chanical trituration. The successive devices consist of a stamping mill, a series of crushing rollers; a roasting furnace in which the ores are treated with alkali, a cold water tank, an amalgamator, an arastra and a second amalgamator. The fumes are condensed in a chamber and the water supply for that and other parts of the apparatus is derived from elevated tanks. For rights in said patent address the inventor, John A. Hitchings, 99 Bond street, Cleveland, Ohio.

A New Photographic Washing Apparatus.

The importance of having photographic prints thoroughly washed can never be too strongly insisted on. A breach of this duty proves disastrous not only to the permanency of the picture, but in many cases to the reputation of the photographer, and incidentally to our art-science itself. So much does it effect the photographer that it would not be difficult to point out instances in which once flourishing businesses have dwindled down to a serious extent through the bad reputation attached to the permanency of the prints issued. There are, indeed, few possessors of well-stocked albums who are not alive to this fact, that the otherwise high reputation attached to the name on the back of a photograph does not necessarily afford a proof that his photograph will resist the ravages of time for even a very limited number of years.

The majority of cases of photographic fading may be traced to the hyposulphite of soda, which, by so intimately associating itself with the fibers of the paper, is difficult of removal, and which, if not perfectly removed, induces an action by virtue of which the print eventually becomes destroyed. To remove the hyposulphite of soda in the most perfect manner, and in the shortest time possible, is to insure to photographs a longer tenure of existence than they otherwise would have held; and any means by which these requirements can be met, are entitled to the greatest consideration.

Availing ourselves of an invitation from Colonel Stuart Wortley to visit Rosslyn House, to see a new form of washing apparatus, we went and saw it in action. It proved to be an instrument invented and patented by Mr. John E. Grisdale.

Before entering upon a minute description of this washing machine, we may state that it is capable of washing a full charge of prints in twenty minutes, and that so perfectly that at the end of this time some ordinary tests for hyposulphite of soda fail to indicate its presence. But we shall allow its inventor to describe the washing apparatus in his own language. "My invention," he says, "relates to a peculiar construction and arrangement of centrifugal machinery or apparatus for washing photographic prints, and consists, according to one arrangement, in the employment of a peculiarly-constructed revolving drum in combination with a trough, in which such drum is partially immersed. The prints to be washed are taken from the water in which they have been placed on their removal from the fixing or other bath, and are packed in one or more piles, which piles are placed round the circumference of the drum, each pile being composed of alternate prints and sheets of wire gauze or other open or reticulated fabric, so that no two prints shall be in contact with each other. These piles are held in their places on the drum by means of open frames or gratings, which bear against the opposite surfaces of each pile, and are secured to the arms of the drum by screws or otherwise, the whole or a portion of such frames or gratings forming part of the drum itself. Or, according to another arrangement, the piles above described may be laid flat upon a disk, which is made to revolve either vertically or horizontally in a trough or cistern, provision being made in the horizontal arrangement for allowing the piles to be brought in or out of contact with the water as required; or in lieu of the photographic prints being disposed in the form of piles or packs round a drum or revolving disk, they may be laid separately and individually round the surface of a drum, a webbing of open or reticulated fabric being wound on such drum simultaneously with the placing of the prints thereon, so as to interpose a thickness of the fabric between each succeeding layer of prints. The process of washing consists in alternately driving out the moisture from the prints by the centrifugal action of the revolving drum or disk, and saturating the prints again. During the first part of the process, the prints are not immersed, but when the second part of the process, namely, the saturation, is to be effected, the trough or cistern is to be supplied with water, or the prints may be brought down into the water, and caused to revolve therein and thoroughly saturated, when the water may be run off from the trough again, or the drum or disk elevated, and the moisture expelled by centrifugal force as before."

The instrument is neat and compact, and immediately strikes any intelligent observer by the efficiency of its action; for, by an amount of manual labor capable of being performed by a child, the drum is rotated with extreme rapidity, and the freshly-supplied water is forced through every pore of the prints, the consequence being the elimination of every trace of hyposulphite of soda in a very brief space of time.—*British Journal of Photography.*

HOW TO MAKE COFFEE.

