No. 778,369. PATENTED DEC. 27. 1904.

G. H. MORSE.

TYPE WRITING MACHINE.

APPLICATION FILED MAR. 7, 1904.

2 SHEETS—SHEET 1.

Fig. 2

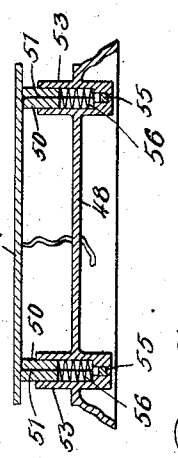


Fig. 1

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2 SHEETS—SHEET 2.

Fig. 3

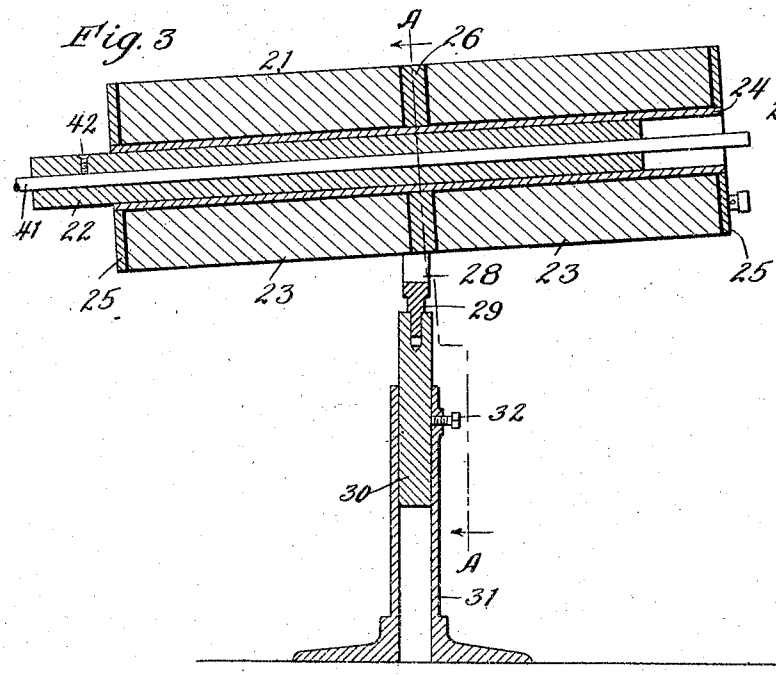


Fig. 4

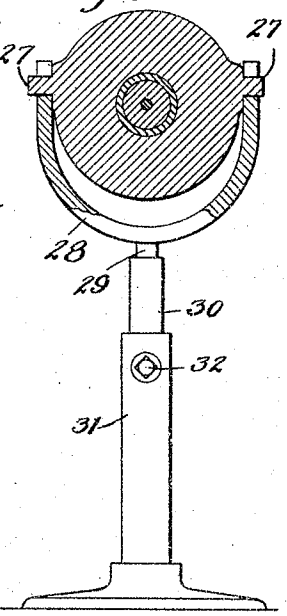


Fig. 5

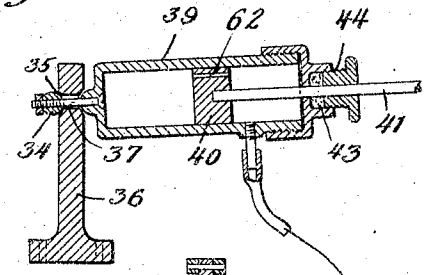


Fig. 6

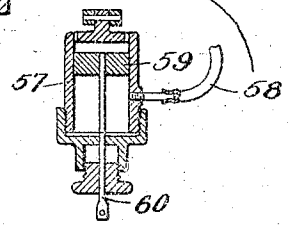
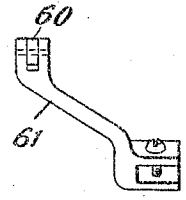


Fig. 7



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No. 778,369. Patented December 27, 1904.

UNITED STATES PATENT OFFICE.

GEORGE HART MORSE, OF LINCOLN, NEBRASKA, ASSIGNOR OF ONE-HALF TO STILES-MORSE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 778,369, dated December 27, 1904.

