O. PFEIFFER.

TYPE WRITING MACHINE.

APPLICATION FILED SEPT. 26, 1907.

1,024,745.

Patented Apr. 30, 1912.

4 SHEETS—SHEET 1.

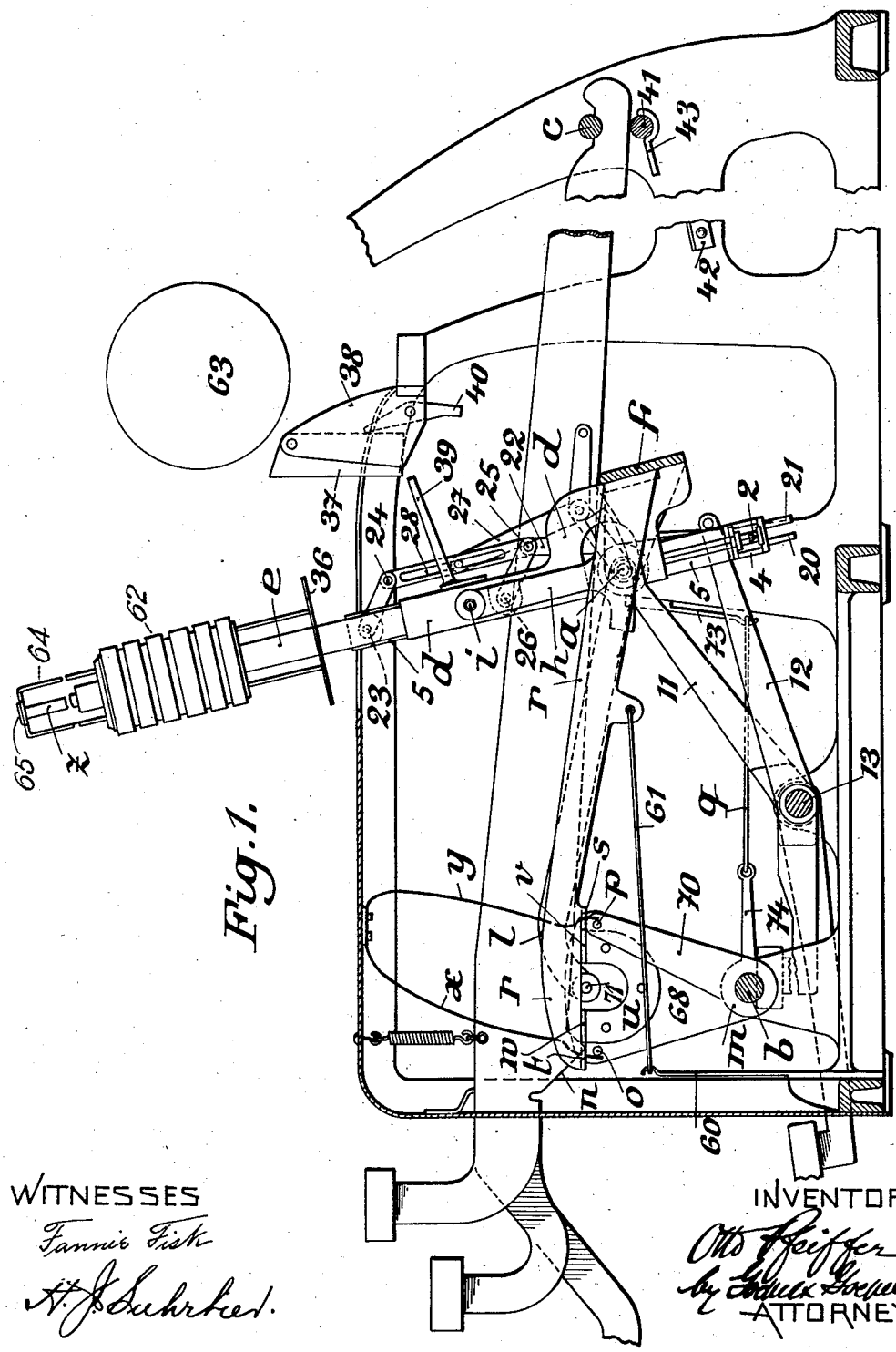

Fig. 1.

WITNESSES

Fannie Fisk

A. J. Schubert.

INVENTOR

Otto Pfeiffer

by Church & Church

ATTORNEYS

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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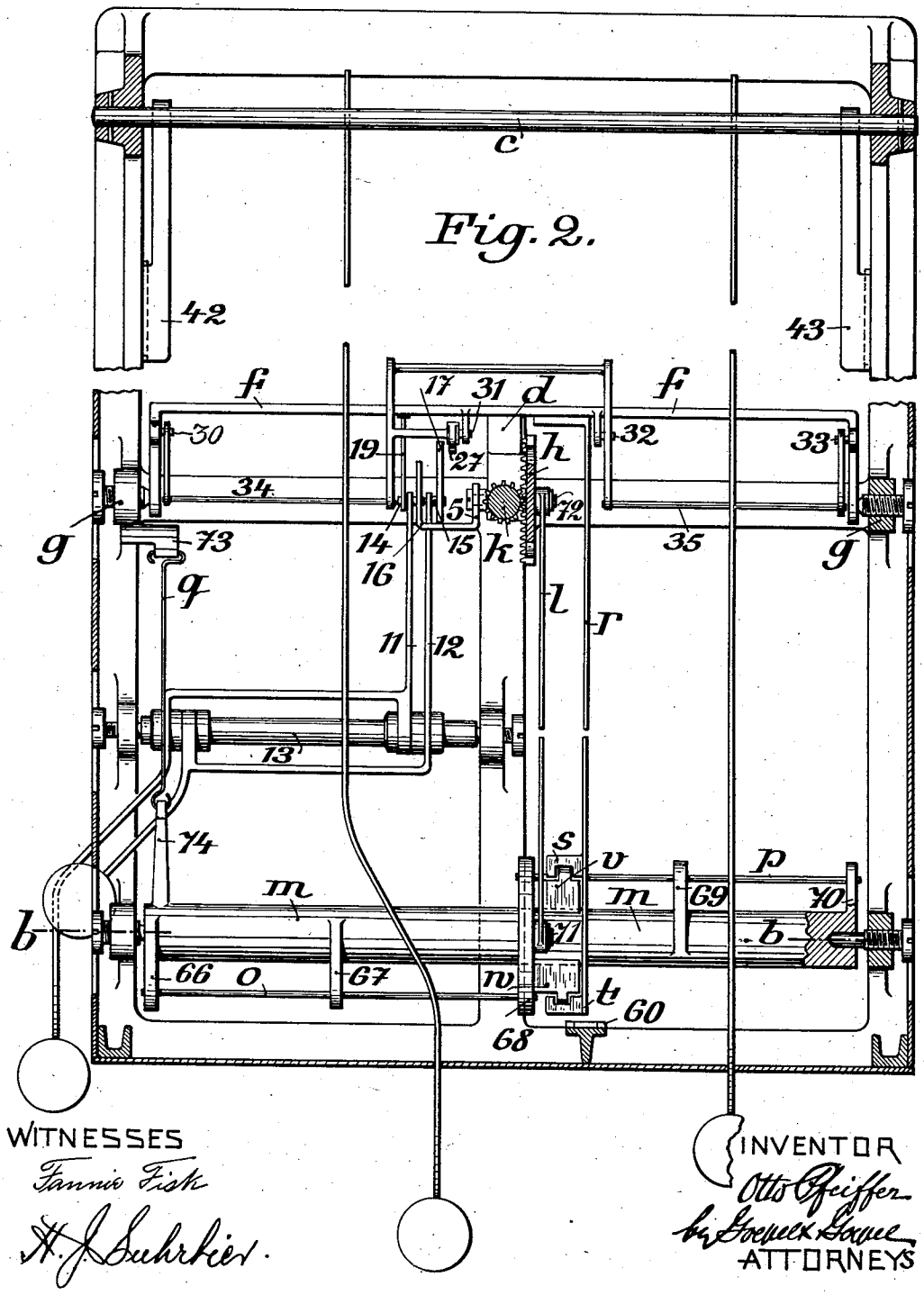
4 SHEETS—SHEET 2.

