

B. C. STICKNEY.
TYPE WRITING MACHINE.
APPLICATION FILED NOV. 3, 1913.

1,216,623.

Patented Feb. 20, 1917.

3 SHEETS—SHEET 1.

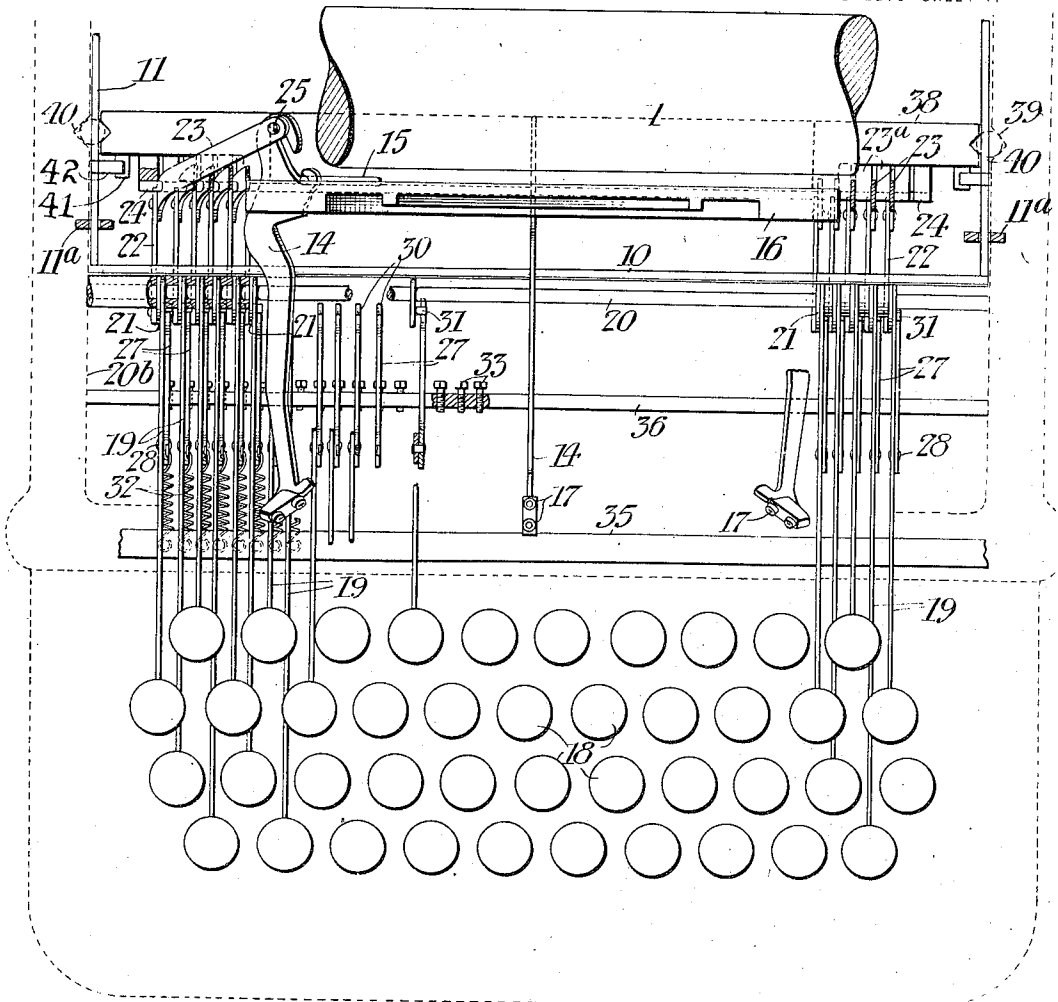


Fig. 1.

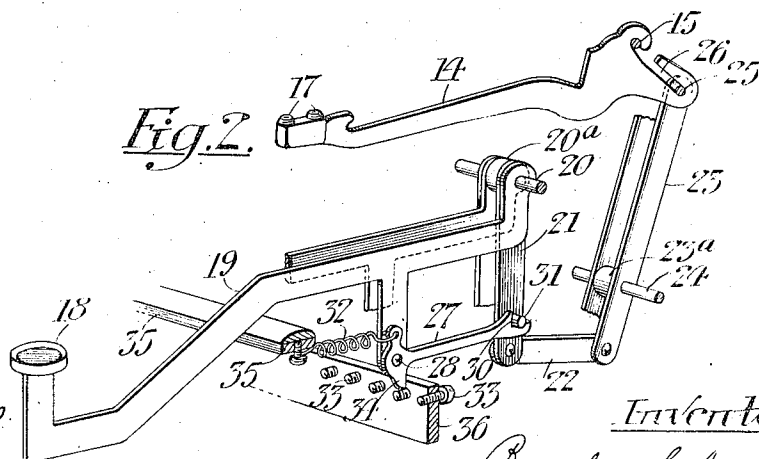


Fig. 2.

