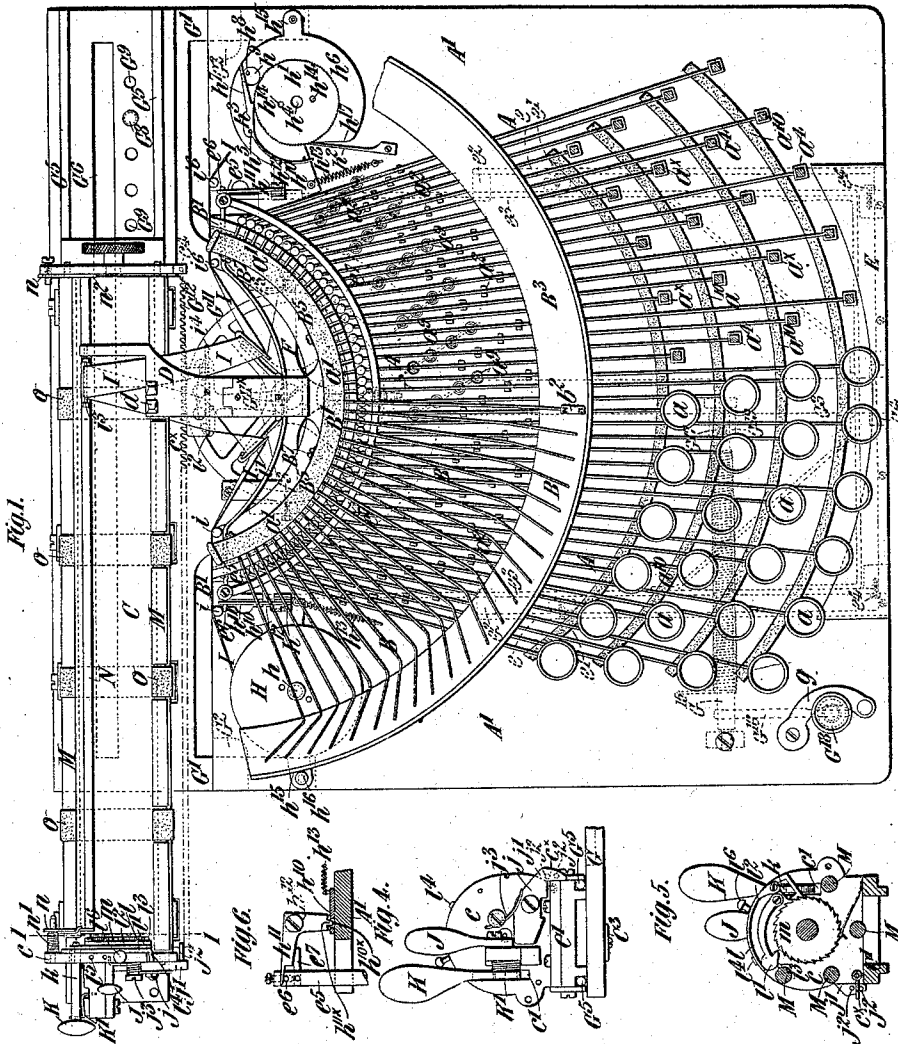


6 Sheets—Sheet 1.

No. 570,389.

Patented Oct. 27, 1896.



Witnesses.
Thos. A. Gunn

Robert Consett.

Inventor.

Eugene Fitch.

By

By James L. Norris
Atty.

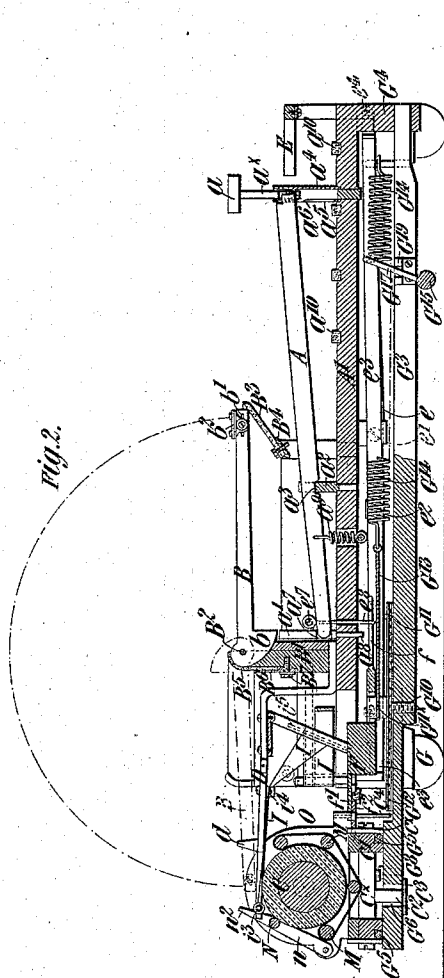
(No Model.)

