

Aug. 20, 1935.

R. ATTI ET AL

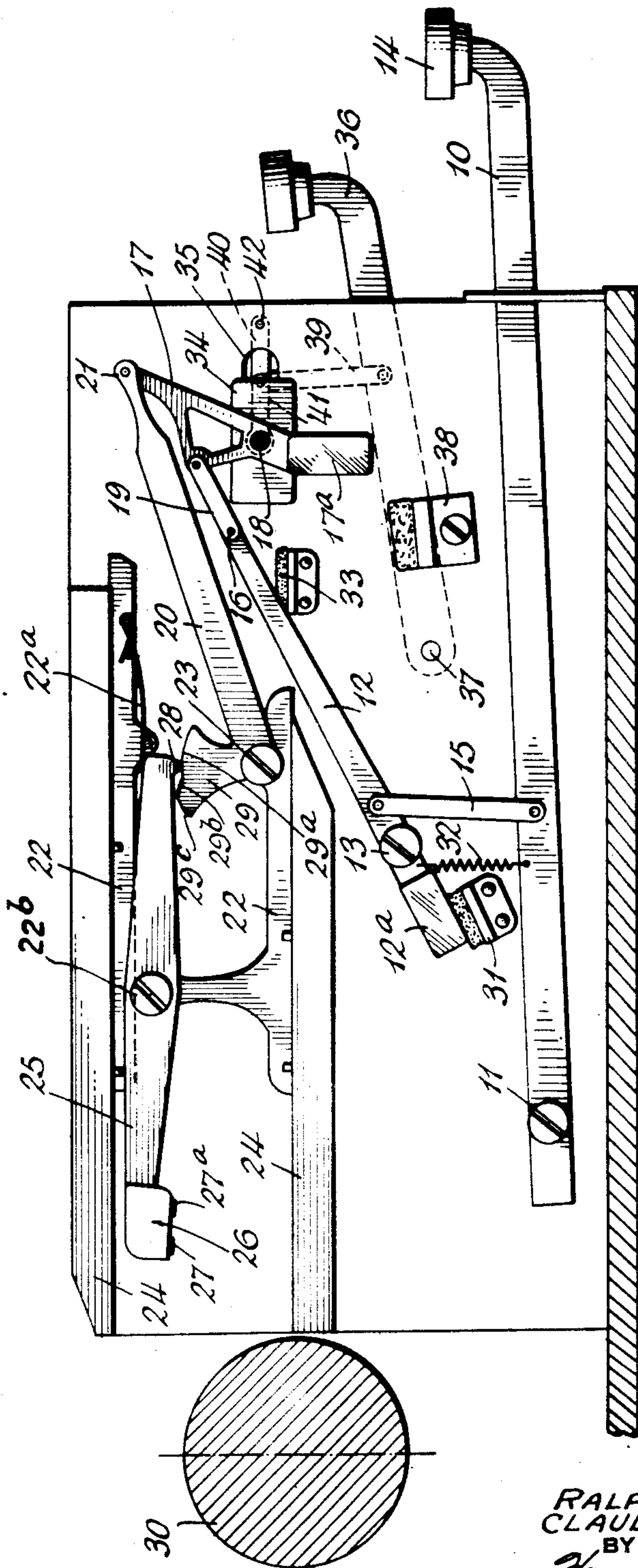
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TYPEWRITER

Filed Aug. 24, 1931

3 Sheets-Sheet 1

Fig. 1-



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Fig. 2.

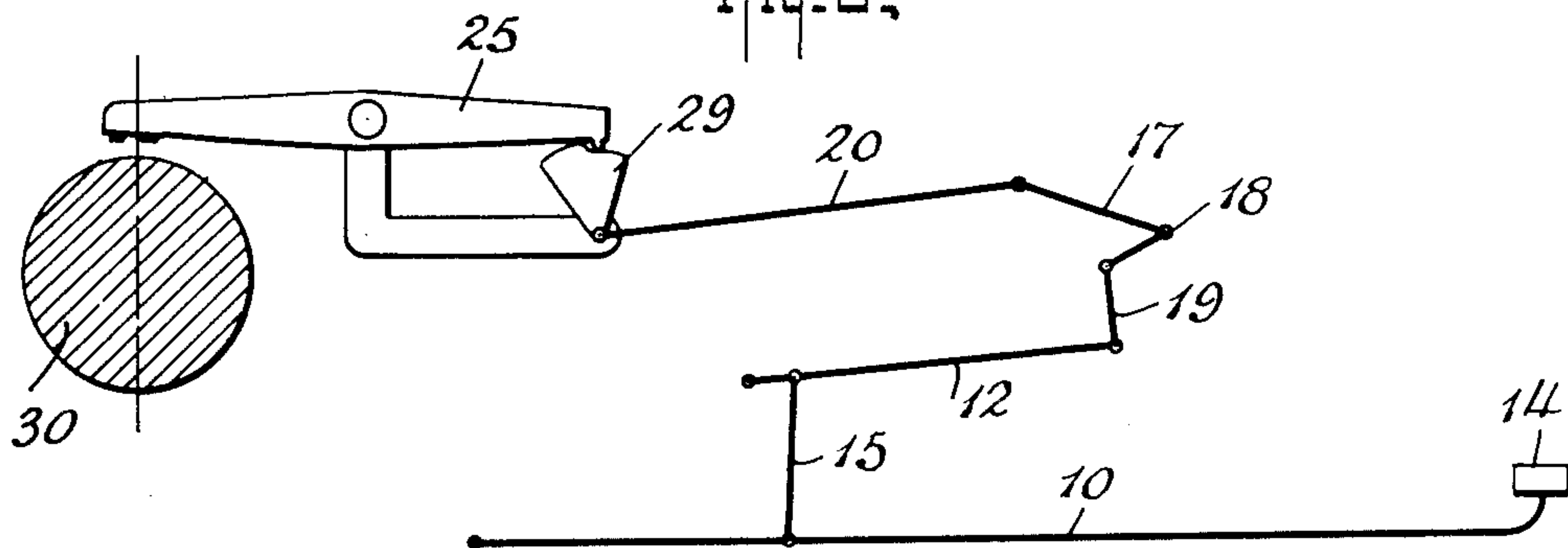


Fig. 3.

