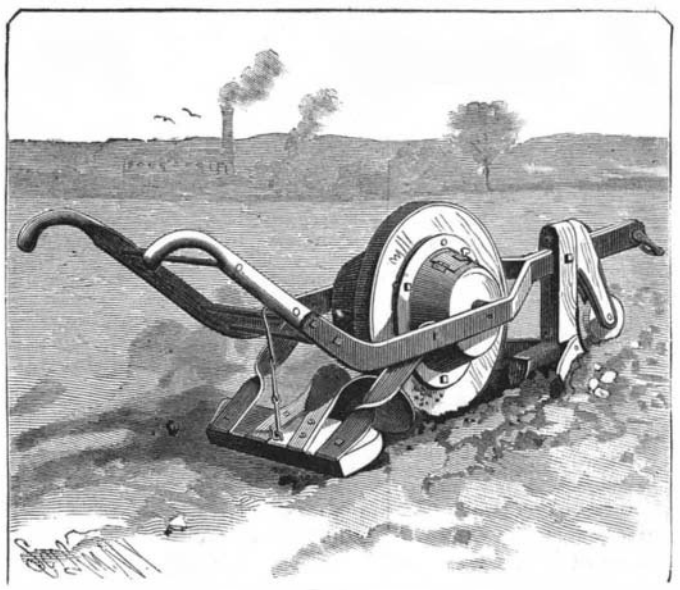
AN IMPROVED COTTON PLANTER.

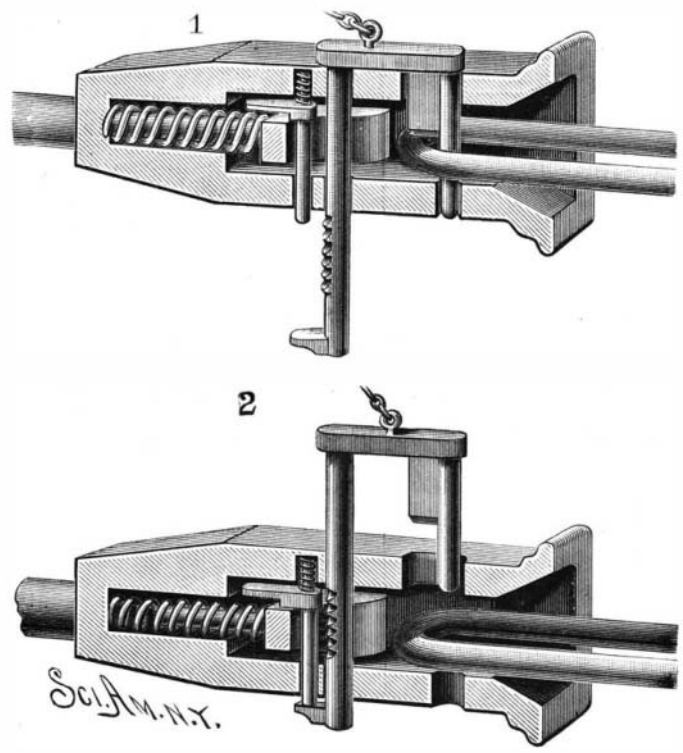
A simple and durable planter of light draught and easily operated, in which the opening of the furrow for the seed may be easily regulated as to depth and the distribution of the seed will be regular, the seed being covered with soil to a suitable depth, is shown herewith, and has been patented by Mr. William T. Magruder, of Port Gibson, Miss. Immediately behind the cotter is a small shovel plow, followed by a block having a convex under surface to keep open the furrow, each side of the block having outwardly extending wings or fenders adapted to remove any loose clods near the furrow. The seed drum consists of two cone-shaped sections mounted on a drum-carrying wheel, rotating on an axle with bearings in each side of the frame, the cone-shaped section on one side being held close against the wheel, and the section on the other side being held more or less close to the wheel by a nut upon the axle, the distance between the base of this section and the side of the wheel forming the seed opening through which the quantity of seed to be dropped is regulated. This section is attached to the wheel by bolts which carry spiral springs, against which the nut on the axle holds the flange at the base of the section, and the wheel has a central aperture making the two sections substantially one seed reservoir. Each section of the seed drum has fingers upon its inner faces to prevent clogging of the seeds and cause them to flow regularly. A covering block, adapted to trail behind the planter, has outwardly inclined share-like shovels, adapted to project forward each side of the hopper wheel, covering the seeds with earth, which is compressed by the trailing tail block. The depth of the furrow is regulated by the leverage afforded the operator using the frame through the handles as a lever, the fulcrum being the drum-carrying wheel.



MAGRUDER'S COTTON PLANTER.

AN IMPROVED AUTOMATIC CAR COUPLER.

