

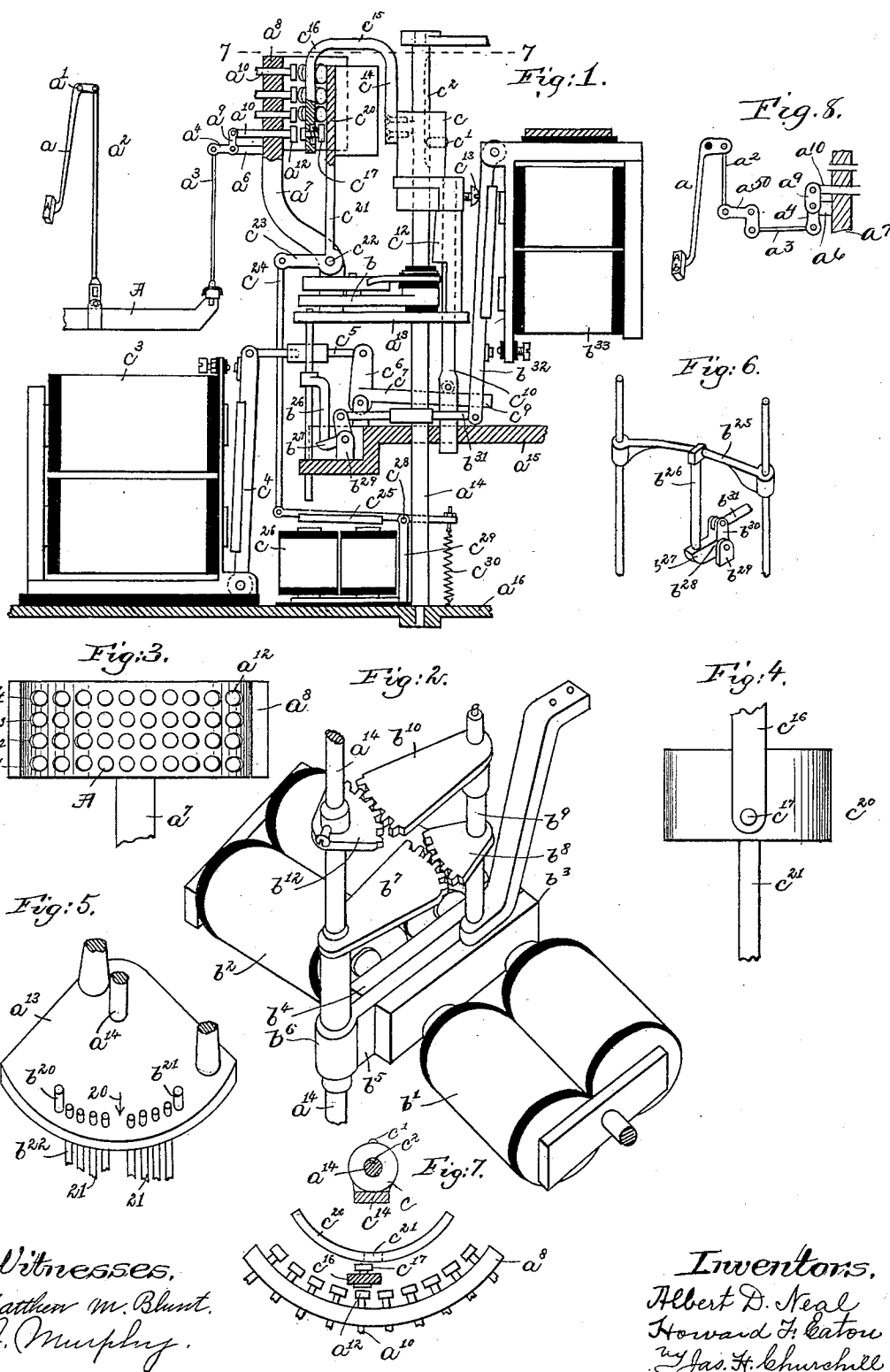
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ELECTROMECHANICAL APPARATUS.

