

taining water, young and delicate leaves are developed, forming a radiated tuft, the graceful and verdant appearance of which makes it a pleasing ornament to a room in that season when any semblance of vegetation is a welcome relief to the eye. Flowers may be cut out of large carrots that closely resemble ranunculuses, without the least aid of coloring.—*Hompson G. Glasspole, in Science Gossip.*

PATENT OFFICE YEARLY REPORT.

The Annual Report of the late Commissioner of Patents, General M. D. Leggett, was recently submitted to the Secretary of the Interior, and we here give an abstract.

The following table shows the receipts, expenditures, and business of the Office during the year from October 1, 1873, to September 30, 1874:

MONEYS RECEIVED.

Amounts received for applications for patents, extensions, caveats, disclaimers, appeals, and trade marks	\$645,480
For caveats	47,923
For recording assignments	18,152
For subscriptions to <i>Official Gazette</i>	8,913
For registration of labels (since August, 1874)	642
Total	\$721,110

MONEYS EXPENDED.

Amount paid for salaries	\$484,694
Amount paid for photographing back issues	36,223
Amount paid for photographing current issues	46,313
Amount paid for illustrations for <i>Gazette</i>	35,292
Amount paid for contingent expenses	83,082
Amount paid for tracings	8,668
Total	\$694,072
Excess of receipts over expenditures	27,038

STATEMENT OF THE BUSINESS OF THE OFFICE.

Number of applications for patents from Oct. 1, 1873 to Sept. 30, 1874	21,077
Number of patents issued, including reissues and designs	13,545
Applications for extensions of patents	229
Patents extended	308
Caveats filed	3,129
Patents expired	5,287
Patents allowed but not issued for want of the final fee	2,680
Applications for registration of trade marks	589
Trade marks registered	524
Application for registration of labels	107
Labels registered (since August, 1874)	50

The number of applications and of patents granted is a slight increase upon those of the preceding year.

The prompt publication of abstracts of patents issued has improved the character of such applications, thereby warranting the issue of patents for a larger proportion than could otherwise be granted. Before the establishment of the Patent Office *Gazette*, it was from two and a half to three years after the issue of a patent before the public had any means of knowing of its contents. Consequently there would be in existence from twenty-five to thirty thousand patents, the substance of which was sealed to all except their owners; hence applications were constantly being made to patent devices which had been previously patented by others.

REPRODUCTION OF DRAWINGS OF OLD PATENTS.

The importance of printing the older existing patents is illustrated and explained.

No one thing in the Office is needed more than a thorough digest, published in convenient form, of each one of the 145 classes of inventions, as represented in the Patent Office. The number of applications on file in the Office is nearly 300,000. To look back over these applications and the devices represented by them, in considering new applications, is a work the vastness of which need not be further explained to be fully understood. The digest referred to should, in a classified form, briefly describe each one of these, in such a manner that they would become sufficient in the examination of cases, without constantly resorting to the files. If correct and thorough digests of this character, from the organization of the Office down to the present time, were in the hands of the examiners, inventors, and attorneys practising before the Office, the labors of the examining corps would be 25 per cent less than at present, and would bear a considerable reduction, unless the number of applicants largely increased. In many of these classes a sufficient number of volumes could be sold to reimburse the government for the entire expense of their publication. Such digests would, therefore, be an economical investment, saving money to the Treasury, and securing far greater accuracy in examining applications and the granting of patents. "To this matter, therefore, I would earnestly request the Secretary to give special thought and attention. A special appropriation would be needed for the purpose."

MORE ROOM NEEDED.

Additional room is required for the use of the Patent Office. It is utterly impossible to properly transact the work of the Office in the narrow quarters granted to it. Eight additional rooms are needed immediately. The report pays a just tribute to the character of the persons employed in the Patent Office, and regrets that the salaries paid are not sufficiently large to retain the best men in the service, who are constantly leaving it for more lucrative employment.

The new American built steamer Tokio has made a successful first voyage, from New York to Aspinwall. Time, seven days and fifteen hours, being an average of eleven knots an hour, on thirty-nine tons of coal per day, with fifty pounds of steam and six boilers. There was no occasion to stop the engine during the entire trip of two thousand miles.

Odors.