A car coupler designed to hold the link in horizontal position, and wherein the coupling pin, when raised to uncouple the cars, will be automatically released by the action of an entering coupling link, is illustrated herewith, and has been patented by Mr. Luther B. Sampson, of Rochester, N. Y. Fig. 1 is a central longitudinal section, representing the parts as they appear when the coupling pin has fallen to engage the link, and Fig. 2 shows the pin raised to couple automatically with an entering link. In the rear of the drawhead is a bore in which is housed a spring which bears against a bifurcated grip, the grip having a rearwardly extending shaft about which the spring is coiled. Upon the inner faces of the grip arms are ribs adapted to engage shoulders on a vertical shaft or bar, the lower end of this bar having a step or toe, and a coupling pin being connected to the upper end of the bar by a crosshead. Above the grip is mounted a catch, which is connected to a short shaft or bar in vertical apertures, the shaft and its catch being normally held depressed by a spring, and to the rear of the coupling pin, beneath the crosshead, is a weight or block. By raising the coupling pin and the parts connected with it, which may be effected from the top or sides of the car in any of the well known ways, the toe of the vertical shaft back of the pin will strike against the lower end of the short shaft attached to the catch, raising the latter, so that the spring around the rearwardly extending shaft of the bifurcated grip will force the latter forward into engagement with the notches of the vertical shaft connected by the crosshead with the coupling pin, and hold the latter in the position shown in Fig. 2. If the drawhead be entered by a link, when the parts are so adjusted, the striking of the link against the forward rounded faces of the grip forces the latter back, whereby the coupling pin is free to drop to the position shown in Fig. 1. With the parts in this position, the weight at the rear of the coupling pin, beneath the crossbar, bears upon the link to hold it in horizontal position, so that it will enter the drawhead of an approaching car.



SAMPSON'S AUTOMATIC CAR COUPLER.

Remarkable Salt Vein.

At a depth of 1,000 ft. from the surface of the ground, near Ithaca, N. Y., a vein of pure natural salt 250 ft. thick has been struck. The discovery was made during an experimental boring in search of gas.

A Water Bicycle.

Prof. Alfonso King has a water bicycle, which consists of two spindle-shaped tubes about 12 ft. in length and 1 ft. in diameter. The tubes are united by an iron framework, which also carries a light water wheel with pedals and a bicycle saddle. This novel boat was lately tried by the inventor in N. Y. harbor. The wind was blowing a small gale, and a strong flood tide was running, and the sea was being chopped into angry waves, which aroused doubts as to the seaworthiness of the novel craft. The little boat skipped over the waves, and the professor worked his pedals with admirable energy. In forty-five minutes from the time of the start, at Liberty Island, the bold navigator ran under the Brooklyn Bridge. Distance, about three miles.

The Brotherhood of Locomotive Engineers.

The twenty-fourth annual Grand International Convention of the Brotherhood of Locomotive Engineers was held in Chicago on the 19th October, with delegates present from all parts of the Union. The Grand Chief Engineer, P. M. Arthur, with his usual rare good sense, said in the course of his annual address: "We are enemies only to wrong in its various devices and garbs, and can assuredly say that political schemes and aspirations have no place nor part in our association. A mighty army of men, representing 365 divisions, has gathered about a nucleus of 12 men who, 24 years ago, assembled in the city of Detroit and started an organization destined to be more than they knew or dreamed. To-day we number 25,000 men, and while our numbers are great, we would not have you consider only the quantity, but the quality as well. To be a Brotherhood man, four things are requisite, namely: Sobriety, truth, justice, and morality. This is our motto, and upon this precept have we based our practice. We have paid out during the fiscal year just closed, to widows and orphans, $259,500, making a total of $2,244,669.61 that we have paid since the association was established. Our *Journal's* circulation has now reached 22,000; from which we derive a revenue of $8,922.84 per year. Taking all things into consideration, our relations, both to ourselves and with various railroads employing Brotherhood men, are amicable. When we consider the dissatisfaction which is everywhere manifest about us, our few troubles pale in insignificance. There have been times and incidents when the 'strike' was the only court of appeals for the workingman, and the evil lay in the abuse of them and not in the use of them. The methods used to bring about a successful termination of strikes, the abuse of property and even of persons, have brought the very name into disrepute, while the troubles of the laboring man are receiving mere cant, and sympathy for him is dying out. More and more clearly defined is the line becoming which divides the honest man, satisfied with a just remuneration which he has truly earned, until by his own effort he can rise to a higher position in life, and the loud-voiced 'bomb thrower,' who, scarcely able to speak the English language, seeks to win his own comfortable living from those who have worked for it, presuming upon the imagination and arousing false hopes in the hearts of those who are still more ignorant than himself. Among sensible men the day for all this is past. Let 'mercy season justice, and justice be tempered with moderation.' A wise arbitration looks to a long result rather than to immediate satisfaction, and accomplishes more than intimidation ever can hope to do.

