

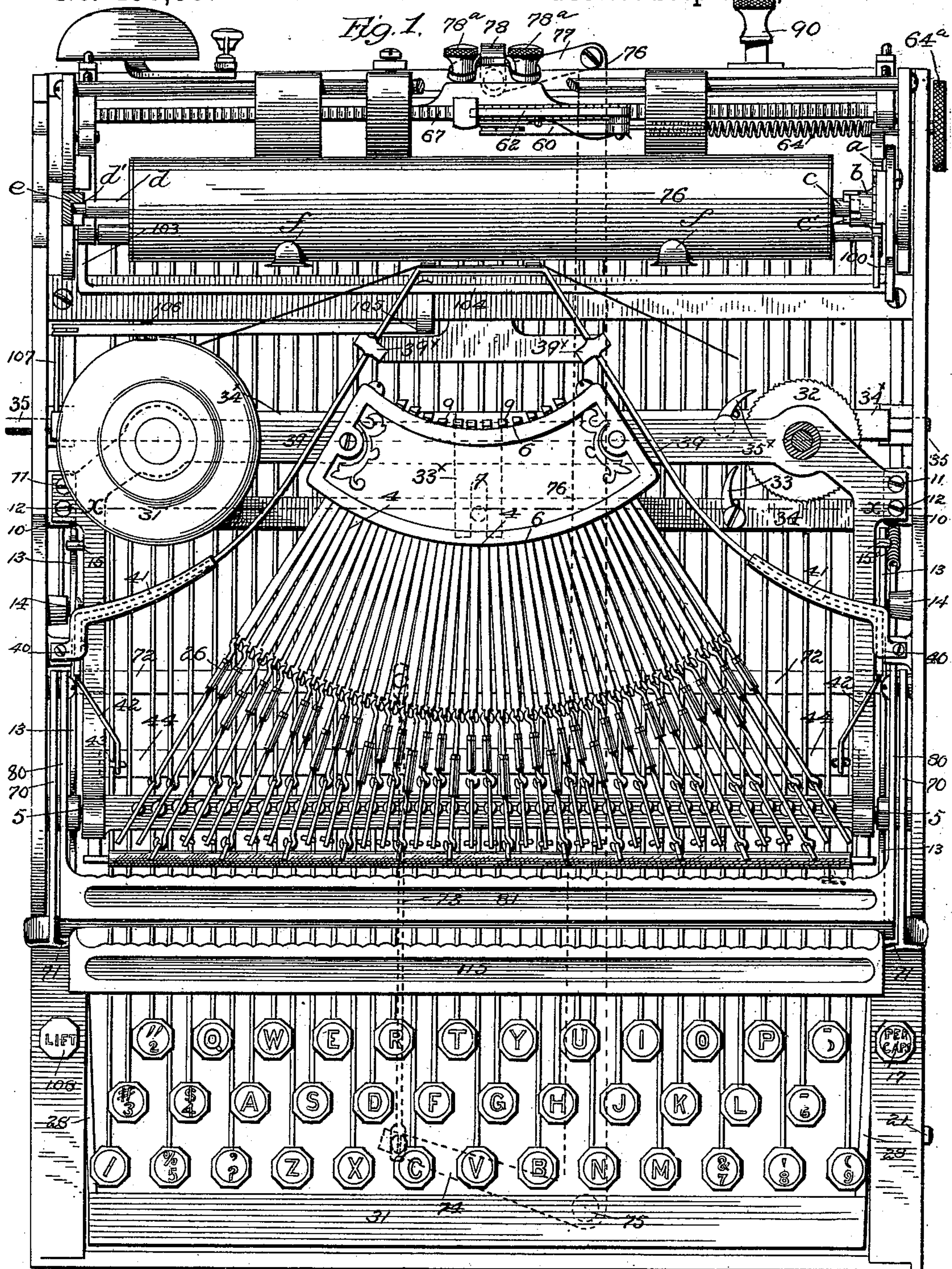
(No Model.)

4 Sheets—Sheet 1.

B. GRANVILLE.
TYPE WRITING MACHINE.

No. 496,304.

Patented Apr. 25, 1893.



Attest
Walter D. Middleton
J. L. Middleton

Inventor
Bernard Granville
by *Ellis Spear*
Att'y.

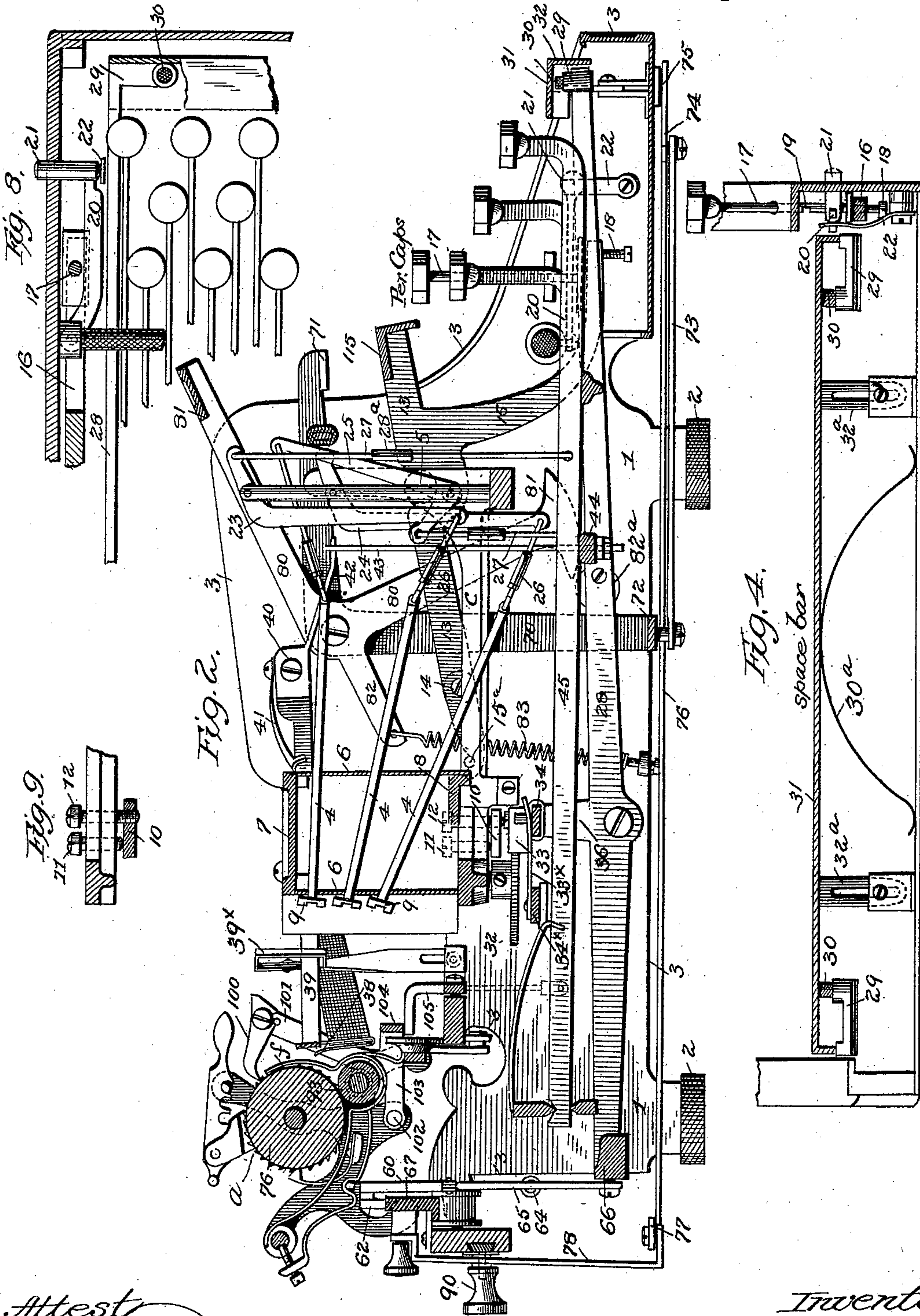
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4 Sheets—Sheet 2.

