No. 815,339. PATENTED MAR. 20, 1906.

J. FELBEL.

TYPE WRITING MACHINE.

APPLICATION FILED FEB. 11, 1903.

5 SHEETS—SHEET 1.

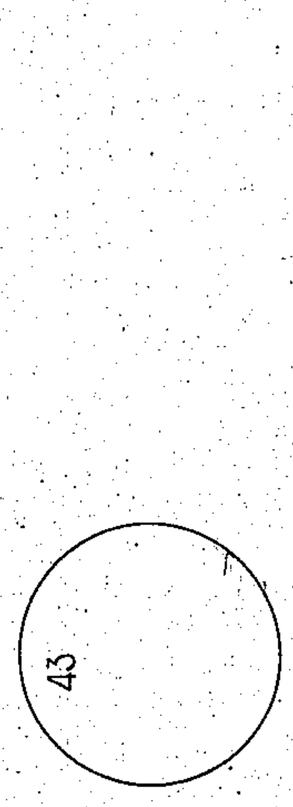
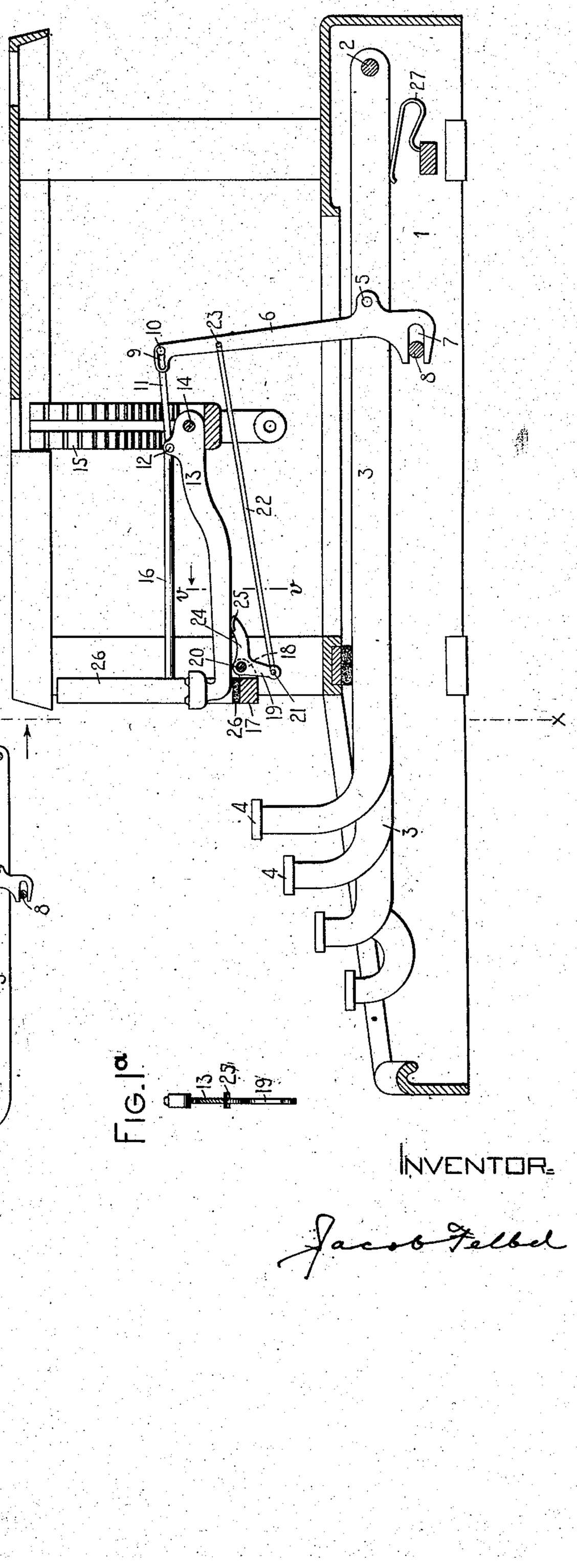


FIG. 1.



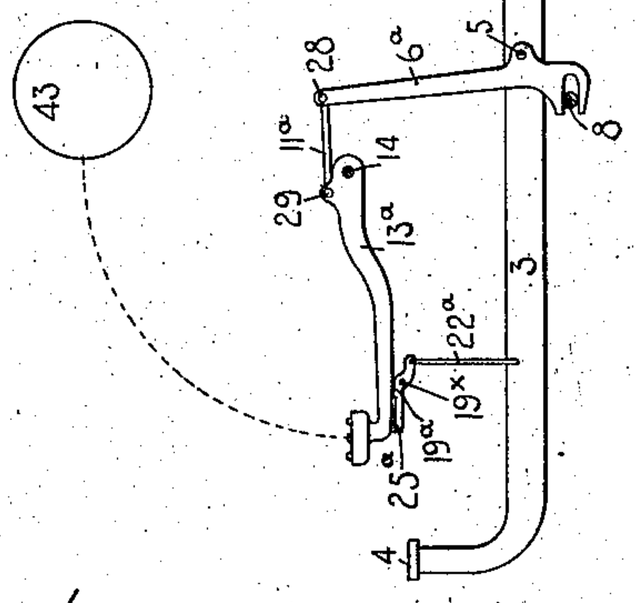


FIG. 4.

