G. L. ANDERS.

PERFORATORS FOR AUTOMATIC TELEGRAPHY.

No. 181,239. Patented Aug. 22, 1876.

Fig. 1.

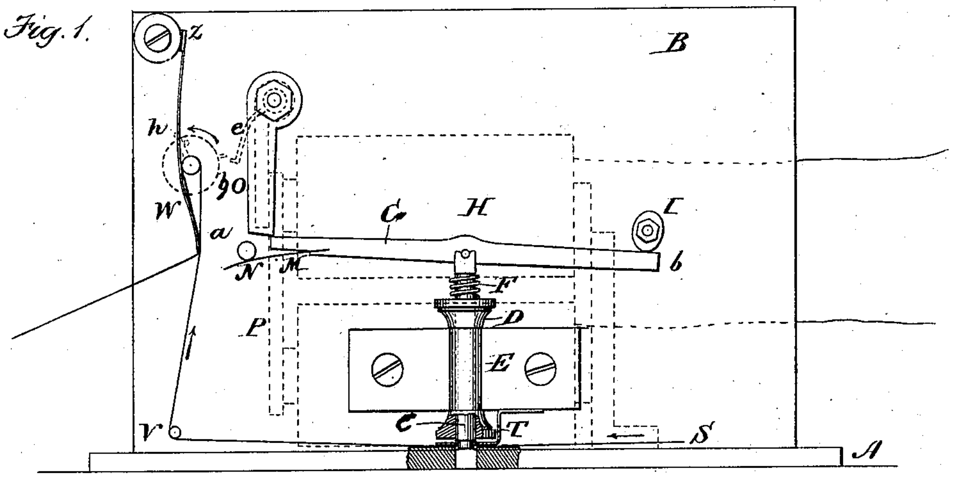


Fig. 2.

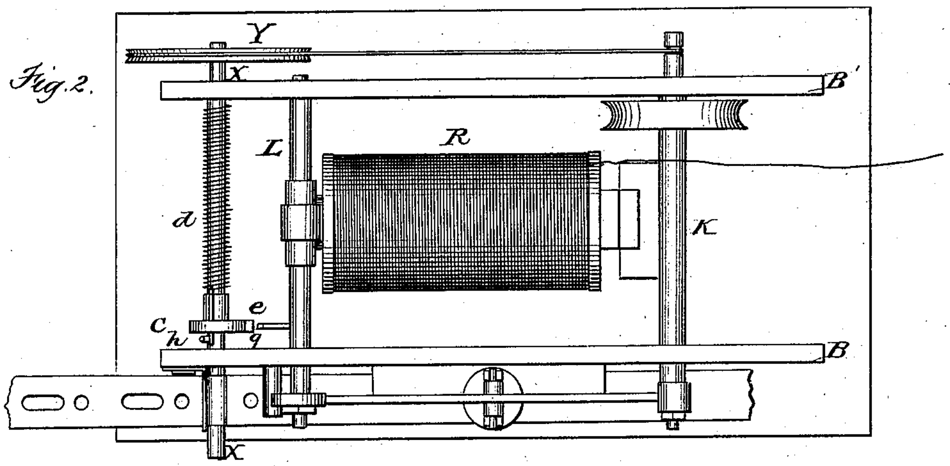
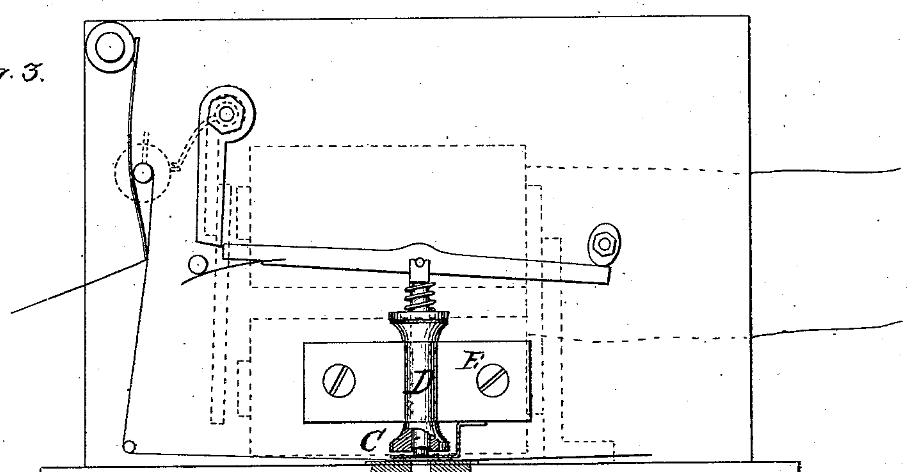


Fig. 3.



Witnesses.
Alex L. Hayes,
[illegible]

Inventor.
George Lee Anders

UNITED STATES PATENT OFFICE.

GEORGE L. ANDERS, OF BOSTON, ASSIGNOR TO E. BAKER WELCH, OF CAMBRIDGE, MASSACHUSETTS.

IMPROVEMENT IN PERFORATORS FOR AUTOMATIC TELEGRAPHY.

