

The Zerograph.

The zerograph is a direct printing telegraph machine, having keys operated like an ordinary typewriter. It is claimed that the faults inseparable from those instruments operated by the step by step system are avoided, and that, instead of short distances, very long distances—at least up to 500 miles—can be worked over with ease at very rapid rates. The zerograph is entirely automatic in its mechanism and synchronism, and it requires no attendance when messages are received. Messages are given in duplicate; that is to say, the message is printed at each respective apparatus, each acting in turn as transmitter and receiver. It has no type wheel and no clockwork, as hitherto chiefly employed, nor does it work by a series of intermittent currents, set apart for each letter or character to be recorded. One improvement is in the construction of a mechanism with an electro-magnetic arrangement, employed to produce a motion, and necessitating only two intermittent currents or impulses for each letter or character to be recorded. The first current starts the synchronous motion and the second current arrests the same at the proper letter. All other necessary mechanical actions are brought about through a system of electro-magnets and by a local source of electricity. A second improvement is in the construction of the electro-magnetic, and also in the mechanical arrangements employed to produce the motion necessary for printing in columns, and the automatic control of the same.

In each apparatus a series of finger keys are employed as in a typewriter, with which keys are connected spring pins, arranged in the arc of a circle. The center of this circle is the axis of an arm, which is termed the synchronizing arm, and which is adapted to be swung by an adjustable weight above the spring pins until arrested by any one pin moved into its path by a finger key. The spindle on which the synchronizing arm is mounted carries a governor or loose weight actuated in one direction only by a pawl connected to the spindle, which weight determines the speed of the arm. The spindle also carries a series of spring types arranged in the arc of a circle and corresponding with the finger keys, a plunger being employed to move each type when in position against a roll of paper upon a carriage; a suitable inking device, such as an ink ribbon, being employed for gaining a face impression. The synchronizing arm also carries two projections adapted to be moved by the armature of the synchronizing magnet, one of which is designed to be projected between the spring pins, while the other is engaged by a hook on the armature of an electro-magnet, so as to hold the arms in its initial or zero position. This magnet, which is termed the starting magnet, is energized by the first electric impulse or current produced by the closing of a local electric circuit when a finger key is depressed; the armature in its movement also closes the line circuit connected with the synchronizing magnet at a distant or receiving apparatus, which magnet attracts its armature and withdraws the projection on the synchronizing arm engaged with the hook of its starting magnet. Both synchronizing arms are thus released simultaneously, and, being similarly constructed and adjusted, move at the same speed. The synchronizing arm of the transmitting apparatus then makes contact with the projecting spring pin, operated by the finger key, thus closing

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another local circuit and energizing an electro-magnet, which is termed the second contact magnet, the armature of which in its movement again closes the line circuit through a contact screw, and produces the second electric impulse or current. This current again energizes the synchronizing magnet of the distant or receiving apparatus, the armature of which moves the other projection so as to stop the synchronizing arm against the spring pin corresponding with that operated by the finger key in the transmitting apparatus, and thus closes a local circuit as in the transmitting apparatus. These local circuits in both apparatus then operate each simultaneously an electro-magnet, which is termed the printing magnet, and which operates the plunger and causes the type to print, to feed the carriage along, carry the paper roll, and close another local circuit, on which circuit is an electro-magnet which is termed the zero magnet, and which is energized to return the synchronizing arm to the zero position. To feed the paper on its roller so as to start a fresh line or column, another electro-magnet is provided, which is termed the column magnet, which is energized by allowing the synchronizing arm to travel farther than the row of spring pins extend, where it is stopped by a fixed pin (which is in the same local circuit as the spring pins), and also causes a contact to close the circuit containing this magnet.

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