BY PROFESSOR CHARLES A. SEELY.

In the capacity of *paterfamilias* and chemist I have made occasional descents into the kitchen, and so have become interested and somewhat skilled in affairs which to most men are profound mysteries. These visits have been profitable, for in consequence of them practical changes have been brought about, which, in the course of a year, will effect the saving of a handsome amount in time and money, and, what is of more consequence, they have furnished material for serious reflection. The preparation of food, though one of the most ancient of the useful arts, and perhaps the art of arts, as Prof. Blot would have it, is yet very far from being perfected. It is only in the nineteenth century that science and inventive genius have been zealously employed for its improvement; with what effect they have been so employed almost any person who can look back from the shady side of forty can tell. What changes in forty years! The dear old chimney corner, the pot hooks, the bake kettle, the brick oven, the Yankee baker exist only among the fairy remembrances of childhood. What will come in the next forty years! But I reluctantly dismiss these thoughts to fulfill the promise which the title of this article indicates.

The virtue of coffee consists in its volatile aroma and its fixed extractive matter. The happy combination of these with hot water is the problem for the coffee maker. This happy combination, in my opinion, when realized in perfection, implies that all the aroma and all the extractive matter of the ground coffee be got into the hot water, and retained there. It seems to me that no argument is required to show that any aroma which escapes into the air, or any extractive matter left in the grounds is so much virtue wasted. Now, to get at the same time the whole of these constituents of coffee has seemed very difficult. If boiling water be filtered through ground coffee—this is the French plan—the aroma is promptly extracted, and very little else, for the fixed matter needs more coaxing. If the ground coffee be boiled a long time in water—the Turkish and more common American plan—the aroma escapes with the steam. The French waste the extractive matter; the Turks, the aroma. The plan which secures one of the ingredients allows the other to escape.

Baron Liebig has investigated this subject, and those who have read his interesting paper published in the Scientific American a short time since, will perceive that so far I have only repeated his ideas. He proposes to avoid the difficulties in the case in this way:—He boils three-fourths of the ground coffee, and thus secures all the extractive matter from that; the other fourth he adds after the boiling, and secures the aroma from that. I know that Liebig's coffee is excellent, for I have made it; but I respectfully submit that it is not the perfect coffee, it is not the happy combination, which we are seeking for. Liebig loses aroma from three-fourths of his coffee, and extractive matter from one-fourth.

I now propose a plan which on reflection and after a considerable experience I find to be nearer perfection. My coffee making is a continuous process, and may be carried on for a life time. It takes two days to get well started, but after that there is a daily routine. To begin, I take rather more than the usual amount of coffee, and pour on it hot water when it is ready to be used; in other words, I make French coffee. The grounds from this operation I leave to soak in the pot till the next day, when I begin coffee making by pouring hot water on these grounds, which hot water I use according to the French plan in making coffee from fresh ground coffee. The process is now in full operation, and every time coffee is wanted the manipulations of the second morning are repeated. I thus extract all the soluble and useful matter of roasted coffee, and waste nothing.

To put the art in the most practical form, I have found it necessary to modify the coffee pot. Perhaps the simplest apparatus is the most ordinary pot provided with two strainers. The strainers are of cup form, and fit into each other and into the top of the pot. For use I set a strainer on the top of the pot, and into the strainer I place fresh ground coffee; over this I use the second strainer, containing the grounds of the last operation. Now hot water is poured into the upper strainer, and percolates down into the pot, carrying with it all the goodness remaining in the grounds, and the aroma and much of the extractive of the fresh ground coffee. When the water has passed down, I throw away the now useless contents of the upper strainer, and upset the contents of the lower strainer into the pot. Delicious coffee is now ready to be served to the appreciative household.

I have now unwittingly made this article so long that I am obliged to omit the scientific considerations and arguments, pro and con, which I have thought over for the occasion, and a discussion of the question from an economical point of view, wherein I was prepared to show the millions of dollars per annum that an adoption of my process might save to the world. I dismiss the subject with reluctance.

Note.—The above is the first of a series of articles which I propose to write for the Scientific American. The subjects of these will cover a very wide range, and in the end, perhaps, I shall have been in *rapport* with all classes of readers.

