85
1868-69	25,833	11.66	32.73	9.80

The following Trustees were elected for the ensuing year: A. Hayward, Thomas Bell, Thomas Sunderland, J. D. Fry, and Robert Sherwood. Subsequently, J. D. Fry was chosen President; John P. Jones, Superintendent; and Charles E. Elliot, Secretary. During the week ending June 4th, 1160 tons of ore were extracted, and 1477¼ forwarded to the mills. The connection has been made with the Hale & Norcross ground, on the eleven-hundred station north. The daily ore-slip of June 7th states that six mills were supplied with two hundred and forty-five tons of ore. The bullion returns for May foot up $131,383.

At the Imperial, there is still no change, either in the shaft or south drift. The bullion receipts in May amounted to $42,902.63, against $37,887.83 in April.

The receipts of bullion from the Savage Mine in May foot up $155,000.

Gold Hill Quartz reports a bullion product of $5600.81 for the month of May.

From the Hale & Norcross, the receipts for the month of June aggregate $152,780.44. During the week ending June 5th, 1142¾ tons of ore were extracted, as follows: One hundred and seventy-five level, 97; three-hundred level, 291; third station, 51 tons; fourth station, 375¾; fifth station, 589½ tons; and, during the same time, 1147 tons were delivered to the mills, leaving on hand 945¾ tons.

The bullion yield of the Empire for May aggregates $14,618.37.

On June 8th, the drift of the Ophir had been extended three hundred and forty-three feet. The rock is as hard as ever, but is changing somewhat in character.

At the Gould & Curry, timbers have been placed for the new station, but no drifting will be done from the station until the timbering and sump are completed. Considerable ore has been extracted recently from the upper works of this mine.

Sierra Nevada disbursed its first dividend on June 10th, amounting to $2.50 per share. They carry over a surplus of $5000 or $6000. In May, the receipts of bullion amounted to $21,800. On the 6th of July next, a meeting of the stockholders will be held, to consider a proposition to increase their capital stock to $3,000,000, divided into 15,000 shares of $200 each.

THE SILVER-MINES—WHITE PINE *vs.* WASHOE.

The following letter from a correspondent of the *Tribune* will be read by miners of the old school with considerable pleasure. The writer is evidently one of that class himself, for he sketches the history of our mining excitements with a spirit that personal experience only could inspire. His statements in regard to the Comstock Mines will startle many, but the cautious and well-posted reader will not be frightened by them. He says:

"After an absence of nearly three years, I have again reached the famous Comstock lode, that, for the past eight years, has yielded such immense wealth in silver and gold, partially compensating for the exhausted placers of California. The changes of three years are very perceptible, even in this city, and several of the little towns, whose vitality depended entirely upon certain mines now nearly or quite exhausted, are now almost depopulated. The quantities of ore removed and reduced every year would have lasted a century, if worked by the crude, disadvantageous processes employed in South-America and Mexico, and the supplies once deemed inexhaustible by the enthusiastic miners are now giving unmistakable signs of depletion. The Gould & Curry—the pride of Washoe, whose owners formerly wielded so great a monetary influence as almost to realize the fabulous story of Midas, whose retorts, in the glorious old days when Charley Strong was Superintendent, turned out from four to six tons of bullion per month, and declared monthly dividends of $75 per foot, in the face of unparalleled expenditures—is now taking, perhaps, a final rest from its herculean efforts, and its great mill, capable of reducing one hundred and fifty tons of ore a day, and the erection of which cost over a million dollars, stands idle and deserted, the quality of ore taken from its mine having so depreciated as to render profitable working at present impossible.

"Washoe has immortalized herself, but her glory has departed, and her mantle will probably descend upon the shoulders of Eastern Nevada. I paid Como a flying visit yesterday. Once its mines were supposed to be as rich as the Comstock, and a town of mushroom growth sprang up, with its full quota of whiskey-shops, gambling-saloons, and embryo hotels, interspersed with stock and pawnbrokers' offices, mining-companies, and outfitting-stores. But, alas! 'the best laid plans o' mice and men,' etc.—the mines failed to sustain first impressions, and to-day only two men remain of the hundreds that made Como their home. On either side, as we rode along the deserted streets, were the monuments of man's industry, standing just as they were left, undisturbed even by the wandering Pinte, who straggles through town, eating pine-nuts, and marvelling at the foolishness of the white man, who builds up towns on the barren mountain-side, and then leaves them to the bats and owls. Only two men, I said, remain faithful to the decayed fortunes of Como, but these two men are a host in themselves. So far from being discouraged by prospects that, to say the least, look rather dark to the visitor not inspired with the degree of confidence they possess, they still have Como on the brain to an unlimited extent. Never was old Caleb, of Wolf's Cragg, more solicitous for the welfare of his master, or more anxious to support the honor of Ravenswood, than are these two sole survivors of departed greatness in the defence of Como. Any expressed doubt of the richness of the adjacent mines is indignantly repelled, and, if persisted in, opens a breach in friendship that nothing but sincere repentance and absolute retraction will close. If you timidly suggest that the absence of so large a portion of the population must retard a rapid development of the resources of the country and cause a stagnation in business matters, they instantly proceed to account for it in so satisfactory a manner that you finally arrive at the conclusion that most of the community are spending their surplus cash during the hot months at Lake Yahoe, and other popular watering-places, while the remainder are using their powerful influence, both East and West, to secure for Como a monopoly of the business now enjoyed by San Francisco and Chicago.

"Miners returning from White Pine are unanimous in the opinion that it is the richest discovery yet made this side of the mountains, but state that there are already a great many more men there than can find employment, and consequently an appalling amount of suffering from hunger and exposure. They speak of men known in this community as industrious, steady men, of unstained reputation, and who left lucrative positions here, begging their bread at White Pine, and, upon the whole, the number prospecting for "grub" seems to be largely in excess of those prospecting for ledges. Many assert that, as the ore has not the clearly-defined vein running in certain directions like the Comstock, it cannot be very extensive, but is confined to pockets, which, although very rich, will soon be entirely worked out. This was a very popular theory, however, in the early days of Washoe, among the "croakers," and is perhaps as fallacious in this case as in that. The Eberhardt is the richest claim yet discovered and thoroughly prospected, and the "pay-ore" is found in a vein twenty-five feet wide. This mine has already sent some hundreds of thousands of bullion to San Francisco, and the ore grows richer as they sink deeper. The returns are nearly all in silver, very little gold being found in any of the mines east of the Comstock. In most of the White Pine mines, it is easily reduced by the common mill process, but smelting-furnaces are now being erected to destroy minerals, common in some of the levels, that neutralize the action of quicksilver upon the precious metals. The Reese River country is nearly deserted for this new excitement, and property there cannot be sold at any price, unless it can be profitably transported to White Pine. Many of the quartz-mills are being removed thither, and even dwelling-houses and stores. Lumber stood for several weeks at $500 per thousand, but rapidly declined, as did provisions, both of which may now be bought there as cheap as here, with the cost of transportation added. All returning from White Pine agree that the climate is of the most villainous description. This is owing entirely to its great elevation, Treasure City being more than nine thousand feet above the sea, or two thousand feet higher than Virginia City.

"The stampede for White Pine from California in general, and from San Francisco in particular, has gradually subsided, and society is again returning to its normal condition. The excitement attending this last great discovery of auriferous and argentiferous lodes and ledges has been almost unprecedented in its intensity, even among the volatile and versatile dwellers of San Francisco. These periodical mining excitements seem to be as essential to the healthy growth and proper development of the Pacific Slope as is the regular morning whiskey-cocktail to most of its inhabitants, and a dearth of the stimulant which has now become a necessity is attended by a universal stupor, from which a large class of people are only aroused by the glad news of discovery from the prospectors in the mountains. Never, since the palmy days when the silver-leads of Washoe were opened had the mining excitement raged so generally as during this latest rush to the far interior. "Old forty" miners, who had trod every gold-placer from the Yuba to the Merced, had shivered under their tattered blankets on the hyperborean banks of Frazer River, and paid their *devoirs* at the shrine of Midas under the burning suns of Arizona, again sprang to their feet, with eyes sparkling under the stimulating influence of gold, strapped their blankets to their backs, and led the van of the great tidal wave of humanity now surging eastward over the snow-capped summits of the Sierras, to the barren, sage-covered hills of Nevada. Inured as they are to every hardship, privation, and change of fortune known to this fluctuating community, these worthies, never discouraged, never disheartened, are always ready to pioneer the way to the hidden treasures of the mountains; the fact that they had returned from the Boise diggings "dead broke," had "spared" their way back to "Frisco" from Salmon River, and chased the glittering *ignus fatuus* through the pestilential wilderness of New-Granada, was but as a feather in the balance when the glorious news was heralded over the land that rich mines had been discovered at White Pine, and the life-inspiring cry of gold changed them in a twinkling from "chronic old bums," whose stamping ground was the What Cheer House and the Miners' Restaurant, into the hardy, iron-framed pioneers, perfectly adapted by nature, inclination, and experience to prepare the way for the thousands of adventurers, laborers, and mechanics that followed so closely upon their footsteps. These latter classes, of course, furnished the great bulk of emigrants to White Pine; and San Francisco, overcrowded by adventurers, disgorged her thousands. Steamer after steamer left the wharf for Sacramento loaded with passengers, until it resembled a beehive just before swarming. Passages were engaged a week in advance, and high premiums were offered for tickets that secured an immediate departure, and even then the passage could only be secured to the end of the railroad, leaving 150 miles of stage-coaching, which, if it had not previously been secured by telegraph, was of the most uncertain character. The stage-route was difficult in the extreme—huge snow-drifts, through which the passengers were obliged to shovel their way; intense cold, that froze the feet and hands of nearly all the travellers, were not the only things that made the journey unpleasant. All along the route were strewn broken wagons and dead cattle, some deserted by the owners, others in process of repair, though the only tool, perhaps, was a miserable old axe or a jackknife. Here a party might be seen dragging down from the timbered hillside a pine-log from which to fashion a rude axle, and there a man sitting in despair over the ruins of his slender mud-wagon that had been literally pulled in two in the desperate endeavors to extricate it from the slough in which it had nearly disappeared, while near by the treacherous side-hill road had given way beneath the ponderous freight-wagons, and hurled them down the slope, a chaotic mass of irretrievable ruin, leaving the luckless driver to dispose of them as best he could, with Hamilton still 100 miles away. Such are a few of the hardships encountered during the early months of the White Pine excitement. The barren slopes of Treasure Hill were checkered from valley to summit with claims and cabins, while house lots at Hamilton, a town occupying a position similar in its resources to the surrounding country, as Denver does in Colorado, doubled in value every week as the eager thousands still came pouring in from the east and west."

Arizona.

THE Prescott correspondent of the San Francisco *Bulletin*, writing under date April 25th, thus reviews the mining field:

WICKENBURG AND THE VULTURE MINE.

After a few days' stay at La Paz, I took stage to Wickenburg, about one hundred and twenty miles nearly due east. Wickenburg, named after the discoverer of the Vulture Mine, is a lively mining town, situated on the Hassyampi River. The Vulture Mining Company, the owners of the discovered claim, have as complete a twenty-stamp mill as I ever saw. It has been running continuously for over two years. The Company is a sort of close corporation—organized in New-York, and the managers keep their own counsel. The mine is situated about fifteen miles south of the town, and is said by those who have visited it to be something wonderful. The fact that the Vulture Company have hauled and crushed over 25,000 tons, all taken from less than three hundred feet of the ledge, and the most of it from above the level of the surrounding plain, is wonderful. They have paid over $200,000 for hauling ore. There is, besides the Vulture Company's twenty-stamp mill, a ten-stamp mill running on ore from an extension claim.

FROM WICKENBURG TO PRESCOTT.

From Wickenburg to Prescott it is about sixty miles by trail, and eighty by the wagon-road. The mail and most of the passengers go by this road. At Date Creek, thirty miles from Wickenburg, is a two-company military post. From this point toward Prescott the country improves in fertility and beauty, until when the vicinity of Prescott is reached, it seems like a terrestrial paradise—mountains and valleys clothed in verdure, clear, sparkling brooks, and dense forests of pine—a most agreeable contrast to what you leave behind.

PRESCOTT—FORT WHIPPLE.

Prescott is beautifully located on Granite Creek, partly in a pine forest, and partly in an opening extending east, and has all the appearance of a northern town. There are two or three brick buildings, a few log houses, but the great majority are frame buildings, boarded and shingled, and some of them neatly painted.

Fort Whipple, a two-company cavalry post, is one mile east of the town. The view looking northeast toward San Francisco Mountain, with its snow-capped summit, is magnificent.

MINING AFFAIRS—THE STERLING.

My first day's work was a visit to the Sterling mine, situated on Granite Creek, about four miles from town. The ride is along the Creek, and nearly the whole distance through a pine forest. Arrived at the mill, we found every one busy preparing for the new ten-stamp battery shortly expected. The old mill had only five stamps. Several hundred tons of ore have been worked in the old battery, some of it yielding as high as $32 per ton in free gold, the great bulk of gold being left in the sulphurets, to work which, chlorination works have been erected. At the mine, about one-half a mile from the mill, we found every one so busy that we had to make our observations unaided. At the dump was a large pile of ore, most of that class of sulphurets which are said to be very rich. Descending the shaft about seventy-five feet, we followed along the drift running in the vein, eighty feet. The drift runs along the foot-wall, which is smooth, regular, and covered with a greasy talcose matter. At the end of the drift a cross-cut had been made, showing the width of the vein to be seventeen feet from the foot to the hanging-wall, over three feet of which showed masses of brilliant sulphurets, said to be rich. Irregularities in the side of the eighty-foot drift show the same class of ore. At the end of this drift, men were at work continuing the drift and taking out first-class ore; at the bottom of the shaft others were at work running in a drift on the vein in an opposite direction; on the surface a winze is being erected, so as to hoist by mule instead of man-power. The operations, both at the mill and mine, looked like business. There is a great abundance of ore (enough could be taken out to supply a twenty-stamp mill), and if there is no hitch in the extraction of the gold, I predict for this mine a brilliant success. It is owned in San Fran-

cisco. I saw some fifty pounds of sulphurets from the mine worked in your city, that yielded $484 per ton. Assays recently made here go over $600 per ton—ore taken from the end of the drift.

OTHER LEDGES.

From a small vein running in under the Sterling mill, I was shown some beautiful specimens of silver ore. All around here are ledges on which more or less work has been done, and nearly all of which make sufficient show to warrant exploring them further. With such a delightful climate, such agricultural resources, and such an abundance of wood and water, mining ought to be carried on here almost as cheaply as in California, and more cheaply than in Nevada.

THE BIG-BUG DISTRICT.