"It is not my intention," said Mr. Arthur, "to impose upon this convention any dogma upon the drink question; but I cannot refrain in honesty to my own convictions from deploring the sad havoc that intemperance is making in the ranks of our fellow men. So great is this evil that no man or woman who is striving to improve their fellows can help taking it into account. It is, indeed, an important factor for evil in our midst. Not only from the physical and moral standpoint is it working mischief, but from the standpoint of labor. The man who has so little self-control that he cannot resist the temptation to degrade himself is always in danger of bringing disgrace upon his brethren. He has lost his self-respect and, to some extent, his independence, thus making an easier victim to the greed of a selfish employer. I would therefore urge upon you the necessity of abstaining from everything that will in the slightest degree impair your usefulness as citizens or your efficiency as locomotive engineers."

Progress of Electrical Improvements.

Electrical progress has been almost in keeping with the inconceivable speed of electricity. But a few years back, within the memory of all our readers, what a paltry corner of usefulness was occupied by electrical invention! A few improvements in batteries, and the then wonderful development of the electric telegraph in its various modifications, comprised about the whole crop visible in the field. At the Centennial in 1876, only eleven years ago, some feeble attempt was made to show that electric light could be produced from a dynamo, which was spoken of as a "very interesting exhibit." Professor Bell's first crude telephone attracted thousands of curiosity seekers, and the verdict was "a beautiful conception, but a mere scientific toy." Professor Gray exhibited various forms of what has since become one of the mighty arms of multiplex telegraphy; but most people looked askance at the models as the "in'ards of a church organ," and passed them with indifference.

To-day, only eleven years later, the arc lights of the United States are fast approaching two hundred thousand, while the incandescents have long since passed the million mark. It would be but a one-horse telegraph company that did not use the duplex and quadruplex systems almost exclusively; the harmonic's dainty song is heard everywhere; electroplating has got to be an indispensable adjunct to a great body of industries; the telephone has become the business man's *fidus Achates;* a solid phalanx of electric motors are slowly but surely pushing the small steam plants into the scrap pile, with the moral support of thousands of domestic motors, sons of the same sire; and the knell of the poor street car horse has been tolled. We are surrounded with a myriad of small devices, such as alarms, annunciators, gas lighters, mine exploders, impossible to catalogue here. And we have several very sturdy infants growing. Already electric smelting has taken a strong position commercially; electric welding—or more generically electro-smithing—has come to stay, and will soon take its place in the rank and file of labor-saving inventions; storage batteries are gradually giving up their secrets and becoming amenable to scientific law, and they have a vast field of usefulness awaiting them. The review becomes bewildering, and the mazes of possibility are inexhaustible. Where will it end? Nowhere in our lives. As the years swell into decades, and the decades round into centuries, it will be found that the true flood gates of improvement were opened by the discoveries and practical applications of electricity in the decade now completed, and the onward and ever widening torrent will end only at the crack of doom. —*Electrical Review.*

A Spring of Acid Water.

About fifteen miles south of Meridian, Miss., there is a spring near the foot of a hill. The water is almost as sour as lemon juice. With the addition of sugar it makes first-class lemonade, with a slight taste of iron. The spring was recently discovered, and it is not supposed to possess any value except as a curiosity.

An Incandescent Gaslight.

About two years since, we were afforded the opportunity of privately inspecting an incandescent gaslight, which was then in a more or less incomplete condition, although it gave good promise of success. This was the Welsbach incandescent gaslight, which, since that time, has been perfected in all its details and put through practical trial. Its promise of success has been realized, inasmuch as it is now the subject of manufacture on a commercial scale. The inventor is Dr. Auer von Welsbach, under whose system the gas is burnt completely, without smoke, and the heat thus produced is taken up by an incandescent body and converted into brilliant light. The incandescent body, which is termed the mantle, consists of a small cone of incombustible matter, in the shape of fine gauze. When heated to incandescence over a small Bunsen gas burner this mantle emits a brilliant light, due to the metallic oxides which are employed in the preparation of the mantle. As the mantle is incombustible it remains intact, and does not change in any manner until after several hundred hours' use. A comparatively low temperature being required to raise the material to a state of incandescence, no special apparatus for producing great heat is required. The burner is perfectly silent, and free from any hissing noise.

Of course, as our readers are aware, there have been several prior attempts to produce an incandescent gaslight, but those efforts have not been attended with commercial success. We may here instance two of the more recent examples, namely, those of Clamond and Lewis, both highly ingenious and praiseworthy. Clamond used a pottle-shaped mantle made from filaments of magnesia prepared in a special manner. Lewis used a similarly shaped mantle of platinum wire, and produced more perfect results than did Clamond. But both systems had a fatal drawback in that they required compressed air for insuring perfect combustion. This defect is absent from the Welsbach burner, and this circumstance in combination with its other good points has made it a success. We have stated that this gas burner is manufactured on a commercial scale. Having recently inspected the process of manufacture at the invitation of the Incandescent Gaslight Company, of 15 Leadenhall Street, London, it will be interesting if we now place the particulars before our readers.

