No. 656,576. Patented Aug. 21, 1900.

T. CAHILL.

TYPE WRITING MACHINE.

(Application filed Aug. 3, 1896.)

(No Model.) 2 Sheets—Sheet 1.

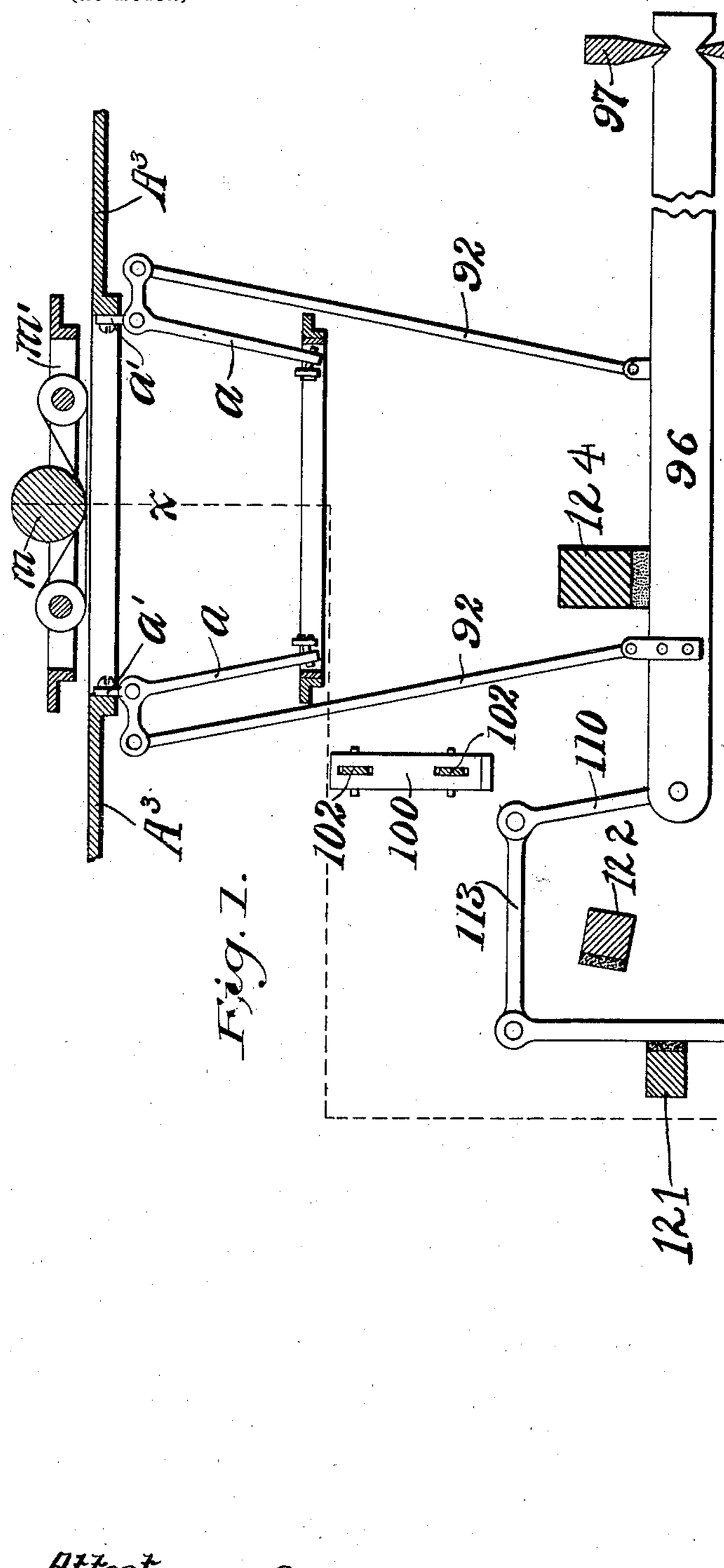

Fig. 1.

Attest
A. M. Paynter.
Arthur T. Cahill.

Inventor,
Thomas Cahill

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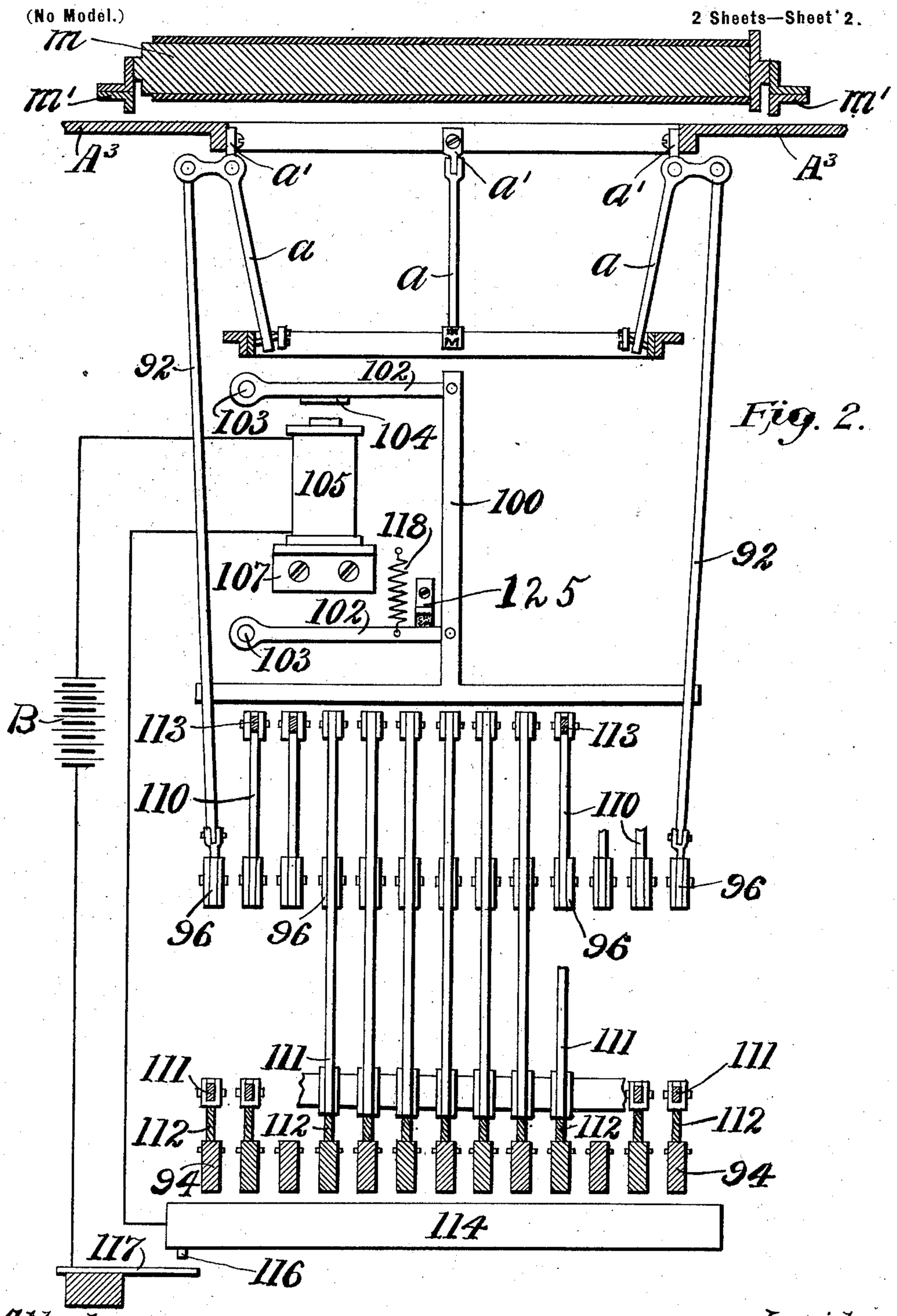

Fig. 2.

Attest: A. M. Poynton
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UNITED STATES PATENT OFFICE.

THADDEUS CAHILL, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF, AMOS J. CUMMINGS, GEORGE F. CAHILL, ARTHUR T. CAHILL, AND E. HILTON JACKSON, TRUSTEES.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 656,576, dated August 21, 1900.

Original application filed January 4, 1896, Serial No. 574,359. Divided and this application filed August 3, 1896. Serial No. 601,520. (No model.)

To all whom it may concern:

Be it known that I, THADDEUS CAHILL, a citizen of the United States, and a resident of the city, county, and State of New York, (but temporarily residing at Washington, in the District of Columbia,) have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

This application is a division of original application, Serial No. 574,359, filed January 4, 1896.

The principal objects of my invention are (*a*) to increase the ease of operating type-writing machines, (*b*) to increase their speed, and (*c*) to make the weight of the printing independent of the touch upon the key, thereby to secure uniformity of printing; and my invention consists in the parts, improvements, and combinations hereinafter described and claimed.