In company with several gentlemen I visited the Big-Bug mining district, twelve miles southeast of Prescott, by trail, and about twenty by wagon-road *via* Woolsey's Ranch. On Big-Bug Creek, which runs through a valley of the same name—one of the most beautiful little valleys I ever saw—I found a splendid ten-stamp mill, complete and in perfect working order. The mill-keeper, who is living here alone, informed me that the mill was built by two parties engaged in business at Prescott, and that some seven hundred tons of ore were crushed in it, when for some reason it was shut down. He said that the ore crushed—some three hundred tons from the Galena, one hundred and twenty-five tons from the Chaparral, and the balance from the Dividend, Independent and others—yielded in free gold from $14 to $20 per ton.

THE EUGENIA MINE.

One-half a mile above the mill, and on the creek, we visited the Eugenia mine, opened by a tunnel driven in on the vein one hundred and fifty feet. At the dump lay from twelve hundred to fifteen hundred tons of ore. The vein runs through a hill, some five hundred feet above the level of the creek, and crops out on the hill for over a mile, in some places thirty feet wide. The ore extracted contains gold-bearing quartz, mixed with sulphurets. Some five tons worked in the mill—an average of the mass on the dump—assayed $35 per ton, and yielded in free gold about $14.

THE BIG-BUG MINE.

West of the mill, about one-half a mile, we visited the Big-Bug mine—the mine after which the district was named. It runs along the side of the hill and crops out boldly for over a mile. The discovery claim has been opened by a shaft about seventy-two feet, the ore containing free gold visible to the naked eye. Several tons worked in arastras yielded $90 per ton, and fifty tons, worked in the mill, paid, but how much my informant did not know. The best proof of the richness of this mine is the fact that the Mexicans who were at work sinking the shaft agreed to do the work for the ore which they took out. Water came in, and for some reason work was stopped. There are now about twenty-five feet of water in the shaft, so I could not go down, but a party who has been down told me that at seventy feet the vein was the width of a long-handled Ames' shovel, every inch of which glistened with gold. I secured some elegant specimens, both from the dump and from the croppings half a mile from the shaft.

THE GALENA MINE—THE CHAPARRAL—DIVIDEND.

About one mile farther on up the hill we visited the Galena mine. This mine has been developed to a greater extent than any other in this district. Three shafts have been sunk on this vein one hundred and twenty feet apart; one sixty-five feet, one eighty feet, and one one hundred and five feet, and a drift run on the vein about ninety feet. In the shafts and drifts the vein is visible and can be seen. The pay streak varies from two feet to six feet. We measured several places where the pay streak was five feet and over. The ore in this mine, as in all the others which I saw, was decomposed or honeycombed quartz down thirty-five or forty feet, below which it is sulphurets mixed with quartz. The mill-keeper told me that there were some three hundred tons of decomposed sulphurets taken from this mine crushed, that yielded $17 per ton free gold. A few hundred yards from the Galena, we visited the Chaparral, on which a good deal of work has been done, and from which one hundred and fifty tons of ore have been taken and crushed; this yielded $18 per ton, in free gold. Two or three hundred tons of good ore are now lying at this mine. Still further on we visited the Dividend, opened by a tunnel run in on the vein, and by a shaft sunk on it some two hundred feet from the mouth of the tunnel, each about fifty feet. From this mine sixty tons of ore were hauled to the mill, which yielded in free gold $20 per ton. Assays of the concentration, and of the tailings of the mill, show that on all the ores worked from the various leads, not over twenty-five per cent of the gold was obtained. The Chaparral and Dividend are both evidently extensions of the Galena.

OTHER MINES.

I visited another mine called the Independence, opened by a cut about twelve feet deep, showing from the outcrop down a vein about five feet wide, rich in fine gold visible to the naked eye. During my trip I passed by and casually examined innumerable quartz ledges slightly developed, every one of which showed "good indications." In the Big-Bug District the number of quartz veins that crop out are almost innumerable. I have only named the few that are developed sufficiently to be known.

GREAT RICHNESS OF THE COUNTRY.

What I have seen thus far exceeds all I ever saw in California or Nevada, and I have visited most of the mines on the Comstock Lode, and in Grass Valley and Amador. Compared with the Eureka in Grass Valley, the Galena makes, in proportion to the development, more show of ore, and ore which, if my information is correct, shows by a test of seventy-five tons double the amount of gold per ton.

WHAT ARIZONA WANTS.

If this country were opened up by the thirty-fifth parallel railroad, the section immediately around Prescott would produce more bullion than Nevada produces to-day. I am not much of an enthusiast on mines—have always been a "bear"—but I must say that the sights I have seen here would induce me to go in on "feet" if I had the cash. The only drawback to the settling up of this section of country and the development of its vast resources is the lack of communication, and the fear of the Apache. Abroad they are regarded as fearful foes; here they are only considered dangerous from their cowardice—one settler considering himself a good match for fifty of them in an open fight.

Pennsylvania.

FROM THE COAL AND IRON DISTRICTS.

RELATIVE to the resumption of work by the miners, the Mauch Chunk *Gazette* says:

"We seem to be no nearer a general resumption than last week. Excepting that about three fourths of the Schuylkill collieries, and a scattering few in the Lehigh, Wyoming, and Lackawanna regions, work has not yet been begun, and the prospect for a settlement of differences between employers and employees is yet as remote as ever. The miners have achieved one of their avowed objects—namely, that of reducing the surplus of coal in the market, and some sort of a basis, or sliding scale, has been virtually conceded by most of the operators. The points of difference now are mainly regarding the amount of the percentage or wages to be allowed. The operators and companies which have come to terms with their employees have, in most cases, granted them their claims in full. They are, of course, reaping a harvest now by having the market to themselves. The other operators say that to yield to the demands of their men would ruin them. The miners still idle exhibit an equal determination, and generally refuse to make any compromise or variation from the terms agreed to in their district meetings. Their more fortunate brethren are in a position now to furnish them with material assistance, and it is impossible to conjecture how long such an anomalous condition of affairs may continue. It is certain, however, that it is for the interest of both parties, as well as of consumers and of business generally, that some just and permanent agreement be arrived at soon."

The Scranton *Republican*, June 24th, states that the Delaware and Hudson Canal Company's men hereabouts have sent notice to the Company that if they are not put to work in five days they will not work for a year. We are told that a number of Hyde Park miners will be down here to go to work on Monday, unless satisfactory arrangements are made for them at home before that time. Delaware and Hudson miners are at work at the different mines of the Wilkesbarre Coal and Iron Company, at some places three and four in a breast. The new coal-works of the Pennsylvania Coal Company, located near Gipsey Grove, about one mile east of Dunmore, are considerably advanced toward completion. The immense cracker, which is being built on contract, by Mr. William Brockway, of Pittston, is so far completed that portions of its machinery are being placed in position. The shaft is being sunk as rapidly as possibly, and the heavy mason work for the foundation of the boilers and engines, which are to run this "machine," is nearly finished. Four drifts are already open and ready to work whenever things are in running order. The branch road connecting these works with the Company's road at the head of No. 7, is also building. D. J. Smith has a large gang of laborers engaged vigorously pushing this work forward. Thus are our forests rapidly converting into busy marts, and the quiet of the wilderness being broken by the hum of industry and the rumbling of ponderous machinery.

THE IRON FURNACES.

The Iron works, says the Easton *Free Press*, along the Valley, especially the furnaces, suffer very much from this coal strike. They all run on half blast; some have already blown out one stack; and some must altogether discontinue in a week or two if the strike lasts as long as that, and all must stop in three weeks, as their supply of coal will then be entirely exhausted.

The Allentown *Register*, June 16th, says:

"The Jordan Rolling-Mill has procured coal from the semi-bituminous regions west of the Alleghenies, and has thus been enabled to resume operations. Other iron works will do the same thing until work is commenced again in the anthracite coal fields."

AFFAIRS AT MAUCH CHUNK.

A correspondent of the Philadelphia *Ledger*, writing from Mauch Chunk under date June 24th, says:

"Mauch Chunk is unusually dull at the present time, in consequence of the strike of the miners. No work is going on at any of the mines belonging to the Lehigh Coal and Navigation Company, and no one seems able to tell at what time work will be resumed. Passing through the mining district to-day, by way of the Switch-back Railroad, we found large numbers of the miners idling away their time in the vicinity of the village on the summit and near the mines, and to all appearance indifferent to the present condition of things: some, however, who were unable to live any longer without work have gone to the Schuylkill region, where mining has been partially resumed. Those living in the houses belonging to the Company, will, it is said, be soon warned to leave, if operations are not commenced.

"It is a somewhat difficult matter to ascertain precisely the reason why the strike continues, as it is stated that the operators are willing to pay the demand for advance wages made by the miners. It s also asserted that the great reason why work is not resumed is that the miners insist that they shall control the mines, and say who shall be employed or discharged; the dismissal of any one to be controlled by a committee appointed by the miners. The operators contend that this arrangement would leave them entirely at the mercy of the miners. Again, the miners demand 55 cents per ton for mining and loading the cars in the mines, the price of the coal to be fixed at $5, and 20 per cent to be added whenever coal goes beyond that price, the New-York market to be the standard.

"The operators are willing to pay the 55 cents, and 12 per cent on prices over $5, but they insist that the Mauch Chunk market shall regulate the matter.

"The same state of things exists among the miners at Scranton, and nearly all kinds of business suffer from it. Both miners and operators are stubborn in the matter, and there is no telling when a compromise will be made. Over six hundred of the miners at Scranton have left for the Schuylkill coal region, where work can be obtained."

MINERS' WAGES.

The Anthracite *Monitor*, June 19th, says:

"In accordance with the decision given on June 14th, at a regular stated meeting of the Wilkesbarre District No. 12, of the Miners' and Laborers' Association, of the Anthracite Coal Fields of Pennsylvania, work was resumed on the morning of the 16th, except in one place, which did so on the 17th—that is, under the Wilkesbarre Coal and Iron Co. The basis is as follows: From 7 to 12 cents per car in addition to the old prices. This was given in proportion to the number of cars loaded, and forms our basis. Percentage as follows: 12½ per cent upon the dollar or value of the car. This is to be the sliding scale, to start from the five-dollar basis. This is to cover the cutting of all coal, yardage, and all day labor. That is all that is in the Association, inside and outside, from the breaker-boy up."

Montana.

GULCH MINING AND PRODUCTS.

IN the Helena *Post*, June 4th, we find the following touching the gold product of the mining gulches and their prospects: "We noticed yesterday at Bohm & Aub's Bank a gold brick, weighing 1039 oz.—coin value, $18,547.69; currency value, $26,000. Another young nephew of this 'Old Brick' lying by its side was valued at $7000. In Hussey, Dahler & Co.'s was still another of $14,000 value. All these bricks were made on Saturday from gold taken in at two of the several banks in Helena. Does it look played out? Another fact: During the month of May, 1869, Wells, Fargo & Co. shipped from their office in Helena thirty per cent more gold bullion than during the corresponding month of 1868. The indications are that the product of the placers this year will exceed that of last, a presumption that only requires occasional rain to render it a certainty. Prof. A. Steitz, of the First National Bank, run a bar yesterday amounting in weight to 548 oz., which held a value of about $13,000 currency. This was composed entirely of gulch gold, mined in Deer Lodge county. We understand that all the assayers are busy in moulding into bricks and bars the gold which is daily taken out in our gold-producing gulches."

STERLING.

Mr. John Vanderbilt reports that mining operations in the vicinity of Sterling are in a very prosperous condition. The Sterling Mining Company are at work with seventeen men, and clean up very large returns. A. A. Mesler & Co.'s ditch is completed and conveys water from Willow Creek into Norwegian gulch, and from the claims supplied by this ditch, satisfactory results are obtained. Fletcher & Clark are mining very extensively. Dr. Stafford is hydraulicing. Gilbert & Co. have constructed a ditch conveying water from Willow Creek upon Gold Run, about seven miles long, which increases the facilities for mining. The only drawback to a prosperous mining season is the scarcity of miners. Quite a large number of men could obtain constant employment at good wages. Taken all together, the prospects are very flattering for the summer's mining.

CROW CREEK.

A gentleman just in from Crow Creek reports times lively for the number of population there—about 150 persons altogether. Five hydraulics are being run with good results. In all, about forty claims are being worked, nearly all yielding good average pay. Plenty of water is also reported, and there will be considerable gold taken out the ensuing season.

LINCOLN GULCH.

There are at present from two hundred and fifty to three hundred men employed in mining and other pursuits. There are about thirty-five claims being actively worked, and all pay well. On Nos. 5 and 6 there was a dump of dirt, the result of last winter's drifting, and on last Saturday, from this dirt, one man with a shovel cleaned up 84 ounces. The upper-drain ditch company is working from 25 to 30 hands, and averages some $17.50 to the hand. They have about 400 feet of rich ground to work over. The lower-drain ditch company, which struck bed-rock last fall on No. 49, are now working at No. 43, and are opening up a large amount of very rich ground for working. There is sufficient water to enable the claims to be worked, and, judging from present indications, this camp will see one of the most prosperous seasons that has fell to its portion in a long time.

FRENCH GULCH.

The Deer Lodge *Independent*, June 12th, says of mining in French Gulch:

"About one hundred men find employment in this gulch at present, but in a short time between two and three hundred can find profitable employment, should the water not get too low. A ditch about six miles in length is nearly completed from California to First Chance gulch, a tributary of French. There is also a number of other ditches in process of construction, which will, in the aggregate, furnish all the water needed in that locality. In the main gulch a large amount of work is being performed, and the amount of dust taken out is quite large. Hydraulic claims upon the surrounding hills and bars will soon be in full play, and then French Gulch will be recognized as one of the leading gold-producing camps of Deer Lodge county."

Of mining in German Gulch our contemporary says:

"A force of men are now engaged driving a tunnel through the main range of the mountains at the head of German Gulch, which, when completed, will convey about 200 inches of water from the head-waters of the Missouri to those of the Columbia. Forty feet of the tunnel only has to be run to complete it. Three eight-hour shifts are working at each end, and it is confidently believed that in ten days the waters of Big Hole will be coursing down German Gulch, affording an abundance of fluid to successfully operate every claim in that gulch. A large number of men will soon be profitably employed.

Utah Territory.

PETROLEUM PROSPECTS.