Witnesses:

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W. O. Westphal

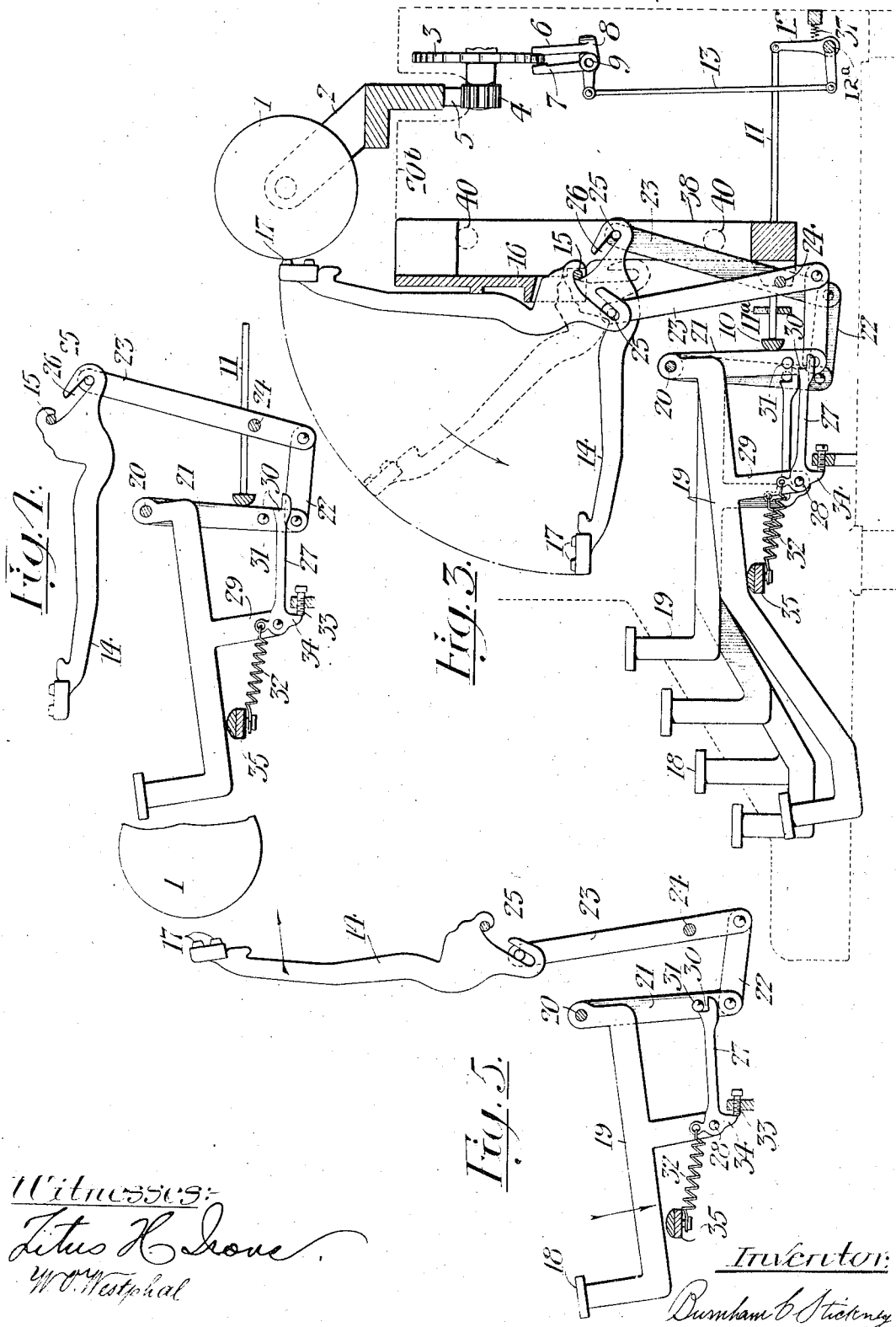
Inventor:

Burnham C. Stickney

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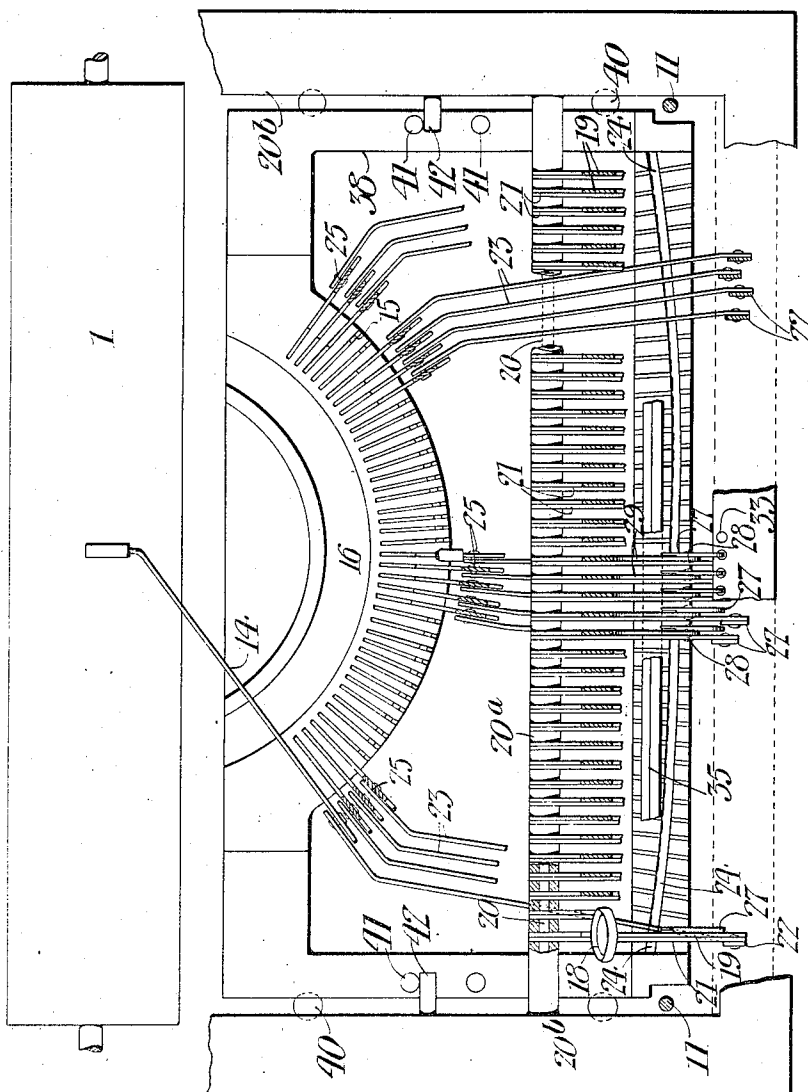