(Application filed Nov. 19, 1892. Renewed Oct. 27, 1898.)

No Model.)



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ELECTROMECHANICAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 625,408, dated May 23, 1899.

Application filed November 19, 1892. Renewed October 27, 1898. Serial No. 694,743. (No model.)

To all whom it may concern:

Be it known that we, ALBERT D. NEAL, of Boston, county of Suffolk, and HOWARD F. EATON, of Quincy, county of Norfolk, State of Massachusetts, have invented an Improvement in Electromechanical Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to an electromechanical apparatus embodying novel combination of parts especially adapted, among other things, to be embodied in or form part of an electromechanical type-writing and printing instrument.

This invention further consists, essentially, of a movable device, herein shown as an oscillating arm, an electromagnet to positively move the said device or arm, and means operated by the electromagnet to amplify or extend the movement of the said arm or device through a given or predetermined distance, and a plurality of movable stops or pins co-operating with the movable arm or device to arrest the said arm or device at different distances in its range of movement, and electromagnets to operate the said stops or pins.

The movable arm or device and the parts referred to when embodied in an electromechanical type-writing and printing instrument constitute a selecting device for the type or character to be printed, and in the present embodiment of this invention the selecting-arm and its coöperating parts are represented as forming part of an electromechanical type-writing and printing instrument of that class in which the type or characters are operated by independent levers or bars—that is, in which each type or character is mounted on an independent or separate type-carrier after the manner of the well-known Remington type-writing machine.

The features of our invention will be pointed out in the claims at the end of this specification.

Figure 1 represents in elevation and section a sufficient portion of an electromechanical type-writing and printing instrument embodying our invention to enable it to be understood; Fig. 2, a detail in perspective of

one form of mechanism for producing a multiplied movement of the movable arm or device; Figs. 3 and 4, details to be referred to; Fig. 5, a detail of the movable pins; Fig. 6, a detail showing one manner of operating two movable pins simultaneously; Fig. 7, a sectional detail to be referred to, the section being taken on the line 7 7, Fig. 1; and Fig. 8, a modification to be referred to.

Referring to Fig. 1, A represents a key-lever of a mechanical type-writing instrument—such as the well-known Remington, Caligraph, &c.—in which each key-lever A is connected to a type-carrier, shown as a lever a , pivoted, as at a' , and connected by a link a^2 to the key-lever A, the latter in the present instance being positively connected by a rod or link a^3 to one arm a^4 of an elbow-lever a^5 , pivoted, as herein shown, to a suitable projection a^6 of an upright a^7 , having secured to or forming part of its upper end a curved or cylindrical cross-bar a^8 . The elbow-lever a^5 has its other arm a^9 pivotally connected to a rod or bar a^{10} , extended through the cross-bar a^8 and provided, as shown, with a head a^{12} . The cross-bar a^8 (shown separately in Fig. 3) has extended through it as many of the headed rods a^{10} as there are type-levers a in the instrument, which number in the present instance is shown as forty.

As represented in Fig. 3, there are four horizontal rows of the rods a^{10} , each row consisting of ten rods. The upright a^7 is secured to or forms part of a plate a^{13} . (Shown in Fig. 5 as substantially triangular in shape and which in practice may be of any desired form or construction.) The plate a^{13} has extended through it, as herein shown, a shaft a^{14} , also extended through plates or bars a^{15} a^{16} , forming a framework which supports the apparatus. The shaft a^{14} has mounted upon it, as herein shown, an arm or movable device b , which is fast to the shaft a^{14} in the present construction of the instrument and which is revolved in opposite directions, as will be described. The arm or device b is moved in opposite directions, as herein represented, by electromagnets b' b^2 . (Shown only in Fig. 2 for sake of clearness.) The said electromagnets have coöperating with them, respectively, armatures b^3 b^4 , shown as secured to the op-