FIG. 1a

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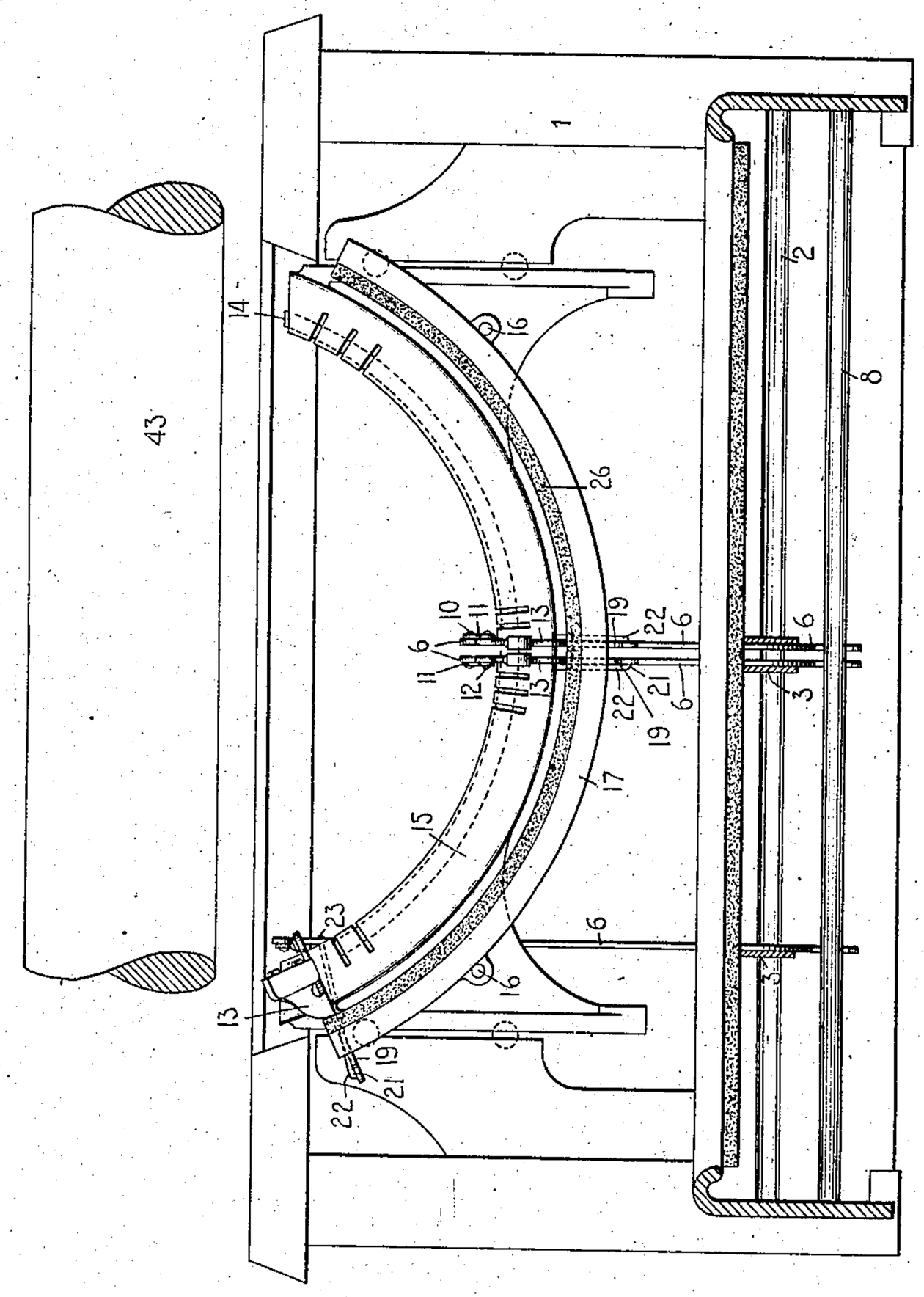
5 SHEETS—SHEET 2.

FIG. 2.



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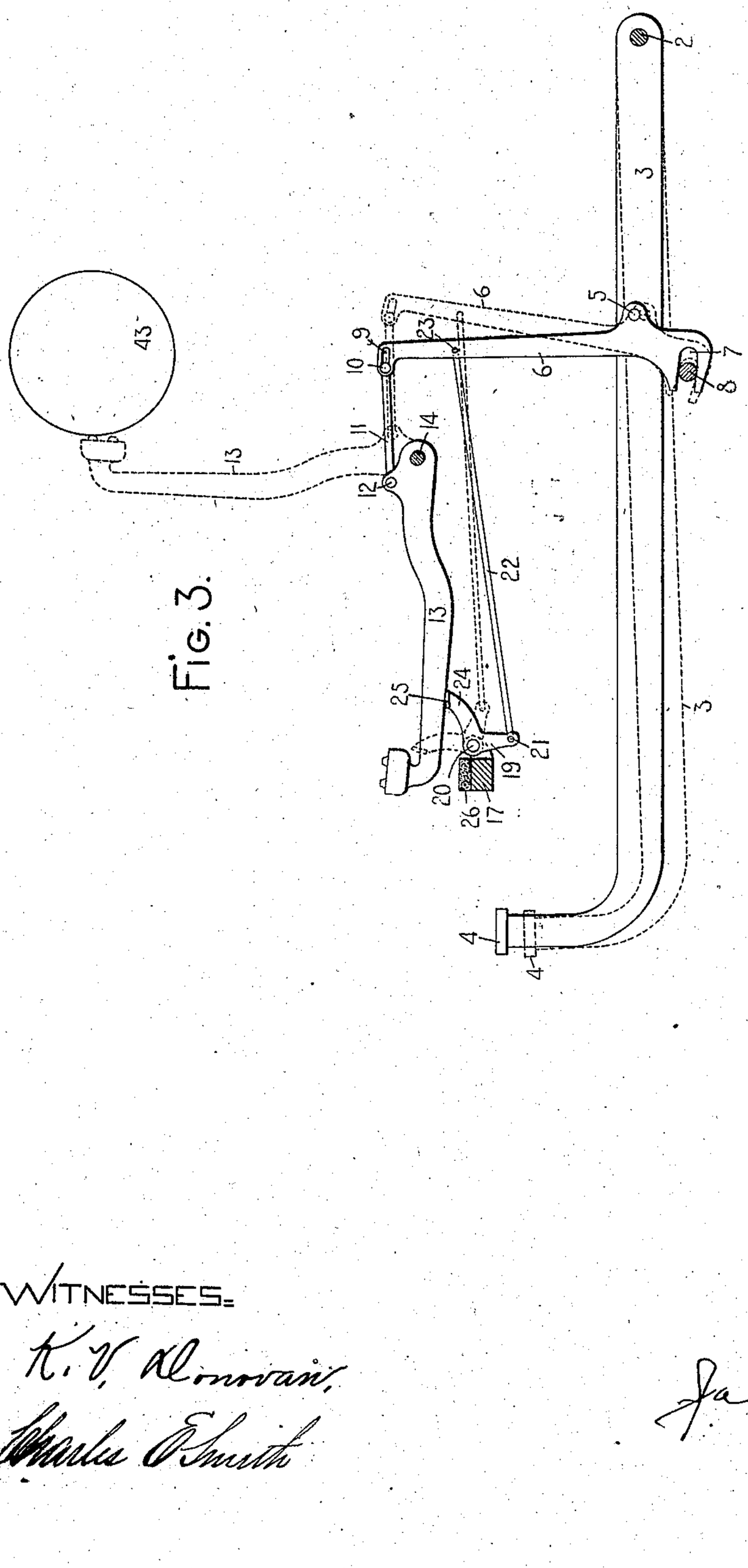
5 SHEETS—SHEET 3.

Fig. 3.