Application filed March 7, 1904. Serial No. 196,801.

To all whom it may concern:

Be it known that I, GEORGE HART MORSE, a citizen of the United States, residing in Lincoln, in the county of Lancaster and State of Nebraska, have invented a new and useful Improvement in Type-Writing Machines, of which the following is a specification.

My invention relates to improvements in type-writing machines, and more particularly to the mechanism for turning the platen and returning the carriage after the completion of one line preparatory to the next line.

In type-writers heretofore generally in use the platen has ordinarily been turned by hand and the carriage returned to position by hand; and it is the object of my invention to provide a mechanism for automatically turning the platen and returning the carriage to position after the completion of each line of writing which will at once be simple in construction, efficient in operation, capable of being readily and conveniently connected or attached to existing machines of any ordinary construction, and which will not in any way impede the ordinary step-by-step or letter-by-letter movement of the carriage in writing or interfere with the rapid or easy movement of the carriage or the turning of the platen or movement of the carriage by hand when this is required or desired to be done.

My invention consists in the means I employ to practically accomplish this object or result—that is to say, it consists in the combination, with a type-writer carriage and the rotatable platen thereon, of an electric circuit, a circuit-closer or key adjacent to the key-board of the type-writer and adapted to be operated by the finger at the completion of each line, a solenoid having a long sliding core the travel of which is substantially the same as that of the type-writer carriage, the sliding core being connected to the carriage through an interposed air-compression cylinder and piston and a supplemental air-compression cylinder and piston in communication with said first-mentioned air-cylinder, the piston of the supplemental cylinder being connected to the platen-turning lever, so that when the electric circuit is closed at the completion of each line the sliding movement of the solenoid-core will compress the air or other fluid in the first cylinder, and thus actuate the piston of the second cylinder to turn the platen, while the continued movement of the solenoid-core returns the carriage to position. The connecting-rod of the solenoid-core is detachably connected by a simple bolt and nut, hook, or other simple connection to the type-writer carriage, thus enabling my carriage-returning mechanism to be very easily connected to or disconnected from the type-writer. As in my invention the pull or movement of the solenoid-core corresponds to that of the carriage, no intermediate gearing or motion-varying mechanism is required to effect the desired movement of the carriage, and this not only makes the device simple in construction, but practical and efficient in operation. The solenoid in its combination with the sliding carriage is mounted at a slight inclination to the horizontal, so that the sliding core will by its own gravity overcome its friction during the step-by-step or letter-by-letter forward feed of the carriage, thus preventing my mechanism from any way impeding or interfering with the free and rapid movement of the parts in the ordinary use of the type-writer in writing, and as in my invention the solenoid-core is connected to the carriage without any intervening gearing being interposed, the carriage is left free to be moved by hand forward or back the same as though my mechanism were not attached at all, and as in my invention the platen is automatically turned through the agency of an air-cylinder and piston the piston of the air-cylinder does not in any way interfere with the turning of the platen by hand by means of the platen-turning lever. As the soft inner core or plunger of the solenoid is for the greater part of its length withdrawn from the solenoid-coil when the type-writer carriage is at the left-hand limit of its travel on the completion of a line, when the electric circuit is first closed to turn the platen and return the carriage the magnetic impulse or power exerted by the solenoid and its core upon the carriage is of a moderate and gradually-increasing character as the core slides within the coil, thus imparting an easy, smooth, and at the same time

quick and positive movement to the carriage, and thus no sudden shock, jerk, or jar is imparted to the carriage tending to injure the machine or interfere with its proper operation, and as in my combination of the type-writer carriage with the solenoid coil and core the magnetic pull of the solenoid-core on the carriage gradually diminishes as the core approaches its central, neutral, or home position in the solenoid-coil the carriage is by the same means brought to a gradual and easy stop free from jar or shock. In practice I so combine the solenoid coil and core with the reciprocating type-writer carriage that the solenoid-core reaches its central, neutral, or home position in respect to the coil slightly before the carriage reaches the full limit of its return travel, so that the reverse magnetic pull of the solenoid or its core after the core passes the neutral line may itself overcome or aid in overcoming the momentum of the carriage on its return movement and in bringing the carriage to an easy, smooth, and gradual stop free from shock or jar. The air-cylinder and piston interposed between the type-writer carriage and the solenoid-core also aids in producing a smooth and easy reciprocation of the type-writer carriage free from sudden shock or jar either in stopping or starting, while at the same time permitting the return movement of the carriage to be made very quickly and at a relatively great practical saving of time over the old way of turning the platen and retracting the carriage by hand.