posite sides of a bar b^5 , fast on a sleeve b^6 , mounted on the shaft a^{14} . The electromagnet b^7 when energized attracts its armature b^8 and effects the movement of the arm b in the opposite direction from that in which it is moved by the electromagnet b^2 attracting its armature b^4 . In order to give to the arm b a movement through a substantially extended space, means are provided for amplifying or multiplying the movement of the armatures b^3 b^4 . One form of apparatus or means by which this result may be obtained is shown in Fig. 2, and consists of a substantially long segmental arm b^7 , secured to or forming part of the sleeve b^6 and provided with gear-teeth in mesh with gear-teeth on a smaller segmental arm b^8 , fast on a shaft b^9 , the latter also having mounted on it a substantially long segmental arm b^{10} , having gear-teeth which mesh with gear-teeth on a smaller segmental arm b^{12} , fast on the shaft a^{14} .

The multiplying-gearing just described effects the movement of the shaft a^{14} and its arm b through a predetermined distance or range in opposite directions, which may be supposed to be the distance from its normal position at rest (indicated by arrow, Fig. 5) to the stops b^{20} b^{21} , which in practice are preferably stationary stops or pins secured to the plate a^{13} . The movement of the arm b in one or the other direction from its normal position may be limited at different distances in the range of movement of the said arm by movable stops or pins b^{22} , extended through the plate a^{13} , the corresponding stops or pins on opposite sides of the normal position of the arm being preferably operatively connected together to be moved simultaneously.

In Fig. 6 we have represented one manner of operatively connecting the corresponding pins together to be moved simultaneously, the said pins being joined, as represented in said figure, by a tie-bar b^{25} , having a depending arm b^{26} , adapted to be engaged by an arm b^{27} of an elbow-lever b^{28} , pivoted, as herein shown, in an upright b^{29} , erected from the table or plate a^{15} , and having its other arm b^{30} joined by a connecting-rod b^{31} to the armature b^{32} of an electromagnet b^{33} , which we will hereinafter designate as a "pin" operating-magnet.

As shown in Fig. 5, there are four movable pins on each side of the normal position of the arm, and consequently in practice with an instrument embodying the construction shown in Fig. 5 there would be four pin-magnets, each pin-magnet elevating two pins on opposite sides of the normal position of the arm. It will be seen that when a pin-magnet is energized the arm b is arrested in its movement at a distance or point intermediate of the normal position of the arm and one of the stationary stops or pins b^{20} b^{21} .

The shaft a^{14} , as shown in Fig. 1, is provided with a sleeve or hub c , secured to the said shaft by a key c' , fitted into a groove or channel c^2 to permit the sleeve c to be moved lon-