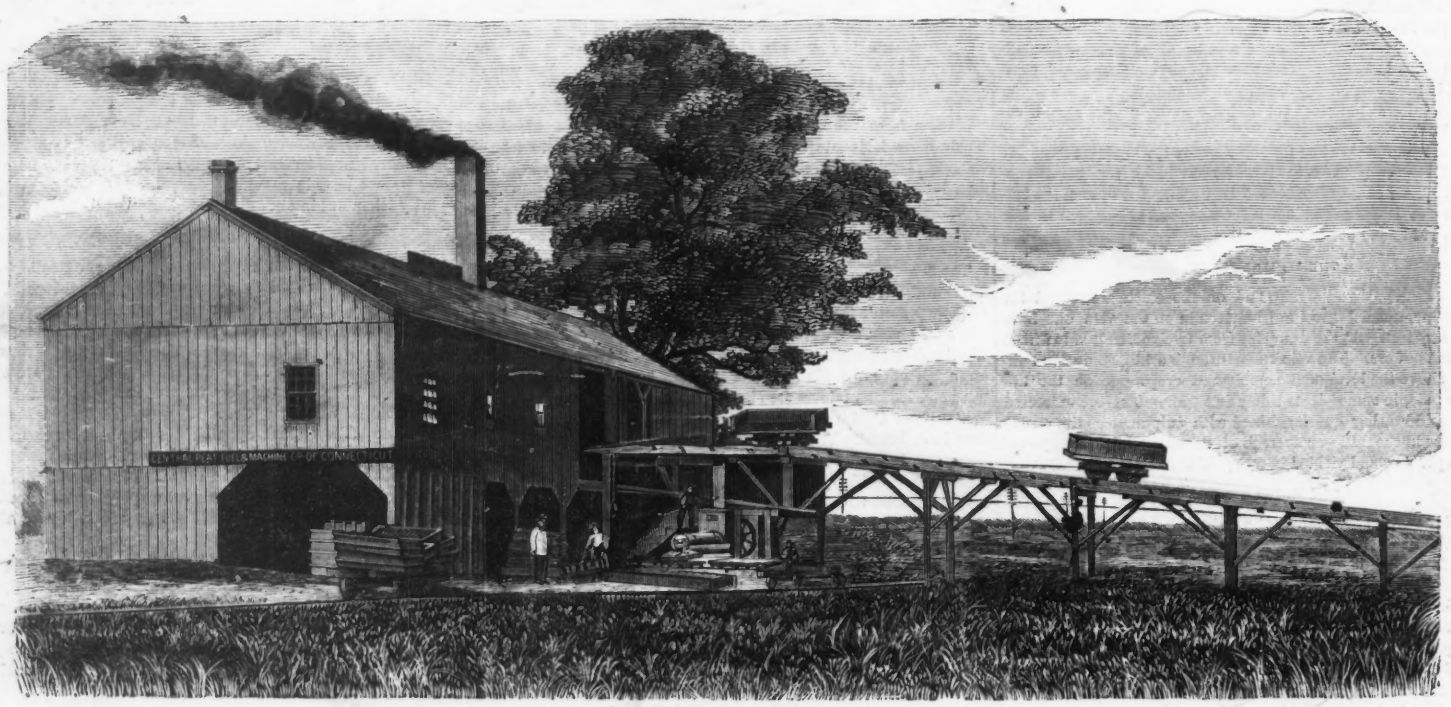
THE Omaha *Republican*, June 5th, has the following account of the results of recent prospecting for petroleum in the Territory: "To-day we have been presented by Superintendent Snyder, Union Pacific, with a bottle of crude petroleum, taken from a spring near the line of the railroad in Summit County, Utah. Some time since Mr. J. W. Howard commenced prospecting the Bitter Creek region for petroleum, and his researches have been very successful. An old oil-miner, Mr. C. M. White, has been quietly operating a spring near Bear River City, and now only awaits proper tools to sink and complete an oil-well. Mr. White feels sanguine of striking an abundant flow somewhere between the second and third sand-rock. Mr. Howard has had some of the oil analyzed, and it compares favorably with the best of the Pennsylvania district. A competent oil expert has given the opinion, from actual observations made, that oil exists in paying quantities from Bitter Creek to Evanston, 256 miles west of Omaha; and from the Uintah Mountains, south to the Wind River Mountains, north of the Union Pacific. It now only remains for men of enterprise and capital to open up a section which should prove as valuable to Omaha as the Venango district is to Cleveland. The crude oil from some of the springs can be seen at this office."

Notes on Peat—Its Manufacture and Uses as Fuel.

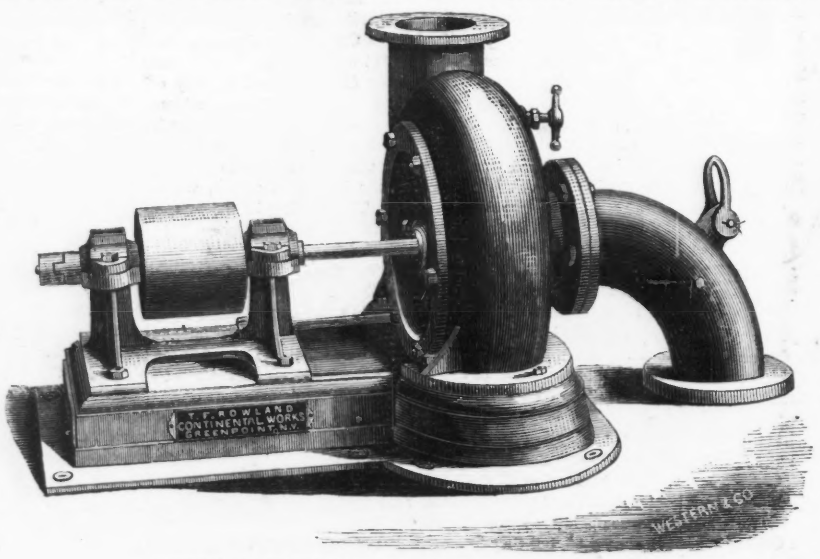
IN many parts of the country the process of peat-formation has been for ages, and is even now, going on. Mosses, and, to some extent, other plants usually found in low, swampy localities, grow, die, and accumulate before destructive decomposition takes place. To that incessant operation of nature are due the immense deposits of a substance which may be considered in a certain degree a rudimentary lignite, and perhaps even coal. But little attention has been paid to it in this country until within a very few years. But the abundance of wood and the comparatively low price of coal account for this fact. However, the demand for fuel which seems to increase in a greater ratio than the usual avenues for procuring it, has, in many localities, drawn attention to the necessity of seeking a substitute or auxiliary to ordinary combustibles. Peat has been utilized for many years in Ireland, Scotland, Belgium, and other European countries mainly for household purposes. The process of manufacture usually resorted to in such instances was confined to merely cutting square pieces of the deeper layers and allowing them to dry upon the ground until required for use. Under such a method of treatment, peat is, except in very few cases, light and porous, burns rapidly, emits a good deal of smoke, and cannot withstand the blast of iron-furnaces, or the strong draught of locomotives. Many efforts have been made to increase its density, and thus extend the range of its usefulness. But the difficulty of overcoming the resistance of water, which constitutes from fifty to ninety per cent of its volume in the natural state, and the cost of the different devices to which inventors have had recourse in order to deprive the crude peat of that element, have, in numerous instances, presented great obstacles in the way of the attainment of the end in view. Of late years, several contrivances have been adopted, having for their object the cutting or grinding and moulding of peat into bricks of different sizes and forms. These have met with more or less success. In the works of the "Central Peat Fuel and Machine Company, of Connecticut," of which we give a perspective view, the several desiderata looked for by those who have studied the subject seem to have been attained in a very simple and economical manner. The machinery used is free from complication, and yet accomplishes its work in a thorough and rapid manner. The peat is simply dug out of the bog by hand-labor, which is considered, after all, as the cheapest in view of its adaptability to local changes and circumstances. It is thrown directly into ordinary dumping-cars, running upon tracks laid in the space already excavated. It is then hoisted by steam-power, and thrown into a large hopper leading to the machine. This consists of a horizontal cylinder, to the interior surface of which are fastened knives of different shapes. These cut, grind, and reduce to pulp the crude peat, which is then expelled by means of the rotary action of a central drum, to the periphery of which other knives and grinding projections are affixed.

The cylinder or shell is constructed of boiler plate, and is in three sections, which can be quickly and easily taken apart, and again put together. The whole interior portion of the machine can thus be readily inspected. At one end of the cylinder is a wide spout, through which the peat is expelled in the form of pulp, and from which it passes into moulds underneath. These moulds are propelled by means of an endless chain, furnished with catches. One man attends to the feeding of these moulds, which are conveyed to him from the returning car in a trough filled with water. The moulds are simply oblong boxes, with tapering sides and movable bottoms, furnished with cross projections. They are carried away in cars, running upon wooden rails and drawn by horses, to the drying-grounds, which are either an adjacent field or the surface of the bog itself. The moulds are upset upon the grass, and the peat allowed to dry without any further attention or cost. In the process of drying, the mass breaks into pieces of different sizes and forms—the lines of separation being usually those of the indentations made by cross-pieces on the bottom of the moulds. These pieces have, indeed, many of them, almost the hardness and density of bituminous or anthracite coal. The total cost of the manufacture of peat by means of this simple process is found, from actual tests, not to exceed one dollar and fifty cents per ton of peat, ready for market; the lowest wages paid to the men being two dollars per day. Of course the cost of manufacture will vary with that of labor, which constitutes the largest expense attending it. The works of the above company are proportioned so as to produce one hundred tons of dry peat per day, and including steam-engine, moulds, cars, tracks, etc., cost, we are informed, ten thousand dollars. Peat when thus prepared seems to be of a very uniform consistency; constitutes a very convenient, useful, and economical fuel, either for household or manufacturing purposes, for generating steam, and for many metallurgic operations.

It burns with a far-reaching flame, almost without smoke. The combustion is kept up in the form of glowing coals, the heat of which can be carried to a great degree of intensity without running the risk of covering the grate-bars with clinkers, or it may be reduced to a very low point without being extinguished. This latter property, it may be remarked in closing, renders it very useful for warming greenhouses, drying lofts, dwellings, etc. Cooking-stoves in which this fuel was used have continued in operation for a whole year without the necessity of relighting the fire.



CONNECTICUT PEAT WORKS.



LEBBY & DUC'S MINING AND WRECKING PUMP.

Mining and Wrecking Pump.

THE adjoining figure represents the best pump in existence for certain mining and wrecking operations where there is danger, or where the necessity exists, of raising other materials, from which it appears that for the improvement of the channel in Charleston Harbor, where dredging-machines had failed, this machine or pump gave perfectly satisfactory results, principally as it overcame the chief difficulty encountered by the others—the great motion from the roughness of the sea.

The machine consists of a large centrifugal pump, connecting at its centre with the suction-pipe, and at its circumference with the discharge-pipe. The pump-wheel may be easily withdrawn, to clear it from obstructions which may occasionally chance to foul therein. This may be done without even disturbing the belt or any gearing by means of which it revolves, and causes only a few moments' delay. For wrecking purposes or deepening channels, it may be placed in the centre of a propeller, just below its deck or in the hold of the vessel, and worked by the propeller's engine. The dredged material comes up in the form of a fluid mud and escapes at the circumference of the pump in the well of the boat, where the solid matter settles down, and the water overflows and escapes at the bow, stern, or sides. When filled, the pump is disconnected from the engine, and this again so connected as to take the vessel to the place of deposit. The best way for unloading is to have the bottom of the well closed by shutters, which, when opened by a simple arrangement, allow every thing to run out freely. It may of course be placed on deck, and, if need be, used to clear a ship of water, in case of an excessive leak. It may also be used to provide for the proper action of the condenser of the engine. As regards its use on shore, for lifting large masses of liquids, in preparing for foundations for buildings, removing water from mines or other excavations, and digging canals through low grounds, it is without a rival. We believe it might have replaced advantageously some of the very expensive contrivances built in France for the excavation of the channel of the Suez Canal in the lakes through which it passes.

It is manufactured at the Continental Works, Greenpoint, Brooklyn, in ten different grades of size; the smallest being a suction-pipe of two inches, and the largest a pipe nearly twenty-four inches in diameter. The price ranges according to size, from $75 to $2200.

THE *Scientific Review* says that a project for the formation of a society for the exploration of China is being actively promoted in Belgium, with a view to the introduction in the Celestial Empire of railroads, telegraphs, and the development of its mineral wealth. The project is very favorably viewed by King Leopold, who has travelled in China.

THE ENGINEERING AND MINING JOURNAL.

CONTENTS FOR THIS WEEK.

[Illustrated Articles are marked with an asterisk.]

PUBLISHERS' ANNOUNCEMENT.

THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.*

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To the Press.

EVER since the date of its first issue, the AMERICAN JOURNAL OF MINING has maintained the kindliest relations to the press of this country and Europe. Devoted to a specialty which in importance is second to none in the country, we have endeavored to represent fairly—without sensational exaggeration or the distortion produced by interest or prejudice—the true interests and progress of those departments of industry which we have represented, and it is our purpose to pursue in the wider field which now opens before us the same line of conduct which has gained us the good feeling which now exists. It is, therefore, with no slight confidence that we bespeak from our brethren of the press a continuation of that countenance and aid which has been so warmly accorded to us in the past.

To the Public.

AFTER mature deliberation, we have decided to offer to the reading public a paper devoted to the engineering and mining interests combined. These two branches of the industrial arts are so nearly related to each other, that, in giving them an equal representation upon the title-page, it seems to us we only arrive at a symmetrical arrangement as regards the scope of the paper. In doing this, we feel that opportunity is given us for supplying to the engineering profession, in the fullest sense of the term, a long-existing, urgently-felt want. Comment is unnecessary as to whether this initial number is a fair exponent of what is to be done. It may be well, however, merely to suggest that thirty or forty contributors of original articles cannot all of them be brought forward in a single number of a weekly journal. With the end of a volume or two, there will be no hesitation on our own part in putting ourselves to the test of the severest criticism. If not now, there must then be either a fulness to the growing fruit or signs of sure decay. Our eyes are open to the hard work before us necessary to build up a paper that will compare favorably with European models, in this, one of the most difficult branches of public journalism. We aim to give to the engineering profession an interesting, live, well-arranged, and thoroughly trustworthy periodical. Naturally, therefore, in the endeavor to carry out to a final successful issue the object of our intent, we look for a full, hearty coöperation on the part of the profession and the public whose best interests we desire to promote.

Power of the Ocean Tides.

"IT is said that there is power enough in the rise and fall of the tides to drive all the machinery that man would ever have occasion to use." This paragraph, from one of the April numbers of the JOURNAL OF MINING, is a most suggestive one, considered from a mechanical and utilitarian point of view. That the statement is correct, we propose to show by a rough estimate.

In many parts of the sea-shore the rise and fall of the tides is considerable: In the Bay of Fundy, 70 feet; at the mouth of the Severn and at St. Malo, France, 46 feet; at Gnernsey and Jersey, 32 to 38 feet; at the mouth of the Scheld, 20 feet, and along the coast of Holland, from 10 to 16 feet; in the Adriatic, only 2½ feet; while in the rest of the Mediterranean, the tides are scarcely perceptible; along the east coast of the United States, the tides vary from 4 feet to 10 and 20.

As the original tide-wave is generated in the Pacific Ocean, and moves westward with the apparent motion of sun and moon, it is clear that gulfs having their mouths funnel-shaped, and opposed to the direction of the tide-wave, like the Red Sea, will have a strong tide. As the tide-wave moves from the Pacific Ocean around the Cape of Good Hope, and then northward in the Atlantic Ocean, the same peculiarities are observed—any gulf having its mouth toward the south, and funnel-shaped, like the Bay of Fundy, will have a strong tide, and where the mouth is narrow, like that of Chesapeake Bay, the tide-wave will be less high than in the free ocean. When the tide-wave reaches any place on the coast from two sides, as is often the case behind large islands, the effect will be to increase or diminish its height, according as the high tides coincide, or the high and low tides neutralize one another.