Fig. 2.



WITNESSES

Fannie Fisk

H. J. Suhrkier.

INVENTOR

Otto Pfeiffer

by Goepel & Goepel

ATTORNEYS

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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4 SHEETS—SHEET 3.

Fig. 3.

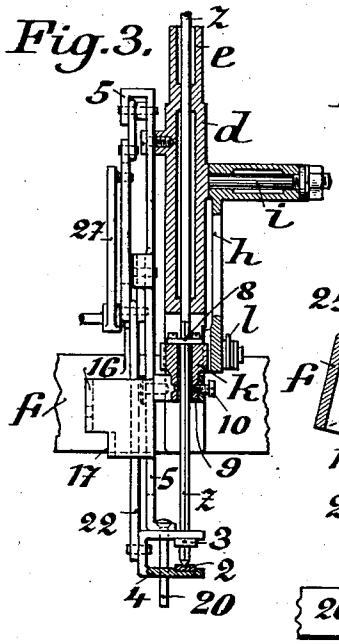

Fig. 4.

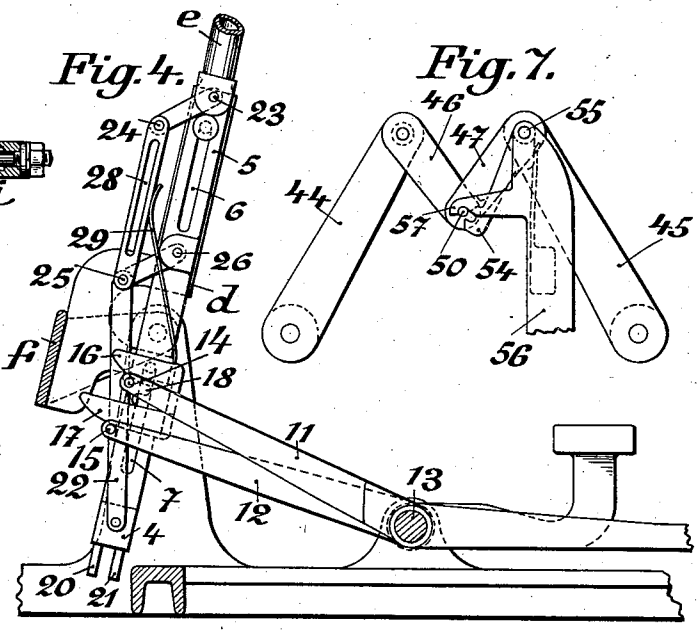

Fig. 7.

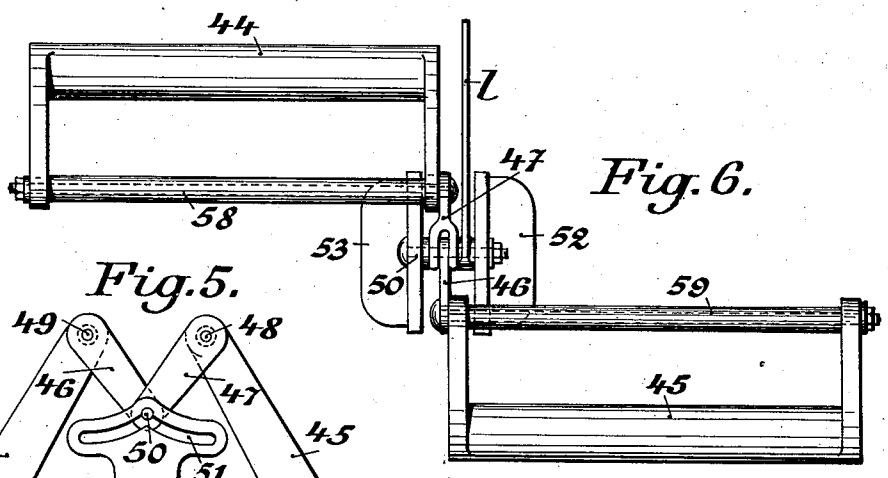

Fig. 6.

Fig. 5.

WITNESSES

Fannie Fiske

H. J. Sulzbacher.

INVENTOR

Otto Pfeiffer

by Fraser & Goepel.

ATTORNEYS

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

O. PFEIFFER.

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4 SHEETS—SHEET 4.