3 Sheets—Sheet 2.

E. FITCH.
TYPE WRITING MACHINE.

No. 570,389.

Patented Oct. 27, 1896.



Witnesses.
Thos. A. Green

Robert Corbett

Inventor,
Eugene Fitch,
By James L. Norris,
Atty

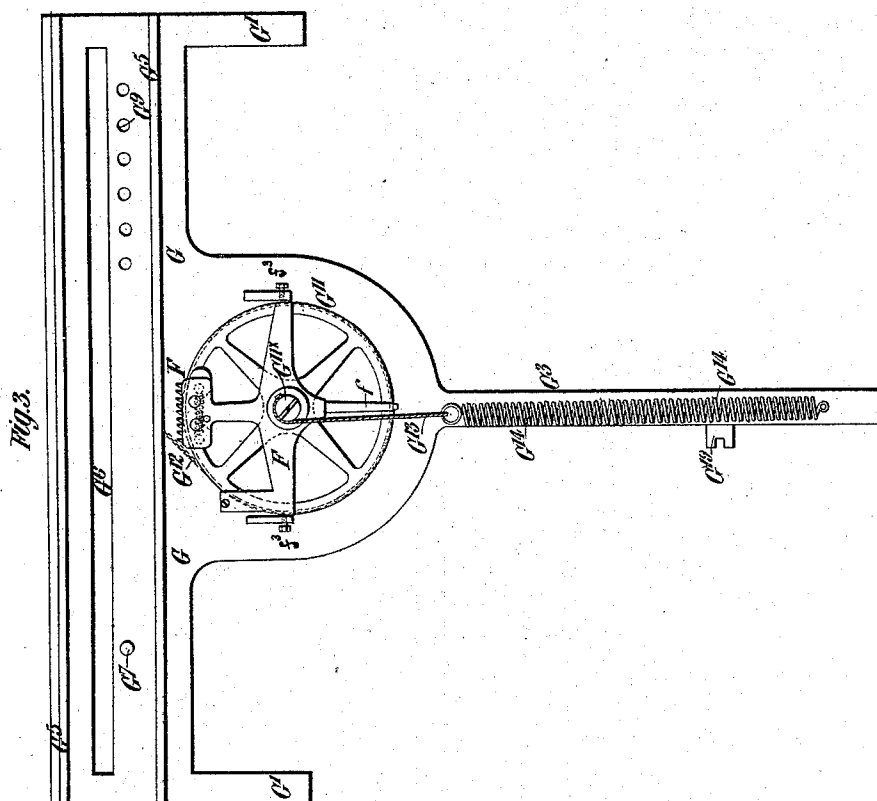
(No Model.)

6 Sheets—Sheet 3.

E. FITCH.
TYPE WRITING MACHINE.

No. 570,389.

Patented Oct. 27, 1896.



Witnesses.
Thos. A. Green
Robert Conant.

Inventor.
Eugene Fitch.
By James L. Norris.
Atty.

(No Model.)

6 Sheets—Sheet 4.

E. FITCH.
TYPE WRITING MACHINE.

No. 570,389.

Patented Oct. 27, 1896.

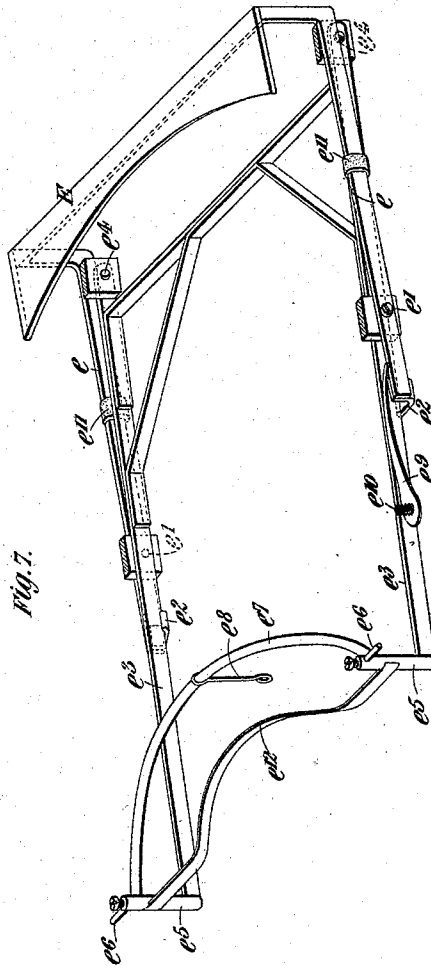


Fig. 7.