gitudinally on its shaft. The movement of the sleeve is effected by electromagnets, only one, c^3 , of which is shown, the said electromagnet having its arm c^4 joined by a connecting-rod c^5 to one arm c^6 of an elbow-lever c^7 , pivoted in suitable uprights c^8 of the plate a^{15} and having its arm c^9 extended through a slot in a vertical arm or post c^{10} , herein shown as extended up through a depending arm c^{12} on the sleeve c and secured thereto by a set-screw c^{13} . The magnet c^3 when energized attracts its armature c^4 and rocks the elbow-lever c^7 and moves the sleeve c longitudinally on its shaft. The sleeve c in the present instance has secured to it one end of a yoke or U-shaped piece c^{15} , having its other end or arm c^{16} provided with an opening, through which is extended a movable piston or bunter c^{17} , with which coöperates a curved or cylindrical cross-bar c^{20} , (see Fig. 4,) constituting a hammer and secured to or forming part of an arm c^{21} of an elbow-lever pivoted, as at c^{22} , to the upright a^7 and having its other arm c^{23} joined by a connecting-rod c^{24} to an armature c^{25} of an electromagnet c^{26} , hereinafter referred to as the "printing-magnet," the armature c^{25} , as herein shown, being pivoted, as at c^{28} , to an upright c^{29} and having its other end acted upon by a retractile spring c^{30} , which serves to keep the hammer c^{20} in its normal position out of contact with the piston or bunter c^{17} when the printing-magnet c^{26} is demagnetized. In the normal position of the sleeve c the bunter or piston c^{17} coöperates with or is in the same horizontal plane as the first or lowermost row of rods a^{10} and marked in Fig. 3 "No. 1." The magnet c^3 when energized may be supposed to move the sleeve c longitudinally on its shaft a sufficient distance to bring the piston or bunter c^{17} in line with the second horizontal row of rods a^{10} and marked "No. 2" in Fig. 3. In practice with the construction herein represented two more electromagnets similar to c^3 are employed, having their armatures connected substantially the same as the armature c^4 , so as to elevate or move the sleeve c^3 different distances on its shaft, and thereby bring the bunter c^{17} into line with the third and fourth horizontal rows of rods a^{10} and marked, respectively, in Fig. 3 "No. 3" and "No. 4." In practice the electromagnets herein shown and referred to will be governed by suitable circuit-controllers, not herein shown, but which may be operated substantially as shown in United States Patent No. 486,889, granted to us November 29, 1892. The operation of the apparatus herein shown may be described as follows: The key-lever A, which, as above described, may be the key-lever of the Remington, Caligraph, and like machine, in which the character to be printed is connected to its respective key and the latter connected to a rod a^{10} , located in the first horizontal row and marked in Fig. 3 by the letter A. The rod a^{10} , corresponding to the letter A and connected to its key-lever A, is located on the

cross-bar, the second from the transverse center of the said bar, and to effect the printing of this letter the yoke c^{15} and its piston or bunter c^{17} would have to be moved so as to be brought behind and in line with the rod a^{10} corresponding to the letter A, which would require the shifting or movement of the arm b by means of one of the magnets b' b^2 and the stopping of the said arm by one of the pin-magnets b^{33} and thereafter the movement of the bunter by means of the hammer operated by the printing-magnet c^{26} .

Let it be supposed that the magnet b^2 will effect the movement of the shaft a^{14} , the arm b , and the yoke c^{15} in the direction to move the bunter c^{17} behind the rod a^{10} (marked A in Fig. 3) and that the pin-magnet b^{33} will elevate the proper pin, which in the present instance would be one of the pins marked 21 in Fig. 5, to arrest the movement of the arm b in its predetermined range of movement, and thereby place the bunter c^{17} behind the rod a^{10} corresponding to the letter A. When in this position, the printing-magnet c^{26} may be energized and the hammer c^{20} moved forward against the bunter c^{17} , so as to bring the latter in contact with the head a^{12} of the rod a^{10} and, through the elbow-lever a^5 and the connecting-rod a^3 , depress the key-lever A, so as to elevate the type-carrier a . If it is desired to print a character or letter connected to one of the rods a^{10} on the opposite side of the vertical or normal position of the bunter, the shifting-magnet b' will be energized. If the letter required to be printed is connected to a rod a^{10} in the second row, the first elevating-magnet will be energized in addition to the shifting, pin, and printing magnets, and if the letter to be printed is connected to a rod in the third horizontal row a second elevating-magnet, not herein shown, will be energized, together with the shifting, pin, and printing magnets. So, also, if the letter to be printed is connected to a rod in the fourth row a third lifting-magnet will be required in addition to the shifting, pin, and printing magnets. It will thus be seen that in the present instance our improved apparatus may be coupled directly to any form of mechanical type-writing instrument in which the types or characters are connected to independent type carriers or levers.

We have herein shown the application of our improved electromechanical apparatus directly to the levers of the type-writing instrument, so that it is evident the type-writing instruments of this class as now commonly constructed may be used electromechanically after the manner illustrated in the Patent No. 486,889, above referred to, without change of the instrument itself and requiring only the connection between the key-lever and the electromechanical apparatus herein shown. If desired, it is evident that the connection between the type bar or lever a and the rods acted upon by the piston or bunter may be a direct connection without

the intervention of the key-levers, as shown in Fig. 8; wherein the rods a^2 a^3 are connected by a bell-crank lever a^{50} .