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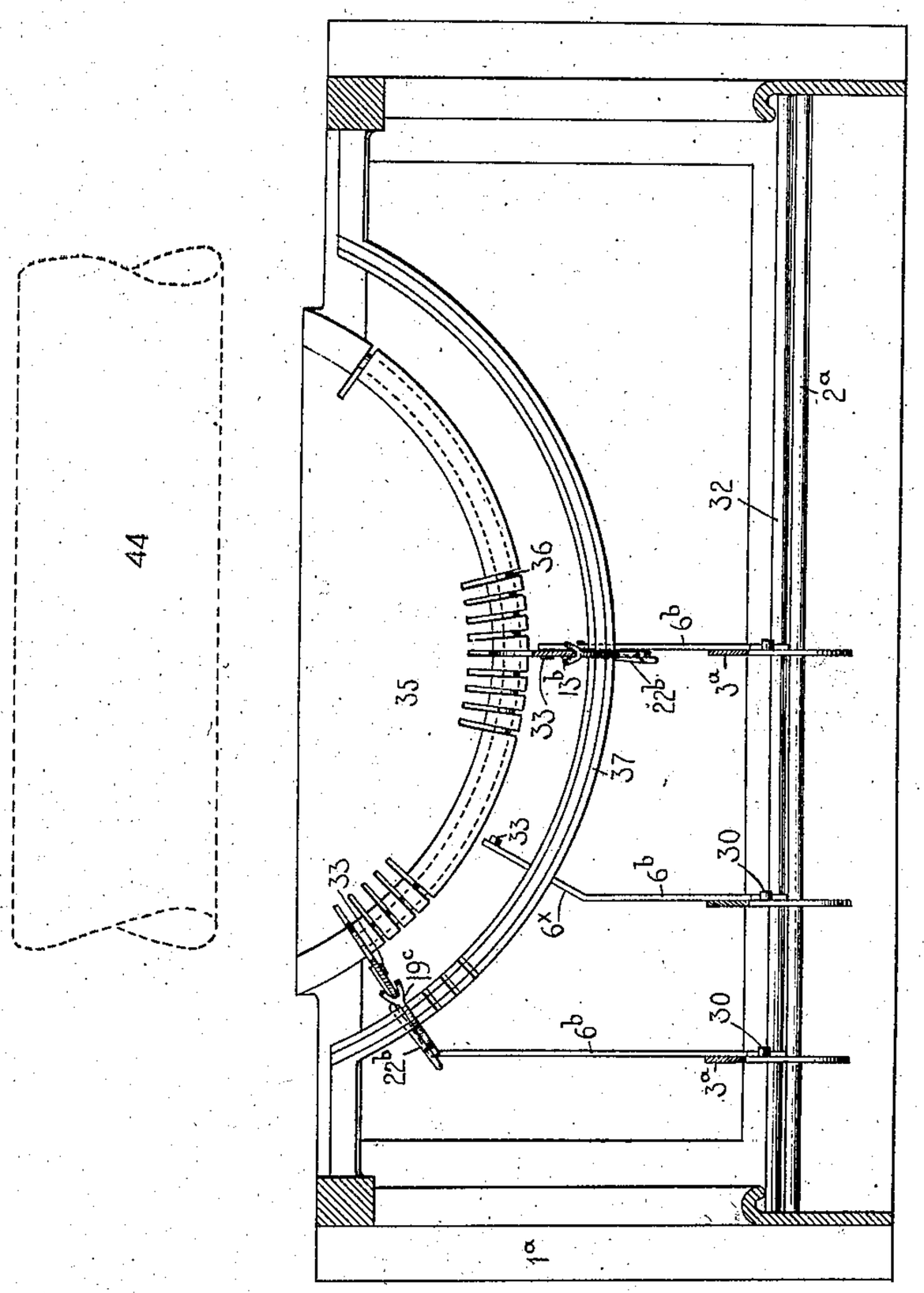
5 SHEETS—SHEET 4.

FIG. 5.



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5 SHEETS—SHEET 5.

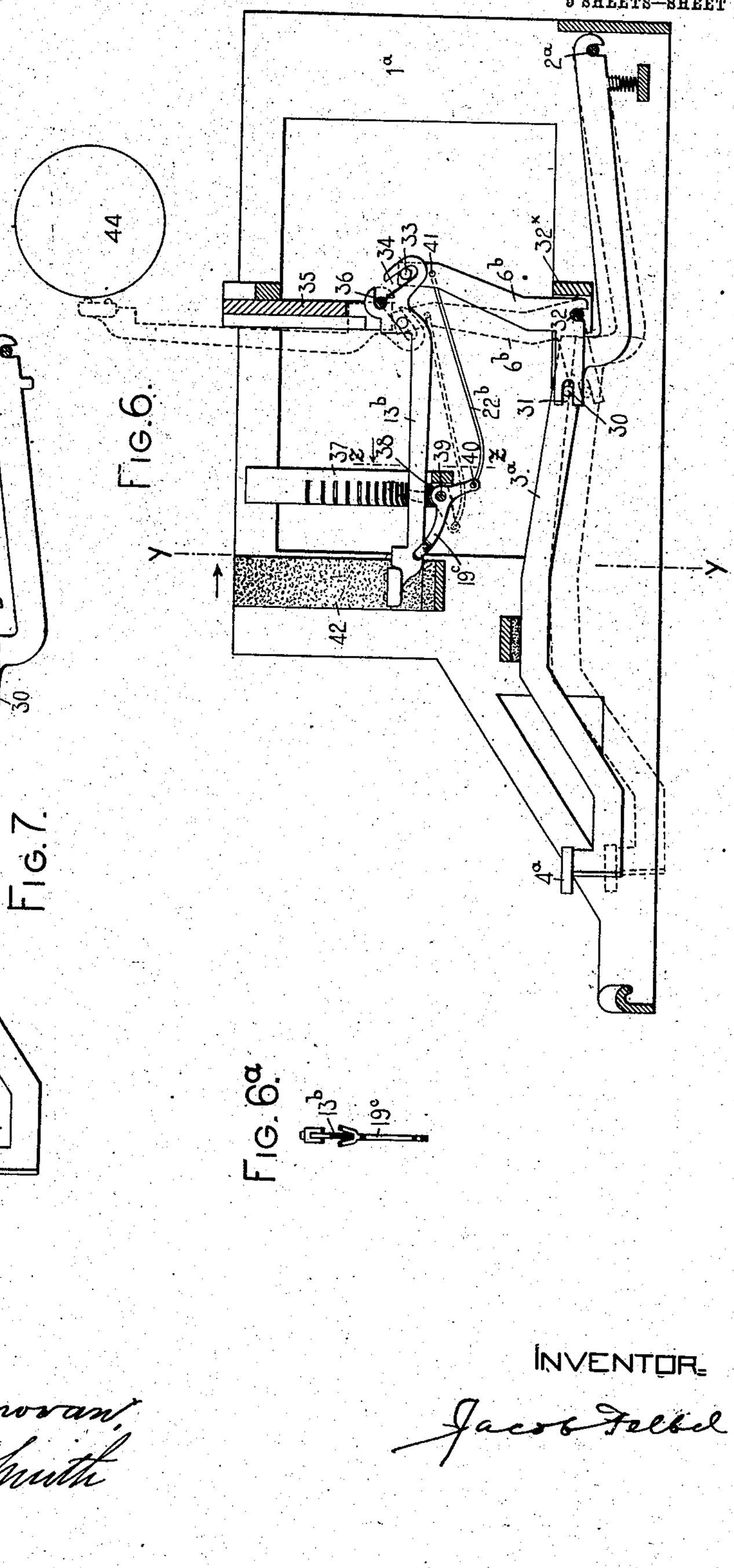

FIG. 6.

