tended to furnish for newspaper offices, and business purposes in general, an addressing machine of exceedingly simple construction.

SATURATOR AND REGULATOR OF MEKARSKI'S COMPRESSED AIR MOTOR.

Many attempts have been made at locomotion by compressed air; but serious difficulties are encountered. Air absorbs heat or "produces cold," just in proportion as it produces work by its being used in a compressed state through a motor. This absorption of heat has many inconveniences. From a dynamic point of view, there is a considerable difference between the foot-pounds of work which the same amount of compressed air can furnish, according as the work is got out at a constant temperature or without addition of heat. From a physical point of view, the cooling causes the freezing of the water contained in the air, and of the oils and greases employed in the machine, and forms of the two a sort of mastic which prevents proper operation of the working parts.

All the means hitherto employed to combat these inconveniences have been so inefficacious that inventors had almost given up the idea, and, in consequence, the duty obtainable from compressed air machines remained very low. In the Mékarski system, which is illustrated in Figs. 1 and 2, these inconveniences are avoided by admitting to the driving cylinders air saturated with steam at a high temperature. This mixture is obtained by causing the air to pass, in the form of fine bubbles, through a column of hot water, inclosed in a receptacle at a temperature of about 150° to 160° C. at the commencement, and of which the volume is so calculated with respect to that of the air that the proportions of the mixture rest constant during the period of work. The proportion of vapor varies between $\frac{1}{6}$ and $\frac{1}{8}$. These conditions are easily realized; as, during the period of expenditure, the pressure of the air in the reservoir diminishes, as does also the temperature of the water; and, in consequence, the tension of its vapor diminishes in the saturating apparatus.

Fig. 1 shows part of this apparatus as applied to the platform of a locomotive driven by compressed air. It is without firebox, and is filled with hot water while the air reservoirs are being charged. After its force is spent the temperature is brought up again by an injection of steam. Coming from this reservoir, the gaseous mixture passes through the regulator, shown in Fig. 2. There is an orifice controlled by a conical valve, so arranged that it closes by the pressure of air in the reheater, and opens only when there is an opposite pressure put against it. This pressure can be produced by a flywheel connected with the piston of a small hydraulic press with air spring. The pressure is transmitted to the conical valve by a rubber diaphragm separating the two parts of the apparatus. The amount of flow being once determined, equilibrium will establish itself, when the pressures are the same above and below the diaphragm. Now the pressure above is that of the air spring of the hydraulic press;

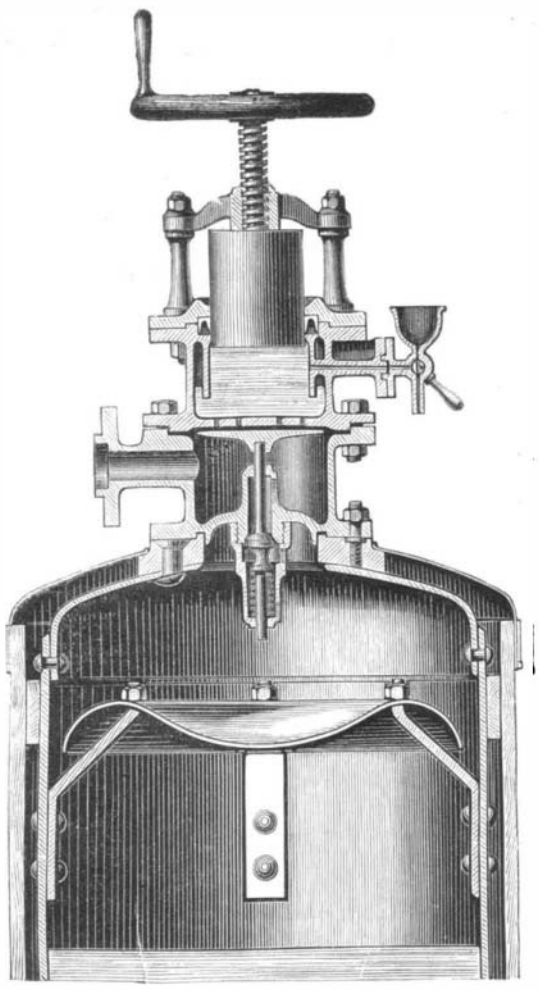
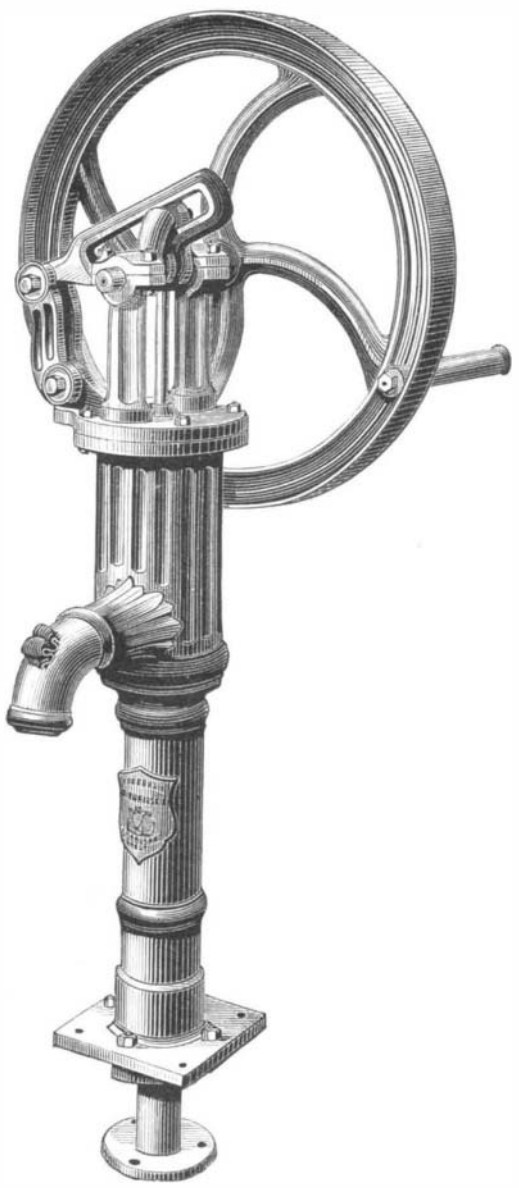