By my invention—my practical combination of a solenoid coil and core with the type-writer carriage—the time required for turning the platen and returning the carriage is diminished more than one-half, and the practical capacity and speed of the type-writer is thus correspondingly increased.

My invention also consists in the novel construction of parts and devices and in the novel combinations of parts and devices herein shown or described.

In the accompanying drawings, forming a part of this specification, Figure 1 is a perspective view of a device or apparatus embodying my invention, only those portions of the complete type-writer being shown which are necessary to fully illustrate my invention. Fig. 2 is a vertical section through the contact-maker or key by which the electric circuit is opened and closed. Fig. 3 is a vertical longitudinal section through the solenoid. Fig. 4 is a cross-section on line A A of Fig. 3. Fig. 5 is a section on the plane X X of the air-cylinder and piston interposed between the solenoid-core and the type-writer carriage. Fig. 6 is a section on the plane Y Y of the platen-turning air-cylinder and piston, and Fig. 7 is a side elevation of the clamp connecting the piston of the platen-turning cylinder to the platen-turning lever.

In the drawings, 10 represents a portion of the frame of any ordinary form of type-writer machine; 11, its reciprocating carriage; 12, the rotatable platen mounted thereon; 13, the guide-rails upon which the carriage reciprocates; 14, a portion of the keyboard, and 15 the spacing-key; 16, the ratchet for turning the platen; 17, the pawl; 18, the pawl-lever by which the platen is turned and the carriage reciprocated by hand; 19, the guide-rod on which the pivot-arm 20 of the carriage turns and reciprocates. All these parts are or may be of any well-known or suitable construction now commonly in use, as my invention is equally applicable to any customary construction of type-writer machine and of these parts.

21 is a solenoid, the same having a soft-iron core or plunger 22, somewhat exceeding in length the travel of the type-writer carriage and furnished, preferably, with two coils 23 23, connected in series and wound upon a suitable brass tube or spool 24, having end flanges or disks 25 25 to confine the coils, and a dividing ring or disk 26, furnished with trunnions 27 for centrally pivoting and suspending the solenoid on a supporting-yoke 28, which itself is mounted to turn or swivel horizontally by its pivot-stem 29 on the vertically-adjustable standard 30 of the supporting-stand 31, so that the solenoid may be adjustable to any height desired to bring it into proper coöperative relation with the type-writer and also adapted to turn horizontally or vertically, and thus enable its core or plunger to at all times slide freely in the brass tube or spool. The standard 30 is fixed in any position desired in the stand 31 by a set-screw 32.

The solenoid core or plunger 22 has a loose, flexible, or pivotal connection 33 with the type-writer carriage 11, so that the solenoid will exert no binding action upon the carriage as the carriage moves into different positions, and thus varies the inclination of the solenoid. The loose or flexible connection 33 between the solenoid-core and the carriage may be of any suitable form or construction adapted to give the necessary freedom of movement to the parts. The loose connection which I have illustrated in the drawings and which I prefer to employ is in the nature of a ball-and-socket joint, and it consists of a hemispherical nut 34, fitting in a similarly-shaped socket 35, the socket 35 being in a bracket 36, secured to the type-writer carriage, and the hemispherical nut 34 being on a threaded rod 37, which is connected with the solenoid core or plunger 22. The rod 37 is preferably not directly connected with the solenoid-core, but is connected thereto indirectly through the interposed air-cylinder 39, piston 40, and piston-stem 41. The piston-stem 41 is adjustably connected to the soft-iron solenoid-core or plunger by a set-screw 42, so that the solenoid may be readily brought into the required coöperative relation with

the type-writer carriage and its travel. The air-cylinder 39 has a stuffing-box 43 44, through which the piston-stem 41 extends.