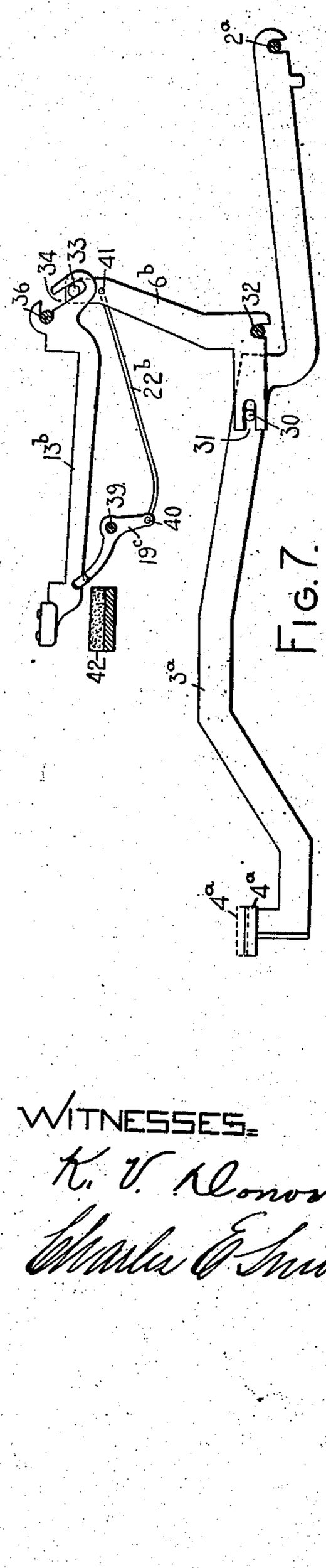

FIG. 7.

FIG. 6a.

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UNITED STATES PATENT OFFICE.

JACOB FELBEL, OF NEW YORK, N. Y., ASSIGNOR TO UNION TYPEWRITER COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TYPE-WRITING MACHINE.

No. 815,339. Specification of Letters Patent. Patented March 20, 1906.

Application filed February 11, 1903. Serial No. 142,930.

To all whom it may concern:

Be it known that I, JACOB FELBEL, a citizen of the United States, and a resident of the borough of Manhattan, city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My invention relates to improvements in the type-actions of type-writing machines, especially those known as "front-strike visible-writing" machines, the object of the invention being first to render the key-action especially easy, and, furthermore, to prevent or limit the rebound of the type-bars on their return to their normal positions.

The invention consists in the various features of construction and combinations and arrangements of parts, all as will be hereinafter fully described, and particularly pointed out in the appended claims.

In the accompanying drawings, wherein like reference-numerals designate like parts in the different views, Figure 1 is a central front-to-rear vertical sectional view of certain parts of a type-writing machine to which my invention is applied; Fig. 1ª, an enlarged sectional detail on the plane *v v*, Fig. 1, of a type-bar and part of its actuating mechanism viewed in the direction indicated by an arrow at the right of the section-plane; Fig. 2, a transverse sectional view of the mechanism shown in Fig. 1 viewed in the direction indicated by the arrow near the top of said figure, the section being on the plane *x x;* Fig. 3, a detail skeleton view, in side elevation, of the type-action and platen; Fig. 4, a like view of the same, showing a modified form of construction embodying my invention; Fig. 5, a transverse sectional view on the plane *y y*, Fig. 6, of certain parts of another form of type-writing machines with my invention applied thereto; Fig. 6, a central vertical front-to-rear sectional view of the same; Fig. 6ª, an enlarged sectional detail on the plane *z z*, Fig. 6, of the type-bar and a notched bell-crank to act thereon viewed in the direction indicated by an arrow at the right of the section-plane; Fig. 7, a detail skeleton view, in side elevation, of the type-action shown in Fig. 6.

In certain front-strike machines the type-bars are commonly actuated by means connected to very short arms formed on the type-bars near their pivoted ends, this being the only actuating means with which they are provided. In such structures the weight of a type-bar acts at a long leverage against the force applied to the short arm at the beginning of the stroke of a key, so that to overcome the dead-weight of the bar and start the bar toward the platen a harder blow must be struck on the key than is required to start a type-bar of an ordinary "under-strike" machine. The mechanism herein described and claimed is designed to remedy this objection and to otherwise improve the action of the type-bars.

The frame 1 of the machine supports a pivot-rod 2, upon which key-levers 3 are mounted, the key-levers being provided with the usual finger-keys 4. Each key-lever has pivoted thereto at 5 a sublever 6, which is slotted at 7 near its lower end and engages with a fixed fulcrum-rod 8, supported by the frame of the machine. The upper end of each sublever may have a slot 9 therein, through which extends a pin 10, carried by a link 11, the opposite end of which is pivoted at 12 to a type-bar 13 near the heel or pivot thereof. The various type-bars are segmentally arranged and turn on a pivot-wire 14, that is secured in the type-bar segment 15. Projecting forward from the segment 15 are arms 16, which support a segmental carrier or support 17, with ears or hangers 18 extending from the rear face thereof. Auxiliary actuating devices or bell-cranks 19 are pivoted at 20 to the hangers, and one arm of each bell-crank is pivotally connected at 21 to a link 22, that is pivotally connected at its opposite end 23 to the associated sublever 6. It will be understood that one of these actuating devices or bell-cranks 19 is provided for each type-bar and is connected to the sublever 6 of the type-bar with which it is associated. The arm 24 of each bell-crank may have a laterally-projecting shoe 25 at the end thereof which is broad enough to render the type-bar sure to strike against and rest upon it and is rounded on its upper face, where it is shown in contact with the under side of the type-bar near the outer end thereof. If desired, the upper side of the segmental support 17 may be sheathed with a pad 26, against which the outer ends of the type-bars may rest when they are in their normal positions, or this pad may be dispensed with and the bars be entirely supported at their outer ends by the bell-cranks 19.

The type-bars may normally rest on the

bell-cranks instead of on the pad, as appears by Fig. 1, the pad being, as here shown, close to but not in contact with the type-bars.

From the foregoing description it will be understood that when a key-lever is depressed against the pressure of its restoring-spring 27 the movement of the key-lever causes the upper end of the associated sublever 6 to move toward the rear of the machine, and the lost motion in the connection formed between the sublever and type-bar by the slot 9 and pin 10 allows the sublever to move a certain distance without transmitting motion to the type-bar through the link 11. While the sublever so moves, however, the link 22 is drawn toward the rear of the machine, and the bell-crank 19 is turned on its pivot and alone imparts motion to the type-bar. The free end of the type-bar is thus raised by the bell-crank until the front end of the slot 9 reaches the pin 10 and actuates the link 11, when the movement of the type-bar is continued by the sublever acting through the connecting-link 11, and the type is carried to the printing-point, as indicated by dotted lines in Fig. 3. During the return of the type-bar to its normal position it overtakes the downwardly-moving shoe 25, carried by or forming part of the bell-crank 19, when the parts are in the positions indicated in full lines in Fig. 3, and the two travel together back to normal position, the bell-crank acting as a moving abutment or resistance, and thus tending to prevent rebound of the type-bar and acting to limit such rebound. Furthermore, the blow of the type-bar on the bell-crank causes a reaction of the bell-crank on the type-bar, since the force of the impact of the bar on the bell-crank is transmitted through the link 22 to the sublever 6, which tends to draw the upper end of the sublever 6 toward the front of the machine, thus exerting a forward pressure upon the link 11 when the rear end of the slot 9 in the sublever reaches the pin 10, and this pressure tends to limit or prevent a rebound of the type-bar. The rebound is thus limited or prevented in two ways, one by the key-controlled movable resistance interposed in the returning path of the type-bar and traveling with it to normal position and the other by the forward pressure exerted by the sublever and the link 11 on the type-bar when the latter reaches its normal position.