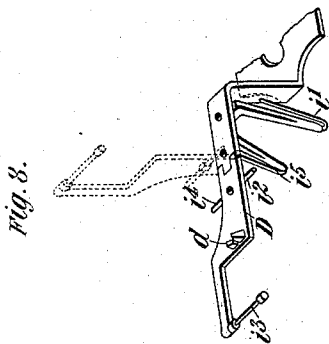


Fig. 8.

Witnesses.
Thos. A. Ennis
Robert Emmett.

Inventor.
Eugene Fitch.
By Janus L. Norris.
Atty.

(No Model.)

6 Sheets—Sheet 5.

E. FITCH.
TYPE WRITING MACHINE.

No. 570,389.

Patented Oct. 27, 1896.

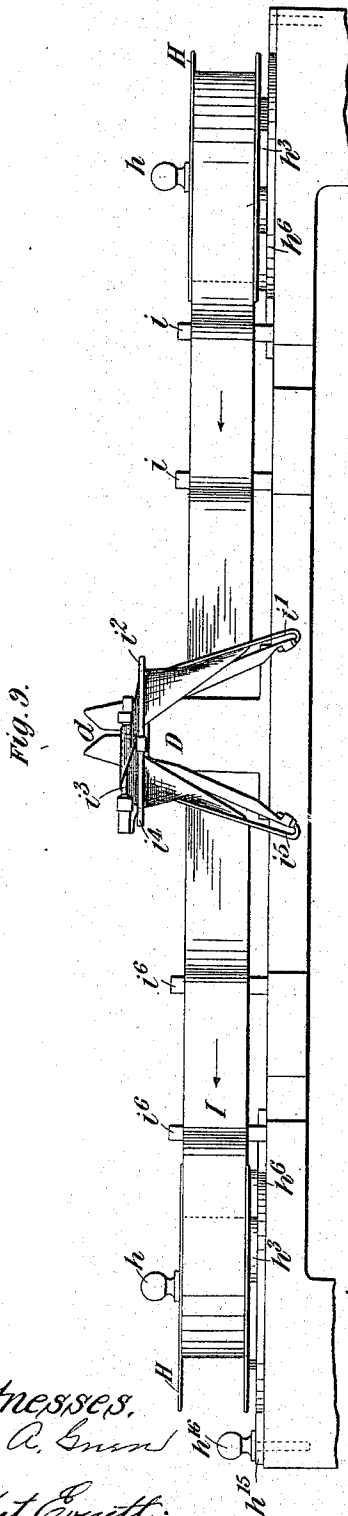


Fig. 9.

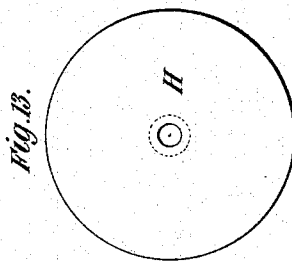


Fig. 13.

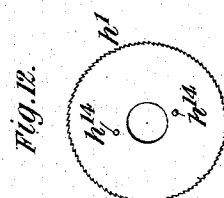


Fig. 12.

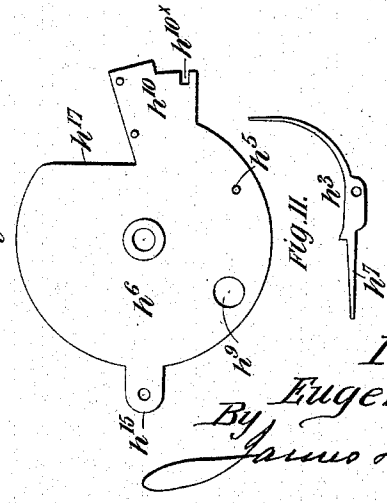


Fig. 10.

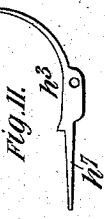


Fig. 11.

Witnesses,
Thos. A. Green
Robert Conitt;

Inventor,
Eugene Fitch.
By James L. Norris,
Atty.