Among mineral substances, few solids, but quite a number of liquid and gases, are endowed with more or less powerful scents, in most cases not very pleasant ones, and usually characteristic. Those odors belong to simple substances, such as chlorine, bromine, and iodine; to acids, as hydrochloric and hydrocyanic acid; to carburets of hydrogen, as those of petroleum; to alkaline substances, ammonia, for instance, etc. The odors observable among minerals may almost all be referred either to hydrocarbonic or hydrosulphuric gases, or to various solid and liquid acids produced by the decomposition of fats, or to peculiar principles secreted by glands, such as musk, ambergris, civet, and the like.

The odor of plants is due to principles very unequally distributed throughout their different organs; some solid, as resins and balsams, others which are liquid, and known by the name of essences or essential oils. In most cases the essence is concentrated in the flower, as occurs with the rose and the violet. In other plants, as in bent grass and Florence iris, only the root is fragrant. In cedar and sandal wood, it is the wood that is so; in mint and patchouli, the leaves; in the Tonquin bean, the seed; in cinnamon, it is the bark which is the seat of the odorous principle. Some plants have several quite distinct fragrances. Thus the orange has three: that of the leaves and fruit, which gives the essence known by the name of *petit grain*; that of the flowers, which furnishes neroli; and again the rind of the fruit, from which essence of Portugal is extracted.

What, now, is the chemical nature of the odorous principles in plants? The chemistry of today reduces almost all of them to three categories of well ascertained substances: hydrocarburets, aldehydes, and ethers. We will endeavor to give a clear account of the constitution of these three kinds of substances, and to mark their place in the register of Science. The hydrocarburets are simple combinations of carbon and hydrogen, as, for instance, the petroleum oils. They represent the simple compounds of organic chemistry. As to aldehydes and ethers, their composition is rather more complex; besides carbon and hydrogen, they contain oxygen. Every one knows what chemists mean by an alcohol; it is a definite combination of hydrogen, carbon, and oxygen, neither acid nor alkaline, which may be regarded as the result of the union of a hydrocarburet with the elements of water. Common alcohol, or spirits of wine, is the type of the most important series of alcohols, that of the mono atomic alcohols. Chemists represent it by the formula C^2H^6O , to indicate that a molecule of it arises from the union of two atoms of carbon with six atoms of hydrogen and one of oxygen. Independently of the alcohols, which are of great number and varying complexity, organic chemistry recognizes another class of bodies, of which vinegar is the type, and which receive the name of organic acids, to mark their resemblance to mineral acids, such as oil of vitriol or aquafortis. Now, every alcohol, on losing a certain amount of hydrogen, gives rise to a new body, which is called an aldehyde; and every alcohol, on combining with an acid, produces what is called an ether. These rapid details allow us to understand precisely the chemical character of the essences or essential oils which plants elaborate within their delicate tissues. Except a small number among them which contain sulphur, as the essences of the family of crucifers, they all present the same qualitative composition—carbon and hydrogen, with or without oxygen. Between one and another of them merely the proportion of these three composing elements varies, by regular gradations, but so as always to correspond either to a hydrocarburet, or to an aldehyde, or to an ether. In this case, as in almost the whole of organic chemistry, everything is in the quantity of the composing elements. The quality is of so little importance to Nature that, while following always the same laws and constantly using the same materials, she can, by merely changing the ponderable relations of the latter, produce, by myriads of various combinations, myriads of substances which have no resemblance to each other. The strange powers of the elements and the mysterious forces concealed in matter make themselves known to us in a still more remarkable phenomenon, to which the name of *isomery* is given. Two bodies, thoroughly unlike as regards their properties, may present absolutely the same chemical composition with respect to quality and quantity of elements. "But in what do they differ?" it may be asked. They differ in the arrangement of their molecules. Coal and the diamond are identical in substance. Common phosphorus and amorphous phosphorus are one and the same in substance. Now, the odorous principles of plants offer some exceedingly curious cases of isomery. Thus the essence of turpentine, the essence of lemon, that of bergamot, of neroli, of juniper, of savin, of lavender, of cubeb, of pepper, and of gillyflower are isomeric bodies, that is, they all have the same chemical composition. Subjected to analysis, all these products yield identical substances in identical proportions, that is, for each molecule of essence, ten atoms of carbon and sixteen atoms of oxygen, as denoted by their common formula, $C^{10}O^{16}$. We see how these facts as to isomery prove that the qualities of bodies depend far more on the arrangement and the inner movements of their minute particles, never to be reached by our search, than on the nature of their matter itself; and they show, too, how far we still are from having penetrated to the first conditions of the action and forces of substances.