From the foregoing it will be seen that owing to the fact that the first part of the key-stroke is utilized solely for lifting the type-bar at or near its free end where the key has a long leverage or purchase on the type-bar only slight resistance is offered to the depression of said key at the beginning of the stroke, and hence the touch is very materially improved. After the type-bar has been started in the manner described its printing movement is completed by the pull of the link 11, and which owing to the partial vibration of the type-bar by the preliminary starting or lifting devices is enabled to take hold of the bar with a better leverage and more ease than if said link were compelled to act on the bar from the beginning of the key depression, and this better leverage or purchase of the link 11 on the type-bar is caused by the movement of the point of attachment 12 of said link to said bar more nearly to a position in which said point of attachment is vertically over the pivot 14, at which vertical position the leverage of the short arm of the type-bar (which is represented by the distance between the points 12 and 14) is greatest and which diminishes more and more as the point of attachment 12 is distant from said vertical position. At the beginning of the depression of a key the type-bar offers practically no resistance to the operation of the sublever 6 in consequence of the pin-and-slot or lost-motion connection between the sublever and the link 11, and hence comparatively little force is required to actuate the bell-crank or bent lever 19 through the link 22 to start the type-bar.

In Fig. 4 I have illustrated a modified construction wherein an actuating-lever 19^a is pivoted at $19^\times$ and is connected by a link 22^a directly to the key-lever 3 instead of to the sublever 6^a, as in the construction hereinbefore described. It will be observed that the link 11^a (shown in Fig. 4) is pivoted at 28 to the sublever and at 29 to the type-bar, so that in this connection there is no lost motion between the sublever and type-bar. The lever 19^a in this construction may operate in unison with the sublever to actuate the type-bar 13^a; but, acting, as it does, on the type-bar near its free end, it affords means to start the type-bar easily, notwithstanding the resistance of the dead-weight of the latter. Whether the lever 19^a acts in unison with the sublever to actuate the type-bar or not depends on the mutual relation of the parts. Thus, for instance, if the sublever 6^a be pivoted nearer the bearing-rod 2 of the key-lever the speed of movement of the lever 19^a relatively to that of the sublever would be increased, so that the lever 19^a would then act slightly in advance of the sublever on the type-bar. The construction shown in Fig. 4 may be employed with especial advantage in machines containing a comparatively small number of type-bars—for instance, in a machine in which there are three types on a bar and a comparatively short segment.

It should be understood in all cases that the auxiliary actuating devices are not needed so much in connection with the type-bars which are at the sides of the segment of a front-strike type-writing machine as they are with the type-bars located centrally of the

segment, because the dead-weight of the latter bars has to be lifted at the beginning of the stroke of the finger-key, while the weight of a bar which is on one side of the segment is largely borne by the bearings thereof, and the uppermost type-bars swing in planes more nearly horizontal than vertical. Therefore it may be sufficient in some cases to apply the auxiliary actuating devices merely to the type-bars that are located in the vicinity of the center of the segment, and thus dispense with the use of such devices in connection with the type-bars at the sides of the segment.

The lever 19ª, like the lever 19 previously described, is provided with a contact-shoe 25ª of sufficient breadth to assure the impact of the bar thereon.

In Figs. 5, 6, and 7 I have illustrated another form of type-writing machines embodying my improvements. In this construction the key-levers 3ª are pivoted at 2ª in the frame of the machine, and each key-lever is provided with a finger-key 4ª and with a laterally-projecting stud or pin 30, which is received within a slot 31 in one arm of a bell-crank or sublever 6ᵇ, that vibrates on a fixed pivot-rod 32, secured to the frame of the machine and is guided in its movement by the side walls of a slot in a bar 32ˣ. The upright arm of this sublever has a laterally-projecting pin or stud 33, which occupies a cam-slot 34 in the heel of a type-bar 13ᵇ, a direct connection being thus established between the sublever and its associated type-bar. The type-bars are segmentally arranged and are pivoted in slots in a segment 35, carrying a pivot-wire 36, on which the type-bars are mounted. A segmental support 37 is secured to the frame 1ª and is slotted to provide hangers 38, that support a pivot-wire 39, on which the bell-crank-actuating levers 19ᶜ are pivoted, the bell-cranks being guided between the hangers. One arm of each of these bell-cranks is pivotally connected at 40 to a link 22ᵇ, which is pivoted at its opposite end 41 to the upright arm of its associated sublever.

From Fig. 5 of the drawings it will be observed that the upright arms of the outer sublevers are bent inwardly at 6ˣ and that the bends in the different levers diminish as the central levers are approached. It will likewise be observed that the vertical portions of the various sublevers extend upwardly to different heights from the center to the sides of the series of sublevers and that each of the links 22ᵇ, connected with the unbent sublever, is in substantially the same radial plane as that of the associated sublever, and each other link 22ᵇ is in substantially the same plane as that of the bent portion of the associated sublever, so that the bell-cranks 19ᶜ, which are segmentally arranged, are located in substantially the radial planes of the associated type-bars and sublevers or the bent arms of the sublevers.

From an examination of Figs. 6 and 7 it will be observed that a slight lost motion is provided by the pin-and-slot connection 33 34 between each sublever and its type-bar, so that when a finger-key is depressed from the dotted-line position to the full-line position represented in Fig. 7 it causes the upper end of the sublever 6ᵇ to be rocked toward the front of the machine and to transmit motion to the link 22ᵇ and the bell-crank-actuating lever 19ᶜ. The associated type-bar is thus moved from its position of rest before the pin 33 engages the opposite side wall of the slot to effect a movement of the type-bar by a direct action of the sublever thereon. For this reason it requires but little power to start the type-bar against the dead-weight thereof, the power being first applied to the outer portion of the type-bar instead of to the pivoted end thereof, as heretofore, and the type-bar being set in motion before the connection with its pivoted end becomes effective.

The construction shown in Figs. 5, 6, and 7 embodies a segmental pad or rest 42, which finally limits the return movement of each bar and with the lever 19ᶜ supports the free end thereof in the normal position. It should be understood, however, that in this and in the constructions previously described the pad may be employed or not, as desired.

It is immaterial to the purpose of my invention whether one or more types be employed on a bar, whether the platen 43, diagrammatically shown in Figs. 1 to 4, inclusive, is fixed against a shifting movement and the type-bars as a whole are shifted relatively thereto for the purpose of upper and lower case writing, as in the construction represented by these figures and fully shown and described in my Patent No. 657,927, dated September 18, 1900, or whether the type-bars are fixed against a shifting movement and the platen 44 (diagrammatically shown) is shifted for the purpose mentioned, as in the construction represented by Figs. 5 to 7, inclusive.