Fig. 6.

Witnesses:

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Inventor:

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UNITED STATES PATENT OFFICE.

BURNHAM C. STICKNEY, OF ELIZABETH, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNDERWOOD TYPEWRITER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

TYPE-WRITING MACHINE.

1,216,623.

Specification of Letters Patent.

Patented Feb. 20, 1917.

Application filed November 3, 1913. Serial No. 798,798.

To all whom it may concern:

Be it known that I, BURNHAM C. STICKNEY, a citizen of the United States, residing in Elizabeth, in the county of Union 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 an improved form of type action for writing machines, and provides, among other features, a convenient and compact arrangement of the type actions, which also comprise a novel form of trip to release the type-bars at the completion of the type strokes, and permit the type-bars to return independently of the keys.

The key levers are pivoted at their rear ends on a fulcrum rod extending across the machine beneath the type-bars, and to this rod may also be pivoted depending arms, movable independently of the key levers, but driven by the key levers by means of trips. The type-bars are actuated by sub-levers pivoted intermediate their ends and each connected at one end to a type-bar, and at its other end connected through a link to one of said depending arms. When a key is depressed, the trip drives the associated pivoted arm as a unit with the key lever, and, through the link and sub-lever, swings the type-bar upwardly to printing position, the trip being released by a stop as the type-bar is completing its stroke, and permitting the type-bar to fall back independently of the key.

The type-bar segment may form part of a vertically shiftable frame permitting the type-bars to be shifted to upper and lower case positions, the sub-levers being mounted in said frame to maintain an operative relation to the type-bars during the shifting movement.

Other features and advantages will hereinafter appear.

In the accompanying drawings,

Figure 1 is a part sectional plan view showing the keyboard and type actions.

Fig. 2 is a perspective view of a type action, the parts being in their normal position of rest.

Fig. 3 is a sectional elevation view, showing a number of type-bars at different points in the type stroke.

Fig. 4 is an elevation view of a type ac-

tion, the type-bar having returned to its normal position of rest, while the key is still held down.

Fig. 5 is a similar view showing a key depressed, and the position of the type-bar just before the trip is released.

Fig. 6 is a part sectional front elevation view of the machine.

The rotary platen 1 is mounted to travel on a carriage 2, the letter-feed movement of which is controlled by an escapement mechanism comprising an escapement wheel 3 connected to a pinion 4 running in mesh with a rack 5 on the carriage. Escapement dogs 6 and 7 control the movement of the escapement wheel and are mounted on a rocker 8 pivoted at 9, actuated from a universal bar 10, said bar connected through rods 11, rock arms 12, rock shaft 12^a, and link 13 to the rocker 8. The rods 11 are supported and guided in stationary guides 11^a.

The type-bars 14 are fulcrumed on a rod 15 on a type-bar segment 16, and are movable about their fulcrum rod from a horizontal or forwardly extending position to an upright position in which the types 17 are brought against the front face of the platen 1. The keyboard consists of a set of keys 18 comprising key levers 19 pivoted on a rod 20, supported on the machine frame 20^b and located beneath the type-bars a short distance in front of the fulcrum rod 15.

Associated with each key lever 19 is a depending arm 21 loosely mounted on the rod 20 beside its key lever. The lower ends of the arms 21 may be connected through horizontally disposed links 22 to sub-levers 23 pivoted intermediate their ends on a pivot rod 24. The levers 23 may be spaced by washers or spacing blocks 23^a on the rod 24, and the key levers may be likewise spaced by washers 20^a on the rod 20. Each lever 23 carries at its upper end a pin 25 which works in a cam slot 26 in the type-bar 14 for swinging the latter from a horizontal to a vertical position.

In order to permit the type-bars to fall back independently of the type-keys after they have been operated to printing position, and thereby secure quick action, and prevent piling of the type-bars, each key lever is provided with a trip 27 which forms an operating connection between the key lever and the associated arm 21 during the downward stroke of the key, the trip being

released as the type-bar has about completed its printing stroke. Each trip 27 is in the form of a lever connected by a pivot 28 to a depending arm 29 of the key lever, the trip extending rearwardly and provided at its rear end with a notch 30 forming a vertical shoulder to engage a pin 31 on the associated arm 21. The trip lever is normally held upward against the pin 31 by a spring 32, and thus forms a positive operating connection between the key lever and the arm 21.