The works of the company are situated in Palmer Street, Westminster, and we found them to be a busy hive of industry, where female labor is chiefly employed, for in their manufacture the mantles require that delicacy of manipulation which more muscular fingers rarely command. The first process is the manufacture of the tubular netting, which is produced in lengths of several yards by means of circular knitting machines, a special kind of cotton being employed. These lengths of netting are passed on to another room, where they are cut into suitable lengths, which are transferred to the saturating room. Here they are one by one dipped in a chemical solution and sent in batches to the drying room. When dry they are returned to the saturating room and dipped in a second chemical solution, after which they are again dried in a gentle heat. The ingredients of the solutions are the oxides of zirconium, lanthanum, thorium, and cerium, and they form a coating around the cotton filaments. After the second drying the mantles have a platinum wire run around the edge at one end, which is then contracted, and the ends of the wire are used as points of suspension in the next operation, which is the burning out of the cotton fiber from the chemical coating. This is done by means of a gas flame from a Bunsen burner, which destroys the cotton and leaves a skeleton of practically indestructible material, that is, so far as heat is concerned. The mantles are now mounted on their frames, and are subjected to a second burning, which occupies about twenty minutes. The third burning then takes place within a glass chimney, and lasts from two to three and a half hours, at the end of which time the mantle is ready for the market. They are made of different sizes, the ordinary size being 4 inches long and about 1 inch in diameter when finished. They are also made of two different tones, one of which gives a pure white light, and is suitable for artistic purposes, and in connection with industries where it is important to distinguish various delicate tints. The other mantle gives a faintly yellow light, and is used for domestic and general lighting. These differences are produced by variations in the solutions.

In use the incombustible mantle mounted on its metallic framing is fitted over a 'simple Bunsen burner, the gas being admitted at the bottom of the tube through a perforated disk, and the air passing in through holes in the tube just above the disk. The regulation of this burner for pressure is a very simple matter, as was shown. The durability of the mantles is very considerable; they are computed to last from 800 to 2,000 hours. A number of these burners are in use on test in one of the government offices, and the mantles are reported to have already stood 1,700 hours' use without manifesting signs of deterioration. With respect to the economy of gas resulting from the use of the Welsbach burner, we cannot do better than refer to the report of Mr. Conrad W. Cooke, M.S.T.E. After having had some of these burners under his constant observation for fifteen months, Mr. Cooke states that the economy is very remarkable. Thus, while a standard Argand gas burner, as certified by the Board of Trade, consuming 5 cubic feet of gas per hour, has an illuminating power of 16 candles, showing an efficiency of 32 candles per cubic foot of gas per hour, the Welsbach burner produced a purer light, with less heat and absolutely no smoke, of the same candle power with 2 cubic feet of gas per hour, thus effecting a saving of about 60 per cent. If the Welsbach light be compared with the ordinary nipple burners in general use, the saving of gas for the same illuminating power is very much greater. The perfect combustion attained in this burner was demonstrated during our visit to the works in question in a practical way. To our mind, however, the most satisfactory proof was that of the burning room, where several hundred burners were under test. The room was very hot, but there was a total absence from the atmosphere of those sulphurous fumes evolved from gas burned in the ordinary manner. To sum up, we obtain with the Welsbach system a maximum of light with a minimum of cost for gas, a decreased quantity of the deleterious products of combustion, and a diminution in the amount of heat resulting from combustion—qualities which constitute a perfect gas burner.—*Iron.*

A Plant Destructive to Sweet Taste.

The *Wien. Med. Blat.* says that lately a drug which possesses the property of rendering our sense of taste unsusceptible to sweet and bitter has aroused the interest of the London medical circles, as it is hoped that by its aid our as yet limited knowledge of the physiology of the sense of taste may be extended, and that it may prove a valuable addition to materia medica. The drug, which reached the manager of the King's Gardens at Kew through the Governor of Madras, Sir Montstuart Grant Duff, was examined by Professor Thisleton Dyer, etc., and the statements made above corroborated. David Cooper delivered a lecture on the subject lately, at Ootacamund, from which the following is stated: "The drug is obtained from Gymnema sylvestre (R. Br.), an asclepiadaceous plant, which inhabits the peninsula Deccan, Assam, and the coast of Coromandel; it also occurs on the continent of Africa. It is represented as a strong, woody, climbing plant, with long, thin branches. The leaves are from 1½ to 3 inches long, 1 to 2 inches broad, entire, elliptical to egg-shaped, and occasionally cordate at the base, covered with woolly hairs; the upper surface is dark green. The plant is alluded to in the Indian Pharmacopœia. The powdered bark has long been employed by the Hindoos as a remedy for snake bite. For this purpose the decoction is applied externally. But the most remarkable property was discovered by Captain Edgeworth, who found that after chewing the leaves the tongue lost its capacity of distinguishing the taste of sugar or anything sweet. Powdered sugar had no taste whatever, feeling like so much sand in the mouth. This effect lasted for 24 hours. It is remarkable that the sense of taste for sour, acrid, burning, or salt substances is not impaired. When under the effect of this drug, sulphate of quinine tastes like lime. The lecturer found that the peculiar effect did not last 24 hours, but passed off in less than two hours. The chemical analysis showed the drug to contain two resins, of which one is soluble in alcohol; the other, which is present in greater quantity, insoluble. Through suitable treatment, an organic acid was separated, which bears some resemblance to chrysophanic acid. This acid, gymneminic acid, possesses the property of the drug, and constitutes, combined with an undetermined base, about six per cent of the leaves.—*Phar. Record.*