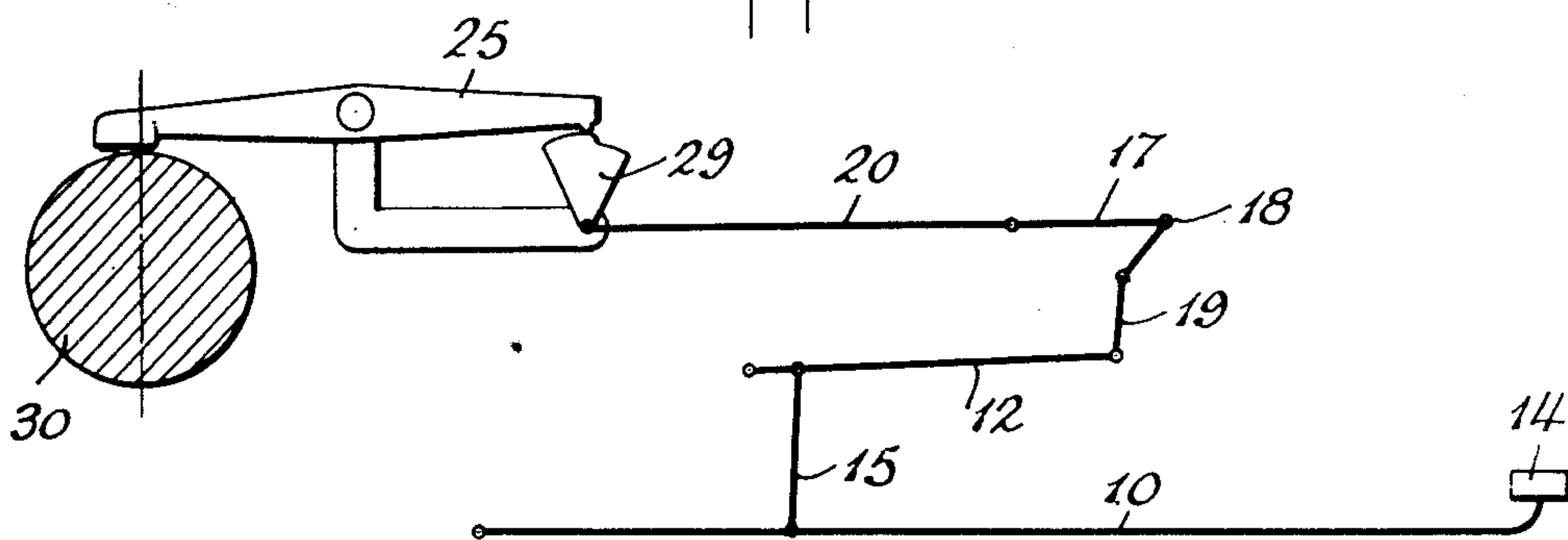
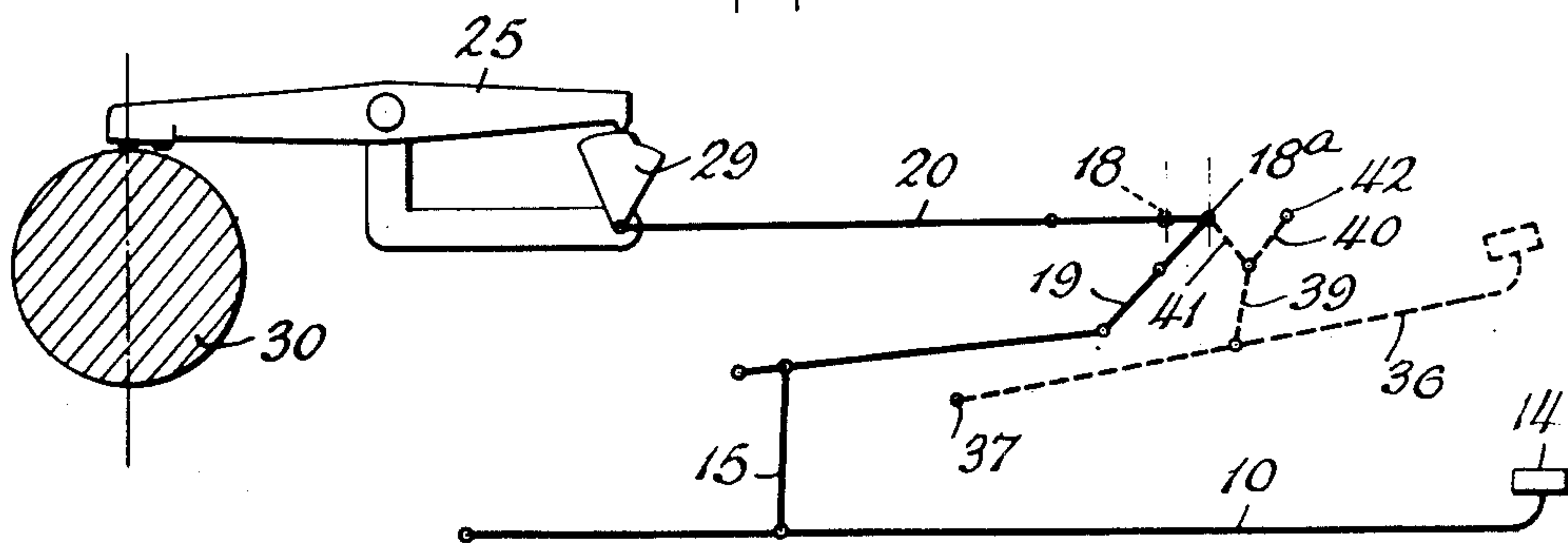


Fig. 4.



