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Patented Feb. 6, 1894.

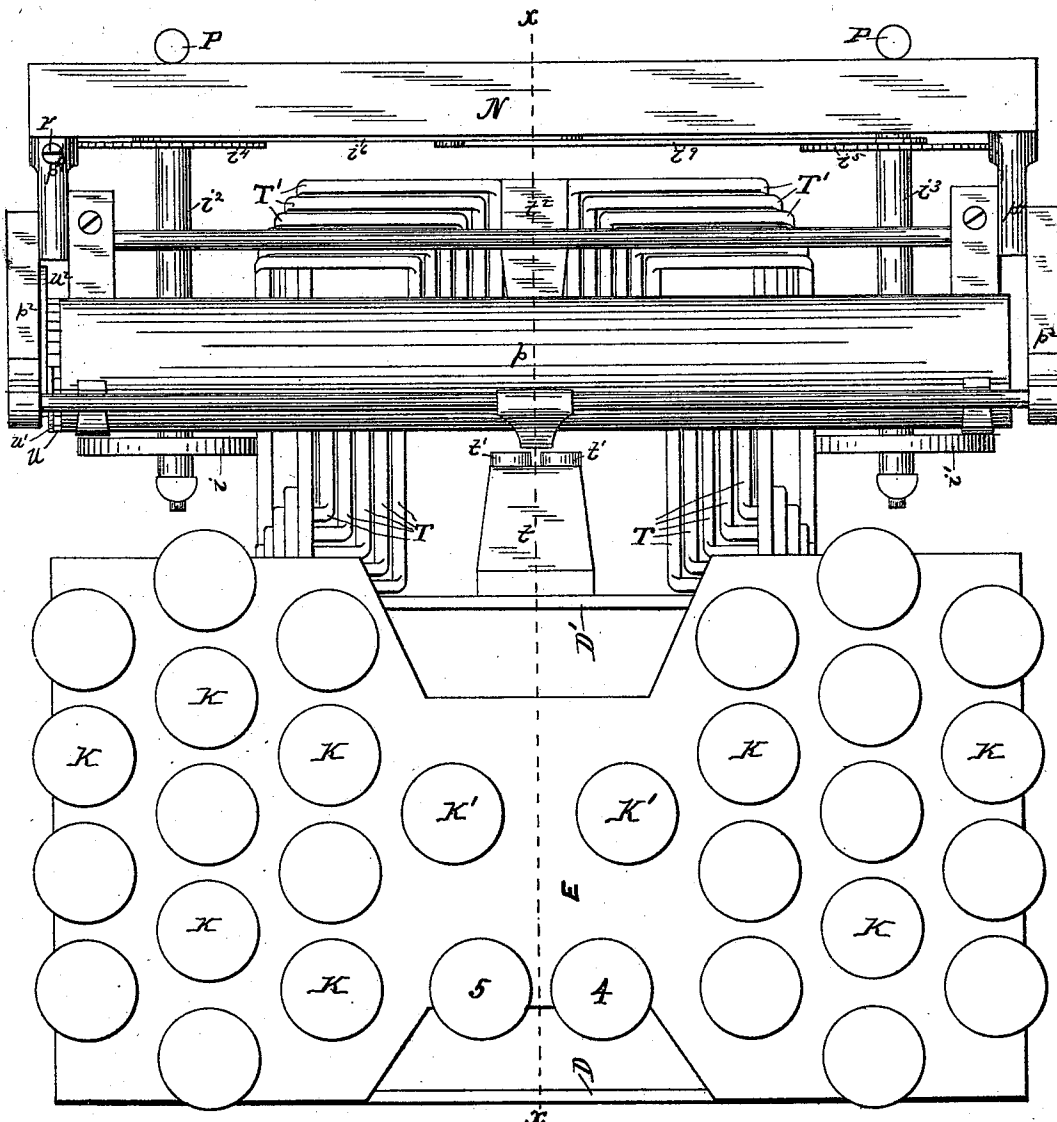


FIG. 1.

Geo. B. Clover

Therese F. Woodward
by his attorney
Chas A. Rutter.

(No Model.)

5 Sheets—Sheet 2.

T. F. WOODWARD.
TYPE WRITING MACHINE.

No. 514,141.

Patented Feb. 6, 1894.