B. GRANVILLE.
TYPE WRITING MACHINE.

No. 496,304.

Patented Apr. 25, 1893.



Attest
Walter D. Maudslayi
J. L. Middleton

Inventor
Bernard Granville
by Ellis Spear
Att'y.

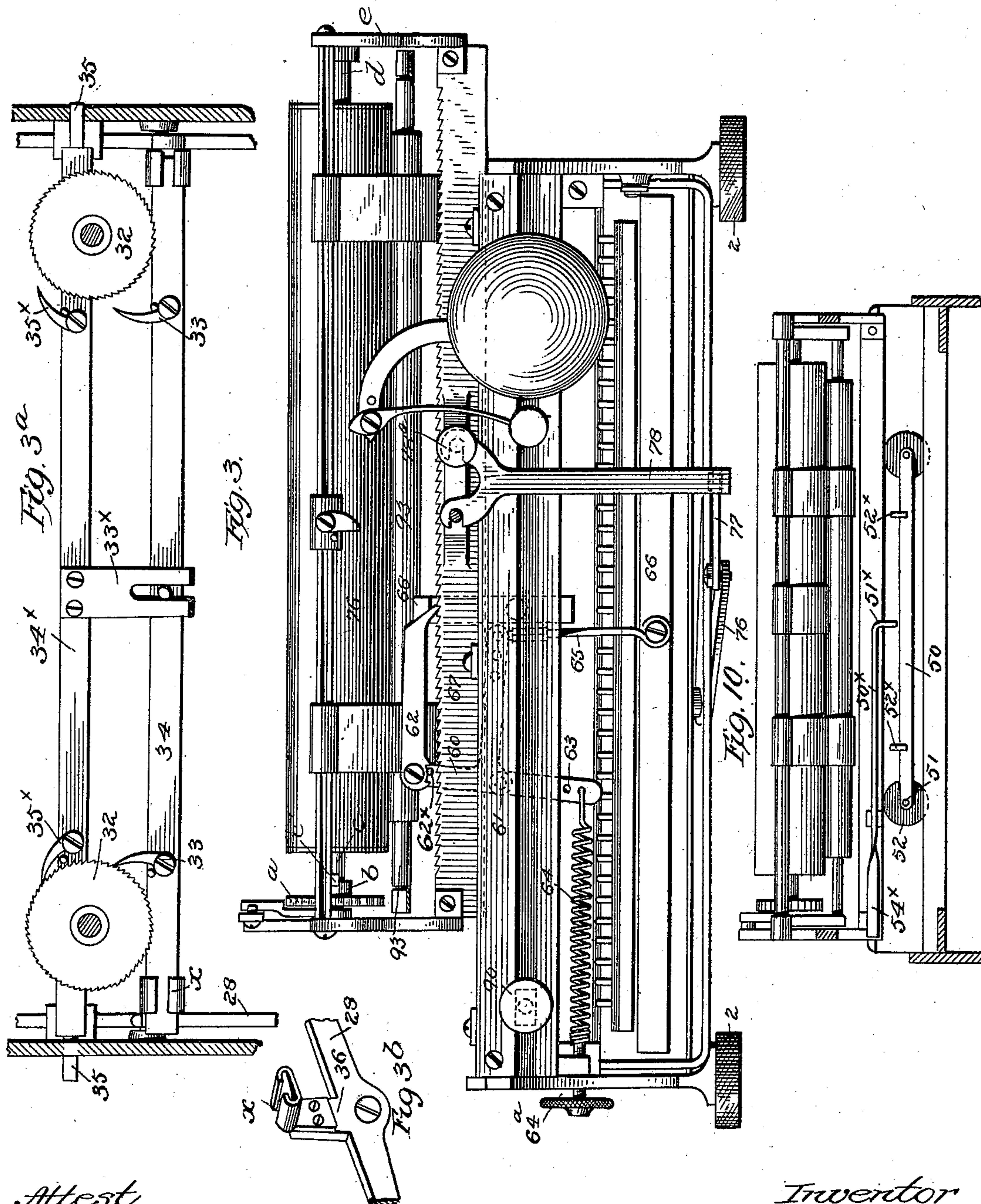
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4 Sheets—Sheet 3.

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Attest
Walter D. Alden
J. L. Middleton

Inventor
Bernard Granville
by *Ellis Spear*
Att'y.

(No Model.)

4 Sheets—Sheet 4.

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Fig. 5.

