

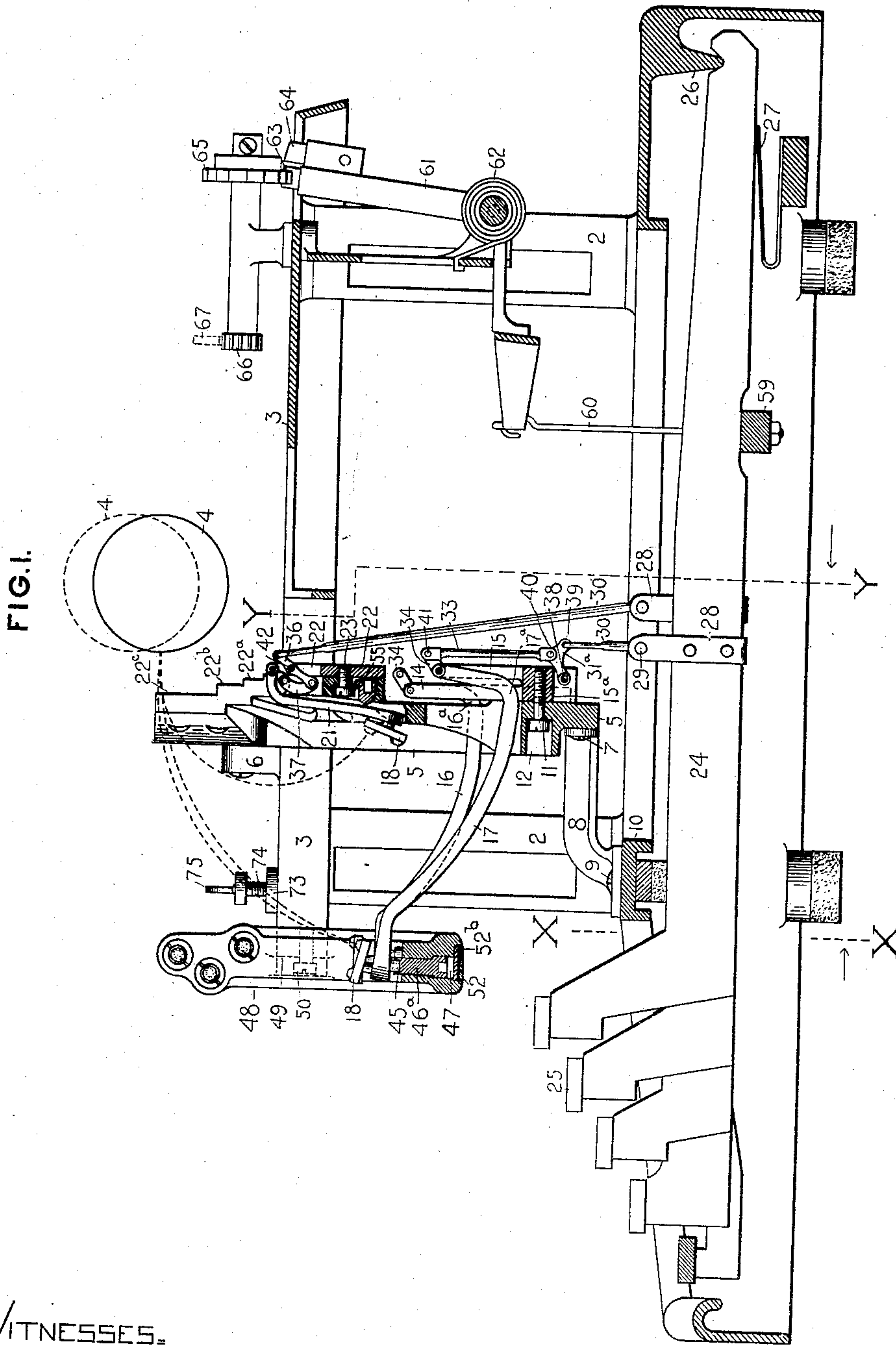
No. 762,290.

PATENTED JUNE 14, 1904.

L. P. DISS.
TYPE WRITING MACHINE.
APPLICATION FILED MAY 14, 1901.

NO MODEL.

7 SHEETS—SHEET 1.



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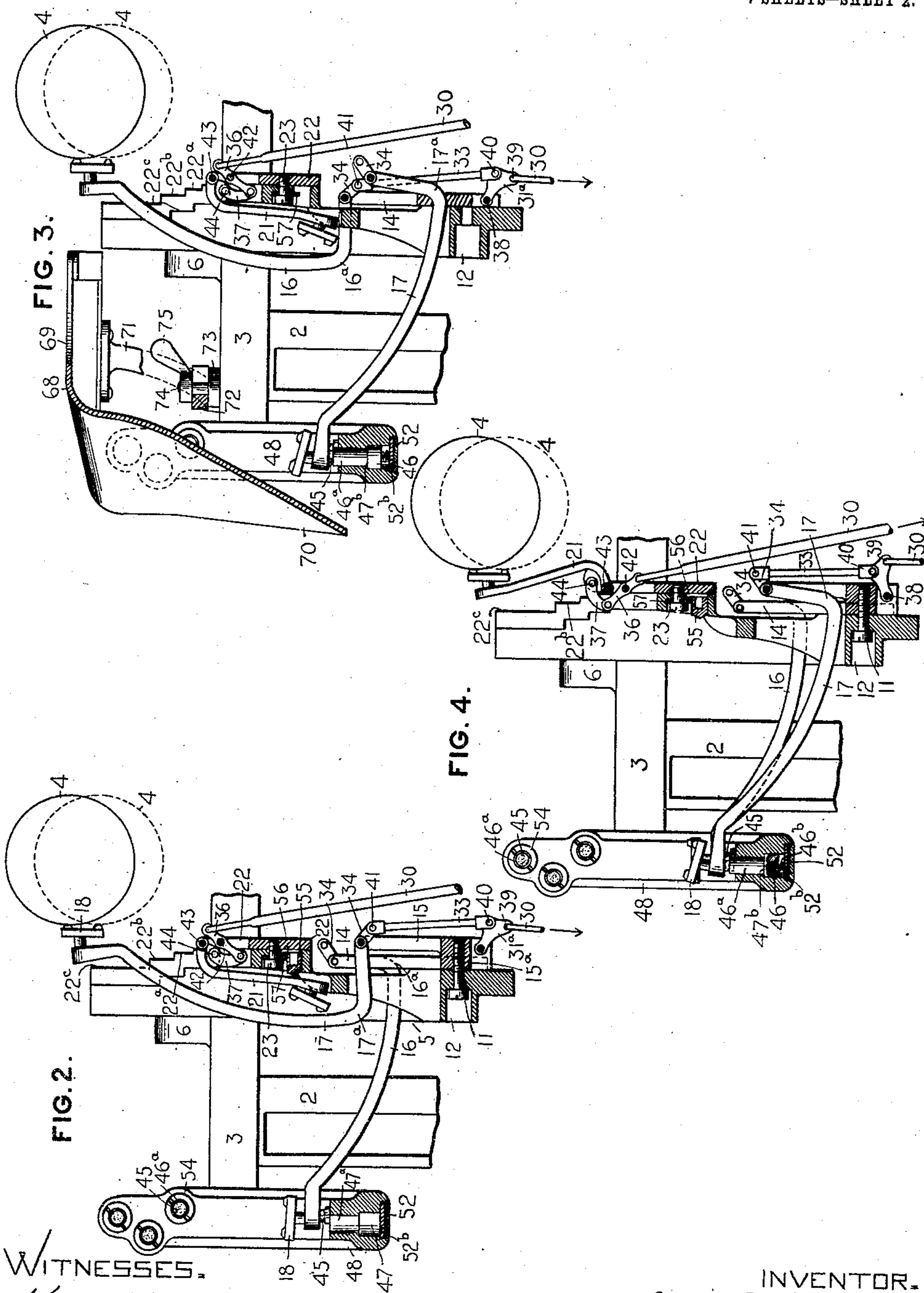
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7 SHEETS—SHEET 2.

NO MODEL.



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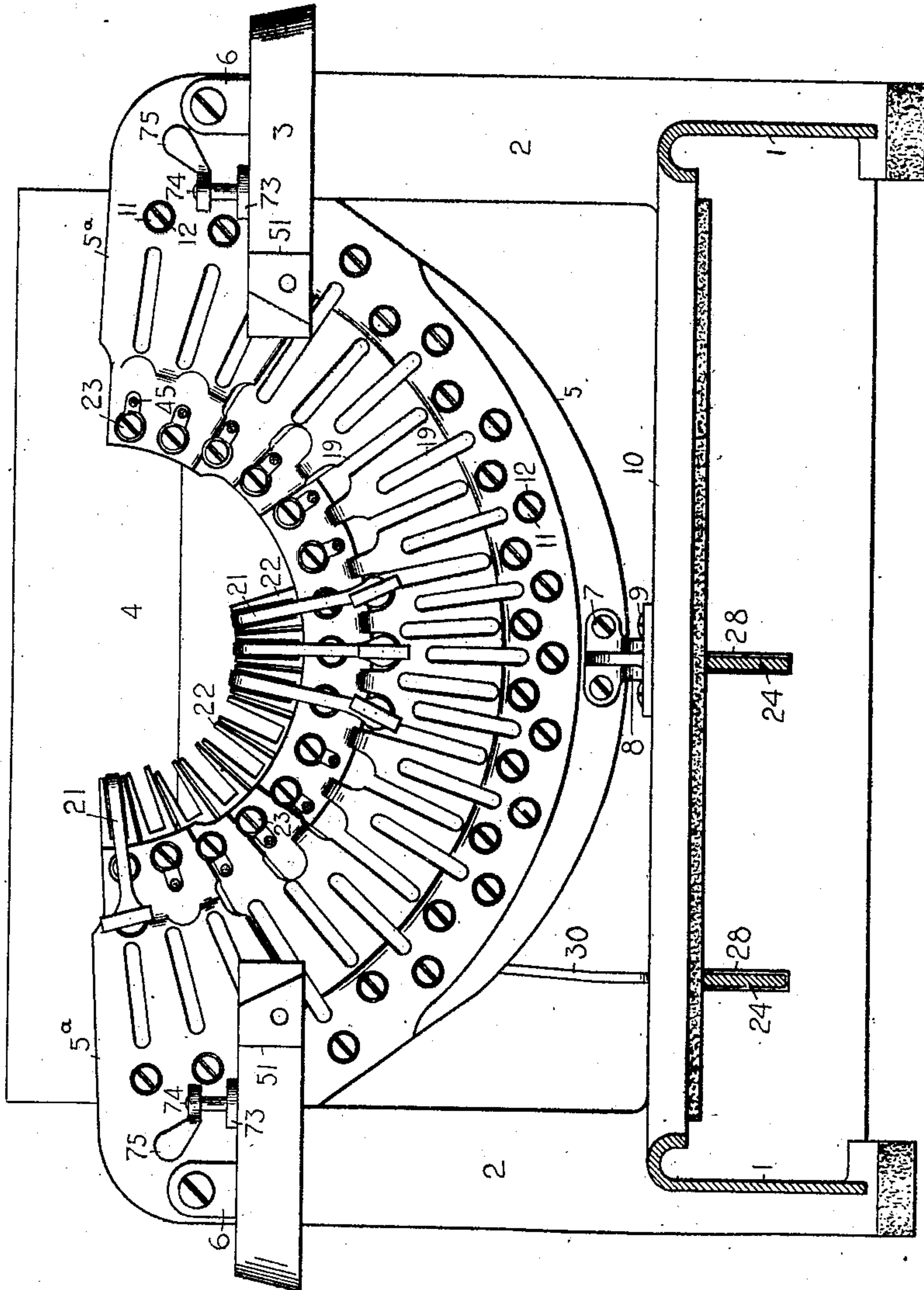
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7 SHEETS—SHEET 3.