But chemistry has not stopped short with ascertaining the inmost composition of these substances; it has succeeded in reproducing quite a number of them artificially; and the compounds thus manufactured, wholly from elements, in laboratories, are absolutely identical with the products extracted from plants. The speculations of theory on the arrangements of atoms, sometimes condemned as useless, do

not merely aid in giving us a clearer comprehension of natural laws, which is something of itself, but they do more, as real instances prove: they often give us the key to brilliant and valuable inventions. An Italian chemist, who was then employed in Paris, Piria, in 1838, was the first who imitated by art a natural aromatic principle. By means of reactions suggested by theory, he prepared a salicylic aldehyde, which turned out to be the essence of meadowsweet, so delicate and subtle in its odor. A few years later, in 1843, Cahours discovered methyl-salicylic ether, and showed that it is identical with the essence of wintergreen. A year after, Wertheim composed essence of mustard, while believing himself to be making only allyl-sulphocyanic ether. These discoveries produced a sensation. Nowadays the chemist possesses the means of creating many other natural essences. Common camphor, essence of bitter almonds, that of cummin and of cinnamon, which are aldehydes, as we have seen, may be prepared without camphor leaves or almonds, without cummin or cinnamon. Besides these ethers and aldehydes, whose identity with essences of vegetable origin has been proved, there exist, among the new bodies known to chemistry, a certain number of products formed by the union of common alcohol or amylic alcohol with different acids, that is to say, of ethers, which have aromatic odors more or less resembling those of some fruits, but as to which it cannot yet be affirmed that the odors are due to the same principles in both cases. However this may be, perfumers and confectioners, more industrious and wide-awake than chemists, have immediately made good use of many of these properties.

Artificial aromatic oils made their first appearance at the World's Fair of London in 1851. There was there exhibited a pear oil, diffusing a pleasant smell like that of a jargonel, and employed to give an aroma to *bombons*. This product is nothing else than a solution of amylic ether in alcohol. Apple oil was exhibited beside the pear oil, having the fragrance of the best rennets, and produced by dissolving amylic ether in alcohol. The commonest essence was that of pineapple, which is nothing else than ordinary butyric ether. There was observed, too, an essence of cognac, or grape oil, used to impart to poor brandies the highly prized aroma of cognac. The product which was then, and still is, the most important article of manufacture, is the essence of mirbane, which very closely resembles in its odor that of bitter almonds, and which commerce very often substitutes for the latter. Essence of mirbane is nothing else than nitrobenzine, which results from the action of nitric acid on benzine. Benzine, in turn, is met with among the products of distillation of tar, which also yield the substances used in preparing those beautiful colors called aniline.—*F. Papillon, in Revue Scientifique.*

SCIENTIFIC AND PRACTICAL INFORMATION.

OCCCLUSION OF GASES BY IRON WIRE.

In drawing certain numbers of iron wire, it often becomes necessary, in order to continue the use of the drawing bench, to anneal the iron. This is done in a hermetically closed receptacle, so as to avoid, as much as possible, the oxidation of the metal. In spite of this precaution, however, the latter becomes covered with an ochraceous film, which it is necessary to remove by an acidulated bath. It frequently happens, however, that, subsequent to this process, the metal becomes so brittle as to render its further drawing impossible. M. Seroz, engineer of the *Société des Forges de La Franche Comté*, has examined into this phenomenon, and finds that the iron becomes charged with a condensed gas. On breaking the wire under water in a test tube, inflammable bubbles were generated, which detonated in the air. The exact nature of the gas has not yet been decided, nor that of its direct action upon the metal; but it is believed to be either hydrogen or carbonic oxide.

THE EUCALYPTUS GLOBULUS.

In addition to its remarkable properties as preventer of miasmatic fevers, Dr. Behr, of San Francisco, Cal., states that he has been recently informed by an Australian correspondent that the wood of this tree made most excellent shingles, by reason of its non-inflammable characteristics. It was a common joke in Australia to hand new comers an ember, from the fireplace, of this wood, by which to light their pipes. It would go out as soon as drawn from the fire. Made into shingles, it furnishes a first rate fireproof material for buildings.