In Fig. 4 of the drawings the starting-lever 19ª is shown provided with a pad 25ª either of leather or other suitable material to prevent noise, and such pads may likewise be applied to the other forms of starting devices.

It is to be understood that the actuating mechanism to complete the prinitng movements of the type-bars after they are started by the starting devices may differ widely from any of the particular forms of such mechanism shown herein without affecting the invention.

Certain features of the invention may be employed without the others and various changes may be made without departing from the spirit of my invention.

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

1. In a type-writing machine, the combination of a pivoted type-bar, and actuating means to coöperate with opposite end portions of the type-bar in imparting to it a continuous swinging movement terminating with the action of the type at the printing-point.

2. In a type-writing machine, the combination of a pivoted type-bar, and actuating means to coöperate successively with opposite end portions of the type-bar in imparting to it a continuous swinging movement terminating with the action of the type at the printing-point.

3. In a type-writing machine, the combination of a type-bar, and actuating means to coöperate with the free end portion of the type-bar at the beginning of the printing stroke.

4. In a type-writing machine, the combination of a pivoted type-bar, actuating means to coöperate with the pivoted end portion of the type-bar, and other actuating means to coöperate with the free end portion of the type-bar at the beginning of the printing stroke.

5. In a type-writing machine, the combination of a pivoted type-bar, actuating means to coöperate with the pivoted end portion of the type-bar, other actuating means to coöperate with the free end portion of the type-bar at the beginning of the printing stroke, and means to produce a successive operation on the type-bar of said actuating means.

6. In a type-writing machine, the combination of a pivoted type-bar, a finger-key, and two actuating devices controlled by said key to operate successively on different portions of the type-bar during a key depression in imparting to the type-bar a continuous movement terminating with the action of the type at the printing-point.

7. In a type-writing machine, the combination of a pivoted type-bar, a finger-key, and actuating means to coöperate with the free end portion of the type-bar to lift it only at the beginning of the depression of the key.

8. In a type-writing machine, the combination of a pivoted type-bar, a finger-key, actuating means to coöperate with the free end portion of the type-bar to lift it at the beginning of the depression of the key, and means controlled by the same key to complete the movement of the type-bar.

9. In a type-writing machine, the combination of a pivoted type-bar, and separate sets of type-bar-actuating means to coöperate with different portions of the bar between the pivot and free end thereof in imparting to the type-bar a continuous movement terminating with the action of the type at the printing-point.

10. In a type-writing machine, the combination of a pivoted type-bar, and a type-bar-actuating device to coöperate with the type-bar between its ends at the beginning of the printing stroke, the type-bar being also movable independently of said actuating device.

11. In a type-writing machine, the combination of a type-bar, a lifting device to coöperate with the type-bar between its ends, and other actuating means to move the type-bar after the lifting device ceases to act on it.

12. In a type-writing machine, the combination of a type-bar, a lifting device to coöperate with the type-bar between its ends, other actuating means to move the type-bar after the lifting device ceases to act on it, and a single finger-key to move said lifting device and said other actuating means.

13. In a type-writing machine, the combination of a pivoted type-bar, a plurality of actuating devices to coöperate directly with different portions of the type-bar in imparting to it a continuous swinging movement terminating with the action of the type at the printing-point, and intermediate connections between said actuating devices.

14. In a type-writing machine, the combination of a pivoted type-bar, a plurality of actuating devices to coöperate directly with different portions of the type-bar in imparting to it a continuous swinging movement terminating with the action of the type at the printing-point, intermediate connections between said actuating devices, and a finger-key to control said actuating devices.

15. In a type-writing machine, the combination of a pivoted type-bar, a plurality of actuating devices to coöperate directly with different portions of the type-bar in imparting to it a continuous swinging movement terminating with the action of the type at the printing-point, and a key-lever to which said actuating devices are connected.

16. In a type-writing machine, the combination of a pivoted type-bar, a plurality of actuating devices to coöperate directly with different portions of the type-bar in imparting to it a continuous swinging movement terminating with the action of the type at the printing-point, and a key-lever to which said actuating devices are connected and by which they are successively operated.

17. In a type-writing machine, the combination of a pivoted type-bar, a lever disconnected from the type-bar and movable in contact therewith to lift it at the beginning of the printing stroke, and means to actuate said lever.

18. In a type-writing machine, the combination of a pivoted type-bar, a lever disconnected from the type-bar and movable in contact therewith to lift it at the beginning of the printing stroke, means to actuate said lever, and means besides the lever to complete the printing movement of the type-bar.

19. In a type-writing machine, the combi-

nation of a pivoted type-bar, a lever disconnected from and movable in contact with the type-bar to lift it at the beginning of the printing stroke, actuating means connected to the type-bar and to said lever, and a finger-key to actuate said lever-actuating means.

20. In a type-writing machine, the combination of a pivoted type-bar, a lever disconnected from and movable in contact with the type-bar to actuate it at the beginning of the printing stroke, other means connected to the type-bar to actuate it, and intermediate connections between said lever and other actuating means to control the movement of one by a movement of the other.

21. In a type-writing machine, the combination of a pivoted type-bar, a key-lever, a sublever controlled thereby and operatively connected to the type-bar, and a separate actuating device controlled by the key-lever to act on the type-bar at the beginning of the printing stroke.

22. In a type-writing machine, the combination of a pivoted type-bar, a finger-key, and a bell-crank disconnected from the type-bar and movable in contact therewith to move the type-bar at the beginning of a depression of the finger-key.

23. In a type-writing machine, the combination of a type-bar, a finger-key, and a bell-crank disconnected from the type-bar and movable in contact therewith to move the type-bar at the beginning of a depression of the finger-key, the type-bar being movable independently of the bell-crank during the latter portion of the key depression.

24. In a type-writing machine, the combination of a type-bar, a finger-key, a bell-crank disconnected from the type-bar and movable in contact therewith to move the type-bar at the beginning of a depression of the finger-key, the type-bar being movable independently of the bell-crank during the latter portion of the key depression, and other means controlled by said key to actuate the type-bar during the latter part of the key depression.

25. In a type-writing machine, the combination of a type-bar, a key-lever, and a type-bar-actuating bell-crank operatively connected with the key-lever and disconnected from the type-bar and movable in contact therewith near the type-carrying end of the type-bar at the beginning of the printing stroke.

26. In a type-writing machine, the combination of a series of type-bars, a series of key-levers, a series of sublevers controlled by said key-levers and operatively connected to the type-bars, and another series of type-bar-actuating devices separately connected to said sublevers.

27. In a type-writing machine, the combination of a type-bar, a key-lever, a sublever controlled by said key-lever and operatively connected to the type-bar, a bell-crank disconnected from said type-bar and movable in contact therewith, and an intermediate connection between said sublever and bell-crank.

