

SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES

Vol. XVIII.--No. 26.
(NEW SERIES.)

NEW YORK, JUNE 27, 1868.

\$3 per Annum
(IN ADVANCE.)

The Novelty Works, New York City.

THE accompanying engraving presents an interior view of a portion of the celebrated Novelty Iron Works of Stillman, Allen & Co., at the foot of Twelfth street, East river.

The position selected by our artist shows one end of the erecting shop, in which the various parts of engines and other machinery in process of construction, are assembled after having been cast, turned, and finished in the different shops composing this immense establishment. Here the final adjustment, and fitting of the several parts to each other are effected, and each member of the future machine adapted to perform perfectly and harmoniously its appointed function.

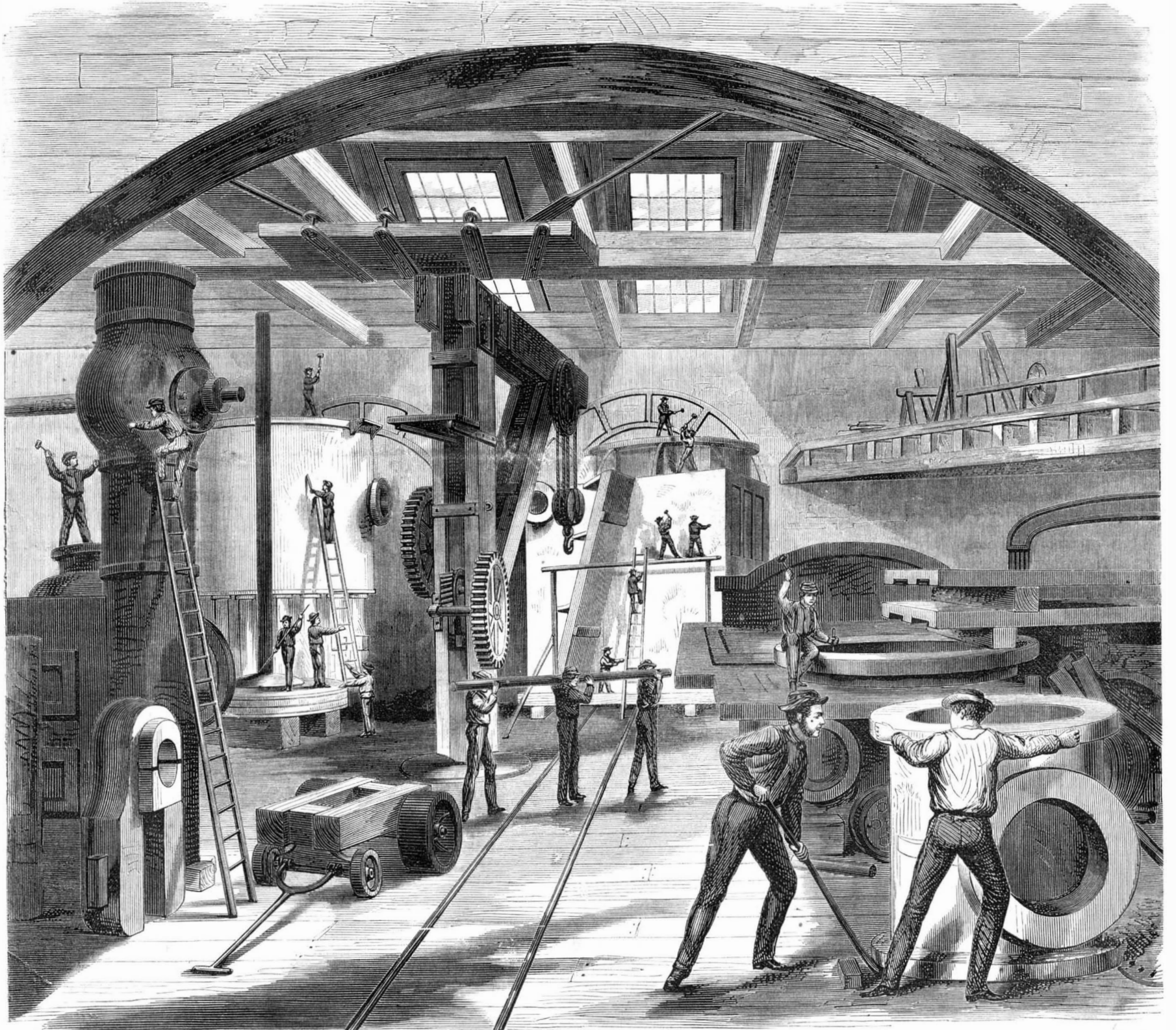
This shaft is to carry the working parts of Mr. Allen's adjustable cut-off now applied by this firm to all their marine engines with the most gratifying success. It is indeed a marvel of ingenuity and must challenge the admiration of all lovers of mechanical beauty and perfection. In front of the side pipe stands the main crank pin, strap for the connecting rod. It is 4 ft. 6 inches long and grasps a crank-pin having 14 inches diameter.

Immediately to the right of, and behind the side pipe, are seen the piston and piston-rod, for the same engine. The former is 105 inches in diameter, while the piston-rod is 11 inches diameter and 19 ft. 4 in. long. The rod is firmly seated

mer and chisel. This foundation plate of the whole super-structure weighs 20 tons. To the right, and resting on the bed plate are shown the bed plates for a large 40 ft. lathe. Over these again, in the background, appears a portion of the tool gallery where the hand tools are kept ready for the workman's hand, but out of the way, and in place, when not in use.

The large casting in the foreground, right hand corner, is a jet condenser for a smaller 62 inch engine, and weighs 4 tons.

The shifting and placing in position of these heavy masses are effected by the use of the ponderous crane shown in the



VIEW OF SHOPS FOR THE MANUFACTURE OF LARGE ENGINES.

That the reader may have an intelligent idea of the nature and uses of the objects shown in the engraving, we propose to give some explanatory notes, obtained in a recent visit to the works, through the courtesy of Lyman Hall, Esq., the superintendent.

Most of the parts here shown belong to a large marine engine now building for the Pacific Mail Steamer *America*. She will be the twelfth vessel of this line fitted with machinery from these works, and has the following dimensions: Length 360 ft., beam 50 ft., and depth of hold 32 ft. 6 in., giving a burden of over 4000 tons. She is to be fitted with a single beam engine of 105 inches cylinder, and 12 ft. stroke, with Allen's adjustable cut-off.

In the left foreground of the engraving, will be seen the front lower steam-chest, and one of the side pipes with the cut off shaft passing through its upper portion.

in the piston by a conical expansion and large nut on the end of the former.

Just behind these may be seen the air pump and reservoir, with a ladder standing against it. This pump has a diameter of 62 inches and 6 feet stroke, the whole casting weighing 9 tons. In the central background and over the tramway stands the condenser, an immense and complicated casting weighing 21 tons. It is of the tubular kind and is to be fitted with Mr. Allen's wooden packing. On its top flange, where the workman is seen with a sledge hammer, the cylinder bottom will rest with a weight of 8 tons. Upon this again comes the main cylinder weighing 19 tons with its cover, weighing 7 tons. These are all supported by the condenser, which in its turn is to be securely fastened on the bed plate which is seen just to the right of the three central figures with a workman seated upon it, engaged with ham-

central part of the engraving, and by immense chains and pulleys to which steam power is applied.

The cylinder which is to form a part of the *America's* engine, is now being excavated from the sand pit in which it was cast, and has yet to go through the boring mill and finishing shop. Of the other parts not appearing in the engraving, the working-beam deserves mention. It weighs 24 tons without its centre pin, which alone weighs 4 tons.

The main shafts are 2 feet in diameter, and are probably the largest ever made entirely of charcoal iron, they having a weight of 24 tons.

Beside the large marine engine, we noticed a stationary engine of beautiful design and improved valve gear, in process of construction. This firm is also manufacturing Stephen son's & Luther's turbines, and Messrs. Stillman, Allen & Co., have recently added to their extensive works an architectural

Improvement in Machines for Developing Gas from Hydrocarbons.

