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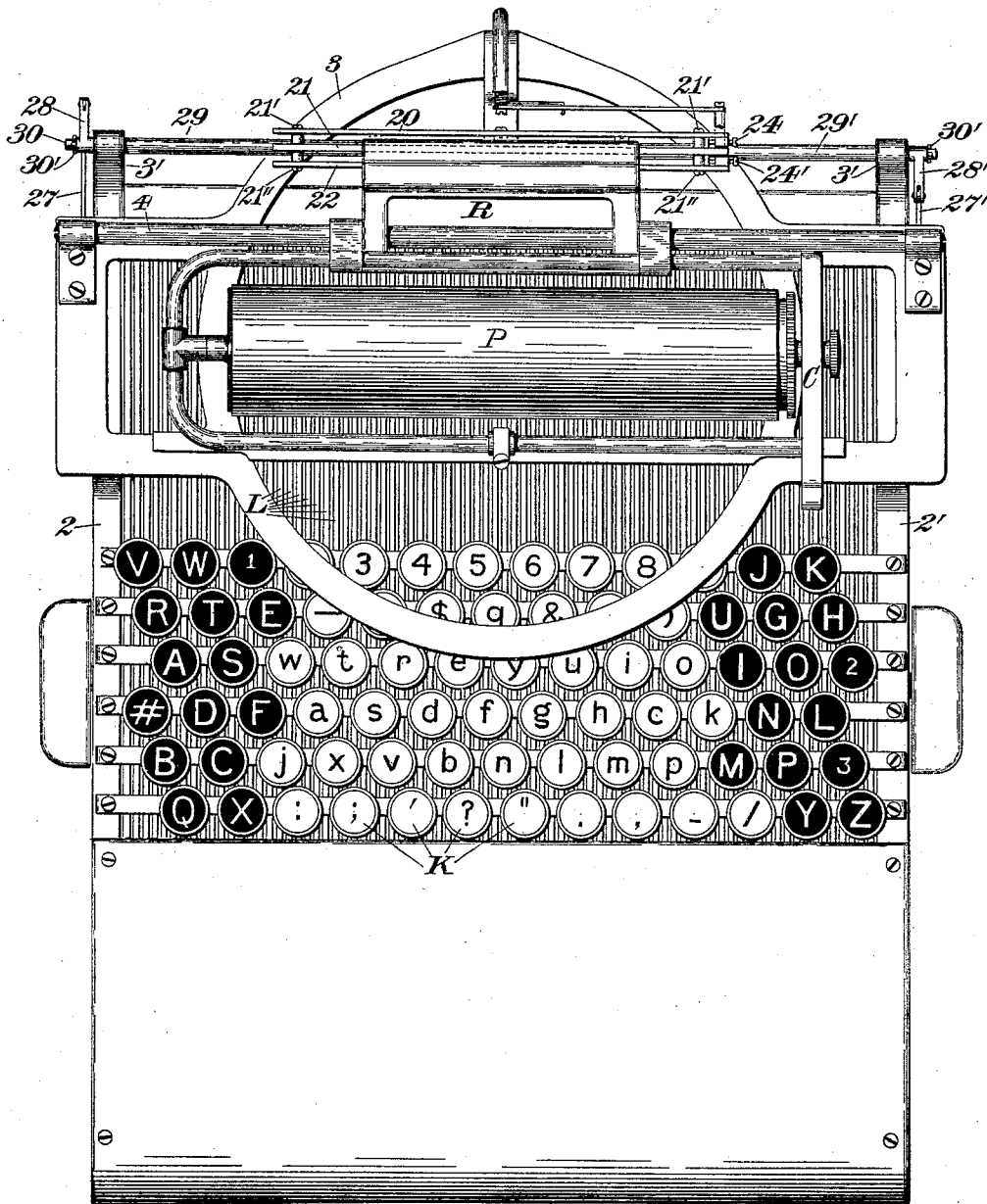
5 Sheets—Sheet 1.

F. H. RICHARDS.
KEY OPERATED MECHANISM.

No. 573,619.

Patented Dec. 22, 1896.

Fig. 1.



Witnesses:
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Inventor:
F. H. Richards.