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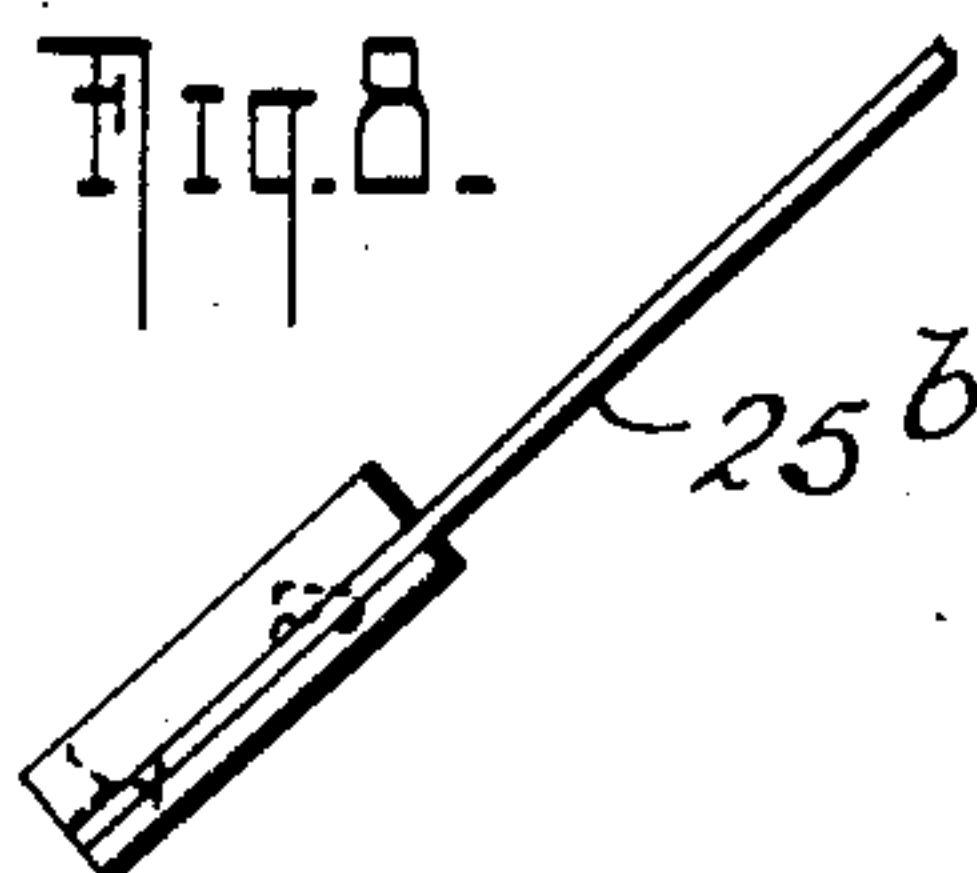
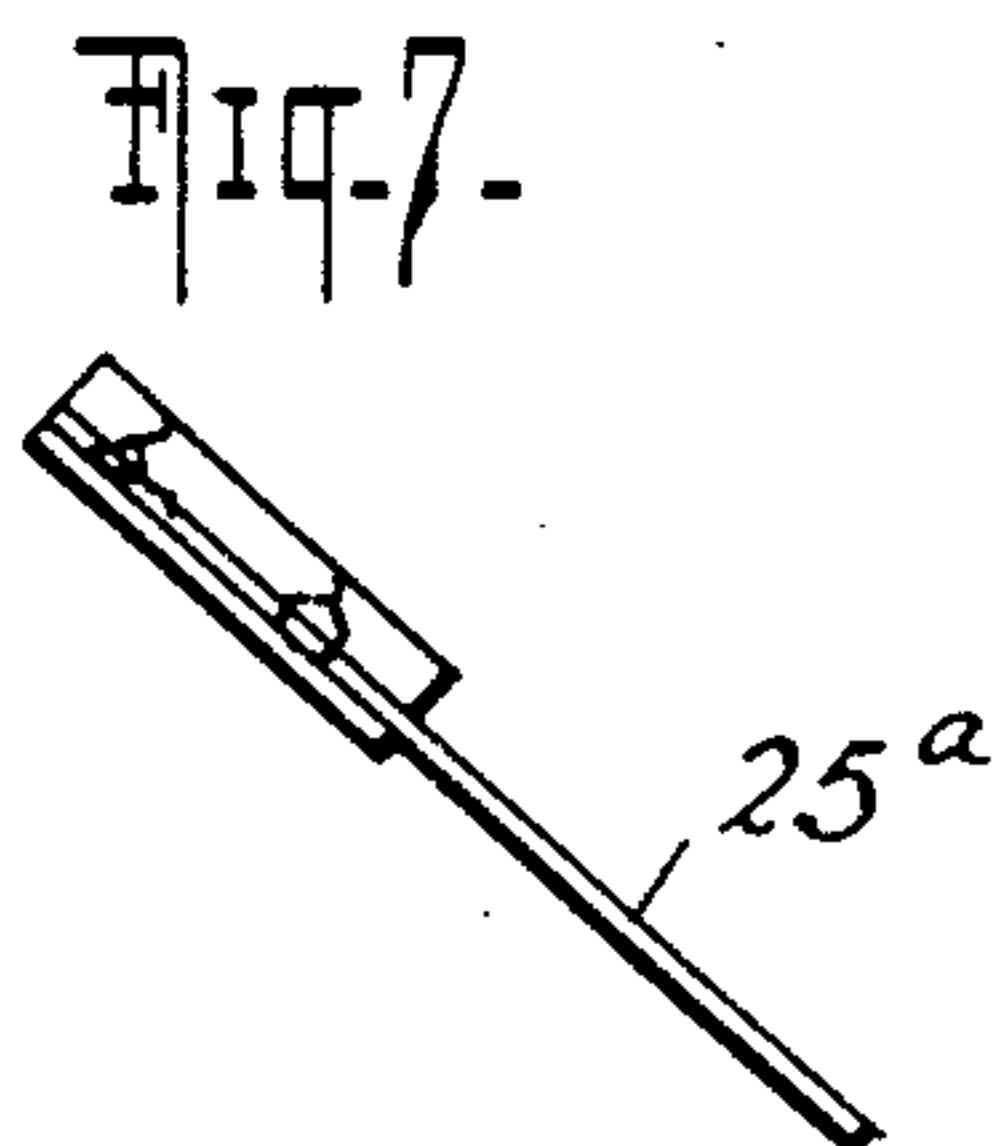