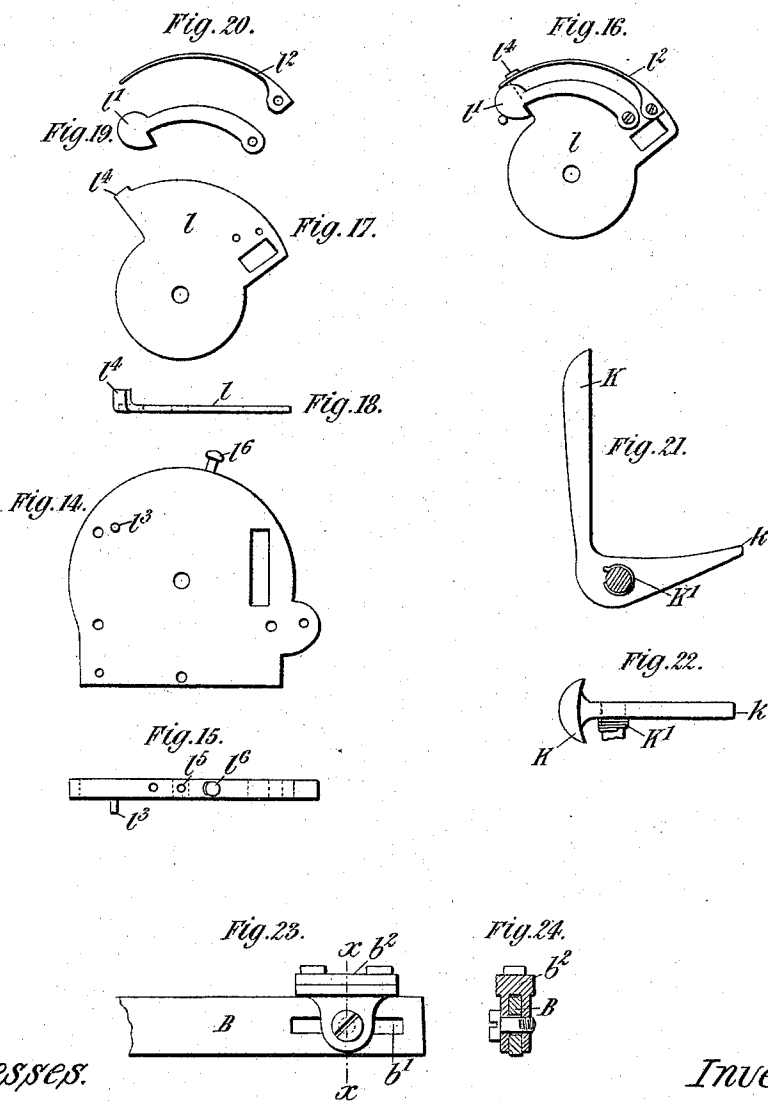
(No Model.)

6 Sheets—Sheet 6.

E. FITCH.
TYPE WRITING MACHINE.

No. 570,389.

Patented Oct. 27, 1896.



Witnesses.

Robert Everett.
Albert H. Norris.

Inventor.
Eugene Fitch.
By
James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

EUGENE FITCH, OF EAST MOLESEY, ENGLAND.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 570,389, dated October 27, 1896.

Application filed June 18, 1895. Serial No. 553,224. (No model.) Patented in England November 10, 1894, No. 21,743.

To all whom it may concern:

Be it known that I, EUGENE FITCH, engineer, a citizen of the United States of America, residing at 6 River Bank, East Molesey, in the county of Surrey, England, have invented certain new and useful Improvements in Type-Writing Machines, (for which I have obtained Letters Patent in Great Britain, No. 21,743, dated November 10, 1894,) of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in type-writing machines, whereby their construction is simplified and their total height considerably reduced, so as to render them more portable and capable of occupying less space than heretofore.

One of the essential features of my improvements is the manner in which the type-arms are arranged with relation to the finger-key levers, so that they occupy a horizontal position and perform approximately a half-revolution about their pivots in causing their type to strike the paper.

Another essential feature of my improvements is the manner in which the type-arms are actuated by the finger-key levers without being connected thereto.

My invention also comprises various other improvements for enabling the before-mentioned essential features to be satisfactorily applied, as is hereinafter fully described.

In order that my invention may be clearly understood and readily carried into effect, I will proceed to describe the same more fully with reference to the accompanying drawings.

Figure 1 is a plan of a type-writing machine constructed in accordance with my invention. Fig. 2 is a longitudinal central section of the same. Fig. 3 is a plan of a movable under frame with which the base of the machine is provided. Fig. 4 is an end view of the carriage carrying the paper-cylinder. Fig. 5 is a cross-section taken on the line 1 1 of Fig. 1. Fig. 6 is a detail view of a crank-arm hereinafter described. Fig. 7 is a perspective view showing the spacing-bar and its connections, which are located below the base of the machine. Fig. 8 is a perspective view of the hinged bracket hereinafter referred to. Fig. 9 is a front elevation of the part of the machine farthest from the operator with the

paper-carriage removed, showing the manner in which the ink-ribbon is guided from one spool to the other. Figs. 10 to 13 are plan views illustrating separately the various parts of the mechanism for driving one of the ribbon-spools. Fig. 14 is a face view, and Fig. 15 a plan, of the carriage end plate carrying the line-spacing device. Fig. 16 is a face view of a segmental plate carrying the spring-controlled pawl for the purpose hereinafter stated. Fig. 17 is a face view, and Fig. 18 is a plan, of the aforesaid segmental plate shown separately. Fig. 19 is a face view of the pawl, and Fig. 20 a face view of the spring for controlling the pawl. Fig. 21 is a side view, and Fig. 22 a plan, of the lever for operating the line-spacing device. Fig. 23 is an enlarged elevation of the outer end of one of the type-arms, and Fig. 24 is a vertical cross-section taken on the line *xx* of Fig. 23.