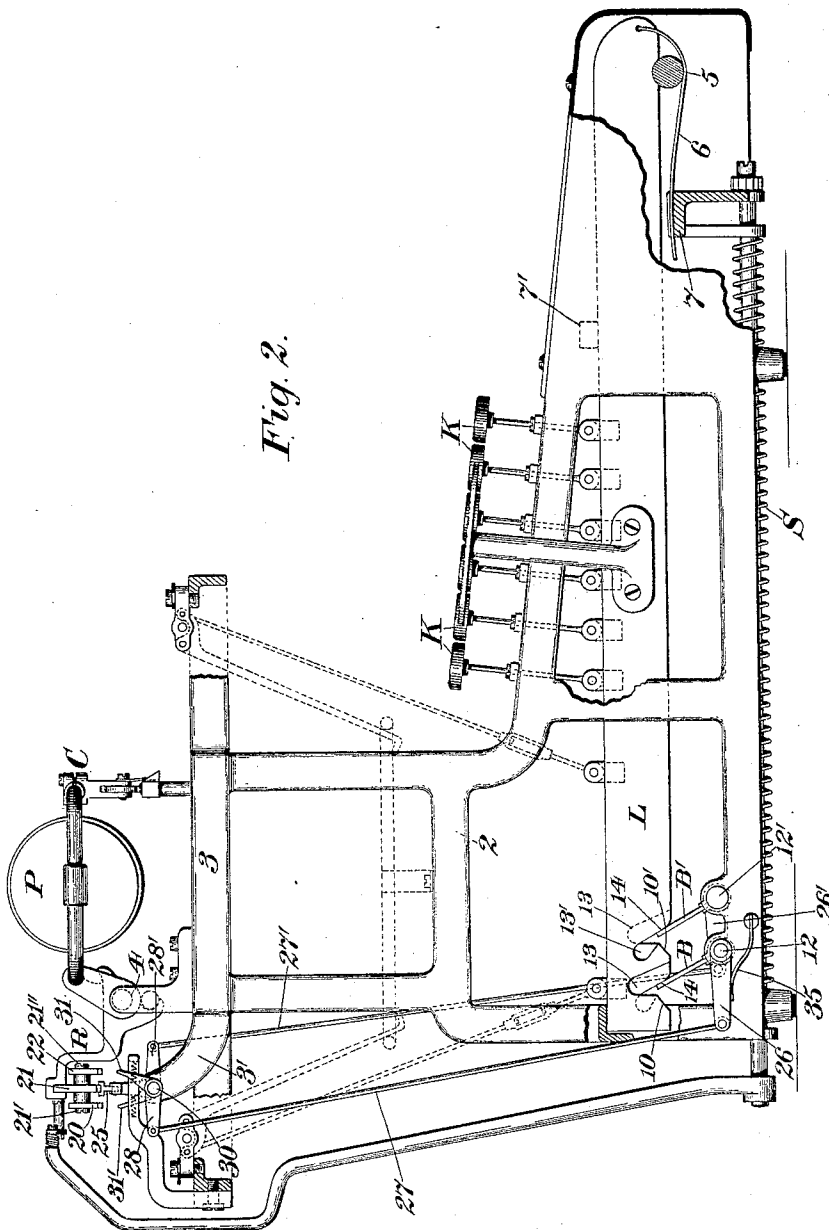
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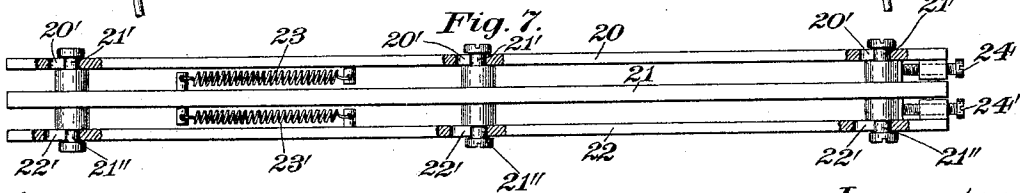
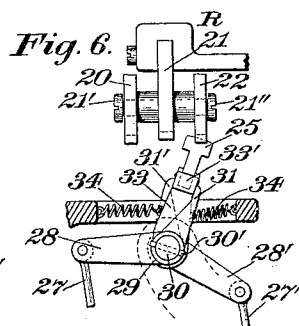
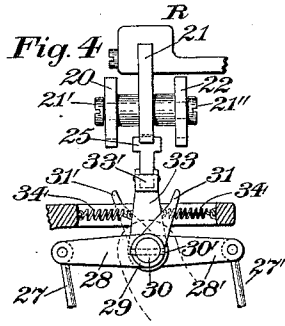
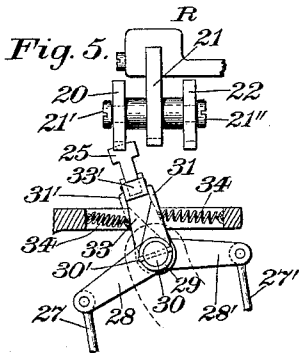
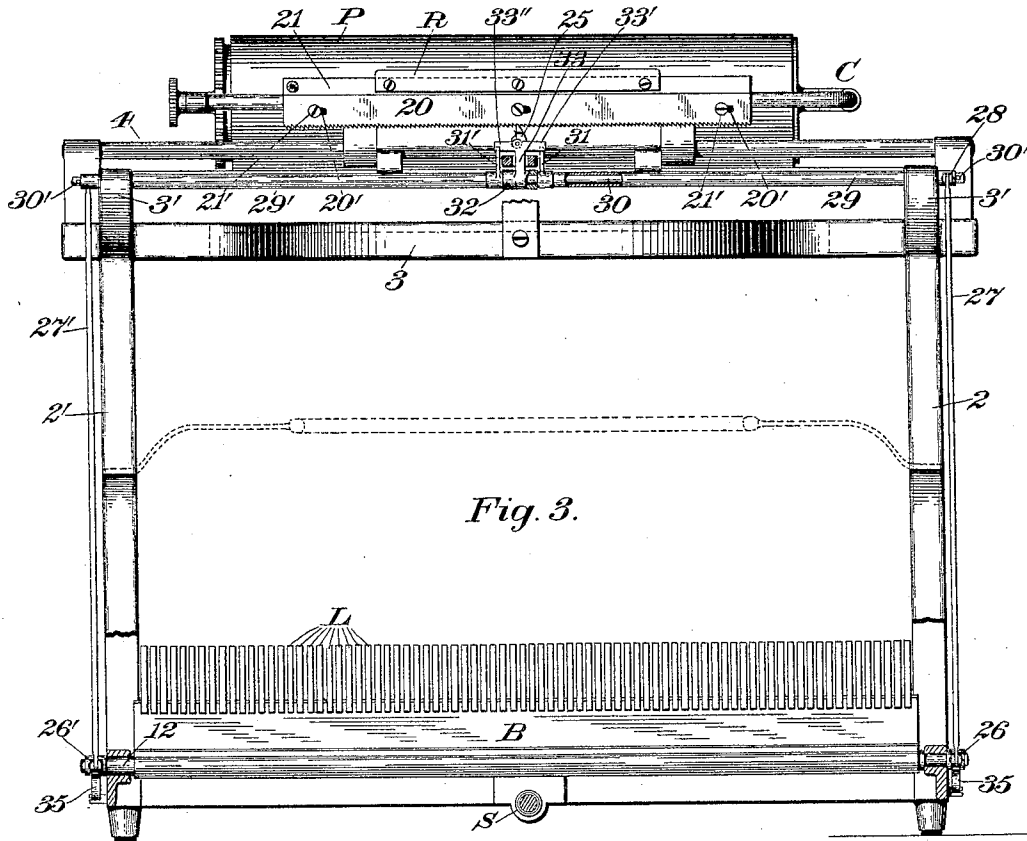
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Fig. 8.