Fig. 1. SATURATOR, MEKARSKI COMPRESSED AIR LOCOMOTIVE.

and that below is that of the supply of the gaseous mixture. This last will thus remain automatically constant as long as the air spring is kept at the same tension; and is thus varied at the will of the driver, who can compress the air spring more or less by means of the flywheel.

ROTARY LIFT PUMP.

Messrs. Henry Bamford & Sons, Uttoxeter, England, have introduced to public notice a new and improved rotary lift and force pump, for which they claim several features of importance. The engraving shows the general outline of the pump, which is strongly made and compact in all its parts.



ROTARY LIFT PUMP.

The makers state that it has a very powerful and smooth action, much more so than in any of the ordinary rotary pumps. Its specialty consists in a slow upward stroke and quick downward movement, thus equalizing the work. It has double bearings, and is adapted both for hand and steam power, to be used either for shallow or deep wells, or as a force pump. The position of the pump head is reversible, so that it may be worked on any side by hand or steam power to a depth of 25 feet. The head is arranged to form an air chamber. It is fitted with heavy flywheel, wrought iron crank and turned rod, brass stuffing box, draw-off tap, and retaining valve, screwed for iron tube. The barrels vary in diameter from 3 to 4 inches, and can be had with or without copper linings.

The Electric Light in London.

The first experiment of public lighting in London by means of electricity, commenced a shorttime ago at Billingsgate Market, has now received a very important extension on the Thames Embankment and the Holborn Viaduct. Between Westminster and Waterloo Bridges twenty Jablochkoff candles illuminate the Embankment and the river with a novel brilliancy, and turn the gas lamps—which perforce are kept burning—very yellow with their pure white brilliancy. On the west side of Charing Cross Railway Bridge, upon the Embankment, and about 50 yards from the river wall, a wooden shed has been erected containing the motive power and the machine. The former is supplied with one of Messrs. Ransomes, Sims & Head's semi-portable engines of 20 horse power nominal. This engine, which is an excellent example of workmanship, has two 10 inch cylinders of 13 inches stroke, and has 360 feet of heating surface. This engine is provided with a very sensitive automatic governor, and having a large margin of power beyond what is required for driving the machines now installed, is extremely well adapted for its purpose. It will, in fact, indicate from 60 to 70 horse power. At present it is worked with a steam pressure of 62 lbs., and at a speed of 140 revolutions. From the pulley on the engine a belt transmits power to an intermediate shaft mounted on a timber framing, and carrying, besides the pulley for the engine belt, two others, from one of which the Gramme continuous current machine is driven, and from the other the Gramme dividing machine. The speed at which the first machine is driven is 650 revolutions, while the dividing machine has a velocity of 700 revolutions. The current from this machine is divided into four circuits of five lights each, and the length of circuit is the greatest yet successfully reached, the furthest light being about 700 yards from the source of power, and the total distance between the extreme lights is 1,170 yards. The lamps are distributed so that there are ten between Westminster and Charing Cross Bridges, one under this bridge, and nine from this point to Waterloo. The lamps in the latter series are placed somewhat more closely together than those on the western side of Charing Cross Bridge.