The manufacture of illuminating gas by carbureting the atmosphere with liquid hydrocarbons, has long been known and used, but its general introduction was greatly retarded by the cost of the hydrocarbon liquid before the discovery of petroleum in this country, and the absolute inefficiency of the different kinds of apparatus used to make the gas. A great many patents have been taken out to make gas from the volatile portions of crude petroleum, but they have been defective by reason of their being automatic, that is, they manufacture gas only as fast as used; therefore a constant evaporation is taking place while the gas is burning. The objections to this class of machines are these: In proportion to the rapidity of the evaporation of the liquid is the reduction of temperature or loss of heat; now, as the quantity of hydrocarbon vapor which will unite with the atmosphere depends upon the temperature of the liquid and atmosphere, it of course follows that unless a uniform temperature is preserved gas of a uniform quality will not be produced. In order to obviate this difficulty of refrigeration, heat has been applied in many ways to keep up the temperature. Now if a little too great heat is produced the atmosphere will become supersaturated with the vapor, and, most certainly, condensation of the vapor into a liquid will follow. The danger of such a condition need not be dwelt upon; every pendant and chandelier becomes filled with liquid gasoline, and, of course, as soon as the gas stops are opened the gasoline would be ignited by the match applied to light the gas. By Rand's process these dangers and difficulties are overcome by the utilization of the earth heat.

The *modus operandi* is simply this. A cistern is placed in the ground, and inside of this cistern is firmly secured a small tank, D, to hold the liquid from which the gas is made. Outside of this tank is the water bath, E, so it will be observed the sides and bottom of the hydrocarbon tank are covered by water. The air pump, A, supplies the air to the bottom of the tank, D, from which it issues in fine streams from a perforated horizontal pipe into the gasoline, up through which it passes into the holder, C; there it remains during the day and is drawn off through the usual exit pipe, G, into the pipes leading to the burners. If by reason of the very light specific gravity of the gasoline the gas should smoke, the diluting pipe, F, with the air pump, is so arranged that the air is driven at once into the holder without entering the gasoline tank. By the use of this pipe the gas can be made of any quality desirable. The objects of placing the tank in the ground are, first, its safety from accidents by fire; next, the uniformly low temperature maintained in the gasoline storage tank, and lastly, the heat known as sensible heat of the water, and latent heat in the earth, are utilized in this manner. As the gas for a large house is made by these works in five minutes, the evaporation of course is very rapid and the loss of heat consequently great. Now as soon as the temperature of the gasoline becomes lowered by evaporation, the heat from the water and earth acts upon the fluid, and before the next batch is to be made the gasoline has absorbed enough heat from the earth to bring its temperature up to the point where it was before evaporation commenced.

The tank, D, is always made of sufficient capacity to hold liquid enough for at least one year; thus the danger of filling often is avoided. This gas is practically incondensable, the gas having its birth at a low temperature, will not condense in the pipes leading to the burners. If it was possible at such a low temperature to surcharge the air with hydrocarbon vapor, the gas standing a number of hours over water would part with its excess of heat and precipitate the excess.

In the engraving, B represents a gas burner, placed in this instance in close contiguity with the works, but which may be at any required distance from the tank. H is a drip pump; I, the balancing weights, and K, the surface of the ground. The apparatus may be placed at any distance required from the point where the gas is used, and it may be covered by an ornamental structure, as seen in the engraving.

This method of utilizing liquid hydrocarbons is the subject of two patents, bearing date, Feb. 26 and Dec. 25, 1867. It has received the commendation of many competent judges, including persons who are using the apparatus, and has been adopted by the Metropolitan Gas Company of New York, who submitted the plan during the past winter to the severest tests of low temperature of the atmosphere, with such success that the company has purchased the right for their lines.

The New York office for these patents is at 16 Nassau street, where working models are on exhibition. Address A. C. Rand & Co., as above, for further information.

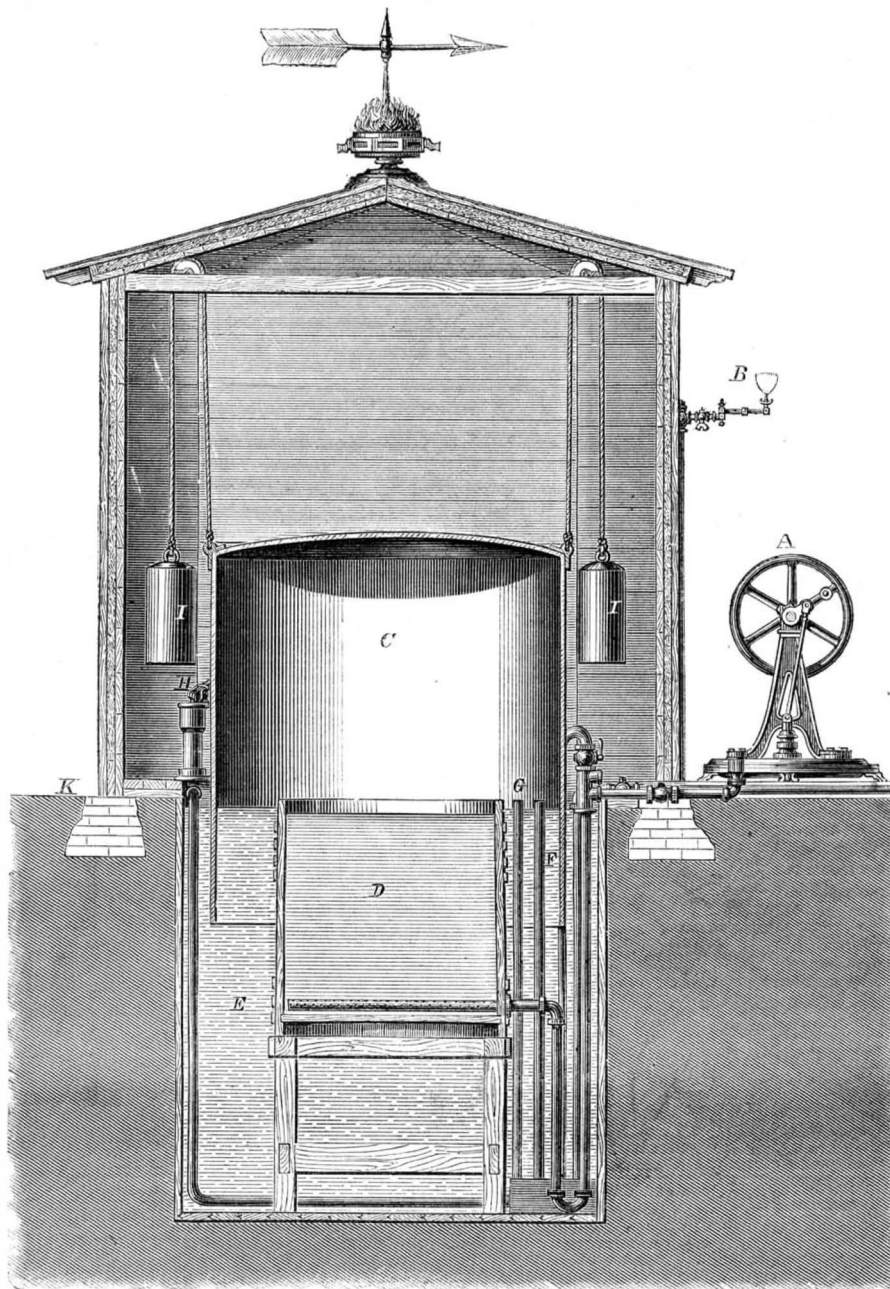
Transfer Composition.