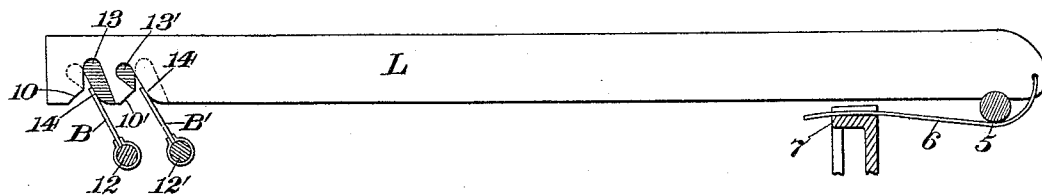


Fig. 9.

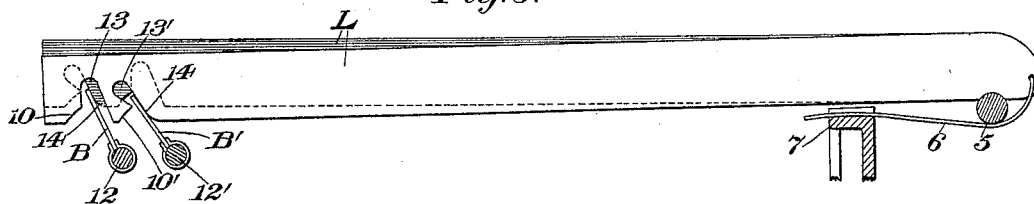


Fig. 10.

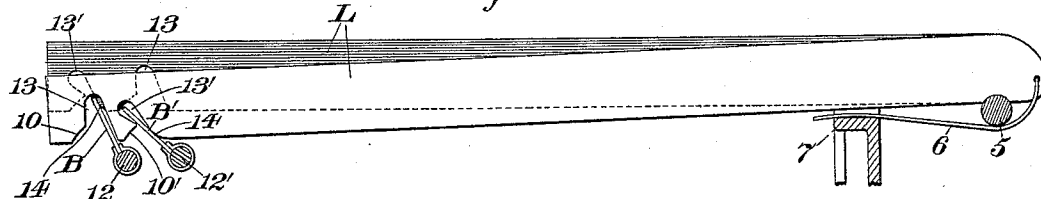


Fig. 11.

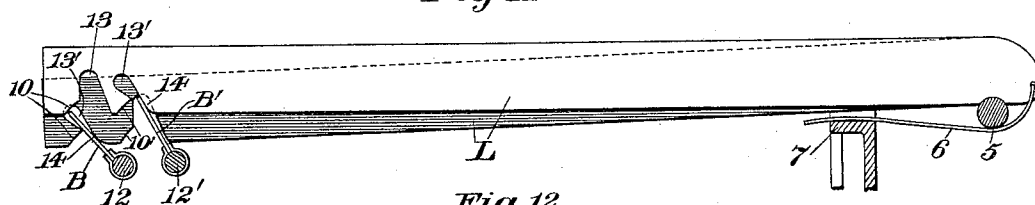
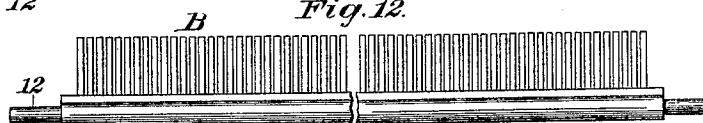


Fig. 12.



