visible in all cases in which nitrate of silver has been used, may be obviated by the addition of a certain amount of copper salt to the argentic solution.

Nitrate of silver, 30 grammes; sulphate of copper, 2·5 grammes. Dissolve the two salts in 250 cubic centimeters of water, and add sufficient ammonia to dissolve the precipitate formed, and make it up to one liter.

An instantaneous dye may be made by steeping the hair in a solution of pyrogallic acid in acetic acid, and then in the argenti-cupric solution dissolved above. The hair should be allowed to dry partially after the application of the pyrogallic solution. By varying the proportion of the pyrogallic acid from one gramme to fifty grammes per liter, any tint may be obtained from light brown to black.—*Moniteur Scientifique.*

To Cleanse a Soiled Chamois Leather.

Many workshops contain a dirty wash leather, which is thrown aside and wasted for the want of knowing how to clean it. Make a solution of weak soda and warm water, rub plenty of softsoap into the leather and allow it to remain in soak for two hours, then rub it well until it is quite clean. Afterward rinse it well in a weak solution composed of warm water, soda, and yellow soap. It must not be rinsed in water only, for then it would be so hard, when dry, as to be unfit for use. It is the small quantity of soap left in the leather that allows the finer particles of the leather to separate and become soft like silk. After rinsing, wring it well in a rough towel and dry quickly, then pull it about and brush it well, and it will become softer and better than most new leathers. In using a rough leather to touch up highly polished surfaces it is frequently observed to scratch the work; this is caused by particles of dust, and even hard rouge, that are left in the leather, and if removed by a clean rougy brush it will then give the brightest and best finish, which all good workmen like to see on their work.

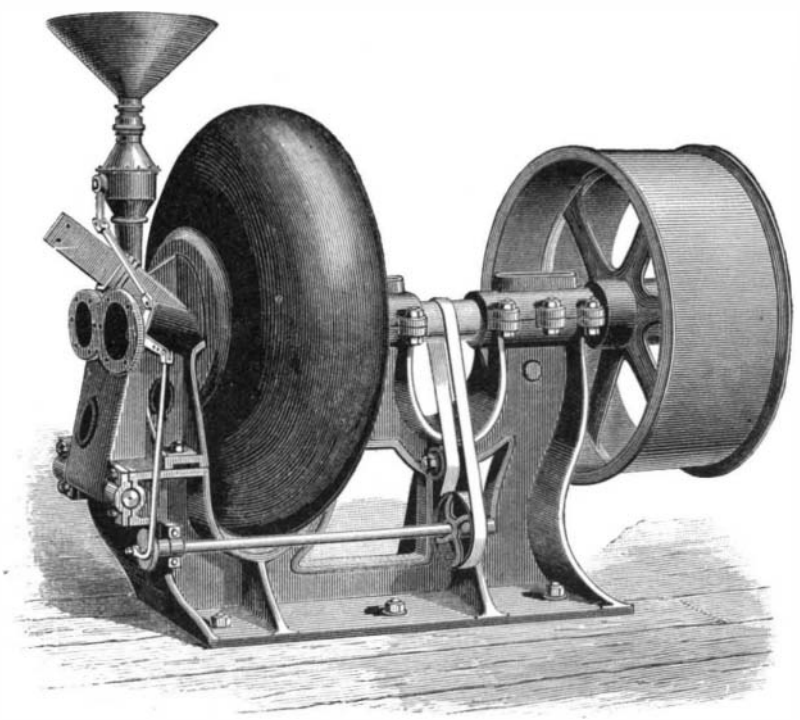
DUC'S PATENT MECHANICAL ATOMIZER.

[*Continued from first page.*]

contact with the revolving ring of rock. To compensate for the unavoidable abrasion, it can be inserted further in as may be found necessary, and in time, when worn out, may be replaced at very small cost, in two or three minutes' time. The broken material is fed into the shell, and falling in front of the plow bar is prevented by it from turning with the shell, and banks up in a pile, which is kept in a state of rest; meanwhile the ring or belt of rock before alluded to is passing under this pile, and the two surfaces are subjected to severe attrition, which reduces them to a powder in an exceedingly short space of time.