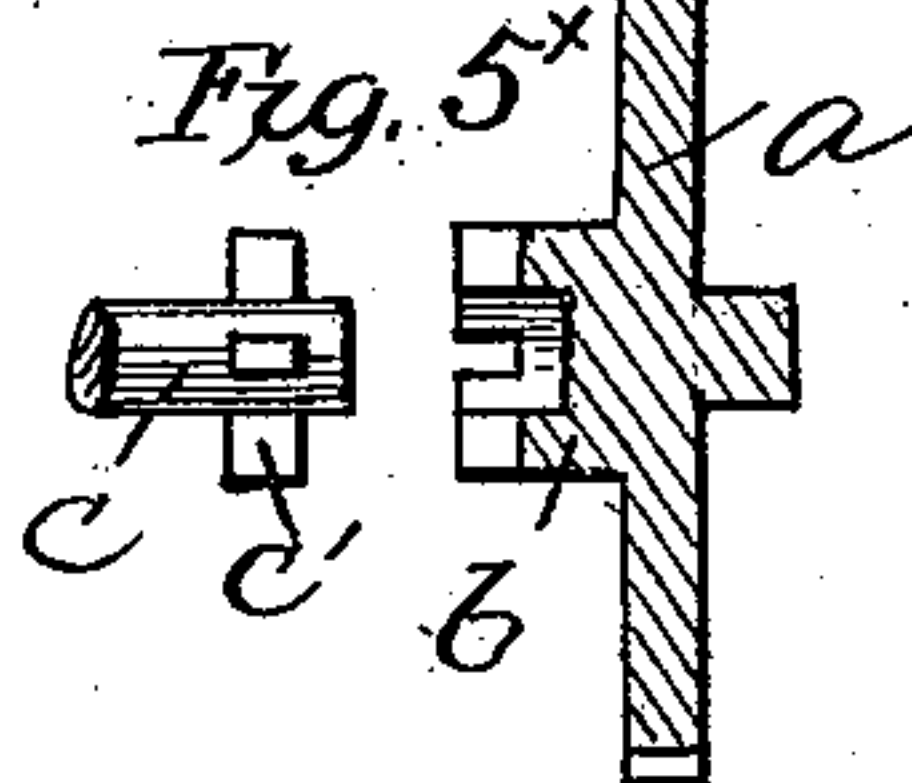
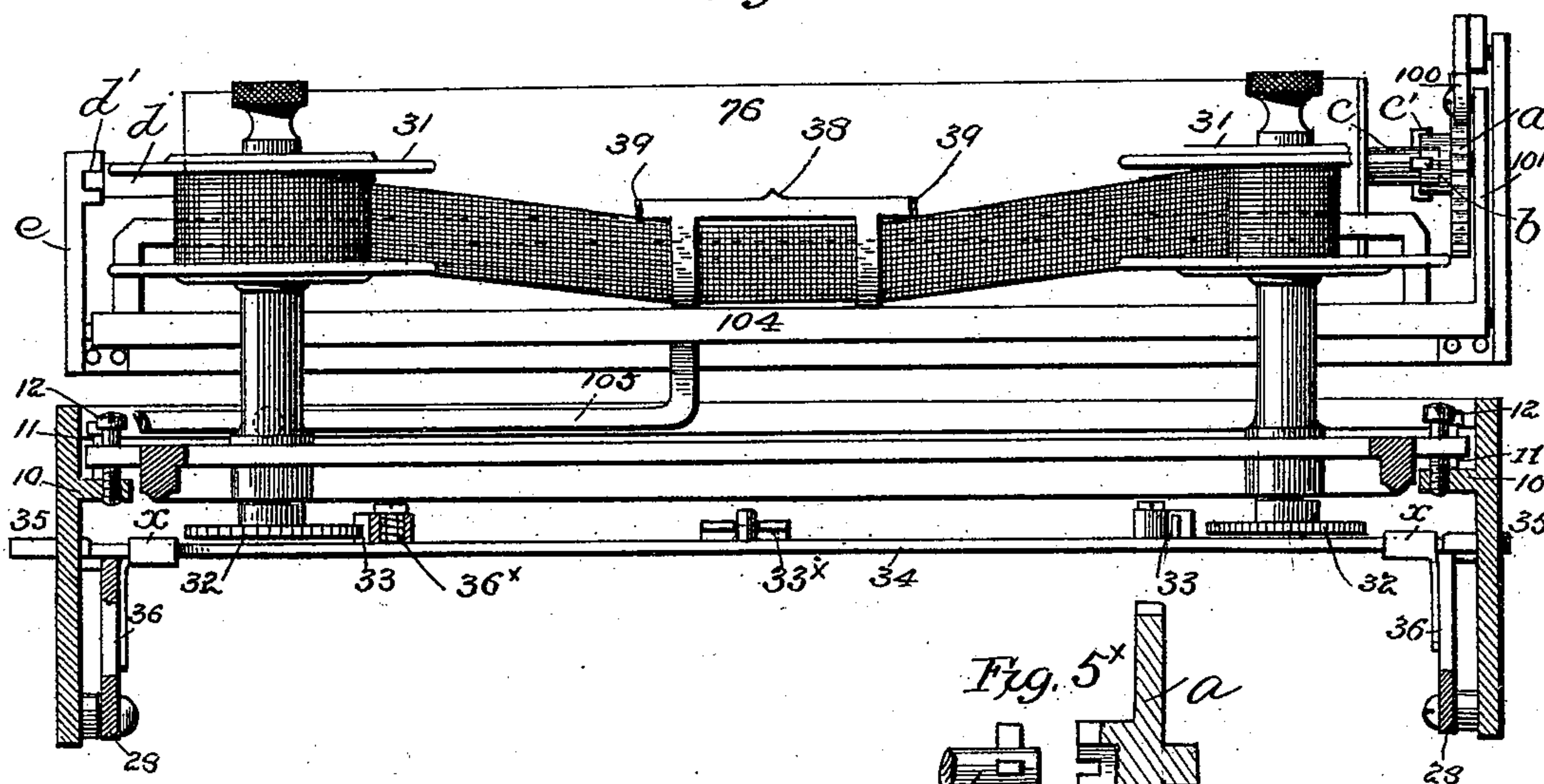