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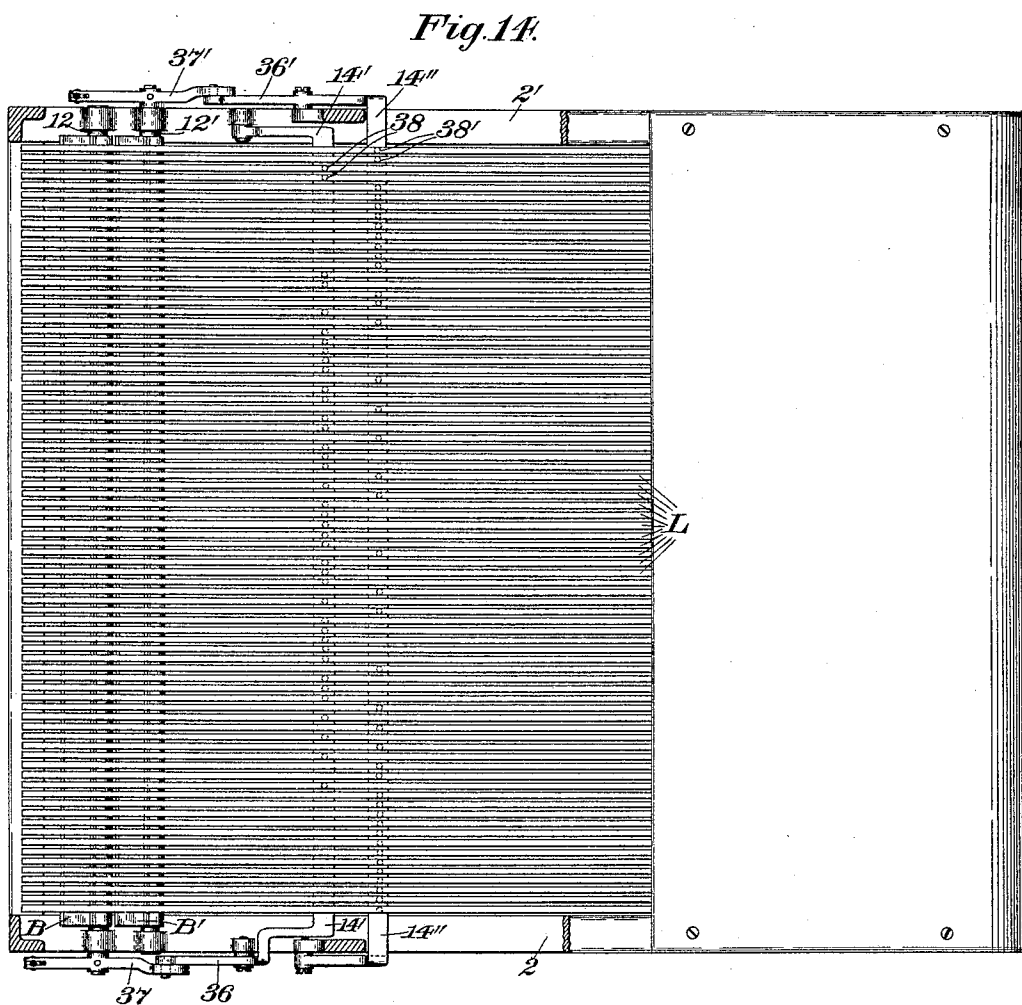
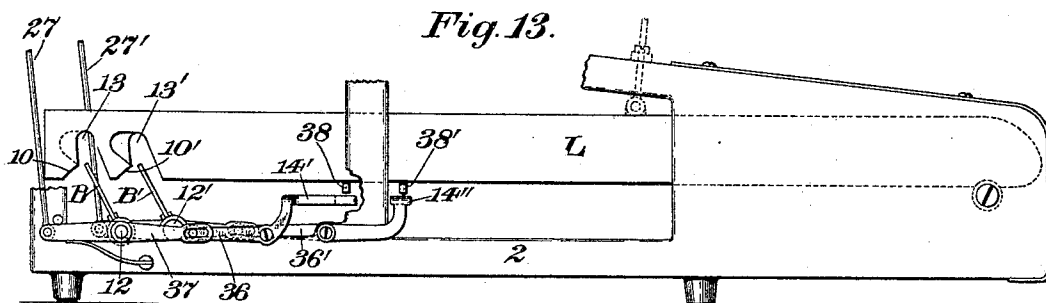
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No. 573,619.

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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

KEY-OPERATED MECHANISM.

SPECIFICATION forming part of Letters Patent No. 573,619, dated December 22, 1896.

Application filed April 6, 1896. Serial No. 586,344. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Key-Operated Mechanism, of which the following is a specification.

This invention relates to a key-operated mechanism—a type-writer or similar machine—and more especially to an interlocking mechanism by means of which all the other operating-keys are locked against movement on the actuation of any one thereof.

Another object of my invention is to provide means whereby the feed movement of a driven member or carriage may be varied, so that each individual key will control the extent of movement of such driven member, and I further provide that some of the keys shall be operated to feed the driven member one distance, while others of said keys shall control a feed movement of different length, whereby the space required for each individual character may be governed directly by its proper key. I find it advantageous to divide the characters usually employed in a type-writer having capital and small letters into groups, one of which groups is composed of characters requiring the spacing ordinarily employed, while the other group comprises all those characters for which a somewhat wider spacing will insure greater regularity in the positioning of the successive characters of a line.

In the drawings accompanying and forming part of this application, Figure 1 is a plan view of a type-writer embodying my present invention, some of the upper parts of the machine being removed to more clearly illustrate the construction. Fig. 2 is a side elevation of the same, partly in section, looking from the left hand in Fig. 1. Fig. 3 is a sectional rear elevation of the same. Fig. 4 is a detail sectional end elevation, on an enlarged scale, of the rack-feed mechanism, showing the parts in their normal positions. Fig. 5 is a similar view showing the parts in position for imparting a short feed movement to the carriage. Fig. 6 is a similar view with the parts in position for imparting a long feed movement to the carriage. Fig. 7 is a

sectional plan view of the racks on an enlarged scale. Figs. 8 to 10, inclusive, are detail sectional side elevations of a pair of operating-arms or key-levers and the blocking devices coöperative therewith and illustrate the normal and two successive operative positions of one of such arms or key-levers. Fig. 11 is a view similar to Fig. 10, showing the other of said arms or key-levers in its extreme operated position. Fig. 12 is a view of a modification of the blocking devices. Fig. 13 is a side elevation of a portion of a key-operated mechanism embodying a modification of my invention, and Fig. 14 is a plan of the same.