The dust produced by this wearing action of the particles of rock among themselves is removed from the mill by means of a vacuum induced by a small rotary exhauster, which sucks the air out of the shell of the mill, by which means the ground rock is floated out of the shell, and conducted by a pipe to a settling chamber underneath the floor. Here the velocity of the air current is so greatly reduced that the particles of dust are deposited, and by accumulating, gain weight enough to open the valve in the bottom of the chamber, and run out into a screw conveyor, or any proper receptacle.

Meanwhile the air, relieved of its load of ground material, although still holding in suspension a certain amount of the finest particles of dust, passes through the exhauster, and thence to a chamber consisting of a frame covered with coarse cloth, technically termed a "dust chamber." This portion of the apparatus may be located in any convenient place, and serves as a settling chamber for the finer particles of dust which were not deposited in the first chamber. To compensate for the air taken out of the shell, a pipe is connected from the dust chamber to the "return air port" of the mill, by means of which a "belt of air," so to speak, is formed, which is continually entering the mill, where it is laden with dust, and upon coming out, deposits it in the settling chambers, and again enters the mill on a similar errand. The amount of rock ground with the Duc atomizer in a given time, and by the application of a given power, is much greater than the output of burrstones or other devices used for that purpose, and the degree of fineness much more satisfactory; the ground material is quite uniform in grade, due to the fact that the exhauster maintains a constant amount of vacuum sufficient to draw from the mill only such particles of material as have attained the requisite degree of fineness.



DUC'S MECHANICAL ATOMIZER.

The usefulness of this machine is not limited in its adaptation to phosphate rock alone, but it has worked successfully on ores, quartz, marble, soapstone, etc., etc., and in fact may be employed for any refractory material which it is necessary to reduce to a powder.

This apparatus has been patented in the United States, Great Britain, and the Canadas, and is the property of the Continental Works, Brooklyn, N. Y., with the exception of the State of South Carolina, which latter territory belongs to the "Charleston Mechanical Atomizer Company," of Charleston, S C., and the said company reserves the right to sell all the machines which may be required in their territory, the Continental Works being the sole manufacturers.

Either party in interest will be pleased to furnish circulars giving detailed information, prices, etc., to parties making application personally or by mail, as above.

IMPROVED KNOCKDOWN BARREL.

It has been the custom of shippers of goods packed in barrels and casks to seldom, if ever, reship the package for use the second time, on account of the space occupied in car

Fig. 1.

Fig. 2.

ADAMS' KNOCKDOWN BARREL.

or wagon, it being too great to admit of transportation with any profit to the shipper; in fact, in many cases, it is less expense to buy the casks new than to pay freight on the old packages.

The engraving shows an improved separable barrel lately patented by Mr. Robert F. Adams, of Chariton, Iowa, which can be taken apart for shipment, so that the package will occupy no more space than the material from which the barrel is formed would occupy.

In carrying the invention into effect the inventor forms the cask in the old method, and the hoop or hoops on each end are attached to the cask by nails or otherwise, and may be divided into two or more arcs. The sections of the barrel thus fastened together may be put together to form a barrel by workmen, whether skilled or not, by driving the whole hoops, as in the old method of making barrels.

Eight or ten barrels made in this way can be knocked down and packed in the space required for a single complete barrel.

The advantage of this construction will be readily comprehended by makers and users of the ordinary barrel. A quantity of barrel sections is packed in a case for shipment, and the heads and hoops are placed on top.

The additional cost of this barrel over the ordinary barrel is insignificant compared with the immense saving in barrels that can be effected by this construction.

Further information in regard to this useful invention may be obtained by addressing the inventor as above.

RECENT INVENTIONS.

A novel mechanical musical instrument has been patented by Mr. Azro Fowler, of New York city. This invention relates to wind musical instruments that are operated manually by keys, or are played or controlled by means of one or more sheets or strips of paper or other suitable material perforated to represent the different notes or sounds it is desired to produce, and caused to automatically pass over air ducts, which, according as they are opened by the perforations in the paper, cause the reeds or other sounding devices to be played as desired; and the invention has special reference to the pneumatic action of the instrument.