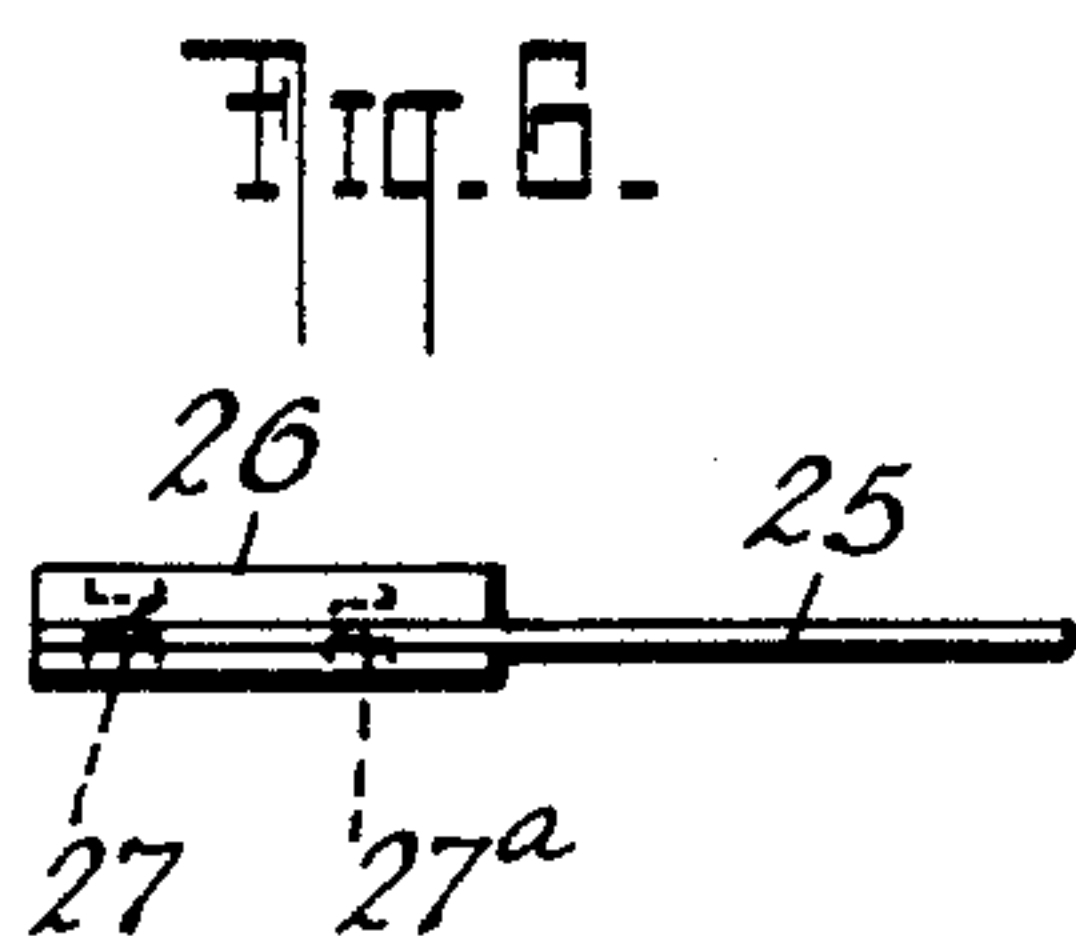
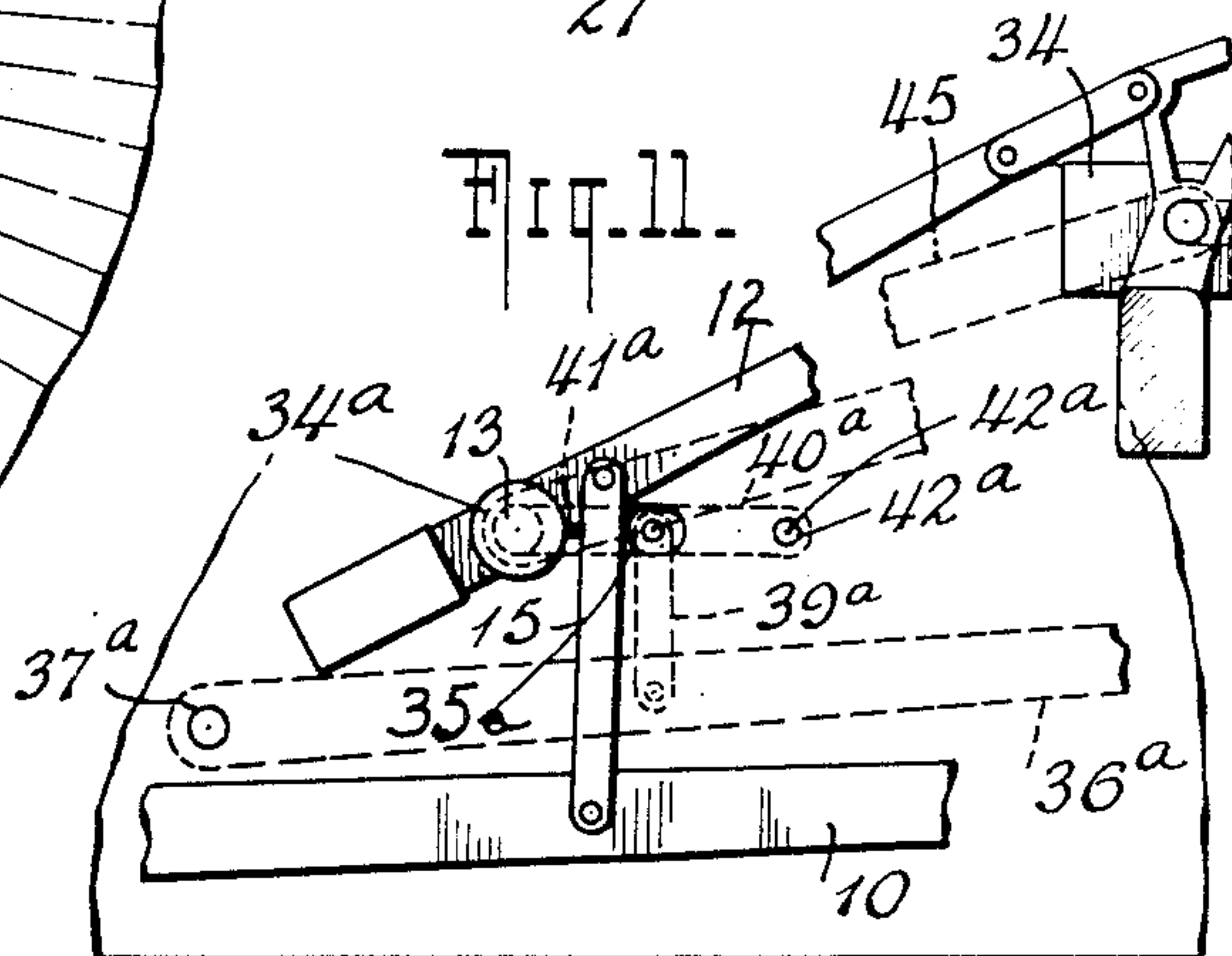
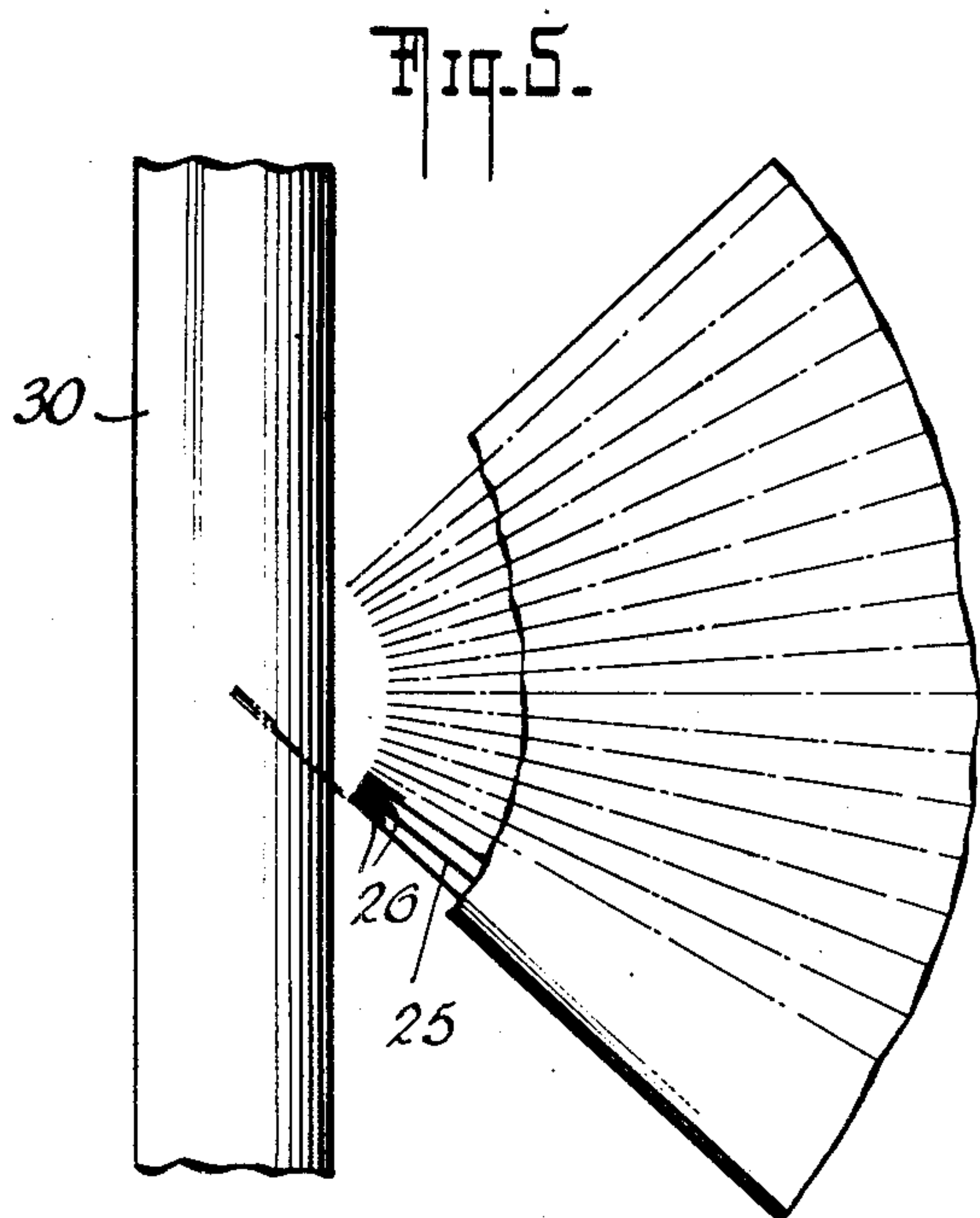