Patented by Max Rosenthal, of Philadelphia, Pa. —

I use the cheapest kind of unsized paper; I use one pound of fine starch; half an ounce of common washing soap; one ounce of rock candy, dissolved in water, and about twenty

drops of glycerin. Mix the ingredients warm, and let the mixture stand until cold. I then apply this mixture to the paper with a brush, coating the paper on one side only, and leave it to dry. After it has thoroughly dried, I apply on the top of the dried surface another mixture, composed of gum-arabic and rock candy, one ounce of each, dissolved in a pint of water, and coat the same prepared surface again with a clean brush, and let it dry, when the paper is ready for use,

bolts or rivets proved to be too great, and the halves of the rails tended to separate by the breaking of the connecting bolts. By the adoption of an improved chair, having only a single head, as at A, Fig. 1, the ends of these compound rails are intended by the inventor to be firmly held. These double rails may be turned to present one face when another is too much worn. The spike on the low side of the chair is driven, as usual, vertically, the rail put to place, and then the spike on the side of the chair head driven at an angle, as seen firmly locking the rail. This peculiar action of the angularly driven spikes with the double or single-headed chairs, is seen at B and C, Fig. 1. A top view of a double rail with single chairs is seen in Fig. 2. The third figure presents a modification of the ordinary solid rail, only having a scarf joint, secured at D and E, by the single-headed chairs. By the use of this chair, with the angularly driven holding spike, all wedges are dispensed with, and the rails, either at their joints or at any other point, firmly held. The chair seen at B, Fig. 1, is considered by the inventor as well adapted to the present style of rails with butt joints, as two will take the place of three single ones. The saving in amount of spikes—as only one is used with this chair where two are used with the ordinary chair—and the dispensing with wedges, apt to work loose, would seem to recommend this device to the attention of railroad men. It was patented by John H. Downing, Dec. 10, 1867, who may be addressed relative thereto at Salem, Mass.

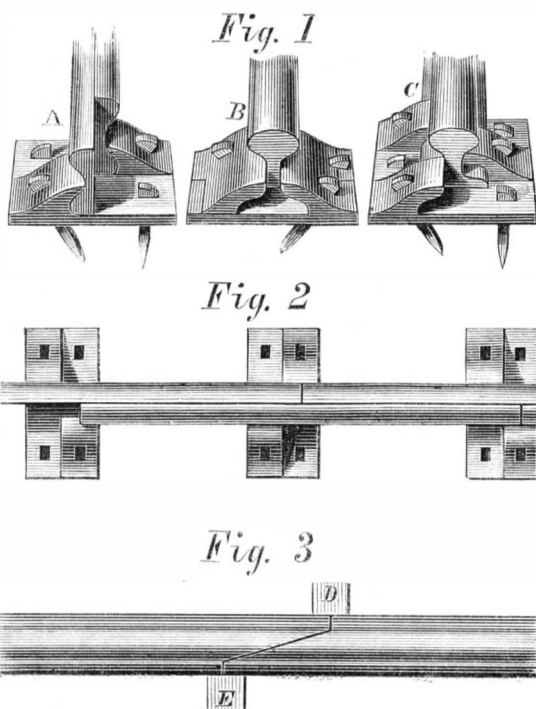


RAND'S PNEUMATIC GAS GENERATOR.

and the prepared side of the paper to be printed upon by the usual mode of printing. After the printing is done, the printed side is instantly transferred upon any smooth surface of any material, by merely moistening the back of the paper with clean water, and the paper can be instantly removed by raising it up, and the impression is thus easily, quickly, and permanently transferred.

DOWNING'S PATENT IMPROVED RAILWAY CHAIR.

Double rails, made in two pieces as though divided vertically, have been used, but the two sections were secured, to



make a whole rail, by means of rivets or bolts, which were seated in place as the rails were laid. This made a smooth roadway, breaking joints, but the strain on the connecting

short, done by women.

The price paid for weaving plain silks is about fourteen cents per yard; for rich and flowered silks it is more. This trade suffered much from the American war, which greatly lessened the demand, and the people are not now working more than half time. The silk manufacture of France originated in the luxury of the Court of Francis I. In addition to that grown in France, the imports of raw silk were, in 1792, 136,000 lbs. The manufacture had increased so much that the quantity imported in 1851 had increased to 2,291,500 lbs., or about seventeenfold. Lyons has on several occasions been the scene of trade outbreaks, in consequence of attempts to introduce machinery or to alter the rate of wages. The cost of carrying coal will always operate in favor of manual labor. Great Britain offers a large and increasing market. She used to import raw silk and manufacture it in England, but the importation of raw silk has decreased, and silk manufacturing has lessened. The imports of raw silk have lessened to one half, of silks from India to one fourth, while the import of silks from Europe has increased nearly tenfold, and that of ribbons has doubled. The Lyonese silk weavers comprise about 120,000, out of a population of 300,000.

Estimation of the Quality of Soap.

The quality of soap may be properly estimated from the amount of fatty acids which any given specimen contains. The following simple analysis may be performed by any one, and may be relied upon as giving good results.

The soap to be examined should be dissolved in water. If distilled water cannot be readily obtained, rain water will answer well enough. When a perfect solution is obtained, add hydrochloric acid. After a little while the fatty acids will be found to be separated from the other constituents of the soap. These should be collected, and their relative weight for any given quantity estimated. The relative weight thus found will be a sufficiently just indication of the quality.

THE *Amelia* steamboat, at San Francisco, Cal., is being fitted to burn petroleum. Anthracite coal being worth \$20 a ton, and oil \$5 a barrel, it is expected that the liquid fuel will prove exceedingly economical. In back number of the SCIENTIFIC AMERICAN we have given the comparative fuel values of oils and anthracite, to which those interested in the subject may readily refer.

Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

"The American News Company," Agents, 121 Nassau street, New York
"The New York News Company," 8 Spruce street
Messrs. Trubner & Co., 60 Paternoster Row London, are also Agents of the SCIENTIFIC AMERICAN.
Messrs. Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill, London England, are the Agents to receive European subscriptions or advertisements for the SCIENTIFIC AMERICAN. Orders sent to them will be promptly attended to.

VOL. XVIII., No. 26. . . [NEW SERIES.] . . Twenty-third Year.

NEW YORK, SATURDAY, JUNE 27, 1868.

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END OF VOL. XVIII.—BEGINNING OF A NEW VOLUME

The present issue of the SCIENTIFIC AMERICAN completes Volume XVIII., new series. Probably there never was a time when greater activity was displayed in the sciences and arts than the present. And this activity is not confined to this country, but our foreign exchanges afford us, weekly, many items of interest to the scientist, mechanic, and farmer. From these sources we glean everything which can interest our readers, in whatever walk of life, and every important improvement in mechanics or discovery in science, which is made in this country, receives an early and prominent recognition. Thus the SCIENTIFIC AMERICAN is literally a compendium of all that is new and valuable in the arts and sciences.

In other departments we believe it to be equally valuable. Its pages contain correspondence from all parts of the country and the world, on subjects which cannot fail to interest all classes. They are frequently the productions of our most eminent scholars and engineers, while the hints, suggestions, and directions of our working mechanics find place in our columns. These are always interesting, and not seldom exceedingly valuable.

The answers to correspondents are always instructive. We endeavor in framing them not only to convey the information sought by the individual inquirer, but to instruct others. In fact, this department is intended to give such items of information succinctly as do not require a column of editorial. The contributors to this department are men who are practically conversant with the subjects upon which they profess to treat.

Our descriptions, accompanied with illustrations, give our readers accurate information of the latest and most important inventions. The engravings are not equalled by those published in any other country, and the descriptions, for terseness, clearness, and conciseness, are certainly not surpassed.

Our weekly list of patent claims are received direct from the Patent Office in Washington. They are full, accurate, and alphabetically arranged for convenience of reference. They are invaluable to the mechanic, inventor, and capitalist.

Editorially, we believe the SCIENTIFIC AMERICAN will compare favorably with any journal devoted to similar objects. The writers are gentlemen of long experience and undoubted ability, and they aim rather at presenting facts and practical suggestions than mere conjectures and speculative theories.

That we have succeeded in making a popular scientific and mechanical journal, our constantly increasing list of subscribers fully demonstrates. What the paper has been in the past it will be in the future; encouraging the struggling inventor, instructing the unlearned mechanic, informing the scientific student, interesting the young and the old. It will fearlessly expose unwarranted pretension, and rebuke charlatanism, while it faithfully records the improvements made by inventors and mechanics.

THE INDICATOR AS A FIXTURE TO THE STEAM ENGINE.

The steam engine indicator has received occasional notices in our columns, in which its construction and operation have been described and its uses partially enumerated. We have shown that it gives exact information of the working of the valves, the admission, expansion, and pressure of the steam, its action at all parts of the stroke, transferring these points to paper and forming a diagram which is a basis of the calculations to ascertain the force expended and the power exerted.