In the manufacture of turpentine the crude article containing chips, bark, twigs, and other foreign substances is introduced directly into the still, and in the process of distillation the extractive coloring matter of these substances discolors the residual rosin, thereby depreciating its commercial value. Much time and labor are also spent in dipping or straining the chips, etc., from the liquid rosin, and the fire risks are greatly enhanced by the taking fire of the hot saturated chips as they are removed from the still, most of the conflagrations of turpentine stills originating from this cause. Mr. Allen Garner, of Americus, Miss., has patented an apparatus for the manufacture of turpentine and rosin which will avoid these difficulties, and will economize time and labor and lessen the costs and risks in distilling turpentine, and will produce a cleaner and more valuable rosin.

Mr. Anson J. Bacon, of Hallowell, Me., has patented an improved holdback, constructed so that the first resistance to the forward pressure of the vehicle will be elastic or yielding, so as to prevent any jar to the vehicle or horse.

An improved tire setter and cooler has been patented by Mr. William W. Whitmore, of Defiance, O. This invention relates to improvements in that class of tire setters and coolers in which a table carrying a wheel is raised and lowered in a tank containing water to cool and set the tire. In this device the center post ordinarily employed is dispensed with, and the operator is readily enabled by means of a lever to immerse the table and wheel in the water in the tank and hold it in any desired position.

Mr. Melville J. Fenwick, of Cottage Grove, Oreg., has patented an improved washing machine. The washing machine is provided with a rubbing cylinder attached to the lower ends of two connected rocking arms loosely mounted on a shaft of the machine, which arms also carry at their lower end an additional rubbing block, on which the clothes are held by a clamp bar provided with two arms fitting in sockets containing springs for pressing the clamping bar on the block.

Where Buttons Come From.

The button trade of New York is estimated at from eight to ten million dollars a year. Last year the importation of buttons exceeded three and a half million dollars, the aggregate for the four years just passed being but a little short of thirteen million dollars. At American rates of wages many of the imported buttons could not be put upon their cards for the price they sell for.

Glass buttons are made mostly in Bohemia, and children are largely employed at the work, which they do as quickly and as neatly as adults. The children get ten cents a day, men from forty to fifty cents, and women a little less. Pearl buttons are imported from Vienna, where they are almost exclusively manufactured; and the all-important shirt buttons are received mostly from Birmingham, England, where the majority of metal buttons are likewise procured. The most extensive of all the button manufacturing, however, is that of the Parisian and Berlin novelties. In one manufacturing village near Paris, where there are from 5,000 to 6,000 inhabitants, all the working people are engaged in making the agate button, which, even with thirty per cent duty added to the cost, sell, when imported into this country, at the extremely low figure of thirty-one cents per great gross. The material alone, it is reported, could not be procured here for double that amount.

While American manufacturers make no attempt, and probably have no desire, to compete with European producers employing hand processes, they excel in making bone, composition, brass, ivory, and gold buttons by machinery, and are able to export considerable quantities of these styles. In Providence, R. I., for example, sleeve buttons and jewelry buttons are largely manufactured expressly for exportation.

New Electrical Meter.

At a recent meeting of the London Physical Society, Mr. C. Vernon Boys read a paper "On a New Current Meter." The rate of a pendulum clock depends on gravity, and is proportional to the square root of the strength of gravity. That of a watch depends on the strength of the hair-spring, and is proportional to the square root of its strength. The force due to an electric current is proportional to the square of the current strength. Hence if part of an electric circuit is capable of vibrating under electro-magnetic force, the speed of vibration will be proportional simply to the current

strength, for the square of the speed measures the force, and the force is proportional to the square of the current. If, then, such a contrivance takes the place of the balance of a pendulum clock, the clock will measure electric currents instead of time. To keep the indications true the maintaining power must be so contrived that the amplitude does not vary much, or the parts must be so arranged that the force is directly proportional to the displacement. Mr. Boys showed several ways of producing a controlling power. The first was a combination of solenoids, one passing through the other, and in which the force was proportional to the displacement. Being without iron it applies to the case of alternating currents. In another a small armature is mounted on the balance staff, and around it are the two poles of an electro-magnet which forms part of the circuit. In a third form which is unaffected by residual magnetism, two crescent-shaped pieces of iron, forming the sides of the balance, pass through two fixed solenoids. In all these cases the direction of the current does not matter.