The trunnions 27 on the solenoid-supporting ring or disk 26 are preferably slightly above the axis of the solenoid, so that the solenoid will be suspended at a point somewhat above its center of gravity, thus causing it to remain in horizontal equilibrium when the plunger is removed, the solenoid-supporting ring or disk 26 being at the middle of the solenoid.

The solenoid-coils 23 23 are connected up in series and included in an electric circuit 45, the current being supplied from any suitable source of electricity—as, for example, a battery 46.

47 is a contact-maker or key, preferably arranged adjacent to the spacing-key 15 of the type-writer keyboard and serving to close the electric circuit against the contact-piece 48. The contact-maker or key and its coöperating contact-piece may be of any suitable form or construction. The construction, however, which I prefer to employ comprises, as illustrated in the drawings, a non-metallic finger-bar 47, having non-metallic plugs 50 at each end, pierced by wires 51, connected to one of the binding-posts 52, the plugs 50 fitting and moving up and down in cups 53 on the metallic base-piece 48, which is connected to the other binding-post, 54. Each of the cups 53 contains a small quantity of mercury 55, with which the end of the wire 51 makes contact when the key 47 is depressed. Springs 56 hold the key 47 normally in its uppermost position, the circuit being closed by the depression of the key.

To cause the platen to be turned by the initial pull of the solenoid on the type-writer carriage when the circuit is closed, I employ a supplemental air-cylinder 57, connected by a flexible tube 58 with the air-cylinder 39, the supplemental cylinder having a piston 59 connected by a stem 60 and connecting-link 61 with the platen-turning lever 18, so that the compression of the air in the first cylinder by the pull of the solenoid on the carriage will actuate the piston of the supplemental cylinder, and thus automatically turn the platen the space of one line.

The piston 40 of the cylinder 39 is furnished with a small hole 62 through the same, the function of which is to gradually neutralize the pressure in the two ends of the cylinder in which the piston operates.

The solenoid is mounted in relation to the carriage at a slight inclination to the horizontal, as illustrated in the drawings, so that the gravity of the solenoid core or plunger will compensate for its friction in the brass tube or spool of the solenoid, and thus cause it to move freely and not impede or interfere with the free and easy forward movement of the carrirge step by step in writing, and the solenoid is also so combined with the carriage in respect to the travel of the carriage that when the carriage is retracted to its full extent the solenoid core or plunger will be carried slightly beyond its central or neutral point in respect to its coil or coils, thus causing the solenoid itself by its reverse pull to overcome the momentum of the carriage and bring the same to a smooth easy stop without shock or jar.

In operation at the completion of each line of writing the operator simply depresses the contact-maker or key with the finger or thumb, thus closing the electric circuit through the solenoid, and thereby retracting the solenoid-core, and with it the type-writer carriage, the initial compression of the air in the interposed air-cylinder actuating the piston of the supplemental air-cylinder, which is in connection therewith, and thus turning the platen.

I claim—

1. In a type-writer, the combination with the reciprocating carriage and its rotatable platen and platen-turning lever, of a solenoid having a long sliding soft-iron core or plunger, an air-cylinder and piston interposed between said solenoid-core and carriage, and a supplemental air-cylinder and piston in connection therewith, and a connection between the supplemental-cylinder piston and the platen-turning lever, substantially as specified.

2. In a type-writer, the combination with the reciprocating carriage, of a solenoid having a long sliding soft-iron core connected to the carriage for returning it to position after the completion of a line and gradually stopping the carriage at the end of its return movement without shock or jar, substantially as specified.

3. The combination with a reciprocating type-writer carriage, of a solenoid having a core with a reciprocating movement corresponding to that of the carriage, and a connection between the solenoid-core and carriage, whereby the carriage is returned to position quickly after completion of a line, and gradually stopped without shock or jar, substantially as specified.

4. The combination with a reciprocating type-writer carriage, of a solenoid having a core with a reciprocating movement corresponding to that of the carriage, and a loose or flexible connection between the solenoid-core and carriage, whereby the carriage is returned to position quickly after completion of a line, and gradually stopped without shock or jar, substantially as specified.

5. The combination with a type-writer carriage, of a centrally and pivotally supported solenoid for returning the carriage to position, substantially as specified.

