M. CARPENTIER'S MELOGRAPH.

M. Carpentier describes, in *La Nature*, a small apparatus for reproducing music, which he devised and constructed some years ago, and which was made in the following manner: A small rectangular box was inclosed on all sides; in the interior there were thirty small harmonium reeds in juxtaposition, very delicate, taking up but little space, and fastened in the usual manner. These reeds were inserted in mortises in the sounding-board. At the bottom of each mortise there was a small orifice leading to the outside of the box. On one side of the box was a tube for supplying air from any suitable blower. By means of a crank and cylinder a large band of paper was drawn over the perforated face of the box in a direction perpendicular to the line of the orifices. The paper was pierced with long and short slots, and in its progression the band of paper carried these slots over the mouths of the various pipes, giving escape to the wind through the reeds, when the melophone would play automatically the piece thus inscribed.

After the invention of this apparatus M. Carpentier heard of a similar instrument in America. He now turned his attention to the construction of the perforated bands, which were similar to those used in the Jacquard looms. He combined with the melophonea melograph, intended to record stenographically the pieces played upon an instrument with keys, but employing the characters adapted to the melophone. The melophone was modified and arranged to operate on larger bands suitable to an organ or piano.

This apparatus was exhibited at the International Exposition of Electricity at Paris.

This new instrument is capable of repeating automatically any piece, and not only reproduces the manner of the player, but even any false notes which may be struck. By passing the band through a printing apparatus the piece, instead of being played, is written in ordinary characters. This musical press is not an experiment, but will prove to be of great practical value.

In describing the apparatus the harmonium should be considered as one part, and the melograph as another part. Fifty wires concealed beneath the floor put the two instruments in communication; they are about five meters distant from each other. Fifty of the keys of the harmonium are provided with such devices that their fall throws an electric current into the corresponding wires. These currents, which are controlled by the melograph, operate a series of perforators, which inscribe upon a band of paper the movements of the key which sends it. This band is carried along in the apparatus with a uniform movement. In a second unrolling of the band which has been rewound, fifty small brushes of silver wire placed in the instrument make contact through the holes with a metallic crosspiece, against which they press the paper. When one hole permits the brush to touch the crosspiece a current circulates in one wire of the line, and puts in operation the opening mechanism of the corresponding key, and determines the emission of sound, sustaining the sound as long as the crosspiece remains in contact with the bar.

This general explanation having established the relation which exists between the different parts of the apparatus, M. Carpentier describes separately the principal organs which are represented in Figs. 2 and 3. Above each key there is a spring, *a* (Fig. 2), which is capable of touching a band of silver, *b*, reaching the length of the crosspiece, *c*, which covers the posterior part of the keys. A guide, *d*, attached to the key and moving easily in a hole in the crosspiece, *c*, keeps the spring raised when the key is in a position of repose. When the key is depressed the guide is carried with it, and the spring, *a*, is released and makes contact with the strip, *b*. Two regulating screws allow variations of the current and the tension of the spring. The current sent by the key is directed over a line wire in passing by a commutator, *e*.

The currents transmitted by the harmonium and received in the melograph, produce the movement of the parts through the agency of electro-magnets, *a* (Fig. 3), of special form. The movement of the armature, *b*, is transmitted by the rod, *c*, to the angled levers, *d*. At the extremity of the horizontal arm of each lever is found an embossing point, which rests upon the paper and marks there the trace of the pressure which the musician exercises upon the keys of the harmonium. This point, in marking the paper, pushes it up into one of the mortises in the plate, *f*, under which the band circulates, and it approaches thus to a rotary cutter having two teeth and revolving rapidly. The part of the paper which is thus presented to the action of this tool will be instantly cut, and the markings converted into perforations.

In order to avoid the double danger of piercing the paper imperfectly or of causing the collision of the embossing point with the teeth of the cutter, two bands of paper are superposed; the first is completely cut away, and the cutter enters only into the surface of the second one.