In Fig. 1 one of the ink-ribbon spools, as well as some of the type-arms and some of the finger-keys, have been removed for the sake of clearness.

A A are the finger-key levers, B B the type-arms, and C is the paper-cylinder.

The finger-key levers consist of a series of metal blades, each having at its outer extremity the usual finger-key *a* and at its inner extremity a vertical pin *a'*. These finger-key levers have their fulcrum in short pins or posts *a²*, that project vertically from the base A', the said pins or posts being slotted for the reception of the notched portions *a³* of the finger-key levers. The finger-keys *a* are provided with square stems *a^x*, that enter correspondingly-shaped sockets *a⁴*, affixed to the base of the machine, the said sockets being formed with longitudinal slots *a⁵*, into which the outer ends of the finger-key levers project and enter recesses *a⁶* in the stems of the finger-keys. The before-mentioned vertical pins *a'* are also formed with recesses *a⁷*, into which the inner ends of the finger-key levers fit, the said pins *a'* having at their lower ends prolongations or stems *a⁸*, that enter holes formed for their reception in the base of the machine. These prolongations *a⁸* insure that the pins shall move in a vertical manner and also serve, together with the sockets *a⁴*, as guides for preventing lateral movement of the finger-key levers.

$a^9 a^9$ are spiral springs which normally tend to keep the inner ends of the finger-key levers depressed.

$a^{10} a^{10}$ are strips of india-rubber or other suitable material, against which the outer ends of the finger-key levers strike when they are depressed.

B' is a segmental support situated on the base A' and in proximity to the paper-cylinder C . This segmental support is formed with a series of equidistant radial slots, into which the inner ends of the type-arms B are fitted, the said arms being pivotally connected to the support by means of a wire B^2 , which extends through holes formed in the type-arms. In order to enable this wire to be conveniently placed in position, the segmental support may be made in two vertical portions, as seen at Fig. 2.

The type-arms have laterally-bent outer ends, those arms on the left-hand side of the centrally-located type-arm being bent toward the left and those on the right-hand side being bent toward the right. In this way the outer ends of the type-arms are enabled to enter the forked piece d for the purpose hereinafter stated. The inner or pivotal ends of the type-arms are formed with curved shoulders or lugs b , which, when the type-arms are in their normal or horizontal position, lie immediately above but without being connected to the upper ends of the pins a' , so that when the finger-key levers are operated the type-arms are thrown forward by a sudden blow delivered upon the shoulders b by the pins a' .

B^3 is a strip of leather or other suitable material whose lower edge is affixed to a segmental frame B^4 , carried by the base of the machine. This strip B^3 occupies a concentric position relatively to the segmental support B' and is located at such a distance therefrom that the outer ends of the type-arms rest thereon when in their horizontal position.

Situated on the inner surface of the segmental support B' is a resilient cushion or strip of india-rubber B^5 , which is of such a shape in cross-section that its upper edge normally lies partially over the upper edge of the segmental support. This resilient strip B^5 is secured to the said segmental support by means of a curved plate B^6 , which is held in place by screws B^7 . It will thus be seen that while this resilient strip is firmly retained in position its upper edge is left disconnected and free. Therefore when the type-arms are thrown forward by the operation of the finger-key levers the said strip offers small resistance to their movement, but is sufficiently resilient to cause them to promptly return to their normal position immediately after striking the paper.

The outer ends of the type-arms are slotted at b' , so that the screws by which the type b^2 are connected to the type-arms can be adjusted and the position of the type be thereby regulated to obtain proper alinement thereof. D is a hinged bracket having near its

outer end a forked piece or guide d , which occupies the central point of the segmental support, so that when the type-arms are thrown forward by the finger-key levers the bent ends of said type-arms enter the forked piece. Their type are thus always directed toward the same point.