Preparing Casts for Electrotyping.

An excellent method has been published by Dr. Heeren, of Hanover, for preparing the conducting surfaces of casts, whether of gutta-percha, wax, or gypsum, from which electrotypes are to be taken. The surface is well moistened with a nearly concentrated solution of nitrate of silver in alcohol by means of a soft brush. An aqueous solution cannot be employed, because it does not readily moisten fine lines or narrow interstices, and easily runs together into little drops. When the entire surface has been wetted, the excess of the alcoholic solution is wiped away with a drier brush. The cast is now at once, before the silver liquid dries, exposed to the action of sulphureted hydrogen; if the object be small, it need merely be suspended for a few moments in a vessel filled with gas. If its dimensions, however, be so great that it cannot be readily moved, a stream of this gas should be made to play upon it from an india-rubber tube. The surface becomes covered with a thin film of sulphide of silver, the alcohol quickly evaporates, and in a few minutes the cast is dry and ready for immersion in the electrotyping bath. The sulphide of silver is an excellent conductor of electricity, being not inferior to graphite, and is therefore admirably fitted for this purpose; an alcoholic solution of acetate of copper can also be used, but the resulting sulphide does not conduct as well as that of silver. Various kinds of fruit, and the bodies of soft and delicate animals, can be easily electrotyped by this process.

A Great Meteor.—The most remarkable addition that has ever been made to the collection of meteorites in the British Museum accrued to it in the past year by the arrival from Melbourne of the great mass of meteoric iron found at Cranbourne, near that city, and known in the colony as the "Bruce Meteorite." It was purchased by Mr. Bruce, with a view to his presenting it to the British Museum. Through a misunderstanding the museum at Melbourne had a promise of half of it; the trustees of the British Museum, therefore, acquired and sent to the Melbourne Museum the mass of the meteorite iron, weighing 3,000 lbs., that was sent to the exhibition of 1862, and which had been found close to the great meteorite, and the latter was then forwarded entire to London. Its weight is rather more than 3½ tuns. It is, consequently, by far the largest meteoric mass of any collection in the world.

Improved Slide Valve.

These engravings represent a new method of working the slide valve, as also a different plan of constructing it, whereby the ordinary steam chest is dispensed with, the steam being taken through a separate casting connected to the valve aforesaid.

Fig. 1 is a perspective and Fig. 2 a section through the valve. The valve is shown at A, and has hollow rods, B, at each end which enter stuffing boxes in the frame or casing, C. The valve is worked from the rods, D, which have a crosshead, E, on the front end. In the top of it there is a plug, F, Fig. 2, which werks freely in its place, but is kept steam tight by packing. This plug bears against two steel segments which, in turn, are received by the plate, G,

Fig. 1.

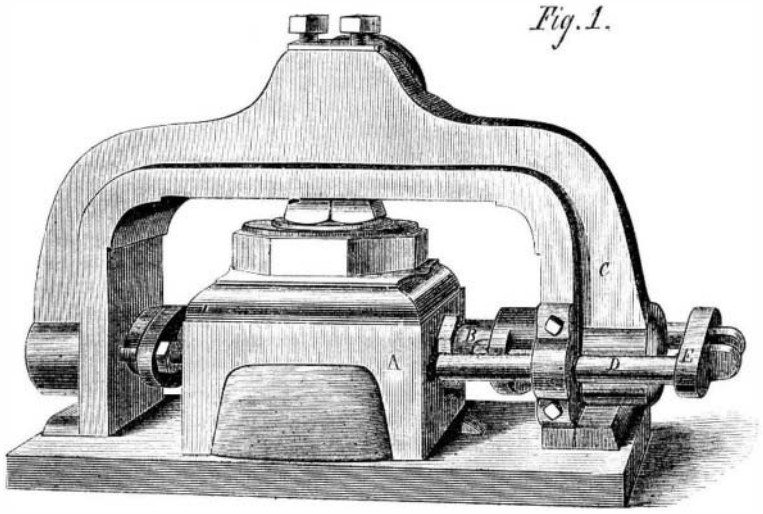
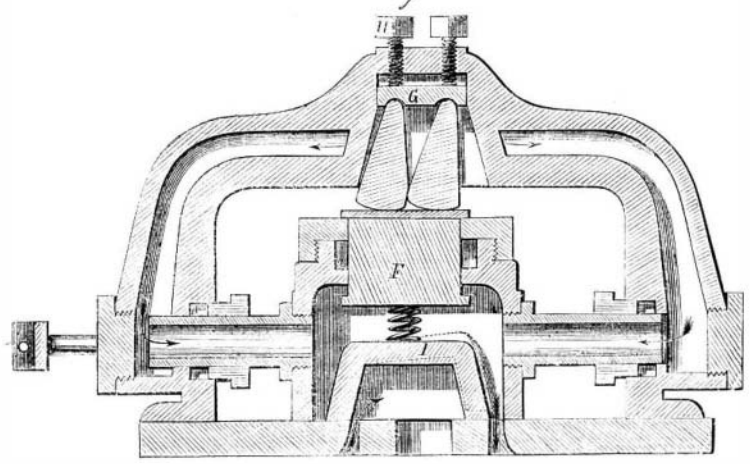