In reading the bands the melograph transmits the currents and the harmonium receives them. The commutator, *e*, may be turned so as to cause the melophone to transmit or receive currents. For each key of the harmonium there is an electro-magnet, *f*, similar to those of the melograph. Below the keyboard there is suspended to each key by flexible bands a small wooden shoe. These shoes are received by grooves in the cylinder, *h*, which turns with a continuous and rapid motion. When the electro-magnets are traversed by a current the armature presses the shoe against the cylinder, *h*, and the friction of the shoe against the cylinder draws down the key and permits the note to sound.

M. Carpentier says that the melograph is constructed with great precision, and that the movement of the parts is regulated to the hundredth part of a millimeter.—*La Nature.*

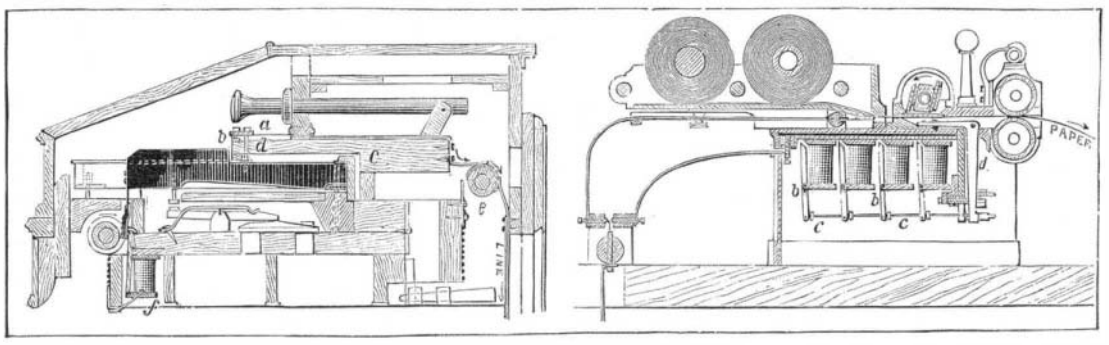


Fig. 2.—DIAGRAM OF HARMONIUM.

Fig. 3.—DIAGRAM OF THE MELOGRAPH.