In operating a type-writing machine rapidly considerable force is required to give the type-bars and other moving parts the velocities which rapid operation of the machine involves. To exert the necessary force by abrupt sharp blows, repeated with great rapidity, as type-writing machines as now constructed require, tends to fatigue the operator, not so much by reason of the total amount of work performed as of the nervous tension which the peculiar mode of doing such work requires. By my invention the operator does not impel the type-bars by his own force, but by depressing the key he calls a motor or power device into action and connects the type-bar or equivalent part corresponding to the key depressed with said motor, so that it is impelled thereby. These operations (to wit, calling the motor into activity and connecting the type-bar with the motor) involve a trifling amount of force, and I make the touch of the machine very light. Also I am enabled to greatly reduce the dip of the key, which at once increases the speed and reduces the labor of operating the machine. Moreover, the small resistance which the finger has to overcome with my construction is chiefly an elastic spring resistance, which, unlike the inertia resistance of the present machines, does not increase with an increase in the speed of operation. I thus reduce both the nervous tension and the muscular exertion required of the operator and make the rapid operation of the machine easy. I also increase the speed of operation materially. Further, in the type-bar type-writing machines in common use the weight of printing depends upon and is governed by the force with which the keys are depressed. If the key be depressed forcibly, the printing is black or heavy; but if the key be depressed lightly the printing is faint, and, indeed, if the touch be very light there will be no printing at all. It thus becomes necessary for the operator to cultivate a uniform weight of touch; but the strength of the fingers is very unequal, the forefinger and the middle finger being very much stronger than the ring-finger and the little finger. Now this necessity for a touch of uniform force and the further necessity for exerting considerable force to move the type-bars with the requisite rapidity and to print with the requisite force lead the great majority of operators to actuate the keys with a few fingers only. Some operators use only the forefinger of each hand, many (probably the majority) use only the forefinger and the middle finger. Some others use the forefinger, the middle finger, and the ring-finger, and a very few, probably not five in a hundred at this date, use all the fingers. The fewer the fingers used the larger travel of the hands there must be and the more narrowly the eyes must watch the keyboard to prevent mistakes in touching the keys; but by my invention the touch is made to be so light and the keys are operated with such facility that the operator can readily use all his fingers, even the little finger. Thus the amount of travel of the hands over the keyboard is reduced, the keys do not need to be watched so closely, and the ease and speed of operation are increased, and, finally, I arrange everything in such manner that the type-bar is actuated and the type carried thereby thrown from its normal position

toward the printing-center by a force other than that exerted by the operator upon the key—to wit, by the power of a motor which exerts always the same force whether the key be pressed down with a light force or with a very great force—and by this means I relieve the operator from the necessity of using a uniform pressure upon the keys, lighten his labor, increase the speed of the machine, and secure uniform printing. These important advantages resulting from my invention are not speculative or theoretical merely. They have been proved by the actual use of the machines which I have had built, and they are apparent to any intelligent person upon an examination and use of those machines.

The accompanying drawings illustrate a convenient form of device for carrying out my invention. They show the invention as applied to a type-writing machine of the common kind, having type-bars arranged about a circle and striking to a common printing-point on the bottom of the paper-roll.

Figure 1 is a sectional view, partly in elevation, through the center of the machine, parallel to the length of the key-levers; and Fig. 2 is a sectional view in elevation on the line $x\,x$, Fig. 1. Both figures are largely diagrammatic.

The drawings are not to scale and no attempt is made to represent a complete machine with all its details. Enough only is shown to clearly illustrate the essential principles of the invention and the manner of connecting those parts which are new with me with the essential parts of the old structure of a type-bar type-writing machine familiar to all persons skilled in the art.

A few type-bars only are illustrated in the drawings and a few keys only; but it is to be understood that in the preferred form of device illustrated in the drawings there is a type-bar for each letter of the alphabet and also preferably other type-bars for figures or marks and a key for each type-bar to control said type-bar. As figured in the drawings, each type-bar carries two characters, usually an upper-case and lower-case letter; but obviously this is not indispensable.

In the drawings, 94 94 are the usual key-levers centered between the fulcrum-bars 95 95.

96 96 are levers centered between fulcrum-bars 97 97 and connected by pull-down wires 92 92 with the type-bars $a\,a$, which latter are hung by hangers $a'\,a'$ in the usual manner. 100 is a frame impelled by a motor in a manner hereinafter described. A swinging arm 110 is pin-jointed to each of the levers 96 96. Said swinging arm 110 is connected with the corresponding key 94 by means of a bell-crank lever 111, flexible cord 112, and link 113. When a key 94 is in its normal position, the bell-crank 111 rests against the felted bar 121, thus holding the swinging arm 110 out from under the frame 100, so that said frame can move down under the influence of the motor device, hereinafter described, without catching the swinging arm 110; but when a key is depressed it pulls through the flexible cord 112 down upon the horizontal arm of the bell-crank 111, so thrusting the vertical arm of said bell-crank inward, and thus through the link 113 thrusting the swinging arm 110, connected with the corresponding lever 96, in under the frame 100 into such a position that said frame cannot descend without catching said swinging arm 110 and pressing it down, thereby depressing the lever 96, which through the pull-down wire 92 impels the type-bar a, throwing the type up against the paper carried by the paper-roll m, so that it prints. One effect then, it will be seen, of depressing any key is to thrust the swinging arm 110, connected with the corresponding lever 96, in under the motor-frame 100. At the same time the key causes the motor-frame to operate. One construction for this purpose is as follows: The motor-frame is mounted by means of bridle-levers 102 102, which are suitably fulcrumed upon centers 103 103. 105 is an electromagnet whose armature 104 is connected with the motor-frame 100, being attached to the bridle-lever 102. The magnet 105 is attached to a suitable support or bracket 107, which is in turn secured to or formed as part of the main frame of the machine, which main frame (as it may be of any suitable shape) I have not thought it necessary to illustrate in the drawings. Said magnet when energized by the passage of an electric current through its coils draws down its armature 104, thereby depressing the frame 100, which in turn depresses the particular swinging arm 110 (belonging to the key depressed) which has been thrust under it, thus depressing the lever 96 and throwing up the corresponding type, so that it prints upon the paper carried by the paper-roll m.

The magnet 105 is controlled by the following mechanism: Underneath all of the keys 94 94 is a rocking frame having a front rail 114 and a center rod 115, suitably connected and lying transverse to the keys in such a position that any key depressed touches the front rail 114 and depresses it. One terminal of the coils of the motor-magnet 105 is connected with the metallic front rail 114 of the rocking frame aforesaid, and the other terminal of the coils of said electromagnet is connected through the battery B with the contact-spring 117. The platinum point 116 is set in the front rail 114 of the rocking frame aforesaid in make-and-break relation with the contact-spring 117.

m is the paper roll or platen, and m' is the frame of the traveling paper-carriage.

A^3 is the top plate of the machine.

The ribbon mechanism, spacing mechanism, and other usual details not being material to my invention are omitted. Any suitable sort of spacing mechanism whatever may be used. Spacing mechanism may be used—for example, such as that fully described in prior pending applications of mine, Serial No. 572,121,

filed December 14, 1895, or Serial No. 574,359, filed January 4, 1896, (which have since issued as Letters Patent No. 600,119, dated March 1, 1898, and No. 566,442, dated August 25, 1896, respectively)—having another magnet in circuit with the magnet 105 and battery B serving to move the space-dogs every time the circuit is closed and opened, or any of the spacing mechanisms now used in the art impelled by the keys may be used, or any other spacing mechanism whatever that is suitable for the purpose may be used. The felted stop-bar 122 serves to limit the downward movement of the keys 94 94 and the inward movement of the swinging arms 110 110. Other felted stop-bars 123 and 124 serve to limit the upward movement of the key-levers 94 94 and the levers 96 96, respectively. The levers 94 94 and 96 96 are returned to their normal positions by springs. (Not shown in the drawings.)

The operation is as follows: When any key is depressed, it thrusts the swinging arm 110, connected with the corresponding lever 96 and type-bar *a*, in under the motor-frame 100 in the manner above described, and at the same time it depresses the front rail of the frame 114, so that the platinum point 116 closes the circuit of the battery B with the contact-spring 117 through the electromagnet 105. Said magnet immediately becomes energized by the passage of the battery-current and attracts its armature 104, which presses the motor-frame 100 down upon the swinging arm 110, thereby depressing the corresponding lever 96 and throwing the corresponding type up against the paper carried by the paper-roll *m*, thus printing the required character. When the key 94 is released, the frame 114 rises, (under the influence of a returning-spring, not shown,) the platinum point 116 moves away from the contact-spring 117, the circuit of the battery B is broken, the magnet 105 loses its magnetism, the motor-frame 100 under the influence of the contractile spring 118 returns to its normal position of contact with the felted adjustable stop 125, and the bell-crank lever 111 returns to its normal position under the influence of the contractile spring 126 and withdraws its swinging arm 110 from its position underneath the motor-frame. Thus everything is ready for another operation.