FIG. 5.



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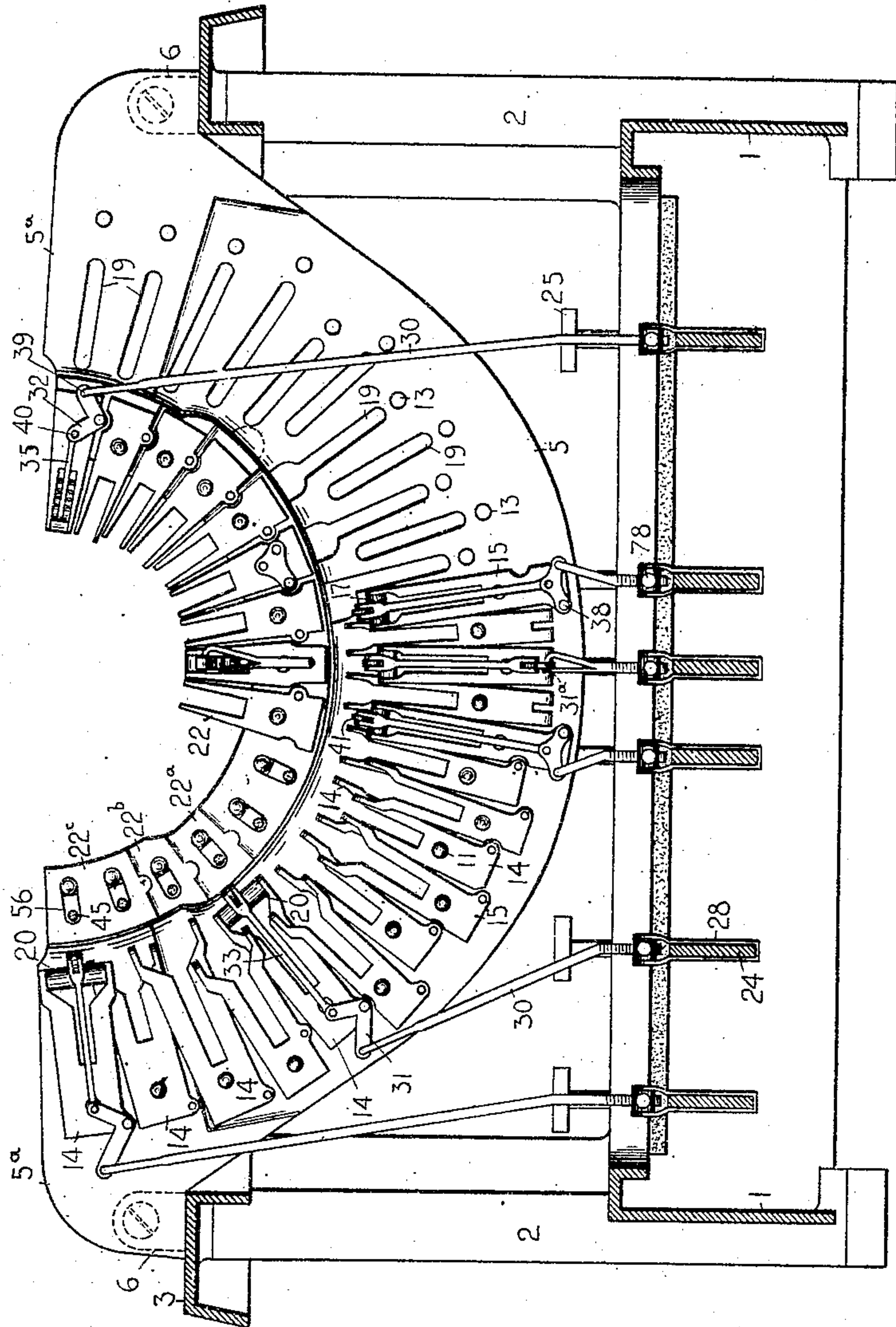
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7 SHEETS—SHEET 4.

FIG. 6.



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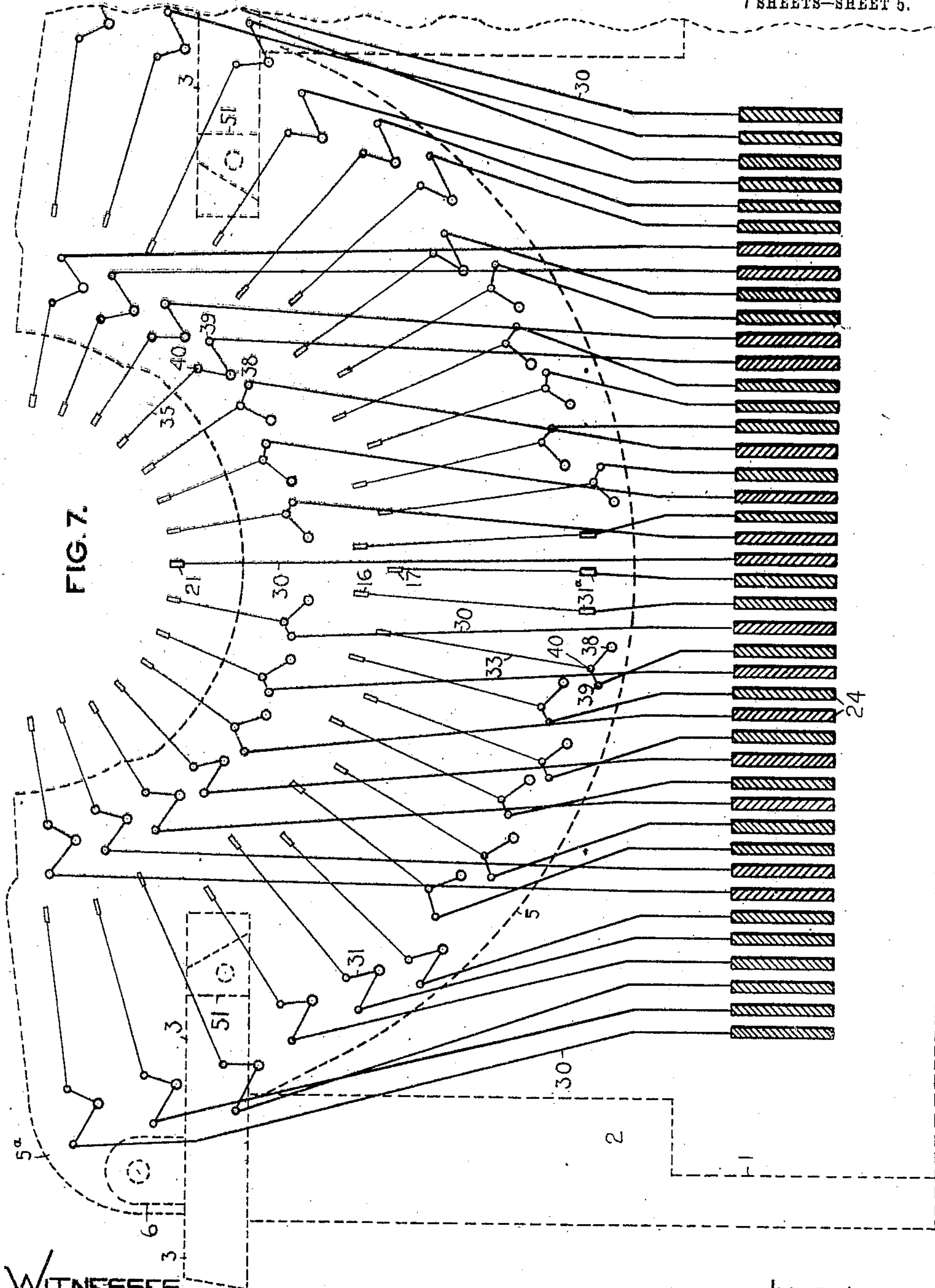
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NO MODEL.

7 SHEETS—SHEET 5.



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NO MODEL.

7 SHEETS—SHEET 6.

FIG. 8.