We have no space to apply these rules to the numerous special localities, from observations of which they have been deduced; but they serve to show that the subject has been thoroughly investigated, and is as well understood as any other in physical geography. The power exerted by the tides every day along thousands of miles of sea-coast is especially remarkable, as it is the only natural force directly dependent on gravitation, which owes nothing to the heat of the sun, itself a result of gravitation, and in its turn the cause of all other forces on the surface of our planet, either wind or water-power, steam-power, or the power of animals.

To estimate the force of the tides, all that is necessary is the consideration that the attraction of the sun and moon (principally of the latter), acting in opposition to terrestrial gravitation, elevates the surface of a large portion of the ocean, nearly twice in twenty-four hours, to the mean height of about two feet. The extent of surface thus raised may be set down at 100,000,000 square miles, or one half of the surface of the earth, taking this at 200,000,000 of square miles, of which the ocean occupies about three fourths, or 150,000,000. Every square mile of water two feet thick contains nearly 60,000,000 cubic feet, or 3,840,000,000 pounds of water, and this, multiplied by 100,000,000, the number of square miles affected by the tide, gives the enormous number of 768,000,000,000,000,000 foot pounds exerted every 12½ hours, or 750 minutes, which gives, per minute, a power of 100,000,000,000,000,000 foot pounds. Dividing this by 33,000, to reduce it to horse-power, we obtain nearly 3,000,000,000,000 horse-power as the total power of the tide-wave over the whole surface of the earth.

Only a small portion of this power, however, can be made available—namely, that which is spent on the sea-coasts of continents and islands. The method of utilizing this we will discuss in a future article.

The Overland Route to India.

THE demand for rapid transit between England and India is daily growing into an importance that the luxury of the Mont Cenis and Suez Canal communications accelerate rather than abate—these undertakings being regarded as links in the future direct route from the European to the Asiatic Continents. The old voyage to India round the Cape of Good Hope occupied six tedious months; the present overland route can be achieved with regularity in twenty-three days. In a few days from the date of this issue, the Suez Canal will be formally opened. The first break in the direct European Asiatic route is Mont Cenis, the communication through which by a tunnel has been the subject of so much interesting discussion. The official reports affirm that there remain but 2500 metres of bore to complete this great work; that the quartz has been worked through, and the quality of the remaining rock will permit of driving at the rate of 130 metres a month. It is anticipated that the tunnel will be opened to passengers on January 1st, 1871, and before April of the same year locomotives will be running through. The two sections, from west to east of Modane to St. Michel, and from east to west of Susa to Bardonneche, although there are some obstacles to be encountered in the shape of heavy work, can be readily completed. During this period the Mont Cenis summit route will be in daily operation, and the confidence of travellers is daily increasing, as exhibited by its receipts. If the tunnel works are protracted, the mountain route may pay its expenses; but this is problematical. The tear and wear of the line and cost of repair of the engine stock are excessive. Hardly a single journey is accomplished but some readjustment of the machinery is necessary.

Mr. Fell, one of the projectors of the mid-rail system of grade railways, has designed four new locomotives, whose construction is entrusted to the eminent French firm of Cail & Co., of Paris. It is proposed to construct engines sufficiently powerful to convey 180 passengers; nearly three times the number now transported by one engine. The time occupied in traversing the mountain is 5½ hours by railway, and 10½ hours by road, in the heavy "diligence." If the railway company were to substitute 7 hours for 5½, they might render remunerative that which prodigious wear, tear, and grinding render unprofitable. Arrangements are being made throughout the route from Brindisi to Ostend *via* Stuttgart, Munich, and Bremen, for sleeping and refreshment cars, with every comfort, and for running the entire length, from Ostend to Brindise, in thirty-three hours.

Having traversed the Mediterranean in the Peninsular and Oriental steamships company's magnificent steamers, and landed in the recently formed harbor of Port Saïd, we will consider the great ship canal, whose opening in a few days is a subject of universal interest. But the practical opening of the canal as a navigable communication can hardly be said to be achieved until the canal is capable of accommodating ships of a draught of twenty-three feet, and until the ports at each terminal are completed to that standard, and permanent means carried out to insure these harbors from silting up. With regard to the danger to the canal arising from sand storms, it is calculated that one of the enormous dredgers employed will be able to withdraw all the sand thus deposited. Of these machines there are at present seventy-eight in operation, at a cost of $1,200,000 per month. Great apprehensions are entertained from the fear of the destruction of the banks by exposure to the heavy wash of the passing steamers. The canal as designed is nearly one hundred miles in length. The sea-water has already advanced to half this length, and the canal to the middle of the Isthmus is excavated to its intended width of one hundred yards, but not to its depth, which is designed to be twenty-six feet, and the work is throughout in various stages of completion.

Of particular interest is the proposal of a cut, connecting the Atlantic with the Mediterranean, through the valley of the Garonne *via* France, capable of conveying heavy vessels and trans-Atlantic steamships. But as 442,000,000 francs will be required, the scheme, like many other French ones, may be regarded as ephemeral. The direct railway route from England to India, including the use of the proposed Dover Channel railway, will be considered in another issue.

The French Atlantic Cable.

THIS cable, now in process of being paid out from the Great Eastern steamship, has some modifications of construction. The gutta-percha employed for insulation is brought direct from Singapore, as it left the hands of the natives, in the shape of unsightly idols, deformed quadrupeds, caricatures of patriarchs, dogs, ships'-birds; and is made into a paste for protecting the electric core. The copper wire is received from the wire-mills in hanks of fifteen or twenty pounds each; each hank being tested on its arrival to ascertain its conductivity, none below a certain standard being allowed to be used. The conductor consists of a strand of seven wires, 0.56 inch in diameter, or a little less than one-sixteenth of an inch, six being twisted round the central wire. The seven wires are rendered perfectly compact by the coating of the central wire with an adhesive matter known as "Chatterton's Compound." The weight of the complete strand is four hundred pounds per nautical mile. It is made in lengths of about one mile, and wound on reels ready to be covered with gutta-percha. The strand is passed through a vessel of Chatterton's Compound, and through a die corresponding to the size of the first coating of gutta-percha, which is forced round the strand as it passes through the die. Four successive coats are thus applied, and between each coating the wire receives a film of the compound, which improves the insulation and binds the coats together. The total weight of the core is 800 lbs. per nautical mile, equally divided between the copper and the gutta-percha. The total length of cable for the section between Brest and St. Pierre is 2788 nautical miles, the second section thence to New-York 776 nautical miles long, with smaller wire consisting of a conductor of 107 lbs. per nautical mile, and a covering 150 lbs. per mile. The cable thus prepared is finished with a serving of jute yarn and ten wires of homogeneous iron, each of which is covered with manilla yarn steeped in tar.

Sunstroke.

SUNSTROKE, like hydrophobia, is always a doubtful subject as to what it really is, and how caused. The forms of medical treatment in the case of sunstroke are as varied as the theories advanced of the character of the malady.

In England, such cases are considered as arising from direct over-heating of the blood, and treated accordingly. At home some doctors consider it a poisoning of the blood, and follow a treatment analogous to that in snake-poisoning. Indian doctors believe that sunstroke is occasioned by the direct action of the sun's rays upon the hair, or perhaps upon the *medulla oblongata*. But how is this effect caused? What rays of the sun thus affect? It cannot be the illuminating rays, nor can it be the heat—for firemen, puddlers, glass-blowers, etc., endure much greater heat, and at still greater disadvantage. But in the solar rays we have the "actinic" or chemical rays, and it is the actinic which acts most powerfully on organic nature, and the actinic rays are surpassingly energetic in the tropics.

FOR want of space, we are compelled to hold over until our next issue some exceedingly interesting papers, among which are the following: An article on Judging of the Performance of the Steam-Engine; a communication on Wood Preservation; and also the Report of the Consulting Engineers to the Directors of the East River Bridge Company, on the feasibility of the proposed plan of construction.

A SITE for the erection of the model of the railway-bridge from Calais to Dover, designed by M. Boutet, has been granted at the Government marble depot, Paris, by the Emperor's minister of the imperial household.

MARKET REVIEW.

The Coal Trade.

NEW-YORK, July 1st, 1869.

THE market is greatly excited over the news that the Lehigh operators, on Tuesday last, conformed to the miners' demands in regard to the wages basis, and have notified the men to resume operations. The miners present at the time immediately began work, and the balance scattered about the county on other improvised jobs will be gathered together, and resume work to day or Monday. The operators, particularly those who are owners, as well as miners and shippers, are not well pleased with this backing down. But the pressure brought to bear upon them by parties who sell Lehigh coal in this market, as middlemen (who have only their commissions at stake), in permitting the miners to resume on their own terms, was overwhelming. They were compelled to give in. We fear, however, that this sudden unsatisfactory settlement of the difficulty will not be long-lived, and that the question as to which shall have the governing power, the operators or miners, will have to be contested at another time. The large companies still remain firm, and refuse to confer with the men. In the mean time we shall be deprived of our auction sales, and the usual supply of Lackawanna coal from the Delaware and Hudson Company. We expect to present our readers next week with full lists of prices. At present too much excitement and uncertainty exists to warrant our making any quotations.

The coal dealers will note a change in our name this week. The engineers are a large and influential class. They are just the persons that coal-dealers should desire to be well known among, in order to have their coals become popular for manufacturing and other purposes. We confidently expect to double our circulation by the change, and trust that our advertisers of coal will be greatly benefited by it. Freights remain unchanged; vessels are in good supply.

The following table exhibits the quantity of Coal passing over the following routes of transportation for the week ending June 26th, 1869.

COMPANIES.	1868. WEEK.	1868. TOTAL.	1869. WEEK.	1869. TOTAL.
Phila. & Read. R. R.	81,593	1,554,090	78,419	1,348,346
Schuylkill Canal,..	33,111	417,751	12,536	195,570
Lehigh Valley R. R.	62,611	1,294,227	21,014	1,098,509
Lehigh & Sus. R. R.	9,000	180,163	10,928	346,792
Lehigh Canal,.....	29,881	317,890	4,078	178,705
Scranton North,....	11,397	192,741		205,857
" South,	25,159	618,098		587,630
Penn. Coal Co., rail,	23,090	401,637	25,364	449,532
" " " canal,	830	9,675	599	6,551
Del. & Hudson Rail,			117	98,304
" " " canal,	50,722	540,625	31,960	507,910
Shamokin,.....	12,961	222,151	5,533	149,378
Trevorton,.....	215	8,613		7,054
Short Mountain,....		30,134		21,562
Lykens Val.,Cun.Co.		37,220		23,268
Hunt'g'n & B'd Top.	7,221	109,112	9,620	164,889
Wyoming South,....		48,028		37,391
" North,				
Williamstown, Col'y	4,216	82,625	6,163	72,658
Total, ...	354,652	6,065,083	206,321	5,500,006
1869,.....		5,500,006		
Decrease,.....		565,077		

Lehigh Canal Coal Trade.

Shipped for the Week Ending June 26, 1869.

WHERE FROM.	WEEK. Tons. Cwt	TOTAL. Tons. Cwt.
Total M. Chunk Region,.....		51,453 17
" B. Meadow "	755 14	21,921 15
" Mahanoy "		878 01
" Hazleton "		50,261 02
" Upper Lehigh "		2,088 11
" Wyoming "	3,322 03	49,005 02
Grand Total,.....	4,077 17	178,701 11
Corresponding Week last year,	29,881 07	317,889 16
Increase,.....		
Decrease,.....	25,806 10	139,185 05

Report of Coal Transported over Lehigh Valley Railroad

For the week ending June 26, 1869, and previously this season, compared with the same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt	TOTAL. Tons. Cwt.
Total Mahanoy,.....	12,361 10	142,881 18
" B. Meadow, ...	2,459 11	172,379 19
" M. Chunk,.....		121 04
" U. Lehigh,.....		7,506 16
" Hazelton, ...	1,071 01	498,213 01
" Wyoming,.....	4,563 00	190,690 07
Total, ...	20,258 02	1,011,796 05
To L. & S. R. R., at Penn Haven for rail,.....		4,174 00
Do. for canal,.....		54,281 12
At Mauch Chunk for Canal,....	755 14	27,705 03
Total Anthracite, ...	21,013 16	1,097,957 00
Susquehanna Region Bit. Coal (Full Creek).....		552 03
Total by rail and canal,.	21,013 16	1,098,509 03
Same time last year, ...	62,611 07	1,294,227 15
Increase,.....		
Decrease,.....	41,597 11	195,718 12
Forwarded east from M. Chunk by rail, ...	19,875 07	977,391 03
Same time last year, ...	52,120 09	1,223,149 03
Increase,.....		
Decrease,.....	32,245 02	245,755 00

RECAPITULATION:

Forwarded east from M. Chunk by rail,.....	19,875 07	977,391 03
Delivered at M. Chunk,.....		569 14
Del. on line of railroad above M. Chunk,.....	106 05	5,123 05
Del. above M. Chunk for use of L. V. R. R.,.....	276 10	24,197 18
To N. C. R. R., at Mt. Carmel,.		2,516 09
To L. & S. R. R., at Penn Haven, for railroad,..		4,174 00
Do. for canal,.....		54,281 12
Do. Packerton for rail,.. ...		2,516 19
At Mauch Chunk for canal, ...	755 14	27,705 03
Total,.....	21,013 16	1,098,509 03

Lehigh and Susquehanna Railroad.

Report of Coal Shipped for the Week ending June 26, 1869.

WHERE FROM.	WEEK. Tons. Cwt	TOTAL. Tons. Cwt.
Total M. Chunk Region,.....		67,602 13
" Hazelton "		51,813 19
" Upper Lehigh "		56,577 19
" Wyoming "	14,260 12	269,993 18
Grand Total,.....	14,260 12	445,988 09
Corresponding Week Last Year,	21,359 15	334,977 10
Increase,.....		111,010 19
Decrease,.....	7,099 03	
Forwarded South from Manch Chunk,.....	10,655 12	312,937 12
Delivered on line of L. & S. R. R., above Manch Chunk,...	282 17	15,066 15
Delivered to Lack. & Bloom. R. R., at Plymouth Bridge, ...		13,688 06
Delivered to L. V. R. R. Co., at Sugar Notch,.....		5,100 03
Delivered at Coal Port, for Shipment by Canal,.....	3,322 03	99,195 13
To North Branch Canal, ...		615 16
Total.....	14,260 12	445,988 09

Prices of Coal by the Cargo.

[CONNECTED WEEKLY.]