But there are other offices and uses of the indicator. By it the relative value of the lubricants used can be ascertained and the best mode of applying them; the amount of steam required to work the attached machinery as compared with the work done, consequently the saving that can be made in changing machinery to do the same work. Another important office of the indicator is to compare the power developed with the amount of fuel used. This is a check upon the carelessness of the fireman or of the engineer; for if it is known

that an engine can be run with an expenditure of two and a half or three pounds of coal per hour for each horse power on one day, there can exist no reason, except carelessness or heedlessness, why, other things being equal, it should not do the same on another day. It also determines the quality of the fuel. Suppose the last invoice of coal gave one horse power for every two and a half pounds consumed per hour. On one day four thousand pounds are used, but on another day, four thousand five hundred pounds. The indicator shows on both days the same amount of power exerted and that the engine is in the same condition. Then the question is narrowed down to the neglect or carelessness of engineer or fireman, or to a difference in the quality of the coal. If, on weighing the ashes and clinkers it be seen that on one day they exceeded in amount those made on the other day, it would be plain that the difference in results arose from difference in the quality of the fuel. The incombustible portion of anthracite coal varies from six per cent to thirty per cent. The proof of its quality can be determined in no way so well as by the indicator combined with the scales.

Every engine—all large engines—should have a pair of indicators permanently attached, and an engineer should be employed who can intelligently use them. A pair of diagrams should be taken twice a day, say at 9 P. M. and 3 P. M. Let every pound of coal be weighed and also the ashes and clinkers, and a tabular statement of these facts and the results of the indicator diagrams be made out daily on blanks furnished for the purpose, and a balance struck each week. Thus the proprietor will know at a glance the condition of his engine, the efficiency of his machinery, and the value of his fuel—in fact the cost of all his expenditure of power as compared with the work done.

This may be objected to on the ground that few engineers can be found who can use the indicator, and that some firemen cannot read the scale of the weighing machine. The objection refutes itself; if men are not competent to perform these duties they are not competent engineers or firemen. The use of the indicator can be acquired by the study of such elementary books as "Porter on the Indicator," "Paul Stillman's Treatise," "King's Notes on Engineering," "Bourne's Handbook," etc. By the aid of these and practice with the implement any intelligent engineer can readily become an adept in the use of the indicator.

Such education will tend to raise the status of mechanical engineers, reduce the cost of power, insure better work, and induce superior mechanics to adopt practical engineering as a vocation.

CAPITAL AND LABOR AS AFFECTED BY LABOR-SAVING MACHINERY.

It was thought in former times that the introduction of labor-saving machinery into any department of manufacture, would be the means of throwing large numbers of operatives out of employment, yet the result has shown those fears to be unfounded. The introduction of any improvement that enables individual productions to be made with less manual labor, and at a consequently reduced cost, has always made an increased demand for labor in that department. *Labor creating machines* would be a more significant term, so far as the effect of such inventions upon the amount of production is involved.

To illustrate this idea, let us suppose a machine to be invented that would enable an operative to make two hats while he now can make one. Let us further suppose the cost of producing hats by manual labor only, to be \$3 00 apiece, one half the cost being for labor and the other being for the materials of which each is made. Allow a profit of one dollar, which will make the price of the hat to the purchaser \$4 00, so long as manual labor alone is used. Upon the introduction of the machinery, which doubles the amount of production, the cost for labor would be reduced one half. The profit for a single hat, estimated at the same rate of percentage, would be less than a hat costing \$3 00, so that the price of hats would thus be reduced, say one third. Further, suppose the reduction in price to increase the demand for hats, so that three hats would be wanted where one was desired previous to the improvement in their manufacture. It will now be apparent that the introduction of machinery, while it has reduced the manual labor connected with the production of a single hat one half, has increased by one half the amount of labor needed for the entire production of hats.

How has the relation which capital bears to labor been affected by the constantly increasing use of machinery in all branches of manufacture? Manifestly they have been brought nearer together, until now it is somewhat difficult to determine which has the balance of power. Operatives complain of insufficient remuneration, and are continually embarrassing large manufacturing interests by combinations and strikes. On the other hand, capitalists complain that, in view of all the risks and complications attendant upon fluctuations of trade and unreasonable demands of employes, that capital cannot be embarked in any manufacturing enterprise with a certainty that it will return the legal interest upon the amount invested.

These complaints, though in some measure sustained by facts upon both sides, are essentially without a solid foundation. Capital and labor are interdependent, and are only rendered antagonistic when either disregards the just claims of the other. Both suffer from the withdrawal of either; but when they mutually and harmoniously cooperate, all classes prosper.

We cannot admit, however, that of late capital has obtained any undue advantage over labor. That money has been made in certain branches of manufacture cannot be denied; but if we deny the right of capital to accumulate by legitimate use, we strike a blow at the very root of sound social

organization. But where any remarkable instance of profit by manufacture, within the last ten years, can be pointed out, it will doubtless be found that the question of capital is involved with other elements, which should not be allowed to escape observation. If, for instance, an individual with limited means is enabled to commence the manufacture of a patented article, and, by virtue of the intrinsic value of the invention, can obtain a very large advance on cost of production, sufficient to allow him to realize a fortune in a short time, it is not the capital involved, nor the labor, considered singly or together, that are the cause of profit; it is the brain which devised, and the skill which developed the means for the acquisition of wealth. For employes to demand, in such a case, an increase of wages, on the ground that the employer is making money so fast, is equivalent to demanding of him a share of the privileges which are granted to him by letters patent, in addition to the market value of labor, at the time the demand is made. Notwithstanding the evident truth of this proposition, such demands are often made. In fact, the sole cause of discontent among operatives at the present time, is the desire to enjoy the luxuries and privileges, which in former years were only the accessories of wealth. It is not the gratification which such things are capable of imparting of themselves alone, which is sought, but the avoidance of the unhappiness generated by the lack of them.

We intend in a future number to show that the effect of the introduction of labor-saving machinery has been to constantly increase wages, and to prevent any permanent reduction, and that, from the nature of the case, such must be its effect in the future. If we establish this proposition, it will follow that the whole machinery of "Trades Unions," and combinations of a similar character, are only attempting to secure that which is inevitable, and to prevent that which can never come to pass.

THE LATEST NOVELTY IN PHOTOGRAPHY.

Perhaps the most curious invention of the present day is the new kind of photographs, made on a so-called phosphorescent surface, of which absolutely nothing can be seen in the daylight, but which is distinctly visible in the dark. Many years ago, compounds were invented which had the property of shining in the dark many hours, and even days or weeks, after an exposure to sunlight for only a few seconds. These phosphoric compounds, called after their inventors Canton's, Baldwin's, Bolognian phosphorus, etc., were formerly of no use whatever, but it was hoped that they might eventually reveal something concerning the nature of light; and such has indeed been the case, as the phenomena connected with these experiments are a strong argument in favor of the undulatory theory, and the correlation of forces.

An English photographer lately conceived the idea of covering a sheet of paper or glass with a layer of such a phosphorescent substance, and then treating it in a similar manner to paper or glass sensitized in the ordinary way for taking a photograph. Pictures taken in this way seem, by daylight, to have no existence, but the places where the light has acted upon, become phosphorescent or luminous in the dark, the shadows remaining invisible, the semi-tints slightly luminous, and the result is such a change in the surface that the picture is only perceptible in a dark room, by an unearthly glow of a greenish, blue, red, or purplish tint, according to the preparation used.

We notice this invention only by reason of its oddity, and not for its utility. The only practical use we see for it, would be to terrify the uninitiated by the exhibition of luminous images of skulls, skeletons, demons, and similarly cheerful subjects suddenly appearing on the walls, window panes, curtains, or other unexpected localities at the moment the lights are extinguished. It is very easy to make such pictures. A sheet of albumen paper is moistened to make it sticky, and then equally covered with a thin layer of the finely powdered phosphorescent substance, or a pane of glass is covered with a thin coating of paraffine, to which also, when warmed, the powder will stick; then the prepared surface is treated as in taking an ordinary photograph, either by placing it in the camera, or exposing it for a few seconds under a positive to the rays of the sun, or the magnesium or electric light.