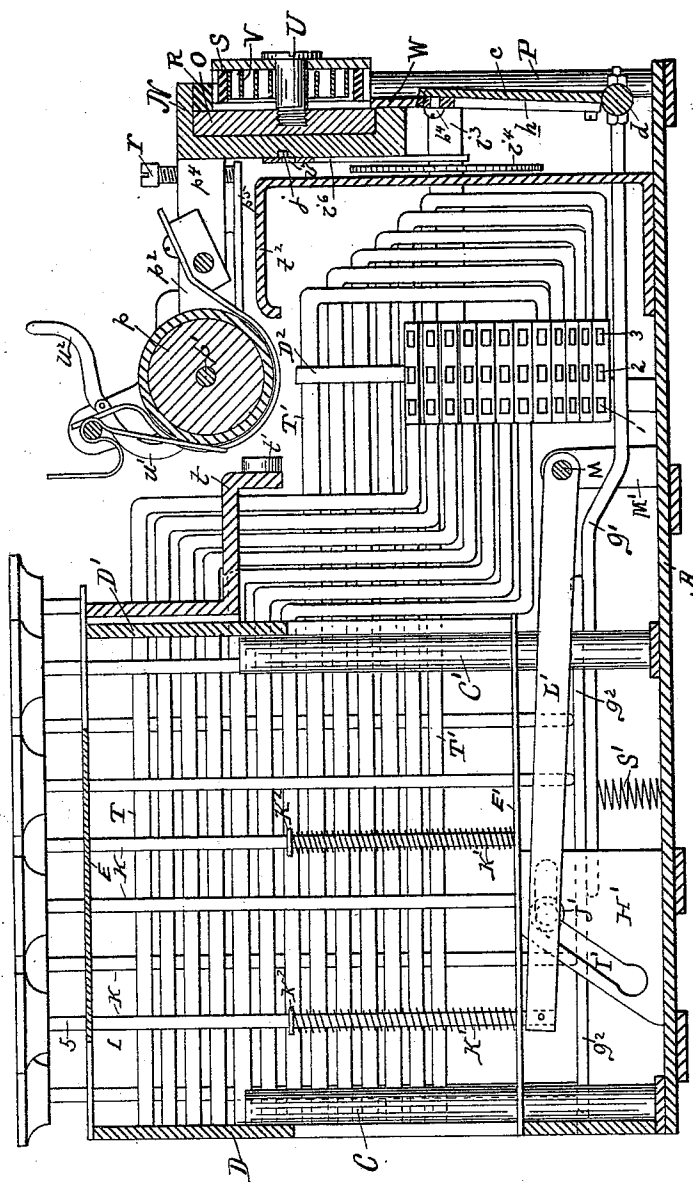


FIG. 2.

WITNESSES:

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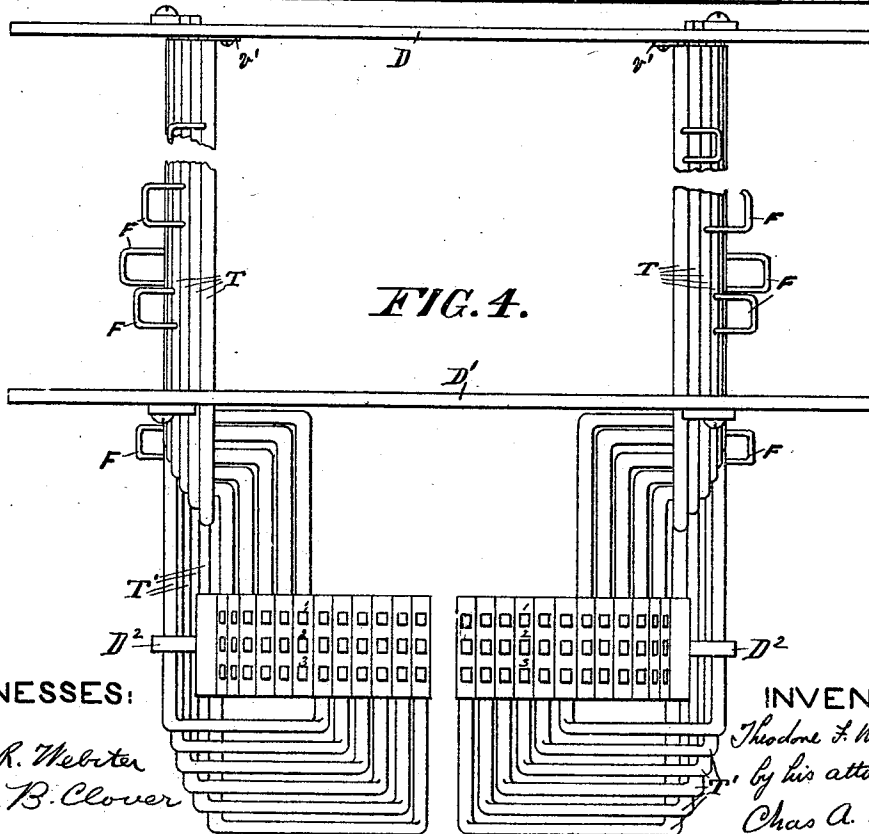
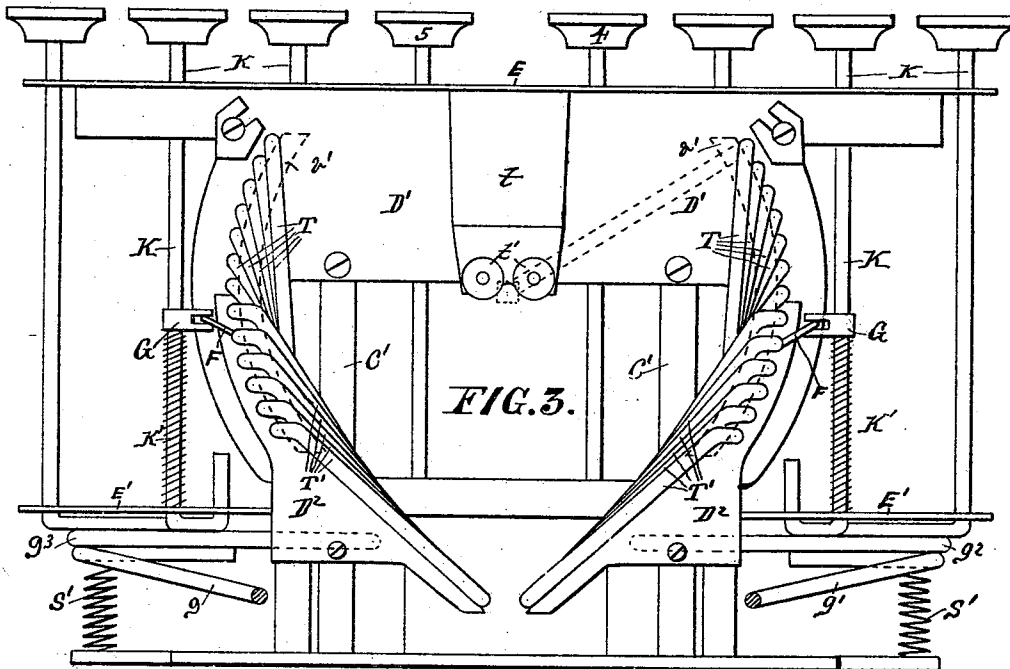
(No Model.)

5 Sheets—Sheet 3.

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WITNESSES:

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(No Model.)