E is a spacing-bar which is provided with arms e , extending beneath the base and pivotally connected thereto at e' . These arms are furnished with projections e^2 , that engage with other arms e^3 , also pivotally connected to the under side of the base at e^4 . The free ends of these last-mentioned arms e^3 carry uprights e^5 , whose upper ends project through the base of the machine and are furnished with transverse pins e^6 .

e^7 is a curved rod that extends from one upright e^5 to the other and lies immediately over the inner ends of the finger-key levers.

e^9 is a flat spring secured to the under side of the base of the machine by a screw e^{10} . The free end of this spring normally tends to keep the spacing-bar E in its raised position by pressing upon the end of one of the arms e remote from the spacing-bar E . When the curved rod e^7 is raised by the inner ends of the finger-key levers, the arms e^3 turn about their pivots e^4 without affecting the spacing-bar E .

e^{11} are india-rubber rings with which the arms e are provided, the said rings serving to deaden the sound which would otherwise be produced when the said arms e came into contact with the under side of the base each time the spacing-bar E returned to its normal position.

e^{12} is a bar connecting the uprights e^5 together and imparting extra rigidity thereto. Depending from the said curved rod e^7 is a link e^8 , whose lower end engages with a tail f , with which the pivoted escapement F is provided. This escapement is of ordinary construction, being provided with two sets of teeth $f' f^2$, that can be alternately brought into engagement with the rack c^x on the carriage C' when the said escapement is rocked about the pivots f^3 , which are mounted on an under frame G . It will be observed that by reason of the position occupied by the said curved rod e^7 the escapement is operated each time any one of the finger-key levers or the spacing-bar is actuated. The aforesaid under frame G is movable and is provided with a pair of lugs or guide-bars G' , entering recesses G^2 in the base of the machine. This under frame is also provided with a longitudinal bar G^3 , that extends to the front of the machine, where it is received in a socket G^4 on the base. The outer part of this under frame is provided with rails G^5 , which act as guides for the carriage C' and insure its traveling to or fro in a truly rectilinear manner. The said outer part of the under frame is formed with a slot or opening G^6 , through which a centrally-located lug C^2 , on the under side of the carriage, projects and in which the said lug travels

during the movements of the carriage. This lug is furnished with a turn-piece C^8 , which, when turned at right angles to the aforesaid slot G^6 , prevents the carriage from becoming detached vertically from the under frame.

G^7 G^8 are two studs that project upward from the outer part of the under frame and lie in the path of a centrally-located projection C^x , Fig. 2, on the under side of the carriage and thereby act as stops to limit the extent of the carriage's movement. The last-mentioned stud G^8 is detachable, and can therefore be placed in one or other of a row of holes G^9 , so that the movement of the carriage toward the right can be regulated and lines of typing of the required length be obtained.

G^{10} is a stud carried by the under frame G , and mounted on this stud and moving freely thereon is a grooved wheel G^{11} , having a boss G^{11x} .

G^{12} G^{13} are two cords, the former of which passes around the wheel G^{11} and is connected to a pin C^4 on the carriage, while the latter passes around the boss G^{11x} and is connected to one end of a spiral spring G^{14} , whose opposite end is secured to the bar G^3 . This spiral spring becomes stretched when the carriage is shifted toward the right and supplies the necessary force to move the carriage along toward the left during the working of the machine, as is well understood.

G^{15} is a transverse rocking shaft situated below the base of the machine, the said shaft being provided with two arms G^{16} G^{17} , the former engaging with the stem of the push-button G^{18} and the latter with a forked piece G^{19} on the bar G^3 . This rocking shaft G^{15} is surrounded by a spiral spring which normally tends to keep the arm G^{17} pressed forward—that is to say, in a direction away from the operator—and the movable under frame with the carriage in its outermost position. When the under frame is in this position, the lower-case type, which are situated at the extreme end of the type-arms, strike the paper. By pressing upon the push-button G^{18} the rocking shaft G^{15} is turned and the under frame thereby caused to assume its innermost position. The upper-case type, which are situated farther away from the ends of the type-arms than the lower-case type, then strike the paper. By turning a pivoted catch g into engagement with a notch in the stem of the push-button G^{18} when the latter is depressed the under frame can be locked in its innermost position when desired. The drawings show the parts in this position.

By removing the rocking bar G^{15} and disconnecting the link e^8 from the tail f of the escapement the entire under frame and parts connected therewith can be bodily detached from the machine.

H H are spools upon which the ink-ribbon is wound. These spools revolve on detachable pins h , that are situated on opposite sides of the machine. One of the spools in Fig. 1—

viz., that on the right of the machine—has been removed in order to clearly show the feed mechanism beneath it.

Figs. 10 to 13, inclusive, illustrate different parts of the feed mechanism detached from one another.