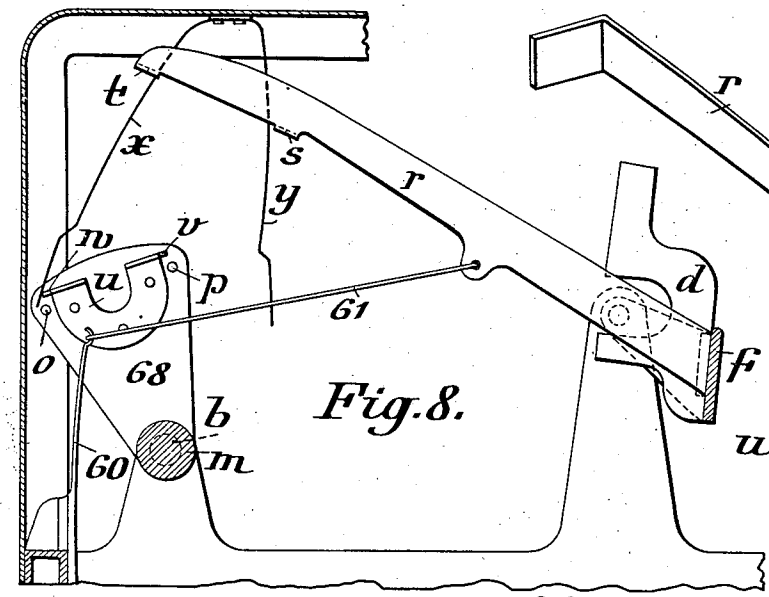

Fig. 8.

Fig. 9.

Fig. 10.

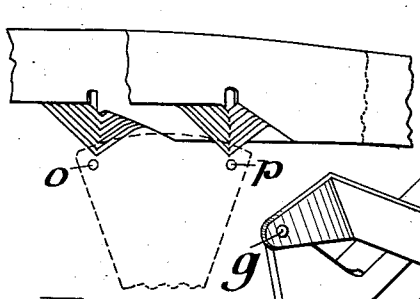

Fig. 12.

Fig. 11.

WITNESSES

Fannie Fisk

H. J. Buhrkies

INVENTOR

Otto Pfeiffer

by Goepel & Goepel

ATTORNEYS

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C

UNITED STATES PATENT OFFICE.

OTTO PFEIFFER, OF CASSEL, GERMANY.

TYPE-WRITING MACHINE.

1,024,745. Specification of Letters Patent. Patented Apr. 30, 1912.

Application filed September 26, 1907. Serial No. 394,604.

To all whom it may concern:

Be it known that I, OTTO PFEIFFER, government official, a subject of the German Emperor, residing at 14 Kaiserplatz, Cassel, Germany, have invented certain new and useful Improvements in Type-Writing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to that class of typewriting machines, in which the types are arranged on a cylinder having a striking movement against the platen and at the same time a rotary and a longitudinal shifting motion whereby the desired type is positioned. Typewriting machines of this class heretofore in use were of minor efficiency, because they had neither the easy and quick work of the type bar machines, nor their effect in printing several copies at a time. However this inferiority is not a necessarily inherent quality of the said system. For a type cylinder having a greater mass, but making shorter ways, can be moved as rapidly, and, when the same power is spent, can have the same printing effect as a type bar, having a smaller mass, but moving a larger distance and acquiring a larger final velocity. However, to obtain good results, the mechanism transmitting the force from the keys to the operating parts of the machine should be as simple as possible, and the movements for positioning the proper type, which are useless for the printing effect, should consume as little as possible of the spent power. The type cylinder machines heretofore in use are not constructed according to those principles.

Now, the object of the improvement is to provide a machine of this class, in which due regard is paid to the principles stated, whereby a machine of high efficiency is produced.

The invention, therefore, consists in constructing a machine of this class according to the aforesaid principles.

The invention also consists in certain details of construction which will appear from the following description and which are pointed out in the claims forming part of this specification.

For the purpose of explaining the invention, an example of a machine embodying the same is illustrated in the accompanying drawings, in which—

Figure 1, is a side elevation of the machine showing the mechanism for rotating the type cylinder, Fig. 2, is a horizontal cross section of the machine showing the key levers, Fig. 3, is a vertical sectional elevation of the type cylinder support, Fig. 4 is a side elevation of the mechanism for effecting the vertical adjustment of the type cylinder. Figs. 5, 6 and 7 show a modification of the mechanism for adjusting the type cylinder in an axial direction, Fig. 8 shows the stop work of the positioning frame, Figs. 9 and 10 show details of this stop work, Fig. 11 is a perspective view of parts of the machine, illustrating the cooperation of the mechanisms, and Fig. 12 shows the different surfaces or slopes of the key levers.

The same numerals have been used to indicate corresponding parts in all the views.

The machine comprises three main fulcrums *a*, *b* and *c*.

a is the fulcrum of the printing frame, *b* is that of the positioning frame, and the shaft *c* affords a common fulcrum for all the key levers. The printing frame consists of two parts rigidly connected to each other, *i. e.* the type cylinder support *d* with the shaft *e* secured thereto and the frame *f* extending laterally below all the key levers. The frame *f* is pivotally supported on brackets *g*—*g* located on the base of the machine. It is actuated directly by the key levers resting on its upper edge, Figs. 1 and 11. From the frame *f* motion is derived to actuate the feeding mechanism for the platen and the color ribbon, and for raising the latter at the moment of printing. These parts are not represented in the drawings, because they do not form a part of this invention.

On the depression of a key, the key lever presses the frame *f* down and the type cylinder strikes the platen. After the impression is made, the printing frame is moved back to its normal position by a spring 60, Fig. 1, connected by a wire 61, to an arm *r* of the printing frame *f*. In the position of rest, the action of the spring operates nearly in the direction of the radius of a circle, described by all the parts of the oscillating type cylinder support *d* and the frame *f* around the axis *a*, Figs. 1 and 11. Therefore

the resistance of the spring is very small at the beginning of its deformation and increases by and by, whereby an easy starting of the printing frame is obtained, even if the spring be strongly bent.

The type cylinder has a rotary and a longitudinal motion on the shaft *e* fixed to the type cylinder support *d*. The latter and the shaft *e* have axial bores through which the type cylinder shaft *z* passes. The latter has a circular cross section at its upper end, where it is guided in the shaft *e* (Fig. 3). It has a square cross section at its lower end and extending through a small plate 8, which has a corresponding square opening, and is rigidly secured to a pinion *k*. The latter, with its lower cylindrical part 9, is located in the bottom part of the type cylinder support *d*. The pinion *k* and its cylindrical part 9 are made with a longitudinal opening through which the shaft *z* extends with some play, so as to have contact only with the guiding plate 8. The shaft *z* can therefore be moved longitudinally within the pinion *k*, but it must follow the rotation of said pinion. To prevent the pinion *k* from following the upward movement of the shaft *z*, the cylindrical part 9 is provided with an annular groove, engaged by a screw 10 (Fig. 3). At the upper end of the shaft *z* the type cylinder 62 is mounted by means of a bail like wire 64, Fig. 1, and a clamping piece 65, whereby the type cylinder can readily be removed. By the mechanism described, all the rotary and longitudinal motions of the shaft *z* are communicated to the type cylinder.