By my invention it will be seen a single electromagnet of very moderate size may be made to do the work which now tends very materially to fatigue the operater. The touch may be made as light as any one desires, and the play of the keys may be reduced to a fraction of what is now required, and, moreover, the electromagnet 105 operates always in the same manner and throws the type-bar up to strike with the same uniform force whether the key be depressed with great force or with very moderate force, thus securing uniform printing, or, at least, securing more nearly uniform printing, without any care or attention to that matter on the part of the operator than can now be secured by the greatest care and attention.

Obviously my invention is susceptible of many modifications. Other motor devices than electromagnets may be used, and I wish it to be understood that while I consider an electromagnetic motor device as a most convenient motor device, at least in most situations, I do not limit myself thereto except in those paragraphs of claim in which such limitation is clearly expressed, for some of the most important features of my invention may be carried out in connection with other forms of motor device than the electromagnetic form. The exact form of the motor-frame is not material, and obviously it may be varied within wide limits. I have, in fact, used several other forms of motor-frame; but whatever the geometrical shape of the frame I have always found it advantageous, and, in fact, a matter of great importance, to make the frame very light, so that it can move back and forth with great rapidity without requiring too much power to start it and without making any more noise in starting and stopping than that which cannot be avoided. Also I have found it advantageous to pivot said frame, thereby minimizing the friction and reducing also the average *vis viva* of its various parts or particles; but I do not limit myself to a pivoted, swinging, or oscillating motor-frame except in those few paragraphs of claim in which a combination with such limitation is expressed. Instead of using a single motor device and motor-frame for the whole machine a plurality of motor devices and motor-frames might obviously be used, each serving for a part of the keys and type-bars, and while I consider it very advantageous in many ways to use a single vibratory frame or a single motor device for the entire alphabet of type-bars I do not, I wish it to be very clearly understood, limit myself to that construction except in those paragraphs of claim in which such limitation is clearly expressed by apt words. The means herein illustrated for connecting the type-bars with the vibratory frame 100 or with the motor device which impels said frame are suitable for the purpose in a machine of the kind herein illustrated; but consistently with certain broad features of my invention, which are set forth in the statement of claim at the end hereof, other and more or less widely different means may be used for connecting the type-bars with the motor device. It will be understood, therefore, that I do not limit myself in any of the paragraphs of claim at the end hereof to the details of construction herein illustrated any further than is clearly pointed out by apt words in such claim, and one paragraph of claim, it will be observed, is limited to one or to several features of construction which find an embodiment in the mechanism hereinbefore described, and illustrated in the draw-

ings, and is not limited to other such features to which in turn some other paragraph of claim will be found to be limited, and any limitation which is expressed in one paragraph of claim and is not expressed in another paragraph of claim should not be read into the claim from which it has been omitted, for the broader features of my invention may be carried out in machines widely differing in form and in details from the one illustrated in the accompanying drawings. It will therefore be understood that many variations and alterations (some of which may in fact involve invention) may be made from the mechanism hereinbefore illustrated and described without departing from certain essential features of my invention pointed out in the statement of claim at the end hereof; and in particular while I prefer to use, wherever an electric current can be conveniently had, an electromagnet for a motor device to actuate the type-bars I do not limit myself by the word "motor" or by the words "motor device" to an electromagnet or to an electromagnetic device, for other forms of motor device not being electric and not having electromagnets may be used instead, as stated hereinbefore and as clearly pointed out in other patents and pending applications of mine; also, while I have illustrated a single motor-controlling device controlled by a complete set of keys, and while I consider that a very convenient arrangement for the purpose, I wish it to be understood that I do not limit myself to using a single motor-controlling device for a whole alphabet of keys except in those few paragraphs of claim in which such limitation is clearly expressed by apt words. By making one motor-controlling device serve for a plurality of keys, particularly by making a single motor-controlling device serve for all the keys, the number of parts is reduced and the mechanism made to be in this respect as simple and cheap as possible. I have shown that form of key-controlled connection between the type-bar and motor which I consider best; but any other suitable form of key-controlled connection whatever may be used. I have in fact employed other and widely-differing forms, and I do not restrict myself to any particular form except in those paragraphs of claim in which some restriction in this respect is clearly expressed.

In several of the paragraphs of the claim at the end hereof I speak of "pivotal connections." Thus, for example, I speak of "swinging movement-receiving members" and "pivotal connections" between said members and the type-bars. By "pivotal connections" I mean connections which are pivoted or which contain pivots. Thus, for example, in Fig. 1 the movement-receiving member 110 is pivoted to the lever 96, which is in turn connected with the type-bar by the link 92, which link is pivoted both to the lever 96 and to the type-bar *a*. In this case we have pivotal connections, it will be seen, at three points; but a single pivot is sufficient to make the connections pivotal connections in the sense in which I use the language in this specification.

In a number of paragraphs of the claims at the end hereof I speak, in effect, of the "motor" or the "electromagnet" or the "vibratory frame" giving movement to the type-bars from their normal positions to the printing-center, or throwing the type-bar or the type carried thereby from its normal position to the printing-center. I do not mean, however, by this language to imply that the motor is actually supplying power to the type-bar at every point of the type-bar's movement, for that is neither necessary nor, in fact, especially advantageous; but I mean by the expressions above referred to that the motor or electromagnet or vibratory frame (whichever one may be mentioned in a particular claim) applies to the type-bar the power which causes the type-bar to move from its normal position to the printing-center. This power once applied the type-bar can of course complete its movement under the momentum thus acquired, even though the motor apply no power to it during the latter part of its movement.

In various places in this specification, and particularly in several of the paragraphs of claims at the end hereof, I speak of a type-writing-machine having a "main keyboard." By this term "main keyboard" I mean the keyboard proper of a type-writing machine in contradistinction to any keyboard which may be applied by way of attachment to a type-writing machine to operate the keys of the main keyboard or the levers corresponding thereto. In the sense in which I use the language a common type-writing machine—such as the Remington machine or the Smith Premier machine or the Caligraph, for example—has a main keyboard, and it has usually no other keyboard. By the expression "type-writing machine having a main keyboard," then, it will be understood that I do not mean to imply that such a type-writing machine has also some other keyboard, but merely to differentiate by this language "main keyboard" the usual and proper keyboard of a type-writing machine built therewith and forming a part thereof from any keyboard which may be applied as a mere attachment to a type-writing machine to operate the keys of the main keyboard or the levers corresponding thereto.

In some places in this specification, particularly in the statement of claims at the end hereof, I speak of "mechanical connections." By this term "mechanical connections" I mean connections which are wholly mechanical, and I do not include under this term "mechanical connection" either electric or pneumatic connections.

Finally, I wish it to be very distinctly understood that it is not my intention or desire

to dedicate or abandon any part of my invention to the public, and that I wish full and just protection for all that is new with me.

I do not claim herein anything that is claimed in my other pending applications, Serial No. 522,435, filed September 8, 1894; Serial No. 684,880, filed June 30, 1898, and Serial No. 700,234, filed December 24, 1898; but

What I do claim in this application as of my own invention, and desire to secure by Letters Patent hereunder, is—

1. In combination in a type-writing machine having a main keyboard, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) a single motor device common to said type-bars for giving movement to said type-bars from their normal positions to the printing-center, each as required; said motor device being normally inactive and said type-bars being normally disconnected therefrom; (*c*) keys of said main keyboard, for controlling with a single action the type-bars aforesaid, each as required; (*d*) means controlled by said keys acting, when a key is depressed, to connect the appropriate type-bar with the motor device aforesaid so that it can receive movement therefrom, and also operating to bring said motor device into action so that it impels said type-bar as aforesaid.

2. In combination in a type-writing machine, (*a*) a plurality of type-bars, striking to a common printing-center; (*b*) a motor device, common to said type-bars, for giving movement to said type-bars, each as required; said motor device being normally inactive and said type-bars being normally disconnected therefrom; (*c*) keys, at the keyboard of said type-writing machine, corresponding to the type-bars aforesaid, a key for each of the type-bars actuated by the motor device aforesaid; and (*d*) means, controlled by said keys, acting, when a key is depressed, to connect the corresponding type-bar with the motor device aforesaid, so that it can receive movement therefrom, and also operating to bring said motor device into action, so that it impels said type-bar, throwing the type carried by said type-bar from its normal position toward the printing-center.