5 Sheets—Sheet 4.

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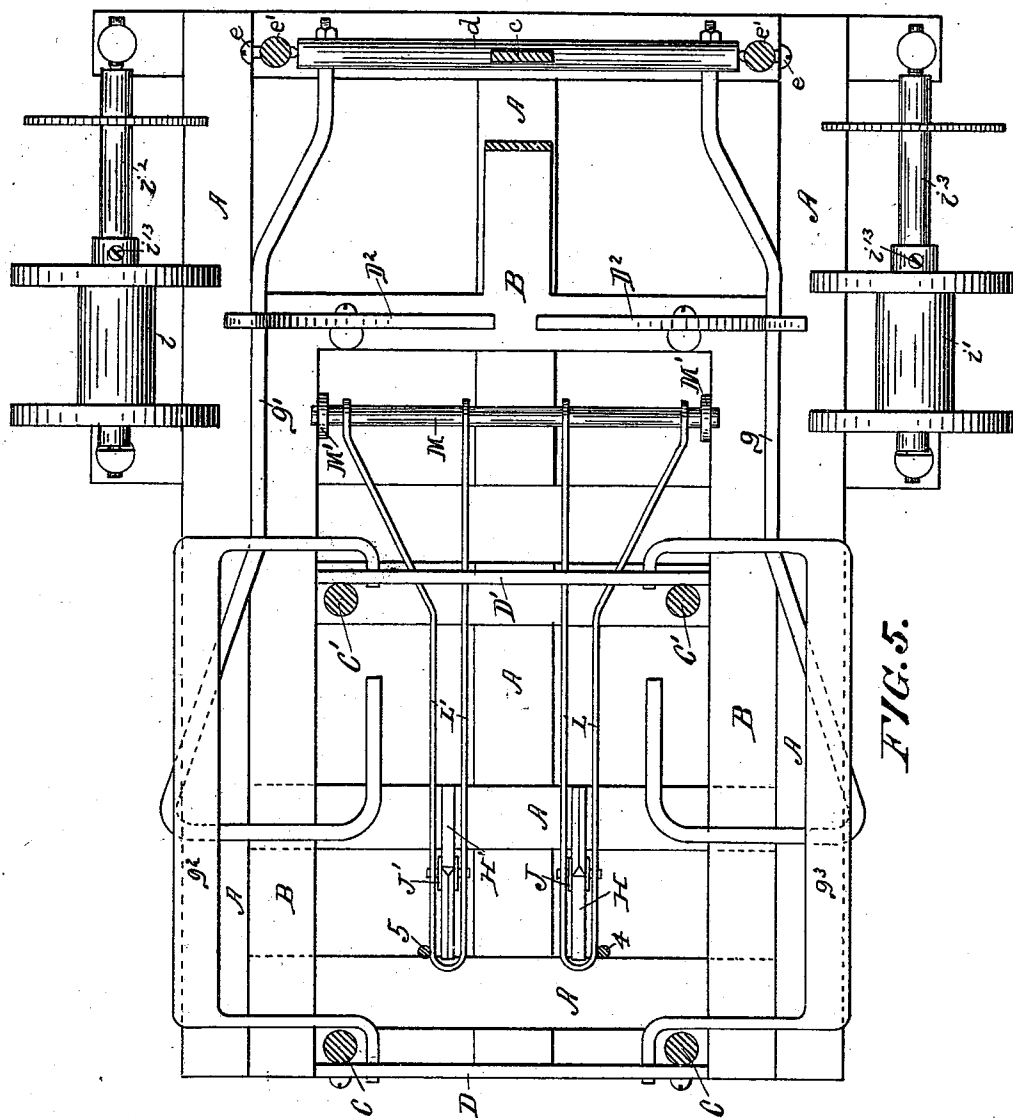


FIG. 5.

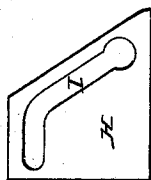


FIG. 7.

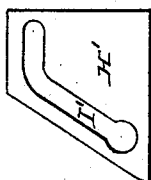


FIG. 6.

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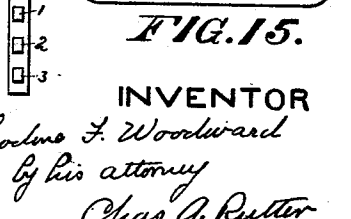
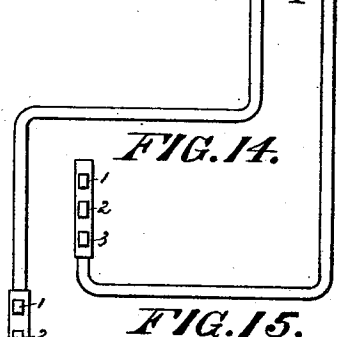
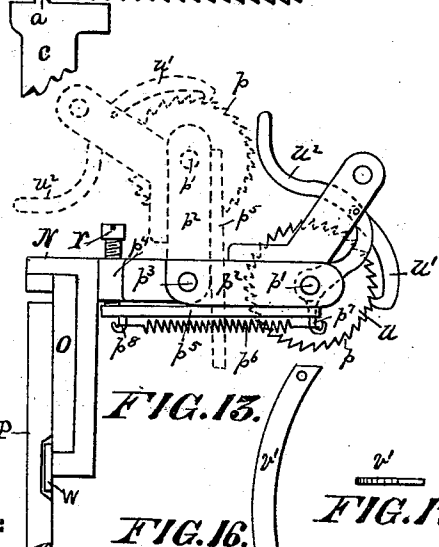
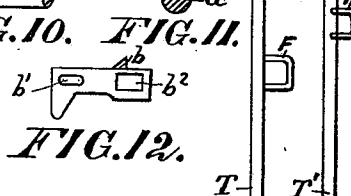
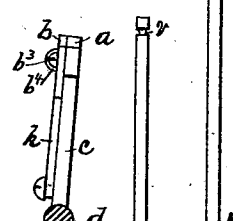
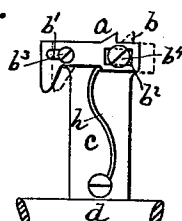
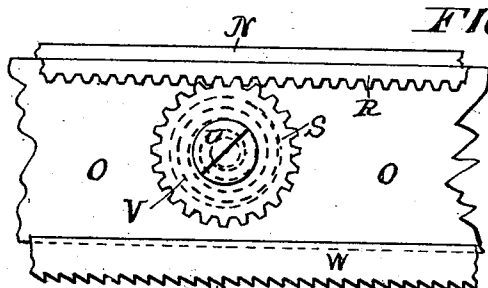
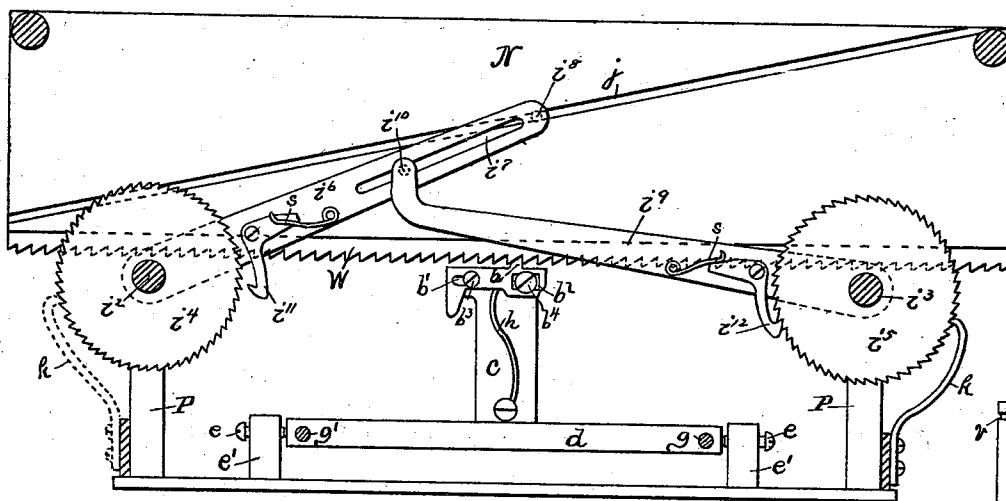
(No Model.)