A toothed sector *h* pivotally supported on a pivot *i* of the type cylinder support *d* is in engagement with the pinion *k*. When the sector *h* is moved out of its normal position forward or backward, the type cylinder receives a rotation in one or the other direction amounting up to 180°. The point of engagement of the sector *h* with the pinion *k* lies in the axis of oscillation of the printing frame *f*. In the same axis, but on the outside of the sector *h*, the connecting rod *l* is pivoted, Figs. 1, 2 and 11, by which the circular positioning movements are communicated to the sector and, consequently, to the type cylinder.

The positioning motions of the sector *h* and the type cylinder are effected and limited by a positioning frame *m* (Figs. 1, 2 and 11), pivotally mounted on standards of the frame of the machine. The positioning frame *m*, which must be very light, but perfectly rigid, has different arms 66, 67, 68, 69, 70, between which rods or bars *o* and *p* are mounted. Above these bars, the key-levers are provided with downwardly extending projections, having faces inclined to different degrees. The engaging faces of the projections of the key-levers above the bar *o* are inclined in a direction opposite to that of the projections located above the bar *p*, as shown in Figs. 11 and 12. On the depression of a key-lever, its inclined face strikes the bar *o* or *p* and turns the frame *m* to the right or to the left around its pivots *b*, which motion is greater or smaller according to the slope of the projection of the actuated key-lever. At the rear of the slopes of projections of the key levers, actuating the bars *o* and *p*, a slot is provided, which is substantially straight. Therefore the positioning frame is stopped in a certain final position although the depression of the key-lever continues.

The connecting rod *l* is pivoted at one of its ends to the central arm 68 of the positioning frame *m*, and at the other end at 71 to the sector *h*, Figs. 1, 2 and 11, so that all the movements of the positioning frame in one or the other direction must cause corresponding motions of the sector and rotations of the type cylinder. On account of the pivotal connection of the positioning frame and the sector, the said movements may be effected simultaneously with the oscillation of the type cylinder.

While the positioning frame and consequently the sector and the type cylinder are in their positions of rest, the pivot 72 (Fig. 11), connecting the rod *l* with the sector *h*, is located exactly in the axis of oscillation of the printing frame and type cylinder support. Therefore the oscillation of the latter parts has no influence on this point and on the connecting rod *l*. If, however, the rod *l*, by the positioning motions is caused to move to the right or to the left, the pivot 72 is also moved out of the axis of oscillation of the printing frame, so that a circular motion around the latter is imparted thereto. This motion is the greater, the more the pivot 72 is out of the center of oscillation. If, however, the positioning frame, and thereby also the other pivot 71 of the rod *l* is locked by a key, the pivot 72 and the rod *l* can oscillate only around the pivot 71. Therefore the pivot 72 must deviate slightly from the circular way around the axis of oscillation of the printing frame, by which means the position of the sector and consequently that of the type cylinder is influenced. However, this influence of the oscillating motion on the positioning motion is finished as soon as the two pivots 71 and 72 are in line with the center of oscillation of the printing frame *f*. Now, as nearly as possible, the parts are so arranged, that the pivots have this position for all the positioning movements, when the type cylinder is near the platen, and as the type cylinder must have this position at the last moment of its oscillation, the oscillation of the printing frame *f* and the type cylinder support *d* influences

the positioning motions so little as not to be of importance.

In order to move the positioning frame *m*, the sector *h* and the type cylinder back into their normal positions, a retracting spring 73 is provided, which is attached to the frame of the machine and connected to an arm 74 of the frame *m* by a wire *q*. This spring actuates the frame *m* in the direction of a radius of the circular motion of the frame around its fulcrum *b*. Therefore the same spring pulls the frame *m* back into its normal position, in whatever direction it had been impelled. Moreover, an easy starting is obtained, because the resistance of the spring is zero at the beginning and increases by and by.

When the key levers are released, the type cylinder and the positioning frame *m*, by the momentum they have acquired, may sometimes swing beyond their normal positions. In order to avoid this and to obtain the exact normal position of the frame *m* instantaneously and without any vibration, as is required to secure an exact engagement of the slopes of the key-levers with the bars *o* and *p*, a stopping mechanism is provided, which is shown in Figs. 1, 2, 8, 9 and 10. This stopping mechanism consists of the arm *r* fixed to the printing frame *f* and having two laterally projecting flanges *s* and *t* engaging corresponding flanges *v* and *w* of a stopping piece *u* secured to the central arm 68 of the positioning frame *m*. Springs *x* and *y* extend into notches of the flanges *s* and *t* between *s* and *v*, *w* and *t* repectively so that in the normal position in which *s*, *t* and *v*, *w* are in the same plane, the frame *m* is locked. When the arm *r* rises (Fig. 8), the springs *x* and *y* expand, so as to unlock frame *m*, as shown in Fig. 8. On the return stroke of the printing frame *f* and its arm *r*, the stopping pieces *s* and *t* slide along the springs *x* and *y* and, through the intermediary of these springs, actuate the pieces *v* and *w* so as to accelerate their return movement to the position of rest. As soon as the arm *r* has returned to its normal position, the springs *x* and *y* are inclosed again between the parts *v*, *w* and *s*, *t*, respectively, and the positioning frame *m* is therefore locked. The stopping of the frame is effected without any shock, because the intermediate pieces *x* and *y* are elastic. This result has not heretofore been obtained.

As will readily be understood from Fig. 12, the slopes of the key levers actuating the bars *o* and *p* of the positioning frame *m* are so formed as to effect the oscillation of this frame and the rotation of the type cylinder as near the end of the depression of the key lever, as possible. Only a considerable rotation of the type cylinder is required, and therefore the whole depression of the key lever is used to rotate the type cylinder, the rotative movement starts soon after the beginning of the depression of the key. However, it is always necessary for the printing frame at first to make a certain way without simultaneous rotative motion, in order that the arm *r* may rise sufficiently to disengage the springs *x* and *y* and the positioning frame *m*. The characters are so arranged on the type cylinder that for printing the letters most frequently used the shortest rotary motions of the type cylinder are required. As these small movements always take place near the end of the depression of the key lever, the rotary return movement of the type cylinder into its normal position is rapidly completed for most of the depressions, and therefore a new key may generally be depressed without waiting for the printing frame to have moved back to its normal position.