We have herein represented the rods a^{10} as arranged in four horizontal rows; but it is evident that any other disposition or arrangement of the rods may be made without departing from the spirit of our invention.

We claim—

1. The combination with a movable arm or device, an electromagnet to move it in one direction, a second electromagnet to move it in the opposite direction, means operated by the electromagnets to produce a multiplied or extended movement of the said movable arm or device, a stop-arm movable with the said arm or device, movable stops or pins to limit the movement of the said stop arm or device at different points or stations in the range of its movements and thereby limit the movement of the said movable arm, and electromagnets to operate said stops or pins, substantially as described.

2. The combination with a movable arm or device, an electromagnet to move it in one direction, a second electromagnet to move it in an opposite direction, means operated by the electromagnets to produce a multiplied or extended movement of the said movable arm or device, movable stops or pins operatively connected together to be simultaneously moved, to limit the movement of the said arm or device at different points or stations in the range of its movement, and electromagnets to operate said pins or stops, substantially as described.

3. In an electromechanical type-writing and printing instrument, the combination of the following instrumentalities: a movable type selecting or positioning arm or device, an electromagnet to positively effect its movement, means operated by the said electromagnet to amplify or extend the movement of the said arm or device through a predetermined or given distance, a plurality of movable stops or pins coöperating with the selecting device or arm to stop or arrest the said arm or device at different distances in its range of movement, electromagnets to operate said stops or pins, and a printing-magnet to effect the printing of the type selected, substantially as described.

4. In an electromechanical type-writing and printing instrument, the combination with a type-writing and printing instrument having a plurality of character-carriers, of a movable type-selecting arm or device, a stop arm or device movable within the type-selecting arm, an electromagnet to effect the movements of both of said arms or devices, means to amplify or extend the movements of the said arms or devices through a predetermined or given distance, a plurality of movable stops or pins coöperating with the stop device or arm to stop or arrest the said arm or device at different distances in its range of movement and thereby stop or ar-

rest the type-selecting arm in position to operate the desired character-carrier, electromagnets to operate said stops or pins, and a printing-magnet to effect the printing of the letter or character on the selected character-carrier, substantially as described.

5 5. In an electromechanical type-writing and printing instrument, the combination
10 with a type-writing and printing instrument having a plurality of character-carriers, of a rotatable type-selecting arm or device, a rotatable stop arm or device, an electromagnet to effect the movements of both arms
15 or devices, means to amplify or extend the movement of the said arms or devices through a predetermined or given distance, a plurality of movable stops or pins coöperating
20 with the stop device or arm to stop or arrest the said arm or device at different distances in its range of movement and thereby stop or arrest the type-selecting arm in position to operate a desired character-carrier,
25 electromagnets to operate said stops or pins, a printing-magnet, and means operated by the printing-electromagnet to act on the selected type-carrier to effect the printing of the character selected, substantially as described.

30 6. In an electromechanical apparatus, the combination with a bunter or piston, a movable arm or device operatively connected to said bunter, an electromagnet to move said

arm or device and thereby the said bunter or piston, means operated by the said electromagnet to amplify the movement of the said arm and bunter, a movable stop-arm, movable stops or pins to arrest the said stop-arm at different distances in its range of movement and thereby arrest the movement of the bunter-carrying arm in a selected position, 35
40 and electromagnets to operate said stops or pins, substantially as described.

7. In an electromechanical apparatus, the combination with a movable arm or device, a bunter or piston connected therewith, a stop arm or device, an electromagnet to move said arms or devices, stops or pins coöperating with said stop arm or device to arrest the said arm at different distances in its range of movement and thereby arrest the bunter-carrying arm in its movement, electromagnets to operate said stops or pins, a hammer to operate on said bunter or piston, and an electromagnet to operate said hammer, substantially as described. 55

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ALBERT D. NEAL.
HOWARD F. EATON.

Witnesses:

JAS. H. CHURCHILL,
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