Ivy Poisoning.

A writer in the *Popular Science News* gives the treatment which he has often found serviceable in his own case when poisoned with ivy:

I have always been extremely susceptible to the poison of poison ivy and oak, so as to give me great annoyance, unless it is immediately checked on its first appearance. This common washing soda accomplishes for me, if properly applied. I make the application by saturating a slice of loaf bread with water, then cover one surface with soda and apply to the eruption, the soda next the flesh. When the bread is dried by the animal heat, I drop water on the outer side, so as to keep it thoroughly moistened, and dissolve the soda crystals in contact with the skin. This, you will perceive, is merely a bread poultice, the bread being a vehicle through whose moisture the soda reaches the humor. I find that washing or bathing with soda water, even continuously, will not suffice with me. My skin requires the heat and moisture of the bread in order for the soda to act on and neutralize the poison. I rarely have need to retain this soda poultice for more than thirty minutes to any affected part. No pain ensues. Formerly I suffered often for weeks, as the poison would spread all over my body. Now thirty minutes measures the duration of its exhibition.

Candy Making.

The mother who stops and buys a stick of candy to pacify her child would probably be surprised if informed that candy manufacture is one of the great industries of the city; that thousands of men, women, and children, many thousands of dollars' worth of machinery, and whole great buildings are called into play in appeasing the sweet tooth of humanity. The young man who stops to count up the expense of the many boxes of French mixed he has presented to his best girl with the oft-repeated motto, "Sweets to the sweet," perhaps would not be so much surprised. Candy is a luxury, pure and simple, and there is no better way of observing how the luxuries of life must be holding their own in the popular demand, side by side with, and sometimes at the expense of, the necessities, than to spend a few hours in a candy manufactory. Such an establishment, on a large scale, has its chemist, its designer, a number of skilled hands trained by years of labor for certain special branches, and scores of more ordinary workmen. Sugar is bought by the ton, starch and glucose in large quantities, cocoanuts by the car load, besides cochineal, prepared fruits, etc.

The business may properly be divided into two general branches—the making of stick candy and of the various fancy kinds. The most interesting branch by all odds is the first mentioned, and is as much of a revelation when seen for the first time as glass blowing. The mixture, after boiling, is thrown in a plastic state on large stone slabs, where it runs out flat into thick sheets. These sheets are repeatedly picked up, doubled over, and kneaded together until they become of the right consistency, when they are rolled into one immense cylinder of a grayish color. A narrow strip of the same mixture, colored red with cochineal, is laid along one side of the larger piece and adheres to it. Little strips of a shade made whiter by pulling are also laid lengthwise and all around that cylinder equal distances apart. This gives an immense stick of soft, gray candy, with one big red stripe and several white ones, all running lengthwise on it. A man with a pair of gloves on takes hold of this and pulls it out the whole length of the long table at one end of which it lies, runs his closed hand along the sugar rope thus made with such dexterity as to make it perfectly round and of the exact size he wishes, twists the rope once or twice to make the stripes run round it, and, presto! there is a stick of candy as long as a fish pole. All this is done quick as a wink, the long, pliant ropes squirming into place like snakes under the magician's hand, until the whole table is covered with them. When they are cool, they are cut into the right length with a peculiar pair of shears. There is as much stick candy sold as all the other kinds put together. The operation just described requires a workman who has had years of experience.

Making the various kinds of fancy candies is a more complicated matter. There is a designer, whose business it is to continually invent novel devices, artistic forms and imitations of nature—frogs, bugs, mice, fruits, nuts, etc. These devices are reproduced in plaster of Paris, and several of a kind fastened on a stick. The instrument thus formed is repeatedly stamped into the level surface of boxes of pulverized corn starch. Into these holes in the corn starch the prepared sirup is turned, and cools in the required shape. The candy is then placed in pans and sirup turned over it, which, after several hours, cools and covers it with crystals. Then, when exposed in the gaslight, it sparkles and appeals to the eye as well as the palate. All this trouble has been taken to probe the young man's pocketbook, and the reflection should afford him some satisfaction when spending his last dollar.