Fig. 2.



GREEN'S SLIDE VALVE.

in the top of the casing, C. The set screws, H, are merely to adjust the parts as they wear.

When the steam enters the chest through the casing, C, it presses against the plug, F, and forces it up, which has the effect of equalizing the pressure on the valve, I, inside, so that the friction on the face is greatly reduced.

The central or inner valve, I, is capable of rising when the pressure in the cylinder is greater than that in the chest, which is the case when locomotives are reversed suddenly with the train going ahead. It can be seen at a glance whether this valve is working steam tight or not. It is easily adjusted and is not liable to get out of order. It is adapted to engines of all kinds.

For further information address the patentee, V. D. Green, of Watertown, Wis., by whom it was patented on Jan. 30, 1866.

Strikes.

The following is an account of the strikes that have been successful, according to report:—House carpenters, for $3 50 a day; bolt workers, against a reduction; plumbers, for $4 a day; fresco painters, for an increase of 50 cents a day; horseshoers, higher wages on various scales; pencil-case makers, higher wages; dock builders, for $3 and $4 a day.

There have been unsuccessful strikes, as follows: Painters, for eight hours; longshore ship painters for eight hours; horse collar makers, for higher wages; also harness makers, musicians, lightermen of Brooklyn; longshoremen of Brooklyn; Brooklyn house painters; carpenters and plasterers of Brooklyn; Brooklyn masons; Brooklyn quarrymen as laborers; Jersey City plasterers and bricklayers—all for higher wages; laborers in shipyards and ship painters, for eight hours; city railroad car drivers, for fifty cents a day; and hod carriers for higher wages. Some of the strikes were compromised or were partly successful, a few of the men receiving higher wages. Among them were the stone cutters, flaggers, tin and slate workers, stone masons, sash and blind makers, Brooklyn bricklayers and plumbers; quarrymen of New York, and mason laborers of Jersey City.

The unsettled strikes, beside those of the ship carpenters, caulkers, etc., are very few. Reductions in rates for labor have been made by a number of large establishments and companies. Among those are the Neptune Steamship Company and the Erie Railway Company.

A Reform Needed in the Patent Office.