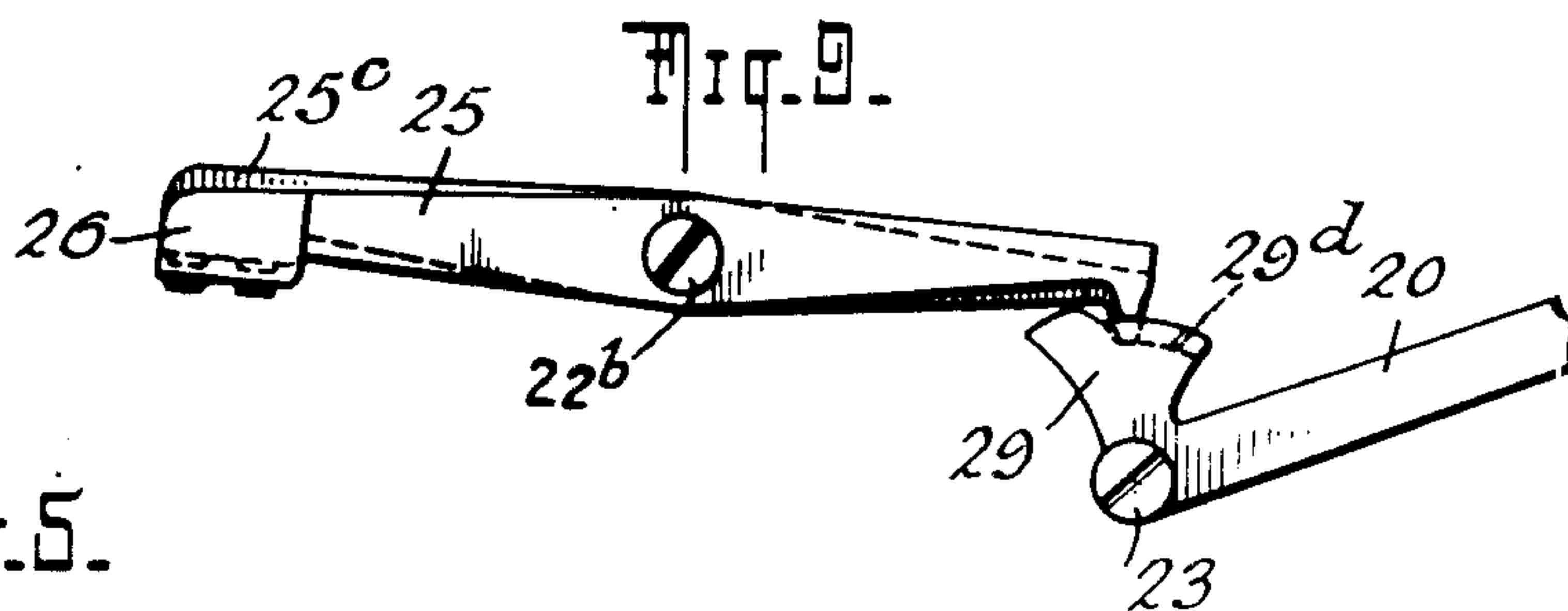
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# UNITED STATES PATENT OFFICE