Fig. 7a

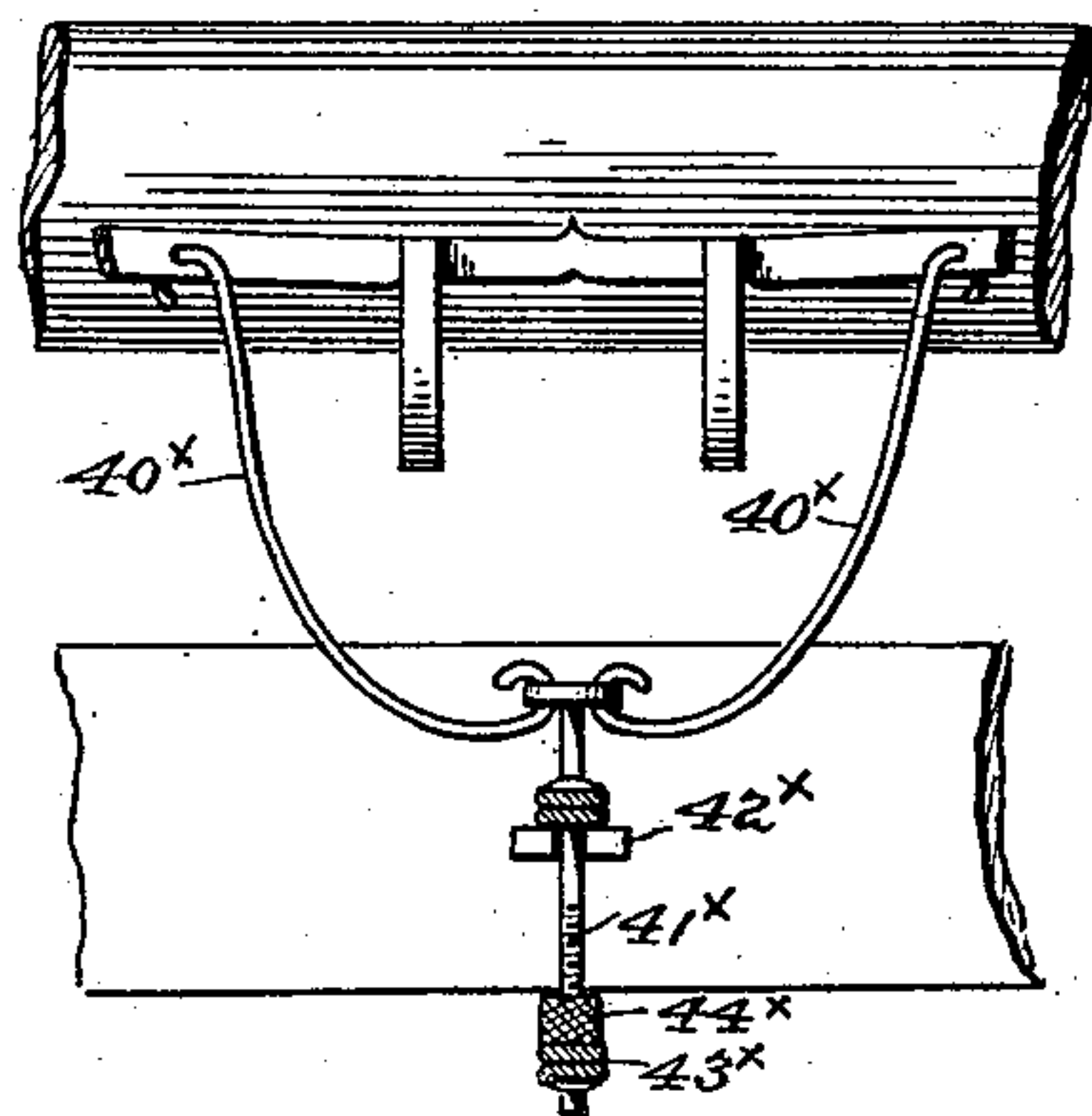


Fig. 6.