The only thing remaining to state is the preparation of these phosphorescent substances. One of the cheapest is Canton's phosphorus, and it is made by burning oyster shells for half an hour, powdering and mixing with an equal weight of sulphur, and heating again for one hour in a covered crucible. The produced substance must of course be preserved in the dark, and protected from moisture in a well closed bottle. Wachs found that the luminosity is much increased by moistening the mixture of shells and sulphur before the second heating, with a solution of sulphide of arsenic in liquid ammonia. The powder thus obtained emits so strong a light of blue color that it does not require perfect darkness to perceive its glow.

Baldwin's phosphorus, mentioned above, is prepared by dissolving chalk in nitric acid, then heating and grinding it to powder. The Bolognian phosphorus is made by simply heating a mixture of powdered heavy spar with the white of eggs, gum water, or a solution of tragacanth. Fluor spar is naturally such a phosphorescent substance, some specimens however more than others, and diamond appears to be the best; but the expense of the powder would hardly admit of its employment for the above mentioned purpose. Experiments have proved this property, in some degree, to exist in a great number of substances not suspected to possess such a singular quality; for instance, many natural compounds of lime, baryta, strontia, and magnesia; besides corals, fossil bones, and teeth; the shells of eggs, oriental

pearls, dry bleached linen, white paper, and even the stones extracted from the human bladder.

Grott has found that the same luminous rays—the blue and violet—which produce the photographic pictures, also produce this effect, and that the rays which have no photographic powers—red and orange—not only do not produce it, but extinguish the existing luminosity. However, this is not because it is easily extinguished, as handling and even immersion in water will have no effect upon it, neither plunging the body in different gases. Groszer found that the luminosity was not even in the least impaired in a perfect vacuum.

Some philosophers have already, and with apparent good grounds, mentioned their suspicion that in nature the same phosphorescence may take place on a larger scale, that we see in different minerals, fossils, and preparations on a small scale, and if so, planets and comets are luminous partly by light reflected from the sun, and partly by phosphorescence of their own. That comets possess such a light of their own has been proved by Arago's conclusive observations by means of polarized light; and perhaps the peculiar appearance of the moon during its eclipse is due, besides the refraction and absorption of light in our atmosphere, to such a phosphorescence; even ice shows luminosity in the dark for several hours, when suddenly withdrawn from sunlight exposure to a dark room. The periodical obscuration taking place during the moon's phases is so slow that no phosphorescence can show itself, but on the occasion of an eclipse the obscuration is so rapid that any phosphorescence on its surface persisting for an hour or half an hour must become visible.

Practical Researches in Sugar Refining.

M. Monnier, of France, has recently published his researches in sugar refining from which we publish some interesting facts:

If sulphurous acid gas is conducted into a chamber containing coarse sugar, the latter is promptly bleached, and about three-fourths of the coloring matter is entirely destroyed, while the sugar undergoes no change whatever in composition. After this treatment the sugar smells strongly of sulphurous acid, which presents no inconvenience in the process of refining. To bleach sugar in this manner; for 1000 parts by weight of sugar about four parts of sulphur must be burnt and the gas conducted into the chamber. When the operation is once set going, the proportion of sulphur may be notably diminished. The sulphur is converted into gas by combustion in a little furnace placed at the side of the chamber. When the action is complete, the sugar is dissolved in water and its sulphurous acid neutralized by a small quantity of lime. This lime may be previously converted into sucrate of lime by M. Peligot's method, that is, by crushing it with a little sirup; for 1000 pounds of sugar three or four pounds of lime are requisite to obtain this sucrate.

M. Monnier has been at great trouble to ascertain whether the sulphurous acid gas thus used modified the sugar so as to produce a certain amount of grape or non-crystallizable sugar, and he has convinced himself that sugar bleached in this manner undergoes no change whatever. The quantity of non-crystallizable sugar, found by analysis after the operation in question, was in each case exactly equal to the amount which the sugar contained before being bleached; namely, on the average, about 2-15 per cent. In all these experiments the sugar was exposed about forty-eight hours to the bleaching action.

The above process gives most striking results with exotic sugars, which are highly colored; with lighter-colored samples, the bleaching is not so marked, but in the former case, two thirds to three-fourths of the heterogeneous coloring matters are eliminated completely.

The author took the same opportunity of examining into the action of chlorine gas, and precisely in the same manner. But the result was very different. In destroying the coloring matters present in the sugar, chlorine is converted into hydrochloric acid, which at once renders a certain amount of sugar non-crystallizable even at the ordinary temperatures. A specimen was taken for experiment which contained two per cent of non-crystallizable sugar; it was submitted to the action of chlorine for twenty-four hours only, and then a fair specimen of the whole bulk was taken and analysed. It showed no less than nineteen per cent of uncrystallizable sugar. If it were not for this enormous loss, the action of chlorine as a bleaching agent would be preferable to that of sulphurous acid, for its action is more rapid and complete; but it does not appear possible to prevent its destructive action upon the sugar itself.

It was lately hinted in London that ozone was going to be used as a bleaching agent in sugar refining, and we believe one or more patents were taken out for this purpose. We should be glad to learn whether anything really practical has been done in that direction, and whether ozone will prove to be a more economical agent, or more complete in its action, than sulphurous acid gas, used as indicated above.

New Grain Warehouses of Liverpool.

The city of Liverpool is justly celebrated for its magnificent docks, which extend a distance of seven miles along the river Mersey. With a view to the proper handling and storage of the immense shipments of grain, the Harbor Board at Liverpool and Birkenhead have constructed some new warehouses, which we recently visited, the most perfect buildings of the kind in the world. On the Liverpool side the new warehouses, which are fire-proof, comprise three blocks, forming a quadrangle, within the margin of which is the dock. The total length of the building is 1,485 feet by 70 feet in width. Beside the quay floor there are five stories available for storage, and a sixth, which is appropriated as a machinery floor.

The aggregate clear internal area, including the quay floor, is 11½ acres. The height of the building from the quay to the top of the cornice is 82 feet. The stores, with the exception of the quay floor, which is 15 feet 3 inches high, are 9 feet three inches from the surface to the underside of girder above. Every attention has been paid to the relative strength of each part of the structure, the breaking strain of the beams and girders being three times the load they are intended to carry. An idea of the vast capacity of the warehouses may be gained from the fact that the total weight of grain upon the floors when fully loaded will amount to not less than 77,660 tons. The clear aggregate storage area of all the floors, exclusive of the quay and silo spaces, is 48,918 square yards, affording storage capacity for 196,000 quarters of grain. A quarter is equal to 8 bushels. Rails are laid within the warehouses, forming a communication with the main dock line.

Throughout the building the machinery for hoisting and distributing the grain is worked by hydraulic power. There are five self-acting, traversing, rocking cranes, for raising the grain in tubs from the hold of the ship. Each crane is capable of raising a tun of grain at a time at the rate of 50 tons per hour, through an extreme distance of 136 feet. Having brought the grain to the machinery floor at the top of the warehouses, the cranes discharge it into hoppers, from which, after being freed from dust, it is weighed by a single operation in one tun lots, and then transmitted by a most ingenious arrangement to any part of the warehouses. This work of transmission is effected by means of endless bands, of which there are two running the entire length of the three stacks of warehouses. The bands are of vulcanized india-rubber, 18 inches wide, and traverse at a speed of about 500 feet per minute. They are capable of transmitting grain from end to end of the warehouses at the rate of 50 tons per hour. There are chutes for passing grain from one floor to another, into the holds of vessels, or into wagons beneath. Beside the cranes there are eleven hoists for barrels and sacks, and twenty jiggers for lowering purposes.

The Birkenhead warehouses are in many respects similar to those on the Liverpool side of the water, and are fitted up in the same manner. Their storage capacity is 212,800 quarters of grain. They are not fire-proof. When completed, the warehouses on both sides of the Mersey will be handed over by the dock board under a ten years' lease to the Liverpool Grain Warehousing Company. We may here add that the imports of grain during the year 1867 into Liverpool were as follows: Wheat, 1,805,044 quarters; barley, 93,918 quarters; malt, 7,418 quarters; oats, 201,018 quarters; beans, 209,495 quarters; peas, 132,549 quarters; Indian corn, 913,855 quarters; oatmeal, 153,445 loads; flour, 382,572 sacks and 132,040 barrels—making a total of 3,363,293 quarters, 153,445 loads, 382,572 sacks, and 132,040 barrels; or about one-fourth of the entire grain imports of Great Britain.