The efficiency of that valuable branch of the Government, the Patent Office, is much lessened by the long delays which often intervene between the filing of an application and the final decision. We hope that if any amendment is made to the Patent Laws by this Congress, it will be aimed to cure this defect in the administration of the office, a defect which arises from an inadequate force, or else from a wrong classification of that force. There are now three classes of Examiners, called "Examiners," "First Assistants," and "Second Assistants." If there was but one class, and each had equal pay and an equal share of work, the accumulations would soon be got rid of, without the necessity of increasing the force. The present system compels an Examiner who has one or even two assistants, to go over the work again before a case is finally disposed of, and it seems to us, that if the assistants were made principals, and each had his separate and independent portfolio, the work would soon be brought up, and the examining corps might even be reduced in number, instead of being enlarged. While we are upon Patent Office matters, we owe it to the public and to inventors, to add our protest against the imposition of the ten dollars appeal tax. The patent fund is overflowing now, having about $150,000 surplus, and this comes wholly from the fees of inventors. What good will it do any one to make the inventors who have to appeal, pay an additional tax? Will that secure a more intelligent examination of their cases by the Examiners? This proposed tax is odious, and we hope Congress will refuse to pass it. On the other hand, we hope they will grant to those of the few Assistant Examiners who have, by the direction of the Commissioners, ever since the time of Judge Mason, been doing the work of full Examiners, the compensation allowed by law to Examiners who have independent charge of different classes of invention. Congress directed the Commissioner in 1856 and 1860 to pay such the legal compensation, and we believe that inventors would no longer have to wait six months or nine months for their turns, if Congress will break up the grades of Examiners altogether, and let each Examiner have his proper share of work and equal pay, and be able to dispose of applications with more promptness.—*New York Times.*

Experiments and Observations on Oxygen and Binoxide of Hydrogen.

Barium and manganese, which chemists agree in classing among the bodies improperly called *diatomic*, and which the author proposes to call *diploty pic*, present remarkable differences in their binoxides. Binoxide of manganese, for example, when treated with hydrochloric acid, gives chlorine, while binoxide of barium under the same circumstances gives binoxide of hydrogen,

Binoxide of hydrogen remains intact in the presence of binoxide of barium which served to produce it; but in the presence of binoxide of manganese it decomposes into oxygen and water, the binoxide of manganese undergoing no change.

The oxygen which peroxidizes the manganese decomposing the hydrochloric acid to take the place of the chlorine and form water, it is clear that the oxygen of the binoxide barium cannot do the same, at all events under ordinary circumstances. No chemist who has prepared binoxide of hydrogen by Thenard's process has obtained chlorine. It must be admitted, then, that chlorine has more affinity for hydrogen than for the oxygen which peroxidizes the barium, while the contrary is the case with the oxygen which peroxidizes the manganese. This is demonstrated by the following experiments:—

If we fill with chlorine gas a bottle into which a little water and some very finely powdered binoxide of barium has been introduced, a lively effervescence is seen when the mixture is shaken, the color of the chlorine dissappears, and in the end the bottle is found to be full of oxygen, which does not act on ozone paper.

The following experiments show still further differences between the binoxide of barium and that of manganese. We know that sulphovinic acid gives aldehyde when heated with binoxide of manganese. In the presence of binoxide of barium, however, sulphovinic acid gives ether and bicarbureted hydrogen mixed with oxygen and sulphurous acid, the reaction commencing at 103° and ending at 150°.

Pushing the analogies still further, the author has succeeded in preparing oxygenated water by means of peroxide of manganese. This water is destroyed by the simple presence of binoxide of barium, just as that obtained by the latter body is destroyed by binoxide of manganese, an experiment which clearly demonstrates the difference that exists between these two products. But the difference is rendered still more evident by the following fact: The oxygenated water obtained by means of binoxide of barium and that obtained by means of binoxide of magnanese destroy each other; the effervescence produced when they are mixed is not violent, but it is continuous, certain, and indubitable.

After referring to the physical investigations which the author intends to make, he states that oxygenated water prepared by means of binoxide of barium, when submitted to the action of four large Bunsen's elements, gives equal volumes of hydrogen and oxygen, even when far from being saturated, showing that the binoxide of hydrogen is decomposed in preference to the water.

Lastly, the author remarks that if oxygen presents two allotrophic states it is eminently probable that the bodies with which it unites may do the same; and hydrogen giving birth to two distinct binoxides, it is probable that it also may present itself in two distinct states, complimentary one to the other, in the two binoxides. Further, it seems probable that barium may present itself in one of these states and manganese in the other, which will account for the differences observed in their binoxides, and that the two bodies may be found in the opposite state to that in which we know them, and, indeed, that all elements may exhibit this sort of allotrophy.

MR. SCOTT RUSSELL, the eminent iron ship builder, of Cardiff, through untoward circumstances, has been compelled to hand over his extensive iron ship building establishment to his creditors, who intend carrying the works on under inspection.