The different vertical positions of the type cylinder are caused by the longitudinal displacements of the type cylinder shaft *z*. The shaft *z* is engaged at its bottom part, by a foot 4 (Fig. 3), the upper part of which is made with a fork like portion through which the shaft *z* extends. The lower end of the shaft *z* is conical and is supported on the bottom of the foot 4; by a collar 3 the position of the shaft relatively to the foot is secured. A sliding piece 5, having a sliding engagement, by its slots 6 and 7, with the type cylinder support *d*, is provided, at its lower end, with two pins 20, 21 passing through the foot 4. The latter is adapted to move on the pins 20, 21, and, furthermore, it may be moved to different vertical positions by shifting the whole sliding piece 5. The latter is moved by the shifting key levers 11 and 12. These levers are provided at their ends with pins 14 and 15 engaging arms 16 and 17 projecting laterally from the sliding piece 5 to different distances and located at different heights. The lever 12, engaging the lower flange, moves the sliding piece 5 as far as is permitted by the slots 6 and 7. Therefore, by adjusting the displacement of the sliding piece 5 the upward movement of the lever 12 is determined. The displacement of the sliding piece 5 caused by the lever 11 is only one half of that caused by the lever 12. During the said upward movement, the pin 14 engages within a slot 18 of the arm 16, and the opposite end of the pin 14, serving for limiting the motion, abuts against a stopping pin 19 fixed to the printing frame *f*, whereby the sliding piece is stopped in its final position. The lower edges of the arms 16 and 17 are so located, that the points of engagement of the pins 14 and 15 with the edges of the arms are exactly in the axis of oscillation of the printing frame *f*, when moved to the end of the shifting motions, as shown in Fig. 1 representing the final position effected

by shifting the lever 11. As the points of engagement of the shifting levers and the arms of the sliding piece at their end positions are in the center of oscillation of the frame *m*, where no motion takes place, the oscillation of the printing frame and the type cylinder support cannot cause a motion of the sliding piece, and there is no friction between the oscillating parts and the shifting levers when in their end positions. By the said devices three different vertical positions of the type cylinder are possible. Nevertheless a type cylinder having six rows of types is provided. In a practical machine, at least one third of all the characters must be written by depressing a single key; therefore two rows of types must always be in action, also when no shifting lever is actuated, and the type cylinder must move longitudinally on the depression of certain keys without simultaneously actuating a shifting lever. For this purpose the foot 4, Figs. 3 and 4, is shifted downward on the pins 20 and 21 by a link 22. By the latter the type cylinder is moved downward a distance equal to the distance of two rows of types, while the shifting levers move the type cylinder upward to an extent equal to two or four times the distance of two rows of types. In the position of rest the second type row from the top is in front of the platen; if one of the shifting levers is actuated, the fourth row is brought into the field of action, while by the other shifting lever the sixth row is brought into the operative field. And if simultaneously the foot 4 is shifted, the upmost, third or fifth row is positioned.

It is evident that sometimes the type cylinder is raised by the shifting levers as far as two or four rows, and at the same time lowered as far as one row by actuating the foot 4. As the displacements of the type cylinder effected by the link 22 must take place independently of the shifting motions and simultaneously with the latter, the link 22 must be equally actuated, whatever the position of the sliding piece 5 may be. For this reason a jointed parallelogrammic frame 23, 24, 25, 26 is connected with the link 22. By the lever 27 the parallelogram is compressed until all of its parts are in line with one another, in which position the said parts are also in line with the shaft *z* of the type cylinder. A lever 27, Figs. 1, 2 and 3, having a sliding motion in a slot 28 upon the shifting motions always receives an equal impulse, and as, on the compression of the parallelogram, all the points of the link 24—25 make the same way, the lever 27 may be engaged at any point between 24 and 25. By a spring 29 the jointed parallelogram is retracted to its normal form. To the lever 27 a frame extending below all the key levers is rigidly secured, which is pivotally mounted, at the points 30, 31, 32, 33, on the frame *f*, and is provided with two bars 34, 35 placed in the axis of oscillation of the frame *f*. All the key levers when depressed strike these bars except those which are notched above the bars. It is evident that when an unnotched key lever is actuated, it presses the bars 34, 35 down, and therefore turns the frame around its axis 30, 31, 32, 33, causes the lever 27 to actuate the parallelogram, moves the foot 4 of the type cylinder shaft *z* down, and thereby shifts the type cylinder downward to an extent equal to the distance of two rows of types.

All type wheel machines need a device securing the exact radial position of the type cylinder and correcting slight inaccuracies of the positioning mechanisms. In the present case this adjustment is obtained, as usually, by a toothed positioning wheel 36 engaged by a dog 37. However, in the present case, the positioning wheel is rigidly fixed to the type cylinder, so as to follow the longitudinal displacements of the latter. It must therefore be engaged by the dog at different points. In the lower positions of the type cylinder the wheel 37 is nearer the center of oscillation of the type cylinder support than in its upper positions, so that its path is shortened accordingly. In order to secure the correct engagement of the wheel with its dog in any case at the end of the same angular motion of the printing frame, a device is provided, whereby the dog is moved toward the positioning wheel to an increasing extent, the lower the wheel is placed. For this purpose the dog is pivoted at its upper end in a guiding block 38, and it is impelled by means of a ram 39 and lever 40 immediately before the impression takes place.