The maintaining power may be an ordinary escapement driven in the usual way. It may also be independent of clockwork, an impulse being given to the balance electrically at each swing. A meter of this kind was shown, in which the controlling power depends on iron crescents and solenoids, and in which a portion of the main current is shunted through secondary solenoids when the balance is in its natural position, at which time a variation in the currents in the controlling solenoids has no effect in disturbing the period of oscillation. Such a meter is regulated by an adjustable weight if it goes too fast or slow. Being independent of gravity it will work equally well anywhere.

MECHANICAL INVENTIONS.

Mr. Henry R. Dulany, of Alexandria, La., has patented a suction device for elevating sand, or for elevating sugar, mortar, or similar substances from large vats, holes, or tanks. The invention consists principally of a large inverted bucket provided with a piston head, the vessel being provided at the top with suitable air-valves, the piston rod passing through the center of the top of the vessel, and being provided with notches adapted to engage with a spring-actuated clutch for holding the piston head when forced up by the material to be raised.

Mr. Eugenio Beovide, of Mineral de Catorce, Mexico, has patented an improved machine for cleaning and separating the fibers of leaves. The object of this invention is to provide a machine for removing the epidermis and filling cellular tissue from the fibers of such leaves as those of the *Agave americana*, or aloe, *Heniquen zechuquitta marquisia*, or *Coprosma*, and other plants growing in Mexico, Central and South America, which fibers are then used in the industries in the same manner as hemp and jute fibers, etc. The invention consists of a frame in which two or more rollers provided with yielding, rasping, and scraping knives, and with yielding, feeding, and pressing blades guided by suitable guide rings on the frame, are journaled above each other, and are surrounded by suitable casings, into the upper one of which the leaves are fed from an inclined table by adjustable feed rollers, and are drawn downward through the several receptacles by adjustable feed rollers journaled between each pair of rasping rollers. The rasping rollers revolve very rapidly and scrape all cellular matter from the fibers, this waste being thrown out through openings in the casings, and the cleaned fibers passing out between two rollers below the lowest rasping roller.

An improved buggy top, which is of simple construction, light, durable, folded and raised conveniently, has been patented by Mr. James H. Howe, of Conneaut, Ohio. The buggy top is formed of a single bow, to which front and rear sliding arms are pivoted at the ends of the bow, which arms are braced by hinged or jointed braces pivoted to the bow and to the sliding side arms, the braces having a short rod pivoted to them at the joint for operating them.

An improvement in beam calipers, with devices for automatically registering or indicating variations in the size of work to which they are applied, so that small differences in size can be readily detected, has been patented by Mr. George B. Webb, of Thomaston, Conn. In filing, grinding, or turning, the amount removed and to be removed can be quickly and exactly shown by means of this tool. The invention consists in a slide and indicating lever combined with one moving jaw of the calipers.

An improvement in spinning machines has been patented by Mr. Philip Townson, of Thompsonville, Conn. The object of this invention is to automatically change the speed of spindles when the bobbins are about two-thirds filled, and also to facilitate the stopping of the spindles when the fliers have been stopped.

Mr. Abraham Van Trump, of West Elkton, Ohio, has patented an improved pump. This invention relates to a pump which is more particularly intended to be attached to a water tank or box mounted on wheels, so as to be carried from place to place to obtain its supply of water. The invention consists in a novel arrangement of the cylinder, piston, valves, a hose, and a double screen, for guarding against the entrance of foreign substances into the pump cylinder.

Mr. Herbert W. Reed, of Ware, Mass., has patented an improvement in the class of so-called "monkey wrenches" whose sliding jaw is combined with a rack-bar and pawl, and also an adjusting nut to adapt it for rapid and close adjustment to the work.

A novel device for converting motion has been patented by Mr. Frank Elbing, of Algersdorf, Bohemia, Austria. This invention is for converting reciprocating rectilinear to continuous rotary motion, and is designed to overcome the dead centers of the usual crank mechanism without loss of motion or power. The invention consists in a shifting crank pin guided to move in a path eccentric to the crank axis.

An improved tool for bending railroad rails, patented by Mr. Robert Fagan, of Hazleton, Pa., consists of a bar of iron of suitable size carrying a screw at one end, the bar being adapted to be yoked to the rail in such manner that the portion of the bar beyond the yoke will form the short arm of a lever, the end through which the screw passes being the long arm of the lever. The end of the screw, when the device is attached to the rail, rests upon the rail for operating the lever and bending the rail.

