BAIN'S PRINTING TELEGRAPH.

CHAPTER XVII.

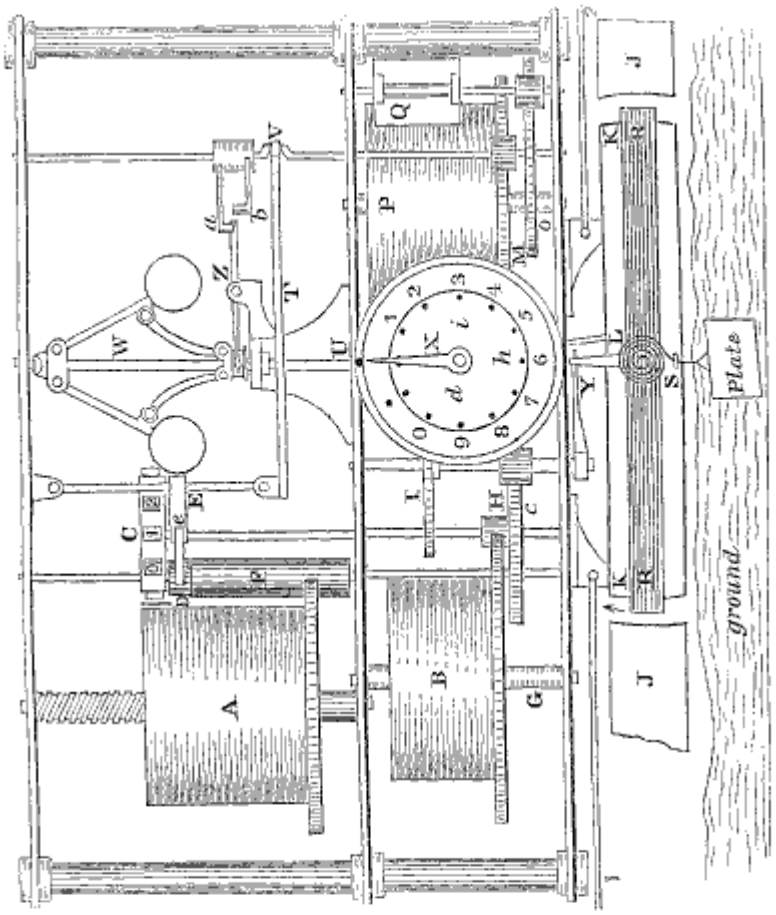
DESCRIPTION OF THE PRINTING TELEGRAPH APPARATUS.

On an examination of English authorities for the preparation of this work, I have been very often surprised to find the many ingenious contrivances invented by Mr. Alexander Bain. He was not a commercial man, but his inventive powers were most wonderful. He has given to the world some invaluable inventions in various departments of the sciences and arts.

As early as 1840, Mr. Bain was active in the production of a printing telegraph, of which full accounts are to be found in the various publications. I present the following as a description of his printing apparatus:

The figure overleaf exhibits the arrangements of Mr. Bain's telegraph. Imagine two figures the same, one representing the Portsmouth, and the other the London station. The same letters will refer to either instrument: *d*, *i* and *h* represent the signal dials, insulated from the machine. x is a hand or pointer. The small dots represent twelve holes in the dial, corresponding with the twelve signals, and two blanks, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0. u is a similar hole over the starting point of the hand, x. R is a coil of wire, freely suspended on centres. K K is a compound permanent magnet placed within the coil, and immovably fixed upon the frame of the machine. J and J are sections of similar permanent magnets. S is a spiral spring (and there is another on the opposite side) which conveys the electric current to the wire coil, and at the same time leaves the coil free to move in obedience to the magnetic influence. So long as the electricity is passing, the wire coil continues to be deflected, but the instant the electric current is broken, the springs, S, bring back the coil to its *natural position*. L is an arm fixed to and carried by the wire coil, R and R, to stop the rotation of the machinery. B is a main spring barrel, acting on the train of wheels, G, H and I, which communicate motion to the governor, W, and the hand, X.