Similar characters designate like parts in all of the figures.

According to my present invention I provide a mechanism of the class hereinbefore specified with a plurality of normally clear operating-arms, which may be the usual key-levers, each one of which constitutes, when operated, a blocking operating-arm for the non-operated arms—that is to say, each of these operating-arms is normally in position to operate the devices controlled thereby, and each is preferably reactive, so as to return promptly to its normal position. In connection with these operating-arms I make use of a blocking member having a series of simultaneously-operative blocking-surfaces, one for each arm of the proper series of non-operated arms, and also employ a blocking-member actuator, which is provided with means whereby it is operated by a blocking operating-arm, this actuator being so located as to carry the blocking-surfaces into position to block the movements of their respective non-operated arms. Each of the operating-arms employed preferably has a blocking-actuator, and in the constructions herein illustrated the actuator for the blocking members is located in such a position relatively to the non-operated arms as to carry the blocking-surface for the operated arm clear of such arm, while it is carrying the other blocking-surfaces to their blocking positions.

Any suitable framework may be employed for carrying the several operative details of my invention. In the present case I have represented the invention as applied to a type-writer of the "Caligraph" type, al-

though it will be obvious that the novel mechanisms herein described may be applied to other forms of machines.

A suitable framework for supporting my interlocking and feeding mechanisms is illustrated having a pair of side frames, such as 2 and 2', supporting a top plate or basket-frame, such as 3. The usual platen and carriage ordinarily supported upon this top plate are designated, respectively, by P and C. In a manner well known in the art a suitable rack mechanism, which will be hereinafter more fully described, is shown supported upon a rear carriage rod or rail 4, so as to be capable of longitudinal reciprocation with the carriage and platen, and so as to have also an oscillatory movement transversely of the course of the carriage. Power is shown as transmitted to the carriage C by means of the usual driving-spring S and connections with such carriage for actuating the same, all of which are well known in the art.

The operating-arms by means of which the type-arms (shown in dotted lines, Fig. 2) are actuated are illustrated herein at L, fulcrumed upon a rod 5 and having suitable springs, such as 6, for returning the arms to their normal positions after being operated by the depression of the proper keys K in the usual manner. Stops are shown at 7 and 7', respectively, for checking the operating-arms at the opposite extremes of their range of movement.

Each of the operating-arms L is so formed as to constitute, in the present case, a blocking-operating arm for each of the other arms of the machine, and in the preferred construction illustrated herein each arm is provided with a pair of stop-faces (one of which is illustrated at 10) and is adapted to lie over the upper edge of a blocking-bar B when said bar is operated, while the other (shown at 10') is so positioned as to be opposed in a similar manner to the upper edge of a blocking member, shown as a bar B', when said last-mentioned bar is actuated.

The blocking-bars B and B' are illustrated herein fixedly secured to corresponding rock-shafts 12 and 12', which are shown journaled at their ends in the opposite side frames 2 and 2' in parallelism with each other, the blocking-bars being represented extending transversely of the operating-arms and entirely across the machine, so that each one controls all of the key-levers. Moreover, the stop-faces 10 of one series of levers are preferably alined with one another, and the stop-faces 10' are shown similarly alined, each series of stop-faces being represented disposed parallel to the blocking edge of its respective blocking-bar.

As it is obvious that it is necessary to permit the unimpeded downward movement of an operating-arm when it is operated, while all the other arms of the mechanism remain in their idle positions, I have shown each of the operating-arms having a clearance-space

opposite each one of the blocking-bars B and B', so that when such arm is actuated these blocking-bars will enter the clearance-spaces provided for them, and will present no obstruction to the action of such operating-arm for actuating its cooperative devices.

In the construction illustrated in Figs. 8 to 11, inclusive, each of the operating-arms has a clearance space or recess, such as illustrated at 13, of sufficient length to prevent operation of the adjacent blocking-bar on the descent of such arm, and also of sufficient height to permit the arm to descend to the limit of its downward movement without being stopped by said blocking-bar. In these views each of the operating-arms also has a clearance space or recess, such as 13', of sufficient height to receive the corresponding blocking-bar when such bar is oscillated, while one wall of this recess is so positioned as to form an actuator, such as shown at 14, for moving the blocking-bar to oscillate the same on the depression of the operating-arm. It will be noticed that this actuator is shown in these views as in the nature of an operating-face, against which the blocking-bar normally abuts, and by which such bar is freely actuated without binding or undue friction of the parts. The stop-faces 10 and 10' are preferably defined by arcs struck from the centers of movement of the respective rock-shafts 12 and 12' in order that these faces on the non-operated arms may be most nearly adjacent to the edges of the blocking-bars at all points in the oscillation thereof. Moreover, the recesses 13 of each series preferably register with one another, while the clearance-spaces 13' of each series are also preferably registering recesses.