5 Sheets—Sheet 5.

T. F. WOODWARD.
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UNITED STATES PATENT OFFICE.

THEODORE F. WOODWARD, OF CAMDEN, NEW JERSEY.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 514,141, dated February 6, 1894.

Application filed July 16, 1891. Serial No. 399,675. (No model.)

To all whom it may concern:

Be it known that I, THEODORE F. WOODWARD, a citizen of the United States, and a resident of the city and county of Camden and State of New Jersey, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My invention relates to improvements in type-writing machines and particularly to improvements in that form of machine in which the type are carried upon movable arms which are operated to strike the paper to make an impression, and which are usually called "type bar" machines in contra-distinction to the machines known as "wheel" machines, in which the type are stationary, the impression being made with a plunger operated by a spring.

It is well known that type bar machines as ordinarily constructed while being excellent for manifolding soon get out of alignment, and that wheel machines, while always keeping their alignment, are very unsatisfactory as manifolders.

The object of my invention is to furnish a machine which will manifold as well as any of the type bar machines now in use, and which will have an alignment equal to that of the best wheel machines.

My object is further to produce a machine of extreme simplicity and compactness, and of low cost and light weight.

In the accompanying drawings forming part of this specification, and in which similar letters and figures of reference indicate similar parts throughout the several views, Figure 1 is a plan of my type-writing machine; Fig. 2 a sectional elevation of the machine on line *x. x.* Fig. 1; Fig. 3, an end view of the machine, the carriage and rear part of the frame being removed so as to show arrangement of type bars, &c.; Fig. 4, a plan of the type-bars and the bearings in which they work; Fig. 5, a plan of the lower part of the machine showing devices for shifting the key board and for operating rock shaft which carries pawls for regulating movement of carriage which determines the spacing; Fig. 6, a side elevation of cam for throwing key board backward; Fig. 7, a side elevation of cam for throwing key board forward; Fig. 8, an ele-

vation of inside end of carriage frame showing devices for driving inking ribbon spools and spacing device; Fig. 9, an elevation of part of outside end of carriage, showing devices for driving it; Fig. 10, an inside elevation of part of rock shaft and pawls for limiting movement of carriage; Fig. 11, an end elevation of Fig. 10; Fig. 12, a front elevation of movable pawl; Fig. 13, a side elevation of carriage and frame; Fig. 14, a side elevation of one of the shorter type-bars; Fig. 15, a side elevation of one of the longer type-bars; Fig. 16, a front elevation of device for holding the type-bars in place, and Fig. 17 a plan of Fig. 16.

The base of the machine is constructed in two parts, one stationary, the other movable.