On the arbor of the wheel, H, is fixed a type wheel, *c*, at a little distance from the paper cylinder, A, on which the messages are to be imprinted. P is a second main spring barrel, with its train of wheels, M, *o*. Q is a fly, or vane. On the arbor of the wheel, *o*, there is a crank, V, and the two pallets, *a* and *b*, which prevent the train of wheels from rotating, by



coming in contact with the lever, z. When the telegraph is not at work, a current of electricity is constantly passing from the Portsmouth plate, buried in the ground, through the moisture of the earth, to the plate in the ground at the London station. From the copper plate of that station the electric current passes up through the freely suspended multipying coils, R and R (which it deflects to the horizontal position),

into the machinery, and thence to the dial, by means of a metal pin inserted in the hole, U; from the dial it passes by a single insulated conducting wire, I, suspended in the air, back to the first machine; traversing which, it passes through the freely suspended multiplied coil, R and R, which it deflects, also, to the horizontal position to the plate from which it started, and thus completes the circuit.

When a communication is to be transmitted from either end of the line (one station only being able to transmit at a time), the operator draws out the metal pin from the hole, U, in the dial of his machine; the electric circuit is then broken, and the ends of the multiplying coils, R and R, at both stations, are carried upward, in the direction of the arrow, by the force of the spiral springs. The arms, L, attached to the two coils, moving to the right, release the lever, Y, which leaves the machinery free to rotate, and as the moving and regulating powers are the same at both places, the machines go accurately together; that is, the hands of both machines pass over similar signals at the same *instant* of time, and similar types are continually brought opposite to the printing cylinders at the same moment. An inspection of the wheel-work will show that this movement will have caused the governor, W, to make several revolutions, and the divergence of the balls, in obedience to centrifugal force, will have raised one end of the lever, Z, and depressed the other, which allows the pallet, *a*, to escape; but the rotation of the arbor is still opposed by contact with the second pallet, *b*. The operator having inserted the metal pin in the hole, under the signal which he wishes to communicate, the moment the hand of the dial comes in contact with it, the circuit is again completed, and both machines are stopped instantly. The governor balls, collapsing, depress the left hand end of the lever, Z, clear the pallet, *b*, and this allows the crank spindle, V, to make one revolution.

The motion of the crank by means of the crank rod, T, acting on the lever, E, presses the type against the paper cylinder, A, and leaves an impress upon the paper; at the same time, a spring, *e*, attached to an arm of the lever, E, takes into a tooth of the small ratchet wheel, D, on the spindle of the long pinion, F, which takes into and drives the cylinder wheel; so that the crank apparatus, going back to its former position, after impressing a letter, moves the signal cylinder forward, and presents a fresh surface to the action of the next type. As the cylinder moves round, it has also a spiral motion upward, which causes the message to be printed in a continuous spiral line until the cylinder is filled. In order to mark, in a distinct

and legible manner, the letters printed by the apparatus, two thicknesses of riband, saturated with printing ink and dyed, are supported by two rollers so as to interpose between the type wheel and the cylinder (the rollers are not shown in the figure, to prevent confusion). If a second copy of the message, thus simultaneously printed at two distinct places, is desired at either, a slip of white paper is placed between the ribands to receive the imprint at the same time as the cylinder.

Fig. 2.

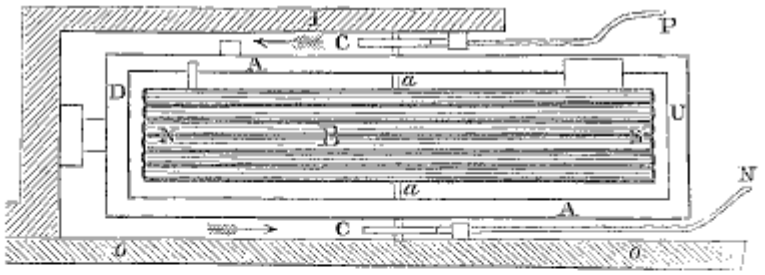


Figure 2 represents a top view of the coil and magnets of Mr. Bain's machine. B is the compound permanent magnet, with six bars. N is the north pole, and S the south pole. A A are the sides of the brass frame containing the coils; C C are the spiral springs on each side: *a a* is the axis of the coil: *o o* is a part of the frame containing the clock-work (not shown in this figure), supporting one centre of the coil, and I I, a support for the other centre. N and P are the wires, one of which is in connection with the ground, and the other with the extended wire. When the circuit is closed, and the current from P pole of the battery is in the direction of the arrow above, and then through the coil to the other pole, N, in the direction of the arrow below, the end, D, of the coil will be depressed, and the end, U, will rise; reverse the current and the effect is the elevation of the end, D, of the coil, and the depression of the end, U.