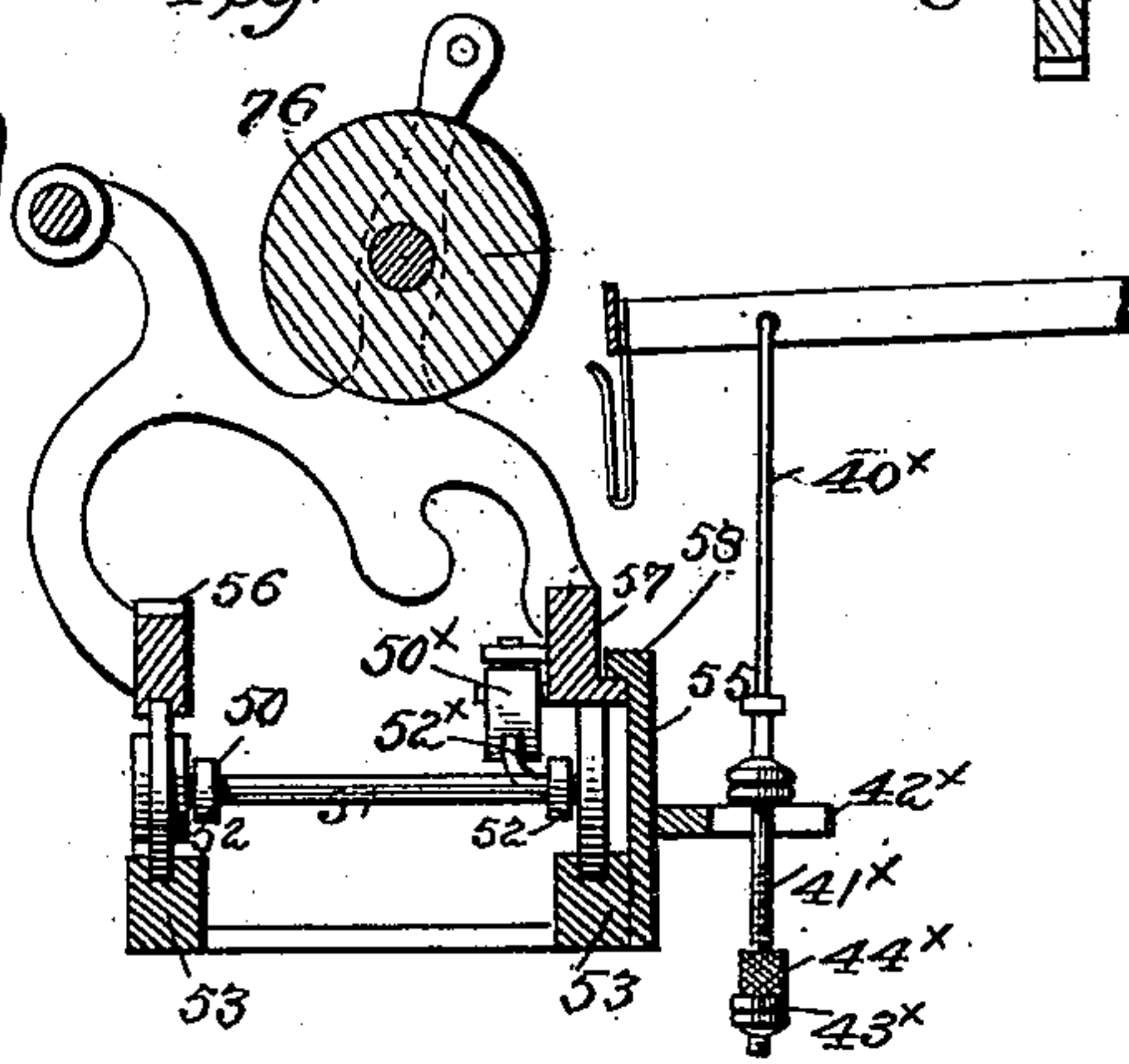
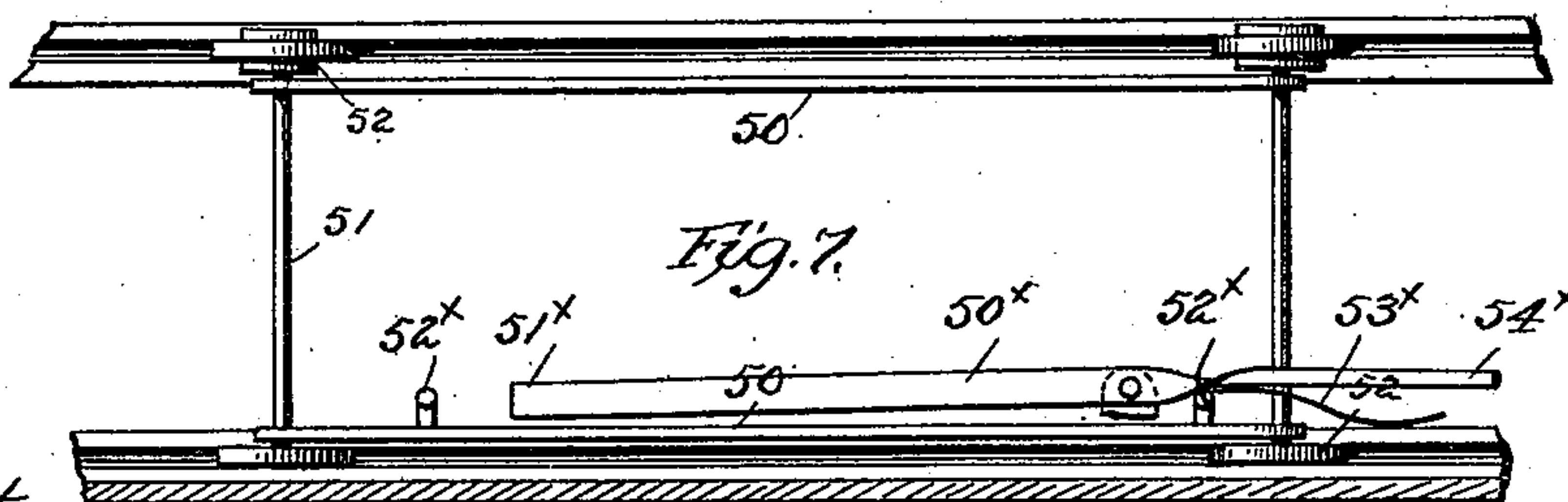


Fig. 7.



Attest
Walter Maddison
J. L. Maddison

Inventor
Bernard Granville
by Ellis Spear
Att'y.

UNITED STATES PATENT OFFICE.

BERNARD GRANVILLE, OF DAYTON, OHIO.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 496,304, dated April 25, 1893.

Application filed May 6, 1891. Serial No. 391,846. (No model.)

To all whom it may concern:

Be it known that I, BERNARD GRANVILLE, a citizen of the United States of America, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My said invention is in part an improvement upon that form of type writers in which the type are carried upon reciprocating bars arranged to converge, when in operation, upon a printing point; and in part to a carriage for the paper and mechanism for controlling the carriage, the use of which is not restricted to the particular construction of the printing mechanism.

The principal objects are, first, to give the operator more complete and easy control of the paper carriage, and secondly, to provide for an increased number of characters without increasing the number of type bars. In connection with these objects I have made subordinate improvements in the constructions for the purpose of simplifying the machine and increasing its durability and effectiveness.

I have illustrated my invention in the accompanying drawings, in which:—

Figure 1 shows a machine in plan view. Fig. 2 is a view of a vertical section. Fig. 3 is a rear view of the machine. Fig. 3^a is a detail plan view of the spindles of the ribbon spools and the operating mechanism therefor. Fig. 3^b is a view of a detail of construction. Fig. 4 is a partial view of the front illustrating the space bar. Fig. 5 is a section on line *x—x* of Fig. 1 with parts omitted. Fig. 5^x is a detail view of the paper roll journal and the socket therefor; Fig. 6 a section showing the carriage and track; Fig. 7 a plan view illustrating the carriage track. Fig. 7^a is a detail of the preferred form of stop for the ribbon frame. Figs. 8 and 9 show details of construction hereinafter explained. Fig. 10 is a rear view of the carriage and paper showing the track frame and stop therefor.