When a key 18 is depressed, the key lever 19, trip 27 and arm 21 engaged by the trip, swing as a unit about the fulcrum rod 20, and through the link 22 rotate the sub-lever 23 about its pivot to move the connected type-bar 14 from its position of rest to the position shown in Fig. 5. The trip 27 at this point is actuated by an adjustable stop 33 which engages a depending lug 34 on the trip lever and swings the latter about its pivot 28 to release the trip from the pin 31, thereby disconnecting the key lever from the type-bar. This release takes place only when the type-bar has substantially completed its upward stroke, the momentum of the type-bar being sufficient to complete the stroke. The type-bar, when it strikes the platen or work-sheet thereon, at once rebounds and falls back to its position of rest (see Fig. 3) entirely independent of the position of the type-key by which it is actuated. Very rapid operation of the machine is thus permitted, as the type-bars are prevented from interfering with each other and piling up, as is usual in the rapid operation of the machine, owing to the failure of the operator to fully release each key before the succeeding key is depressed.

The downward movement of the keys is limited by a cushioned stop bar 35 to which the springs 32 may also be conveniently anchored. The stops 33 may consist of a series of set screws mounted in a bar 36 extending across the machine, each stop thus being independently adjustable to control the exact point at which the trip 27 is released. Each type-bar as it falls back from the platen, also returns the lever 23 and associated arm 21, thereby permitting the universal bar 10 to be returned, as by means of a spring 37, to complete the actuation of the escapement mechanism preparatory to the operation of the succeeding type.

The type-bar segment 16 may be mounted in or form part of a frame 38 vertically shiftable to carry the types to upper and lower case positions, the frame being guided on anti-friction bearing rollers 40 between the frame 38 and the machine frame, said rollers running in vertical raceways 39. The fulcrum rod 24 for the sub-levers 23 may be mounted in the frame 38 to shift

up and down therewith and thus maintain an undisturbed relation of the sub-levers and type-bars when the frame 38 is shifted. Stops 41 on the frame 38 cooperate with stops 42 on the machine frame to limit the movements of the shifting frame 38.

It will be observed that owing to the arrangement of the keys in banks, one behind another, while the key-levers have a common fulcrum rod, the key-levers for the uppermost bank of keys are much shorter than those for the lowermost bank, the intermediate key-levers having intermediate lengths. As a result of this arrangement, the depression of a key in an upper bank through a given distance causes a greater movement of the connected arm 21 than is imparted to an arm 21 connected with a key of a lower bank, when said keys are moved through the same distance. In order to compensate for the difference in the movement of the arms 21, the connected links 22 are pivoted to their sub-levers 23 at different distances from the sub-lever pivot 24. Such distances may be inversely proportional to the lengths of the corresponding key-levers. As a result, the depression of the different keys through a predetermined distance results in equal movements of the type-bars, regardless of the lengths of the key-levers. A uniform action for all the keys is thus obtained, the depression of the keys in the different banks being through substantially equal distances.

The key-levers are preferably arranged in parallel vertical planes, and the width of the system of keys is materially greater than the width of the set of type-bars; that is to say, the outlying key-levers and their connected arms 21 and links 22 are located at substantial distances laterally beyond the outlying type-bars. The outer sub-levers 23 are therefore inclined inwardly from their links 22, and the upper ends of said links are bent into the planes of the connected type-bars. The fulcrum rod 24 for the sub-levers is also preferably curved sufficiently to bring it perpendicular to the sub-levers at the points at which the latter are mounted on the rod. The arrangement of parts just described provides for an easy and substantially uniform action of all of the keys.

Variations may be resorted to within the scope of the invention, and portions of the improvements may be used without others. Having thus described my invention, I claim:

1. In a front-strike typewriting machine, the combination with a type-bar, of a vertically-disposed lever pivoted intermediate its ends and connected at its upper end to the type-bar for swinging the latter upwardly and rearwardly to the platen, a horizontally-disposed key pivoted at its rear end, a depending arm fulcrumed on the pivot of

said key, a link connecting the lower end of said arm to said lever below its fulcrum, a trip forming an operating connection between said depending arm and the key, and means to operate the trip.

2. In a typewriting machine, the combination of a key lever extending forwardly from its pivot and comprising a key having an up and down movement, a depending arm on the key lever, a depending arm having a pivotal connection with the key lever pivot, a type-bar operated by said pivoted arm, a trip forming a rigid connection between said arms and having mainly a bodily movement rearwardly during the depression of the key lever, and means to actuate said trip and break said connection when the key lever is depressed.

3. The combination with a key lever extending forwardly from its pivot, and comprising a key having an up and down movement, of a pivoted arm, a trip connecting said key lever and arm to swing the arm when the key is depressed, a sub-lever, a link connecting the sub-lever and said arm, said arm and sub-lever having mainly a forward and rearward movement at the points of connection with the link, a type-bar operated by said sub-lever, and means to actuate the trip to release said arm from the key lever when the type-bar is near the printing point and thereby permit the type-bar to return in advance of the return of the key lever.