	AT NEW-YORK, June 30th.		AT PHILADELPHIA, June 30th.	
SCHUYLKILL.	R. A.	W. A.	R. A.	W. A.
Lump, ...	$7 50	$7 50	6 75	6 75
Steamer,.....	7 25	7 25	....	6 75
Broken, ...	7 00	7 00	....	6 75
Egg, ...	7 00	7 00	....	6 75
Stove,.....	7 50	7 50	....	6 75
Chestnut,.....	6 75	6 75	....	....
Pea,.....	....	....	....	....
LEHIGH.				
Lump,.....	....	....	6 00	....
Steamer,.....	....	....	6 00	....
Broken,.....	....	....	6 00	....
Egg, ...	....	....	6 00	....
Stove,.....	....	....	6 25	....
Chestnut,.....	....	....	5 50	....
Pea,.....	....	....	....	....
SPECIAL COALS,*				
Diamond Vein,....	R. A.		....	....
New-England,.....	"		....	....
Locust Dale,.....	W. A.		....	....
Honey Brook, Le'h	"		....	....
Harleigh,	"		....	....
Spring Mount'n	"		....	....
Sugar Creek,...	"		....	....
Sugar Loaf,.....	"		....	....
Fulton,.....	"		....	....
Stout,.....	"		....	....
Old Comp'y's...	"		....	....
Cross Creek,....	"		....	....
Chauncey,.....	"		....	....
Girardville,.....	"		....	....
McMichael,.....	"		....	....
Duncan,.....	"		....	....
Shamokin,.....	"		....	7 25
Lykens Valley,..	"		....	7 25
Broad Top,.....	"		....	6 75
Hill & Harris,..	"		....	6 90
Henry Clay,.....	"		....	....

[* Dealers in these coals may be found in our advertising columns.]

COMPANY COALS.

	L.	Str.	Gra.	Eg.	Sto.	Cst.
Scranton at E. Port,	..	..	..	..	..	..
Pittston at Newb'g,	..	..	..	..	..	..
Lacka'na at Rond't,	..	..	..	..	..	..
Wilk'b're at Hob'kn,	..	..	..	..	..	..

For freights to different points, see "Freights."

Prices at Baltimore, June, 1869.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load,.....	$	5 60
Pittston and Plymouth,.....	5 40	5 65
Shamokin R., or W. Ash.,.....		5 40
Lykens Valley, R. A.,.....		5 65
Trevorton, R. A.,.....		5 40
By retail, per ton of 2240 lbs. delivered,....	8 00	8 50
Georges Creek & Cumberland f. o. b. at Locust Point for shipping,.....		5 00
West Fairmount Gas, f. o. b.,.....		6 00

Prices of Gas Coals.

June, 1869.

PROVINCIAL. Duty, $1.25.	Coarse. Gold.	Slack. Gold.
Block House,.....	$1 75 @$	75
Gowrie,.....	1 75	75
Lingan,.....	1 75	75
Sydney,.....	2 13½	71½
Picton,.....	2 13½	1 18½
Little Glace Bay,.....	1 50	1 00
Caledonia,.....	1 50	75

AMERICAN.	Coarse. Currency.	Slack. Currency.
Westmoreland Co.,.....	$8 75	
Despard Coal Co.,.....	8 50	8 00
Penn,.....		
Newburg Orrel Gas,.....	8 50	8 00
West Fairmount Gas Coal,.....		8 00
AT PHILADELPHIA.		
Kittaning Coal Co.'s Phœnix Vein,....f. o. $	65	25
Lemon " .. "		5 00

Freights.

July, 1869.

To Eastern Ports.	From Philadel'a.	From E. Port and Port Johnston.	From Newburg.	From Rondout.
Stamford,.....	.. ..	$1 00	$1 25	$1 25
Norwalk,.....	$2 05	1 00	1 25	....
Bridgeport, ...	2 00	1 15	1 25	1 25
New-Haven,.....	2 25	1 00	1 25	1 25
Hartford,.....	2 25	1 10	....	1 65
New-London,.....	2 35	1 15	1 35	1 35
Norwich, ...	2 35	1 25	1 45	1 45
Mystic,.....	....	....	1 40	....
Stonington,.....	.. ..	....	1 40	1 35
Sag Harbor, ...	....	....	1 40	....
Bristol, ...	2 00	....	1 55	1 45
Newport, ...	2 00	1 40	1 55	1 45
Fall River,.....	2 00	1 40	1 55	1 45
Providence,.....	2 00	1 40	1 60	1 50
Dighton,.....	2 25	....	1 60	....
Warren,.....	....	....	1 60	....
Pawtucket,.....	1 75	....	1 75	1 75
New-Bedford,.....	2 25	1 40	....	1 75
Boston,.....	2 55	1 75	1 75	2 00
East Cambridge,.....	2 45	....	1 85	....
Salem,.....	2 50	1 75	1 75	1 90
Newburyport,.....	....	2 00	1 85	1 80
Portsmouth,..	2 75	1 75	1 80	1 80
Rockport,.....	....	....	1 80	....
Saco,.....	2 75	1 75	1 80	1 75
Portland, ...	2 00	1 75	1 75	....
Bangor,.....	2 50	....	1 75	1 80
Bath,.....	2 50	....	1 80	....
Middletown, ...	....	....	....	....

Freights—Continued.

To River Ports.				
Troy,.....	1 95	95	60	55
Albany,.....	1 90	90	55	50
Coeyman's, ...	1 50	....	55	50
Stuyvesant,.....	1 50	....	50	45
Coxsackie,.....	1 75	....	45	45
Hudson Railroad,.....	....	1 00	40	50
Catskill,.....	....	....	40	35
Poughkeepsie,.....	1 50	75	30	25
Fishkill,.....	1 55	....	20	30
Cold Spring,.....	1 75	70	30	50
Haverstraw,.....	1 50	50	45	50
Nyack,.....	1 45	50	55	50
Sing Sing,.....	1 50	....	60	50
Yonkers,.....	1 40	40	60	55
New-York,.....	1 30	50	60	60
Saugerties,.....	1 50	....	35	40
Rhinebeck,.....	1 50	....	30	35
Rondout,.....	1 60	60	30	35
Tarrytown,.....	1 75	80	....	....
West Point,.....	1 50	75	30	35

Mining Stocks.

NEW-YORK, July 1st, 1869.

The sales at the Mining Exchange yesterday were confined principally to Colorado stocks. Smith & Parmelee sold at $1.95 @ $2.10, and Gregory at $1.95 @ $2.20.

Sales of Grass Valley were made at 44c., and Quartz Hill at 83c. Wallkill Lead was in demand at 18c. @ 19c. The following table exhibits the prices current for the stocks in this market:

	Bid.	Asked.
Consolidated Gregory,.....	$1.95	$2.05
Grass Valley,.....	45	50
Gunnell Gold,.....	..	50
La Crosse Gold,.....	..	14
Mariposa,.....	7¼	9¼
" pfd,.....	15	16½
Montana Gold,.....	11	15
Quartz Hill,.....	80	83
Smith & Parmelee Gold,.....	1.95	2.05
New-York and Eldorado,.....	20	..
Rocky Mountain,.....	..	..
Central,.....	20	25
Quicksilver,.....	16	..
Davidson Copper,.....	..	30
Wallkill Lead,.....	..	18
Wallkill, ass'd,.....	15	18
Tudor Lead,.....	3 40	4.60

SAN FRANCISCO, CAL., June 30th, 1869.

Stocks.	Bid per share.	
Gould & Curry,.....	$1.17	$1.14
Savage (per share),.....	89¼	89
Chollar Potosi,.....	3 20	..
Ophir,.....	20	21
Hale & Norcross,.....	1.50	..
Crown Point,.....	53	..
Yellow Jacket,.....	57	..
Belcher,.....	21¼	..
Imperial (per share),.....	81	..
Alpha (per share),.....	25	24¼
Kenuck,.....	1 75	1.76

Assessment—KENTUCK MINING COMPANY. Ten dollars, coin, per share. Delinquent, July 15th; sale, August 3d, 1869.

Metals.

IRON.—Duty: Bars, 1 to 1¼ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1¼ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb; Pig, $9 ℔ ton; Polished Sheet, 3 cents ℔ lb.

Pig, Scotch, No. 1, ℔ ton,.....	39 —	@44 —
Pig, American, No. 1,.....	42 —	— —
Pig, American, No. 2,.....	38 —	39 —
Pig, American, Forge,.....	36 —	37 —
Bar, Refined, English and American,.....	85 —	90 —
Bar, Swedes, assorted sizes (gold),.....	82 50	87 50
	STORE PRICES.	
Bar, Swedes, ord'y sizes,....	less 5 ℔ ct., — —	140 —
Bar, Refined,.....	less 5 ℔ ct., 90 —	92 50
Bar, Common,.....	less 5 ℔ ct., 85 —	87 50
Scroll,.....	less 5 ℔ ct.,120 —	150 —
Ovals and Half-round,.....	less 5 ℔ ct.,117 50	142 50
Band,.....	less 5 ℔ ct.,117 50	— —
Horse Shoe,.....	less 5 ℔ ct.,117 50	— —
Rods, ¾ to 3-16 inch,.....	less 5 ℔ ct., 97 50	135 —
Hoop,.....	less 5 ℔ ct.,125 —	180 —
Nail Rod, less 5 ℔ ct.,.....	8¾ —	9¼
Sheet, Russia, as to Nos. (gold),..	— 11½ —	13½
Sheet, Single, D. and T. Common,.... .. —	5 —	7
Sheet, Galvanized,.....	List 20 @ 25 ℔ cent dis.	
Rails, English (gold), ℔ ton,.....	— 55 —	56
Rails, American, at Works in Pa,.....	— 75 —	76

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under, 2¼ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 2¾ cents ℔ lb, and 10 ℔ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ℔ lb,	— 18 @	— 22
English Spring (2d and 1st quality),...	— 9 @	— 11½
English Blister (2d and 1st quality),...	— 11½@	— 19
English Machinery,....	— 12½@	— 15
English German (2d and 1st quality),..	— 11 @	— 16
American Blister, "Black Diamond,".	— 10½@	— 16
American, Cast, Tool, "	.. — 19 @	— —
American, Spring, "	.. — 10 @	— 13
American Machinery, "	.. — — @	— 13
American German, "	.. — 10 @	— 13

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper cents ℔ lb; Manufactured, 45 per cent ad val.

	All Cash.	
Copper, New Sheathing, ℔ lb,.....	— @	— 33
Copper Bolts,.....	— @	— 35
Copper Braziers,.....	— @	— 35
Copper Nails,.....	40 @	— —
Copper, Old Sheathing, etc., clean,.....	22 @	— 23
Copper, Chili Pig,.....	— @	— —
Copper, American Ingot, ...	22 @	— 22½
Yellow Metal, New Sheathing,.....	— @	— 27
Yellow Metal Bolts,.....	— @	— 27
Yellow Metal Nails,.....	— @	— 27

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cts. ℔ lb; Pipe and Sheet, 2½ cents ℔ lb.

Galena, ℔ 100 lbs,.....	— — @	— —
Spanish (gold),.....	$6 30 @	$6 37½
German "	6 30 @	6 50
English "	6 30 @	6 87½
Bar,.....(less 6 ℔ cent).....	— — @	10 50
Pipe and Sheet, "	— — @	— 12

REMARKS.

COPPER has been quiet at the nominal quotation of 22 cents for Lake Superior and Baltimore, with a moderate business. Sales for the week foot up 500,000 lbs. in lots. The article is cheap, but in the present condition of the money market there is no disposition to buy it on speculation.

The London market rose in the middle of June from £67 to £68 10s. for Chili Bars.

TIN.—The market has improved. 1800 lbs. Straits have been sold at 29½c. @ 30c., gold, 30 days. Banca is quoted at 33½c. gold; English, 30 cents.

The European markets are unsettled at 132s. for Straits in London, and 80fl. for Banca in Amsterdam.

SPELTER is dull at $6.50, gold, for Silesian. The last sales were 25 tons at $6.37½ gold.

LEAD can be bought at $6.25, gold, for ordinary foreign from ship. Sales of the week, 100 tons in lots.

ZINC.—We quote American Dry at 8¼c. @ 9c.; French, 12c. @ 12½c.; French Metallic, 12½c. Duty, 2½c. per pound.

REGULUS ANTIMONY.—We note a sale of 5 casks at 12½c. gold.

STEEL.—Prices are steady and the demand is moderate.

IRON.—There is a little more inquiry for Scotch Pig; the supply in dealers' hands is pretty well exhausted, and they are again compelled to come forward, but they buy sparingly, only supplying their immediate wants. The sales are 150 tons Eglinton, part at $39; 150 do. Glengarnock, on private terms; and, by an Importer, 2 @ 300 tons, in lots, at $39 @ $40 for Eglinton, and $42.50 for Gartsherrie. The demand for American continues light, but prices are unchanged. We quote $41 @ $42 for No. 1, and $38 @ $39 for No. 2 ex.; 150 tons Crane and 100 do. No. 1 Mineral Vale sold on private terms. There has been more inquiry for new English Rails, but no sales of importance have as yet transpired; 4000 tons old were disposed of at a private price. Bar from store continues very dull, there being no life in the trade. Prices are nominally unchanged, but sales of Refined have been made as low as $87.50, less 5 ℔ cent, cash.

The following is a statement of the amount of Pig Iron transported by the Lehigh Valley Railroad Company for the week ending June 26th, 1869: From Carlton Iron Co., 170 tons; from Lehigh Valley Iron Co., 75 tons; from Thomas Iron Co., 465 tons; from Lehigh Crane Iron Co., 630 tons; from Allentown Iron Co., 175 tons; from Robert Iron Co., 180 tons; from Glendon Iron Co., 450 tons; other shippers, 470 tons. Total, 2615 tons.

BUSINESS NOTES.

The Sargent Card-Clothing Company.

SAID a distinguished general once to a companion: "When heroes are numbered, you will be called first." The grand idea underlying the sentiment is one calculated to work out success in any sphere of business. To be first is a laudable ambition anywhere.

Such was our involuntary train of thought a few days since, after a visit to the manufactory of the Sargent Card-Clothing Company at Worcester, Mass. In beauty of architecture and adaptation to the work to be done in it, in ventilation, light, and neatness, this mill is a model.

It is made of pressed and glazed brick, one hundred and fifty feet deep, and of four stories height, presenting a front of fifty feet on the street; thus forming the most noticeable object from the car-window as one approaches Worcester Junction by rail. It is under the superintendence of Mr. Edwin S. Lawrence, a gentleman of more than a quarter of a century's experience in this special manufacture, and, we may add, devoted to his business and accomplished in it. He personally presides over the establishment; as director of labor, as inspector in chief of all goods shipped, as the prime power that impels the machinery, thus guaranteeing to the trade the utmost good faith in filling orders, and perfect satisfaction with the quality of their goods. With Mr. Lawrence as head of their concern, and none but the most competent workmen as employees, the Sargent Company need never be called on to take back an inferior article or to dread the repudiation of any contract.