A is the stationary part, B the movable part. The stationary part of the base A carries the carriage and its connected parts and the movable portion B carries the type-bars and the operating keys.

C, C' are posts carried by the movable base. D, D' are metallic plates carried by these posts in which are the bearings for the type bars.

E is a plate of metal carried by the upper ends of plates D, D' through which the keys pass. E' is a similar plate near the bottom of the machine.

The type bars T, T' are preferably made from a single piece of metal, each bar preferably carrying three type—1, 2, 3—so that small letters, capitals, numbers, &c., may be written by the machine. The type-bars have bearings in the end plates D, D' and are arranged preferably in the arc of a circle as clearly shown in Fig. 3, that is to say the type bars are placed thirteen upon each side of the machine, their centers being upon the arc of a circle whose center is in line with the point where the type impinge upon the platen. The type bars are arranged so that their rear portions, which are secured in the bearings, are parallel to each other and to the longitudinal axis of the machine, as best shown in Figs. 2 and 4. The type bars are of two forms, in order that they may be compactly arranged in the machine, the upper ones T, Figs. 1, 2, 3, 4 and 14, being bent down and outwardly, and the lower ones T', Figs. 1, 2, 3, 4 and 15, being bent down and inwardly. The type

bars are furnished with cranks F which are engaged by fingers G carried by the keys K as shown in Fig. 3. When the key is depressed the finger G upon the key engages and draws the crank F down and rotates the type bar in its bearings and throws the end which carries the type against the platen or against the paper carried by the platen.

K' are springs surrounding keys K and which have a bearing against some stationary part of the key board; for instance, against the lower plate E' and against a collar K² or its equivalent fast to the keys K. These springs are adapted to hold the keys in their raised position as shown in Fig. 2. The upper type-bars T are the shortest ones and they have bearings in the plates D, D'. The lower type-bars T' are longer than the upper ones and they have an additional bearing in a plate D², Figs. 2, 3, 4 and 5, which also forms a stop to keep the front end of these bars from falling too low down. The shortest type bars have bearings four inches apart. The longest ones have bearings of six inches, from the plate D to plate D². The length of the crank arm on the type bars is the same in both forms and in practice does not exceed two inches. The type which are formed on pieces of metal separate from the type bars are secured to the latter in any convenient manner; for instance, by electric welding.

Type-bar machines as ordinarily constructed have very short bearings and the free end of the arm is very long. In some cases the bearings are only three-eighths or one-fourth of an inch, while the type bar itself is from four to five inches long. Consequently if the bearings become worn, which they do very shortly, a slight change in the bearings is greatly multiplied by the length of the type-bar and the alignment becomes very bad. In my machine I have bearings of great length and the crank arm of the type-bars is short, and a change in the bearings would have to be very great to affect the alignment of the machine. In fact, the wear would never be enough in ordinary use to affect the alignment.

As I have three type upon each type-bar it is necessary to shift either the type bars or the platen into position to bring all the type into play. In the drawings I have shown a device for shifting the key board and its connected parts. H, H', Figs. 2, 5, 6 and 7, are plates of metal which are secured to the stationary base of the machine and which are furnished with slots I, I', the upper parts of which are horizontal, and the lower parts of which are inclined. J, J' are rollers which travel in slots I, I', and which are carried by straps L, L', the forward ends of which are secured to a rod M, which is carried by lugs M' secured to the movable base of the machine. When the machine is in its normal position, the center type is in position to be used. If it be desired to bring the rear type into use, the key board is moved forward by depressing

the key 4, which depresses the strap H and causes wheel J to run down inclined slot I which pushes the strap L, rod M, frame B and its connected parts forward. If it be desired to use the forward type, the key 5 is depressed, which through strap L', wheel J', rod M and frame B moves the key board and its connected parts backward. The carriage N is carried upon a guide O, Figs. 2, 8, 9, 10 and 13, which is supported in any suitable manner upon the stationary base A. In the drawings I have shown it supported upon posts P. The carriage is furnished with a rack R which is driven by a gear wheel S, Figs. 2 and 9, which is carried on a stud U carried by the guide O. A coil spring V, one end of which is secured to stud U and the other to the gear wheel S, drives this latter. This device is common to most type-writing machines and need not be further described herein. Upon the lower part of the carriage is a ratchet W, which together with the pawls a-b limits the movement of the carriage and regulates the spacing. The fixed pawl a is carried upon an arm c which is attached to a rock shaft d which is carried by trunnion screws e, Figs. 5 and 8, which are suitably supported in standards e' carried by the stationary base A of the machine. Attached to the rock shaft d are arms g, g' Figs. 2, 3, 5 and 8, which extend backward, as best shown in Figs. 2 and 5, and under the keys. g² g³ are levers which are pivoted to the plates D, D' and which rest upon the arms g, g' as shown in Figs. 2 and 5; the keys K and the spacing keys K' bear against the levers g² g³ or against the arms g, g'; as these keys are depressed they push down the arms g, g' and cause the rock shaft d and arm c to be reciprocated. It will be seen that the levers g² g³ may be done away with if desired, and the arms g, g' so shaped as to be engaged by all the keys. A spring S' returns these parts to their original position. b is the movable pawl which is formed upon a flat piece of metal which is furnished with slots b' b² through which screws b³ b⁴ pass; these screws are secured to the arm c which carries the pawl a; h is a spring, one end of which is secured to the arm c or rock shaft d and the other of which bears against the plate carrying pawl b.