Specification forming part of Letters Patent No. **181,239**, dated August 22, 1876; application filed June 15, 1876.

To all whom it may concern:

Be it known that I, GEORGE LEE ANDERS, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Machines for Perforating Paper Strips for Use in the Automatic Transmission of Telegraphic Messages, of which the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the drawings accompanying and forming part of this specification.

This invention relates to a simple, cheap, and effective perforating-machine, to be operated either solely by mechanical means, or by the aid of electricity, and, when the latter agent is used, capable of being operated from any point on a telegraph-line.

It consists in the combination of one or more punches of the kind ordinarily used for preparing the perforated strips used in the well-known manner in automatic telegraphing; a continuously-acting power, and a device connected with each punch, and under the control of an operator, either at the instrument or at any point on a telegraph-line, connected to the same, for causing the power to be applied to each punch at will to operate the same, said device consisting of a lever oscillating at its center upon the upper end of the punch; a rotating cam bearing upon one end of the lever, and mounted upon a shaft having a continuous rotation derived from any suitable power; a movable stop for arresting the movement of the other end of the lever, so as to stop its oscillatory motion, and cause the punch to be operated by the action of the cam; and a device for moving the stop, with suitable mechanism operated by the same power that rotates the cam, and moving simultaneously with it, for feeding the paper strip or strips perforated by the punch or punches continuously, and at a uniform rate. It also consists in a device attached to the feeding mechanism, which arrests the action of the same after a certain length of unperforated paper has been fed, and thereby prevents waste of paper.

In the accompanying drawings, Figure 1 is a front view of the machine in elevation, showing the punch, cam, lever, stop, and feeding mechanism. Fig. 2 is a plan view of the machine; and Fig. 3 is a view of the machine in elevation, showing the stop and end of the lever in the position that they have relatively to each other when the end of the latter is free to move.

In these figures the same letters refer to similar parts.

A is the base-plate of the machine, upon which are mounted two upright plates of metal or other suitable material, B B′, parallel to each other, which form the frame for supporting and affording bearings to the working parts of the machine. C is a punch of the form usually used in perforating-machines for telegraphic purposes, and has an up-and-down motion in the guide D, which is attached to the plate B by a clamp, E, or in any other suitable manner. The upper end of this punch is encircled by a spiral spring, F, one end of which bears against a shoulder on the punch, and the other end rests upon the top of the guide. The object of this spring is the retraction of the punch after the perforation is made, and any other suitable arrangement which will effect this result may be used. G is a lever, pivoted at its center to the punch, at right angles to the same. To one end, *a*, is attached a flat spring, M, secured to a fixed point, N, on the frame B, which spring acts to throw up the opposite end *b* of the lever G, so that it will bear against the cam I in every position of the same. This cam is situated just above the end *b* of the lever G, and is mounted upon a shaft, K, having its bearings in the plates B B′, which shaft is rotated continuously by any suitable power—as, for instance, a treadle mechanism; and when the shaft rotates, the cam operates to depress the end *b* of the lever G in opposition to the force of the spring M on the other end of the lever, and for the reason that the spiral spring F is stronger than the spring M the lever oscillates on its pivot H as a fulcrum, without moving the punch C. If, however, the free end *a* of the lever G be prevented from completing its full upward movement, caused by the action of the cam I on the other end *b* of the lever, by

the interposition of a suitable stop the pressure of the cam will overcome the resistance of the spiral spring F, the fulcrum of the lever will be changed to the end *a*, and the punch will be depressed in correspondence to the action of the cam on the end *b* of the lever, and a small round disk will be cut from the paper strip under the punch.

This strip of paper is fed with a continuous movement, and at a uniform rate, by mechanism operated by the same power that rotates the cam, and simultaneously with the rotation of the cam, and the rate of feed bears such relation to the period of this rotation that if the detaining-stop is allowed to arrest the oscillatory movement of the lever long enough to permit the cam to cause the action of the punch more than once, the successive perforations will overlap, and an elongated perforation will be made in the paper strip, the length of which will be determined by the time during which the stop arrests the movement of the free end *a* of the lever.

When the strip is used for telegraphing in the well-known automatic system, the short perforations give dots, and the long perforations dashes, and therefore, if suitable means are provided, under the control of an operator, for moving the stop so that it can be made to engage with the lever for a shorter or longer time, at will, and, by arresting the oscillation of the same, cause perforations of corresponding length in the paper strip, the latter can readily be perforated for the transmission of any desired series of telegraphic characters.

Any suitable means may be used for moving the stop so as to cause its interposition, as explained, as it will be obvious to the mechanician that there are various ways of accomplishing this result. A simple and effective method that I have devised for this purpose is shown in the accompanying drawings, and will now be described. It consists in the use of an electro-magnet, (shown at R, Fig. 2,) having its armature P attached to the rock-shaft L, mounted in suitable bearings in the frame B B′, and having attached thereto, on the outside of the plate B, an arm, O, which extends to the end *a* of the lever G, and is of such a length that when the rock-shaft is moved by the movement of the armature the end of the arm will engage with the end of the lever G, as shown in Fig. 1, and the movement of the latter will be prevented, so that the punch will be operated by the action of the cam, as before explained. In the drawing the arm is shown as moved from its normal position, to engage with the lever, by closing the circuit through the magnet; but the latter might be so placed that the same result would be effected by opening the circuit.