In the drawings the main frame is shown in Fig. 1 at 1, it having rubber blocks 2 on which it rests, the figure showing only one side. The lines 3 indicate the walls of the

case in which the machine is held. The type bars 4 are mounted upon a movable frame or cradle, the pivotal point of which is shown at 5. The rear end of this frame carries the curved plates 6, formed on curves struck from the printing point as a center. These plates are fixed directly to upper and lower horizontal plates or frames 7 and 8 the lower plate 8 being fixed to the frame C. The printing or type bars have their bearings in the plates 6, the openings being formed so as to guide accurately the bars in their movement toward and from the printing point, the type bars carrying the type heads 9 on every one of which are set two types one above the other. The cradle frame C is arranged to rock upon the pivot 5 in a vertical plane, said cradle frame being pivoted in the line parallel to the base of the machine. This rocking movement is limited and is just sufficient to raise the type so as to bring the lower into line with the printing point, the upper type of every type head being normally in line with the printing point when the frame is down. The upward movement of the frame is limited by means of screws set in the lugs 10, projecting from the frame of the machine. In the lower part of the cradle frame is set a screw 11 which bears upon the upper face of the lug 10 when this screw is adjusted, so that when the frame is down the end of the screw will rest upon the upper face of said lug and the upper type will be in alignment with the printing point. Another screw 12 passes loosely through the lower part of the cradle frame and is fixed adjustably in the bar 10 by threaded connection. When the type frame is raised so as to bring the lower type into alignment, the lower part of the cradle frame bears against the head of the screw 12. This construction is illustrated more clearly in Fig. 9. Preferably the lower type are capitals principally, with some of such other characters as are least frequently used. The type bar frame is raised by means of a lever 13 pivoted at 14 on the main frame. Its rear end extends under the pin 15^a on the cradle frame. The front end is provided with a cross bar 115 extending across the key board just in rear of the rear bank of keys. The cradle frame is held down normally by means

of its own weight. The lever 13 is operated by pressure upon the cross bar 15 which is in a convenient position to be touched by the fingers of the operator from any point on the key board L.

It is sometimes desirable to print capitals only. For this work, with only the construction above described, it will be necessary to hold down the cross bar 15 while the operator manipulates the keys. To provide for locking down the front end of the lever 13 I have formed an arm 16 connected with the lever 13 and extending downward and toward the front at one side of the machine. It is shown in Fig. 2 and also on the right hand of Fig. 4. The front end of this arm extends underneath the foot of a plunger 17, the said foot bearing upon an adjusting screw 18 in the front end of the arm 16. The plunger 17 has a finger piece on its upper end, and when it is depressed the arm 16 is pushed down carrying with it the front end of the lever 13 raising the cradle frame to print capitals. In order to hold the cradle frame in this position the plunger is provided with the notch 19, which, when the plunger is down to the proper position, engages with the lever 20, which lever is pressed by a spring into the notch to hold the plunger down. To release the plunger and to let the rear end of the type bar drop I have provided a plunger 21 held normally out by a spring 22 which bears against the lever 20. This plunger is located on the right hand side of the front end of the machine, in a convenient position to be pressed by the finger (Figs. 4 and 8).

The type bars 4, as shown, are in three banks or horizontal rows. They are operated by bell crank levers which are connected to the key levers. The bell crank levers are best illustrated in Fig. 2 being indicated at 23, 24 and 25. The type bars are arranged so as to bring the pivot of the frame in which they move about equally distant from the upper and lower type bars, so that the variation caused by the vertical movement of the cradle frame will be evenly distributed. In order to give space for the bell crank levers which connect the type bars to the key levers, they are pivoted upon the main frame of the machine in reversed order, for example the lever 23 is pivoted at its upper end, also the lever 24 is pivoted at its upper end, but lower down on the frame, and these are connected with the middle and the lower type bars respectively. The bell crank levers 25 are pivoted at their upper ends to one of the upper bank of type bars. These levers illustrate the whole system of bell crank levers for the type bars, there being one lever for each bar,—but they are not all fully shown. The connection between the type bars and the bell crank levers is made by adjustable links 26, these serving to accurately adjust the type bars and to permit the slight movement necessary as the type bar frame oscillates vertically. The short ends of the bell crank le-

vers are connected to the key levers by means of connecting links or rods 27 having adjustable sleeves 28^a.

The key levers in respect to their general construction, and their connection with the type mechanism, are not materially different from those shown heretofore by me in the Letters Patent of the United States No. 446,676. Every key lever which operates the type mechanism, also operates the carriage to shift the printing point.

To operate the carriage moving mechanism alone for spacing, and without bringing into operation the printing mechanism I have provided the ordinary spacing levers 28, one on each side. At the front these levers are bent inwardly, at right angles as shown at 29 and at the end of each is a buffer 30 set in a socket. A plate 31 having a flange 32 extending downwardly on its front edge, is placed across in front of the key board and rests upon the ends of the levers 28. It is guided by slotted arms 32^a which play in sockets fixed to the base of the machine. The arms are held in the sockets by pins. When the plate is pressed down it carries with it the lever at one end, or the other, but normally it is held up by the spring 30^a. The buffers receive the impact of the plate and prevent any jar or noise. The ribbon spools 31, are mounted on vertical shafts in the cradle frame, each having at its lower end ratchet wheel 32. These ratchet wheels are operated by pawls 33 mounted upon a cross-bar 34. This cross bar is arranged to be shifted longitudinally in order to engage either one or the other of the pawls 33 with its ratchet separately to wind the ribbon first onto one spool and then back again onto the other. It is mounted on the vertical arms 36 of the levers 28 so that it may slide and is guided by the clips 4 projecting from said arms, which embrace the bar. When the levers 28 are rocked the bar 34 is moved back and forth causing whichever pawl is in engagement with its ratchet, to turn the same and wind the ribbon. The longitudinal shifting of the bar is effected by a second bar 34^x connected thereto by a fork 33^x and having push pins 35 extending through the casing to be operated by the finger. The bar 34^x carries check pawls 35^x engaging alternately with their respective ratchets, simultaneously with the push pawls. The pawls are under tension of a concealed spiral spring 36^x Fig. 5 and are limited in their movements by pins adjacent thereto. The ribbon is thus moved in either direction. It is supported by a frame 38 which is held upon arms 39 pivoted at 40. The arms are held down by a spring 41. In front of the pivot they have an extension 42 which is connected by a rod 43 to a cross bar 44 which lies across the machine and under the key lever 45. The frame which supports the ribbon in front of the type bars is thus normally pressed down by its spring so that the ribbon is a little below the range of the bars, and be-

low the printing point, and the printing is visible. As soon however as the key levers are depressed the first effect is to raise the inking ribbon, through the mechanism above described and interpose it between the type and the printing point. This action occurs as often as the key levers are depressed to operate the printing mechanism and the inking ribbon is held up long enough for the printing operation. At all other times the printing is visible and the operator can see the work as it progresses.