The operation of this device is as follows: A key being struck the arms g, g' are lowered and the rock shaft d is moved in carrying with it arm c which carries the pawls; when the machine is at rest the movable pawl b is engaging one of the teeth of ratchet W, and the stationary pawl is directly opposite this movable pawl. When arm c is thrown in the movable pawl is moved in, out of contact with the ratchet W, and the stationary pawl is moved in and engages the tooth which the movable pawl has just left. As soon as the former pawl is moved out of contact with the ratchet the spring H operates to throw this pawl to the right as shown by dotted lines in Fig. 10, a distance equal to one tooth of the

ratchet. As soon as the key is released the spring S' raises arm $g g'$, and the shaft d and arm c and pawl a are returned to their original position; the pawl b has been moved one tooth to the right on the ratchet W , and as soon as the pawl a is out of contact with the ratchet, the carriage, which is driven by the spring in the gear wheel S , moves to the left carrying pawl b with it until the movement is stopped by one of the slots $b' b^2$ in this pawl bringing up against the screws $b^3 b^4$ which pass through them. This operation is repeated every time a key is struck.

The mechanism for driving the inking ribbon spools is shown best in Fig. 8.

The ribbon spools $i i'$, Fig. 5, are carried on shafts $i^2 i^3$ which are supported in any suitable manner upon the stationary base A . Upon the shafts $i^2 i^3$ and fast to them are toothed wheels $i^4 i^5$. Upon the inside of the carriage N is a diagonal slot j extending from a point near the lower left hand corner of this carriage to a point near its upper right hand corner.

i^6 is an arm one end of which surrounds and is free to turn on shaft i^2 ; i^7 is a slot in this arm and i^8 a pin on this arm which projects out and enters slot j in the carriage.

i^9 is an arm which surrounds and is free to turn on shaft i^3 and i^{10} is a pin projecting from the end of this arm which enters slot i^7 in arm i^6 .

Upon arm i^6 is a pawl i^{11} and upon arm i^9 is a pawl i^{12} ; springs s throw these pawls into the teeth of wheels $i^4 i^5$ or they may engage by gravity alone. In the drawings the pawl i^{12} is shown engaging wheel i^5 while pawl i^{11} is out of gear with wheel i^4 . As the carriage is driven to the left by the operation of the keys as already described, the slot j in carriage N is moved to the left and as this movement takes place the pin i^8 and arm i^6 are raised, raising with them pin i^{10} and arm i^9 which raises pawl i^{12} which turns wheel i^5 , shaft i^3 and the ribbon spool i' which is carried on this shaft which unwinds the ribbon from spool i which is carried by shaft i^2 . The operation can be reversed by throwing pawl i^{11} into gear with wheel i^4 and by throwing pawl i^{12} out of gear with wheel i^5 . These pawls, i^{11} , i^{12} are thrown into or out of gear with the ratchet wheels, i^4 , i^5 , by the operator moving them with his finger, so that they will be engaged or disengaged by the springs, s , which hold them in gear with the teeth of the ratchets.

The spools $i i'$ may be secured to shafts $i^2 i^3$ by means of screws i^{13} passing through their hubs. If this be the case, both pawls may be left in gear with the wheels $i^4 i^5$ and the screw which secures the ribbon spool from which the ribbon is being unwound may be loosened in order that the ribbon may be drawn off it.

k , Fig. 8, is a spring which engages with the teeth of wheel i^5 to prevent this wheel from turning backward while the ribbon is being

wound upon the spool on shaft i^3 . A similar device may be used upon wheel i^4 .