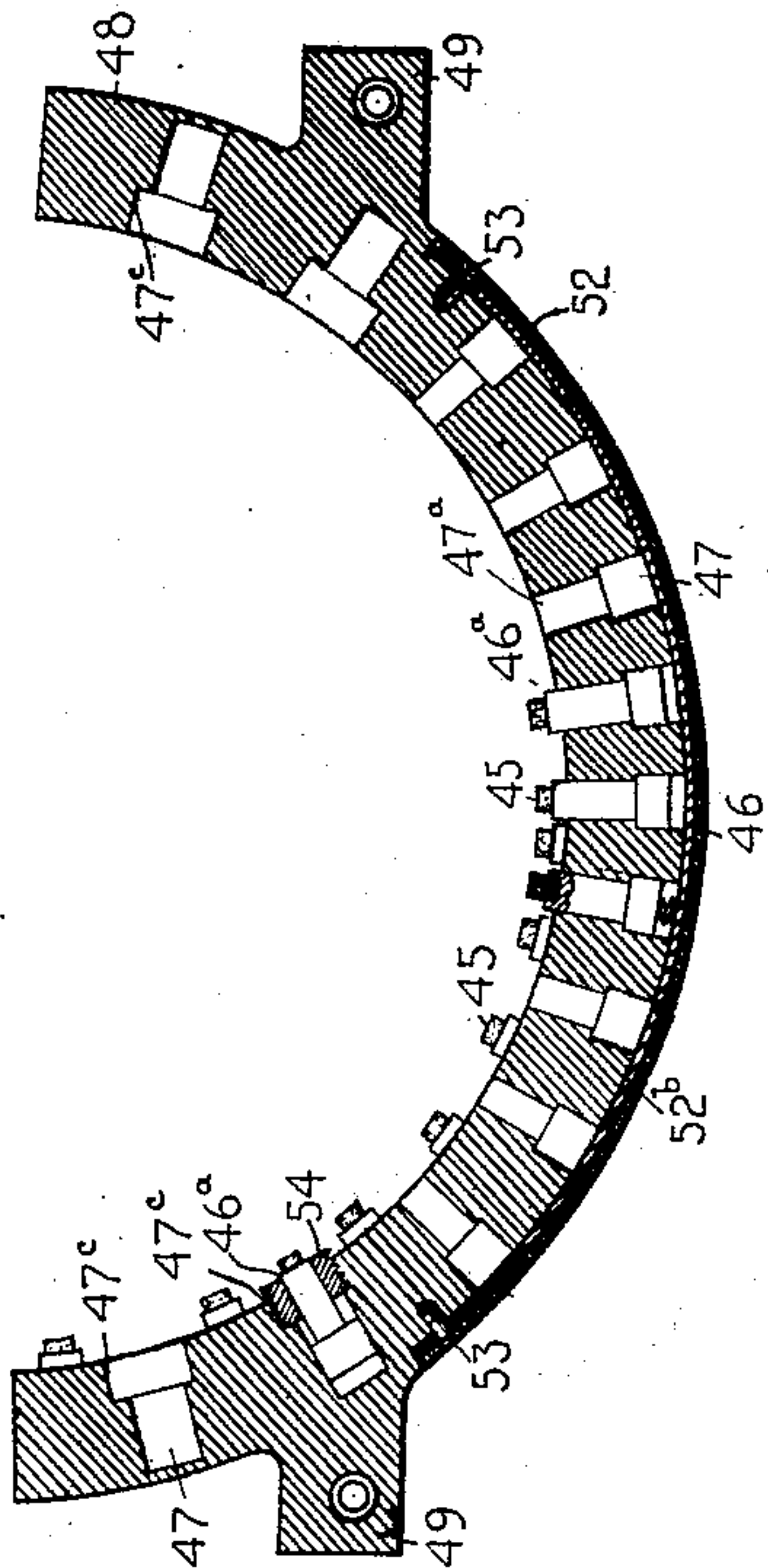


FIG. 9.

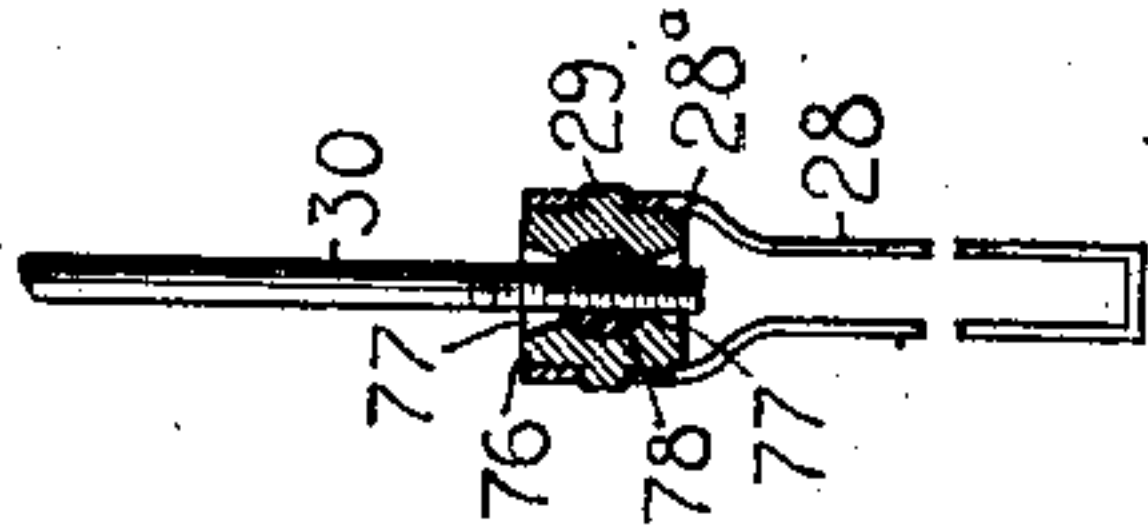


FIG. 10.

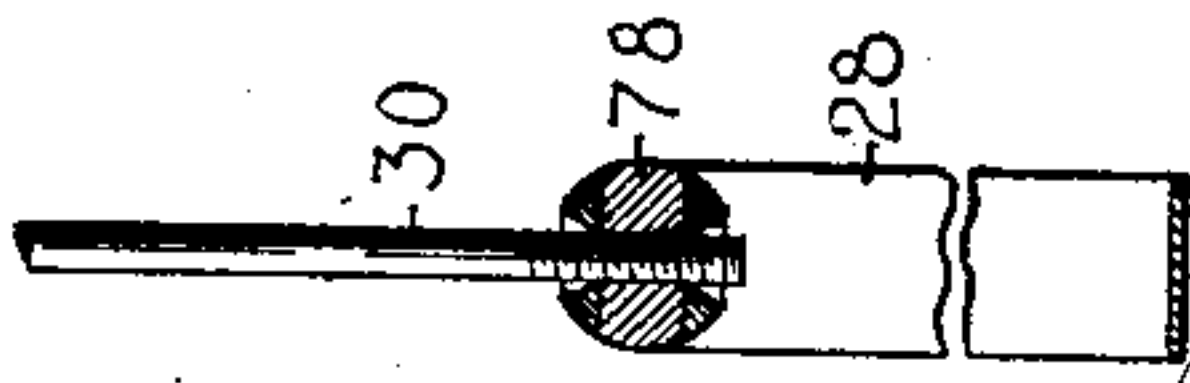
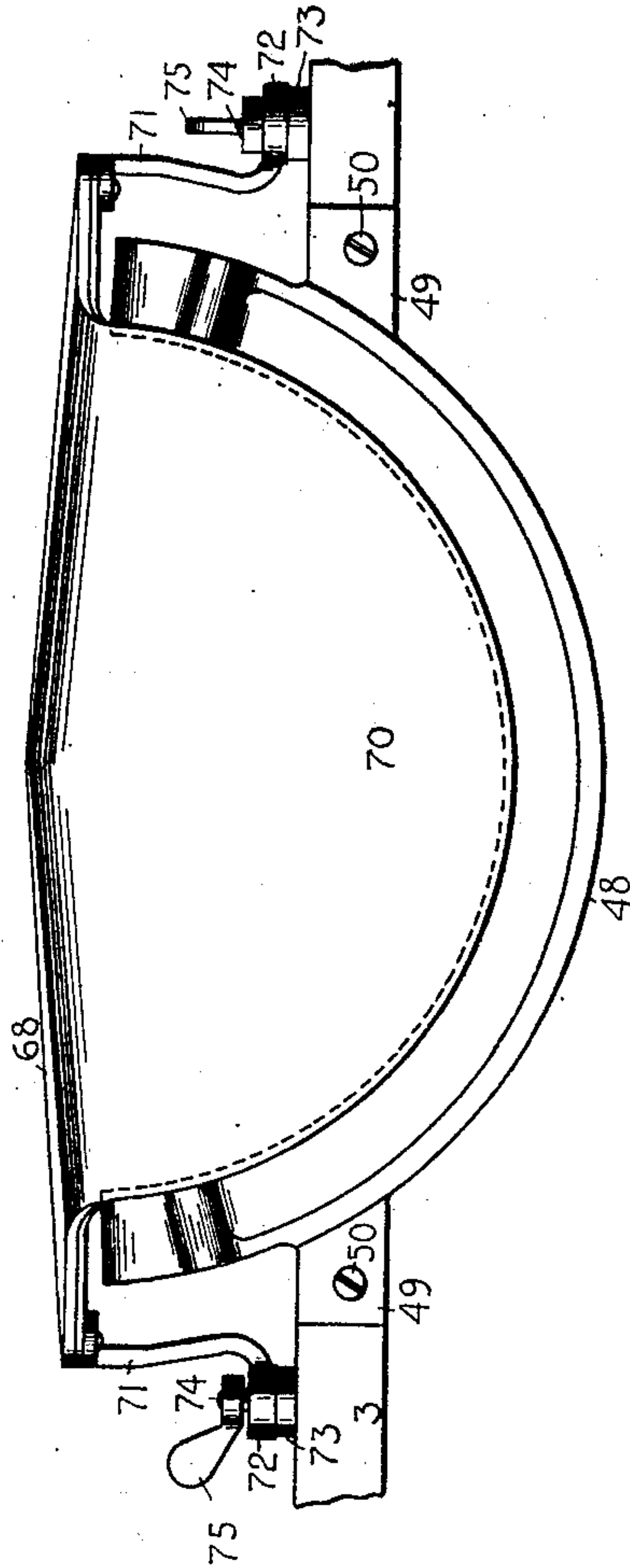


FIG. 11.