The operation of the machine is as follows. Upon depressing a key, the key lever engages at first the frame *f* so as to push the same downward, and causes the type cylinder to begin its oscillation toward the platen 63. Thereby the arm *r*, Figs. 1, 2, 8 and 9, with its locking pieces *s*, *t* rises and the springs *x*, *y* and the positioning frame *m* are unlocked. Now, the inclined face of projection of the key lever engages, sooner or later according to its form, the bar *o* or *p*, Figs. 1, 2 and 11, and, by further depressing the key, moves the positioning frame *m* to the right or to the left out of its normal position. By the connecting rod *l* this motion is communicated to the sector *h*, so as to swing the same to the right or to the left according to the displacement of the positioning frame. Thereby the pinion *k* is rotated in one or the other direction, which motion is transmitted to the type cylinder by the intermediary of the type cylinder shaft *z*, the clamping piece 65 and the fork 64. The rotation of the type cylinder continues simul-

taneously with the further motion thereof toward the platen, until the bar *o* or *p* engages the straight slot of the slope of the key lever. Now the final position of the positioning frame and of the sector is obtained, and the rotary motion of the type cylinder is finished. But at the same time the printing movement is almost completed, the type cylinder being near the platen and the ratchet 36 in front of the dog 37. The ram 39 of the type cylinder support strikes the lever 40, the dog 37 engages one of the teeth of the wheel 36, and the type cylinder strikes against the paper. If the actuated key lever has a notch above the bars 34, 35, and if no shifting lever is depressed, a type of the second row from the top is printed. If a key lever having no notch is actuated, apart from the said motions, the bars 34, 35 are pressed down by the key lever, the lever 27 is actuated, the parallelogram 23, 24, 25, 26 is compressed, the type cylinder is lowered to an extent equal to the distance of two type rows, and a type of the first row is printed. If one of the shifting levers 11 or 12 is depressed, as stated before, a type of the third and fourth, or of the fifth and sixth row is printed. Upon releasing the key, the type cylinder swings backward into its normal position under the action of the spring 60. As soon as the dog 37 unlocks the toothed wheel 36, the spring 73 retracts the positioning frame *m* and with it the sector *h* to their normal positions, whereby also the type cylinder is rotated to resume its normal position. The return of these parts to the exact position of rest is accelerated and secured by the arm *r*, whose locking pieces *s* and *t* slide along the springs *x*, *y* and finally inclose the latter between themselves and the locking pieces *v* and *w*. The backward motion of the printing frame is limited by limiting the upward motion of the key levers guided in slots on the front part of the machine. When an unnotched key lever has been depressed, and therefore the parts lowering the type cylinder to the extent of a type row have also been actuated, the said parts, on releasing the key lever, are brought into their normal positions by the spring 29, which expands the parallelogram 23, 24, 25, 26, and thereby pulls upward the foot 4 of the type cylinder shaft *z*, the latter and the type cylinder, and causes the lever 27 with its frame and the bars 34, 35 to return to their positions of rest. The return of the shifting mechanisms 5, 11 and 12 is effected by their own weight, the raised sliding piece 5 with the type cylinder and its shaft *z* moving downward on releasing the shifting key lever, which motion may be accelerated by means of a retracting spring.

As all key levers actuate the same positioning frame *m*, the frame *m* might be hurt upon depressing several keys simultaneously. To avoid this, the shaft *c* is not arranged so as to pass through the key levers, but the latter are provided with circular notches pressed against the shaft by a cross bar 41 extending below all the key levers, and by the springs 42, 43. If by simultaneously depressing several keys considerable force is exerted in the direction of the key levers, the latter will slip out of their normal positions. When the force ceases, the key levers slide backward to their normal positions.

As the positioning frame *m* moves both forward and backward, its bars *o* and *p* cannot always be in contact with the inclined portions of the key levers, but there must be some play in order to permit of the opposite motion, which play, however, on the depression of a key lever, causes a shock on the positioning frame. To avoid this and to obtain an easy operation of the positioning mechanism, the latter comprises two separate parts instead of one, each coöperating with its own set of key levers. The said key levers are always in contact with their respective frame sections. The said construction is illustrated in Figs. 5 to 7 of the drawings. The two frame sections 44 and 45 are connected by links 46, 47, having a common pivot 50 engaged by the connecting rod 1. When the frame 44 is actuated, the link 47 swings around the pivot 48, and the rod 1 is moved forward; if however the frame 45 is actuated, the link 46 swings around the pivot 49, and the rod is moved backward. However, on a very rapid depression of the key lever, the resistance offered by the type cylinder might, under certain circumstances, move the common pivot 50 diagonally downward, so as to take along the other frame not actuated. Therefore the unactuated frame must be locked. This may be effected, in a simple manner, by means of locking pieces. However, in the example illustrated a mechanism is provided, whereby, simultaneously the type cylinder is locked in its position of rest, which mechanism replaces the locking means *r*, *s*, *t*, *v*, *w*, *x* and *y*, shown in Figs. 1, 2, 8, 9 and 10. The pivot bolt 50 connecting the links 46 and 47 has a sliding engagement on both sides in slots 51 of guiding plates 52 and 53. These slots are so shaped, as to guide the pivot 50 in circles, either around the pivot 48 or around the pivot 49, and to prevent the same from slipping downward. At its central part, the slot 51 shows an upwardly extending portion. When the parts return into their normal positions, the pivot bolt 50 is drawn upward into said upward extension by means of a spring not represented in the drawings, so as to prevent the same from moving beyond its position of rest.

When the pivot bolt 50 slides in the slots 51, a sliding friction takes place, which is greater or less according to the resistance

opposed by the inertia of the type cylinder. This friction may be reduced by the device illustrated in Fig. 7, a pivoting guide being provided instead of a fixed one. The slotted guide 51 is substituted by a guide hook 54 having a notch or slot engaged by the bolt 50. The pivot 55 of said hook has the same position as the pivot 48 in Fig. 5. A second hook, which is not represented in Fig. 7, is provided to guide the pivot when moving in an opposite direction. The hooks are mounted on fixed supports arranged sidewise of the links 46, 47, only one of said supports being represented in Fig. 7. As soon as the pivot bolt 50 returning to its normal position slides out of the slot of the hook 54, it is received by the fixed guides 57 secured to the supports 56, whereby it is stopped in its normal position in the same manner, as represented in Fig. 5. The two positioning frames 44 and 45 may also be mounted on the same shaft, in which case the link mechanism is arranged in the form of a parallelogram instead of an "M". If it is desired to make several copies at a time, the type cylinder is preferably made of metal. In this case, however, the weight of the cylinder must be reduced in order to decrease its inertia. Such a type cylinder may be made in the following manner. The types are impressed in a thin metal cylinder so as to appear prominent on the outside, and the cylinder is made rigid by means of a light, but hard material, whereby a sufficient resistance against the printing strokes is obtained.

Having now particularly described and ascertained the nature of my said invention and the manner in which the same is to be performed I declare that what I claim is:

1. In a typewriting machine, the combination with a rocking type-cylinder carrier and means to rock said carrier, of a type-cylinder rotatable on said carrier, a pinion for rotating said type-cylinder, a rack movable on said type-cylinder carrier and meshing with said pinion, a driver having a loose or pivotal engagement with said rack, and means for moving said driver in either direction to different positions.