2,011,700

## TYPEWRITER

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ments, to said Claude T. Rice

Application August 24, 1931, Serial No. 558,896

17 Claims. (Cl. 197—26)

This invention relates to typewriters and more particularly to a shift mechanism and type action for noiseless typewriters. It is an improvement on the invention disclosed in the application of Ralph Atti, Serial No. 337,757, filed February 6, 1929, now Patent No. 1,864,521, issued June 28, 1932.

It is the principal object of this invention to provide an improved shift mechanism for noiseless typewriters of the fixed platen top stroke printing type.

Another object of this invention is to provide a shift mechanism for typewriters in which the printing bar is projected in rectilinear motion into position ready to print and in which the projecting means is pivotally mounted on a shiftable pivot operated by the shift key to permit shifting from one case letter to another.

Another object of this invention is to provide an improved noiseless type action for top stroke printing by a rectilinear movement which has a higher acceleration and a higher velocity of the printing bar than heretofore known constructions.

Another object of this invention is to provide an improved system of staggering the type heads to provide for a uniform and additional clearance in a rectilinear moving printing bar.

Another object of this invention is to provide a printing bar with angularly disposed type in the line of movement of a rectilinearly moving type carrier for multiple case type heads.

Further objects and advantages of this invention will appear from the following description thereof taken in connection with the attached drawings which illustrate a preferred form of embodiment of our device and in which—

Figure 1 is a side elevation of the type actuating mechanism.

Figs. 2, 3 and 4 diagrammatically illustrate different steps in the printing action,

Figure 5 is a schematic partial plan view of the typewriter mechanism,

Figs. 6, 7, and 8 are top plan views of the ends of different printing bars,

Figure 9 is a side elevation of adjacent printing bars,

Figure 10 is an end elevation of adjacent type heads, and

Figure 11 is a side elevation of a modified form of type shift.

The actuating mechanism chosen as an illustrative embodiment of the invention is shown in Figure 1 and comprises a type lever 10 which is pivoted to a fixed pivot 11 which will be mount-

ed on the typewriter frame (not shown). An intermediate actuating lever 12 is pivoted to a second fixed pivot 13, which fixed pivot is intermediate the type lever fixed pivot 11 and the type key 14. A link 15 is pivoted to the type lever 10 and to the intermediate lever 12, in such manner that the freely moving end 16 will have an arcuate movement about the fixed pivot 13 and such movement due to the difference in leverage will be extremely rapid on a normal downward movement of the type lever key 14.

A modified form of bell crank 17 having a small angle between the operating arms is mounted on a shiftable pivot 18, one arm of the bell crank 17 being secured to a link 19 which is connected to the intermediate lever 12 at the freely movable end 16, and the other lever arm of the bell crank being secured to the cam lever 20 at the freely movable end 21. The cam lever 20 is pivoted to the type carrier 22 at the point 23, the type carrier 22 being slidable in a rectilinear direction in the type carrier guides 24, which in a complete embodiment of the device will be suitable combs on a plate carried from the frame. A printing bar 25 preferably of balanced construction is pivoted at 22b to the type carrier 22, and on one end of the printing bar is the type head 26 carrying the respective type 27 and 27a, the type 27 being upper case letters, and the type 27a being lower case letters. The opposite end of the balanced printing bar 25 is provided with a cam follower 28 which cooperates with the cam 29, which is integral with the actuating cam lever 20. The cam surface on the cam 29 is for a major portion 29a, substantially inactive, giving a period of dwell and is provided with a lift portion 29b and a final dwell portion 29c which is also inactive. This structure is only diagrammatically shown in Fig. 1 to illustrate a single type action. In a complete machine there will be a plurality of similar linkages and carriers mounted in a suitable frame and all operated from a standard key board and comprising the usual or any preferred arrangement of type and operating keys.

The operation of the type motion for one case of type is shown in Figs. 2 and 3. The type lever key 14 as first depressed rotates the intermediate lever 12 through the link 15 and causes an instantaneous breaking of the straight line relation between the intermediate lever 12 and link 19 and this breaking of the toggle action will cause an accelerated movement of the bell crank 17 toward the left of Fig. 1. The cam lever 20 is then projected forwardly under high accel-



eration which directly moves the type carrier 22 to which it is connected. This downward movement of the free end of the lever 12 thus exerts the greatest possible force to bring about the rapid initial acceleration of the type carrier. The dwell surface 29a on the cam as shown may move under the follower without causing rotational movement of the printing bar during this period.

On the further movement of the type lever key 14, the bell crank arm attached to the cam lever passes through a right angle position and the links 19 and 15 will become perpendicular with respect to the intermediate lever 12 and type lever 10. This position is shown in Fig. 3 and all of the energy and motion of the type lever key 14 will be used for the high velocity movement of the type carrier 22. Such movement comes into effect after the initial acceleration, and the position of rest of the bell crank 17 in Fig. 1 will not interfere with the high velocity movement of the type carrier as the right angle relation between the bell crank arm and the cam lever 20 will be reached immediately after the straight line relation between the link 19 and intermediate lever 12 is broken.

On further movement of the type lever key 14, the position is reached shown in Figure 3. The straightening of the toggle between the cam lever 20 and the arm of the bell crank 17 effectively stops further movement of the type carrier, so that the printing bar is in position over the platen 30. At the same time, the cam 29 has passed through the dwell period 29a and the follower 28 is forced upward by the lift portion 29b and the printing is accomplished.

A stop 33 prevents the movement of the toggle members 20 and 17 beyond the straight line position and the stop 38 cooperates with the intermediate lever 12 to prevent its movement beyond the fixed point.

This description of the preceding action is typical of the action whether lower case or upper case letters do the printing. The action has first rapid acceleration, then high velocity, finally a simultaneous rapid deceleration to a stop and cam actuated printing, and the printing is thus noiseless and rapid due to the cam actuation.