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L. P. DISS.
TYPE WRITING MACHINE.
APPLICATION FILED MAY 14, 1901.

NO MODEL.

7 SHEETS—SHEET 7.

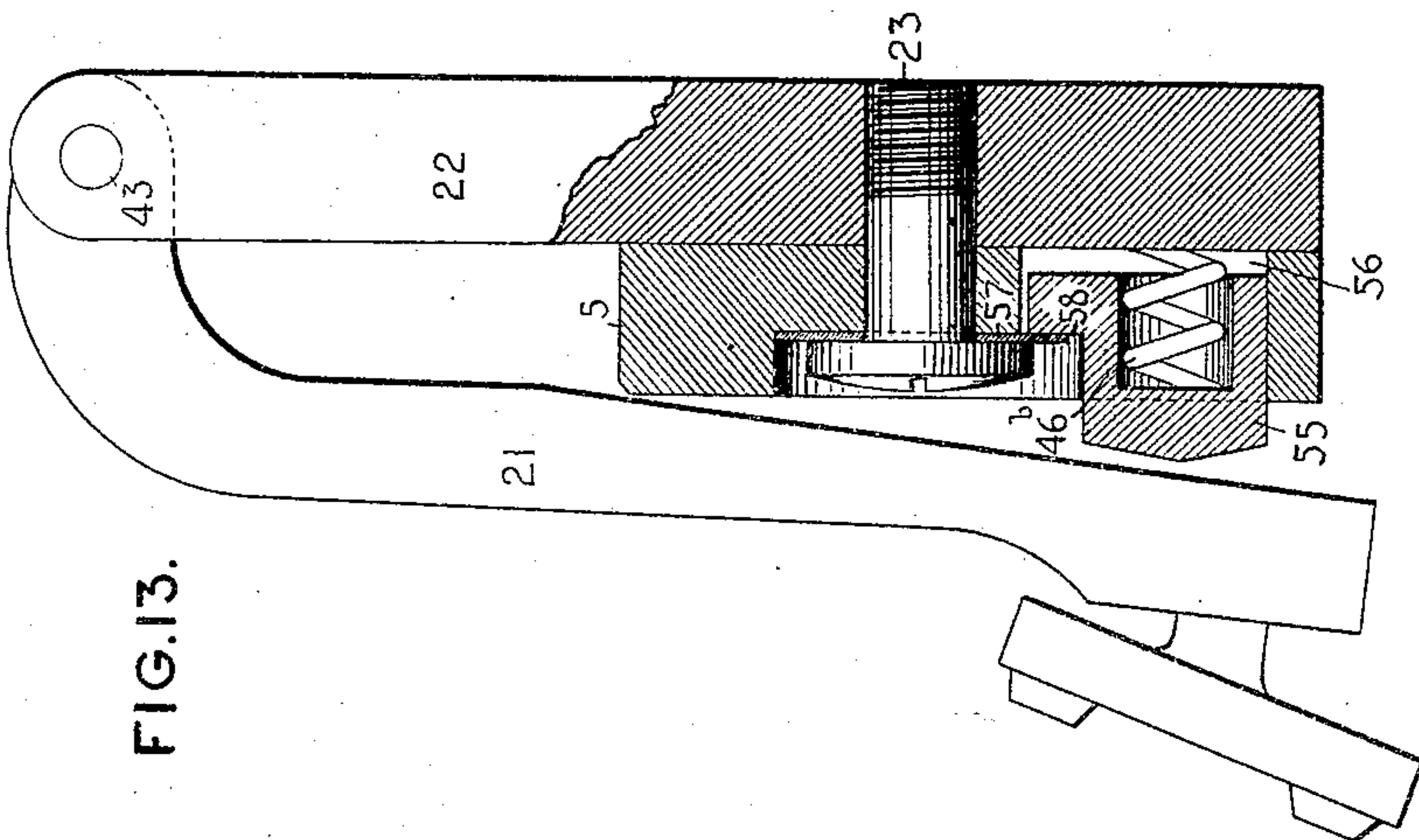


FIG. 13.

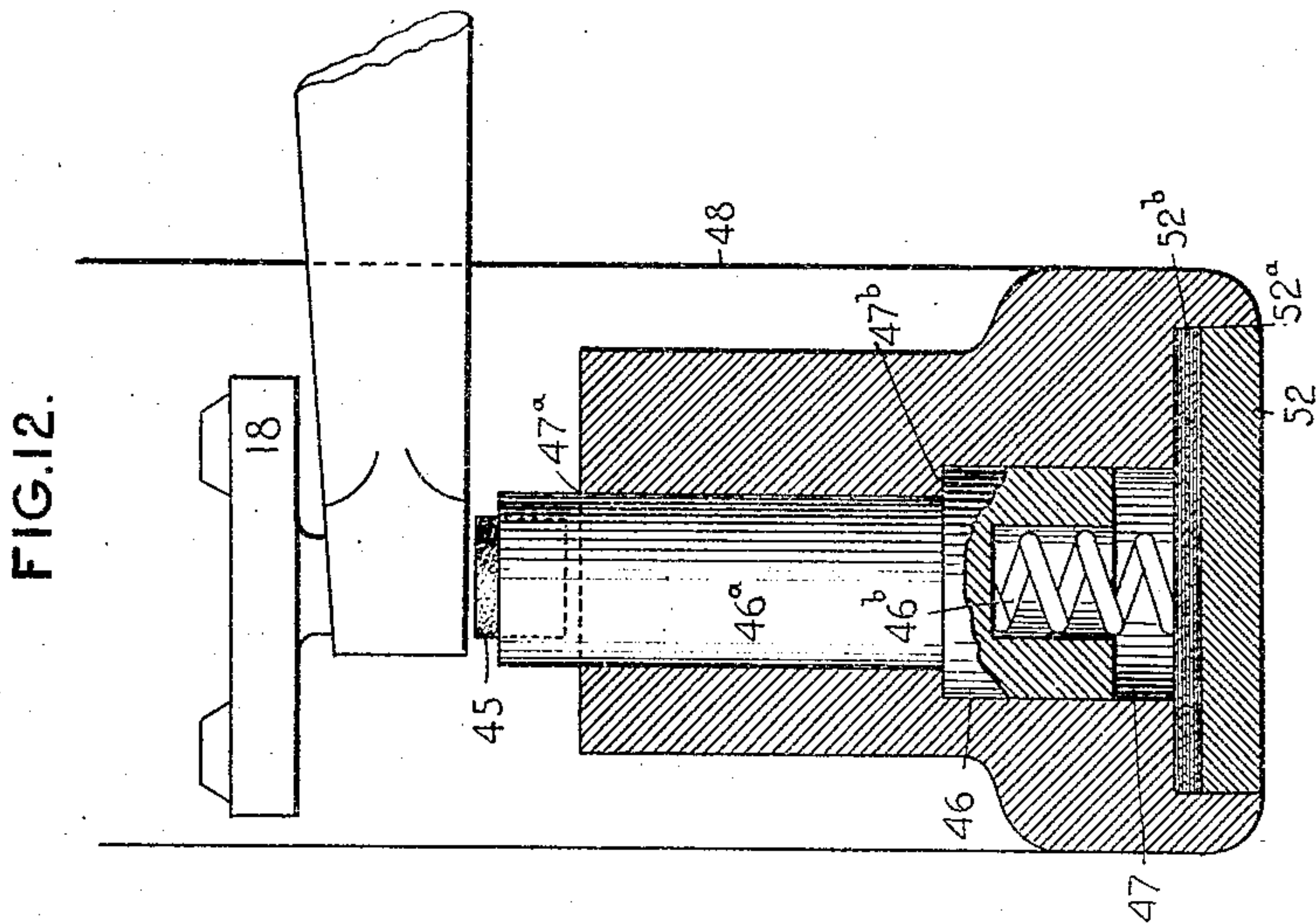


FIG. 12.

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UNITED STATES PATENT OFFICE.

LOUIS P. DISS, OF ILION, NEW YORK, ASSIGNOR TO WYCKOFF, SEAMANS & BENEDICT, OF ILION, NEW YORK, A CORPORATION OF NEW YORK.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 762,290, dated June 14, 1904.

Application filed May 14, 1901. Serial No. 60,154. (No model.)

To all whom it may concern:

Be it known that I, LOUIS P. DISS, a citizen of the United States, and a resident of Ilion, in the county of Herkimer and State of New York, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

This invention relates to the type-actions of writing-machines.

The principal objects of the invention are to assemble compactly in a "front-strike" machine a large number of type-bars mounted upon wide bearings, so that they may vibrate freely and accurately to the printing-point, to improve the connections between the type-bars and the keys, and to prevent rebounding of the types upon their return to normal position.

Other objects will hereinafter appear.

My invention consists in certain combinations of devices, features of construction, and arrangements of parts, all as will be hereinafter fully set forth, and particularly pointed out in the concluding claims.

In the accompanying drawings, Figure 1 is a central sectional elevation taken longitudinally of a front-strike writing-machine constructed in accordance with my invention, the parts being shown in normal position. Fig. 2 is a fragmentary sectional view showing a long type-bar in printing position. Fig. 3 is a similar view showing another long type-bar in printing position. Fig. 4 is a similar view showing a short type-bar in printing position. Fig. 5 is a front elevation, partly in section, on the line X X of Fig. 1 and showing a type-segment and some of the short type-bars mounted thereon. Fig. 6 is a rear sectional elevation taken at about the line Y Y of Fig. 1. Fig. 7 is a diagrammatic front elevation of the system of connections extending upwardly from the key-levers. Fig. 8 is a vertical section of a type basket or rest. Figs. 9 and 10 are front and side sectional details of a universal joint between a connecting-rod and a key-lever. Fig. 11 is a fragmentary front view showing the type-bar shield in position. Figs. 12 and 13 are enlarged de-

tails of means at the basket or rest for preventing rebounding of the type-bars.