2. In a typewriting machine, the combination with a rocking type-cylinder carrier, and means to rock said carrier, of a type-cylinder rotatable on said carrier, a toothed sector pivoted to said carrier and adapted to rotate said type-cylinder, a pivot secured to said sector on its periphery, a driver engaging said pivot and means to move said driver in either direction to different positions.

3. In a typewriting machine, the combination of a rock-frame, a plurality of key-levers adapted to rock said frame on their depression, a type-cylinder carrier rigidly secured to said rock-frame, a type-cylinder rotatable on said carrier, a pinion for rotating said type-cylinder, a toothed sector pivoted to said type-cylinder carrier and meshing with said pinion, a pivot secured to said sector on its periphery, a driver engaging said pivot and means to move said driver in either direction to different positions.

4. In a typewriting machine, the combination, with a rocking type-cylinder carrier and means to rock said carrier, of a rotatable type-cylinder mounted on said carrier, a spindle rigidly secured to said type-cylinder, a pinion mounted on said spindle, a toothed sector mounted on said type-cylinder carrier and having engagement with said pinion, and an actuating rod pivoted to said sector, said pivot and the meshing point of the sector with the pinion being located substantially in the axis of the fulcrum of the rocking type-cylinder carrier.

5. In a typewriting machine, the combination with a rocking type-cylinder carrier and means for rocking said carrier, of a type-cylinder rotatable on said carrier, rack and pinion mounted on said carrier and adapted to rotate said type-cylinder, a plurality of key-levers, a frame adapted to be brought into different positions by said key-levers, and a rod connecting said frame and said rack and having its direction of motion in each position substantially transverse to the axis of the fulcrum of said rocking type-cylinder carrier.

6. In a typewriting machine, the combination with a rocking type-cylinder support, a type-cylinder, a plurality of key-levers and means operated by said key-levers to rotate said type-cylinder in its support, of a rocking frame extending crosswise below the key-levers and arranged to actuate said rotating means when rocked, and projections on said key-levers having inclined surfaces and adapted to be brought into rocking engagement with said rocking frame, the engaging inclined surfaces extending from their respective key-levers to points at a distance from said rocking frame, whereby the latter is rocked during the last part of the depression of the key-levers.

7. In a typewriting machine, the combination, with a rocking type-cylinder carrier and means for rocking said carrier, of a type-cylinder rotatable and slidable on said carrier, means for supporting said type-cylinder, means for shifting the supporting means, and means for arresting said shifting motion exactly at the instant when the contact of the shifting means with the shifted supporting means reaches the plane of the pivotal axis around which the rocking type-cylinder carrier swings.

8. In a typewriting machine, the combination with a rocking type-cylinder support, a type-cylinder mounted on said sup-

port, the key-levers, and means to rotate said type-cylinder in its support, of a rocking frame adapted to be rocked by each of the key-levers, and a link connecting said rotating means and rocking frame, the connecting line of the pivots of said link substantially crossing the axis of the fulcrum of said type-cylinder.

9. In a typewriting machine, the combination with a type-cylinder, and a rocking support therefor, of a rocking frame, means to transmit rotary movement from the rocking frame to type-cylinder, arms rigidly connected with the rocking frame and the type-cylinder support respectively and located adjacent to each other in the normal position of the rocking frame and support, and a brake spring extending between said arms and adapted by its tension to follow the displacement of the arm of the rocking frame and to be brought back thereby against its tension, whereby a braking action is exerted on said rocking frame.

10. In a typewriting machine, the combination of a tube forming the axle of the type-cylinder and extending through the same, a type-cylinder rotatable and slidable on said tubular axle, a spindle journaled in said axle and connected with said type-cylinder, and means for shifting said spindle to different positions.

11. In a typewriting machine, the combination of a tubular type-cylinder axle, a type-cylinder rotatable and slidable on said axle, said axle extending through the type-cylinder, a spindle journaled in said tubular axle, means for securing said spindle to said type-cylinder, and means for moving said spindle longitudinally and rotatively.

12. In a typewriting machine, the combination with a rocking type-cylinder carrier and means to rock said carrier, of a tubular type-cylinder axle secured to said carrier or forming part of it, a type-cylinder rotative and slidable on said axle, said axle extending through the type-cylinder, means to rotate said type-cylinder, a spindle journaled in said tubular axle and connected with said type-cylinder, and means to shift said spindle to different positions.

13. In a typewriting machine, the combination with a rocking type-cylinder carrier and means adapted to rock said carrier, of a tubular type-cylinder axle secured to said carrier, a type-cylinder rotatable and slidable on said axle, said axle extending through the type-cylinder, a spindle journaled in said tubular axle, means for securing said spindle to said type-cylinder, and means for moving said spindle longitudinally and rotatively.

14. In a typewriting machine, the combination with a rocking type-cylinder carrier and means for rocking said carrier, of a tubular type-cylinder axle secured to said carrier, a type-cylinder rotatable and slidable on said axle, means for rotating said type-cylinder, a spindle journaled in said tubular axle, and connected with said type-cylinder, a slide shiftably mounted on said type-cylinder carrier and adapted to support the lower end of said spindle, and means for shifting said slide to different positions.

15. In a typewriting machine, the combination of a type-cylinder carrier, a tubular axle rigidly secured to said carrier, a type-cylinder rotatably and slidably mounted on said tubular shaft, a spindle journaled in said shaft and secured to the type-cylinder, means for rotating said spindle, a slide shiftable on said type-cylinder carrier supporting the lower end of said spindle, flanges projecting laterally on said slide to different distances and at different heights and shifting levers having cross-pins engaging said flanges.

16. In a typewriting machine, the combination of a type-cylinder carrier, a tubular axle rigidly secured to said carrier, a type-cylinder rotatably and slidably mounted on said shaft, a spindle journaled in said shaft and secured to the type-cylinder, means for rotating said spindle, a slide shiftable on said type-cylinder carrier, an abutment on said carrier limiting the shifting position of said slide, flanges projecting laterally from said slide to different distances and at different heights, shifting levers each having a pin engaging one of said flanges, one of said flanges having a slot adapted to engage on the shifting motion with the cross-pin of the shifting lever, and an abutment limiting the shifting of each lever.