4. The combination of a horizontally-disposed key lever extending forward from its pivot and comprising a key having an up and down movement, said lever having a depending projection thereon, a depending arm pivoted to the fulcrum of the key lever, a trip connected to said projection and having a releasable connection with said arm beneath its pivot to swing said arm, said arm and trip at their point of connection having mainly a rearward movement as the key is depressed, a type-bar, a sub-lever arranged to actuate the type-bar, a link between the sub-lever and said arm and arranged to thrust the sub-lever rearwardly at its point of connection therewith when the key lever is depressed, and means to release said trip.

5. The combination of a key lever comprising a key having mainly an up and down movement, a pivot rod for said lever, an arm pivoted on said rod, a trip pivoted on the key lever and having a releasable connection with said arm at a point beneath said rod, said arm having mainly a backward and forward movement at its point of connection with the trip, a sub-lever, a link arranged to transmit said movement of said arm to the sub-lever, and a type-bar operatively connected to said sub-lever.

6. The combination of a key lever, a pivot

rod therefor, an arm pivoted to said rod, a trip pivoted to the key lever and having a releasable connection with said arm, a sub-lever, a link connecting said arm and sub-lever at points substantially in vertical alinement with the pivots of said arm and sub-lever respectively, said link having mainly a forward and rearward bodily movement, and a type-bar connected to said sub-lever.

7. The combination of a key lever comprising a key, a fulcrum rod on which the key lever is pivoted, an arm pivoted on said fulcrum rod, a trip releasably connecting said key lever and said arm, said arm at its point of connection with the trip movable in a direction substantially perpendicular to the direction of movement of the key, a type-bar, a sub-lever to actuate the type-bar, an operating connection between said arm and sub-lever, and means to actuate the trip to release the key lever from said arm and permit the type-bar to return independently of the key.

8. The combination of a horizontally-disposed key lever comprising a key having an up and down movement, a pivot rod for the key lever, a depending arm pivoted on said rod, said key lever having a depending arm, a pivoted trip connecting said depending arms and having a substantially horizontal bodily movement to swing said pivoted arm when the key is operated, a type-bar operatively connected to said pivoted arm, and means to swing the trip about its pivot and disconnect said arms to permit the return of the type-bar in advance of the return of the key.

9. In a type-action, the combination of a horizontally-disposed key lever and a vertically-disposed arm independently rotatable about a common pivot, a trip connecting said arm and key lever, a type-bar, a vertically-disposed lever connected to actuate the type-bar, and a link connecting said arm and said vertically-disposed lever, said arm and vertically-disposed lever having mainly forward and rearward movement at their points of connection with said link.

10. The combination with a key lever comprising a key having an up-and-down movement, of a depending pivoted arm, a trip connecting said key lever and arm for moving the latter backward and forward when the key is depressed, a pivoted type-bar, a sub-lever having arms extending one upwardly and the other downwardly from its fulcrum, one arm operatively connected to the type-bar for swinging the type-bar from non-printing to printing position, a link connecting the other arm of the sub-lever with said first-mentioned arm for swinging the sub-lever when the key lever is depressed, and means to automatically actuate said trip to release said depending arm as

the type-bar approaches printing position and permit the type-bar to return to its position of rest independently of the key lever.

5 11. The combination with a key lever extending forwardly from its pivot and comprising a key having an up-and-down movement, of an arm swinging about the same fulcrum with the key lever and depending
10 from its fulcrum, a trip to cause said arm to swing forwardly as a unit with the key lever when the key is depressed, a pivoted type-bar, a sub-lever comprising an arm extending upwardly from its pivot and connected to the type-bar to swing the latter
15 from non-printing to printing position, said sub-lever comprising an arm extending downwardly from its pivot, a link connecting said downwardly extending arm with
20 said first-named depending arm for swinging the sub-lever when the key is depressed, and means to actuate said trip to release said depending arm from the key lever as the type-bar approaches printing position and
25 thereby permitting the type-bar to return to its position of rest independently of the key lever.

12. The combination with a key lever extending forwardly from its pivot and comprising a key having an up-and-down movement, of an arm pivoted to swing about the fulcrum of the key lever and depending from said fulcrum, a trip lever pivoted to the key lever and having a releasable connection with said depending arm for causing
30 the latter to swing rearwardly when the key is depressed, a swinging type-bar, a sub-lever having a slot-and-pin connection with the type-bar, a link connecting said depending arm with the sub-lever and moved rearwardly by said arm when the key is depressed to swing said sub-lever and thereby
40 move the type-bar from non-printing to printing position, and a stationary stop in the path of the trip lever to engage said trip lever and swing it about its pivot to release said depending arm as the type-bar approaches printing position, thereby permitting said type-bar, sub-lever, link and
45 depending arm to return while the key lever is still held depressed.