In the several views similar parts are designated by similar numerals of reference, and portions of the machine are omitted or broken away to disclose the invention more clearly.

The framework consists of a rectangular base 1, corner-posts 2, and a top plate 3. A platen 4 (diagrammatically illustrated) may be mounted to move longitudinally over the latter. Forwardly of the platen is a segmental frame 5, which is secured at its ends to lugs 6, rising from the top plate, and at its lower central portion by screws 7 to the rear end of a bracket 8, which at its forward end is fastened by screws 9 upon a cross-bar 10, which is formed integral with the base. Upon the rear vertical face of the segment and along its lower curved edge is secured, by means of screws 11, a double set of radial type-bar hangers. The front face of the segment 5 is counterbored at 12 to receive the heads of the screws 11, which pass rearwardly through perforations 13, formed in the segment, and are tapped into the type-bar hangers. The latter are arranged in two tiers, those in the forward tier being designated as 14 and those in the rear tier as 15, the former lying close against the vertical face of the segment and the latter having thickened body portions 15^a, whereby they are offset from the segment, thus occupying a position in rear of the hangers 14. As appears at Fig. 6, all of these hangers are forked at their inner ends to provide wide bearings for the type-bars, the forks of the rear hangers 15 overlapping the forward hangers 14 and being farther from the common printing-point than are the forks of the forward hangers, and the type-bar pivots at the sides of the system are longer than the central pivots, the outermost pivots being preferably the longest.

The radially and segmentally arranged rearwardly and upwardly striking type-bars that are mounted upon the brackets or hangers 14 and 15 are designated, respectively, as 16 and 17, the former measuring less from pivot to type than the latter and each carrying a

plurality of type 18. The type-bars extend through radially - elongated perforations 19 formed in the segment, said perforations being preferably so wide that the type-bars do not contact with the edges thereof. The pivots of the type-bars 16 and 17 may increase more or less gradually in length from the middle to the sides of the system, the body of a type-bar being farther from the bearings of its pivot the nearer the type-bar is to either side of the system. The type-bars at the sides of the segment preferably have hubs 20 of greater width than those at the middle portion thereof, the forks of the side hangers being accordingly widened, since these type-bars vibrate in planes which gradually approach the horizontal, and hence have more or less tendency to sag, and it being of especial importance to prevent their lateral vibration, which would destroy the vertical alinement of the types at the printing-point.

The above-described pivots and bearings will properly support the type-bars from side to side of the system, and so preserve the alinement for a long time, notwithstanding the tendency of the side type-bars to sag and the peculiar wear to which their bearings and pivots are subjected. Of course the longer the pivots of the side bars are the less liable is the alinement to be impaired by wear at the ends of the pivots. The effect of this wear may be rendered substantially equivalent to that in the bearings of the central type-bars by providing all of the type-bars of the system with pivots of proper relative lengths. The two or three outer hangers 14 are secured against a step or face 5^a of the segment whose plane is forward of the face upon which the other hangers are secured, so that these hangers may clear the platen and usual paper-feeding devices. The pivots of the rearmost type-bars 17 lie in substantially the same vertical plane as the printing-line upon the platen, so that the types upon these bars move in practically horizontal lines when closely approaching the printing-point, and hence the alinement is nearly as perfect when manifolding as when writing single copies, the increased diameter of the platen due to the placing of additional sheets thereon not having any appreciable tendency to cause the impressions to fall below or above the normal plane of writing, such as would be the case if said pivots were placed far in front or in rear of the illustrated positions.

Arranged between the platen and the hub portions of the above-described type-bars is a series of short type-bars 21, which are pivoted upon hangers 22, secured by screws 23 to the rear vertical face of the segment 5 and near the upper curved edge thereof. The type-bars 21 lie nearly in contact with the front vertical face of the segment and diverge radially from their pivots. They swing through nearly half a circle from normal position to

the printing-point, while the long type-bars move through a little less than one-quarter of a circle, the paths of the types upon the shorter bars being, however, of substantially the same length as those upon the longer bars and the pivots of the shorter bars being in nearly the same vertical plane as the pivots of the longer bars 17. The purpose of swinging the short type-bars 21 to a point below the usual horizontal position is to enable them to lie behind the long type-bars when the latter are swung to the printing-point, each long bar having a bend or elbow, as at 16^a and 17^a, so as to enable it when in printing position to clear the types upon the short bars, as will be understood by reference to Figs. 2 and 3. When all the bars are in normal position—that is, at rest—the short bars extend in directions at right angles to or crosswise of the long bars, and when the latter are in printing position they extend longitudinally of the short bars. Preferably I place fifteen short bars in the upper curved row of hangers 22 and twenty-seven long bars in the lower double set of hangers. According to this arrangement the type-bars are divided into two sets, the bars in one set extending forwardly from their pivots and the bars in the other set fanning or extending from their pivots radially of the printing-center and being arranged between the pivots of the first set and the printing-center. Ample clearance for the types is thus secured, and liability of collision is avoided. It should be understood, however, that from certain aspects of my present invention and for certain purposes thereof it is immaterial whether or not the upper set of type-bars are employed. The lower set of bars may be employed alone in the machine and the number of types on each bar varied at will. The upper side portions of the segment to which the hangers 22 are fastened are stepped forwardly at 22^a, 22^b, and 22^c, so that the hangers 22 at these points may clear the platen and the usual carriage mechanism.

The type-bars are operated by a series of levers 24 of the second order, having keys 25 and extending rearwardly beneath the type-bars, said levers being fulcrumed upon a transverse bar 26 and provided with returning-springs 27. Each lever is provided with a strap 28, to which is pivotally connected at 29 the lower end of an upwardly-extending connecting-rod 30, whose upper end is attached to a bell-crank or lever, which in turn is connected to a type-bar, the connecting-rod 30 being of varying lengths, according to the elevations of the bell-cranks. It will be seen at Fig. 7 that the connecting-rods 30 which are associated with the long type-bars fan outwardly at their upper ends, while the other connecting-rods extend directly upward to their associated bell-cranks. It will also be seen at Fig. 1 that the connecting-rods for the long type-bars are arranged forwardly of

those for the short type-bars, the straps 28 being accordingly staggered or arranged in two transverse rows across the key-levers. Each of the bell-cranks or angle-levers to which the upper ends of the connecting-rods are attached is pivoted upon the same hanger as its associated type-bar, the bell-cranks connected to the long type-bars being designated as 31 and being pivoted upon the hangers 14 and 15, while those connected to the short type-bars are designated as 32, Fig. 6, and are pivoted upon the hangers 22. Each bell-crank for the long type-bars is connected by a radially-directed link 33 to a short arm 34, formed upon its type-bar, said links extending longitudinally of the hangers. The bell-cranks or angle-levers are of various shapes and sizes, according to their positions upon the segment, and each is provided with an outwardly-extending arm for attachment to the connecting-rod 30. The axes of all the bell-cranks associated with the long type-bars lie in horizontal planes and are hence parallel. The axes of the three central bell-cranks 31^a are parallel with their type-bar pivots, which in these instances swing in planes nearly parallel with the planes in which their key-levers 24 work. Their bell-cranks are disposed at various heights over the rear vertical face of the segment. Each of the bell-cranks 32 in the upper tier is connected by a link 35 to a sub-lever 36 of the first order, which is pivoted between the forks of the hanger 22 just below or outwardly from the type-bar pivot and is connected by a link 37 to the type-bar. One arm of the lever 36 extends rearwardly and the other forwardly from its pivot, and the general direction of said lever is obliquely downward and forward. The link 37 extends in a radial direction parallel with the type-bar 21 and is arranged forwardly of the hanger 22. The hanger 22 at the center of the system is unprovided with a bell-crank, its lever 36 being directly connected by a rod 30 to a key-lever strap 28, the type-bar in this instance vibrating in substantially the same vertical plane as its key-lever. The pivot of each bell-crank is designated as 38. Its point of attachment to the connecting-rod 30 is designated as 39 and its point of attachment to the type-bar link as 40. The point of attachment of the latter to the type-bar is 41. Referring particularly to Figs. 3 and 4, it will be seen that the length of the forward arm of the sub-lever 36 is greater than the distance between the pivot 42 of said lever and the pivot 43 of the type-bar 21, whereby the lever 36 in vibrating through an arc of only about ninety degrees is enabled to swing the type-bar through nearly half a circle, the lever 36 having full control of the type-bar throughout the stroke. The pivot 44, by which the link 37 is attached to the type-bar, lies normally at a point below the type-bar pivot 43 and swings to a point above said pivot, when the link