Each of the blocking-bars shown in this application comprises a plurality of blocking-surfaces, which are illustrated as preferably connected or as surfaces of an integral bar and as corresponding in number with the operating-arms of the machine. It is obvious, however, that each of the blocking-bars may be composed of a series of individual members constituting a comb, if deemed desirable, as shown at B^x in Fig. 12. As these blocking-surfaces are simultaneously operative they are adapted to come simultaneously into juxtaposition with the corresponding line of stops on the non-operated arms when the blocking-operating arm corresponding to such non-operated arms is depressed. It will be noticed that in the present case I have illustrated two blocking-bars, which, therefore, constitute two independently-operative series of simultaneously-operative blocking-surfaces; but it is obvious that I may make use of any desired number of such series.

In the embodiment of the invention shown the key-levers are in two series, each series consisting of the alternate levers. One series actuates the blocking-bar B and the other the bar B'. The position of the clearance-spaces 13 and 13' is reversed in one series as compared to their positions in the other series.

The stop-face 10 of a lever in one series not only aligns with the stop-faces of the other levers in the same series, but also with the stop-faces 10 of all the levers in the other series of levers, and the same is true of the stop-faces 10'.

The operation of the interlocking mechanism will be readily understood by reference to Figs. 8 to 11, inclusive. In Fig. 8 two operating-arms, corresponding, respectively, to each of the blocking-bars, are shown side by side in their normal positions, each blocking-bar being contiguous to its corresponding actuator, and also lying within the mouth of the clearance-recess of its respective operating-arm. In Fig. 9 the forward arm is represented depressed part way, and the actuator 14 thereof has carried the blocking-bar B' into position to lie just beneath the upper edge of the stop 10' of the other arm, so as to prevent the actuation of the same. At this time, although the forward arm has been but slightly depressed, any downward movement of the rear arm will be prevented until the return of the forward arm to its normal position. It will be noticed that each of the blocking-bars now lies, for a considerable portion of its width, within the clearance-spaces 13 and 13', respectively, the blocking-bar B' being guided into its recess on its oscillation by the actuator 14. In Fig. 10 the forward arm is represented in its extreme downward position, the edge of the blocking-bar B' being contiguous to the lower end of the stop-face 10' of the companion arms and the upper edges of both bars being adjacent to the upper walls of their respective clearance-spaces. In Fig. 11 the rear operating-arm is shown having carried the blocking-bar B into juxtaposition with the stop 10 of the forward arm, and of course each of the other arms, while the bar B' lies within the proper recess of the rear operating-arm and of the other arms.

It will be evident from the foregoing that I employ a series of blocking-bars, each bar of which is operative independently of the others, and that each bar of such series has a blocking surface or portion for each of the operating-arms of the machine. In connection with these I also employ, as will be apparent by reference to the drawings, a plurality of blocking-bar actuators having means whereby they are operated, one by each of the operating-arms, respectively, each actuator coöperative with its respective coating surface of the blocking-bars in the manner before described.

For the purpose of feeding the carriage on each actuation of a key-lever a distance corresponding to the width of the letter carried by the type-arm operative by such key-lever I have illustrated herein a feed mechanism having a short feed movement which is controlled by each one of a series of the operating-arms and a long feed movement controlled by each one of the remaining series of said arms. In the present case I have

shown a pair of differential feed devices in operative relation with the carriage, preferably in the form of a pair of movable racks, such as 20 and 22, respectively. (See Fig. 7.) The movable racks are represented mounted on suitable studs secured to a fixed rack, such as 21, which is illustrated herein in rigid connection with a rack-frame, such as R, which moves with the carriage longitudinally in the manner hereinbefore described. Each of the movable racks is illustrated in the present case having two or more longitudinal slots, (designated, respectively, by 20' and 22',) through which pass a suitable series of studs, such as 21' and 21'', fixed to the stationary rack 21. The racks 20 and 22 are movable longitudinally on their respective studs and are normally held by means of suitable springs with the right-hand end walls of their slots in contact with the studs, which permit and limit the movements of the feed-racks. Suitable springs for holding the racks 20 and 22 in these positions are represented at 23 and 23', respectively, each secured at one end to the stationary rack and at the other end to its respective movable rack.

It will be noticed that all of the slots 20' are of the same length, while all of the slots 22', although also equal in length, are longer than the slots 20', and hence it will be apparent that the movable rack 22 is adapted to feed the carriage a greater distance than the rack 20. In the present case the rack 20 is illustrated having its slots of a length suitable for feeding the carriage a distance corresponding to the length of two of the teeth of the rack, (it being understood that the teeth of all the racks are of the same size and disposed in like positions,) while the rack 22 is capable of feeding the carriage a distance corresponding to three such teeth. It is of course obvious that the spacing herein described need not necessarily be employed, as one of the racks might be adapted to feed the carriage twice as far as the other or any other distance within limits; but I prefer to employ the respective feeds specified in order to insure regularity in the spacing of the letters of a line. The usual adjusting-screws are shown at 24 and 24' for regulating the positions of the movable racks with respect to the feed-pawl.

In the present case the movement of the carriage is represented normally checked by the engagement of a feed pawl or dog, such as 25, with the teeth of the fixed rack 21, the feed of the carriage being effected by carrying this pawl laterally into engagement with the teeth of one of the other of the movable racks.