6. The combination with a type-writer carriage, of an inclined solenoid for returning the carriage to position, the inclination of the so-

lenoid preventing it from interfering with the free movement of the carriage, substantially as specified.

7. The combination with a type-writer carriage, of an inclined centrally and pivotally supported solenoid for returning the carriage to position, substantially as specified.

8. The combination with a type-writer carriage, of an inclined centrally and pivotally supported solenoid for returning the carriage to position, and a loose pivotal connection between the core of the solenoid and the carriage, substantially as specified.

9. The combination with a type-writer carriage, of a solenoid and a fluid-cylinder and piston interposed between the core of the solenoid and the carriage, substantially as specified.

10. The combination with a type-writer carriage and platen, of a solenoid, a fluid-cylinder and piston interposed between the solenoid-core and carriage, and a supplemental fluid-cylinder and piston for turning the platen, substantially as specified.

11. The combination with a reciprocating type-writer carriage, of a solenoid having a sliding core connected to the carriage to return the same to position, the solenoid also exerting a retarding movement on the carriage to overcome its momentum, whereby the carriage is returned to position quickly after completion of a line, and gradually stopped without shock or jar, substantially as specified.

12. The combination with a type-writer carriage, of a solenoid having a sliding core connected thereto, and a cushion device interposed in the connection between the solenoid-core and the carriage, whereby the carriage is returned to position quickly after completion of a line, and gradually stopped without shock or jar, substantially as specified.

13. The combination with a type-writer carriage, of a solenoid having a sliding core or plunger connected to the carrriage, and provided with two coils connected in series, whereby the carriage is returned to position quickly after completion of a line, and gradually stopped without shock or jar, substantially as specified.

14. The combination with a type-writer carriage, of a solenoid furnished with trunnions at its middle portion, a supporting-yoke upon which the trunnions turn to permit the solenoid to swing vertically, and a vertically-adjustable standard upon which the yoke turns horizontally, substantially as specified.

15. The combination with a type-writer carriage, of a solenoid having trunnions at its middle portion and above its central axis, a supporting-yoke and a loose or flexible connection between the solenoid-core and the carriage, whereby the carriage is returned to position quickly after completion of a line, and gradually stopped without shock or jar, substantially as specified.

16. The combination with a type-writer carriage and its platen, of a solenoid having a sliding core or plunger, and connecting means for causing the solenoid to return the carriage to position and turn the platen for the next line, whereby the carriage is returned to position quickly after completion of a line, and gradually stopped without shock or jar, substantially as specified.

17. In a type-writer, the combination with the type-writer carriage, of a key or contact-maker adjacent to the type-writer keyboard, an electric circuit, a solenoid having a core or plunger moving the length of the type-writer-carriage travel, and a connection between the solenoid-core and the type-writer carriage, whereby the carriage is returned to position quickly after completion of a line, and gradually stopped without shock or jar, substantially as specified.

18. In a type-writer, the combination with the type-writer carriage, of a key or contact-maker adjacent to the type-writer keyboard, an electric circuit, a solenoid having a core or plunger moving the length of the type-writer-carriage travel, a connection between the solenoid-core and the type-writer carriage, and an independent and adjustable support for the solenoid, substantially as specified.

19. In a type-writer, the combination with the type-writer carriage, of a key or contact-maker adjacent to the type-writer keyboard, an electric circuit, a solenoid having a core or plunger moving the length of the type-writer-carriage travel, a connection between the solenoid-core and the type-writer carriage, and an independent and adjustable support for the solenoid, said solenoid being centrally and pivotally mounted to swing horizontally and vertically on its adjustable support, substantially as specified.

20. In a type-writer, the combination with the type-writer carriage, of a key or contact-maker adjacent to the type-writer keyboard, an electric circuit, a solenoid having a core or plunger moving the length of the type-writer-carriage travel, a connection between the solenoid-core and the type-writer carriage, an independent and adjustable support for the solenoid, said solenoid being centrally and pivotally mounted to swing horizontally and vertically on its adjustable support, and an elastic or yielding device interposed in the connection between the solenoid-core and writer type-carriage, substantially as specified.

GEORGE HART MORSE.

Witnesses:
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