An improvement in swivel racks for looms has been patented by Mr. Buckley Weston, of Paterson, N. J. This invention consists in the combination, with the rack-bar, swivel-shuttle, and pick-bar, of pins hung on wires attached to the rack-bar and provided with lugs designed to drop in recesses near the extremities of the pick-bar, the pins being actuated by springs, so that they engage in holes formed in the shuttle.

A saw filer, which secures the accurate gauging of the depth of the saw teeth, the equal action of the file on the saw teeth throughout the whole length of the file, the automatic feeding of the file, and its adjustment for any desired angle or pitch of teeth, has been patented by Mr. William H. Shutte, of Emporia, Kan. The invention consists of a sliding carriage carrying a spring-and-pawl-actuated bent arm that serves as a gauge for the depth of the saw teeth, and at the same time to support the file frame; an adjustable clamp is secured on the bent arm for the direct support of the file frame, and so constructed that the direction of the frame and file can be changed vertically.

A useful improvement in wagon gearing, whereby the king-bolt passing through the head-block and the axle can be dispensed with, has been patented by Messrs. Zephirin Dulmaine and George H. Poole, of Laramie City, Wyoming Ter. The invention consists in a short pintle passing through the end of the reach and fastened at the ends to plates or clips of the axle and the head-block, the head-block and bolster being also pivoted to each other by a short king-bolt secured to clips on the head-block and the bolster in a like manner.

Solvent for Gallic Acid.

Mr. Frederick Long says, in the *British Medical Journal*, that he has accidentally discovered a method of dissolving gallic acid. Having a short time since a case of hæmaturia, the result of uric-acid gravel, he chanced to prescribe a mixture containing half a drachm of gallic acid and a drachm and a half of citrate of potassium, and to his surprise he found he had a perfectly clear liquid, the gallic acid being completely dissolved. He has since made further experiments, and he finds that, with care, twenty grains of citrate will dissolve as much as fifteen grains of gallic acid in an ounce of water, and remain quite clear for any length of time. To be able to give gallic acid in perfect solution is a great advantage, as absorption must take place more rapidly when the salt is in solution than when simply suspended in mucilage. The citrate, being a very simple salt, can do no harm in any cases in which gallic acid is required.

Etching Film for Tracing with a Needle.

Mr. H. Trueman Wood, the secretary of the Society of Arts, sends the following to the *Photographic News*:

There are many purposes in photography for which an opaque film capable of being etched with a sharp point might be useful. Such a film can be obtained by use of the following formula: Negative collodion, one-half ounce; ether, 6 drachms; alcohol, 6 drachms; shellac, 30 grains; aurine, 2 grains; Judson's mauve dye, 30 drops; water, 30 drops.

A collodion thus treated gives a film which is perfectly non-actinic, and which allows the finest tracery to be executed upon it without any tearing or chipping whatever. The film is the result of a good many experiments, and was devised by a friend of the writer for the purpose of reproducing tracings made by a geometric chuck in the lathe. As a general rule, these patterns, which form the delight of so many amateur turners, are either traced with a pencil suitably held, or by a glass pen charged with aniline ink, the latter being the more recent device which has superseded the old pencil. They are, of course, also cut upon wood or metal with suitable tools. By the use of a plate coated with a film of the above described mixture, a steel point can be used. The glass plate is properly held in the chuck, and a steel point, which may be fitted with a spring, so as to prevent undue pressure or risk of breakage, is placed in the position usually occupied by the pencil. The pattern is thus traced in perfectly clear glass, and from the negative—if the term may be used—thus produced, prints can be taken on ordinary albumenized paper. As the film itself transmits practically no actinic light, the printing can be carried to any extent, and a perfectly black print produced. The film may also be etched upon with an ordinary etching needle, or even with a common needle, and prints produced from the plate thus obtained.