In both of the embodiments of my invention herein represented the feeding is illustrated as accomplished by suitable connections from the rock-shafts 12 and 12'. Rock arms or levers are shown at 26 and 26' fixed to said rock-shafts and operating, by means of con-

neeting-rods, such as 27 and 27', a pair of rock-arms 28 and 28' in fixed engagement with corresponding sleeves, such as 29 and 29'. These sleeves are illustrated (see Fig. 3) mounted for oscillation upon a rod or shaft 30, which passes at its outer ends through said sleeves, and is held in place by suitable stop-pins 30'. The sleeves are journaled in the present instance in brackets 3', extending rearwardly from the top plate 3, and are represented as having secured thereto, respectively, pawl-operating arms 31 and 31'. These pawl-operating arms are illustrated in the drawings (see Fig. 4) normally standing clear of the pawl and sloping in opposite directions from the axis of the shaft 30, so that they will have a partially idle movement before coming into contact with the arms of the pawl-frame. The pawl 25 is preferably of the "pass-by" type, being shown herein pivotally connected to a rocking frame and normally held up in working position by a light spring in a well-known manner. The rocking frame is represented (see Fig. 3) comprising a short sleeve 32, preferably journaled on the rod 30 between and in contact with the inner ends of the long sleeves 29 and 29', an upright or pawl carrier 33, extending from the sleeve 32, and a pair of arms, such as 33' and 33'', extending in opposite directions from the pawl-carrier 33 and in position to be engaged by the pawl-operating arms.

On the depression of an operating-arm it will be seen that the corresponding rock-shaft 12 or 12' will be oscillated, and thereupon the dog 25 will be carried either to the position shown in Fig. 5 or to that illustrated in Fig. 6, it being understood that the pawl and its frame are normally held in the central position, as by means of springs 34. If the pawl is carried to the position shown in Fig. 5, the carriage will move forward, immediately on the disengagement of the pawl from the teeth of the fixed rack, a distance corresponding to the length of two teeth, and on the return of the pawl to its central position the rack 20 will be carried back to the position shown in Fig. 7. In a similar manner the carriage is fed a distance corresponding to the length of three teeth of the rack by the oscillation of the rock-shaft 12'.

It should be here noted that all of those characters of the keyboard which take up but a slight longitudinal portion of a line are adapted to operate the rock-shaft 12, while those characters which require a wide spacing are adapted to operate the rock-shaft 12'. After being actuated each of these rock-shafts is returned to its normal position, preferably by means of a suitable spring, such as 35.

In Figs. 13 and 14 I have illustrated a modification of my invention in which the blocking-member actuators are not carried directly on the operating-arms of the machine, but are mounted separately from such arms and in operative relation therewith, these actu-

ators being shown as having means whereby they are operated from the operating-arms. In each of these figures two cross-bars are shown at 14' and 14'', journaled on opposite sides of the machine, so as to form rocking or oscillating frames, the former bar having an extended arm or lever, such as 36, for cooperation with and actuating, as by means of a pin-and-slot connection, a rock-arm, which is illustrated at 37, secured to the rock-shaft 12. The cross-bar 14'' is represented having a corresponding arm 36' at the opposite side of the machine for cooperating with a rock-arm 37', similar to the rock-arm 37. One of these cross-bars is operative by each one of a portion of the operating-arms or key-levers of the machine, while the other is adapted to be actuated by each one of the remainder of said operating-arms, those operating-arms which operate type-arms controlling narrow characters being represented having pins, such as 38, for actuating the cross-bar 14' on the depression of such respective operating-arms, while the operating-arms which control the type-arms of wide characters are shown carrying pins, such as 38', for actuating the bar 14''. It will be apparent that each of these bars has substantially the same function as the universal bar ordinarily employed in type-writing machines of this class, but that, in this case, two bars are employed, each one of which is controlled by only a portion of the operating-arms. As the bars 14' and 14'' constitute in these views the blocking-bar actuators and cooperate, respectively, with the pins 38 and 38', whereby they are operated from the key-levers, it is obvious that the clearance-recesses 13' (see Fig. 13) should be considerably larger than the corresponding recesses illustrated in Fig. 8, for example. The actuating-face 14 should not of course be employed when the actuating-bars 14' and 14'' are used.

Having thus described my invention, what I claim is—

1. The combination with a plurality of operating devices and a blocking device which, when actuated by one of said operating devices, serves to block and prevent the movement of all the other operating devices; a feed-motion; and means actuated by the blocking device and serving to operate said feed-motion.

2. The combination with a plurality of operating devices, of a plurality of blocking devices, any one of which, when actuated by one of said operating devices, serves to block and prevent the movement of all the other operating devices; and a differential feed-motion operated by said blocking devices.

3. The combination with a plurality of operating devices, of a plurality of blocking devices, any one of which, when actuated by one of said operating devices, serves to block and prevent the movement of all the other operating devices; and a feed device operated by said blocking devices.

4. The combination with a normally clear blocking operating-arm, and with a series of operating-arms also normally clear, of a series of blocking members, each having blocking-surfaces, one for each of said series of arms, respectively; a blocking-member actuator operated by said blocking operating-arm, and located to carry said blocking-surfaces into position to block the movements of their respective non-operated arms; a feed-motion operated by said blocking members; and means connecting the blocking members and feed-motion.

5. The combination with a plurality of normally clear operating-arms disposed side by side; of a rock-shaft disposed transversely of said arms; a blocking member having a series of blocking-surfaces, one for each of said arms, secured to said rock-shaft; a blocking-member actuator having means whereby it is operated by one of said arms, and said actuator located relatively to the operating-arms to oscillate its own blocking-surface to a position clear of its arm, and to oscillate the other blocking-surfaces into position to block the movements of their respective non-operated arms; and a feed-motion operated by said blocking members.