THE ORIGIN OF GUANO.

Dr. Habel, who has devoted several years to the exploration of guano islands and the microscopic study of the fertilizer, has recently arrived at the conclusion that the material is not the dejection of sea birds, as ordinarily supposed. He has obtained an insoluble residue after chemical treatment, composed of fossil sponge and marine plants and animalculæ. He thinks, therefore, that guano results from the accumulation of fossil remains, of which the organic matter has been transformed into a nitrogenized substance, while the mineral portion has remained intact.

COOKING OATMEAL.—W. says: One reason why oatmeal is not more generally used as food is that, in the way in which it is usually cooked, it requires constant stirring, which takes a good deal of time and attention. If, after the porridge is mixed, that is, as soon as the oatmeal is stirred into the boiling water, the cover is put on and the tin saucepan containing it placed in another pot of boiling water on the stove, and the water let boil, good oatmeal porridge will be made, without the least danger of its being scorched.

A Dog on the Witness Stand.

The Richmond, Va., *Enquirer* states that a Mr. Spears was recently before the police court in that city, charged with keeping a vicious dog, and the animal was ordered to be killed. Subsequently, however, the execution of the sentence was suspended, as the evidence upon which he was convicted was *ex parte*, and a new trial granted. When the case came up again, a large number of persons testified as to the good character of the dog, and the whole matter resolved itself into the fact that he had scared the gentleman, who complained of his attacking him, by rough play. Nevertheless, to make assurance doubly sure, at the request of his master, the dog was put upon the stand to testify in his own case. On being asked if he would bite any one, he uttered a peculiar noise and shook his head. He was then asked if he would bite if his master set him on, and replied in the affirmative by nodding his head and barking. When asked if he would bite the Court, he replied in the negative. Several other questions were asked him, and his answers and actions exhibited the greatest intelligence. It is needless to say that he was honorably acquitted.

Resharpening Files.

Well worn files are first carefully cleaned with hot water and soda; they are then placed in connection with the positive pole of a battery, in a bath composed of 40 parts of sulphuric acid and 1,000 parts of water. The negative is formed of a copper spiral, surrounding the files but not touching them; the coil terminates in a wire which rises toward the surface. This arrangement is the result of practical experience. When the files have been in the bath ten minutes, they are taken out, washed, and dried, when the whole of the hollows will be found to have been attacked in a very sensible manner; but should the effect not be sufficient, they are replaced in the bath for the same period as before. Sometimes two operations are necessary, but seldom more. The files, thus treated, are to all appearances like new ones, and are said to be good for 60 hours' work. M. Werdermann employs twelve medium Bunsen elements for his batteries.

New Lighthouses.

A Baltimore firm, under contract with the government, have in course of construction two lighthouses, one of which is destined for Hunting Island, and the other for Morris Island, South Carolina. The one for Hunting Island is entirely of cast iron, and is one hundred and thirty-six feet high and twenty-seven feet in diameter. The one for Morris Island will be one hundred and fifty feet high; the lantern brackets, the gallery, and the lantern are of cast iron, the tower being of brick. The roofs of both the lighthouses are of copper, and each is to be supplied with a spiral stairway.

E. A. says (in commenting on the following statement in our recent articles on "Dentistry": "The teeth may possibly be removed by patiently sawing and cutting the vulcanite away from the pins"): "Teeth can be easily and quickly removed by holding them in a spirit lamp until the vulcanite is softened a little around the pins, and the teeth pushed off, using a cloth to protect the hand; but they will come off entirely clean and in much less time than they can be filed, to say nothing of the cost of the teeth."

Recent American and Foreign Patents.

Improved Car Coupling.

Richard Hopkins, Frostburg, Md.—The coupling is pivoted loosely to the lateral front piece of a frame, which is pivoted by arms to staples of the drawhead. The arms of a rod frame swing along the sides of the drawhead, and carry a bottom piece, which extends across the under side of the drawhead, and defines the extent of motion in raising the pin for uncoupling, and also weights the same, to cause the dropping of the coupling pin after the uncoupling mechanism is released. The rod frame is hung to hook-shaped levers, which are pivoted to the car frame, and connected by elbow-shaped extensions to the forward projecting lever. The device is operated at the top of the car by a lateral crank rod and lever connection, with a crank shaft and wheel supported in a top frame.