In order to assist the return of the parts in a rapid manner, and to balance the action on the typing movement, counter-weights 12a and 17a are placed on the intermediate lever 12, and the bell crank 17 respectively, and a suitable stop 31 is provided for cushioning and limiting the stroke of the intermediate lever 12, and the cam actuated lever 20 respectively. A suitable return spring 32 is also used in connection with the intermediate lever 12, and a spring 22a is used to maintain the cam follower on the cam 29 and maintain the type head out of printing position.

Shifting of the printing bar from lower case letters to upper case letters is brought about by the shift key lever 36 which is pivoted at 37 and has a link 39 connected to a pair of links 40 and 41. The link 40 is secured to a fixed pivot 42 and the link 41 is secured to the pivot 18 of the bell crank 17 which may preferably be carried by the block 34 movable in slot or channel 35 to guide the movement of the pivot in a direction parallel to movement of the printing bar 25. On the depression of the shift key lever 36 and the movement of this lever about its fixed pivot 37, the link 39 draws the two links 40 and 41 into a V shape, thus moving the bell

crank pivot from its lower case position 18 into upper case position 18a, as shown in Figure 4. This movement of the pivot 18 to its new position 18a is equivalent to the distance between the upper case and lower case type which is approximately 1/4 inch and such movement will limit the forward movement of the type carrier to such extent. This movement will have substantially no effect on the movement of the bell crank or associated parts as to acceleration or velocity as the angular change brought about is negligible. No movement of the platen is necessary and the type shift will effectively and quickly change the type printing and will not interfere with the noiseless type action.

The type heads are provided with upper case and lower case letters 27 and 27a, as shown in Figs. 6, 7, and 8. The printing bar moving in the center of the bank of keys has the upper case and lower case letters 27 and 27a in direct alignment. This construction is particularly shown in Figure 6.

An extreme position is shown in Figure 7 in which due to the rectilinear motion of the printing bar 25a the type 27 and 27a are not in alignment with the printing bar but on the contrary are at an angular relation thereto which angle is equivalent to the angle between the printing bar and the central printing bar or a line perpendicular to the platen. Both the upper case and lower case type are parallel, and parallel lines bear the same angular relation to the printing bar as the type carrier does to the central type carrier or a line perpendicular to the platen.

The other extreme position of type carrier is shown in Figure 8 and in this figure the upper case and lower case letters are also angularly placed with respect to the printing bar 25b and this angle is also equivalent to the angle between the particular printing bar and a line perpendicular to the platen. The angle however, is opposite to the previous angle.

This angular relation is essential due to the rectilinear motion of the printing bar and the top stroke printing action. Such construction permits a direct engagement of the type heads 26 on the printing bars 25 and each printing head although separately formed due to the angular relation and different character of the type may be integrally secured to the printing bar, without any other correction for angle or offset of the printing head as the offset is taken care of by the angular relation of the type on the type heads 26. A modified form of type shift construction is shown in Figure 11 in which the type shift lever 36a operates to laterally move the pivot 13 of the intermediate lever 12 and simultaneously to move the pivot 18 of the modified bell crank 17 which are joined by a connecting bar 45. Both pivots are preferably carried by blocks 34a and 34, movable in suitable slots or channels 35a and 35 respectively. A connecting link 39a connects the type shift lever 36a which is pivoted at 37a to a pair of toggle members 40a and 41a. The toggle member 40a is fixed to the pivot point 42a and the toggle member 41a is secured to the pivot 13 or the block 34a carrying such member. On depression of the type shift lever 36a, the toggles will move into a V-shape substantially as shown in Figure 4, but will move both the pivot 13 and the pivot 18 and the connecting member 45 in radial direction instead of only moving pivot 18 as in first form. Such movement will cause the link 19 to break from the straight line position and will cause a partial movement of the type



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carrier through the movement of the bell crank arm which will be equivalent to the distance between the type and thus the type carrier will be moved from the lower case to the upper case position. The movement of the pivot 13 and of pivot 18 or the movement of the pivot 18 singly is in a straight line direction parallel to the movement of the type carrier.

In order that all of the type carriers may be placed in the required small segment as shown in Figure 5 without the necessity of multiplying the number of type on each printing bar, the type heads 26 may be staggered as shown in Figs. 9 and 10. The type head 26 on one printing bar 25 has a position slightly higher than that of the adjacent type head in such a manner that the type carriers do not contact with each other until the type is moved to a position substantially intermediate between the printing position and the rest position. The construction of the printing bar for such an arrangement is additionally shown in Figure 9, it being noted that one printing bar 25 can be in a raised position so that it will normally clear the paper and the platen, whereas the adjacent printing bar 25c is raised a further amount which amount is slightly greater than the thickness of the type head 26.

Such construction requires a slightly different cam surface on the cam 29 and the adjacent cam 29d will have a lower dwell portion and will have a lift substantially double that of the first cam to bring the type head into the same printing position. In operation, the type key will be depressed in the usual manner and no wedging effect or overlapping of the adjacent printing bars will take place and the type carriers may be extended to the intermediate position as shown in Figure 5 before they will contact with each other. The additional lift necessary is not noticeable in the typing action as it is brought about by the formation of the toggle by cam lever 20 and bell crank 17.

The operation of this typewriter mechanism thus shows a high acceleration movement in the preliminary step and as the type carrier reaches its position over the platen for printing a straight line is formed by the toggle thus stopping further movement of the type carrier. In such position, the printing is brought about by the straightening of this toggle.

The staggering of the type permits a unilateral movement of the type carriers without doubling up of the type heads on each carrier and the type carriers can move the usual distance half way to printing position without wedging or overlapping. Shifting from one case type to another is brought about by shifting the pivot of the type carrier moving mechanism which controls the distance of the movement of type carrier. Return of the parts is brought about by return springs which are used to balance the movement, all of which cooperate to return the parts noiselessly and rapidly. The action of the mechanism will thus effect a rapid, noiseless and effortless typing with the minimum number of parts.

While we have shown a preferred form of embodiment of the device, we are aware that other modifications may be made therein and consider that the described apparatus is merely illustrative of our invention and desire that the description and hereinafter appended claims should receive a broad interpretation within the scope and spirit thereof.

We claim:

1. In a typewriter of the top platen printing

type, a type bar, a pivoted lever for moving the type bar forward to a position less than printing position, cam means to depress the type bar to cause printing, and means to shift from one case letter to another on said type bar, comprising a pivot block for said pivoted lever and a shift lever to shift said pivot block to vary the printing.