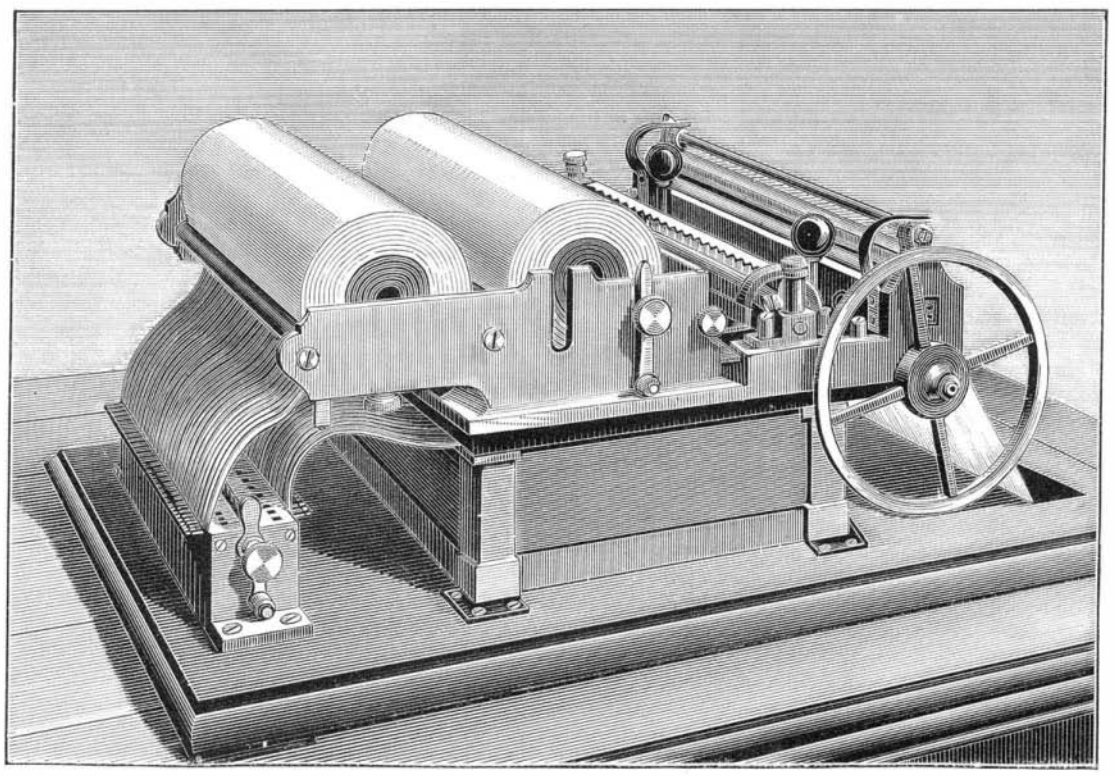


Fig. 1.—M. CARPENTIER'S MELOGRAPH FOR REGISTERING AND REPRODUCING MUSIC.

New Cattle Cars and Momentum Brakes.

A large number of cattle dealers, humanitarians, and railway officers were present, February 27, at a trial exhibition of the Tallman brake, attached to a train of new-style cattle cars. The cars are divided by flexible partitions into stalls, so arranged that the animals are kept apart and can be fed and watered on the road. The brake is so contrived that when the speed of the engine is slackened the drawheads are compressed by the momentum of the train, bringing certain friction pulleys together, causing the brake chain to be wound up and the brakes applied. The company owning these devices claim that by their system cattle can be brought from the West in less than half the time now required, and delivered in a condition for immediate killing, and with much less loss in weight than by the old and less humane method. During the trial trip, the train of ten cattle cars with two passenger coaches, running at a speed of thirty-five miles an hour, on a down grade of twenty-three feet to the mile, was stopped within 1,080 feet.

Proposed College of Electrical Science.

The President of the British Society of Telegraphic Engineers proposes the establishment of an institution for the instruction of electrical engineers.

The rapid advances in the application of electricity to the uses of daily life make, it is urged, a clear demand for a larger number of men skilled in the management of electricity than the existing schools can supply. This may be true in England, and to some degree in this country, though the subject is by no means neglected in our technical schools. At the Stevens Institute, in Hoboken, the course in practical electricity and electrical engineering is full and thorough.

Increasing Need of Brain-work in the Arts.

At a recent gathering of the spinners and weavers of a large Paisley firm, one of the proprietors gave his men an account of his recent visit to this country. Speaking of the race for industrial supremacy between the English speaking peoples of the Old and the New World, and the increasingly important part played by technical knowledge and inventive power in the great competition, he said: "The time was when physical exertion alone could win the battle; but in these days of scientific research brain power is the element of success. A workman now requires to employ his head quite as much as his hands, and with every new invention physical labor will be lessened, but head labor will be increased. You cannot read too much, you cannot study too much, and you cannot tax your powers of thought too much. Specially would I say to young men: Never consider that your present machinery is perfect; look at it rather as crude compared to what it might be."

Some Electrical Properties of Indium.