The feed mechanism consists of a fine ratchet-wheel h' , engaging with which are two pawls h^2 h^3 , the former being a retaining-pawl and the latter a driving-pawl. The ratchet-wheel is loosely mounted on a hollow fixed spindle h^4 , into which the before-mentioned pin h enters. The driving-pawl is pivoted at h^5 to a plate h^6 , which is also loosely mounted on the hollow spindle h^4 , the said driving-pawl being provided with a nose h^7 , that lies in proximity to a pin h^8 , projecting through the aperture h^9 in the plate h^6 . This plate h^6 is formed with a lateral extension h^{10} , having a notch h^{10x} therein, which engages with a pin h^{11x} , Fig. 6, projecting from the lower end of a crank-arm h^{11} , pivoted to a vertical support h^{12} , that projects from the base of the machine. The other end of the said crank-arm lies immediately above the pin e^6 , with which each of the hereinbefore-mentioned uprights e^5 is provided. It will thus be seen that each time the curved rod e^7 is raised by the operation of one of the finger-key levers or of the spacing-bar the crank-arm h^{11} is actuated by the pin e^6 , with the result that the plate h^6 is shifted and the ratchet-wheel partially rotated by the driving-pawl h^3 .

h^{13} is a spiral spring by which the said plate h^6 , together with the driving-pawl h^3 , is returned to its original position.

h^{14} h^{14} are pins on the ratchet-wheel which enter corresponding holes in the spool when the latter is in place and impart thereto the step-by-step motion of the ratchet-wheel.

h^{15} is another lateral extension with which the plate h^6 is provided. This extension is formed with a hole which can be brought over a corresponding hole in the base of the machine and be locked in this position by means of a detachable pin h^{16} . When the plate is shifted and locked in this position, the said crank-arm is moved out of the reach of the pin e^6 and cannot therefore be acted upon thereby. The driving-pawl is also moved out of engagement with the ratchet-wheel by reason of its nose h^7 coming against the pin h^8 , and the retaining-pawl is likewise disengaged by the edge h^{17} of the plate h^6 coming against it. When the plate is in this position, the ratchet-wheel remains unaffected by the driving mechanism and can be turned in either direction. In the drawings the driving mechanism on the left-hand side of the machine is in this position, while the mechanism on the right-hand side is in its working position and will cause the spool on this side to be turned in a direction to wind up the ink-ribbon at each movement of the finger-key levers or of the spacing-bar. By removing the pin h^{16} from the position it occupies in the left-hand mechanism and inserting it into a

corresponding position in the right-hand mechanism the direction of the winding of the ribbon can be readily reversed. The course taken by the ribbon is shown in Figs. 1 and 9. It passes from the left-hand spool in Fig. 1, (which is the right-hand spool in Fig. 9,) over vertical guide-pins i , through a hook i' , then in an upward direction over a horizontal pin i'' and in a forward direction around a front rod i''' . It then passes backwardly toward a horizontal pin i^4 and downwardly through a hook i^5 , whence it passes over the guide-pins i^6 and thus reaches the right-hand spool.

J and K are two pivoted levers situated at the left-hand end of the cylinder C. The lever J is for lifting the rack c^x out of engagement with the escapement F when it is desired to shift the carriage into position for commencing a fresh line of typing, and the lever K is for turning the paper-cylinder the requisite distance for spacing the lines. The said lever J engages with one end of a pivoted lever j , having at its outer end j' pins j^2 , that lie on opposite sides of the pivoted rack. Thus when the said lever J is pressed inwardly the end j' of the lever j is raised and disengages the rack from the escapement. The carriage can then be shifted in either direction, as required. When the lever J is released, a spring j^3 returns the lever j to its original position and brings the rack again into engagement with the escapement.

The lever K is controlled by a spring K' and is provided with an extension k , that passes through a vertical slot c' , formed in the end plate c of the carriage. This extension k enters a slot formed in a segmental plate l , that is loosely mounted on the axis of the paper-cylinder. The segmental plate carries a pawl l' , which is capable of engaging with the teeth of a ratchet-wheel m , which turns with the paper-cylinder.

l^2 is a spring which tends to keep the said pawl in engagement with the ratchet-wheel m , but is normally prevented from so doing by a pin l^3 . When, however, the lever K is pressed inwardly, the segmental plate l turns about the axis of the paper-cylinder and the pawl l' leaves the aforesaid pin l^3 and engages with the ratchet-wheel m , thereby turning this latter and partially rotating the paper-cylinder. In order to regulate the extent to which the paper-cylinder can be turned by the movement of the lever K, and therefore the distance between the lines of typing, the said segmental plate l is formed with a projection l^4 , and the edge of the end plate c is provided with a series of holes l^5 , into one or other of which a detachable pin l^6 can be inserted. This pin l^6 when in place acts as a stop against which the projection l^4 strikes, and thus prevents the segmental plate and its pawl from moving beyond this point when the lever K is actuated.