Great quantities of fruit, especially the quince, pear, apple, and apricot, are consumed in the manufacture of candy, giving their flavor to the finished confection. The manufacture of motto candies ought to interest sentimental people. The material of these tender little *billet doux* is made plastic by means of gum tragacanth, kneaded like dough, and rolled out, as if for cookies, with a long rolling pin. The mottoes are then stamped on by means of a copper stamp dipped in cochineal dye, and lozenges cut out with a cutter, square, round, or heart-shaped. Sugar is confessedly sweet. But a sugar lozenge, with one of these mottoes on it, is "sweeter than anything on earth." Many a schoolboy, in the flush and fury of his first young love, has laid his heart on one of these lozenges, as on a platter, and sent it to some rosy lass. What could be more effective as a feeler than this: "Your eyes are bright as diamonds"? It contains the whole science of courtship—flattery.—*American Analyst.*

IT is said that two per cent by weight of finely pounded bottle glass, placed at the bottom of the crucible in which red brass is being melted for castings, gives great hardness and at the same time ductility to the metal. Porous castings are said to be almost an impossibility when this is done, and the product is likely to be of great service in parts of machinery subject to strain. An addition of one per cent of oxide of manganese facilitates working in the lathe and elsewhere where great hardness might be an objection.

The Value of Physics to a Mechanic.

If the ordinary, every-day workman, engaged at his bench in the pursuit of his vocation, were aware of the enormous number of natural laws by which his every action is controlled, he would be surprised at their existence and desirous of learning about them. This desire would be natural and most praiseworthy, yet the fear of study seems to prevent those who would like to gain this knowledge from simply reading, as one would a story, the interesting things described in books on physics—facts far more valuable than fiction, and so clearly demonstrated that a mere tyro can understand and experiment from description, thus proving how much can be learned even from a rapid perusal.

Why should a woodworking mechanic study the science? The reasons why he should do so are numerous and important, and in explaining some of them we shall endeavor, as far as possible, to show its practical application and the part it plays in his individual efforts, though, at the same time, it must not be forgotten that all the movements on this earth of ours depend on and are controlled according to the principles of natural philosophy.

Let us consider for a moment its bearing on a man standing at a bench in the act of pushing forward a jack plane. What first of all retains his body on the floor on which he stands? The force of gravitation, which, as described, *retains* the earth particles together, and all bodies animate or inanimate on its surface, by drawing them to its center, this influence being exercised on the building in which he labors, retaining its constituents in their positions. It also acts on his person to such an extent that were he devoid of the power of movement, he would be as immovably fixed as the inanimate wood he stands upon. This force, likewise, keeps his stuff on his bench and the plane on his work, and prevents the flying off at a tangent which would occur with all terrestrial bodies were the attraction to cease for a moment. How simple is the fact when demonstrated!

Avoiding the consideration of the different attractions, we will glance at the mechanical means he goes through in planing. Standing with his two feet together, would it be possible for him to lift a shaving? It would not, because the resisting force generated by the friction of the wedge-shaped iron in entering the woody fibers would be so great that his body, being unable to resist it, would be pushed outside the perpendicular line of gravity, and fall. To overcome this resistance he increases his base, and lowering the center of gravity of the body, leans forward and throws his weight on his left leg, with his right forming, as it were, a brace.

Now he can exert his powers effectually, for having overcome unvarying natural forces by the use of natural laws.

His arms, as he moves them forward or draws them back again, are nothing more than a splendid system of compound levers, and the tool employed is on a cubical prism, with an angular opening into which a wedge of steel is inserted and fastened, with its point projecting below the sole or lower face. This wedge is forced forward by lateral pressure, and entering the wood gives out a shaving or strip equal in proportion to the projection.

How many of us are there who know that the edges of our plane iron and chisels, saw teeth, in fine our principal tools, are modifications of a simple wedge, and fewer still who know its power or how to increase its utility in practice.

To us who handle it daily, the screw, or as it is in reality a revolving wedge, is a mystery and an unknown thing, though we are familiar with its usefulness; yet, while in the act of propelling a screw with a screw-driver, a multitude of forces and machines are employed, which are grand in their simplicity and worthy of study

That which teaches why a plumb bob hangs quiescent at the extremity of a string, and why a level is determined by the centering of an alcoholic bubble in a tube, and other valuable mechanical facts, should not be passed over by him whose philosophy is to devote his life to improving the means by which the comfort and happiness of human nature are gained. Independent even of this essential reason, it is imperative that we make ourselves acquainted with the component parts and properties of materials, in order to train the mind into a line of thought tending to invention and the bringing forth of valuable ideas, which only those familiar with this science can essay.—*Builder and Wood-Worker.*

RAISING LIQUIDS BY COMPRESSED AIR.