The platen p is of the ordinary construction. It is carried upon a shaft p' which is journaled in bearings in arms p^2 which are pivoted at p^3 to support p^4 carried by the carriage. Upon one or both of the supports, if desired, is a screw r which passes through this support.

p^5 is a projection from the arm p^2 which bears against the screw r ; the purpose of this screw and projection is to adjust the platen for different thicknesses of paper. When several copies are being made at once they increase the diameter of the platen, and hence the blow delivered by the type to the paper varies with the number of copies that are being made. By means of the screw r the platen may be raised or lowered so that a blow of the same force will be delivered whether one copy is being made or several.

In Figs. 1, 2 and 3, I have shown a device for limiting the upward movement of the type bars; this device consists, for the shorter bars T , of a bracket t which is carried by the plate D' and which projects outwardly and against which the type bar impinges. In the drawings I have shown this bracket furnished with rollers t' , between which the type bar strikes. The longer type bars T' impinge against a bracket t^2 which is carried by the movable base of the machine. The purpose of these brackets is to prevent the type from striking the paper on the platen a blow harder than is necessary for the type to make a good impression. These stops serve further to prevent that part of the type-bar which carries the type from being bent when the keys of the machine are violently struck and the type thrown with undue force against the platen.

u is a ratchet wheel on the platen. u' is a pawl pivoted to a lever u^2 which engages this ratchet. By depressing lever u^2 the pawl u' engages the teeth of the ratchet and moves the platen so as to shift or turn the paper to bring a new line over the type.

p^6 is a spring, one end of which is secured to a projection p^7 from lower part of lever u^2 and the other end of which is secured to a projection p^8 on the projection p^5 from arm p^2 and which returns lever u^2 and pawl u' to their original position after they have been operated to turn the platen.

Numerous devices may be used to prevent a lateral movement of the type bars $T T'$ in their bearings. In Figs. 16 and 17 I have shown a side elevation and plan of a device for this purpose. The type bars, see Figs. 14 and 15, are furnished with grooves v near their ends into which a thin plate of metal v' , Figs. 3, 4, 16 and 17, enters. This plate of metal v' is attached to the front plate D forming one of the bearings for the type bars, as shown in Fig. 4, and enters the grooves v in all the type bars and effectually prevents any lateral movement of these bars.

In Fig. 13, I have shown by dotted lines the arm p^2 , the platen p and connected parts raised so that the writing may be inspected by the operator.

5 I claim—

1. A type-writing machine whose type-bars are divided into series, each type-bar having a pivotal portion or shaft, and an oscillating portion or arm, the pivotal portions, or shafts
10 of the type-bars being parallel to each other and arranged in bearings in arcs of circles whose centers are in line with the point of contact of the type and the platen, and the oscillating portions being adapted to carry
15 the type.

2. A type-writing machine whose type-bars are divided into series, each type-bar having a pivotal portion or shaft, and an oscillating portion or arm, the pivotal portions, or shafts,
20 being parallel to each other and being arranged in bearings in segments of parallel circles.

3. A type-writing machine whose type-bars consist of a pivotal portion or shaft, and an
25 oscillating portion or arm, the former being parallel to each other and arranged in series in the segment of the circumference of a circle.

4. The combination with the type bars as described having grooves v , of a plate of metal
30 v' secured to the frame of the machine, and adapted to enter these grooves to prevent a lateral movement of the type bars.

5. In a type-writing machine, in combination a stationary and a movable base, two cams
35 inclined in opposite direction and attached to the stationary base, a rod carried by the

movable base, stamps attached to this rod and carrying wheels adapted to engage and travel on the cams, keys attached to said straps, and a key board and type bars carried by movable base, the whole arranged and operating substantially as and for the purposes set forth.

6. A type-bar for type-writing machines, the rear portion of which is adapted to be held in bearings in the frame of the machine and to rotate in these bearings, and the front portion of which is bent first at right angles to the rear portion and then parallel to the rear portion, and which carries the type.

7. The herein described device for driving the ribbon spools and in combination with the carriage, the diagonal slot in the carriage, the ribbon spool shafts, ratchet wheels fast to these shafts, an arm on left hand shaft furnished with a slot, a pin on this arm entering
55 diagonal slots in the carriage, an arm on right hand shaft, a pin on this arm entering slot in arm on left hand shaft, and pawls on these arms adapted to engage and turn the ratchet wheels.

8. In combination with the pivoted platen carrying arms and platen and the stationary arms to which the pivoted arms are pivoted, a projection or stop on one of the former and an adjusting screw carried by one of the latter arms and adapted to engage said stop, substantially as and for the purposes set forth.

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Witnesses:

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