28. In a type-writing machine, the combination of a type-bar, a key-lever, a sublever controlled by said key-lever and operatively connected to the type-bar, a bell-crank disconnected from said type-bar and movable in contact therewith near the free end of the type-bar, and a link between said sublever and bell-crank.

29. In a type-writing machine, the combination of a pivoted type-bar movable upward and backward on its pivotal axis from its normal to its printing position, two levers to coöperate with different portions of the type-bar to actuate it, and means to actuate said levers.

30. In a type-writing machine, the combination of a pivoted type-bar movable upward and backward on its pivotal axis from its normal to its printing position, two levers to coöperate with different portions of the type-bar to actuate it, means to actuate said levers, and means to move the type-bar with one of said levers before it is moved by the other.

31. In a type-writing machine, the combination of a pivoted type-bar movable upward and backward on its pivotal axis from its normal to its printing position, two relatively movable devices to actuate said type-bar, a single finger-key to actuate both of said devices, and means to move the bar with one of said devices before it is moved by the other.

32. In a type-writing machine, the combination of a type-bar, a finger-key, means connected to the finger-key and to the type-bar to actuate the type-bar, a device disconnected from the type-bar and controlled by the finger-key to actuate the type-bar, and means to move the type-bar with said device before it is moved by the first-mentioned actuating means.

33. In a type-writing machine, the combination of a pivoted type-bar movable upward and backward on its pivotal axis from its normal to its printing position, a finger-key, two type-bar-actuating levers, and means to move the type-bar with one of said levers before it is moved by the other.

34. In a type-writing machine, the combination of a pivoted type-bar movable upward and backward on its pivotal axis from its normal to its printing position, means to coöperate with different portions of the type-bar in actuating it, and lost-motion instrumentalities between the type-bar and its actuating means.

35. In a type-writing machine, the combination of a pivoted type-bar movable on its pivotal axis from its normal to its printing position, an actuating-lever therefor, a lost-

motion connection between said actuating-lever and one portion of said type-bar, and an independent device to coöperate with another portion of said bar to actuate it.

36. In a type-writing machine, the combination of a pivoted type-bar movable on its pivotal axis from its normal to its printing position, a key-lever, a separate sublever operated by said key-lever, and a lost-motion connection between said sublever and said type-bar.

37. In a type-writing machine, the combination of a pivoted type-bar movable on its pivotal axis from its normal to its printing position, two actuating-levers to coöperate therewith, one connected thereto by a lost-motion connection and the other disconnected from the type-bar and movable in contact therewith, and means to actuate said levers.

38. In a type-writing machine, the combination of a type-bar, a key-lever therefor, a sublever controlled by said key-lever, and two independent sets of operative connections between said sublever and type-bar.

39. In a type-writing machine, the combination of a type-bar, a key-lever therefor, a sublever controlled by said key-lever, and two independent sets of connections between said sublever and type-bar operative successively on said type-bar at different portions thereof.

40. In a type-writing machine, the combination of a pivoted type-bar, a key-lever therefor, a sublever controlled by said key-lever, and two independent sets of connections between said sublever and type-bar operative successively on said type-bar at different portions thereof, one near the free end of the type-bar and the other near the pivot thereof.

41. In a type-writing machine, the combination of a pivoted type-bar movable upward and backward on its pivotal axis from its normal to its printing position, a key-lever therefor, and operative actuating connections between the key-lever and type-bar to coöperate with different portions of the type-bar, one near the pivoted end thereof and the other near its free end.

42. In a type-writing machine, the combination of a pivoted type-bar movable upward and backward on its pivotal axis from its normal to its printing position, a key-lever therefor, and actuating connections between the key-lever and type-bar to coöperate with different portions of the type-bar, one near the pivoted end thereof and the other near its free end, and to successively operate on the type-bar to move it to the printing position.

43. In a type-writing machine, the combination of a type-bar, a key-lever, a sublever controlled thereby, a connection between said type-bar and sublever, and a device movable independently of said connection to actuate the type-bar before it can be actuated by said connection.

44. In a type-writing machine, the combination of a type-bar, a key-lever, a sublever controlled thereby, a connection between said type-bar and sublever, and a device movable independently of said connection to actuate the type-bar before it can be actuated by said connection, said device being connected to and actuated by the sublever.

45. In a type-writing machine, the combination of a type-bar, a key-lever, a sublever controlled thereby, a connection between the sublever and type-bar to afford a limited movement of the sublever independently of the type-bar, and a lever disconnected from the type-bar and connected to the sublever and movable thereby in contact with the type-bar to operate the type-bar.

46. In a type-writing machine, the combination of a type-bar, a key-lever therefor, type-bar-actuating means controlled by said key-lever, and a bell-crank controlled by said key-lever to move the type-bar before it is moved by said actuating means.

47. In a type-writing machine, the combination of a type-bar, a key-lever, a sublever pivoted thereto and fulcrumed on a fulcrum-bar, a connection between the sublever and type-bar that allows a limited movement of the sublever independently of the type-bar, and a separate lever that is actuated by the key-lever to move the type-bar.

48. In a type-writing machine, the combination of a type-bar, a key-lever, a sublever pivoted thereto and fulcrumed on a fulcrum-bar, a connection between the sublever and type-bar that allows a limited movement of the sublever independently of the type-bar, and a separate lever disconnected from the type-bar and movable with the key-lever and in contact with the type-bar to actuate the type-bar at the beginning of the stroke of the key-lever.

49. In a type-writing machine, the combination of a type-bar, means to coöperate with the type-bar near the free end thereof to start the type-bar, and other means to complete the printing movement of the bar.

50. In a front-strike type-writing machine, the combination of a type-bar, a finger-key therefor, and an actuating device controlled by said key and disconnected from the type-bar and normally resting against the type-bar.

51. In a front-strike type-writing machine, the combination of a type-bar movable on a fixed axis from its normal to its printing position, a lever on which said type-bar normally rests, and means to actuate the lever to operate the type-bar.

52. In a front-strike type-writing machine, the combination of a type-bar, an actuating device disconnected from the type-bar and normally resting against it and adapted to ac-

tuate it, a key for said actuating device, and separate means controlled by said key to operate the type-bar.

53. In a front-strike type-writing machine, the combination of a type-bar, a key-lever therefor, a sublever controlled by said key-lever and connected to said bar, and a separate actuating-lever, against which the type-bar normally rests, to coöperate with the free end portion of the type-bar to actuate it, and means to connect said actuating-lever to the key-lever.

54. In a front-strike type-writing machine, the combination of a series of segmentally-arranged type-bars, a series of key-levers therefor, connections between each type-bar and its associated key-lever to actuate the bar, and a series of actuating devices, one device for each type-bar, resting normally against the type-bars, and means to connect each of said actuating devices with its associated key-lever.

55. In a front-strike type-writing machine, the combination of a series of segmentally-arranged type-bars, a series of key-levers therefor, lost-motion connections between each type-bar and its associated key-lever to actuate the bar, and a series of actuating devices, one device for each type-bar, resting normally against the type-bars and forming means to start the type-bars, and means to connect each of said actuating devices with its associated key-lever.