17. In a typewriting machine, the combination of a rocking type-cylinder carrier, means to rock said carrier, a tubular axle rigidly secured to said carrier, a type-cylinder rotatably and slidably mounted on said shaft, a spindle journaled in said shaft and secured to the type-cylinder, means for rotating said spindle, a slide shiftable on said type-cylinder carrier and connected with said type-cylinder, an abutment on said carrier limiting the shifting position of said slide, flanges projecting laterally from said slide to different distances and at different heights, shifting levers each engaging one of said flanges by means of cross-pins, the engagement of said pins with said flanges being located, when in the shifting position, in the fulcrum of the rocking type-cylinder carrier, one of said flanges having a slot adapted to engage on the smaller shifting motion with the cross-pin of the shifting lever causing said shifting motion, and an abutment limiting the movement of said shifting lever.

18. In a typewriting machine, the combination of a rocking type-cylinder carrier,

means for rocking said carrier, a tubular axle rigidly secured to said carrier, a type-cylinder rotative and slidable on said shaft, a spindle journaled in said shaft and secured to the type-cylinder, means for rotating said spindle, a slide shiftably mounted on said type-cylinder carrier and adapted to support the lower end of said spindle, flanges projecting laterally on said slide to different distances and at different heights, and shifting levers engaging said flanges by cross-pins, the points of engagement of said shifting levers and the flanges in their shifted position being substantially located in the axis of the fulcrum of the rocking type-cylinder carrier.

19. In a typewriting machine, the combination, with a type-cylinder carrier, a tubular axle secured to said carrier, a rotative and slidable type-cylinder mounted on said shaft, an actuating spindle journaled in said shaft and secured to the type-cylinder, and means for rotating said spindle, of a slide shiftable on the type-cylinder carrier parallel to the type-cylinder shaft, shifting levers engaging said slide, a foot slidably mounted on said slide engaging the lower end of the type-cylinder spindle, and key-operated means to shift said foot on said slide.

20. In a typewriting machine, the combination, with a rocking type-cylinder carrier, means to rock said carrier, a tubular axle secured to said carrier, a rotative and slidable type-cylinder mounted on said shaft, an actuating spindle journaled in said shaft and secured to the type-cylinder, and means for rotating said spindle, of a slide shiftable on the type-cylinder carrier parallel to the type-cylinder shaft, shifting levers engaging said slide, a foot slidably mounted on said slide and engaging the lower end of the type-cylinder spindle, and key-operated means to shift said foot on said slide.

21. In a typewriting machine, the combination with a type-cylinder support and a type-cylinder slidably and rotatably mounted on said support, of means to rotate said type-cylinder, a slide mounted on said type-cylinder support, a foot shiftably mounted on said slide and adapted to support type-cylinder, a pair of links pivotally mounted on said slide and connected at their free ends by a rod to form a swinging parallelogrammic frame, a link connecting said frame at one of its free pivots with the foot, a bell crank lever engaging the swinging rod of said frame and adapted to be rocked by part of the key-levers, and a spring to hold said frame in its normal position.

22. In a typewriting machine, the combination, with a type-cylinder carrier, a rotative and shiftable type-cylinder mounted on said carrier, an actuating spindle secured to said type-cylinder, means to rotate said spindle, a slide shiftable on said carrier, means for shifting said slide to different positions, a foot slidable on said slide and engaging the lower end of said spindle, a pair of links pivotally mounted on said slide and connected at their free ends to form a pivotal parallelogrammic frame, a link connecting said frame at one of its free pivots with the foot, and a key-actuated bell-crank lever engaging the swinging rod parallel with the spindle of said frame, and thereby, when operated, compressing the frame equally, regardless of the position of the slide, and causing an always equal shifting motion of said foot on said slide.

23. In a typewriting machine, the combination with a rocking type-cylinder carrier and means to rock said carrier, of a type-cylinder rotative and slidable on said carrier, means to rotate and means to shift said type-cylinder to different positions, a star-wheel secured to said type-cylinder, a detent pivotally mounted in the frame of the machine and adapted to engage with said star-wheel in its normal position and in its shifted positions, and means to move said detent above its pivot toward said star-wheel.

24. In a typewriting machine, the combination, with a rocking type-cylinder carrier, means for rocking said carrier, a rotative and shiftable type-cylinder mounted on said carrier, an actuating spindle secured to said type-cylinder, means for rotating said spindle, a slide shiftable on said carrier, means for shifting said slide to different positions, a foot slidable on said slide and engaging the lower end of said spindle, a pair of links pivotally mounted on said slide and connected at their free ends by a rod to form a pivotal parallelogrammic frame, a link connecting said frame at one of its free pivots with the foot, and a key-actuated bell-crank lever engaging the swinging rod of said frame, and thereby, when operated, compressing the frame equally, whatever is the position of the slide, and causing an always equal shifting motion of said foot and said slide.

25. In a typewriting machine, the combination with a type-cylinder and its rocking support, and means to operate the same, of a spring connected to said rocking support and adapted to retract the same into its normal position, said spring being so arranged relatively to the rocking frame that in the normal position of the frame the direction of its tension crosses the axis of the fulcrum of the rocking frame.

26. In a typewriting machine, the combination with a type-cylinder, its rocking support, and a rocking positioning frame, of a spring connected to said positioning frame

and adapted to retract the same into its normal position, said retracting spring being so located relatively to the positioning frame that in the normal position of the positioning frame the direction of its tension crosses the fulcrum of the positioning frame.

27. In a typewriting machine, the combination, with the type-cylinder, the key-levers and the connecting rod for operating the former, of a positioning frame operated by the key-levers, said frame comprising two pivoted sections, links pivoted to and connecting said sections, and a common pivot for said links abutting against said connecting rod.

28. In a typewriting machine, the combination, with the type-cylinder, the key-levers and the connecting rod for operating the former, of a positioning frame operated by the key-levers, said frame comprising two pivoted sections, links pivoted to and connecting said sections, a common pivot for said links abutting against said connecting rod, and guide-plates having slots into which said pivot enters at its ends and by which it is guided concentrically with the pivotal connections between said links with said sections.

29. In a typewriting machine, the combination, with the type-cylinder, the key-levers and the connecting rod for operating the former, of a positioning frame operated by the key-levers, said frame comprising two pivoted sections, links pivoted to and connecting said sections, a common pivot for said links abutting against said connecting rod, fixed supports at the sides of said links, and hooks suspended from said supports and by which said pivot is guided in opposite directions.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

OTTO PFEIFFER.

Witnesses:
GRIPUS SCHULTZE,
EUGEN COHNITZ.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."