N is a longitudinal bar carried by side arms n , pivoted to the end plates of the carriage.

This bar is controlled by a spring n' , which presses it toward the paper-cylinder and keeps the paper in close contact therewith. n^2 is a thumb-piece by which the bar can be turned away from the paper-cylinder when a sheet of paper is being inserted into position.

M M are revoluble rods extending from one plate c to the other of the carriage C'. These rods are recessed at intervals for the reception of india-rubber bands o , which produce sufficient adhesion between the paper and the cylinder C to insure that the paper shall turn with the cylinder.

The segmental support B', to which the type-arms are pivoted, may, if desired, be made detachable for the purpose of enabling the entire series of type-arms to be removed bodily therewith and to be replaced by another segmental support provided with type-arms bearing type of different character.

What I claim is—

1. In a type-writing machine, the combination of a series of horizontally-arranged type-arms whose inner ends are pivotally supported, a paper-cylinder adapted to move in the same horizontal plane as that in which the type-arms lie when at rest, means for actuating the type-arms to bring their type in contact with the paper on said paper-cylinder, and a single resilient cushion for returning all the type-arms to normal position, substantially as described.

2. In a type-writing machine, the means for actuating the type-arms without their being connected to the finger-key levers, consisting of curved shoulders formed on the type-arms near their pivotal ends, a series of vertically-moving pins located immediately below and disconnected from the said curved shoulders and operated by the inner ends of the finger-key levers, and a single resilient cushion for returning all the said type-arms to their normal position, substantially as described.

3. The combination with a type-arm consisting of a thin metal blade having a slot formed near its outer end, of a saddle-piece bearing the type and adapted to slide on the outer end of said type-arm and of a tightening-screw passing through said slot and the saddle-piece, substantially as described.

4. In a type-writing machine the combination of a series of horizontally-arranged type-arms having laterally-bent outer ends and curved shoulders near their pivotal ends, a segmental support to which the type-arms are pivotally connected, vertical pins situated immediately below the aforesaid shoulders, finger-key levers for operating said pins, a single resilient cushion for returning all the type-arms to their normal position, a frame for supporting the type-arms horizontally, and a forked guide located centrally with respect to the aforesaid segmental support, substantially as described.

5. In a type-writing machine provided with horizontally-arranged and pivoted type-arms,

the means for alternately winding the ink-ribbon from one spool to the other, consisting of a pair of uprights e^5 connected together by a curved rod e^7 located above the inner ends of the finger-key levers, pins e^6 projecting transversely from said uprights, crank-arms h^{11} adapted to be operated by the said pins e^6 , movable plates h^6 with which the lower ends of the said crank-arms h^{11} engage, ratchet-wheels h' located above said plates, retaining-pawls h^2 and driving-pawls h^3 gearing with the ratchet-wheels, and means for throwing these pawls out of gear when the aforesaid plates h^6 are turned in a direction to shift the crank-arms h^{11} out of the reach of the pins e^6 , substantially as described.

6. In a type-writing machine provided with horizontally-arranged and pivoted type-arms, the movable and detachable under frame consisting of a transverse portion upon which the carriage C' travels, guide-bars G' adapted to enter recesses G^2 in the base of the machine, a longitudinal bar G^3 adapted to enter a socket G^4 , a forked piece G^{19} carried by the bar G^3 , and a spring-controlled rocking shaft provided with radial arms G^{16} G^{17} the former of which engages with a push-button G^{18} and the latter with the aforesaid forked piece G^{19} substantially as described and for the purpose specified.

7. The combination with the curved rod e^7

extending over the inner ends of the finger-key levers and adapted to be operated by the spacing-bar and the finger-key levers, of a depending link e^8 whose lower end is in detachable engagement with a tail f carried by the escapement, and of a frame G in which the said escapement is pivotally mounted, substantially as described and for the purpose specified.

8. In a type-writing machine provided with horizontally-arranged and pivoted type-arms, the line-spacing device consisting of a spring-controlled pivoted lever K having an extension k engaging with a segmental plate l mounted on the axis of the paper-cylinder, a spring-controlled pawl l' carried by the plate l , a ratchet-wheel m on the paper-cylinder, a pin l^3 which acts to keep the said pawl l' normally out of engagement with the said ratchet-wheel m , a transverse projection l^4 on said segmental plate, an end plate c having a series of holes l^5 in its edge, and a removable pin l^6 that can be inserted in one or other of the aforesaid holes l^5 , substantially as described and for the purpose specified.

In testimony whereof I have hereunto set my hand this 30th day of May, 1895.

EUGENE FITCH.

Witnesses:

ARTHUR A. BERGIN,
THOMAS LAKE.