Improved Adjustable Bed.

Albert F. Supplee, Nelsonville, O.—This is a mattress-supporting frame divided in the middle longitudinally; also divided in three sections transversely, and hinged together, and supported by springs upon two middle supports and two end supports. The whole is so arranged on springs and provided with adjusting levers that either end or side of the bed may be raised and supported higher than the opposite side or end.

Improved Box and Bale Hook.

John W. Knight, Galveston, Texas.—This invention consists of a guard or shield of leather or equivalent material, combined with the handle and shank of the hook used for turning or otherwise handling bales and boxes, to prevent the hands from rubbing or pressing against the bale or box, and thus becoming injured. The guard is so applied to the hook that (when, by lifting the box or bale, the hand is pressed toward the said box or bale) it will be interposed to protect the hand from the rough surface, as well as from any accidentally projecting corners, nails, or crews.

Improved Book-Supporting Attachment for Tables.

William H. Patterson and Ole Swensen, Cresco, Iowa.—A spindle holds the book holder directly in front of the writer. The book holder is adjustable along the bracket by a slotted foot and a binding screw. A lamp holder is held so as to throw the light of the lamp on the book on the holder to be copied from, as well as the one on the table to be written in. A couple of weighted arms are jointed to the book holder, hanging down in front of it, so that the weights will rest on the book and keep it open. The bracket can be shifted around the stand in case it may be wanted to do so, and it can be taken off and put on readily for convenience in adjusting the parts. An inkstand holder is also provided.

Operating Steam Engines by Compressed Air.

Jacob B. Van Dyne, Louisville, Ky.—This invention relates to a new method of charging steam boilers with a compressed medium of air or gas for instantaneous use, and is more particularly applicable to the boilers of steam fire engines. It consists in admitting a high pressure of air or gas into the boiler above the water when required, and operating the engine by the compressed medium while steam is being generated, the compressed medium furnishing a motive power which is instantaneously available, and which, owing to the expansion of the air or gas by the heat, is sufficiently continuous to run the engine until reinforced by the steam, without any intermission.

Improved Bale Tie.

Henry B. Jones, Burton, Texas.—The key consists of a head, a short shank, and a radially projecting bit, having sharp corners to clutch the fibers of the bale. The key is inserted in keyhole slots in the ends of the hoop.

Improved Grain Binder.

James McNeal, Chauncey, Ill.—This invention consists of a pair of gripping arms, in combination with a sewing machine needle and shuttle and looping hooks, so contrived that they gripe the gavel, compress it, and pass it across the needle hole into a bight of the twine, and hold it while the twine is being tied by the sewing machine devices.

Improved Bed Lounge.

Ferdinand Braun, New York city.—This sofa bed is readily thrown into open or folded position for use as bed or sofa or lounge, all the parts being firmly and securely connected. A hinged section has a longitudinal sideboard hinged thereto and a fastening rod pivoted to the board, with a hinged top piece for retaining the same rigidly in open inclined position.

Improved Horse Hay Rake.

Solon H. Bushnell, Fairport, N. Y.—Collars placed upon an axle are secured adjustably in place by set screws which pass in through projections. Upon the other side of the collars are formed projections to receive the ends of the rake teeth which are held by set screws which pass in through the side of the said projections, and press against the said teeth. By suitable mechanism the draft strain may be made to hold the rake teeth down to the ground with more or less force, as circumstances may require; and other apparatus is provided which, as the rake teeth are raised to discharge the collected hay, prevents the hay from being raised by and with the rake teeth, and causes the hay to be promptly dropped, thus preventing the teeth from becoming clogged and the hay from being scattered.

Improved Wheel for Vehicles.

George Cornwall, Plainfield, N. J.—The rim of sheet metal has a groove in the face of half a circle; also sockets upon the inner periphery for the reception of the spokes. The last screw deep into the hub, so as to enter the socket, and then screw out again sufficiently to screw them in the rim. The tyre of the wheel is made of round vulcanized rubber, nicely fitting in the groove.

Improved Dust Cap for Watch Regulators.

Wenzel H. B. Schmidt, Napa, Cal.—This is a dust cap arranged to cover and shield the hair spring and regulator hand, and the more delicate portions of the watch movement. It is a metallic frame, enclosing a transparent plate, and is tightly fitted down on the plate and over the bridge, and fastened by square-headed screws. These screws have each an eccentric washer under the head, which, when the cap is fastened, are turned by means of a watch key on the narrow flange of the cap frame, which securely holds the cap in place.