3. In combination in a type-writing machine or other similar instrument, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) a motor device common to said type-bars, for actuating said type-bars, each as required; said motor device being normally at rest, and said type-bars being normally disconnected therefrom; (*c*) keys, corresponding to the type-bars aforesaid, a key for each of the type-bars that is actuated by the motor device aforesaid; (*d*) mechanical connections intermediate the keys aforesaid and the type-bars aforesaid, whereby each key, when depressed, brings the corresponding type-bar into relation with the motor device aforesaid, to receive movement therefrom; said keys being connected to control said motor device; whereby, when a key is depressed, the corresponding type-bar is actuated and the type carried by said type-bar thrown from its normal position to the printing-center by a force other than that exerted by the operator upon the key; the touch made to be light, and the strength of the printing made to be independent of the pressure exerted by the operator upon the key.

4. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) a motor device common to said type-bars, for giving movement to said type-bars, each as required; (*c*) movement-receiving members, suitably connected with said type-bars, (*d*) keys corresponding to the movement-receiving members aforesaid, a key for each movement-receiving member; said keys being each connected with the movement-receiving member to which it corresponds, and giving movement thereto in such manner that it actuates always that same movement-receiving member, to bring said movement-receiving member when said key with which it is connected is depressed, into relation with the motor device aforesaid, to receive movement therefrom; each of said keys serving also, when depressed, to bring the motor aforesaid into action, so that it actuates the type-bar corresponding to said key depressed.

5. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) a motor device common to said type-bars, for giving movement to said type-bars, each as required; said motor device being normally at rest and said type-bars being normally disconnected therefrom; (*c*) movement-receiving members suitably connected with the type-bars aforesaid; (*d*) keys at the keyboard of said type-writing machine, corresponding to said movement-receiving members; (*e*) a motor-controlling device, common to a plurality of the keys aforesaid; each of said keys acting, when depressed, to bring the corresponding movement-receiving member into relation with the motor aforesaid, to receive movement therefrom; said key acting also, when depressed, to control the motor-controlling device aforesaid; said motor-controlling device serving, when one of the keys controlling it has been depressed, and is at rest in its depressed position, to bring the motor aforesaid into action; whereby, when a key is depressed, the corresponding type-bar is actuated and the type thrown from its normal position toward the printing-center by a force other than that exerted by the operator upon the key; the touch made to be light, and the strength of the printing made to be independent of the pressure exerted by the operator upon the key.

6. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) a motor device common to said type-bars, for actuating said type-bars, each as required; said motor device

being normally inactive, and said type-bars being normally disconnected therefrom; (*c*) swinging, movement-receiving members; (*d*) pivotal connections between said members and said type-bars; (*e*) keys for controlling the swinging movement-receiving members aforesaid to bring said members each as required, into relation with the motor device aforesaid, to receive movement therefrom; and (*f*) means, controlled by the keys aforesaid, acting, when a key is depressed, to bring the motor aforesaid into action, so that it gives movement to the swinging movement-receiving member controlled by the key depressed, thereby to actuate the corresponding type-bar.

7. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) a single motor for actuating said type-bars, each as required; (*c*) a pivoted movement-receiving member for each type-bar, suitably connected with said type-bar and serving to receive movement from the motor aforesaid; said member being normally disconnected from said motor; (*d*) keys correponding to the type-bars aforesaid and each acting, when depressed, to give movement to the movement-receiving member connected with the type-bar to which said key corresponds, to throw said movement-receiving member into operative relation with the motor aforesaid to receive movement therefrom; and (*e*) a motor-controlling device, common to a plurality of the keys aforesaid, and operated by them, each key acting, when depressed, upon said motor-controlling device to bring the motor aforesaid into action, for the impelling of the corresponding type-bar.

8. In combination in a type-writing machine, (*a*) an alphabet of type-bars striking to a common printing-center; (*b*) keys, corresponding to said type-bars, and equal in number thereto; (*c*) a single motor device, common to a plurality of the type-bars aforesaid, for actuating said type-bars, each as required; said motor device being normally inactive, and said type-bars being normally disconnected therefrom; (*d*) means, controlled by the keys, corresponding to the type-bars to which the motor device aforesaid is common, serving when any of said keys is depressed, to connect the corresponding type-bar with the motor device aforesaid, and to bring said motor device into action, so that it impels said type-bar, throwing the type carried by said type-bar from its normal position to the printing-center.

9. A type-writing machine, including in combination, (*a*) an alphabet of type-bars, striking to a common printing-center; (*b*) keys, corresponding to said type-bars, and equal in number thereto; (*c*) a single motor device for actuating a plurality of said type-bars, said motor device being normally inactive and said type-bars being normally disconnected from said motor device; (*d*) devices, corresponding to the type-bars actuated by the motor device aforesaid, a device for each such type-bar, operated by the corresponding one of the keys aforesaid, for bringing said type-bar into operative relation with the motor device aforesaid when said key is depressed; and (*e*) means, operating when a key corresponding to one of the type-bars actuated by the motor device aforesaid is depressed, to bring said motor device into action so that it impels the type-bar corresponding to the key depressed, throwing the type carried by said type-bar from its normal position to the printing-center, whereby the printing is effected by means of a force other than that applied by the operator to the key, and the strength of the printing made to be independent of the force exerted by the operator upon the key.

10. A type-writing machine, including in combination, (*a*) an alphabet of type-bars striking to a common printing-center; (*b*) keys, corresponding to said type-bars, a key for each type-bar; (*c*) a single motor device for actuating a plurality of said type-bars, each type-bar as required; said motor device being normally inactive and said type-bars being normally disconnected therefrom; (*d*) movement-receiving members connected with the type-bars that are actuated by the motor device aforesaid, a movement-receiving member for each such type-bar; and (*e*) a controlling device for the motor aforesaid, common to a plurality of the keys aforesaid and operated thereby; each of the keys that operates said motor-controlling device acting, when depressed, both to control the movement-receiving member connected with the type-bar corresponding to said key to bring said movement-receiving member into relation with the motor device aforesaid to receive movement therefrom, and also to operate the motor-controlling device aforesaid to bring the motor aforesaid into action, so that it gives movement to said movement-receiving member and the corresponding type-bar; whereby, when a key is depressed, the type-bar corresponding thereto is actuated, and the type thrown from its normal position to the printing-center by means of a force other than that exerted by the operator upon the key; the touch made to be light, and the strength of the printing made to be independent of the force exerted by the operator upon the key.

11. In combination, in a type-writing machine, (*a*) an alphabet of type-bars striking to a common printing-center; (*b*) keys, equal in number to said type-bars, a key for each type-bar; (*c*) a single motor, common to the alphabet of type-bars aforesaid, for actuating all said type-bars, to throw said type-bars each as required, from its normal position to the printing-center; said motor device being normally inactive, and said type-bars being normally disconnected therefrom; and (*d*) a single motor-controlling device, operated by all the keys aforesaid, each key acting, when

depressed, upon said motor-controlling device to bring the motor aforesaid into action for the impelling of the corresponding type-bar.

12. In combination, in a type-writing machine, (*a*) keys, corresponding to the letters of the alphabet, a key for each letter; (*b*) type-bars, corresponding to said keys; said type-bars striking to a common printing-center; (*c*) a single motor device, common to said keys and type-bars, for actuating all said type-bars, each as required, to throw the type from its normal position toward the printing-center; said motor device being normally inactive; (*d*) movement-receiving members, suitably connected with the type-bars aforesaid, a movement-receiving member for each type-bar; said movement-receiving members serving each to receive movement from the motor device aforesaid for the impelling of the type-bar with which it is connected; said movement-receiving members being normally disconnected from the motor device aforesaid; each of the keys aforesaid serving when depressed, to bring the movement-receiving member connected with the corresponding type-bar, into operative relation with the motor aforesaid, to receive movement therefrom; and (*e*) a motor-controlling device, common to a plurality of the keys aforesaid, and operating, when any of said keys is depressed, to bring the motor aforesaid into action so that it gives movement to the movement-receiving member controlled by the key depressed, thereby to actuate the corresponding type-bar.

13. In combination, in a type-writing machine, (*a*) an alphabet of type-bars striking to a common printing-center; (*b*) keys, equal in number to said type-bars; (*c*) a single motor for actuating all said type-bars, to throw said type-bars, each as required, from its normal position toward the printing-center; said motor being normally inactive and said type-bars being normally disconnected therefrom; (*d*) devices corresponding to said type-bars, a device for each type-bar, actuated by the corresponding key, for bringing said type-bar into operative relation with the motor aforesaid to receive movement therefrom; and (*e*) a single frame, operated by all the keys aforesaid; said frame being connected to control the motor aforesaid, and acting when a key is depressed, to bring the motor aforesaid into action for the impelling of the corresponding type-bar.