37 occupies a position at about right angles to the lever 36. Each of the long type-bars rests normally upon a felt or leather tip 45, provided upon a radially-arranged plunger 46, which is arranged in a hole or seat 47, bored radially in a curved bar or segment 48, the segment being supported by ears 49 and screws 50 upon lugs 51, formed upon the front edge of the top plate 3. The diameter of the upper portion of each hole 47 is reduced at 47^a to fit a reduced portion or neck 46^a of the plunger, thus forming a shoulder or stop 47^b for limiting the upward movement of the plunger. The plungers are retained in the holes by a curved band 52, which is held in a groove 52^a upon the bottom curved edge of the segment 48 by screws 53, said band terminating just below the ears 49 and a leather strip 52^b being placed between the band 52 and the bottom of the groove. The holes for the plungers at the sides of the basket do not extend through the segment 48, but are counterbored and tapped at 47^c to receive screws 54, which are centrally perforated to fit the reduced portions or necks 46^a of the plungers. Beneath each plunger is placed a coiled compression-spring 46^b, one end of which bears against the leather strip 52^b and the other end of which extends into a shallow hole bored in the lower end of the plunger, the spring having the least possible strength that will hold the plunger in its elevated position, or against the stop 47^b. When the returning type-bar strikes the plunger, the velocity of the former is instantly reduced and the plunger is driven downwardly, both the type-bar and the plunger hence moving on in the same direction. As the plunger is lighter than the type-bar, its speed is substantially equal to the original speed of the type-bar, and hence the plunger instantly leaves the type-bar, which, as above explained, is now moving at reduced speed. The plunger strikes the stop 52^b, from which it rebounds, assisted by the spring 46^b, and again strikes the type-bar. Thus the velocity of the type-bar is again reduced, the plunger again descends and again rebounds and strikes the type-bar, and in this manner the rebounding of the plunger is continued until the energy of the type-bar is exhausted, so that the latter is prevented from rebounding and colliding with other type-bar. In other words, the energy imparted to the plunger is at all times less than the opposing energy remaining in the type-bar; but the velocity of the plunger is at all times greater than the velocity of the type-bar, so that the plunger is caused to vibrate between the stop 52^b and the type-bar until no space remains in which it can vibrate, when both the type-bar and plunger will come to a state of rest, the bottom end of the plunger resting against the strip 52^b, from which position it is lifted or projected by the spring 46^b against the stop 47^b as soon as the type-bar is started

toward the platen. The short type-bars 21 rest upon similar non-resonant tips or plugs 45, Fig. 5, provided upon plungers or blocks 55, which fit loosely in perforations 56, through which pass the screws 23, that secure the hangers 22 to the rear face of the segment 5, each of said screws being provided with a collar 57, which fits in a notch 58, cut in the block 55, so as to prevent displacement of the letter from its perforation 56.

I do not claim to be the first inventor of a rest for the free end of a type-bar comprising a spring-supported cushion, nor the combination, with a series of type-bars, of a series of vibratory devices against which the type-bars strike upon returning to normal position and which are set in vibration by the type-bars and absorb energy therefrom; but what I do claim as of my invention with respect to the means for preventing the type-bars from rebounding will be found set forth in some of the appended claims.

Beneath the key-levers 24 extends a transverse universal bar 59, which is hung by hooks 60 upon the usual dog-rocker frame 61. The latter is provided with a returning-spring 62 and carries both a feeding-dog 63 and a detent-dog 64, said dogs being adapted to cooperate with an escapement-wheel 65, which is connected to a pinion 66, meshing with a rack 67, supported, as usual, upon the platen-carriage. (Not shown.)

I arrange over the type-bars an apron or shield comprising a horizontal supporting portion 68, which extends across the type-bar system and is cut away at 69 to afford a passage for the types, and also comprising a downwardly-extending portion 70, whose lower edge is curved concentrically with and overlaps the type-basket or forward segment 48. The portion 68 of the shield is provided with legs 71, having perforated feet 72, which rest upon bosses 73 upon the upper side of the top plate 3 and fit over studs 74, projecting upwardly from said bosses. Wing-nuts 75 are tapped upon the studs 74, so as to secure the feet 72, and hence the entire shield, in position.

Referring to Figs. 9 and 10, it will be seen that the pivots or trunnions 29 are formed upon the ends of a short cylindrical socket-piece 76, which fits between the upwardly-extending ears 28^a of the strap 28. The lower end of the connecting-rod 30 passes down through a central vertical perforation or socket 77, formed in said socket-piece, and is tapped into a cross-pivot 78, which extends horizontally therethrough at right angles to the axis thereof. The rod 30 is thus enabled to vibrate upon the trunnions 29 in a plane parallel with the key-lever and also upon the pivot 78 in a plane at right angles to the key-lever, said opening or socket 77 flaring sufficiently to enable a crosswise vibration of the connecting-rod. It will be

seen that these parts form a universal joint, thereby avoiding the liability of cramping due to the diverse pivotal movements of the key-levers and bell-cranks.

In operation when a key 25 associated with one of the lower type-bars is depressed the lever 24 is vibrated downwardly upon the fulcrum 26 and through the rod 30 pulls down the bell-crank 31 or 31^a, as the case may be, causing said bell-crank to vibrate and through the link 33 swing the type-bar up to print. At the same time the universal bar 59 is carried down and the dog-rocker frame is vibrated. When the key is released, the parts are returned to normal position by the springs 27 and 62, and the platen-carriage is advanced a step in the usual manner. When one of the keys 25 associated with the upper type-bars is depressed, the rod 30 vibrates the bell-crank 32, and the latter, through the link 35, swings, the lever 36, which by means of the driving-link 37 swings the type-bar up to print, and upon relief of the key from pressure the parts return to normal position, the carriage of course feeding a letter-space.

It will be observed that the short type-bars 21, which are pivoted to strike rearwardly against the platen, fan downwardly and outwardly from their pivots and lie radially of the printing-point, each of said type-bars being connected by a short thrust-link 37 to an arm 36, pivoted at 42 and connected to a key, so as to be operated thereby; that said links 37 are adapted to both travel and turn bodily about the type-bar axes during the swinging of the type-bars to the printing-point, as will be seen by comparison of Figs. 3 and 4; that said links are curved so as to clear the pivotal ends of the type-bar supports 22 when the type-bars are at the printing-point; that the direction of each of said short links at the printing moment is crosswise to its normal direction; that during the printing strokes the free ends of the key-operated arms 36 move constantly nearer to the type-bar pivots; that the type-bars 21 swing through considerably more than ninety degrees from normal position to the printing-point; that the links 37 are pivoted to said type-bars below the pivots of the latter; that the distance between each type-bar pivot and the point of attachment of its link to the pivoted arm 36 is normally greater than the length of the link, but at the printing moment less than the length of the link, the purpose of providing this relative arrangement and movement of the arm 36 being to enable the same to swing the type-bar through considerably more than a quarter of a circle, and also that the arms 36, which vibrate through less than ninety degrees, are directly connected to the type-bars by the short links in such a manner as to enable said arms to drive the type-bars through about one hundred and eighty degrees more or less.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a front-strike writing-machine, the combination with a platen, of a segment, a series of radial hangers secured upon the rear face thereof, a series of rearwardly-striking type-bars mounted upon said hangers and extending forwardly therefrom and through openings in said segment, a series of key-levers extending rearwardly beneath said segment, and connections extending downwardly from said type-bars and in rear of said segment to said key-levers.

2. In a front-strike writing-machine, the combination with a platen, of a segment having a vertical rear face, two tiers of hangers arranged at the lower portion of said vertical face, the hangers of one tier lying close against said vertical face, and the hangers in the other tier having thickened body portions and overlapping the other hangers, rearwardly-striking type-bars pivoted upon all of said hangers and extending forwardly therefrom, a series of key-levers extending rearwardly beneath said segment, and connections from said type-bars to said key-levers.

3. In a front-strike writing-machine, the combination with a platen, of a segment having a vertical rear face, two tiers of hangers arranged at the lower portion of said vertical face, the hangers of one tier lying close against said vertical face, and the hangers in the other tier lying in rear of and overlapping the other hangers, rearwardly-striking type-bars pivoted upon all of said hangers and extending forwardly therefrom, a series of key-levers extending rearwardly beneath said segment, and connections from said type-bars to said key-levers, the pivotal points upon the overlapping hangers being more remote from the common printing-center than the pivotal points upon the forward hangers.

4. In a front-strike writing-machine, the combination with a platen, of a segment, a series of hangers secured upon the rear face of said segment, a series of rearwardly-striking type-bars extending forwardly from said hangers through perforations in said segment, a series of key-levers, and connections from said key-levers to said type-bars.

5. In a front-strike writing-machine, the combination with a platen, of a segment having a rear vertical face, a series of radial hangers lying close to said vertical face, a series of overlapping radial hangers in rear of the first-mentioned hangers, the pivots of said overlapping hangers being in substantially the same vertical plane as the printing-point upon the platen, and said segment being formed at its upper portions with vertical faces or steps 5" forwardly of said rear vertical face, hangers secured upon said face 5" and having their pivots forwardly of the general plane of the other hanger-pivots, a series of rearwardly-striking type-bars pivoted at their rear ends

upon said hangers, a series of key-levers extending rearwardly beneath said segment, and connections from said key-levers to said type-bars.

6. In a front-strike writing-machine, the combination with a platen, of a series of rearwardly-striking long type-bars extending forwardly from their pivots, and a series of rearwardly-striking short type-bars pivoted above the pivots of the long type-bars, said short type-bars diverging downwardly and outwardly from their pivots and in directions transverse to those of the long type-bars.

7. In a front-strike writing-machine, the combination with a platen, of a series of rearwardly-striking long type-bars extending forwardly from their pivots, and a series of rearwardly-striking short type-bars pivoted above or inwardly from the pivots of the long type-bars, said short type-bars diverging downwardly or outwardly from their pivots, and the paths of the types upon the short type-bars being of substantially the same length as the paths of the types upon the long type-bars.

8. In a front-strike writing-machine, the combination with a platen, of a series of rearwardly-striking long type-bars, and a series of rearwardly-striking short type-bars arranged between the long type-bars and the platen and so arranged that they lie behind the long type-bars when the latter are in printing position.

9. In a front-strike writing-machine, the combination with a platen, of a series of long rearwardly-striking pivoted type-bars, and a series of short rearwardly-striking pivoted type-bars arranged wholly between the pivotal ends of the long type-bars and the platen, whereby the long type-bars may move to the printing position without passing between the short type-bars.

10. In a front-strike writing-machine, the combination with a platen, of a series of long rearwardly-striking pivoted type-bars, and a series of short rearwardly-striking pivoted type-bars arranged between the pivotal ends of the long type-bars and the platen, said long type-bars having elbows at their pivotal ends so as to enable them when in printing position to clear the types upon the short type-bars.

11. In a front-strike writing-machine, the combination with a platen, of a series of rearwardly-striking long type-bars, and a series of rearwardly-striking short type-bars extending crosswise of the long type-bars when in normal position, the long type-bars when in printing position extending longitudinally of the short type-bars, considered in their normal position.