One hundred and forty machines, employing forty hands, are now run, producing from five hundred to seven hundred square feet of clothing daily, and it well repays one's time to spend a few hours in witnessing their almost human operations. The finest machinery, improved upon by the Company, working with all the fidelity of watch-gear, the attentive and intelligent operatives, having eye to each uncoiling wire fed to the leather back, the bustle of packing and shipping, and the passing freight-cars, form an uncommon centre of mechanical industry.

The company are owners of a patent process of preparing the card-back out of paper instead of leather, and this substitute has received the very general endorsement of our manufacturers, as well as several medals from the more important fairs. In fine, the unsolicited opinion of the trade is, that whoever ranks second in the manufacture of card-clothing in the United States, the Sargent Company are of the first.

Woolen and Cotton Mills.

IN our advertising columns will be noticed the names of two gentlemen composing the Worcester, Mass., firm of Crompton & Dawson, both of whom are favorably known to the manufacturing public. Mr. Crompton is inventor of the loom bearing his name, which can claim the unreserved endorsement of our woolen and cotton-mills. Mr. Dawson is a young man of happy business tact and personal popularity, giving his sole attention to orders for every line of supplies necessary to the equipment of a mill. The new mill, erected by Messrs. Little & Stanton, at Huntington, Mass., is being fitted throughout by this firm, who guarantee fidelity to their customers at satisfactory prices.

Rensselaer Institute.

WE take pleasure in calling attention to the card of the Rensselaer Polytechnic Institute, which appears elsewhere. This is the oldest school of Science in America, and the responsible engineering positions held by its graduates is the best commentary upon its course of instruction.

MISCELLANEOUS.

Valuable Coals Lands in Virginia
FOR SALE OR LEASE.

The undersigned, in pursuance of a decree of the circuit court of the county of Henrico, in the State of Virginia, made on the 3d day of May, 1869, will receive proposals in writing, either for the purchase or lease, from and after the 31st December, 1869, of the whole, or any part, of the coal lands situated in Chesterfield county, Va., belonging to the Chesterfield Coal and Iron Mining Company.

The lands cost said company more than $300,000. The mines which they contain have been, and are now being, profitably worked by the present lessees, and the property is considered of great value for its coal and iron ore.

The different tracts are known as follows:

"Wooldridge's and Falling Creek," containing about 204 acres.
"Black Heath," 99 acres.
"Barker and Branch's," 99 acres.
"Harvie and Harris's," 224 acres.
"Cullin's," 76 acres.
"Martin's" (one tract), 30 acres.
"Martin's" (another tract), 326 acres.
"Salle Pits," 200 acres, and a coal-yard and land attached thereto, on James river, opposite Richmond, containing upward of 4 acres.

Inquiries and proposals may be addressed to the undersigned, post-office box No. 342, Richmond, Va., until the 20th day of October, A.D. 1869.

It is recommended that the proposals be made as specific as possible, since the decree requires them to be reported to the court for its approval or disapproval at the next term, commencing on the 25th day of October, 1869.

ANDREW JOHNSTON,
POWHATAN ROBERTS,
Special Commissioners.

July 6-3t

English Gun Cotton.

About 1500 pounds very superior ENGLISH GUN COTTON,

IN WATER-PROOF COVERING,

(surplus stock) may be had at less than cost of importation. Address

A. K. P. Welch,
Agent of Commonwealth of Massachusetts,
Apr. 10-3m CAMBRIDGE, MASS.

MOTIVE POWER.

The Greatest Hand-Power Machine which is in existence, and can be used wherever power is needed. H. Hasseopding's Gig and Circular Saw Combined, will cut wood from 1 to 4 in.-thick, and 1 in., as fast as by steam. The Gig Saw of the above Machine will cut scrolls and wagon fellies any thickness, with the greatest facility. Price for complete Machine, $165. The Machine, with only circular saw, will cost only $135. The movement can be applied to any other machine where power is needed. Price $50. For further particulars, apply to HASSENPFLUG BROTHERS,
Sept. 26-3m-is No. 211 Canal St., New-York.

INTERNATIONAL
PATENT AGENCY
40 EXCHANGE PLACE,
ROOM 20.

The greatest care taken in the drawing up of Specifications, Claims, Assignments, and other contracts.

The making of working and non-working models and the execution of Patent Office and working drawings, carefully attended to.

Examination and testing of mechanical, chemical, and other inventions.

Patents procured in the United States and other countries, and practical advice in relation to foreign patents, free.

VANDER WEYDE & SCHULTZ,
(P. O. Box, 5112.) 40 Exchange Place.
N. J. VANDERWEYDE. A. H. SCHULTZ.
July 6-tf-os Reference, Western & Co., New-York.

Charles L. Perkins,
General Commission Broker,
TREASURE CITY,
NEVADA.

BUY AND SELL REAL ESTATE,

Mill and Mining Property, Wood Ranches, etc.
Procure Patents for Mining Ground.
Furnish Certificates of Incorporation, Trust Deeds and Mining Blanks.
Trustees for non-resident Stockholders, Secretaries, etc.
Will furnish accurate information in regard to the White Pine Mines; progress of developments, indications, new discoveries, strikes, transactions in real estate and mining property, and attend to all business with fidelity and dispatch. March 20-3m

Charles E. Harris,
GENERAL MINING AGENT,
TREASURE CITY,
WHITE PINE COUNTY,
Nevada.

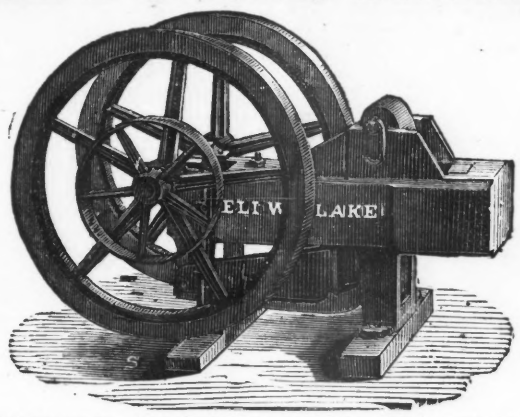
Reports and full information given regarding the Mines of this wonderfully rich Region. May 1-3m

CHANNING G. FENNER. E. F. DUNNE.
FENNER & DUNNE,
COUNSELLORS AT LAW,
Treasure City, White Pine, Nevada.
REFERENCES:
FENNER & PRESTON, 66 Pearl St., N. Y. R. W. RAYMOND, Esq., New-York.
April 17-6m

SCOVILL MANUFACTURING CO.,
MANUFACTURERS OF
SHEET BRASS, GERMAN SILVER,
PLATED METAL,
BRASS BUTT HINGES,
Gilt, Lasting, Brocade and Fancy Dress Buttons, Kerosene Oil Burners, and Lamp Trimmings.
And Importers and Dealers in every description of
PHOTOGRAPHIC GOODS.
No. 4 Beekman Street and 36 Park Row, New-York.
Manufactory, Waterbury, Conn. Sept. 21-1y

MINING MACHINERY.

BLAKE'S STONE BREAKER.



The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

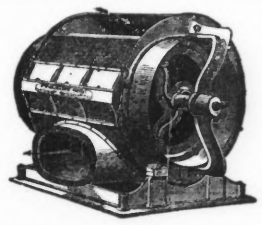
Illustrated circulars, fully describing the machine, with ample testimonials to its efficiency and utility, will be furnished on application, by letter, to the undersigned.

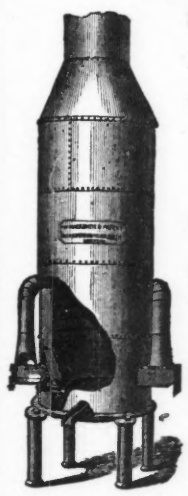
☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well-contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly wheel, are made and used in violation of our patent.

March 14-1y 351 **BLAKE BROTHERS, New-Haven, Conn.**

GREAT WESTERN
Mining and Manufacturing Company.
CHAS. HENDRIE, President.
MANUFACTURES OF MINING MACHINERY,
AND WHOLESALE DEALERS IN
Mining Supplies.

Our list of patterns includes all the improved processes for the procuring and saving of Gold and Silver from the ores, and it is the intention of the company to procure the right to manufacture all new improved mining machinery as fast as brought before the public. Our list, in part, is composed of the following machinery: Quartz Mills, stamps of any weight desired. Engines and machinery for same, of any size or description known to the trade. Amalgamators, Crushers, Desulphurizers, Engines, portable, hoisting, and pumping, of the most approved construction. Saw Mills, portable or stationary. Shingle Machines. H. H. Low's Patent. We also furnish in lengths to suit, Steam and Conducting Pipes, Steam Gauges, Brass Fixtures, Bolts, Belting, and, in fact, every thing needed by Mining Companies. Our works are located at the following places: BURLINGTON, Iowa; COUNCIL BLUFFS, Iowa; CENTRAL CITY, Colorado, and HELENA, Montana. The advantage of ordering machinery of us will be plainly seen from the fact of our having branches of our works in the mining regions, thereby enabling the companies to procure their repairs there, without having to send back to the States for same, which they would be compelled to do did they procure their machinery at an Eastern shop. Our prices here are the same as the Eastern prices, thereby saving to the companies the extra expense of freight to the West. We will contract to deliver freight at any point on the Missouri River, and will be prepared to send a competent man to superintend the erection of the machinery at the mill if desired. Plans and specifications of the mills furnished to all ordering machinery of us. We would be pleased to receive an order from you for any thing in our line, and feel confident we can fill it to the satisfaction of your company. All orders for machinery should be addressed to WM. C. HENDRIE, Secretary, Burlington, Iowa. Address for information to C. F. HENDRIE, Council Bluffs, Iowa. CHAS. HENDRIE, Helena, Montana. May 29-6m



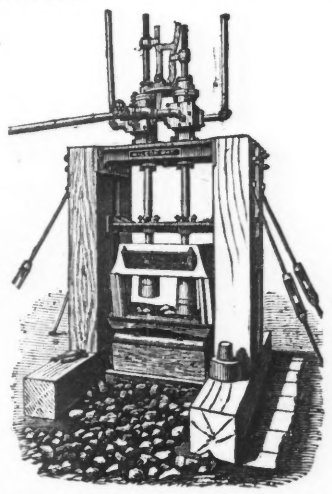


SMITH & SAYRE
MANUFACTURING CO.,
PROPRIETORS AND MANUFACTURERS
OF THE
Mackenzie Patent
BLOWER and CUPOLA and SMELTING FURNACE.
Also, Mackenzie's Patent
GAS EXHAUSTER and COMPENSATOR. Address
SMITH & SAYRE
MANUFACTURING COMPANY,
95 Liberty Street, N. Y. Send for illustrated pamphlet.
Mar. 26-1y

FOR SALE.
A Second-Hand Cameron Pumping Engine, No. 2.
Has 3-inch Water Cylinder,
6-inch Steam Cylinder,
6-inch Stroke.
Will be sold extremely low for Cash. Apply to
J. H. DARLINGTON,
Cor. Centre and Franklin Sts., New-York City.
June 5-tf

THE WILSON PATENT
STEAM STAMP-MILL COMPANY,
OF PHILADELPHIA, PA.

Are now prepared to supply Miners and other parties with their

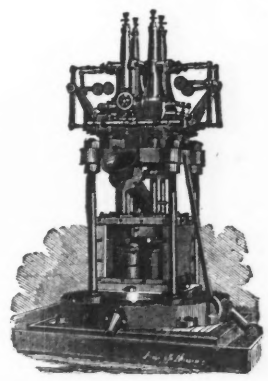


NEW STEAM STAMP-MILLS
AT THE SHORTEST NOTICE.

These Mills have now been in operation for upward of a year, and have proved to be the most durable and efficient, as well as the lightest for transportation, of any Mills now used. The valve gear is of the simplest and most durable construction, readily adjustable by movable cams on the piston rods or stamp stems, thereby giving the operator absolute control of the length and velocity of motion and force of the blow. These Mills are adapted for both dry and wet crushing, and for the hardest rock or softest cement. These Mills are every way equivalent to a Twenty Stamp Mill. For full particulars, call on or address

THE WILSON PATENT STEAM STAMP-MILL COMPANY,
326 WALNUT STREET, PHILADELPHIA.
May 7-1y

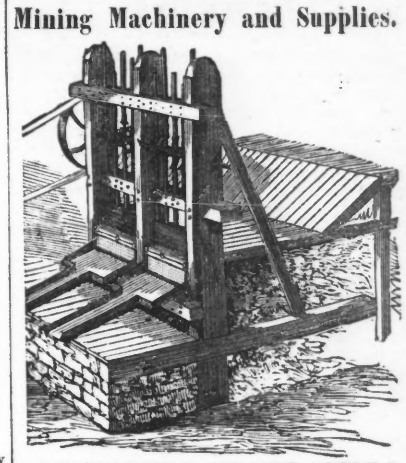
New-York Steam-Engine Company,
Manufacturers of



STEAM STAMPING MILLS,
Stationary and Portable Engines,
Engine Lathes, Planers, Bolt Cutters, Upright Drills and Machinists' Tools of all descriptions.
OFFICE AND WAREROOMS,
Jan. 2-1y-is Nos. 126 & 128 Chambers St., N. Y.

MINING MACHINERY, ETC.

Mining Machinery and Supplies.

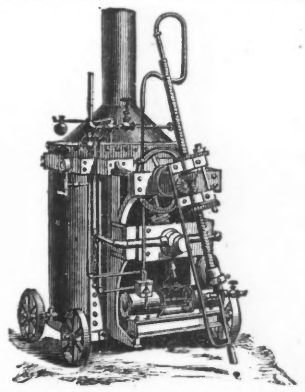


CALIFORNIA STAMP MILLS,
With Iron or Wood Frames.
WHEELER & RANDALL'S
PATENT
Excelsior Grinder and Amalgamator.
Conoidal Separator and
Tabular Concentrator,
With Self-Discharging Quicksilver Apparatus.
HEPBURN & PETERSON'S
Pan and Separator.

Rock Breakers, Retorts, Engines, Boilers, and Shafting, Shoes and Dies of the best White Iron and Steel. Plans, Drawings, and Specifications for Quartz Mills furnished, and practical information in Mining, Milling, Amalgamating and Concentrating Gold and Silver Ores given.

Agents for UNION IRON WORKS, San Francisco.
MOREY, SPERRY & CO.,
95 Liberty Street, New-York.
F. MOREY. J. A. SPERRY. P. M. RANDALL.
Oct.10-1y-is

PATENT DIAMOND DRILLS,
FOR
MINING, QUARRYING, SHAFTING, TUNNELING, WELL-BORING, PROSPECTING, AND SUBMARINE BLASTING,
WITH
IMPROVED MACHINERY,



Adapted to all kinds of rock-drilling. Ordinary rock bored at the rate of
4 to 6 Inches per Minute.
Mines and Quarries tested in the most satisfactory manner by taking out TEST CORES from any depth. For full information and price list, address
SEVERANCE & HOLT,
PROPRIETORS AND MANUFACTURERS,
MIDDLEBURY, VT.,
AND
Nos. 14 and 16 Wall Street,
Mar. 27-3m-is NEW-YORK.