14. In combination, in a type-writing machine, (*a*) a plurality of type-bars, striking to a common printing-center; (*b*) a vibratory frame, for giving movement to said type-bars, to throw said type-bars each as required, from their normal positions to their printing-center; said frame being normally at rest, and said type-bars being normally disconnected therefrom; (*c*) keys at the keyboard of said type-writing machine, equal in number to the type-bars actuated by the vibratory frame aforesaid and corresponding to said type-bars, a key for each such type-bar; and (*d*) means, acting, when a key is depressed, to connect the type-bar corresponding to such key with the vibratory frame aforesaid whereby said type-bar is actuated and the type carried thereby thrown from its normal position toward the printing-center.

15. In combination in a type-writing machine having a main keyboard, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) a vibratory frame for giving movement to said type-bars to throw said type-bars, each as required, from their normal positions to their printing-center; said frame being normally at rest and said type-bars being normally disconnected therefrom; (*c*) a motor device for actuating said vibratory frame; (*d*) keys of said main keyboard; and (*e*) means controlled by said keys acting, when a key is depressed both to connect the appropriate type-bar with the vibratory frame aforesaid so that it can receive movement therefrom, and to bring the motor device aforesaid into action to operate said vibratory frame and the type-bar connected therewith; whereby when a key is depressed the appropriate type-bar is actuated and the type carried thereby thrown from its normal position toward the printing-center by a force other than that exerted by the operator upon the key, the touch made to be light, and the strength of the printing made to be independent of the pressure exerted by the operator upon the key.

16. In combination, in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) a vibratory frame for giving movement to said type-bars, to throw said type-bars, each as required, from their normal positions to their printing-center; said frame being normally at rest; and said type-bars being normally disconnected therefrom; (*c*) keys at the keyboard of said type-writing machine, equal in number to the type-bars actuated by the vibratory frame aforesaid; a key for each such type-bar; (*d*) a device for each type-bar, controlled by the corresponding key, acting when said key is depressed, to connect said type-bar with the vibratory frame aforesaid to receive movement therefrom; (*e*) a motor for actuating the vibratory frame aforesaid, and (*f*) a motor-controlling device, common to a plurality of the keys aforesaid, operated thereby, and acting, when any of said keys is depressed, to bring the motor aforesaid into action, so that it gives movement to the vibratory frame aforesaid, whereby when a key is depressed, the type-bar corresponding to such key is actuated, and the type carried thereby thrown from its normal position to the printing-center by a force other than that exerted by the operator upon the key, the touch made to be light, and the strength of the printing made to be independent of the force exerted by the operator upon the key.

17. In combination in a type-writing ma-

chine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) a vibratory frame for giving movement to said type-bars, each as required; said frame being normally at rest and said type-bars being normally disconnected therefrom; (*c*) movement-receiving members suitably connected with the type-bars for the actuating of which the vibratory frame aforesaid serves, a movement-receiving member for each such type-bar; said movement-receiving members being normally disconnected from the vibratory frame aforesaid, and (*d*) keys, at the keyboard of said type-writing machine, equal in number to the movement-receiving members, aforesaid, a key for each movement-receiving member, each key controlling the corresponding movement-receiving member and acting, when depressed, to give movement to said movement-receiving member, to bring said member into operative relation with the vibratory frame aforesaid to receive movement therefrom, for the impelling of the type-bar with which such movement-receiving member is connected.

18. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) a vibratory frame for giving movement to said type-bars, each as required; said frame being normally at rest, and said type-bars being normally disconnected therefrom; (*c*) swinging movement-receiving members; (*d*) pivotal connections between said members and the type-bars that are actuated by the vibratory frame aforesaid; (*e*) keys controlling the movement-receiving members aforesaid and each acting when depressed to swing the appropriate movement-receiving member into operative relation with the vibratory frame aforesaid to receive movement therefrom; and (*f*) a motor-controlling device common to a plurality of the keys aforesaid, operated thereby, and acting when a key is depressed, to bring the motor device aforesaid into action; whereby when a key is depressed, the corresponding type-bar is actuated and the type carried thereby thrown from its normal position to the printing-center by a force other than that exerted upon the key, the touch made to be light, and the strength of the printing made to be independent of the pressure exerted by the operator upon the key.

19. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) a vibratory frame, for actuating said type-bars, each as required; said frame being normally at rest and said type-bars being normally disconnected therefrom; (*c*) levers, corresponding to the type-bars aforesaid, a lever for each type-bar; (*d*) links, connecting said levers with said type-bars, a link for each type-bar and the corresponding lever; (*e*) movement-receiving members pivoted to said levers, one for each lever; (*f*) keys, at the keyboard, corresponding to said type-bars, a key for each type-bar; said keys each acting, when depressed, to give movement to the movement-receiving member connected with the corresponding type-bar, to bring said member into operative relation with the vibratory frame aforesaid to receive movement therefrom; and (*g*) a motor, controlled by the keys aforesaid, and acting when one of said keys is depressed, to operate the vibratory frame aforesaid, whereby the type-bar aforesaid is actuated.

20. In combination in a type-writing machine, a plurality of type-bars striking to a common printing-center, and a type-bar-controlling mechanism, including, (*a*) a vibratory frame, normally at rest, to throw said type-bars each as required, from their normal positions to their printing-center; the type-bars aforesaid being normally disconnected from said frame; (*b*) a plurality of movement-receiving members normally disconnected from the frame aforesaid; said movement-receiving members serving to receive movement from said frame, for the impelling of the type-bars aforesaid; (*c*) keys corresponding to the movement-receiving members aforesaid, and equal in number thereto, a key for each movement-receiving member, said keys each acting, when depressed, to bring the corresponding movement-receiving member into operative relation with the vibratory frame aforesaid to receive movement therefrom, for the impelling of a type-bar.

21. In combination in a type-writing machine, a plurality of type-bars striking to a common printing-center, and a type-bar-controlling mechanism including (*a*) a vibratory frame, normally at rest, to throw said type-bars each as required, from their normal positions to their printing-center; the type-bars aforesaid being normally disconnected from said frame; (*b*) a plurality of movement-receiving members normally disconnected from the frame aforesaid; said movement-receiving members serving to receive movement from said frame for the impelling of the type-bars aforesaid; (*c*) keys corresponding to the movement-receiving members aforesaid, and equal in number thereto, a key for each movement-receiving member, said keys each acting, when depressed, to bring the corresponding movement-receiving member into operative relation with the vibratory frame aforesaid to receive movement therefrom, for the impelling of a type-bar; (*d*) a motor device, for actuating the vibratory frame aforesaid; and (*e*) a controlling device for said motor common to a plurality of the keys aforesaid, said controlling device acting, when any of the keys to which it is common is depressed, to bring the motor aforesaid into action to operate the vibratory frame aforesaid, thereby to impel a type-bar.

22. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) an electromagnet for actuating said type-bars, each as re-

quired; (*c*) keys for controlling with a single action the type-bars aforesaid, each type-bar as required; and (*d*) means controlled by said keys acting, when one of said keys is depressed to bring the type-bar controlled by said key into operative relation with the electromagnet aforesaid to receive movement therefrom and to bring said magnet into action to operate said type-bar, the keys aforesaid acting solely, when depressed, to connect the type-bars with the magnet and to bring said magnet into action, said magnet thereupon operating to impel the type-bar from its normal position to the printing-center, independently of the force exerted by the operator upon the key, whereby when a key is depressed the appropriate type-bar is actuated and the type carried thereby thrown from its normal position toward the printing-center by means of a force other than that exerted by the operator upon the key, the touch is made to be light, and the strength of the printing made to be independent of the pressure exerted by the operator upon the key.

23. In combination in a type-writing machine, (*a*) a plurality of type-bars, striking to a common printing-center; (*b*) an electromagnet for actuating said type-bars, to throw said type-bars, each as required, from their normal positions to their printing-center; said electromagnet being normally inactive and said type-bars being normally disconnected therefrom; (*c*) keys, corresponding to the type-bars actuated by the electromagnet aforesaid, a key for each such type-bar; and means controlled by said keys, acting when one of said keys is depressed, to bring the type-bar with which such key corresponds into operative relation with the electromagnet aforesaid to receive movement therefrom, and to bring said magnet into action to operate said type-bar; whereby, when a key is depressed the corresponding type-bar is actuated, and the type carried thereby thrown from its normal position toward the printing-center by a force other than that exerted upon the key, the touch made to be light, and the strength of the printing made to be independent of the pressure exerted by the operator.