Circuit No. 1 supplies the four lamps which extend from Waterloo Bridge to the Cleopatra Needle, and one on the west side of it. Circuit No. 2 provides for the remaining three lamps, east of Charing Cross Bridge, one under that bridge, and one on the west side of it. The other ten are connected with circuits 3 and 4. The wires from the machine are led underneath the road through a drain pipe into the Embankment subway. This pipe is 4 inches in diameter, and contains all the eight wires forming the four circuits. On reaching the subway the wires are taken right and left, and are attached to boards fastened to the side of the subway. Where each lamp occurs the wires are led up through the tubing let into the granite pedestal and so to the lamp. Each globe contains four candles, so as to secure a light for six hours. Circumstances rendered it necessary to place the commutator at the top of the lamp instead of near the base, a very awkward arrangement, since the attendant has now to mount a ladder to shunt the current, instead of doing so from the ground. The average distance apart of the light is 45 yards, but the spacing is irregular, the maximum distance being 120 yards between the lamp under Charing Cross Bridge and the adjacent one to it on the western side. The corresponding lamp on the eastern side is 115 yards away.

The Holborn Viaduct is illuminated by sixteen Jablochkoff candles, and are supplied from similar Gramme machines driven by a 20 horse power engine furnished by Messrs. Robey & Co. The machinery is placed in a wooden shed erected near the bridge. The wires are laid in pipes from the shed to the subway, and thence conducted to the lights. The commutators are here fixed near the ground level, a much more convenient arrangement.

The general effect produced by these lights both at the Viaduct and on the Embankment is, of course, extremely pleasing, and the contrast to the gas lamp very great. At the former place the conditions approximate to those on the Avenue de l'Opéra, in Paris, a wide street being illuminated by lamps on each side, while a good deal of reflected light is thrown from the adjacent houses. On the Embankment, however, the case is different. Here we have a single line of lamps with a great void of darkness on either side, on the one hand the river and on the other the width of the Embankment. Much of the available light is, therefore, lost, and all that radiated from the upper portion of the globes is distributed skywards, as is visible by the glow with which the air is filled for a considerable height above the ground, and more clearly by the bright illumination of the underside of the bridge. Probably when some alteration in this respect has been made, a considerable improvement will be obtained. Meantime the result can hardly be considered as highly satisfactory, more especially as an irregularity or pulsation in the light given, is too often noticeable. Possibly this defect may be overcome shortly, since at present the installation has scarcely passed out of the experimental stage. That

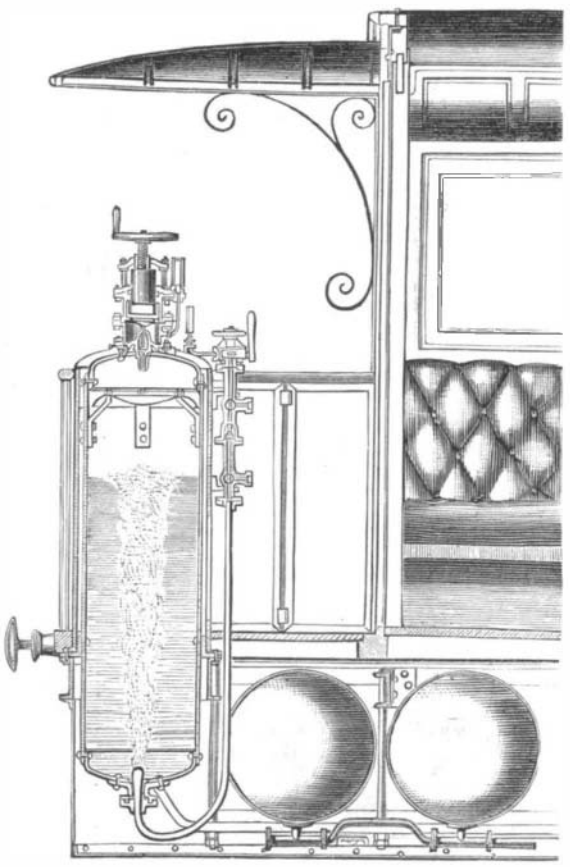


Fig. 2.—REGULATOR, MEKARSKI COMPRESSED AIR LOCOMOTIVE.

it must be overcome is certain before the light can be regarded as a success, and that this is possible appears evident from the good results obtained in many places.

When this has been satisfactorily adjusted, there will remain the important question of cost, and this question, which