13. The combination with type-bars, of a support on which the type-bars are pivotally mounted, said support shiftable to move the
55 type-bars to upper and lower case positions, levers for swinging said type-bars from non-printing to printing position, said levers mounted on said support to shift with the type-bars and thereby maintain an operative
60 connection between the type-bars and said levers, key levers, arms mounted to swing in a direction transverse to the shifting movement of said support, trips connecting the key levers and said arms for actuating the latter
65 when the keys are depressed, and links con-

necting said swinging arms with said first-named levers for actuating the latter to swing the type-bars when the keys are depressed, and also maintaining an operative connection between said swinging arms and levers as the latter are shifted with the type-bars. 70

14. The combination with type-bars, of a support on which the type-bars are pivotally mounted, said support shiftable to
75 move the type-bars to upper and lower case positions, levers for swinging said type-bars from non-printing to printing position, said levers mounted on said support to shift with the type-bars and thereby maintain an operative connection between the type-bars
80 and said levers, key levers, arms mounted to swing in a direction transverse to the shifting movement of said support, trips connecting the key levers and said arms for actuating the latter when the keys are depressed, links connecting said swinging arms with said first-named levers for actuating
85 the latter to swing the type-bars when the keys are depressed, and also maintaining an operative connection between said swinging arms and levers as the latter are shifted with the type-bars, a carriage, a platen thereon, letter-feed mechanism controlling the movement of the carriage, and a universal bar lying in the path of said swinging
90 arms and actuated thereby when the keys are depressed.

15. The combination with a fulcrum rod, of key levers fulcrumed thereon and extending forwardly from said rod, arms pivoted on said fulcrum rod and depending therefrom, trips connecting the key levers with
100 said arms to swing the latter rearwardly when the keys are depressed, pivoted type-bars, sub-levers connected to operate the type-bars, links connecting said sub-levers to said depending arms, a carriage, a platen thereon, letter-feed mechanism controlling the travel of the carriage, and a universal
105 bar lying behind said depending arms and operated thereby whenever a key is depressed, said universal bar connected to operate the letter-feed mechanism.

16. In a front-strike typewriting machine, the combination with a platen, of a set of
115 type-bars, a vertically shiftable support on which said type-bars are pivotally mounted to swing upwardly and rearwardly against the front face of the platen, sub-levers pivotally mounted on said support and comprising
120 arms extending upwardly from their pivots and having slot-and-pin connections with the type-bars for swinging the latter, said sub-levers also having arms depending from said pivots, a set of non-shifting key levers extending forwardly from their pivots and having depressible keys, pivoted arms depending from the fulcrums of the key levers and having a backward and forward
125 130

swinging movement about their fulcrums, trip levers pivotally connected with depending portions of the key levers and extending rearwardly from and having a releasable connection with said last-named depending arms, links connecting said last-mentioned arms with the depending sub-lever arms for swinging said sub-levers when the keys are depressed, the link connections permitting the type-bars to be shifted up and down while maintaining an operative relation to the key levers, and stops in the path of the trip levers to swing them about their pivots and release them from said depending arms to permit the type-bars to return to non-printing position in advance of the return of the key levers.

17. The combination of a key lever extending forward from its pivot, a pivoted arm extending downward from its pivot, means to releasably connect said arm with the key lever for swinging said arm rearwardly when the key lever is depressed, a sub-lever, a link connecting said arm and sub-lever and arranged to transmit said movement of the arm to the sub-lever, a type-bar actuated by the sub-lever, and means to actuate said releasable connecting means to release the key lever from the type-bar.

18. The combination of a key lever, a depending arm thereon, a second depending arm movable relatively to the first-mentioned arm, a trip connecting said arms, a type-bar actuated by said second mentioned arm, and means to actuate the trip to disconnect said arms.

19. In a typewriting machine, the combination with a carriage and platen, of a set of type-bars, a support shiftable up and down, on which the type-bars are pivotally mounted, said type-bars supported in a reclining position and arranged to swing upwardly and rearwardly about their pivots to strike the front face of the platen, said support shiftable up and down to bring the type-bars to upper and lower case positions, non-shifting key levers pivoted beneath the type-bars and extending forwardly and comprising keys having up and down movement, arms pivoted adjacent to the pivots of the key levers and depending from their pivots, trips pivoted to the key levers in front of said depending arms and extending rearwardly from their pivots and having a releasable connection with said arms, sub-levers mounted on said shiftable support and comprising arms extending upwardly from their pivots, and connected to swing the type-bars, said sub-levers having arms extending downwardly from their pivots, links connecting said last-mentioned arms with said first-mentioned arms and having mainly a forward and rearward bodily movement, said links movable rearwardly

by said first-mentioned arms when the keys are depressed to swing said sub-levers about their pivots and actuate said type-bars, letter-feed mechanism controlling the travel of the carriage, a universal bar lying behind said first-mentioned depending arms and operable thereby to actuate the letter-feed mechanism when the key levers are depressed, and stops in the paths of said trips to swing the trips about their pivots and release them from said depending arms as the type-bars approach the printing position to permit the type-bars and said universal bar to be returned in advance of the return of the key levers.

20. The combination with a carriage, escapement mechanism controlling the letter-feed movement of the carriage, and a universal bar having a forward and rearward movement to operate the escapement mechanism, of key levers comprising keys having mainly an up and down movement, arms pivoted on the key lever fulcrums, trips connecting said arms with the type keys and imparting to said arms a horizontal movement, said arms arranged to actuate the universal bar when the keys are actuated, type-bars, operating connections between said arms and type-bars, and positive means to automatically release each trip when the corresponding type-bar has about completed its throw, and thereby permit a return of the actuated type-bar, arm, and the universal bar independently of the actuated key.

