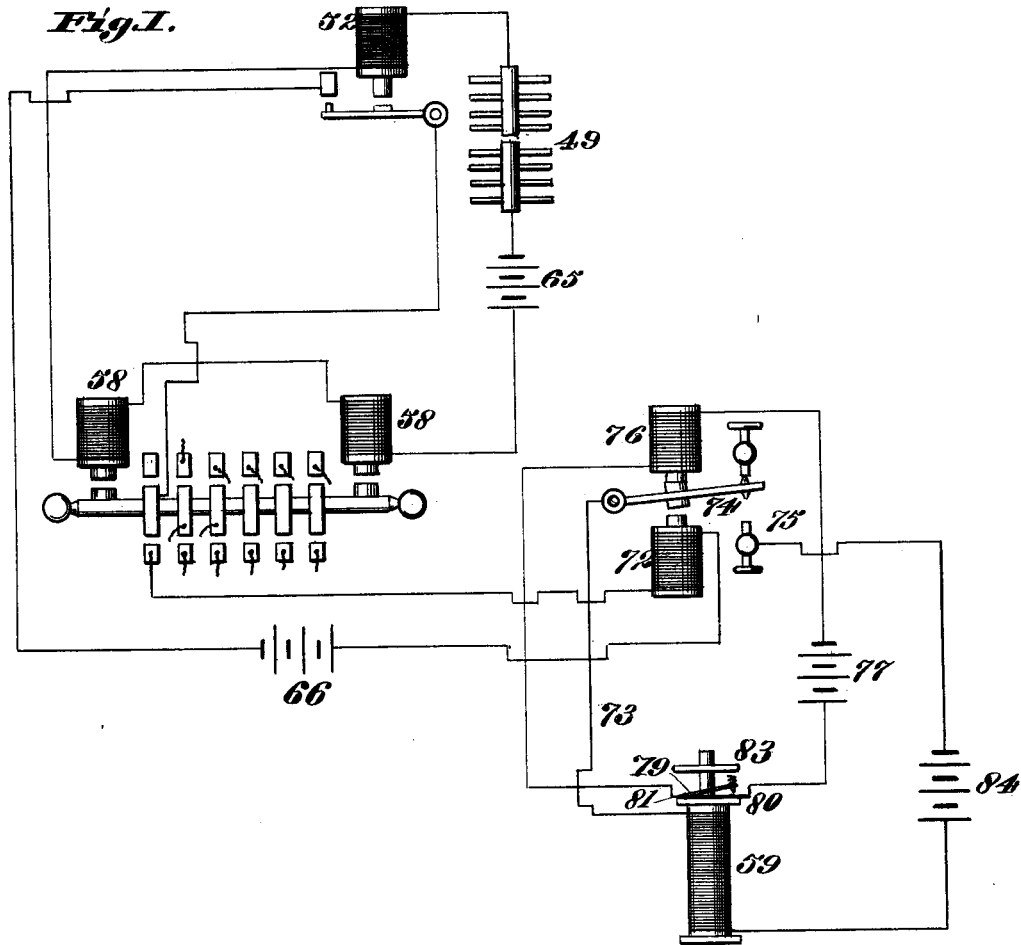


No. 675,895.

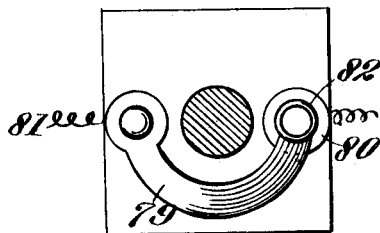
Patented June 11, 1901.

**F. H. LITTLEFIELD.**  
**PRINTING TELEGRAPH.**  
 (Application filed Feb. 23, 1901.)

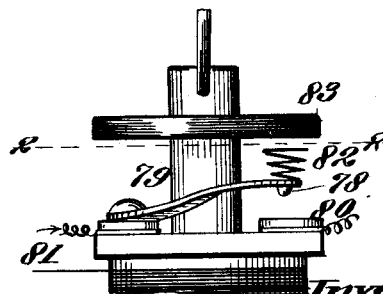
(No Model.)



**Fig. 2.**



**Fig. 3.**



**Attest:**  
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*Attys.*

# UNITED STATES PATENT OFFICE.

FREEMAN H. LITTLEFIELD, OF ST. LOUIS, MISSOURI, ASSIGNOR OF TWO-THIRDS TO MORDECAI YARNALL AND J. O. CHENOWETH, OF SAME PLACE.

## PRINTING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 675,895, dated June 11, 1901.

Application filed February 23, 1901. Serial No. 48,388. (No model.)

*To all whom it may concern:*

Be it known that I, FREEMAN H. LITTLEFIELD, a citizen of the United States, and a resident of the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Printing-Telegraphs, of which the following is a specification.

My invention relates to printing-telegraphs, and particularly to the system described in a pending application for Letters Patent therefor filed by me on the 18th day of June, 1900, Serial No. 20,681.

My invention has for its principal object to increase the rapidity and certainty of action of the permutation system and printing mechanism; and it consists principally in providing a separate local circuit for each printing-solenoid arranged to maintain the current through the solenoid until the completion of the printing operation and then automatically restore the connections of the solenoid-circuit to their normal positions.

In the accompanying drawings, which form part of this specification, and wherein like symbols refer to like parts wherever they occur, Figure 1 is a diagrammatic view of the system shown in my application hereinbefore mentioned with my present invention embodied therein. Fig. 2 is an end view of a printing-solenoid, showing the core in section. Fig. 3 is a side view of a printing-solenoid.

