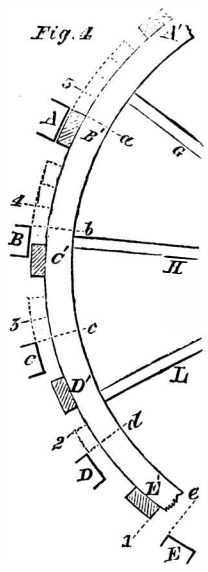
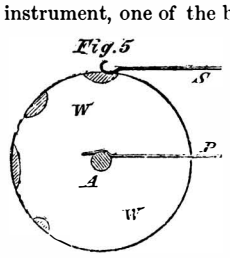
ELECTRICITY AND SOME OF ITS PRACTICAL APPLICATIONS.

ARTICLE IV.

The electro-magnetic rotary engine is constructed in an entirely different manner. It consists of a wheel, on the circumference of which are bolted two or more armatures. Outside of this, and placed in the direction of a radius, is an electro-magnet, which is so arranged that, by means of a contact breaker, it shall attract the armature nearest it until it comes directly opposite, when the current ceases to flow; the whole revolves by the momentum it has acquired until another armature approaches the magnet, when the current again commences to flow, and the second armature is attracted; and this alternate attraction and cessation of attraction produces a rapid rotary motion. As the armatures must necessarily be at some distance from each other, it is evident that if any sudden resistance should occur while the magnet was at a distance from any of the armatures, the machine must necessarily stop. To avoid this difficulty, it was proposed to employ a number of magnets, which should operate successively one after the other, and thus bring a continuous power to bear upon the wheel. The cut Fig. 4 represents a sectional fragment of such a device. A B C D E are electro-magnets, and A′ B′ C′ D′ E′ the armatures which they are to successively attract, bolted firmly upon the circumference of the wheel, G H L. The magnet, E, is fixed at a certain distance from E′, which distance should be that through which it operates to the best advantage. D is at a distance twice as great from its armature, and C three times as far from C′; and so on. Now, suppose E to become magnetic; it will attract E′ until it reaches *e*; the current is now to be transferred to D, which will attract D′, from 2 to *d*; meanwhile, the wheel will have revolved sufficiently to bring C′ to 3, when the current being transferred to *c*, it will be moved from 3 to *c*. This operation being kept up, A′ will finally reach the point, *a*, and, if the parts are properly proportioned and adjusted, D′, will have reached the point, 1, while E′ will have passed sufficiently far beyond E to be out of the reach of its attraction. The current being now passed through E, and then successively through the entire series, again the revolution will be kept up, and will proceed with rapidity.



It will be seen that, in the above engine, although a number of electro-magnets are used, yet a current having power sufficient for only one will suffice for the whole. By increasing the number of magnets, the distance through which they attract their armatures may be diminished, and power gained thereby. For breaking the contact of the conducting wire, *i. e.*, for interrupting the current, a device called the "contact breaker is employed. There are several forms of this instrument, one of the best of which is represented in the cut. W W is a thick disk of metal, which is usually attached to the main shaft of the machine which it is to regulate. Upon the shaft of the disk a spring, P, presses; this spring is connected with one electrode of the battery, and another spring, S, presses upon the circumference of the disk, and is connected with the other pole of the battery. If these springs remain in contact with the disk, which is a good conductor, the current will pass without interruption, whether the disk rotates or remains stationary; but whenever a stoppage of the current is desired, a portion of the disk can be removed by filing or otherwise, and the cavity filled with a non-conductor, as ivory. In the cut, the dark portions represent the non-conducting portion of the disk. It will be seen that these portions can be extended at pleasure.



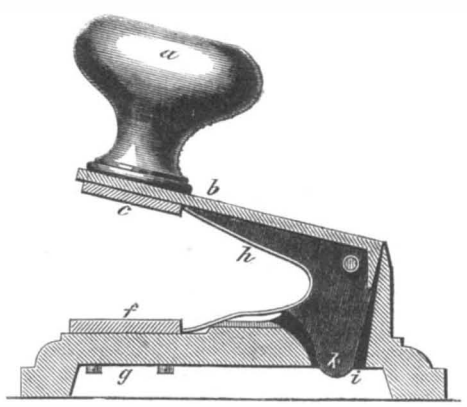
There is an application of electro-magnetism which, although it does not come directly under the head of magnetic motors, yet is a case of motion produced by electro-magnetism. In many machines, there are parts remote from the point at which the power is applied, which require eccentric motions, and these motions must be given through the agency of an endless succession of screws, cams, rackwork and other contrivances, the construction of which often displays much ingenuity, but, at the same time, such contrivances involve a great expenditure in their construction, and much power is consumed by the friction which they occasion. Many such motions—we do not say all—might be given by means of electro-magnets properly arranged. When a rotary motion is desired, an arrangement similar to a small magnetic engine may be made use of. The frequency of such motions can be easily controlled by means of the contact breaker.

There are often situations where a motion either reciprocating or rotary is required, and where, at the same time, it is difficult to give such motions by mechanical means—sometimes on account of the inaccessibility of the part to be moved, and in some cases because of the great friction or liability to corrosion or breakage of the part by which such motions are transmitted. The opening and shutting of ventilators, flue valves, and other appliances used in connection with the warming of large halls and other public buildings, is often attended with difficulty, for the reason given above; but such motions could easily be effected by means of the various devices previously described. We might go on multiplying such instances, but any one who will turn his attention to the subject will find no lack of opportunity for making applications of this kind.