21. In a type-action, the combination of a type-bar shiftable to upper and lower-case positions, a non-shifting key lever, and operating connections between the type-bar and the key lever for imparting a printing stroke to the type-bar when the key lever is operated, said connections comprising a trip to release the type-bar from the control of the key lever, an interponent lever to actuate the type-bar and shiftable therewith to both case positions, and connecting means between the interponent lever and the trip, said connecting means arranged to permit said shifting of the interponent lever while maintaining an operative relation between the key lever and said interponent lever.

22. The combination of type-bars, a frame in which the bars are mounted, said frame shiftable to upper and lower-case positions, key levers, and connections between the key levers and type-bars for operating the type-bars while in either case position, said connections comprising trips to release the type-bars from the control of the key levers when the type-bars are actuated to printing position, interponent levers to actuate the type-bars and mounted on said frame to shift therewith, and links arranged to transmit motion from the key levers to the interponent levers.

23. In a typewriting machine, the combination

- nation of an escapement mechanism, a universal bar movable horizontally rearwardly to actuate said mechanism, key levers comprising depressible keys, interponents depending from the key lever fulcrums and moved rearwardly by the key levers to operate the universal bar when a key is depressed, type-bars actuated by the key levers, and positive means to automatically release each key from its interponent when the corresponding type-bar has about completed its throw, and thereby permit the return of the universal bar independently of the key.
24. In a typewriting machine, the combination of an escapement mechanism, a universal bar movable horizontally rearwardly to actuate said mechanism, key levers comprising depressible keys, interponents fulcrumed on the key lever fulcrum and moved rearwardly by the key levers when a key is depressed and thereby operative to effect said rearward movement of the universal bar, positive means to automatically release each key from its interponent when the key is depressed, and thereby permit the return of the universal bar independently of the key, type-bars, and operating connections between the type-bars and said interponents.
25. The combination with a carriage, escapement mechanism controlling the letter-feed movement of the carriage, and a universal bar having a forward and rearward movement to operate the escapement mechanism, of key levers comprising keys having mainly an up and down movement, arms pivoted to swing about the key lever fulcrum, trips carried by the key levers and connecting said arms with the key levers, whereby each arm is moved with its connected key lever as a unit, said arms arranged to impart a horizontal thrust to the universal bar when the keys are actuated and thereby cause it to operate the escapement mechanism, type-bars, operating connections between said arms and type-bars, and means operable positively to release each trip when the corresponding type-bar has about completed its stroke.
26. In a typewriting machine, the combination with key levers having keys arranged in banks, of a common pivot rod for the key levers, pivoted depending arms individual to the key levers, trips connecting the key levers to said arms to cause the latter to swing with the key levers, type-bars, sub-levers for actuating the type-bars, links extending from said depending arms to the sub-levers and attached to the latter at points so located with respect to the pivots of the sub-levers that equal corresponding motions of the keys give equal motions to the type-bars, and means to release the trips.
27. In a typewriting machine, the combination with key levers having keys arranged in banks, of a common pivot rod for the key levers, pivoted depending arms individual to the key levers, trips connecting the key levers to said arms to cause the latter to swing with the key levers, type-bars, sub-levers for actuating the type-bars, links extending from said depending arms to the sub-levers and attached to the latter at points so located with respect to the pivots of the sub-levers that equal corresponding motions of the keys give equal motions to the type-bars, means to release the trips, and a frame on which the type-bars and sub-levers are mounted, said frame shiftable up and down to move the type-bars to upper and lower-case positions, said links arranged to swing idly during the shifting of the frame while maintaining an operative relation between the parts to which the links are connected.
28. In a typewriting machine, the combination with a platen, of key levers pivoted in front of the platen and provided with keys at different distances forward of their pivots, swinging arms, trips connecting said arms to the key levers to swing therewith, type-bars, upright sub-levers having slot-and-pin connections at their upper ends with the type-bars, links connected to the swinging arms and extending rearwardly therefrom and connected to the sub-levers at different distances from their pivots, said distances corresponding to the length of the associated key levers, whereby equal corresponding movements of the different keys cause equal movements of the associated type-bars, and means to operate the trips.
29. In a front-strike typewriting machine, the combination with a set of type-bars arranged to swing upwardly and rearwardly to a common printing point, of a system of key levers, sub-levers connected to the type-bars and extending downwardly therefrom, depending pivoted arms, trips connecting said arms to the key levers to cause said arms to swing with the key levers, means to actuate the trips to release said arms from the key levers, and links connecting the lower ends of the sub-levers to said depending arms, the outlying links being located at points laterally beyond the outlying type-bars, the outlying sub-levers being inclined inwardly from the links to the type-bars.
30. In a front-strike typewriting machine, the combination with a set of type-bars arranged to swing upwardly and rearwardly to a common printing point, of a system of key levers, sub-levers connected to the type-bars and extending downwardly therefrom, depending pivoted arms, trips connecting said arms to the key levers to cause said arms to swing with the key levers, means to actuate the trips to release said arms from the key levers, links connecting the lower

ends of the sub-levers to said depending arms, the outlying links being located at points laterally beyond the outlying type-bars, the outlying sub-levers being inclined inwardly from the links to the type-bars, and a frame on which the type-bars and sub-levers are mounted, said frame shiftable up and down to move the type-bars to upper and lower-case positions, said links extending in a forward and rearward direction and arranged to swing idly as the frame is shifted while maintaining an operative relation between the key levers and type-bars.