24. In combination in a type-writing machine, (*a*) a plurality of type-bars, striking to a common printing-center; (*b*) an electromagnet for actuating said type-bars, to throw said type-bars, each as required, from their normal positions to their printing-center; said electromagnet being normally inactive and said type-bars being normally disconnected therefrom; (*c*) keys, corresponding to the type-bars actuated by the electromagnet aforesaid, a key for each such type-bar; and means controlled by said keys, acting when one of said keys is depressed, to bring the type-bar with which such key corresponds into operative relation with the electromagnet aforesaid to receive movement therefrom; and (*d*) a circuit-controlling device common to a plurality of the keys aforesaid, operated by them, and acting, when any of said keys is depressed, to bring the electromagnet aforesaid into action to operate the type-bar corresponding to the key depressed, whereby said type-bar is actuated and the type thrown from its normal position toward the printing-center by means of a force other than that exerted by the operator upon the key; the touch made to be light, and the strength of the printing made to be independent of the pressure exerted upon the key.

25. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) an electromagnet for actuating said type-bars, each as required; said magnet being normally inactive and said type-bars being normally disconnected therefrom; (*c*) keys each acting when depressed, to bring one of the type-bars aforesaid into operative relation with the electromagnet aforesaid to receive movement therefrom; (*d*) a circuit-closing device, common to a plurality of the keys aforesaid, said circuit-closing device including a pair of circuit-terminals, each of said keys to which said circuit-closing device is common, serving, when depressed, to press upon said circuit-closing device, thereby to positively press the circuit-terminals aforesaid into contact with one another, to close the circuit of the electromagnet aforesaid; said electromagnet thereupon acting, when the key is at rest in its depressed position, to actuate the type-bar corresponding thereto to throw the type from its normal position to the printing-center, whereby the printing is effected by means of a force other than that applied by the operator upon the key; the touch made to be light and the strength of the printing made to be independent of the force exerted by the operator upon the key.

26. In combination, in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) an electromagnet for actuating all said type-bars, to throw said type-bars, each as required, from its normal position to the printing-center; (*c*) movement-receiving members for the type-bars actuated by the electromagnet aforesaid, a movement-receiving member for each such type-bar, suitably connected with said type-bar, and serving to receive movement from the electromagnet aforesaid for the impelling of said type-bar; said movement-receiving member being normally disconnected from the electromagnet aforesaid; (*d*) keys, corresponding to the type-bars aforesaid, a key for each type-bar, and each acting, when depressed, to cause the movement-receiving member connected with the type-bar corresponding to such key, to come into operative relation with the electromagnet aforesaid, to receive movement therefrom; and (*e*) a circuit-controlling device, operated by a plurality of the keys aforesaid, serving to control the electromagnet aforesaid.

27. In combination in a type-writing machine, (*a*) an alphabet of type-bars striking to a common printing-center; (*b*) keys, corresponding to said type-bars, and equal in number thereto; (*c*) an electromagnet, common to all said type-bars, for actuating said type-bars, to throw said type-bars each as required, from their normal positions to the printing-center; and (*d*) means, acting when a key is depressed, to bring the type-bar corresponding to such key into operative relation with the magnet aforesaid, to receive movement therefrom, and to bring said magnet into action for the impelling of said type-bar, to throw its type from its normal position to the printing-center, so that it prints.

28. In combination, in a type-writing machine, (*a*) an alphabet of type-bars striking to a common printing-center; (*b*) keys corresponding to said type-bars, a key for each type-bar; (*c*) an electromagnet for actuating all said type-bars, to throw said type-bars, each as required, from its normal position to the printing-center so that it prints; and (*d*) a single circuit-controlling frame operated by all the keys aforesaid, and acting to control the electromagnet aforesaid.

29. In combination, in a type-writing machine, (*a*) an alphabet of type-bars, striking to a common printing-center; (*b*) keys, equal in number to said type-bars; (*c*) an electromagnet for actuating all said type-bars, to throw said type-bars, each as required, from its normal position to the printing-center, so that it prints; (*d*) devices corresponding to said type-bars, a device for each type-bar, receiving movement from the corresponding key, and serving to bring the corresponding type-bar into operative relation with the electromagnet aforesaid, to receive movement therefrom; and (*e*) a single circuit-controlling device, operated by all the keys aforesaid, and acting to control the electromagnet aforesaid.

30. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) a vibratory frame for impelling the type-bars aforesaid, each as required; said frame being normally at rest and said type-bars being normally disconnected therefrom; (*c*) an electromagnet for actuating said frame; (*d*) keys; and (*e*) means controlled by said keys acting, when a key is depressed both to connect the appropriate type-bar with the vibratory frame aforesaid so that it can receive movement therefrom and to bring the electromagnet aforesaid into action to operate the vibratory frame aforesaid and the type-bar connected therewith; the keys aforesaid serving solely when depressed, to connect the type-bars with said vibratory frame and to bring the magnet aforesaid into action, said magnet thereupon operating said frame to impel the type-bar from its normal position to the printing-center, independently of the force exerted by the operator upon the key; whereby when a key is depressed the appropriate type-bar is actuated and the type carried thereby thrown from its normal position toward the printing-center by a force other than that exerted by the operator upon the key, the touch made to be light and the strength of the printing made to be independent of the pressure exerted by the operator upon the key.

31. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) a vibratory frame, normally at rest, for impelling the type-bars aforesaid, each as required; said type-bars being normally disconnected from said vibratory frame; (*c*) an electromagnet for actuating said frame; (*d*) movement-receiving members connected with the type-bars actuated by the frame aforesaid, a movement-receiving member for each such type-bar; (*e*) keys at the key-board, corresponding to the type-bars aforesaid, a key for each type-bar; each of said keys acting, when depressed, to give movement to the movement-receiving member connected with the type-bar to which said key corresponds, to bring said movement-receiving member into operative relation with the vibratory frame aforesaid to receive movement therefrom; said keys controlling the electromagnet aforesaid; said magnet serving, when one of said keys has been depressed and is at rest in its depressed position, to give movement to the movement-receiving member controlled by such key depressed, and to the type-bar with which said movement-receiving member is connected, to throw the type from its normal position toward the printing-center; whereby the type-bar is actuated and the printing effected by a force other than that exerted upon the key, the touch made to be light, and the strength of the printing made to be independent of the force exerted upon the key.

32. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) a vibratory frame, normally at rest; (*c*) an electromagnet for actuating said frame; (*d*) movement-receiving members connected with the type-bars aforesaid, a member for each type-bar; (*e*) keys at the keyboard, corresponding to the type-bars aforesaid, a key for each type-bar; each of said keys acting, when depressed, to give movement to the movement-receiving member connected with the type-bar to which said key corresponds, to bring said movement-receiving member into operative relation with the vibratory frame aforesaid to receive movement therefrom; (*f*) a circuit-controlling device for the electromagnet aforesaid; said circuit-controlling device being common to a plurality of the keys aforesaid, each of said keys to which said circuit-controlling device is common serving, when depressed, to operate said circuit-controlling device; whereby the electromagnet aforesaid is brought into action to operate the type-bar corresponding to the key depressed, to throw the type from its normal position toward the printing-center,

the printing effected by means of a force other than that exerted by the operator upon the key, the touch made to be light, and the strength of the printing made to be independent of the force exerted by the operator upon the key.

33. In combination in a type-writing machine, (*a*) an alphabet of type-bars striking to a common printing-center; (*b*) keys corresponding to said type-bars, a key for each type-bar; (*c*) a type-bar-impelling frame for giving movement to a plurality of the type-bars aforesaid, to throw said type-bars, each as required, from their normal positions to the printing-center; (*d*) an electromagnet for actuating said frame; and (*e*) a circuit-controlling frame common to a plurality of the keys aforesaid, controlled by said keys and controlling the circuit of the electromagnet aforesaid.

34. In combination in a type-writing machine, (*a*) an alphabet of type-bars striking to a common printing-center; (*b*) a frame for giving movement to a plurality of the type-bars aforesaid, each as required; said type-bars being normally disconnected from said frame; (*c*) an electromagnet for actuating said frame; (*d*) a movement-receiving member connected with each of the type-bars aforesaid, that is actuated by the frame aforesaid, to receive movement from said frame; (*e*) keys corresponding to the type-bars aforesaid, a key for each type-bar, a plurality of said keys serving each, when depressed, to give movement to the movement-receiving member connected with the type-bar to which such key corresponds, to throw such movement-receiving member into operative relation with the frame aforesaid to receive movement therefrom; and (*f*) a circuit-closing device, common to a plurality of the keys last aforesaid, and acting, when any of said plurality of keys is depressed, to bring the magnet aforesaid into action to impel the frame aforesaid and the type-bar connected with the movement-receiving member that is brought into operative relation with said frame by the key depressed.

35. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) levers, corresponding to said type-bars; (*c*) links, connecting said levers each with the type-bar to which it corresponds; (*d*) a frame, for actuating all the type-bars aforesaid, each as required; said frame being normally inactive, and said type-bars being normally disconnected therefrom; (*e*) movement-receiving members, pivoted to the type-bar-corresponding levers aforesaid, a movement-receiving member for each type-bar-corresponding lever; (*f*) keys, corresponding to the type-bars aforesaid, a key for each of the type-bars actuated by the frame aforesaid, said keys each serving, when depressed, to swing the movement-receiving member connected with the type-bar corresponding to such key, into operative relation with the frame aforesaid to receive movement therefrom; and (*g*) means, acting on the depressing of a key, to give movement to the frame aforesaid for the impelling of the type-bar corresponding to the key depressed.

36. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) levers, corresponding to said type-bars; (*c*) links, connecting said levers each with the type-bar to which it corresponds; (*d*) a frame for actuating all the type-bars aforesaid, said frame being normally inactive, and said type-bars being normally disconnected therefrom; (*e*) movement-receiving members, pivoted to the type-bar-corresponding levers aforesaid, a movement-receiving member for each type-bar-corresponding lever; (*f*) keys, corresponding to the type-bars aforesaid, a key for each of the type-bars that is actuated by the frame aforesaid; said keys each serving, when depressed, to bring the movement-receiving member corresponding to the type-bar to which such key corresponds, into operative relation with the frame aforesaid to receive movement therefrom; (*g*) a motor for actuating the frame aforesaid, and (*h*) a motor-controlling device, common to a plurality of the keys aforesaid, and serving when one of said keys is depressed, to bring the motor aforesaid into action to operate the frame aforesaid, thereby to actuate the type-bar corresponding to the key depressed.

37. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) levers corresponding to said type-bars; (*c*) links, connecting said levers each with the type-bar to which it corresponds; (*d*) a frame for giving movement to the type-bars aforesaid, each as required; (*e*) movement-receiving members, pivoted to the type-bar-corresponding levers aforesaid, a movement-receiving member for each type-bar-corresponding lever; (*f*) keys, corresponding to the type-bars aforesaid, a key for each of the type-bars that is actuated by the frame aforesaid; said keys each serving, when depressed, to bring the movement-receiving member corresponding to the type-bar to which such key corresponds, into operative relation with the frame aforesaid to receive movement therefrom; (*g*) an electro magnet acting, when one of the keys aforesaid is depressed, to give movement to the frame aforesaid, thereby to actuate the type-bar corresponding to the key depressed.

38. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) levers, corresponding to said type-bars; (*c*) links, connecting said levers each with the type-bar to which it corresponds; (*d*) a frame for actuating the type-bars aforesaid, each as required; (*e*) movement-receiving members, pivoted to the type-bar-corresponding levers

aforesaid, a movement-receiving member for each type-bar-corresponding lever; (*f*) keys, corresponding to the type-bars aforesaid, a key for each of the type-bars that is actuated by the frame aforesaid; said keys each serving, when depressed, to bring the movement-receiving member corresponding to the type-bar to which such key corresponds, into operative relation with the frame aforesaid to receive movement therefrom; (*g*) an electromagnet for actuating the type-bar-impelling frame aforesaid; and (*h*) a circuit-controlling device common to a plurality of the keys aforesaid, and serving when one of said keys is depressed, to bring the electromagnet aforesaid into action to operate the frame aforesaid and the type-bar corresponding to the key depressed.

39. In combination in a type-writing machine, (*a*) a plurality of type-bars striking to a common printing-center; (*b*) levers corresponding to said type-bars; (*c*) links, connecting said type-bar-corresponding levers each with the type-bar to which it corresponds; (*d*) a type-bar-impelling frame, pivoted to oscillate and serving to give movement to all the type-bars aforesaid, each as required; (*e*) movement-receiving members, hinged to the type-bar-corresponding levers aforesaid, a movement-receiving member to each such lever; (*f*) keys, corresponding to the type-bars aforesaid, a key for each type-bar; said keys each controlling one of the movement-receiving members aforesaid, and serving, when depressed, to bring said movement-receiving member into operative relation with the type-bar-impelling frame aforesaid to receive movement therefrom; and (*g*) means for actuating the type-bar-impelling frame aforesaid.

40. In combination, in a type-writing machine having a main keyboard, (*a*) a type-bar; (*b*) a single motor device, for actuating said type-bar, to throw the type from its normal position to the printing-center; said motor device being normally inactive, and said type-bar being normally disconnected therefrom; and (*c*) a key, at said main keyboard of said type-writing machine, and means controlled by said key, acting when said key is depressed, both to cause the type-bar aforesaid to be connected with the motor device aforesaid, and to bring said motor device into action; said motor device thereupon operating to impel said type-bar from its normal position to the printing-center, so that it prints; whereby the operator is relieved from actuating the type-bar and the type-bar impelled in its successive printing actions, with a uniform force, notwithstanding variations in the force with which the key may be depressed by the operator.

41. In combination in a type-writing machine, (*a*) a type-bar; (*b*) a single motor device for actuating said type-bar, to throw the type from its normal position to the printing-center; said motor device being normally inactive and said type-bar being normally disconnected therefrom; (*c*) a key, corresponding to said type-bar, and connected always therewith in such manner that said key controls always, whenever it is depressed, that same type-bar only, to bring said type-bar into operative relation with the motor device aforesaid, to receive movement therefrom; and (*d*) motor-controlling means operated by the key aforesaid, and serving, when said key is depressed, to bring the motor device aforesaid into action; said motor thereupon operating to impel the type-bar aforesaid from its normal position toward the printing-center.

42. In combination in a type-writing machine, (*a*) a type-bar; (*b*) a single motor device for giving movement to said type-bar to throw the type from its normal position to the printing-center; said motor device being normally inactive and said type-bar being normally disconnected therefrom; (*c*) a movement-receiving member connected with said type-bar; (*d*) a key, connected with the movement-receiving member aforesaid in such manner that it serves always when depressed, to control that same movement-receiving member; said key acting, when depressed, both to bring said movement-receiving member into operative relation with the motor aforesaid, and also to bring said motor device into action, to impel said movement-receiving member and the type-bar with which it is connected.

43. In combination, in a type-writing machine, (*a*) a type-bar; (*b*) a single motor device, for giving movement to said type-bar to throw the type from its normal position to the printing-center; said motor device being normally inactive and said type-bar being normally disconnected therefrom; (*c*) a movement-receiving member connected with said type-bar; (*d*) a controlling device for the motor aforesaid; (*e*) a key corresponding to said type-bar, and acting, when depressed, to give movement to the movement-receiving member aforesaid to bring the same into operative relation with the motor device aforesaid; said key, when depressed, operating also the motor-controlling device aforesaid, thereby to bring the motor aforesaid into action; the key aforesaid acting solely, when depressed, to bring the movement-receiving member aforesaid into operative relation with the motor device aforesaid, and to bring said motor device into action; said motor device serving, when the key aforesaid has been depressed and is at rest in its depressed position, to give movement to the movement-receiving member aforesaid and the type-bar connected therewith, to throw the type carried by said type-bar from its normal position to the printing-center, whereby the printing is effected by means of a force other than that applied by the operator to the key, and

the strength of the printing made to be independent of the force exerted by the operator upon the key.

44. In combination in a type-writing machine, (*a*) a type-bar; (*b*) a motor device for giving movement to said type-bar; said motor device being normally inactive, and said type-bar being normally disconnected therefrom; (*c*) a swinging, movement-receiving member; (*d*) a pivotal connection between said member and said type-bar; (*e*) a key at the keyboard of said type-writing machine, corresponding to said type-bar and acting, when depressed to give movement to the movement-receiving member aforesaid, to swing said movement-receiving member into operative relation with the motor device aforesaid, to receive movement therefrom; and (*f*) means, acting when said key is depressed, to bring the motor device aforesaid into action upon the movement-receiving member aforesaid, to give movement to the type-bar aforesaid.

45. In combination in a type-writing machine, (*a*) a type-bar; (*b*) a motor device for giving movement to said type-bar; said motor device being normally inactive, and said type-bar being normally disconnected therefrom; (*c*) a lever, corresponding to said type-bar; (*d*) a link connecting said lever with said type-bar; (*e*) a movement-receiving member, pivoted to said lever; (*f*) a key at the keyboard, corresponding to the movement-receiving member aforesaid, and (*g*) a controlling device, for the motor aforesaid; the key aforesaid serving when depressed, both to give movement to the movement-receiving member aforesaid to swing said movement-receiving member into relation with the motor device aforesaid to receive movement therefrom, and also to operate said motor-controlling device, thereby to bring the motor aforesaid into action upon the movement-receiving member aforesaid to actuate the type-bar aforesaid; whereby, when the key is depressed, the type-bar corresponding thereto is actuated by a force other than that exerted by the operator upon the key, and the type carried by said type-bar thrown to the printing-center with a uniform force in its successive printing actions, notwithstanding variations in the pressure exerted by the operator upon the key.