In Figs. 1 and 2 stationary loops 39^x are shown for limiting the movement of the ribbon frame which passes through said loop. The preferred form of limiting means consists as shown in Figs. 6 and 7^a of spring arms 40^x of wire depending from the cradle frame and attached to a vertically movable rod 41^x passing through a fork 42^x on the machine frame. This rod is screw threaded and has a nut 43^x above which is a spring buffer 44^x. When the ribbon frame is elevated the rod is raised and the buffer strikes against the under side of the fork and the resistance together with the spring of the wire arms 40^x renders the action easy, free from shock and makes an easy touch on the keys.

In order to give easy movement to the carriage I have provided a supplemental carriage between the ways and the main carriage which lessens the friction. This carriage is in the form of a truck, shown in Figs. 6 and 7. It consists of side bars 50 which rest upon the axles 51 of the wheels 52. These wheels run upon ways 53. The main carriage has bottom rails 56, 57, which rest upon the wheels 52. A flange 58 on the upper edge of the rail 55 extends over the bottom rail 57 of the main carriage, to hold the carriage in place. The rear rail of the main carriage may be held by any removable means. The truck is made of sufficient length to support the main carriage and is arranged to move within the lateral limits of the machine and with this interposed truck most of the friction is removed and the carriage is moved by a very light impulse. In order that the casing and its truck may be maintained in proper relation to each other and to prevent the carriage running off the rollers in very rapid operation a stop lever 50^x is pivoted to the carriage having its end 51^x bent down intermediate of and in line with the spurs 52^x projecting from the truck frame, which strikes the spur before the opposite end of the carriage leaves the roller and thus pulls the truck along with it. This lever is under tension of a spring 53^x and by pressure on the end 54^x of the lever the carriage may be removed from the machine as the end 51^x is thus thrown out of line with the spurs.

The special form of mechanism for feeding the carriage mechanism step by step to print the successive characters is shown in Fig. 3. The bell crank lever 60 is pivoted on the frame at 61 its upper arm carries a pawl 62

pivoted on the arm 60 and limited in its movement by a pin in the arm 60 working in the open slot in the pivoted end of the pawl 62. The bell crank lever has a downwardly extended arm 63, to which an adjustable spring 64 is attached, in order to give it the forward or feeding movement. The pawl is retracted by means of a link 65 between its horizontal arm and the cross bar 66 which is connected to levers 28. Every time the front end of these levers therefore is depressed, as by the operation of the ordinary key levers, or the direct depression of the levers 28, the pawl 62 is retracted and as soon as the levers are released the spring 64 pushes the pawl forward. It engages with the rack bar 67 fixed to the rear part of the main frame of the carriage. The free end of the pawl is formed inclined and it is arrested by an overhanging inclined stud 68 under which the inclined end of the pawl fits and is held down snugly to the rack bar as long as the pressure continues. This holds the carriage firmly in place during the printing operation. The stop 68 being once set in place it arrests the pawl and holds the carriage accurately and certainly at each step.

For moving the carriage backward I have provided another simple and effective mechanism, a direct and positive movement operated by a key lever, having direct and positive connection with the carriage. On the main frame of the machine are pivoted bell crank levers 70 one on each side. The upper ends have finger pieces 71, the upper ends extending horizontally to the front of the machine. The other ends extend vertically downward and are connected by a cross bar 72 which is near the base of the machine. To this cross bar is pivoted a connecting bar 73 the front end of which is also pivoted to a short arm 74 of the bell crank lever whose pivot is at 75 on the front of the base of the machine. The long arm 76 extends to the rear of the machine and is there connected by a link 77 to a vertical arm 78 which is detachably connected to the rear of the paper carriage. Depression of the finger pieces 71 will sway the arm 76 to the right and move back the carriage. In order to release the carriage and hold the pawl 62 out of engagement I have provided bell crank levers as 80, the lower arms of which have cam faces 81 which bear upon a cam roller 82^a supported on the levers 28. The upper ends of the bell crank arms 80 are connected by a cross bar 81 and a spur upon one of them marked 82 is connected to the base by a spring 83 so that normally the cam faces 81 are held out of engagement with the cam roller. The finger pieces 71 and the bars 81 are sufficiently near to each other to be operated by the same hand simultaneously. Therefore by pressing down on the bar 81 and operating the levers 80, the levers 28 are rocked, the link 65 lifted and the bell crank lever 60 turned, thus moving the pawl 62 to the left, Fig. 3, which also raises it slightly from the teeth of the rack bar its pivotal movement be-

ing limited by the pin 62^x in the open notch of the pawl hub, the pawl is thus held released, and then the carriage may be moved either way by raising or lowering the finger pieces 71. This movement may be any distance, from a single step to the extreme limit of the movement of the carriage, so that the operator without movement of his hands away from the key board has perfect easy and immediate control of the carriage. The arm 78 is forked at its upper ends and each end has a slot adapted to embrace a pin on the main bar of the carriage and the arm is held there-to by a thumb nut 78^a. The backward move-
 10 ment of the carriage is limited by an adjust-
 15 able stop 90^x set in a dovetailed groove in the main part of the machine. The end frames of the paper carriage are shown more clearly in Fig. 6 the roller 76 is mounted in said
 20 frames as is also the paper feed roll 93.

For the purpose of lifting the paper to give it the line feed movement without requiring the removal of the hand of the operator from the key board I have also connected the paper
 25 lifting mechanism with the key lever especially provided for the purpose.