A Royal Railway Train.

The Queen of England, with a numerous suite, recently left Windsor to pay her annual visit to Balmoral, in Scotland. It will interest our readers to know some of the particulars in regard to the style in which Her Majesty travels.

The directors of the Northwestern Railway Company were commanded to prepare a special train for the purpose, consisting of fourteen carriages. The Queen's carriage was fitted with a perfect system of electric communication with the guard—a thing which has bothered the English a good deal. This apparatus consisted of a small, square, gilt box, hollowed out in front, and furnished with a glass handle, by the pulling of which the Queen could at any moment bring the train to a dead stop. When once the handle was drawn out, it could not be replaced by persons occupying the car. An experimental trial proved that the plan operated very perfectly. This same system has been applied to a Birmingham train, and in two instances it has been called into use—once for a joke, by a young officer, and in the other case by a medical man, whose curiosity led him, when the express was approaching a station, to pull out the handle. To his great consternation and chagrin, the train was immediately pulled up, and he heard the bell in the guard's van ringing loudly. As the handle of the "communicator" remained out, the culprit was at once detected, and nearly lynched by the excited passengers, who were, of course, much surprised at the sudden stopping of the train, and annoyed at the loss of time occasioned by the foolish freak.

Her Majesty's saloon, in addition to the electric communication with the guard, was likewise fitted with an electric dial and index, for the purpose of calling the royal dressers and personal attendants, for whose accommodation a new saloon, expressly built by the directors, and was placed in a position in front of and directly adjoining the Queen's saloon. A time table was expressly arranged for running the train 591 miles, which was made in about nineteen hours.

The Pneumatic Dispatch.

We learn that the Governor has approved of the act to facilitate the transmission of letters and merchandise by means of the Pneumatic Dispatch, and that our citizens now have the promise of soon enjoying the most improved and rapid means of intercommunication. The act authorizes the laying down of the pneumatic tubes under the streets of New York and Brooklyn, and also under the waters of the North and East rivers.

The present enterprise contemplates the connection of the Brooklyn, Jersey City, and all our sub-post offices, with the general post office, and also the erection of pneumatic letter-boxes in place of the present lamp-post boxes, so that letters and parcels will be both collected and delivered by air pressure acting on cars, which will fly along at the rate of thirty miles

an hour. The mails will go back and forth between the New York and Brooklyn and Jersey City post offices in from three to five minutes. Letters deposited in any of the street letter-boxes on the pneumatic line below Forty-second street will be carried to the general post office, or to any intermediate station, in from three to six minutes. Our citizens can easily understand the great benefit that will accrue to business transactions from this arrangement.

The introduction of the Pneumatic Dispatch is due to the efforts of our enterprising neighbor, Mr. Alfred E. Beach, of the SCIENTIFIC AMERICAN, and we congratulate him upon his success before the Legislature. The Pneumatic Dispatch was first put into practical operation last October, at the American Institute Fair, and a full account of its construction and operations was then given in our columns. We understand that it is the intention of the grantees to put a short line of the Pneumatic Dispatch into operation within the next ninety days. The exact route has not yet been determined, but it will probably extend from the post office, corner of Nassau and Liberty streets, to the City Hall Park. If this short line is found to operate as well as is expected, the pneumatic tubes will then be laid down extensively in many different directions.—*New York Sun.*

THE SALE OF PATENTS IN OHIO.

The General Assembly of Ohio, at its last session, enacted a law regulating the sale of patent rights in that State. The law renders it necessary for the patentee, or his authorized agent, to produce his documents to be examined by the Judge of Probate of the county, who issues a certificate authorizing the sale of rights, providing he is satisfied of the good faith of the parties. It is questionable whether any State has the constitutional right to impose restrictions upon the sale of patents granted by the United States government, but as the law was enacted for the purpose of preventing swindling, it cannot affect unfavorably legitimate and honorable enterprises.

Commissioner of Patents.

A recent telegram states that a movement is going on at Washington to secure the appointment of Hon. Elisha Foot—now of the Appeal Board—to the office of Commissioner of Patents. Judge Foot has a thorough knowledge of the patent law, and is well versed in mechanical science. The selection would be an excellent one.

Editorial Summary.

BREECH-LOADERS IN ITALY.—The Commission appointed by the Italian Government for examining into the comparative merits of the different breech-loading rifles known, have decided in favor of the Prussian needle gun. This is the only instance of its having been approved by a non-German state, all other countries having endeavored to construct an even more perfect weapon. More general recognition has been bestowed upon the Prussian breech-loading cannon. Having some time ago been adopted by Russia, Belgium, and for fortress and naval artillery, by Austria also, it is now about to be introduced into the Italian service.

THE SPECTRUM RECONSTRUCTED.—Prof. Listing, of Göttingen, considers the solar spectrum as made up of nine colors, in the following order: brown, red, orange, yellow, green, blue, indigo, violet, and lavender. He has also calculated the number of vibrations of each, and has found that their numbers constitute an arithmetical progression; the interval between one color and the next always being 48,524 billions of vibrations per second. The number of vibrations constituting the two extreme colors are represented by 364 trillions for the brown, and 801 trillions for the lavender.

THE London local post office is one of the best conducted institutions in the world. It employs 1,152 letter carriers, who distributed 76,000,000 letters in 1863, and in 1868 it is estimated will deliver 90,000,000; that is, 1,730,000 letters per week, and 288,000 per day. Carriers are paid about twenty-five shillings per week—nearly \$8 75—and the expense of the department is estimated at £120,000. The net profit amounts to nearly £300,000, or two millions of our money.

At a meeting of the Société de Photographie, Paris, M. Civiale made some observations upon the employment of sulpho-cyanides in toning and fixing. He stated that in the summer of 1867 he fixed about 700 positive proofs by means of potassium and ammonium sulphocyanides. A print, one half of which had been protected from the light, the other unprotected, and which had been exposed for three months, showed only a uniform tint.

REMEDY FOR CHAFING.—Obese persons suffer greatly, especially in warm weather, from chafing. We know of nothing better than a wash of alum dissolved in water, and applied with a linen or cotton rag.

SOUNDINGS have been made in the sea to a depth of six thousand feet, without finding bottom, within 1½ miles of the shore of the island of Santa Cruz, W. I. This island is the apex of an immense submarine mountain.

THE grasshoppers, having survived rain, fire, snow, and frost, during last fall and winter, have hatched out thicker than ever on the prairies of Iowa and many other western States.

NEVER leave file marks on a tuning tool. It greatly weakens the material. The grindstone, in this case, is a better finisher than the file.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the most important new inventions...

CLAMP ATTACHMENT TO SAW HORSES, ETC.—Frederic W. Mansfield, Fitchburg, Mass.—This invention relates to a method of constructing portable clamps for holding wood firmly upon a saw horse or bench...

EXPANDING PULLEY.—Thomas H. Savery, Wilmington, Del.—The object of this invention is to provide an expanding pulley the operation of which is more perfect for the use intended than others heretofore in use.

REEL FOR HARVESTERS.—G. W. N. Yost, Corry, Pa.—The object of this invention is to produce a reel which can be adjusted for straw of different height which will not thrash the grain out while throwing it back and which can be easily folded together for transportation.

MOWING MACHINE.—G. W. N. Yost, Corry, Pa.—This invention consists in the manner of arranging the frame of the machine. The same is composed of a horseshoe-shaped metal bar or plate to the two ends of which the shoe at the inner end of the finger bar is secured.

NARROW SWATH HARVESTER.—G. W. N. Yost, Corry, Pa.—The object of this invention is to produce a harvester which can be drawn by one horse and which can mow as much grain as can be bound by one man riding on the platform of the machine.

CARPET WEAVING MACHINE.—Moritz Wolf, Philadelphia, Pa.—This invention relates to an arrangement of the Jacquard attachment of a carpet loom, and consists in the use of a double set of needles by which the harness is operated. Two figure cylinders are employed, one for each set of needles.

APPARATUS FOR DISTILLING WOOD, ETC.—Gaspar Hunziker, Summit, Miss.—This invention relates to a method of constructing an apparatus for distilling wood and stone coal, whereby the resin and tar contained in the same are more effectually separated from the charcoal or carbon...