46. In combination in a type-writing machine, (*a*) a type-bar; (*b*) a motor for giving movement to said type-bar; said motor being normally inactive, and said type-bar being normally disconnected therefrom; (*c*) a pivoted, movement-receiving member, suitably connected with said type-bar; (*d*) a key at the keyboard; (*e*) a bell-crank lever, corresponding to said key, and controlled thereby; (*f*) a link, connecting said bell-crank lever with the movement-receiving member before mentioned, whereby, when the key aforesaid is depressed, the movement-receiving member aforesaid is swung into operative relation with the motor aforesaid; and (*g*) means, acting when said key is depressed, to bring the motor aforesaid into action upon the movement-receiving member aforesaid, to actuate the type-bar aforesaid.

47. In combination in a type-writing machine, (*a*) a type-bar; (*b*) a motor for giving movement to said type-bar; said motor being normally inactive, and said type-bar being normally disconnected therefrom; (*c*) a lever, corresponding to said type-bar; (*d*) a link connecting said lever with said type-bar; (*e*) a movement-receiving member, pivoted to said lever; (*f*) a bell-crank; (*g*) a link, connecting said bell-crank with the movement-receiving member aforesaid; (*h*) a key at the keyboard acting, when depressed, to give movement to the bell-crank aforesaid, thereby to swing the pivoted movement-receiving member before mentioned into operative relation with the motor aforesaid; and (*i*) means, controlled by the key aforesaid, and acting, when said key is depressed, to bring the motor aforesaid into action upon the movement-receiving member aforesaid to actuate the type-bar aforesaid.

48. In combination in a type-writing machine, (*a*) a type-bar; (*b*) a vibratory frame, for giving movement to said type-bar; said frame being normally at rest and said type-bar being normally disconnected therefrom; (*c*) a movement-receiving member, connected with said type-bar; (*d*) a key, permanently connected with the movement-receiving member aforesaid, so that it serves always, whenever it is depressed, to bring said movement-receiving member into operative relation with the vibratory frame aforesaid to receive movement therefrom, for the impelling of the type-bar aforesaid.

49. In a type-writing machine, (*a*) a type-bar; (*b*) a vibratory frame, normally at rest; (*c*) a single motor for actuating said frame, to give movement to the type-bar; (*d*) a controlling device for said motor; (*e*) a movement-receiving member connected with the type-bar aforesaid; (*f*) a key at the keyboard, corresponding to the type-bar aforesaid, and acting, when depressed, to give movement to the movement-receiving member before mentioned, to bring the same into operative relation with the vibratory frame aforesaid to receive movement therefrom; said key, when depressed, also operating the motor-controlling device aforesaid; the key aforesaid acting solely, when depressed, to bring the movement-receiving member aforesaid into operative relation with the vibratory frame aforesaid, and to operate the motor-controlling device aforesaid; the motor aforesaid serving, when said key has been depressed and is at rest in its depressed position, to give movement to the movement-receiving member aforesaid and the type-bar connected therewith, to throw the type from its normal position to the printing-center; whereby the type-bar is actuated and the

printing effected by means of a force other than that exerted by the operator upon the key, the touch made to be light, and the strength of the printing made to be independent of the force exerted by the operator upon the key.

50. In combination in a type-writing machine having a main keyboard, (*a*) a type-bar; (*b*) an electromagnet for actuating said type-bar, to throw the type from its normal position toward the printing-center; said type-bar being normally disconnected from said electromagnet; (*c*) a key, at the keyboard of said type-writing machine; and (*d*) means, acting, when said key is depressed, to bring the type-bar aforesaid into operative relation with the magnet aforesaid to receive movement therefrom, and to bring said magnet into action, to impel said type-bar from its normal position toward the printing-center.

51. In combination in a type-writing machine, (*a*) a type-bar; (*b*) an electromagnet for actuating said type-bar to throw the type from its normal position to the printing-center; said type-bar being normally disconnected from said electromagnet; (*c*) a key, permanently connected with the type-bar aforesaid so that said key always, whenever it is depressed, brings said type-bar into operative relation with the electromagnet aforesaid to receive movement therefrom; said key also controlling said magnet; said magnet acting, when said key is depressed, to impel the type-bar aforesaid independently of the force exerted upon the key, whereby the operator is relieved from the labor of actuating said type-bar and said type-bar impelled with a uniform force in its successive printing actions, notwithstanding variations in the force with which the key controlling it may be depressed.

52. In combination, in a type-writing machine, having a main keyboard, (*a*) a type-bar; (*b*) an electromagnet for actuating said type-bar to throw the type from its normal position to the printing-center; said type-bar being normally disconnected from said magnet; (*c*) a key at the keyboard of said type-writing machine; (*d*) means, receiving movement from said key, for bringing said type-bar, when said key is depressed, into operative relation with the electromagnet aforesaid, to receive movement therefrom; (*e*) a circuit-closing device operated positively by the key aforesaid when said key is depressed, and upon which said key, when at the limit of its downward movement, exerts a pressure to close the circuit of the magnet aforesaid; said magnet thereupon acting, when said key is at rest in its depressed position, to actuate the type-bar, as aforesaid; whereby the printing is effected by means of a force other than that applied by the operator to the key, the touch made to be light, and the strength of the printing made to be independent of the force exerted by the operator upon the key.

53. In combination, in a type-writing machine, (*a*) a type-bar; (*b*) a vibratory frame, normally at rest; (*c*) an electromagnet for actuating said frame; (*d*) a movement-receiving member, connected with the type-bar aforesaid; (*e*) a key, acting, when depressed, to give movement to the movement-receiving member before mentioned, to bring the same into operative relation with the vibratory frame aforesaid to receive movement therefrom; said key controlling the circuit of the electromagnet aforesaid; the key aforesaid acting solely, when depressed, to bring the movement-receiving member aforesaid into operative relation with said vibratory frame, and to control the circuit of the electromagnet aforesaid; said magnet serving, when said key is depressed, to give movement to the movement-receiving member aforesaid and the type-bar connected therewith, to throw the type from its normal position to the printing-center; whereby the type-bar is actuated and the printing effected by a force other than that exerted upon the key, the touch made to be light, and the strength of the printing made to be independent of the force exerted by the operator upon the key.

54. In combination in a type-writing machine, (*a*) a type-bar; (*b*) a swinging, movement-receiving member; (*c*) pivotal connections between said member and said type-bar; (*d*) an electrically-operated device for giving movement to said swinging movement-receiving member to impel the type-bar with which said member is connected; said electrically-operated device being normally inactive, and said movement-receiving member being normally disconnected therefrom; and (*e*) a key controlling both the movement-receiving member aforesaid and the electrically-operated device aforesaid, and serving when depressed, to give movement to said movement-receiving member, to bring the same into operative relation with the electrically-operated device aforesaid, to receive movement therefrom; said key serving, also, when depressed, to bring the electrically-operated device aforesaid into action upon the movement-receiving member aforesaid to give movement to the same for the impelling of the type-bar aforesaid.

55. In combination in a type-writing machine, (*a*) a type-bar; (*b*) a lever corresponding to said type-bar; (*c*) a link connecting said lever with said type-bar; (*d*) a movement-receiving member pivoted to said lever; (*e*) an electrically-operated device for giving movement to said pivoted movement-receiving member to impel the type-bar with which said member is connected, said electrically-operated device being normally inactive and said movement-receiving member being normally disconnected therefrom; and (*f*) a key controlling both the movement-receiving member aforesaid and the electrically-operated device aforesaid, and serving when depressed, to give movement to said movement-receiving member, to bring the same into operative relation with the electrically-operated device

aforesaid, to receive movement therefrom; said key serving, also, when depressed, to bring the electrically-operated device aforesaid, into action upon the movement-receiving member aforesaid to give movement to the same for the impelling of the type-bar aforesaid.

56. In combination, in a type-writing machine, (*a*) a type-bar; (*b*) a swinging, movement-receiving member; (*c*) a pivotal connection between said member and said type-bar; (*d*) a pivoted, oscillating type-bar-impelling frame; said frame being normally at rest, and the movement-receiving member aforesaid being normally disconnected therefrom; (*e*) a key, acting when depressed, to give movement to the swinging, movement-receiving member connected with the type-bar aforesaid, to throw said movement-receiving member into operative relation with the frame aforesaid, to receive movement therefrom; and (*f*) a motor device, controlled by said key, for operating the type-bar-impelling frame aforesaid.

In testimony whereof I have hereunto set my hand, at Washington, in the District of Columbia, this 27th day of July, A. D. 1896, in the presence of the subscribing witnesses whose names are hereto annexed.

THADDEUS CAHILL.

Attest:

ARTHUR T. CAHILL,

GEORGE E. A. GRIFFIN.