12. In a front-strike writing-machine, the combination with a platen, of a series of rearwardly-striking pivoted long type-bars and a series of rearwardly-striking pivoted short type-bars arranged wholly between the platen

and the pivotal portions of the long type-bars, the number of the long type-bars being in excess of the number of the short type-bars, whereby the long type-bars may move to the printing position without passing between the short type-bars.

13. In a front-strike writing-machine, the combination with a platen, of a segment, a series of long rearwardly-striking type-bars mounted thereon, and a series of short rearwardly-striking type-bars also mounted upon said segment and arranged between the pivotal ends of the long type-bars and the platen, and so that the long type-bars may move to the printing position without passing between the short bars.

14. In a front-strike writing-machine, the combination with a platen, of a segment, a series of hangers mounted along the lower portion thereof, a series of long rearwardly-striking type-bars extending forwardly from said hangers, a series of hangers arranged along the upper portion of said segment, and a series of short rearwardly-striking type-bars mounted upon the last-mentioned hangers and extending downwardly and outwardly therefrom, and so that the long type-bars may move to the printing position without passing between the short bars.

15. In a front-strike writing-machine, the combination with a platen, of a segmental frame, a series of hangers fixed upon the lower portion of the rear side or face thereof, a series of long type-bars pivoted upon said hangers and extending forwardly therefrom, a series of hangers mounted upon the upper portion of the rear side or face of said segmental frame, and a series of short type-bars mounted upon the last-mentioned hangers and extending downwardly or outwardly in front of said segmental frame.

16. In a front-strike writing-machine, the combination with a platen, of a segmental frame, a series of hangers fixed upon the lower portion of the rear side or face thereof, a series of long type-bars pivoted upon said hangers and extending forwardly therefrom, a series of hangers mounted upon the upper portion of the rear side or face of said segmental frame, a series of short type-bars mounted upon the last-mentioned hangers and extending downwardly or outwardly in front of said segmental frame, a series of key-levers extending rearwardly beneath said segmental frame, and a series of intermediate bell-cranks connected to the key-levers and to the type-bars.

17. In a front-strike type-writing machine, the combination with a platen, of a single vertically-disposed segment, two series of rearwardly-striking type-bars pivotally mounted upon said segment and the pivotal centers of some of the type-bars of one series being in substantially the same plane as the pivotal centers of some of the type-bars of the other

series, two series of bell-cranks, one series being disposed at a different elevation from the other over the same vertical face of said segment and connected to the type-bars, a series of key-bearing levers extending rearwardly beneath said segment, and a series of connecting-rods of various lengths extending from said key-levers to said bell-cranks.

18. In a front-strike writing-machine, the combination with a platen, of two sets of rearwardly-striking type-bars, one set arranged above and inwardly of the other set, and the pivotal centers of some of the type-bars of one set being in substantially the same plane as the pivotal centers of some of the type-bars of the other set, a series of key-levers extending rearwardly beneath the type-bars, connections from the lower set of type-bars to some of the key-levers, said connections including rods 30 attached to the key-levers, and connections from the upper set of type-bars to the other key-levers, the last-mentioned connections including rods 30 which are arranged in rear of the first-mentioned rods 30 and fan outwardly.

19. In a front-strike writing-machine, the combination with a platen, of a single vertically-disposed segment, two sets of type-bars pivotally supported upon rear face of said segment, one set being arranged above or inwardly from the other set, bell-cranks disposed at different heights over a vertical face and to the rear of said segment, one set of bell-cranks being connected to each set of type-bars, key-levers extending rearwardly beneath said segment, rods 30 connecting the lower set of bell-cranks with some of the key-levers, and rods 30 arranged in rear of the first-mentioned rods and connecting the upper set of bell-cranks to other key-levers.

20. In a front-strike writing-machine, the combination with a platen, of a segment, radial hangers mounted thereon, rearwardly-striking type-bars pivoted in said hangers, bell-cranks mounted upon said hangers, links connecting said bell-cranks to the type-bars, the axes of the bell-cranks being arranged transversely to the axes of the type-bars, a series of key-levers, and connections from said key-levers to said bell-cranks.

21. In a front-strike type-writing machine, the combination with a platen, of a vertically-disposed segment, a series of separately-removable hangers mounted thereon, rearwardly-striking type-bars pivoted upon said hangers, bell-cranks also pivoted upon said hangers, the pivotal centers of each bell-crank extending transversely of the pivotal center of its associated type-bar and each bell-crank being connected by a link to the associated type-bar, whereby a type-bar, bell-crank and link are supported by each hanger and may be mounted in place and removed therewith, and a series of key-levers connected to said bell-cranks.

22. In a type-writing machine, the combination with a platen, of a series of pivoted type-bars, an independently-removable hanger for each bar, a lever pivoted upon each hanger, and links connecting said levers to said type-bars, whereby each hanger may be independently mounted in place and removed together with its type-bar and link.

23. In a type-writing machine, the combination with a platen, of a pivoted type-bar, a hanger therefor, a lever pivoted upon said hanger, and a link connecting said lever to said type-bar, the length of the lever from its pivot to the point of attachment of said link being greater than the distance between the pivot of the lever, and the pivot of the type-bar.

24. In a type-writing machine, the combination with a platen, of a pivoted type-bar, a hanger therefor, a lever pivoted upon said hanger, and a link connecting said lever to said type-bar, the length of the lever from its pivot to the point of attachment of said link being greater than the distance between the pivot of the lever and the pivot of the type-bar, said lever vibrating through about one-quarter of a circle and said type-bar vibrating through about one-half of a circle.

25. In a front-strike writing-machine, the combination with a platen and a top plate, of a system of rearwardly-striking type-bars, a shield having a horizontal supporting portion 68 extending across the type-bar system and cut away at 69 to afford a passage for the types, said shield also comprising a downwardly-extending portion 70, legs 71, perforated feet 72 thereon, bosses 73 upon the top plate, studs 74, and nuts 75 tapped upon the studs 74.

26. In a type-writing machine, the combination with a type-bar and a lever, of a socket-piece 76 pivotally attached to said lever, a pivotal cross-piece 78 mounted in said piece 76 and having an axis at right angles thereto, and a connecting-rod 30 tapped into the cross-pivot 78.

27. In a type-writing machine, the combination with a type-bar and a key-lever, of a strap 28 upon said lever, a socket-piece 76 having trunnions 29 pivoted in said strap, a cross-pivot piece 78, arranged in a perforation in the socket-piece 76, and a connecting-rod 30 tapped into the cross-pivot 78.

28. In a front-strike type-writing machine, the combination with a platen of a vertically-disposed segment, a series of rearwardly-striking long type-bars mounted upon said segment, a series of short type-bars mounted upon said segment, the series of long and short bars being mounted at different distances from the printing-center and the numbers of long bars being in excess of the number of short bars, a series of links radiating from said type-bars, a series of bell-cranks to which said

links are attached, and a series of substantially parallel key-levers connected to said bell-cranks.

29. In a type-writing machine, the combination with a type-bar, of a plunger against which said type-bar strikes upon its return to normal position, said plunger being movable by the type-bar and having a spring whereby it is projected during the next printing stroke of the type-bar.

30. In a type-writing machine, the combination with a series of type-bars, of a bar, a series of perforations or seats therein, a series of plungers or blocks arranged in said perforations or seats and each having a non-resonant tip, and a spring, said spring yielding when the type-bar strikes the plunger or block, and also serving to project the plunger or block during the next printing stroke of the type-bar.

31. In a type-writing machine, the combination with a series of type-bars, of a curved bar, as 48, having a series of radial perforations, a series of plungers in said perforations, each provided with both a non-resonant tip and a spring, and a band, as 52, for retaining the plungers.

32. In a type-writing machine, the combination with a series of type-bars, of a curved bar having a series of radial perforations, a series of plungers in said perforations, each provided with both a non-resonant tip and a spring, a band, as 52, for retaining the plungers, and a non-resonant strip, as 52^b, arranged between said band and the plungers.

33. In a type-writing machine, the combination with a series of type-bars, of a bar having a series of perforations, a plunger placed in each perforation and having a reduced portion or neck, the perforation being correspondingly reduced so as to form a shoulder for limiting the movement of the plunger, a spring for pressing said plunger toward said shoulder, and a stop for limiting the movement of the plunger in the opposite direction.

34. In a type-writing machine, the combination with a type-bar, of a device lighter than the type-bar and against which the type-bar strikes upon returning to normal position, and a stop for limiting the movement of said device when the latter is put in motion by the type-bar, said device being mounted to have free play between said stop and said type-bar, so that it may rebound from said stop and strike the type-bar, thereby reducing the speed of the latter.

35. In a type-writing machine, the combination with a type-bar, of a device lighter than the type-bar and against which the type-bar strikes upon returning to normal position, a stop for limiting the movement of said device when the latter is put in motion by the type-bar, said device being mounted to have free play between said stop and said type-bar,

so that it may rebound from said stop and strike the type-bar, thereby reducing the speed of the latter, and a spring for projecting said device during the next printing stroke of the type-bar.

36. In a front-strike writing-machine, the combination with a platen, of a series of type-bars pivoted to strike rearwardly against the platen and fanning downwardly and outwardly from their pivots and lying radially of the printing-point, links connected each at one end to a type-bar, and a series of key-operated pivoted arms to which the other ends of said links are connected.

37. In a front-strike writing-machine, the combination with a platen, of a series of type-bars pivoted to strike rearwardly against the platen and fanning downwardly and outwardly from their pivots and lying radially of the printing-point, a series of key-operated pivoted arms, and a series of short links directly connecting said type-bars to said pivoted arms, said short links traveling and turning bodily about the type-bar axes during the swinging of the type-bars to the printing-point.