DIAMOND-CARBON,
Shaped and Crystallized for Pointing or Edging Tools used in Mining, Drilling, and working Stone, etc. Send stamps for Circular. JOHN DICKINSON,
May 29-4t 61 Nassau Street, N. Y.

KROM'S DRY ORE CONCENTRATOR.
Concentration by means of Air
has long been attempted, but hitherto without satisfactory results. **S. R. KROM** has invented and patented machines which concentrate the various ores more perfectly than can be done by any other means.

The **Mechanical Combinations** are extremely simple, the machines therefore correspondingly durable. A continuous self-delivery of ore on one side and tailings on the other is effected, hence very little attention is required except keeping the hopper supplied with ore. The power of one man is sufficient to operate a machine that will concentrate one ton per hour.

Parties Interested in Mining are invited to call at No. 210 Eldridge Street, New-York, where they may see a machine in operation, and have samples of their own ores crushed and concentrated.

Illustrated Circulars may be had on application to
STEPHEN R. KROM,
Jan.10-1y-is No 210 Eldridge Street, N. Y.

COAL SHIPPERS.

POWELTON COAL AND IRON CO.,

SOLE MINERS AND SHIPPERS

Of the celebrated

POWELTON

Semi-Bituminous Gas and Anthracite Coals,

104 WALNUT STREET, PHILADELPHIA.

BRANCH OFFICES:

New-York, Trinity Building; 17 Doane-street, Boston; Cleveland, O; Pittsburgh, Pa. Jan. 30-6m-ls.

SAMUEL BONNELL, JR.,

Offers for Sale his

SUGAR CREEK

AND

HONEY BROOK

LEHIGH COALS,

OFFICE—43 AND 45 "TRINITY BUILDING," 111 BROADWAY, N. Y.

E. B. ELY & CO.,

SHIPPERS OF

COAL,

33 Trinity Building, 111 Broadway,

NEW-YORK.

"Old Company's" Lehigh, J. H. Swoyer's Enterprise, Wyoming, Wilkesbarre, and Locust Mountain Bituminous Coal.

E. B. ELY. S. W. ELY.
Apr. 24-1y-q

HONEY BROOK COAL COMPANY,

Exclusive Miners and Shippers of the Celebrated

HONEY BROOK LEHIGH COAL,

No. 111 BROADWAY, NEW-YORK.

JAS. H. LYLES, Agent.

Wharves, Port Johnson, N. J. Philadelphia Office, 209 Walnut-street.
Apr. 20 1y J. B. McCREARY, President.

WILKESBARRE COAL,

Delivered Direct from the Mines of

The Wilkesbarre Coal and Iron Co.,

OR FOR RESHIPMENT AT

HOBOKEN AND JERSEY CITY.

Office, No. 80 Broadway,

April 1-1y NEW-YORK.

WHITE, FOWLER & SNOW,

Successors to JOHN WHITE & CO.,

Wilkesbarre and Lehigh Coal,

FOR STEAM AND FAMILY USE.

OFFICE,

ROOM NO. 75, 111 BROADWAY (Trinity Building).

JNO. WHITE. LINDLEY H. FOWLER. LOUIS T. SNOW.
Jan. 1-1y

DAY, HUDDELL & CO.,

MINERS AND SHIPPERS OF

HARLEIGH LEHIGH COAL,

And the Celebrated

HICKORY, BROAD MOUNTAIN, EXCELSIOR, SHAMOKIN AND NEW-ENGLAND RED ASH.

OFFICES,

ROOM 51, TRINITY BUILDING, 111 Broadway.

Philadelphia, 109 WALNUT STREET. Boston, 7 DOANE STREET.
Ap. 20-1y

RANDOLPH BROTHERS,

SOLE AGENTS OF THE ORIGINAL

SPRING MOUNTAIN LEHIGH COAL,

Extensively Used for Smelting Iron.

ROOMS, 28 AND 30, TRINITY BUILDING,

NEW-YORK.

Apl. 6-tf

COXE BRO.'S & CO.,

Cross Creek Colliery,

Miners and Shippers of the Celebrated

Cross Creek Free Burning Lehigh Red Ash Coal.

FROM THE BUCK MOUNTAIN VEIN.

OFFICES:

Philadelphia, No. 341 Walnut Street. | Drifton, Jeddo P. O., Luzerne Co., Pa.

Agent in New-York, SAMUEL BONNELL, JR., Room 43, Trinity Building,

Feb.-1y 111 Broadway.

COAL SHIPPERS.

Pier No. 14 North Pt. Richmond.

C. J. & J. H. EASTWICK & CO.,

SHIPPERS OF

WHITE AND RED ASH COAL.

No. 228 DOCK STREET, PHILADELPHIA, and No. 19 DOANE STREET, BOSTON.

BURNSIDE RED ASH, SHAMOKIN WHITE ASH, LOCUST MOUNTAIN WHITE ASH COAL.

Jan.1y-ls s.a.

THE DESPARD COAL COMPANY

OFFER THEIR SUPERIOR

DESPARD COAL

To Gas Light Companies throughout the country.

MINES IN HARRISON COUNTY, West Virginia.
WHARVES, LOCUST POINT.
COMPANY'S OFFICE, No. 29 South St., Baltimore.

AGENTS:

PARMELE BROTHERS, No. 32 Pine St., New-York.
BANGS & HORTON, No. 31 Doane Street, Boston.

Among the consumers of Despard Coal we name: Manhattan Gas Light Co., New-York; Metropolitan Gas Light Co., New-York; Jersey City Gas Light Co., Jersey City, N. J.; Washington Gas Light Co., Washington, D. C.; Portland Gas Light Co., Portland, Me.

☞ Reference to them is requested. May 30-1y

THE NEWBURGH

ORREL COAL COMPANY.

Mines at Newburgh, Preston Co., W. Va.

Company's Office, No. 52 S. Gay St., Baltimore, Md.

C. OLIVER O'DONNELL, Pres. G. W. MAHOOL, Sec.

This Company offers their very superior Gas Coal at lowest market prices.

It yields 10,996 cubic feet of gas to the ton of 2,240 lbs., of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,732 cubic feet, with a large amount of coke of good quality.

It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New-York Gas Light Companies of New-York, the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y., the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I.

The best dry coals shipped, and the promptest attention given to orders. Dec.5-1y-q

---

English Coal and Cannel.

DESPARD COAL, from Baltimore,
PROVINCIAL COAL,
ANTHRACITE COAL.

For sale in lots to suit.

PARMELE BROS.,

Agency of OSCAR I. VAN WART, Liverpool.

OFFICE, No. 32 PINE STREET, NEW-YORK.

Yard, West 22d Street, near 10th Avenue.
Feb.27-1y

W. D. CRANE & CO.,

SHIPPERS OF

Anthracite and Bituminous COAL,

For Iron and Steam Purposes.

NEW-YORK: 115 Broadway. | BOSTON: 26 Kilby Street.
Apr.10-tf

VAN WICKLE & STOUT,

Miners and Shippers of

FULTON & STOUT

LEHIGH COALS.

Office, 119 Broadway, Room 18, New-York.

Our Fulton Lump is a Superior Article for FOUNDRY USE. Feb.20-1y

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MORRIS & BRAMAN,

SHIPPERS OF

Lehigh, Wilkesbarre, Hazleton, Chauncey, Red Ash, and Bituminous

COAL.

Office, 47 Trinity Building, 111 Broadway, New-York.

E. L. MORRIS. J. A. BRAMAN.
Apr.24-tf-q

G. B. LINDERMAN & CO.,

MINERS,

Sugar Loaf, Lehigh Coal.

OFFICE:

50 TRINITY BUILDING,

May 23-1y 111 BROADWAY, N. Y.

TYLER & CO.,

SOLE AGENTS FOR THE SALE OF

J. J. Conner's "Girardville" and "McMichael" Locust Mountain and "Duncan" Red Ash Coals.

Also, dealers in the best varieties of Lehigh, Shamokin and Wilkesbarre

COALS.

16 TRINITY BUILDING, New-York.
19 DOANE STREET, Boston.
328 WALNUT STREET, Philadelphia.
HATCH & TYLER, Hartford, Conn.

May 1-1y Box 1371, P. O., N. Y.

COAL SHIPPERS.

H. N. BURROUGHS, Pres't. H. T. SHILLINGFORD, Sec'y. H. H. SHILLINGFORD, Treas.

KITTANING COAL COMPANY,

SOLE MINERS AND SHIPPERS OF

BITUMINOUS COAL,

FROM THE COLLIERIES:

Tunnel Hill (LEMON VEIN), Gallitzin Cambria Co.
Beaverton (PHŒNIX VEIN), Osceola Mills, Clearfield Co.

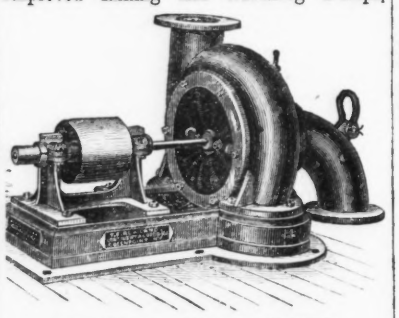
Unequalled for Steam, Rolling Mills, Forges, Glass Works, Brick Kilns, Lime Kilns, and Coke, for the Manufacture of Steel, etc.

OFFICE:

125 South Fourth Street (Forrest Place).
July 6-6mo

STEAM PUMPS.

Improved Mining and Wrecking Pumps,



LEBBY & DUC PATENTS,

MANUFACTURED SOLELY BY

T. F. ROWLAND, CONTINENTAL WORKS,

Greenpoint, Brooklyn, N. Y.

New-York Office, No. 64 Broadway, Room 33.

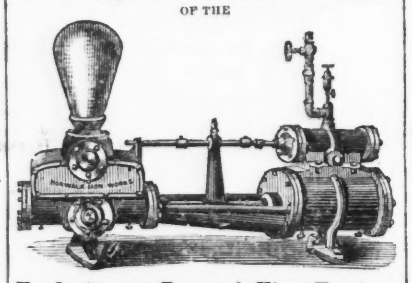
☞ Send for Illustrated Circular. July

NORWALK IRON WORKS,

SOUTH NORWALK, CONN.,

Sole Proprietors and Manufacturers

OF THE



Earle Steam-Pump & Fire-Engine,

(Patented in the United States, France, England and Belgium.)

Air and Vacuum Pumps,

STEAM AND BLOWING ENGINES,

Pumping-Engines for Water Works, Horizontal and Tumbling Beam Engines, Mining, Wrecking, and Supply Pumps.

IRON AND BRASS CASTINGS, of every Description.

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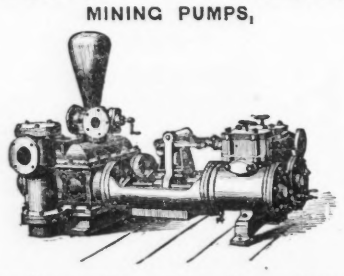
Steam Pumping Engines, Single and Duplex, Worthington's Patent, for all purposes, such as Water Works Engines, Condensing or Non-condensing; Air and Circulating Pumps, for Marine Engines; Blowing Engines; Vacuum Pumps, Stationary and Portable Steam Fire Engines; Boiler Feed Pumps, Wrecking Pumps,

MINING PUMPS,



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AIR PUMP,

Compresses Air or Gas to any Required Pressure.

Fryer's Improved Water Pump,

MANUFACTURED AND SOLD BY

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THE WOODWARD

Steam Pump Manufacturing Co.

Manufacturers of the

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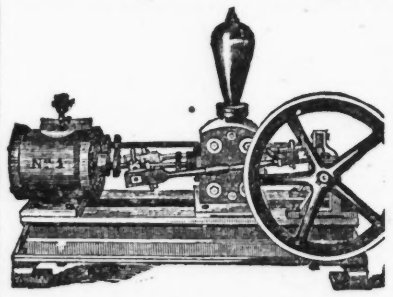
Steam Pump and Fire Engine.



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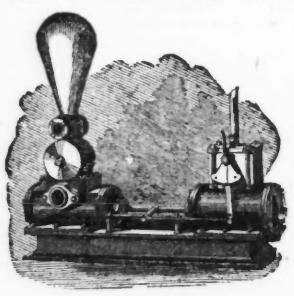

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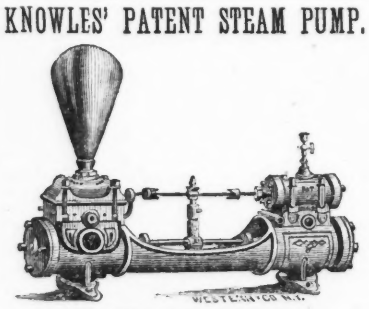

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Improved Horizontal and Vertical

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(Working with Plungers, and especially arranged for pumping water containing dirty or gritty matter).

Pumps for every possible duty, and all fully guaranteed. Also,

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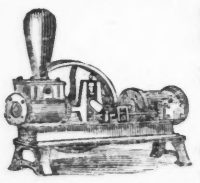

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All sizes made to order at short notice.

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SOUTHWARK FOUNDERY,

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William Wright's Patent Variable Cut-Off Steam Engine, regulated by the Governor. Merrick's Safety Hoisting Machine, Patented June, 1868. David Joy's Patent Valveless Steam Hammer. D. M. Watson's Patent Self-Centering, Self-Balancing Centrifugal Sugar Draining Machine, and Hydro Extractor for Cotton and Woollen Manufacturers. Nov. 15-1y

ENGINEERS.

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Professor of Chemistry and Metallurgy,

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Jan. 30-tf-os

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Rensselaer Polytechnic Institute, Troy, N. Y.,

Is open to engagement for the summer months for the examination of Mining Property, or for any work bearing upon Mining or Metallurgy. June 12-tf

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School of Mines, Columbia College.

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A School of Engineering and Practical Science.

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Applicants for admission must not be less than 16 years of age.
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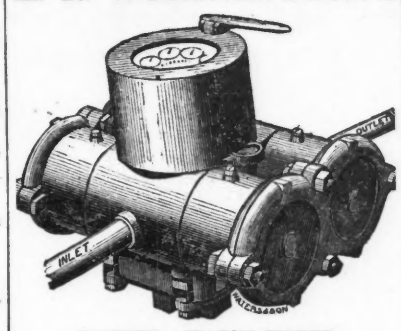
H. R. WORTHINGTON'S



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This Meter is also Used for the Measurement of Oil.

IT COMBINES

ACCURACY, SIMPLICITY, AND REMARKABLE DURABILITY,

with such ease and certainty of motion as to offer no appreciable obstructions to the flow of water in the pipes to which it is connected, as it runs and registers upon three inches head, or when delivering the smallest stream. These qualities, with its low cost, have caused its extensive adoption by corporations and individuals, in many of our larger cities.