In many industries it is necessary to raise liquids stored in casks in the cellar to an upper story of the building. We have recently visited an establishment where this operation is effected by means of compressed air. The compressing of the air is performed without any expense, in this case, by means of city water led into a special reservoir. This system, which was devised by Messrs. Sainte & March, engineers for Mr. Lebeault, proprietor of the Bugeaud medicinal wines, has appeared to us to be of sufficient interest to be made known, as it is capable of being applied to any other liquor of value.

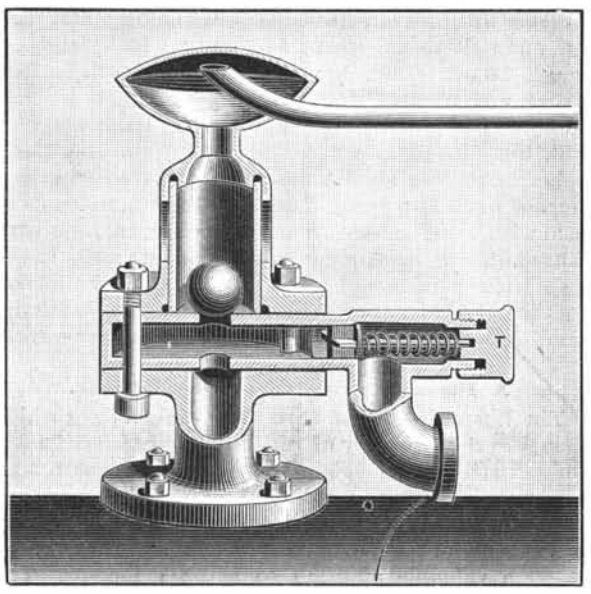


Fig. 2.—BALL VALVE.

In the establishment under consideration, the liquid to be raised is very costly, and, as it would undergo alteration in contact with metals such as iron or copper, all the vessels that are to contain it are lined with tin, and all the pipes and cocks are of the same metal.

As already stated, the agent by means of which air under pressure is obtained is city water, which is made to pass into a reservoir before being used for washing bottles, so that the consumption of water is not increased by this mode of work. Besides, the use of pumps is avoided, the maneuver of which is troublesome and requires time, and which so stirs up the wine as to affect its quality.

In Fig. 1 we give a general view of the arrangement. In the cellar are the tuns, one series, G, of which contains Malaga wine just as emptied from the casks. Each of these tuns is provided beneath with a three-way cock, which puts it in communication with a general conduit