In estimating the expense of working any such arrangement which is to be in use only for a short time, it should be borne in mind that there is no consumption of zinc and acid in the battery except while it is in operation; and if it is only used for short periods, the cost will be trifling.

TEISSERE'S BLANK STAMPING PRESS.

This invention of Mr. A. Teissere, of No. 29 Boulevard St. Martin, Paris, consists of an improved dry stamping press, which may be substituted for presses hitherto in use for that purpose, and also presents the advantage of being easily handled, very simple, and may be produced at a cheaper rate. This press is formed of two parts; of an upper movable piece turning on an axis carrying the impressed letters, figures, or ornament to be stamped, and of a lower piece carrying the letters or corresponding figures or ornament in relief.



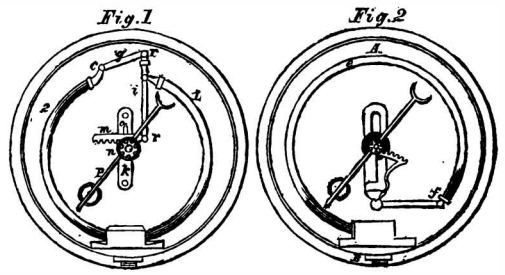
The engraving represents a central vertical section of a press; *a*, wooden knob to receive a firm pressure to press the upper part, *e*, on the part, *f*; *b*, upper part turning on an axis, *d*, which carries the plate, *e*, on which are the sunken letters; *c*, lower fixed part carrying the plate, *f*, on which are formed the letters in relief; *d*, holes formed in the fixed and movable parts to receive the axis on which the upper part, *b*, moves; *e*, plate with the sunken letters fixed to the piece, *b*, with the aid of a screw; this plate can be removed at will; *f*, plate with the letters in relief fixed to the piece, *c*, with the aid of screws, *g g*, which can be removed at will; *g g*, screws intended to fix the plate *f* to piece, *c*; *h*, spring intended to support the movable part, *b*, at a certain hight above the fixed part while the press is not in use; *i*, hollow made in the lower part intended for the passage of the projection, *k*, at bottom of upper part, *b k*, projection for preventing the upper part, *b*, rising too high.

The parts being thus arranged the press works as follows:—Between the two plates *e* and *f* is placed the sheet of paper to be stamped, and the operator gives with the hand a sudden pressure on the knob, *a*, thi sudden pressure causes the movable part, *e*, to approach with force against the fixed part, *f*, and in this way the paper pressed between the two plates receives the impress. So soon as the pressure of the hand ceases to act on the button or knob, *a*, the upper part, *b*, rises by the action of spring, *h*, and thus the sheet of paper is easily removed, bearing the impression. This press was patented February 20, 1860.

NEWTON'S IMPROVEMENT IN PRESSURE GAGES

[From the London Engineer.]

This is an invention that relates to certain improvements in the construction of the Bourdon pressure gage, the object being to remedy certain defects which have detracted from its merit under certain circumstances. Thus, for example, water accumulated in the tube has, on exposure to a low temperature, frozen and burst the gage; again, when applied to locomotive engines, they receive a tremulous motion, and give uncertain indications through the tremulous movement of the index hand.



In Fig. 2 of the accompanying engravings is represented a gage of this description of the usual construction, the bent tube, A, being attached at one extremity to the pipe, B, through which the pressure within the boiler is transmitted to the interior of the tube. When thus constructed, if the bent tube exceeds a semicircle in length, a portion of the tube (as from *e* to *f*, Fig. 2,) hangs down below the point, *e*, so as to form a receptacle in which water soon accumulates from the condensation of vapor within it. The water thus collected is liable to freeze in winter, by which the indicating tube is often burst or strained. To remedy this difficulty it is necessary so to combine the bent tube with the pipe that any water that may condense within the tube shall drain back into the pipe; but it is manifest that a tube attached to its pipe, as represented in Fig. 2, will not thus drain itself in any position in which it can be placed. To accomplish this end is the object of the first part of this invention, which consists in so combining the indicating tube with the pipe through which the pressure within the boiler is transmitted to the gage, that the length of tube in any direction from its junction with the pipe shall not exceed a semicircle, and in placing the tube in such a position that it shall descend at every point towards its junction with and drain back into the pipe. When used upon locomotives, the gage represented in Fig. 2 is liable to another serious objection, arising from the violent shocks and jarring to which the engine is subjected as it passes over the road. These shocks are of a two-fold character, first, those which are occasioned by obstacles encountered by the tread of the wheels (as the joints of rails, &c.), and which occur in directions nearly vertical; second, those which are occasioned by the swaying of the engine from side to side, and by the striking of the flanges or fillets of the wheels against the sides of the rails, and which occur in horizontal directions. The first class of these disturbances communicate to the bent tube, when arranged as in Fig. 2, a tremulous motion in a vertical direction, while the horizontal shocks to which the engine is exposed cause the tube to vibrate in directions nearly horizontal. These vibrations of the indicating tube impart a frivolous vibratory motion to the index hand through a considerable arc, which renders it difficult, if not impossible, accurately to judge of the pressure within the boiler; they also speedily wear away the teeth of the rack and pinion by friction, the one upon the other. This vibration of the index hand is considerably augmented by the water of condensation which is allowed to col-