38. In a front-strike writing-machine, the combination with a platen, of a series of rearwardly-striking type-bars fanning downwardly and outwardly from their pivots and lying radially of the printing-point, pivotal supports for said type-bars, a series of key-operated pivoted arms, and a series of short links directly connecting said type-bars to said pivoted arms, said short links traveling and turning bodily about the type-bar axes during the swinging of the type-bars to the printing-point, and being curved so as to clear said type-bar supports when the types are at the printing-point.

39. In a front-strike writing-machine, the combination with a platen, of a series of type-bars pivoted to strike rearwardly against the platen and fanning downwardly and outwardly from their pivots and lying radially of the printing-point, a series of key-operated pivoted arms, and a series of short links directly connecting said type-bars to said pivoted arms, said short links traveling bodily about the type-bar axes during the swinging of the type-bars to the printing-point, the direction of each link at the printing moment being crosswise to its normal direction.

40. In a front-strike writing-machine, the combination with a platen, of a series of type-bars pivoted to strike rearwardly against the platen and fanning downwardly and outwardly from their pivots and lying radially of the printing-point, a series of key-operated pivoted arms, and a series of thrust-links directly connecting said type-bars to said pivoted arms, said thrust-links traveling bodily about the type-bar axes during the swinging of the type-bars to the printing-point, the free ends of said key-operated arms moving constantly nearer to the type-bar pivots during the print-

ing strokes, and the direction of each link at the printing moment being crosswise to its normal direction.

41. In a front-strike writing-machine, the combination with a platen, of a series of short type-bars pivoted to strike rearwardly against the platen and fanning outwardly and downwardly from their pivots and lying radially to the printing-point so as to swing through more than ninety degrees from normal position to the printing-point, and means for actuating said type-bars.

42. In a front-strike writing-machine, the combination with a platen, of a series of short type-bars pivoted to strike rearwardly against the platen and fanning outwardly and downwardly from their pivots and lying radially of their printing-point so as to swing through more than ninety degrees from normal position to the printing-point, thrust-links pivoted to said type-bars below their pivots, and key-operated pivoted arms to which said thrust-links are pivoted.

43. In a front-strike writing-machine, the combination with a platen, of a series of short type-bars pivoted to strike rearwardly against the platen and fanning outwardly and downwardly from their pivots and lying radially of the printing-point and swinging through more than ninety degrees from normal position to the printing-point, thrust-links pivoted to said type-bars below their pivots, and key-operated pivoted arms to which said thrust-links are pivoted, the distance between each type-bar pivot and the point of attachment of its link to said pivoted arm being at the printing moment less than the length of the link.

44. In a type-writing machine, the combination with a platen and a type-bar, of a pivoted key-operated lever directly connected to said type-bar by means of a link, the distance between the type-bar pivot and the point of attachment of said link to said lever being normally greater than the length of the link, but at the printing moment less than the length of the link.

45. In a front-strike writing-machine, the combination with a platen, of a series of short type-bars pivoted to strike rearwardly against the platen and normally fanning downwardly and outwardly from their pivots, and lying radially of the printing-point, a series of key-operated pivoted arms, each adapted to vibrate through less than ninety degrees, and a series of short links directly connecting said type-bars to said arms in such a manner as to enable said arms to drive the type-bars through about one hundred and eighty degrees.

46. In a type-writing machine, the combination of two series of type-bars, the type-bars of one series extending transversely of the type-bars of the other series, and means for actuating said type-bars.

47. In a type-writing machine, the combination of a series of radially-arranged type-bars, a series of segmentally-arranged type-bars, and means for actuating said type-bars.

5 48. In a front-strike type-writing machine, the combination of a platen, a series of type-bars which radiate from the printing-center, a second series of segmentally-arranged type-bars that extend fore and aft of the machine, 10 and key-actuated means for operating said type-bars.

49. In a type-writing machine, the combination of two series of type-bars, the type-bars of one series extending transversely of 15 the type-bars of the other series, and all of the type-bars of each series being adapted to strike a common printing-center without passing between type-bars of the other series, and means for actuating said type-bars.

20 50. In a type-writing machine, the combination of a platen, a series of radially-arranged type-bars, a series of segmentally-arranged type-bars, the type-bars of one series being of different lengths from those of the 25 other series, all of the type-bars of each series being adapted to strike a common printing-center without passing between the type-bars of the other series, and means for actuating said type-bars.

30 51. In a front-strike type-writing machine, the combination of a platen, a series of type-bars which radiate from the printing-center, a second series of segmentally-arranged type-bars that extend fore and aft of the machine, 35 radiating links for all of said type-bars, and key-actuated means connected to said links for actuating the type-bars.

52. In a front-strike type-writing machine, the combination of a platen and a series of 40 segmentally-arranged type-bars which when at rest radiate downwardly and outwardly from their pivotal portions and from the printing-center.

53. In a type-writing machine, type-levers 45 supported normally in substantially vertical position, having their point of impression substantially over their pivots, and means for causing said levers to move through substantially a semicircle from the point of rest to 50 the point of impression.

54. In a type-writing machine, the combination of a platen or impression member, a series of pendent type-levers arranged below the level of said platen and means for imparting to said type-levers motion through substantially a semicircle in bringing them to the 55 impression-point.

55. In a front-strike type-writer, a series of type-levers approximately vertical at the normal position at rest and at the position of 60 impression and means for causing the same to move through substantially a semicircle when causing an impression and when returning to the normal position of rest.

56. In a front-strike type-writing machine,

the combination of an impression-platen, a series of pendent type-levers pivoted below the level of said platen, a series of bars or links connected to said type-levers so as to make of the latter levers of the third class, and key- 70 levers connected to said links so arranged that the type-levers are caused to move through substantially a semicircle from the point of rest to the point of impression.

57. In a front-strike type-writing machine, 75 the combination of an impression-platen, a series of type-levers approximately vertical at the normal position of rest and arranged to strike on the front of the platen, and means for causing said type-levers to swing through sub- 80 stantially a semicircle.

58. In a front-strike type-writing machine, the combination of an impression-platen, a series of pendent type-levers arranged to strike on the front of said platen, a series of 85 thrust bars or links connected to said type-levers, and means for operating said thrust bars or links so as to cause the said type-levers to swing through substantially a semicircle.

59. In a type-writing machine, the combination of a series of segmentally-arranged pivoted type-bars, the type-bar pivots at the ends of the segment being longer than those at the middle of the segment, and means for actuating said type-bars. 95

60. In a type-writing machine, the combination of a series of segmentally-arranged pivoted type-bars, the pivotal bearings of which increase in length from the center to the sides of said series of type-bars, and means for actuating said type-bars. 100

61. In a type-writing machine, the combination of a series of segmentally and radially arranged pivoted type-bars, the pivots of which gradually increase in length from the center 105 to the sides of said series of type-bars, and means for actuating said type-bars.

62. In a front-strike type-writing machine, the combination of a series of segmentally and radially arranged upwardly and rear- 110 wardly striking pivoted type-bars having pivotal bearings that increase in length from the center to the sides of the series of type-bars, and key-actuated means for operating said type-bars. 115

63. In a type-writing machine, the combination of a series of segmentally-arranged type-bar hangers, a series of type-bars pivoted to said hangers, the pivotal bearings of the type-bars increasing in length from the center 120 to the sides of the series of bars, and means for actuating said type-bars.

64. In a type-writing machine, the combination of a series of segmentally-arranged staggered type-bar hangers, a series of type- 125 bars pivoted to said hangers, the pivots of the type-bars increasing in length from the center to the sides of the series of bars, and key-actuated means for actuating said type-bars.

65. In a front-strike type-writing machine, 130

the combination of a series of segmentally-arranged staggered and overlapping hangers, a series of upwardly and rearwardly striking type-bars pivoted to said hangers and the pivots thereof being greater in length at the sides of the system than they are at the center, and key-actuated means for operating said type-bars.

66. In a type-writing machine, the combination of two sets of segmentally-arranged staggered and overlapping type-bar hangers, the hangers of one set being arranged at their pivot-bearing portions forward of the other set, radially and segmentally arranged upwardly and rearwardly striking type-bars pivoted to said hangers, the pivotal bearings of the type-bars extending at greater distances from the bodies of the bars as the sides of the system are approached, and means for actuating said type-bars.

67. In a type-writing machine, the combination of a series of segmentally-arranged forked type-bar hangers, the distances between the forked arms of the individual hangers being greater at the sides of the segmental series of hangers than at the center, type-bars pivoted to the forked arms of the hangers, and means for actuating said type-bars.

68. In a type-writing machine, the combination of a series of segmentally-arranged pivoted type-bars, the bearings for the pivotal portions of the individual bars being more widely separated at the sides of the segmental series than at the center, so as to resist the greater tendency of the side bars to move laterally on their pivotal bearings, and means for actuating said type-bars.

69. In a front-strike type-writing machine, the combination of a series of segmentally-arranged overlapping and staggered forked

type-bar hangers, the distances between the forked arms of the individual hangers being greater at the sides of the segmental series of hangers than at the center, type-bars pivoted between the forked arms of the hangers, and means for actuating said type-bars.

70. In a front-strike type-writing machine, the combination of a segment, a series of segmentally-arranged overlapping and staggered forked type-bar hangers mounted on one side of the segment, the distances between the forked arms of the individual hangers being greater at the sides of the segmental series of hangers than at the center, type-bars pivoted between the forked arms of the hangers, and key-actuated means for actuating said type-bars.

71. In a type-writing machine, the combination of a series of segmentally-arranged pivoted type-bars, the bearings of each type-bar at the ends of the segment being farther apart than are the bearings of a type-bar at the middle of the segment, and means for actuating said type-bars.

72. In a type-writing machine, the combination of a series of segmentally-arranged forked type-bar hangers, the forks of each hanger at the sides of the series being farther apart than are the forks of a hanger at the middle of the series, type-bars pivoted to said hangers on pivots corresponding in length to the spaces of the hangers respectively, and means for actuating said type-bars.

Signed at Ilion, in the county of Herkimer and State of New York, this 11th day of May, A. D. 1901.

LOUIS P. DISS.

Witnesses:

WM. A. SCHMIDT,
RALPH W. GOUGH.