2. In a device of the character described, a platen, a key, a type bar carrying a plurality of type, means to guide the movement of said type bar and a single train of connections intermediate said key and said type bar whereby said type is first advanced to a point opposite said platen and subsequently moved in a direction separate from its first movement to effect printing on said platen, said train of connections including a link to noiselessly stop the movement of the type bar, and toggle means to shift the movement of the type bar from one type to another with respect to the platen.

3. In a device of the character described, means mounted for rectilinear movement, type carrying means pivoted to said first named means, and a single acting toggle-link adapted to first rapidly move said first named means while said type carrying means is held from rotation about its pivot, and cam means to subsequently rotate said type carrying means about its pivot, and means to shift said toggle link for change of type case.

4. In a device of the character described, a frame, a bar mounted for rectilinear movement upon said frame, a type carrier mounted on said bar and actuating means for moving said bar and moving said type carrier relative to said bar, said actuating means comprising a toggle joint, one of said toggle members being provided with a type depressing cam, the other of said toggle members being a modified bell crank, a pivot for said bell crank, a second toggle joint, one of said toggle members being connected to the pivot and a type shift lever connected to said second toggle to break said toggle and move said pivot for changing from one case to another.

5. In a device of the character described, a shift key, a toggle lever, one of said toggle members having a fixed point, a type carrier, actuating means to move said type carrier, one end of said actuating means being secured to the other toggle member, and connecting means between said shift key and said toggle whereby said actuating means is moved a distance corresponding to the ultimate distance between type to noiselessly shift from one case type to another.

6. In a device of the class described, a platen, a plurality of pivoted printing bars, pivots for said printing bars, all of said pivots being equidistant from the printing point, type heads carried by said bars, type on said type heads, means to effect printing on said platen, means to position adjacent type heads in staggered relation at a distance apart substantially equivalent to the thickness of a type head.

7. In a rectilinearly moving top stroke printing mechanism, a plurality of equal length, pivoted printing bars, a plurality of pivots therefor, each of said pivots being equidistant from the printing point, type heads mounted thereon and means to prevent wedging of adjacent type heads on movement of adjacent printing bars, said means including a staggered arrangement of type heads.

8. In a device of the class described, having a frame, and a platen, printing bars pivoted to slidable supports, toggle levers connected with said



supports, said toggle levers being shiftably pivoted to said frame, cams on said toggle levers, and cam followers on said printing bars cooperating with said cams, said toggle levers adapted to move said supports in substantially rectilinear movement to printing position and a rotary movement to effect printing, said printing bars having type heads on one end thereof, adjacent type heads being vertically staggered, and type on said type heads, all of said type being mounted in parallel planes, said printing bars being angularly disposed to said planes in amount equivalent to the angle said printing bars make with the platen axis.

9. In a type action substantially as described a type bar having a plurality of case letters thereon for printing on the top of the platen, pivoted means to move the type bar forward nearly to printing position, additional means to depress the type bar to cause printing therefrom, and means to shift from one case letter to another, comprising a means to move the pivot of said pivoted means laterally with respect to the platen to control the ultimate position of the type bar.

10. In a type action for noiseless typewriters including a type bar, means to actuate said type bar and means to stop the type bar before contact, a fixed pivot for said latter means, means for shifting from one case letter to another case which comprises means for shifting the position of the pivot for said stopping means in a direction parallel to the movement of the type bar, and cam means, effective after the projection of said type bar to force said type bar into printing contact.

11. A type bar action for noiseless typewriters comprising a type bar carrying a printing type, a reciprocable carrier on which said type bar is mounted movable to carry the type bar to a projected position, a key, a bell crank, a plurality of links connected to said key and said bell crank and a link between said bell crank and said type carrier, whereby on first movement of said key a toggle is broken for primary high acceleration of said reciprocating carrier, and on a second movement of said key said links fall into a right angled relation to move said carrier under high velocity, and on a further movement of said key a toggle is made with the bell crank and type carrier connecting link to stop said type carrier, and a cam actuated by a final movement of said key to give a printing movement to said type bar in projected position.

12. A type bar action for noiseless typewriters comprising a type bar carrying a plurality of printing characters, a reciprocable carrier on which said type bar is mounted movable to carry the type bar to a projected position, a key, a shiftable pivot, links connected to said key, said shiftable pivot and said reciprocable carrier to move said carrier and type bar to a projected position upon actuation of the key, a cam actuated by said links to give a printing movement to said type bar when in said projected position, and

means for shifting the shiftable pivot to shift the type bar from one projected position to another for changing type case.

13. In a noiseless typewriter of the class described having a type bar and means to move the type bar forward adjacent to but out of contact with the platen, means to depress the type bar to cause printing, and means to shift from one case letter to another on said type bar, comprising a normally fixed pivot controlling the ultimate position of the type bar, and means to shift the fixed position of said pivot, said pivot being positively linked to said type bar whereby the point of printing is shifted from one case letter to another on said type bar.

14. In a typewriter of the character described, a type bar carrying a plurality of case type, means to move said type bar into a projected position, including a bell crank, one arm of which acts as part of a toggle, means to cause printing and means to move the bell crank pivot about which the bell crank rotates to affect the projected position of the type bar in the printing position to change from one case type to another.

15. A rectilinear type action for top stroke printing which comprises a type carrier, a printing bar carried thereby, a type key lever and a plurality of intermediate toggles, and intermediate linkage to initially break one of said toggles to accelerate said type carrier into a projected position and to make another toggle to decelerate and stop said type carrier in said projected position before the printing bar reaches printing position and means to move the printing bar with respect to the type carrier for final printing.

16. A type action for noiseless typewriters which comprises a printing bar, a type carrier carrying said printing bar, a type key lever and a plurality of intermediate toggles, and intermediate linkage to initially break one of said toggles to accelerate said type carrier into projected position and to make another toggle to decelerate and stop said type carrier in said projected position, type shift means controlling the fixed position of the second toggle for changing the projected position of the type carrier, means on a part of said second toggle cooperating with said printing bar to rotate said printing bar on said type carrier for printing after said type carrier is stopped.

17. In a noiseless printing device, a printing bar, a type bar carrier pivotally supporting said printing bar, means for giving said printing bar a rectilinear movement including two pivoted modified bell cranks and a pivoted actuating lever, one of said bell cranks being secured to the type carrier, a connecting member secured to the pivot of the other bell crank, any type shift means to move said connecting member to vary the printing position of said printing bar from one case type to another.

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