In my application, Serial No. 20,681, filed June 18, 1900, I have fully described a printing-telegraph system which comprises a receiving instrument adapted to automatically perforate a tape according to a predetermined code and selecting and printing devices which automatically translate and transcribe such perforations into ordinary characters by selecting and controlling the action of magnets arranged to print such characters. As more fully described in said application, the selecting device comprises a set of selecting levers or needles 49, arranged, respectively, in circuit with certain selector-magnets 52 and adapted to cooperate with the perforations of the tape for completing the circuits of such electromagnets. These selector-magnets control various circuits in which are arranged certain permutation-magnets 58, the entire

arrangement being such that for each particular arrangement of perforations in the tape some one circuit is completed through the permutation-magnets. In the circuit thus completed is a solenoid or printing-magnet 59, whose core is arranged to actuate a type-lever. As described in said application, there is one printing magnet or solenoid 59 for each character, and each magnet is so connected that its circuit is completed through the permutation system for some particular arrangement of perforations corresponding to its character. The present improvement embodies the principles and the principal structural features and arrangements of the system described in said application. Instead, however, of having the circuits of the printing solenoids or magnets 59 extend through the armatures of the magnets 58 of the permutation system my present invention provides a separate local circuit 73 for each printing-solenoid. According to the present invention the permutation-magnets 58 are arranged as in said application, so as to complete a separate circuit through their armatures for each arrangement of perforations in the tape. Instead, however, of a printing-solenoid being arranged in each of said circuits thus completed I now provide a relay-magnet 72 in each of said circuits. The armature 74 of this relay-magnet is permanently connected to one pole of a battery 84, and the fore stop of said armature is connected to the opposite pole of said battery. When the relay-magnet is energized, this armature is attracted to its fore stop, and thereby closes the local circuit 73. In each of said local circuits is a solenoid or printing-magnet 59, whose core is arranged to mechanically operate a type-bar bearing some particular character to be printed. This core carries a plate 83, adapted to press downwardly an insulated contact-point 78, which is in permanent electrical circuit through the wire 81 and a second magnet 76, adapted to attract the armature of the relay-magnet to one pole of a battery 77. The fore stop or contact-plate 80 for said contact-point 78 is in permanent electrical contact with the opposite pole of said battery 77. The operation of this construction is as follows: The selecting device acting

as described in my previous application completed a circuit through the permutation system and some particular relay-magnet 72. The relay-magnet 72 thus energized attracts its armature 74, and thereby closes the local circuit 73 of the solenoid or printing-magnet 59, corresponding to said relay-magnet. The printing solenoid or magnet thus energized actuates its type-bar to impress the character thereof upon the strip or sheet of paper, as in my prior application. The movement of the core of the printing solenoid or magnet bears the contact-point 78 downwardly against its fore stop 80, and thereby closes the circuit through the wire 81, magnet 76, and battery 77, so as to energize said magnet and retract the armature 74 common to said magnets 76 and said relay-magnet 72. The retraction of said common armature 74 breaks the circuit of the printing solenoid or magnet 59, whose core is thereupon automatically retracted, whereby the circuit 81 through the restoring-magnet 76 is broken and all the circuits restored to their normal condition, ready for a repetition of the operation.

In the foregoing description I have assumed that any general type of printing solenoid or magnet 59 may be used. The construction shown in the drawings, however, has peculiar advantages. In this construction the solenoid is arranged vertically, and its soft-iron core carries at its upper end an insulated plate. The contact-point 78 is carried by a flat spring or flexible plate 79, mounted on the solenoid-frame and carrying on its upper side a light coil-spring 82. The flat spring 79 is connected to the circuit-wire 81, and a fixed contact-plate 80 is provided for said contact-point and likewise connected to said circuit-wire. In operation the attraction of the core causes the plate thereon to bear down the coil-spring 82 and the flat spring 79, so as to force the contact-point 78 against the contact-plate, and thereby close the circuit of the restoring-magnet 76. In this construction the springs while supporting the contact-point constitutes a cushion, which yields au-

tomatically to the pull of the magnet, and thereby prevents shocks and insures full contact.

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What I claim is—

1. In a printing-telegraph, a system of permutation-magnets arranged to control a plurality of circuits, a relay-magnet in each of said circuits, and a local circuit for each of said relay-magnets normally open at the armature thereof, each of said last-mentioned circuits comprising a printing-solenoid, and a second magnet in a circuit separate from that of said relay-magnet and arranged to act on the armature thereof, the circuit of said second magnet being normally open at the armature of the solenoid and adapted to be closed thereby, substantially as described.

2. In a printing-telegraph, a permutation system comprising a plurality of circuits and circuit-changing magnets arranged to complete some particular circuit according to a predetermined code, a relay-magnet in each circuit so completed, and a local circuit for each of said relay-magnets normally open at the armature thereof, each of said last-mentioned circuits comprising a printing-solenoid, a second magnet for each of said relay-magnets, each of said second magnets being in a special local circuit and arranged to act on the armature thereof, the circuit of said second magnet being normally open at the armature of the solenoid and adapted to be closed thereby, substantially as described.

3. In a printing-telegraph, a solenoid comprising a contact-plate mounted on the frame thereof and a spring-mounted contact-point adapted to be actuated by the core of said solenoid, and a magnet in circuit with said contact point and plate arranged to restore the solenoid-circuit to its normally open condition, substantially as described.

St. Louis, Missouri, February 20, 1901.

FREEMAN H. LITTLEFIELD.

Witnesses:

JAMES A. CARR,  
JOHN B. RENO.