31. In a typewriting machine, the combination with type-bars, of key levers pivoted directly under the type-bars and extending forwardly from their pivots and provided with keys having up and down movements, pivoted arms individual to the key levers and each extending downwardly from its pivot, trips for causing said arms to be swung backwardly by the depression of the keys, sub-levers of the first order, the pivots of the sub-levers having a fixed relation to the type-bar pivots, said sub-levers having a sliding connection with the type-bars and extending downwardly therefrom and connected at their lower ends to said swinging arms, and means to operate the trips to free said arms from the control of the key levers.

32. In a front-strike typewriting machine, the combination with a type-bar, of an upright lever pivoted intermediate its ends and having a connection at its upper end with the type-bar for swinging the latter upwardly and rearwardly to printing position, a key lever extending forwardly from its pivot, a pivoted depending arm arranged to swing independently of the key lever, a trip forming a connection between said depending arm and the key lever to cause said arm to swing with the key lever when the latter is depressed, means to transmit a rearward thrust from said depending arm to the said upright lever below the pivot of the latter to actuate said upright lever, and means to actuate the trip and thereby release the key lever and permit the type-bar to return independently of the key lever.

33. In a typewriting machine, the combination of horizontally-disposed key levers, vertically-disposed pivoted arms rotatable about their pivots independently of the movement of the key levers, trips connecting said arms and key levers to cause the arms to be moved by the key levers, type-bars, vertically-disposed levers arranged to actuate the type-bars, links connecting said arms and said vertically-disposed levers, said arms and vertically-disposed levers having mainly a forward and rearward movement at their points of connection with the links, and a support on which the type-bars are mounted, said support shiftable up and

down to bring the types to upper and lower-case positions, said vertically-disposed levers mounted on said support to shift up and down therewith, said links arranged to permit said shifting movements while maintaining an operative relation between the key levers and type-bars.

34. The combination with a set of type-bars, a support on which the type-bars are pivotally mounted, the type-bars being supported in a cumbent position and arranged to swing upwardly and rearwardly about their pivots to a common printing point, said support shiftable up and down to carry the type-bars to upper and lower-case positions, non-shifting key levers extending forwardly from their pivots, depending pivoted arms, trips mounted on the key levers in front of said arms and extending rearwardly and having a releasable connection with said arms, sub-levers mounted on said shiftable support and comprising arms extending upwardly from their pivots and connected to swing the type-bars, said sub-levers having arms extending downwardly from their pivots, links connecting said last-mentioned arms with said first-mentioned arms, said links movable bodily rearwardly by said first-mentioned arms, when the keys are depressed, to swing the sub-levers and actuate the type-bars, and means to release the trips as the type-bars approach the printing position, and permit the type-bars to be returned in advance of the return of the key levers.

35. In a type-action for typewriting machines, the combination of a type-bar, a support on which the type-bar is mounted to swing upwardly and rearwardly from a normal position of rest to printing position, a key lever fulcrumed in front of said support and extending forwardly from its fulcrum, an upright sub-lever connected at its upper end to the type-bar to actuate the latter, a trip carried by the key lever, means forming an operative connection between the trip and the sub-lever below the pivot of the latter, said trip arranged to transmit a rearward thrust through said connecting means to the sub-lever to actuate the latter and swing the type-bar to printing position, and means to release the trip when the type-bar has about completed its printing stroke, and thereby permit the type-bar to return independently of the key lever.

36. In a type-action for typewriting machines, the combination of a type-bar, a support on which the type-bar is mounted to swing upwardly and rearwardly from a normal position of rest to printing position, a key lever fulcrumed in front of said support and extending forwardly from its fulcrum, an upright sub-lever connected at its upper end to the type-bar to actuate the latter, a trip carried by the key lever, means forming an operative connection between

the trip and the sub-lever below the pivot of the latter, said trip arranged to transmit a rearward thrust through said connecting means to the sub-lever to actuate the latter and swing the type-bar to printing position, 5 and means to release the trip when the type-bar has about completed its printing stroke, and thereby permit the type-bar to return independently of the key-lever, said support 10 shiftable up and down to move the type-bar to upper and lower-case positions, the sub-lever also mounted on said support to move up and down therewith, said connection between the trip and sub-lever arranged 15 to permit said shifting movements while maintaining an operative relation between the type-bar and sub-lever.

37. In a type-action for typewriting machines, the combination with a type-bar arranged to swing upwardly and rearwardly

from a cumbent position of rest to printing position, a vertically-disposed sub-lever having an arm extending upwardly from its pivot and operable by a forward movement of said arm to swing the 25 type-bar to printing position, said sub-lever having an arm depending from its pivot, a key lever, a trip arranged to be moved rearwardly by the key lever when the latter is depressed, means to transmit 30 said rearward movement from the trip to the said depending arm of the sub-lever to impart a rearward thrust thereto and thereby actuate the sub-lever, and means to automatically release the trip as the type-bar 35 has about completed its printing stroke.

BURNHAM C. STICKNEY.

Witnesses:

B. GOLDBERG,
E. B. LIBBEY.