Improved Chemical Fire Extinguisher.

Jacob B. Van Dyne, Louisville, Ky.—This invention relates to certain improvements in chemical fire extinguishers, and consists in the combination of two invertible fire extinguishers, supported upon wheels, and connected with a common discharge pipe by intermediate flexible pipes provided with detachable caps. It consists further in the combination of a swiveled screw rod, a frame, and a nut for the purpose of forming a stopper for the acid vessel, and also in the combination of a detachably locked acid vessel with an acid vessel holder, permanently attached to the shell of the extinguisher.

Improved Plow.

August Ihringer, Calvert, Texas.—This invention relates to means whereby the beam of a plow may be elevated or depressed at the front end, according to the depth to which it is intended that the plow shall run, and held securely at several points of adjustment.

Improved Bureau or Dressing Case Bedstead.

Mark Crosby, Boston, Mass.—The object of this invention is to provide a bedstead in combination with a bureau or dressing-case, so constructed and arranged as to fold in the latter when not in use, and be disposed in a small compass and out of sight. It consists in the combination of a bureau having bottom and rear recesses, with a bedstead having a hinged head section, the said head section sliding in ways into the bottom recess, and the other portion folding in a vertical position in the rear recess. The lower portion of the bureau is also provided with a hinged leaf, which, when the bedstead is drawn out, adds to its length.

Improved Nozzle.

James H. McConnell, New York city.—The nozzle is swiveled to the bulb of a shut-off cock. A plug is inserted through a hole in the side of the bulb, which hole is closed by a screw cap, so formed that its outer surface may be continuous with the surface of the bulb. Upon the inner end of the nozzle is formed a segment, which gears with a segment upon the top of the plug. By this construction, by turning the nozzle in one direction, the plug will be turned to allow the water to flow through the said nozzle; and by turning the nozzle in the other direction, the water will be shut off.

Improved Table.

Louis Postawka, Cambridgeport, Mass.—The head pieces, which are long enough to extend across the table and serve for two legs, are connected by a tenon, fitting in a socket, and are attached to the frame by bolts which pass up to sockets in the upper side of the frame. The posts are mounted on foot pieces which receive the two legs of each end, which, together with the head pieces, form side frames, and the two frames are connected by a stretcher, screwing into them by right and left threads. Mr. Postawka is the patentee of an ingenious and useful improvement in piano stools whereby the seat is raised and lowered by turning a knob at the side, in place of rotating the seat.

Improved Sash Fastener.

Thomas L. Shaw, Laurinburg, assignor to himself and Hugh G. Fladger, Lilesville, N. C.—This invention consists of a pivoted sector-shaped latch piece, which is guided in ribbed inclosing plates, and acted upon by a strong spring bolt for forcing curved V-shaped arms, with tapering ends, into notches of the window casing or sash frame, for retaining the sash in any position, and locking the same. Particulars regarding this invention may be obtained by addressing H. G. Fladger, Lilesville, N. C.

Improved Pianoforte Attachment.

John W. Brackett, Boston, Mass.—This is an improved organ pedal attachment to pianos, which affords the organist and pupil all the advantages of the organ for practice, enabling them to gain the technique of both the piano and organ at the same time. A set of organ pedal trackers, levers, and stickers is combined with the keys of a piano, and stops and their levers are also provided, in connection with the trackers of the device. The value of this invention consists primarily in the facility afforded to students of obtaining practice in the use of the feet in pedaling, and thus acquiring an indispensable qualification for playing the organ when the latter instrument is not accessible.

Improved Faucet for Oil Cans.

Edwin A. Jackson, New York city.—This faucet is arranged entirely within a bell-shaped base part, with faucet barrel and spout, which is soldered to the can. The plug is provided with a hinged and recessed finger piece, to be thrown up for the purpose of turning the plug, and locked in downward position over a spring of the spout for closing securely the faucet.

Improved Slide Valve for Steam Engines.