The metal indium has always been a more attractive object for the physicist than for the metallurgist. If it were not for the two brilliant lines in its spectrum, blue and violet respectively, that helped Messrs. Reich and Richter to its discovery, some eighteen years ago, and which are still one of the favorite sights for the audience of a lecture on spectrum analysis, the general public might hardly know anything of its existence. *Engineering* says: It is so scarce, that even its prominent qualities could hardly secure it a future. The royal mines at Freiberg having come into possession of a somewhat larger quantity of indium than usual, they placed some at the disposal of Mr. Th. Erhard to enable him to make some experiments with a view of ascertaining the electric position of this metal, but great difficulty was caused by the metal being so very soft. To ascertain the conductive resistance in the wire drawn from it, Mr. Erhard rolled it up in a coil, but he found, however, after unrolling and remeasuring at the termination of his researches that the wire had extended its length by 5 mm. (one fifth of an inch), the original length being a little less than six feet. The formula quoted by Mr. Erhard—resistance equal to 0 08903 (1+0·004744 t.)—is based upon Dr. Werner Siemens' unit of resistance (the resistance of a prism of mercury of 1 m. in length, and 1 square mm. area, reduced to 0 deg. Cent.). It shows that indium offers a resistance about eleven times less than that of mercury, and increasing pretty regularly with a rise of temperature. The figures obtained from the observations at different temperatures and those derived from this formula agreed very well with one another. To find the thermo-electric force of indium, Mr. Erhard constructed batteries of pieces of indium on one side and iron, aluminum, tin, copper, gold, silver, and zinc on the other side, soldered together in the usual fashion. Pretty fair currents were obtained with iron and aluminum; with copper the electromotive force appeared to be weak, more so with gold and silver, and with zinc the currents were no longer measurable, though no doubt present. The temperatures applied by Mr. Erhard were 0°. Cent. on one side and 36°, 77°, and 98° Cent. on the other. From his results Mr. Erhard proposes to place indium between tin and zinc, the thermometric series being aluminum, tin, indium, zinc, silver, gold, copper, iron, etc. For small differences of temperature, however, the series undergoes some modification. Mr. Erhard's further experiments with regard to the action of indium when in connection with liquid conductors were not satisfactory.

New Hair Dye.

A one per cent solution of nitrate of silver gives to human hair a dull reddish brown, which is particularly unnatural and disagreeable in a strong light; but this defect, which is

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 soft soap 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.

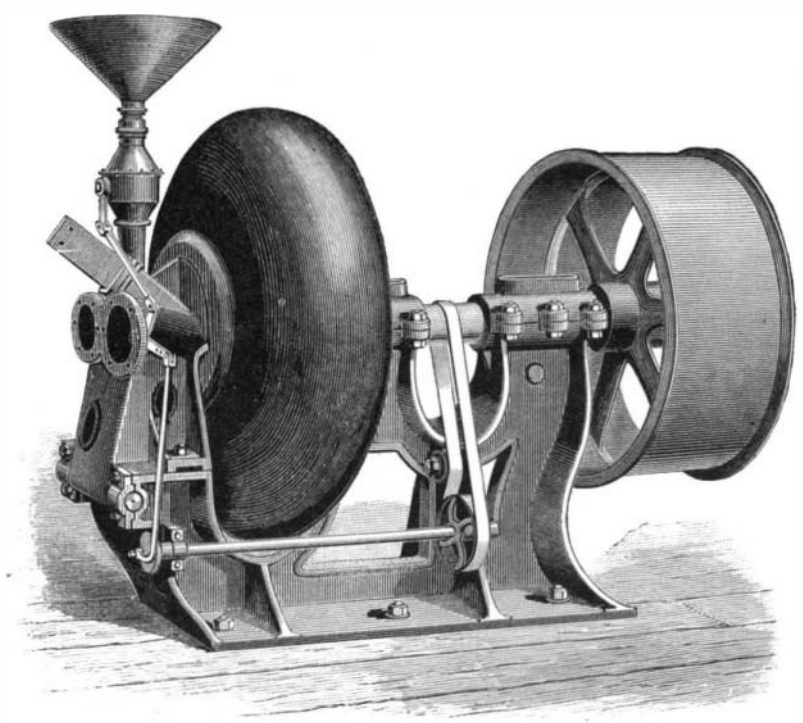
DUC'S PATENT MECHANICAL ATOMIZER.

[*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

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