Another use of the formula is for the preparation of lantern diagrams. Any diagram can be rapidly traced upon a coated plate, and the diagram can then be thrown on the screen in the ordinary manner, appearing, of course, in bright lines on a black ground. A diagram of this sort is quite as effective as, if not more effective than the ordinary black lines on an illuminated ground, as was shown by the very vivid way in which a negative diagram, recently employed by Mr. Bolas at one of his Cantor lectures, shone out upon the screen. It would, of course, be easily possible to obtain a printing block by any of the ordinary methods from a plate etched in this manner.

The mixture requires some little care in its preparation, and especially as regards the addition of water. It is better to add the water gradually, coating the plate occasionally after each addition of a few drops. The formula might doubtless be susceptible of considerable modification; but the one given above has been proved to give the best results of any which have yet been tried.

The Petroleum Outlook.

The outlook given in our last two preceding reports, indicating that the highest production has probably been reached, receives confirmation from the data which we present our readers in the present number.

The Bradford and the Richburg fields are now defined, beyond any reasonable doubt, by a cordon of "dry holes." All the present drilling in outlying localities, notwithstanding it has been very extensive, has entirely failed to indicate any new field in the producing horizon within the line of the known fields. Operations continue to be active, but with all the activity in drilling, and with all the appliances of pumping and torpedoing, the figures for the month of January, compared with those of December, show the significant decline in the daily production of 4,079 barrels.

The Richburg field exhibits all those characteristics of impoverishment of rock and uncertainty of yield which we attributed to it several months ago, and on this account its decline may be expected to be much more rapid than is that of the Bradford field.

From all this condition which at present exists in the region we are of the opinion that the long expected decline has at last set in, and (always, of course, unless a new field is discovered) the production must from this time continue to decline, in spite of the unrestricted energy of the restless producers to enlarge it.

As to the effect of all this upon prices in the immediate future we are not so confident. There are some causes which seem to indicate stagnation for some time at least. Europe having taken advantage of the exceedingly low prices which prevailed last year on account of the excessive competition, has become pretty well stocked with the refined oil. In our own country this is also the case, but probably to a less extent. The busy season of the year has been closed, and we may reasonably look for diminished foreign demand for some months to come. The export of last year has been so far in excess of its predecessors that we can hardly look for an increased demand for the present year. Then, too, our stock of crude oil has grown so large as at times to be rather burdensome. It will, therefore, be seen that there is considerable margin for a decline in the production, without materially affecting the prices.

On the whole, however, we are inclined to the opinion that the continued persistent decline in crude for several months will have the effect of inspiring holders with great confidence for the future, and in the event of a continued ease in the money market we may look for a much better average of prices for this year than prevailed last year.

Daily average production of the Bradford field, 56,000 barrels; decrease in January, 5,000 barrels. Daily average production of the Allegheny field, 12,039 barrels; increase in January, 1,300 barrels. Decrease average daily production in the northern field, 3,700 barrels; decrease average daily production in the southern field, 379 barrels; total decrease average daily production (whole field), 4,079 barrels. —*Stowell's Petroleum Reporter.*

THE skins of certain sharks are used in jewelry for sleeve buttons and the like, and when dried and cured take a polish almost equal to that of stone, and greatly resemble the fossil coral *porites*. The vertebræ of the shark are always in demand for canes. The opening filled with marrow during life is now fitted with a steel or iron rod. The side openings are filled with mother-of-pearl, and when polished the cane is decidedly ornamental. In India, in 1880, $300,000 worth of shark fins were shipped to China for food. In the islands of the Pacific the fish is in great demand for its teeth, which are manufactured into weapons of various kinds, ranging from spears to swords and daggers. The teeth are all serrated or saw-edged, and make terrible wounds. The base of the tooth is bored with some small instrument, and forty to fifty of them are tied or lashed to a hardwood sword, forming the edge. The hilt is alo protected by crosspieces armed in the same way. So effective are these weapons that the natives of these islands wear an armor made of rope especially to protect themselves from the shark's teeth.—*Sea World.*

AN amateur was chaffering about the price of a table service in Dresden china. "But it is much too dear! There is not a single piece in it which has not been mended." The dealer has his answer pat. "My dear sir," he says, "why, that is the very thing that makes the set valuable. This is the table service that Bonaparte broke when he kicked over the preliminaries at Leoben!" The amateur, a little taken aback by this thrust, says: "Are you perfectly sure of that?" "Certainly I am. Would you like the same service without its being mended? I have that also."