56. In a front-strike type-writing machine, the combination of a series of segmentally-arranged type-bars, a series of key-levers therefor, a series of sublevers connected to said key-levers and type-bars, a series of separate actuating-levers, one for each type-bar, disconnected from and resting normally against the type-bars, and connections between each sublever and its associated actuating-lever.

57. In a front-strike type-writing machine, the combination of a series of segmentally-arranged type-bars, a series of key-levers therefor, a series of sublevers connected to said key-levers and type-bars by lost-motion connections, a series of separate actuating-levers, one for each type-bar, disconnected from the type-bars and resting normally against them near their free ends, and connections between each sublever and its associated actuating-lever.

58. In a type-writing machine, the combination of a series of type-bars and a series of rebound-reducing devices each adapted to intercept a returning type-bar and then move with it in the direction of the movement of the bar back to normal position.

59. In a type-writing machine, the combination of a type-bar and a key-controlled movable abutment adapted to intercept the return movement of the type-bar and move back with it in the general direction of the movement of the type-bar and thus reduce its rebound.

60. In a type-writing machine, the combination of a type-bar, a key therefor, an antirebounding device independent of the type-bar and movable in the same direction as the type-bar, and means controlled by the key for moving said antirebounding device.

61. In a type-writing machine, the combination of a type-bar, an antirebounding device to receive the impact of the type-bar in its return movement and against which device the type-bar normally rests, and means for automatically moving the said device with the type-bar back to the normal position and in the general direction of the movement of type-bar during the return movement of the latter.

62. In a type-writing machine, the combination of a type-bar, means for actuating the type-bar, and an independent lever acting in the path of the type-bar during the return movement thereof to limit the rebound of the type-bar.

63. In a type-writing machine, the combination of a type-bar, means for actuating the type-bar, an independent lever acting in the path of the type-bar during the return movement thereof to limit the rebound of the type-bar, and means controlled by the type-bar-actuating means for moving said independent lever.

64. In a type-writing machine, the combination of a type-bar, and a lever to receive the impact thereof during the return movement of the type-bar, the lever being movable in the same direction as the type-bar during its return movement.

65. In a type-writing machine, the combination of a type-bar, and a lever to receive the impact thereof during the return movement of the type-bar, the lever being movable in the same direction as the type-bar during its movements to and from the printing position.

66. In a type-writing machine, the combination of a type-bar, a type-bar-antirebounding lever, with which the type-bar makes contact near its free end during the return movement thereof, a key-lever for the type-bar, and connections between said key-lever and said type-bar-antirebounding lever.

67. In a type-writing machine, the combination of a type-bar, a finger-key therefor, a lost-motion connection between said type-bar and key and operable at the first portion of the key depression, and an antirebounding device controlled by the finger-key to take the impact of the type-bar during the return movement of the bar.

68. In a type-writing machine, the combination of a type-bar, a key-lever therefor, a sublever controlled by said key-lever and con-

nected to the type-bar by a lost-motion connection that is operable at the first portion of the depression of said key-lever, an antirebounding device to receive the impact of the type-bar, and means connected to the sublever to actuate said antirebounding device.

69. In a type-writing machine, the combination of a type-bar, a key-lever therefor, a sublever controlled by said key-lever and connected to the type-bar by a lost-motion connection, an antirebounding-lever to receive the impact of the type-bar, and means controlled by the key-lever to subject said antirebounding-lever to the impact of the type-bar and move it with the type-bar during a return of the bar to its normal position.

70. In a type-writing machine, the combination of a type-bar, a key-lever therefor, a sublever controlled by said key-lever and connected to the type-bar by a lost-motion connection, an antirebounding bell-crank to receive the impact of the type-bar in its return movement, and a link connecting said bell-crank and sublever.

71. In a type-writing machine, the combination of a type-bar, a key-lever therefor, a sublever controlled by said key-lever and connected to the type-bar by a lost-motion connection, an antirebounding bell-crank to take the impact of the type-bar in its return movement, and a link connecting said bell-crank and sublever and constituting a means to transmit the force of said impact to the sublever.

72. In a type-writing machine, the combination of a series of type-bars, a series of finger-keys therefor, a series of antirebounding-levers to take the impact of the type-bars in their backward movements, there being one lever for each type-bar, and means controlled by each of said finger-keys for moving the associated antirebounding-lever with the type-bar in its backward movement and in the general direction of movement of the type-bar.

73. In a type-writing machine, the combination with a type-bar of a combined starting and antirebounding device to act on the type-bar near its free end, and additional means for actuating the type-bar.

74. In a type-writing machine, the combination with a type-bar of a positively-actuated combined starting and antirebounding device to act on the type-bar near its free end, and additional means for actuating the type-bar.

75. In a type-writing machine, the combination of a type-bar, a key-lever, a combined starting and antirebounding device to act on the type-bar near its free end, a positively-acting connection between the key-lever and said device, and additional means for actuating the type-bar.

76. In a type-writing machine, the combination with a type-bar, of a starting device, said device constituting also a rest for the type-bar, and additional means for actuating the type-bar.

77. In a type-writing machine, the combination with a type-bar, of a starting device, said device being adjacent to the free end of the type-bar and constituting also a rest for the type-bar, and additional means for actuating the type-bar.

78. In a type-writing machine, the combination with a type-bar, of a type-bar rest movable to start the bar in its printing movement, and additional means to continue the movement of the type-bar.

79. In a type-writing machine, the combination with a type-bar, of a type-bar rest adjacent to the free end of the type-bar, said rest being movable to start the bar in its printing movement, and additional means to continue the movement of the type-bar.

80. In a type-writing machine, the combination with type-bars, of segmentally-arranged starting devices to start the type-bars, and other means to coact with said starting devices in imparting to the type-bars continuous swinging movements terminating with the action of the type at the printing-point.

81. In a type-writing machine, the combination with type-bars, of segmentally-arranged starting devices to act on the type-bars near their free ends when the type-bars are in and near their normal positions.

82. In a type-writing machine, the combination of segmentally-arranged pivoted type-bars movable upward and backward to their printing positions, a supporting-segment adjacent to the free ends of the type-bars when they are in their normal positions, and starting devices mounted on said segment to act on the type-bars.

83. In a type-writing machine, the combination of segmentally-arranged pivoted type-bars movable upward and backward to their printing positions, a supporting-segment adjacent to the free ends of the type-bars when they are in their normal positions, and starting devices pivotally mounted on the segment to act on the type-bars.

84. In a type-writing machine, the combination of segmentally-arranged pivoted type-bars movable upward and backward to their printing positions, a supporting-segment comprising ears or hangers adjacent to the free ends of the type-bars when they are in their normal positions, and starting devices pivotally mounted on said ears or hangers to act on the type-bars.

Signed at the borough of Manhattan, city of New York, in the county of New York and State of New York, this 10th day of February, A. D. 1903.

JACOB FELBEL.

Witnesses;
K. V. DONOVAN,
E. M. WELLS.