Henry Bolthoff, Central City, Col. Ter., assignor to himself and James Clark, same place.—This slide valve is composed of two parts, connected with two eccentrics on the main shaft. The eccentrics are so arranged on the shaft that the parts are simultaneously moved in opposite directions. The valve is so set as to about half open the main port, more or less, as the case may require, when the crank is on the center. The upper part is moved in an opposite direction, consequently the full opening is made in less than the usual time required by the ordinary valve. The upper part has on the inside of each port an adjustable jaw, for the purpose of increasing and decreasing the size of the ports for cutting off steam at any point of the stroke that may be desirable.

Improved Quilting Attachment for Sewing Machines.

William H. Null, Blandinsville, Ill.—This invention includes apparatus for adjusting the legs toward and from each other, to vary the height of the quilt to adjust it to the machine, and to set the benches so that the frame will descend a little to facilitate the feeding. The quilt is attached to rollers, held against turning by a friction band, lever brake, and holding pawl; and one roller has a ratchet, ratchet lever, and pawl for turning it to draw the quilt from one to the other as the work progresses. The quilt is stretched in the direction of the seams by hooks, cords, and a lever, the cords passing over suitable guides, to be operated alike by the lever to stretch evenly at both ends, and the lever being provided with a catch button, to hold it when pulled back to stretch the quilt.

Improved Battening.

John Loppacker, New York city.—The boards are connected by the cleat pieces, and their edges are grooved. Grooves and rabbets of the cleat piece receive tenons of the boards, and a cleat, which overlaps the latter, is held tightly thereto. The lower side of the cleat piece is flush with the lower sides of the boards. By this mode, the boards and cleat pieces are securely locked together, and the possibility of leakage is avoided.

Improved Bottle Stopper.

Joel B. Miller, Rondout, N. Y., assignor to himself and August Yost, same place.—This stopper is located inside the bottle, and has a bale or handle hinged to the top. It is provided with an enlarged upper end, designed to prevent the stopper from falling to the bottom of the bottle, and also to serve as a handle to facilitate the drawing of the device into the neck.

NEW BOOKS AND PUBLICATIONS.

CHEMICAL AND GEOLOGICAL ESSAYS. By Thomas Sterry Hunt, LL.D., F.R.S., etc., etc. Boston, Mass.: James R. Osgood & Co.

Dr. Sterry Hunt has for many years been a highly valued contributor to our current scientific literature, both on account of his learning and attainments and his uniformly graceful and pleasing style. In collating these papers, published originally in magazines or read before scientific associations, he has given us a book of permanent value to the history of contemporary Science; and in it he enunciates many original views and theories, some of which have been justified by actual discovery by himself and other investigators. The paper on "The Theory of Chemical Changes" deserves especial commendation as a model of popular scientific exposition.

THE COMMON FROG. By St. George Mivart, F.R.S., etc. Lecturer on Comparative Anatomy at St. Mary's Hospital, London, Author of "The Genesis of Species," "Elementary Anatomy," etc. Price \$1. New York: Macmillan & Co.

From the days of Galvani and Volta, the batrachian has always been a martyr to Science; and on this ground, as well as for its remarkable metamorphosis from a fish to an amphibious animal, it deserves the closest study. Mr. Mivart discusses thoroughly and well the whole of the delicate organization which makes the frog so useful for physiological experiments, as well as the number and variety of its relations to other classes of animated nature.

THE BLOWPIPE: a Guide to its Use in the Determination of Salts and Minerals. Compiled from Various Sources by George W. Plympton, C.E., A.M., Professor of Physical Science in the Polytechnic Institute, Brooklyn, N.Y. Price \$1.50. New York city: D. Van Nostrand, 23 Murray and 27 Warren streets.

Professor Plympton's earlier work on blowpipe analysis has long been recognized as a standard authority; and the volume just received is equally valuable as a text book, while its modern date and comprehensive arrangement make it the manual, *par excellence*, of analysis by the dry method. It is well illustrated, and will be read and consulted by practical scientists as well as by pupils and students.

THE USE OF THE STEAM ENGINE INDICATOR, or Practical Science for Practical Men. By Edward Lyman, C.E., M.A.I.M.E., etc. Price \$1, postage paid. Published by the Author, New Haven, Conn.

The use of the indicator is becoming daily more general, and there is need for precise and detailed description of its theory and mechanism which we find excellently given in the treatise before us. Some useful and original tables of pressures at various points of stroke, under steam cut off at different proportions of piston travel, are given, as well as cards showing the merits and faults of engines of all varieties, as displayed by the unerring indicator.

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