6. The combination with a plurality of normally clear operating-arms disposed side by side, and having a series of registering recesses, one for each of said arms, respectively, of a blocking member having a series of blocking-surfaces, one for each of said arms, respectively, and disposed transversely of said arms, and connected for movement in unison; a plurality of alined stops carried by said arms, one for each of said arms, respectively; a blocking-member actuator having means whereby it is operated by one of said arms, and said actuator located relatively to the other operating-arms to carry its own blocking-surface into the recess of its arm, and to carry the other blocking-surfaces into juxtaposition with the respective stops of the non-operated arms to block the movements of said non-operated arms; and a feed-motion operated by said blocking members.

7. The combination with a plurality of normally clear operating-arms disposed side by side, of a plurality of rock-shafts disposed transversely to said arms; a blocking member secured to each of said rock-shafts, and having a blocking-surface for each of said arms; a plurality of blocking-member actuators having means whereby they are operated, one by each of said arms, respectively, and each of said actuators cooperative with a series of said blocking-surfaces, respectively, and each of said actuators located relatively to the non-operated arms of its respective series of arms to oscillate its own blocking-surface clear of its operating-arm, and to oscillate the other blocking-surfaces into position to block the movements of their respective non-operated arms; and a differential feed-motion operated by the blocking members.

8. The combination with a plurality of normally clear operating-arms, each constituting, when operated, a blocking operating-arm for the corresponding series of non-operated arms, of a plurality of independently-operative blocking members; a plurality of blocking-member actuators; a reciprocatory carriage; rack mechanism secured to the carriage for actuating the same, and having a short feed movement operated by one of the blocking members, and also having a long feed movement operated by the other blocking member.

9. The combination with a feed-carriage, of a fixed rack and two movable racks; a swinging feed-dog; a shaft on which said dog is mounted; sleeves, each provided with an arm, for swinging said feed-dog; and devices for actuating said sleeves.

10. The combination with a feed-carriage, of differential feed devices in operative relation therewith; a series of operating-arms; two movable blocking members, one for each series of operating-arms; and means actuated by said blocking members for controlling the motion of the differential feed device.

11. The combination with a feed-carriage and racks carried thereby, one of said racks being movable with relation to the other, of a movably-mounted feed-pawl; a rock-arm; a connecting-rod; a sleeve carrying a pawl-operating arm; and means for actuating the rock-arm.

12. The combination with a feed-carriage, of a fixed rack; movable racks connected to said fixed rack; a feed-pawl of the pass-by type; a rocking frame to which said pawl is pivoted; rockingsleeves, each carrying a pawl-operating arm; and means for actuating said sleeve.

13. The combination with a feed-carriage, of a fixed rack; movable racks connected thereto; a pivoted feed-pawl; rockingsleeves, each carrying a pawl-operating arm; rock-shafts equipped with means for actuating said sleeves; and two series of operating-arms for actuating said rock-shafts.

14. The combination of a blocking member; a swinging frame connected with said blocking member; and a series of operating-arms, any one of which may be brought into direct contact with said swinging frame.

15. The combination with a series of operating-arms, of a rocking frame having a cross-bar extending beneath all of said arms; and a blocking member actuated by said rocking frame on the depression of an operating-arm.

16. The combination with a series of operating-arms, of a pivoted frame having a cross-bar extending beneath said arms; a blocking member; and a pin-and-slot connection between said blocking member and said frame.

17. The combination with a reciprocatory carriage; of a fixed rack secured to the carriage; a pair of movable racks also secured to the carriage, one at each side of the fixed rack, and having differential feed movements;

a feed-dog normally in engagement with said fixed rack; and a pair of key-operated actuators adapted, respectively, for actuating said feed-dog into engagement with said movable racks, respectively, to thereby feed the carriage differential distances.

18. The combination with a reciprocatory carriage; of a feed-rack secured to the carriage; a pair of movable racks also secured to the carriage, one at each side of the fixed rack, and having differential feed movements; a feed-dog normally in engagement with said fixed rack; and a pair of oscillatory key-operated actuators adapted, respectively, for actuating said feed-dog into engagement with said movable racks, respectively, to thereby feed the carriage differential distances.

19. The combination with a pair of normally clear operating-arms, each constituting when operated a blocking operating-arm for the non-operated arm; of a pair of independently-operative blocking members; feed mechanism having a short feed movement operated by one of said blocking members and also having a long feed movement operated by the other blocking member; and a driven member operative by said feed mechanism.

20. The combination with a plurality of normally clear operating-arms, each consti-

tuting when operated a blocking operating-arm for the corresponding series of non-operated arms; of a plurality of independently-operative blocking members; a plurality of blocking-member actuators; a reciprocatory carriage; rack mechanism secured to the carriage for actuating the same, and having a short feed movement operated by each one of a portion of the operating-arms and having also a long feed movement operated by each one of the remaining operating-arms; and operating devices connecting said blocking members and said rack mechanism.

21. The combination with a plurality of normally clear operating-arms, each constituting, when operated, a blocking operating-arm for the corresponding series of non-operated arms; of two independently-operative blocking-bars; feed mechanism having a short feed movement controlled by one of said blocking-bars, and also having a long feed movement controlled by the other of said blocking-bars; and a reciprocatory carriage operative by said feed mechanism.

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Witnesses:

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