It will be understood that the paper is inserted between the rollers and held to the cylinder by the spring clamping shield and that
 30 it is lifted by the rotation of the rollers. The large roller is turned by the pawl 100, this is pressed down by a spring and is carried on the upper end of lever 101. This lever is piv-
 35 oted at 102, each end has arms 103 extending rearwardly and connected to a bar 104, this bar being arranged to cross the carriage. The bearings of the levers 101 are in the carriage and the bar 104 moves with them. Under-
 40 neath said bar is a bent arm 105 which extends downward and is connected to a special key lever in the same rank with the key levers 45, the upper end of the arm extends un-
 45 derneath the bar 104. The bar is shown in plan view in Fig. 1 as is also the lever 105, this lever is pivoted at 106 and is connected to the lift lever 107. The lift key is indicated at 108. The paper roll 76 is removable and another roll with a harder or softer surface can be inserted in its place. The ratchet
 50 wheel *a* with which the pawl 100 engages to turn the roller, is journaled in the end frame of the carriage and on its inner side it has a socket *b* provided with notches in its edges. The journal *c* of the roller has a cross pin *c'*
 55 and this engages with the notches while the end of the journal fits in the socket and thus holds the roller at this end. The other jour-
 60 nal *d* fits in a socket *d'* in the post *e* of the carriage frame. This socket opens laterally toward the front of the machine and in plac-
 65 ing the roller the journal *c* is first seated in its notched socket and then the other journal *d* is slipped laterally into place. The spring guides *f* for the paper extending up in front of the roller keeps the roller in position against lateral displacement. The notch and pin con-
 nection between the journal *c* and the ratchet

wheel causes the movement of the ratchet to be given to the roller.

In this machine the tension on the keys may
 70 be regulated for a light or a heavy touch by adjusting the spring 64 by means of the screw 64^a to which it is connected.

I claim as my invention—

1. In combination a vertically movable cra-
 75 dle frame upon the main frame of a type writing machine, and type bars arranged to move longitudinally, converging to a common center and having their bearings in said mov-
 80 able frame, and having also connections with
 said suitable keys, and mechanism for shifting said movable frame, all substantially as de-
 scribed.

2. In combination, a vertically movable cra-
 85 dle frame pivoted at its front end on the main frame of a type writing machine type bars arranged to move longitudinally on said frame, a lever for shifting said movable frame,
 90 and key levers connected to said frame all substantially as described.

3. In combination with the cradle frame carrying the longitudinally moving type bars, and pivoted at its front end, the lever 13 ar-
 95 ranged to lift the cradle frame having a bar at its front end substantially as described.

4. In combination with the cradle frame le-
 100 ver 13 having a bar at its front end and arranged to lift the pivoted cradle frame, the arm 16 and the plunger adapted to be oper-
 ated by the finger, with locking and releasing mechanism substantially as described.

5. In combination with the vertically mov-
 105 able cradle frame having its type bars arranged in banks or rows one above the other, and its pivot midway between the upper and the lower, the reversely arranged bell crank levers connected by links to said type bars and also connected to the key levers substan-
 tially as described.

6. In combination with the mechanism for
 110 moving the paper carriage, levers, one upon each side of the machine, and a space bar extending over the ends of said levers and sup-
 115 ported by a spring but not connected with the levers, substantially as described.

7. In combination the levers 28 connected
 120 with the mechanism which moves the carriage, said levers having the inwardly bent ends 29 and buffers 30 in combination with a space bar, substantially as described.

8. The ribbon spools mounted upon verti-
 125 cal shafts and having ratchet wheels at their lower ends in combination with pawls, mount-
 ed on a cross bar adapted to be shifted to throw one pawl in and the other out, and mechanism for shifting the said cross bar lon-
 130 gitudinally to change the pawls and connect-
 ing with the key levers, for reciprocating said bar to operate the spools substantially as de-
 scribed.

9. In combination the ribbon spools mount-
 ed upon vertical shafts and having ratchet wheels at their lower ends the cross bar 34 carrying pawls, the space levers 28 having

arms 36 carrying said cross bar and means for shifting the cross bar consisting of the cross bar 34^x having a loose connection with the bar 34 with its ends projecting through the sides of the casing substantially as described.

10. In combination with the cross bar carrying the pawls, and arranged to be shifted lengthwise and reciprocated laterally in the described relation to the ratchet wheels, the arms 36 on levers 28, connected to said cross bar substantially as described.

11. In combination the ribbon the supporting frame held on arms 39, the spring 41 and the extensions 42 connected by rod 43 to cross bar 44 substantially as described.

12. In combination with the main track and the main carriage supporting the paper rolls an interposed truck composed of a frame mounted on wheels arranged to run on the main track substantially as described.

13. In combination the carriage the track, and the interposed truck with projections arranged in line with a projection on the carriage substantially as described.

14. In combination the carriage the track the interposed truck and the projection on the carriage arranged to engage the projections on the truck and to be moved into and out of line with said projections substantially as described.

15. In combination with the frame of the paper carriage and its rack bar, a pawl having a beveled free end and a stop having a shoulder extending over the rack bar and arranged to fit over the end of the pawl and to arrest the same and hold it in contact with the teeth of the rack bar, and mechanism for operating the pawl substantially as described.

16. In combination with the paper carriage a lever connected therewith by means of a rigidly attached vertical arm 78, said lever extending to the front of the machine, and arranged to move the paper carriage in either direction, and connections with said lever adapted to be manipulated by the hand of the operator substantially as described.

17. In combination the bar 71 connected to the lever which operates the carriage, and the bar 81 connected with mechanism for releasing the pawl which holds the carriage, the said bars being arranged over the key board and

near each other whereby they may be operated by one hand substantially as described.

18. In combination with the frame of the carriage the ratchet wheel having the socket the journal *c* of the roller adapted thereto the journal *d* and the socket *e* opening laterally in the frame substantially as described.

19. In combination with the frame of the carriage the removable roller having a journal adapted to the socket of a ratchet wheel and another journal held in a slotted socket and the spring paper guides arranged to retain the roller in place.

20. In a type writer and in combination the key levers the bell crank lever carrying the pawl which directly acts upon the rack bar of the carriage the connections between the bell crank lever and the carriage and a variable tension device consisting of a spring attached to the arm of the said lever, and a screw attached to the spring for adjusting the touch of the keys substantially as described.

21. In combination the carriage a lever having operating means for operating it positively in either direction and a detachable connection between said means and the carriage substantially as described.

22. In combination the carriage feed mechanism therefor connected with the keys, means for releasing said feed mechanism, and operating connections to the carriage for operating it positively in either direction when released from its feed mechanism.

23. In a type writing machine having a platen and series of independently moving type bars supported in a frame, a lever for changing the relative positions of the platen and type bars and a finger bar attached to the said lever and extending across the machine substantially as described.

24. The combination of a series of longitudinally sliding type bars, a series of key levers, and a vertically shifting guide for the free ends of the type bars, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

BERNARD GRANVILLE.

Witnesses:

HENRY E. COOPER,
F. L. MIDDLETON.