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(Successors to WALTON & LEONARD,)

Machinists' and Railroad Supplies,

METALS, TOOLS, AND HARDWARE,

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ALWAYS RIGHT SIDE UP.

Warranted the most durable Oiler made. The spring cannot be "set" by use, or the Oiler injured by falling. These Oilers are made of heavy Tin, Brass, and Copper, and are sold by the trade everywhere. Address

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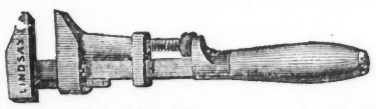

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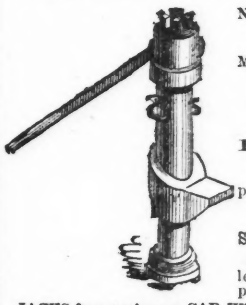

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PUNCHES,

Roller Tube Expanders, and Direct-Acting

STEAM HAMMERS,

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JACKS for pressing on CAR WHEELS or CRANK PINS made to order. May 22-1y

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Engines, Boilers, Pumps, Hoisters.

OSCILLATING ENGINES, run at great speed. Sizes 1-2 to 250 Horse-Power.

SMOKE-BURNING AND SUPER-HEATING BOILERS are economical and Safe.

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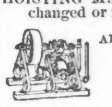

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Oilers, Circular Saw Mills, Mill Works, Cotton Gins, Cotton Gin Materials.

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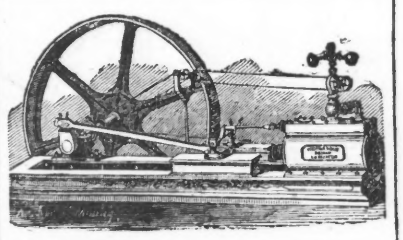

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OF ALL KINDS.

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CLAY RETORT WORKS.

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Root's Wrought Iron Sectional SAFETY BOILER.

Over 100 sold—tested to 300 lbs., no large sheet-iron shell to explode. Economical and durable. All sizes on hand. Also, Steam Engines, Steam Pumps, etc. Send for pamphlets and price lists.

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April 24-6m-os **95 and 97 Liberty St., New-York.**

WORCESTER STEAM BOILER WORKS,

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Locomotive, Flue and Tubular Boilers,

Oil and Water Tanks, Gasometers, etc.,

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Illustrated in the AMERICAN JOURNAL OF MINING of January 16th, 1869.
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CIRCULAR SAWS

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EMERSON'S PATENT MOVABLE TEETH.

These saws are meeting with unprecedented success, and their great superiority over every other kind, both as to efficiency and economy, is now fully established.

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Emerson's Patent Perforated Circular and Long Saws,

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for Spreading, Sharpening, and Shaping the teeth of all Splitting Saws. Price, $5. Manufactured by the

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Send for new Descriptive Pamphlet and Price List.
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Manufacturers of the latest Improved Patent.

Daniels' & Woodworth Planing Machines, Matching, Sash and Moulding, Tenoning, Mortising, Boring, Shaping, Vertical and Circular Re-Sawing Machines.

Saw Mills, Saw Arbors, Scroll Saws. Railway, Cut-Off and Rip-Saw Machines; Spoke and Wood Turning Lathes, and various other kinds of Wood-working Machinery.
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Matching Machines, Moulding Machines, Saw Benches, Chair Lathes, Self-Oiling Pulleys, etc.

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Who has had sixteen years' experience as Superintendent of Mines and Mills, wishes employment. Is very thorough in the mining and metallurgy of Gold and Silver ores. Can give unexceptionable New-York City references as to character, integrity and capacity. Salary not so much an object as prospect of permanency and share or percentage in profits. Address W. M., office of this Journal. June 5-3t-ls

IMPORTANT

TO IRON FOUNDERS AND SMELTERS OF

Lead, Copper, Gold, and Silver Ores.

THE MACKENZIE PATENT BLOWER,

Shown in Figures 1 and 2,

HAS NO EQUAL

FOR A

Pressure Blast,

GIVING A DEFINITE QUANTITY OF AIR

Without Reference to the Condition of Cupola;

CONSEQUENTLY IT IS

RELIABLE UNDER ALL CIRCUMSTANCES.

The Power Required is but One-Half that of any Blowing Apparatus Known.

LOW SPEED.

It is the only Rotary Blower in existence that will give any required pressure at fifty to one hundred revolutions per minute, giving two and one-half lbs. pressure to the square inch in several Charcoal Blast Furnaces.

A DURABLE MACHINE.

A large number have been running from FIVE TO NINE YEARS WITHOUT COSTING ONE CENT FOR REPAIRS.

ECONOMY IN COAL.

It is a well-known fact that a reliable blast, thoroughly penetrating the coal, is of the utmost importance for the economical working of a Cupola, saving in many instances twenty to thirty per cent in coal.

TEMPER OF METAL.

There is nothing more essential than to have your Iron at a proper temper, to insure good work. An immense loss is constantly experienced for the want of a reliable blast. WITH THIS MACHINE YOU HAVE IT.

It produces more perfect combustion and a higher degree of heat.

PERFECTLY NOISELESS.

There is no hum or buzz about it, which is highly appreciated by those having them in use; and NO DANGER as with Fan Blowers or Geared Machinery, running three hundred to three thousand revolutions per minute.

It does its work with the greatest EASE and REGULARITY.

This applies to the MACKENZIE CUPOLA as well as to the ordinary Cupolas in use.

In experiments with Blowers, all those built and tried by Mackenzie that *were* positive in their action, *now* required more than SIX-TENTHS of the POWER required for the *Best Fans known*, when the pressure exceeded four-tenths of a pound to the square inch.

When we consider that *Density* as well as *Velocity* is essential to Centrifugal Force, *it is plain* there must be an IMMENSE LOSS OF POWER in the *great speed required* by all devices *depending* upon that which DOES NOT EXIST, viz.: *Density* or *Weight* in Air.

There is not, at the present time, a Fan Blower in existence that is not, *strictly speaking*, a Centrifugal Machine, and depend upon *high velocity* to obtain very ordinary results.

Do not be deceived by parties representing Blowers that require *two* to *three thousand* revolutions a minute, as Pressure Blowers, as it is *perfectly absurd*. They are nothing but Fan Blowers, and their outlet can be entirely closed up without increasing the pressure or checking the speed in the slightest degree.

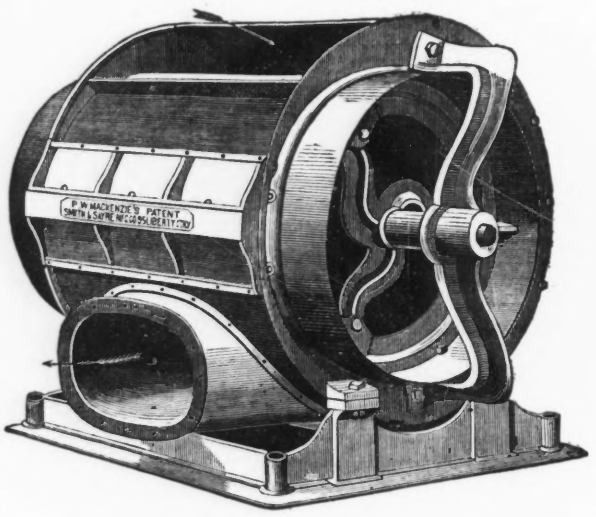

Fig. 1.

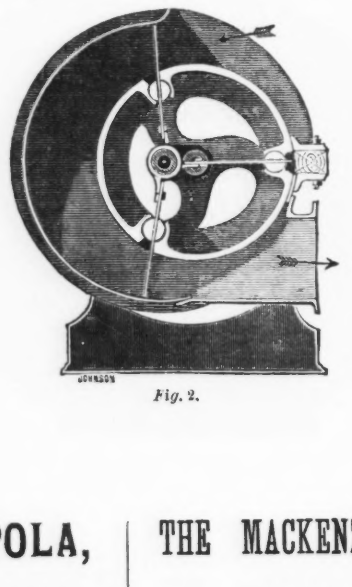

Fig. 2.

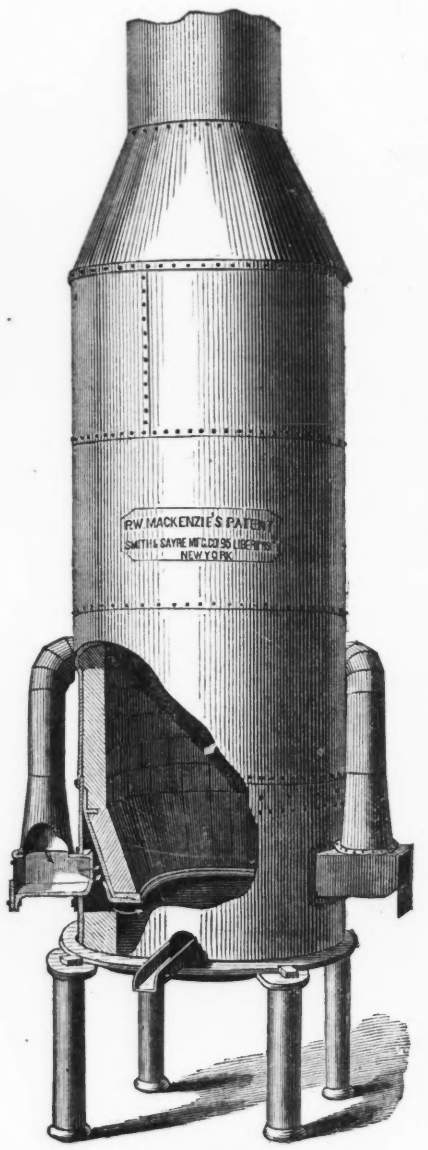

Fig. 3.

THE MACKENZIE PATENT CUPOLA,

Shown in Figure 3,

HAS MADE A GREAT REVOLUTION IN MELTING IRON

The Oval Form brings the *blast* to the *centre* of the Furnace, melting *ten* to *twenty tons* of Iron *an hour*, with the same pressure as that used in the ordinary Cupola to melt two or three tons in the same time, and with the CONTINUOUS TUYERE, produces more perfect Combustion, with BETTER TEMPER of Metal, taking less Carbon from the Iron, and leaving it very near its natural condition, which is of the greatest importance for Foundry or Machinery purposes, and especially for Fine Castings, dispensing with the Annealing Furnace, and using thirty to forty per cent. less Air, which, with the reduced pressure, make the POWER REQUIRED ONE HALF THAT USED to do the same work in ordinary Cupolas. They are designed to hold all the Iron to be melted, thereby avoiding the necessity of charging after the blast goes on.

This is a comfort to Furnace men, and highly appreciated by those having them in charge.

THE MACKENZIE BLOWER AND CUPOLA COMBINED

PRODUCE THE

FOLLOWING EXTRAORDINARY RESULTS.

Melting the Iron in One-half the Time. Using One-Half the Power during that time, and Saving in addition

Twenty-Five to Forty per cent in Fuel.

BALTIMORE, November 2, 1868.

Smith & Sayre Mfg. Co., 95 Liberty Street, New York:

Gentlemen: We have been using for several years the Mackenzie Cupola and Blower with great satisfaction. The Blower has been in constant and almost daily use for nearly (if not quite) ten years. We have melted twenty tons for many consecutive days, and in one casting have made as heavy as thirty tons. We have never lost a pound of castings from any difficulty with the Blower, and to-day it is in use and in excellent order. Yours truly,

POOLE & HUNT.

OFFICE PASCAL IRON WORKS,
PHILADELPHIA, Nov. 2, 1868.

Smith & Sayre Mfg. Co.:

Gentlemen: We have had in use at our works one of the Mackenzie Cupolas the past nine or ten years, and a blower for the same the past five years. We can melt 54,000 lbs. of iron (melting 8 to 9 lbs. by a lb. of coal) in 8½ hours, we think, with the least possible expenditure of power at the Blower.

Respectfully yours, ROBERT BRIGGS, Superintendent.

BOSTON, November 7, 1868.

Smith & Sayre Mfg. Co.:

Gentlemen: Pardon this delay, this being our busiest season; some delays are unavoidable. With regard to the Mackenzie Cupola and Blower we have to say they meet our highest approval. We have eighty-five (85) moniders, and with a No. 6 Cupola we have melted daily from twelve to fifteen tons of iron in one and one-half hours, giving a continual supply as fast as could be taken away. It is our intention the coming spring to enlarge our works, which, should we do, you will receive in one season our order for a No. 5 Cupola and Blower. We are respectfully yours,

Boston and Main Foundry Co.,
A. J. BLANCHARD, Agent.

PITTSBURG, October 2, 1862.

Smith & Sayre Mfg. Co.:

Gentlemen: Yours of the 30th ult. is at hand. In regard to the Mackenzie Cupola, we would just say that it answers our purpose admirably, and gives us entire satisfaction.

Yours respectfully, BIDWELL & CO.

WORKS OF SINGER MFG. Co.,
NEW-YORK, July 27, 1866.

Smith & Sayre Mfg. Co.:

Gentlemen: In reply to your inquiry, we are glad to state that the No. 6 Cupola and No. 5 Blower are giving us entire satisfaction. We melt from ten to fifteen tons of iron daily, in from two to two and one half hours. The iron runs a constant stream until the bottom is dropped. We melt seven and eight lbs. of iron with one of coal, and it is hot enough for any kind of work. The No. 5 Blower runs ninety-four revolutions per minute, uses less than half the power required for the Fan Blower, taken out, and does double the work in the same time. We shall be glad to show them in operation to any parties interested, and most cheerfully recommend them to Iron Founders as the very best thing yet produced for melting iron.

The Singer Manufacturing Co.
W. F. PROCTOR, Superintendent.

RESULTS IN COPPER SMELTING.

LAKE SUPERIOR COPPER WORKS,
PITTSBURG, PA., June 23, 1866.

Dear Sir: Your esteemed favor of the 25th inst, is just at hand. You inquire of us how we like your Cupola and Blower.

As we now use your Cupola and Blower for melting the slag from Lake Superior copper, we find both to answer the purpose admirably.

Your Blower furnishes abundant blast, and takes far less power to drive it than is necessary for ordinary blast cylinders. We have not experienced any trouble since we have had it in use, and cannot see why the principle will not ultimately supersede the use of the ordinary blast cylinders.

With your Cupola we can melt from two to three times the quantity of copper slag in a given time, to what is usually accomplished with the ordinary Cupola. The saving of fuel is from 18 to 20 per cent.

Any further information as to the working of your Cupola and Blower in use at our Copper Works will be cheerfully given.

Respectfully yours,

PARK, McCURDY & CO.

ADDRESS, **SMITH & SAYRE,**

Manufacturing Co., No. 95 Liberty Street, New-York.