The parts are so arranged that, when the cam is rotating, the slightest movement of the arm arrests the oscillatory movement of the lever, and causes the operation of the punch, the movement of the latter being simultaneous with the movement of the armature, and, therefore, if a telegraph-key be placed in the circuit through the magnet, a perforated strip for the transmission of any desired message can be rapidly prepared by manipulating the key in the ordinary manner of transmitting the Morse character.

It is obvious that this key may be located at any point on the circuit near or at a distance from the instrument, and also that the magnet can be used to receive messages from a distant station, which messages will be recorded in perforations upon the paper strip.

In the accompanying drawings but one punch and one strip of paper are shown. Several punches similar to that described may be arranged side by side, all of which can be operated by the same power, by extending the cam-shaft so that it will bear upon the ends of all the levers. Each lever will have its own arresting-arm, and magnet for operating the same, and each punch its corresponding strip of paper; but all the strips will be fed simultaneously, and by the same power that rotates the cam-shaft. A device for arresting the feed of any strip will be provided.

Several stations may be connected with one machine, each station having its corresponding punch, strip, and magnet, and the messages received from each station will be perforated upon its respective strip.

A machine of this description can be used with advantage at a main office which has several branch offices connected with it, as the messages sent from each branch office to be forwarded to a distant point can be automatically perforated upon strips at the main office, and from thence rapidly transmitted to the distant station by the automatic system. I also propose to use, in connection with the electro-magnet controlling the action of the punch, a device operated by a key-board arrangement, which will automatically transmit the proper sequence of short and long currents necessary for perforating any character of the telegraphic alphabet, thus enabling the machine to be operated by any person.

The movement of the stop for causing the action of the punch for a longer or shorter time may be effected by mechanism operated by a key-board arrangement without the aid of electricity; and an apparatus of this description which I have devised will be described in another application.

The feeding mechanism is constructed as follows: X is a shaft, properly supported in the frame B B′, parallel to the shaft K. Upon this shaft is a wheel, Y, which is connected by a band to the shaft K, so that it rotates with the latter; but, as the wheel Y has a greater diameter than the shaft K, the shaft X rotates more slowly. The other end of the shaft X projects through the plate B, and against this end bears a spring, W, which is attached to the plate B at the point Z. The paper strip passes between this spring and the end of the shaft, and is turned continuously and at a uniform rate by the friction of the shaft. S

is the strip, which is led under the punch over a suitable die-plate, and is kept in position by the presser-plate T.

A device is provided for the purpose of arresting the feed of the paper strip after a certain length has been fed unperforated. This consists of a collar, *c*, loose upon the shaft X, but attached to the same by a spiral spring, *d*. Upon the periphery of the collar is a projection, *g*, and projecting from the side of the collar is a pin, *h*, which engages with a pin upon the shaft X, so that the collar rotates with the shaft; but when the circuit is opened on interrupting the action of the perforator, an arm, *e*, on the rock-shaft L engages with the projection on the collar, so that the latter is held, and when the pin upon the shaft strikes against the pin *h* the rotation of the shaft is stopped and the feed of the paper strip interrupted.

By means of the spiral spring the shaft is allowed to make at least one rotation after the circuit is opened, and the arm *e* thrown into the path of the projection *g*, which insures the paper being fed a sufficient time after the perforator has ceased acting to give the necessary spaces between the perforations.

I am aware that the combination in telegraph perforating-machines of a punch, a continuously-acting power for operating the same, and a device, under the control of an operator, for causing the power to operate the punch at will, is not new, as such a combination is shown in the patent to Alexander Bain, No. 43,618, July 19, 1864, and I therefore do not claim that combination, broadly; but

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. The combination, with one or more punches, of a continuously-rotating cam, or its equivalent, an oscillating lever, G, attached to each punch, springs F M, acting on each lever, a movable stop, which arrests the oscillation of the lever and causes the operation of the punch, and a device for moving the stop, substantially as and for the purpose set forth.

2. In combination with the oscillating lever and movable detaining-stop, as described, an electro-magnet for moving the stop, substantially as and for the purpose set forth.

3. In combination with the oscillating lever G, the arm O, rock-shaft L, armature P, and electro-magnet R, substantially as and for the purpose set forth.

4. In combination with the punching mechanism, as described, and the continuously-acting power operating the same, mechanism operated, as described, from the power that operates the punch, and simultaneously with it, for feeding the paper strip at such a rate relatively to the period of rotation of the cam-shaft that a prolonged operation of the punch will produce an elongated perforation in the paper strip, substantially as and for the purpose set forth.

5. The combination of the shaft X, collar *c*, having on it the projection *g*, and attached to the shaft by the spiral spring *d*, pin *h* on the collar, pin upon the shaft, arm *e*, and rock-shaft L, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

GEORGE LEE ANDERS.

Witnesses:
ALEX. L. HAYES,
CLARENCE V. LUCE.