AUGERS AND BITS.—James Swan, Seymour, Conn.—This invention relates to a machine for manufacturing screw augers and bits, and it consists in a novel arrangement of dies and a clamp, whereby bits and augers may be very expeditiously manufactured...

FLUE BLOCK.—John Binns, Oskaloosa, Iowa.—This invention relates to a flue block for stovepipes to pass through in a partition or flooring, in order to prevent heated pipes from firing the building.

ENAMELING MOLDINGS.—John Johnson, Boston, Mass.—This invention relates to a machine for enameling moldings, preparatory to gilding the same, and it consists in a new and improved heating arrangement for warming the preparation, smoothing brushes, and a scraper...

EXPANSION ENGINE.—A. Seely, Alton, Mo.—This invention consists in an improved method of expanding steam in two cylinders, the pistons of which are connected with cranks at right angles on the same shaft...

VOTE REGISTER.—N. A. Patterson, Winchester, Tenn.—This invention relates to the registering of votes of the members of an assembly and consists of a column of blocks bearing the raised names of such members, and so connected by wires that they can be actuated to indicate the negative or affirmative votes of each member.

SLEIGH.—Chester Heald, Marshalltown, Iowa.—This invention relates to the construction of sleighs, and certain braking mechanism attached thereto.

SHINGLE MACHINE.—Luther H. Dodge, Oshkosh, Wis.—This invention relates to shingle machines, and is more particularly designed as an improvement upon that known as the "Valentine Shingle Machine," though it may be applicable to other machines...

HOE.—Josiah Dodge, Grass Valley, Cal.—This invention consists in making the hoe with a horn or pick attached to the blade, and with a forked shank, thereby adapting it to various new and useful purposes...

MILL STONE DRESS.—H. L. Spencer, Social Circle, Ga.—This invention relates to an improved method of dressing mill stones for grinding wheat, corn, or other grain.

SELF-LIGHTING APPARATUS.—Gustav Müller, Newark, N. J.—This invention relates to certain improvements on the well known "Döbereiner's inflammable lamp, and consists in arranging the tube through which the hydrogen passes in a vertical position...

PANTALOON MEASURING RULE.—Patrick W. Dolan, Jersey City, N. J.—This invention has for its object to furnish a simple and easy way for obtaining the correct measurement for gentlemen's pantaloons...

CANAL BOAT PROPELLER.—D. H. Heyen, New York city.—This invention has for its object the construction and arrangement of a propeller wheel which shall be adapted to the propulsion of boats on canals...

COMBINED MOWER AND REAPER.—G. W. N. Yost, Corry, Pa.—This invention relates to a mower and reaper, so arranged that the finger bar and its appendages can be easily raised over obstructions...

DISTILLING APPARATUS.—Adolph Meyendorff, New York city.—This invention relates to a distilling apparatus, so arranged that it will distill directly from the mash, and so that none of the alcoholic contents of the mash are lost...

CAR AXLE CAP.—William Weits, Pana, Ill.—This invention has for its object to furnish an improved cap for car axles, which shall be simple in construction, effective in operation...

CROZES.—John C. Hofer, Bell Air, Ohio.—This invention has for its object to improve the construction of crozes, designed especially for slack work, such as flour, apples, sugar, cracker, and salt barrels...

WIND MILL.—G. J. Thorn, Pecosonica, Ill.—This invention relates to a method of constructing wind mills, whereby the fans of the same are always

in proper position with respect to the direction of the wind, and the speed of the same is more uniform and regular.

RETORTS.—J. D. Perrin & Joseph Saunders, Brooklyn, N. Y.—This invention relates to a new manner of arranging retorts for concentrating sulphuric acid and other purposes...

SASH FASTENER.—Ralph Thomas, Waterbury, Conn.—This invention relates to a sash fastener, which consists of a spring bolt, fitted in a case, secured to the upper edge of the lower sash...

CLEVIS IRON.—Thomas P. Warren, Norfolk, Va.—This invention is a simple, cheap and durable clevis, that can be attached to a plow beam of any size, by which the plow can be adjusted more or less "to land," and can be caused to cut a deep or shallow furrow...

BRUSH.—John F. W. Dorman, Baltimore, Md.—In this invention the bristles are put up in separate packages, one of which answers for a brush; and a new but cheap device is employed to attach them to the handle...

CHURN DASHER.—J. D. Kellogg, Jr. Northampton, Mass.—This invention relates to a new form of churn dasher, by which the butter can be more quickly and easily made and gathered than by any hitherto in use...

CUTTER HEAD AND SPINDLE FOR MACHINES FOR PLANING, RABBETING, MOLDING, ETC.—Frank Douglas, Norwich, Conn.—This invention comprises three important features: First, a new method of adjusting the cutters in the head, by which they can be held more firmly...

TRACTION RAILWAY BRAKE.—Rudolph d'Heurense, San Francisco, Cal.—This invention consists in the application of double flanged or grooved driving-wheel to locomotive engine.

BED CLOTHS HOLDER.—J. B. Munson, Baily Hollow, Pa.—This invention has for its object to furnish an improved device for securing the bed cloths in place upon the bed, so as to prevent them from being thrown out of place by the restlessness of the sleeper.

SPRING BED BOTTOM.—E. Gibbs, and O. W. Gibbs, Richland Center, Wis.—This invention has for its object to furnish an improved spring bed bottom, simple and durable in construction, which will not allow the head part to tip down, and which will be noiseless, easy, and comfortable in use...

VICE.—F. B. Johnson, De Witt, Iowa.—This invention has its object to furnish a simple and convenient bench vice which shall be so constructed as to adapt itself to the shape of the object to be held whether said object be straight or tapering.

SHINGLE MACHINE.—Lyman Jennings, Winchenden, Mass.—This invention consists in the horizontal action of the cutter and elevating block rest, together with the mechanism conducing to the operation of the same.

CAR BRAKE.—Wm. T. Parsons, Thomasville, Ga.—This invention relates to an improved rail-car brake, which consists of shoes pendant with suitable mechanism, whereby they are let down under the wheel and partially receiving the weight of the latter...

TIRE SHRINKING AND PUNCHING MACHINE.—Walter Britton, Abingdon, Ill.—The object of this invention is to accomplish the shrinking of wheel tires in a simple and effective manner.

APPLE PARING AND CORING MACHINE.—Andrew Clark, La Fayette, Ind.—The object of this invention is to produce a machine by means of which apples and other similar fruit may be pared, cored, and quartered in an expeditious and rapid manner.

MACHINE FOR DOUBLE LAPPING SHEET METAL.—Geo. H. Goldsmith, Waverly, Ill.—This invention relates to a machine chiefly used by tinsmiths. It consists of an automatic break bar for bending the tin with a double lap at the edge, together with other devices perfecting the operation of the whole.

SAW GUIDES.—T. Milner, Houston, Texas.—The nature of this improvement consists in the arrangement of the parts constituting the parts of a guide for circular saws, so that they can be operated with facility and accuracy, together with devices for improving and perfecting the whole.

BREAST PUMP.—Wm. T. Fry, New York city.—This invention relates to an improvement in breast pumps of that class which are provided with an elastic bulb for producing the necessary suction.

PAD BILLET.—Lydia Hays, Ames, Iowa.—This invention relates to a pad billet for harnesses, and it consists in a novel construction of parts, whereby several advantages are attained over the ordinary leather billet.

ROPE TRACES.—Thomas Newman, New Orleans, La.—This invention relates to an improvement in rope traces for harnesses and it consists in a novel manner of securing the clips to the trace, whereby firm connections of the trace with the collar hames and whiffletrees are obtained...

PAPER BOX.—William Armour, Belfast, Ireland.—This invention relates to an improvement in the construction of fancy paper boxes, designed more especially for holding gloves, handkerchiefs, confectionery, etc. The object of the invention is to obtain by a simple arrangement two compartments which, when the box is opened, are both accessible...

COMBINATION OF SQUARE AND BEVEL.—H. G. Taylor, Port Hope, C. W.—This invention consists in a combination of a square and bevel, whereby the blade may be set at any required angle or bevel, and at the same time a square be always reserved.