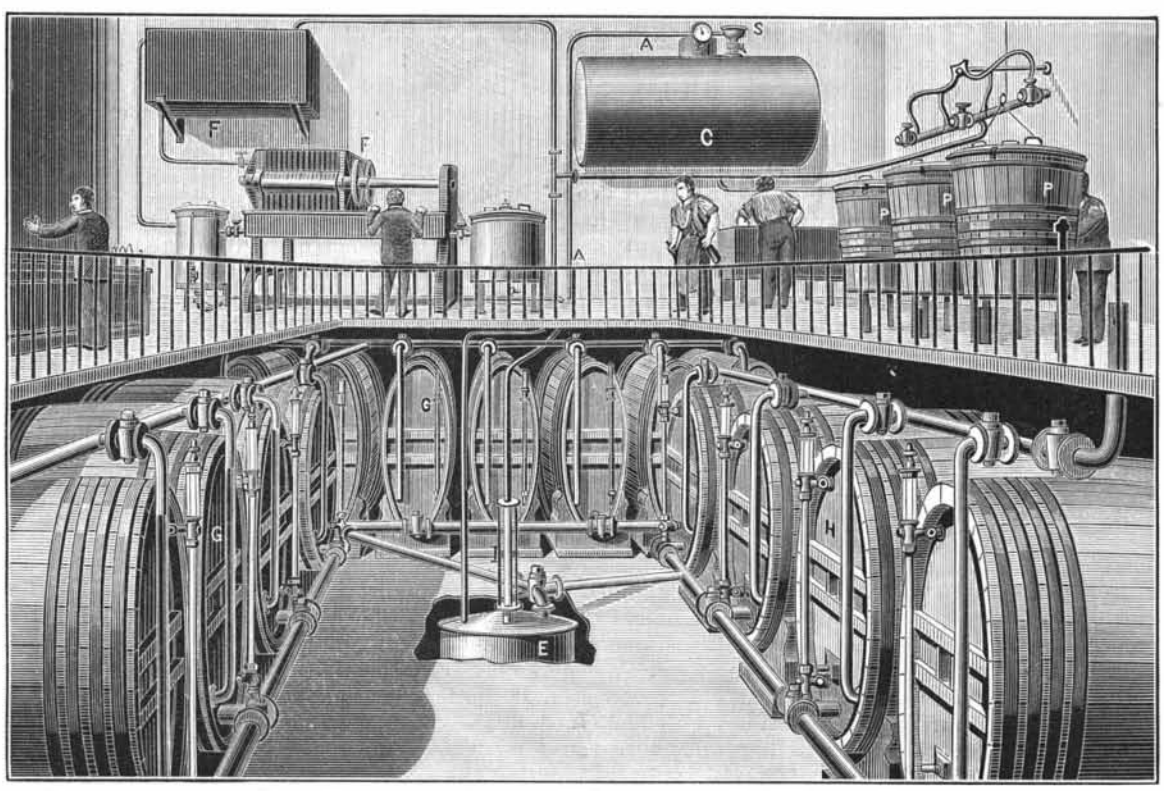


Fig. 1.—RAISING LIQUIDS BY COMPRESSED AIR.

ending in an elevator reservoir, E. Into this latter is led the quantity of wine that it is desired to raise to the mixing apparatus, P. A float, the extremity of whose rod is visible through a glass tube, I, shows the level of the wine in the elevator.

The compressing is effected in a reservoir, C, which communicates through the upper part with the elevator through the intermedium of a conduit, A A I. The water enters at the bottom and expels the air, the pressure of which, shown by a gauge, gradually exerts itself upon the wine in the elevator and causes it to rise to the mixing apparatus. From these latter, the liquid, converted into Bugeaud wine, descends to the tuns, H, of the second series, where it remains for some time. Before delivering it for consumption, it is necessary to make it pass into a filtering apparatus, F, situated on the ground floor. Hither the proper quantity is sent by the same process as before. From this apparatus the wine passes to the bottling machine.

In order to prevent a portion of the water coming from the compressor from entering the air pipe, a float cock is so arranged as to shut off the water when the compressor is full. But, as float cocks are apparatus that cannot be thoroughly depended upon, Messrs. Sainte & March have interposed a safety device, S, at the branching of the air pipe. This device is shown in Fig. 2. It is a ball valve in which the ball is lighter than the water. As soon as the latter enters, the ball is carried along the surface and closes the upper orifice of the valve. The little water that might pass is held back in the small reservoir, R. A spring clack, whose spring has a tension regulated by the nut, T, allows of the escape of the water, as if through a waste pipe, as soon as it exceeds the limit beyond which it ought not to go.—*La Nature.*

To Crystallize Tin Plate.

Crystallized tin plate has a variegated primrose appearance, produced upon the surface of tin plate by applying to it in a heated state some dilute nitro-muriatic acid for a few seconds, then washing it with water, drying, and coating it with lacquer. The figures are more or less diversified, according to the degree of heat and relative dilution of the acid. Place the tin plate, slightly heated, over a tub of water, and rub its surface with a sponge dipped in a liquor composed of 4 parts of aquafortis and two of distilled water, holding 1 part of common salt or salammoniac in solution. When the crystalline spangles seem to be thoroughly brought out, the plate must be immersed in water, washed either with a feather or a little cotton, taking care not to rub off the film of tin that forms the feathering, forthwith dried with a low heat, and coated with a lacquer varnish, otherwise it loses its luster in the air. If the whole surface is not plunged at once in cold water, but is partially cooled by sprinkling water on it, the crystallization will be finely variegated with large and small figures. Similar results will be obtained by blowing cold air through a pipe on the tinned surface while it is just passing from the fused to the solid state.—*Spons' Workshop Receipts.*

Mahogany for House Finishing.

The *Northwestern Lumberman*, which is good authority on the commodity of wood, informs its readers that people whose tastes favor mahogany for inside finish can now indulge them without paying much more money than they would for a finish of the higher priced native hardwoods. To do this, however, the mahogany must be bought as lumber. If a man unacquainted with the price of mahogany bargains with a contractor to finish one or a dozen rooms, as the case may be, in what has sometimes been called the "king of woods," he may depend on it that the price will be a round one. Furniture manufacturers take the same advantages of their customers. They seem to think that because mahogany is not a common wood, because it is very fashionable, and in former days was expensive, consumers will take it for granted that they must pay a good deal of money for mahogany furniture. It is enough to make the initiated smile to walk through a furniture house and price articles made of the different woods. There may be a table or chair of cherry and mahogany standing side by side. The same amount of work has been expended on each, but for the mahogany article at least two prices are asked, when the fact is the wood in it did not cost 25 per cent more than did that in the cherry piece. But simply because it is mahogany a fancy price is wanted. Furniture users will undoubtedly for all time be obliged to pay these exorbitant prices, but there is often no reason why the man who wishes to finish his house in mahogany should not buy the lumber and have his carpenter work it as he would cherry, walnut, or oak.