SHARPENING CUTLERY.—Augustus Thayer, Albany, N. Y.—This invention relates to a device for sharpening cutlery, and is more especially designed for sharpening table cutlery, scissors, pocket knives, etc., but it may be used for sharpening cutlery of various kinds.

JOURNAL BOX.—James Robinnett, Petersburg, Va.—This invention relates to an improvement in that class of bearing pieces employed in car axle boxes, in which the bearing of the body piece is of iron, the main portion of the convex surface being of Babbit metal, and the central portion being of brass. The improvement consists in a new method of attaching the brass central plate to the iron body of the bearing piece...

IMPROVED TOOL FOR REJEWELING WATCHES.—C. Hopkins, Philadelphia, Pa.—This tool is designed to facilitate the work of the watch repairer, in lifting the flange of the socket or bezel in which the previous jewel, now broken out, was set, so that the new jewel can be readily dropped into place. It may also be employed for reaming out the socket or bezel where it is too small for the new jewel, or has been damaged by the breaking out of the old one.

EXTENSION NOTICES.

Elias Ingraham of Bristol, Conn., having petitioned for the extension of a patent granted to him the 3d day of September, 1861, for an improvement in design for clock case front, for seven years from the expiration of said

patent, which takes place on the 3d day of September, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 17th day of August next.

Gardner Chilson, of Boston, Mass., having petitioned for the extension of a patent granted to him the 26th day of September, 1855, and reissued the 27th day of September, 1864, for an improvement in furnace or heat regulator and radiator, for seven years from the expiration of said patent...

Wm. H. Atkins and Joseph C. Burritt, of Ithaca, N. Y., having petitioned for the extension of a patent granted to him the 19th day of September, 1854, for an improvement in calendar clocks, for seven years from the expiration of said patent...

Business and Personal.

The charge for insertion under this head is one dollar a line.

Patent Office Reports.—Persons desiring Patent Office Reports can be accommodated at low prices. Address Samuel C. Jones, Box 773 New York.

Bartlett machine and needle depot, 569 Broadway, New York. Needles for all machines, hackle, gill pins, etc.

Wanted—to correspond with makers of starch manufacturing machinery. Address B. Hubbe, engineer, 25 Chambers st., New York.

A. B. Broughton's oilers are the best in every respect.

Balloon for sale—25,000 feet capacity—netting and ropes alone worth \$150, all for \$400. Address O. T., care box 517, Dayton, Ohio.

Sail safe—sure prevention against sailboat-capsizings. Patent for sale. Also, samples at \$3. Dr. Oehme, Plymouth, Mass.

Situation wanted as assistant railroad engineer by H. A. Collins, Packer Institute, Brooklyn.

Parties desiring patentable improvements in any machine, manufacture, or process, can engage the assistance of a rare inventive genius by addressing G. L. Wild, Washington, D. C.

Merriman's patent bolt cutters—best in use. Address, for circulars, etc., H. B. Brown & Co., New Haven, Conn.

To iron and steel manufacturers.—A gentleman who has given several years to study of metallurgy, mineralogy, chemistry, geology, etc., as also, one year to the manufacture of iron and steel, would be pleased to become connected with some iron or steel establishment on a fair salary. Address, M., box 5636, New York city.

Wanted—manufacturers of tinsmiths' tools, to address Geo. M. Irwin, box 1455, Pittsburgh, Pa.

For Improved Lathe Dogs and Machinists' Clamps, address, for Circular, C. W. Le Count, South Norwalk, Conn.

Brick Machine.—Laflier's New Iron Clad has more advantages than any other ever invented. For descriptive circular address J. A. Laflier & Co., Albion, Orleans county, N. Y.

Wickersham's American oil feeder—the best and will lead. For proof, see advertisement.

Universal filter well.—Drives and works successfully in every variety of soil. Patented in Dec., 1867, by Oscar C. Fox, Georgetown, D. C.

Rare chance for limited capital.—State or the entire right for sale of the "weighing and measuring cup," and the "combination funnel," six distinct uses. Two of the best patents out. Address Goodes & Co 658 Franklin st., Philadelphia, Pa.

Prang's American chromos for sale at all respectable art stores. Catalogues mailed free by L. Prang & Co., Boston.

For breech-loading shot guns, address C. Parker, Meriden, Ct.

Lubricators, oil cups, and gage cocks.—Broughton's are far superior to any. Address Broughton & Moore, 41 Center st.

NEW PUBLICATIONS.

MECHANICAL MOVEMENTS. Brown, Coombs & Co., 189 Broadway, New York.

H. T. Brown, C. E., a graduate from the office of this paper, has compiled and published in book form five hundred and seven engravings of mechanical movements, with letter press descriptions of each. Price \$1; by mail, \$1.15. See advertisement on back page.

GOTHIC ALBUM FOR CABINET MAKERS.—Henry Carey Baird, 406 Walnut street, Philadelphia. Price \$3.

This work comprises a collection of twenty-three engraved designs for Gothic furniture of the newest and most beautiful patterns.

LESSONS IN ELEMENTARY CHEMISTRY, INORGANIC AND ORGANIC. By Henry E. Roscoe, B.A., F.R.S., Professor of Chemistry in Owens College, Manchester. Wm. Wood & Co., 61 Walker street, New York.

A handy duodecimo volume presenting the principles and most important facts of modern chemistry in a plain but scientific form calculated for elementary instruction. The metric system of weights and measures and the centigrade thermometric scale are used throughout the work.

COACHMAKERS' INTERNATIONAL JOURNAL. I. D. Ware, Editor and Publisher, 413 Chestnut street, Philadelphia.

This is a monthly publication of 24 pages, devoted to the interests of the carriage builder. Every number contains engravings of new styles of coaches, wagon bodies, improved gearing, and a price current for material. Terms \$2 a year; 25c. for single numbers.

THE WORKSHOP. E. Steiger, 17 North William street, New York.

No. 4 of this new magazine, devoted to ornamental designs and the practical arts, is just published. Price 50 cents.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

- 960.—HAIR AND OTHER COVERINGS FOR THE HEAD, TO OBTAIN VENTILATION AND COMFORT IN WEAR.—George Deas, New York City. March 21, 1868.
1,363.—PURIFYING, SEASONING, AND PRESERVING WOOD, AND MAKING IT WATER AND FIRE PROOF.—Theodore W. Hinemann, New York city. April 25, 1868.
1,365.—STEAM GENERATOR AND FURNACE.—S. Lloyd Wiegand, Philadelphia, Pa. April 25, 1868.
1,370.—TELEGRAPHY, AND CONSTRUCTION AND ARRANGEMENT OF APPARATUS FOR COMMUNICATING SIGNALS AND INTELLIGENCE.—Lancelot H. Beyerly, M. D., New Orleans, La. April 27, 1868.
1,376.—BREECH-LOADING FIRE-ARM.—Kiel V. Barnekov, C. E., Newburgh, N. Y. April 27, 1868.
1,384.—HAIR SEATING, AND MODE OF SEAMING OR JOINING HAIR SEATING AND OTHER WOVEN FABRICS WITH A HAIR FACE.—Charles Bradley, Providence, R. I. April 28, 1868.

BACON'S IMPROVED TRUNK ENGINE, For Stationary and Hoisting Purposes.

CASTINGS—Hardware, Sewing Machine, or other small gray iron castings, of superior quality, at low rates, delivered in New York.

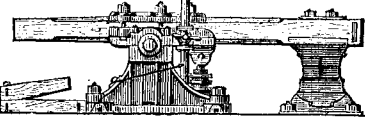
ON TRIAL.—Ten Copies of a first-class \$3 Magazine six months for \$10. The Pictorial Phrenological Journal sent in clubs of 10 from July to Jan.

\$10 A Day for all. Stencil tool, samples free. Address A. J. FULLAM, Springfield, Vt.

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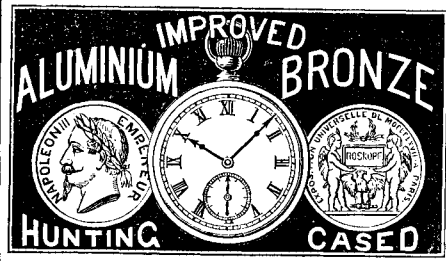
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