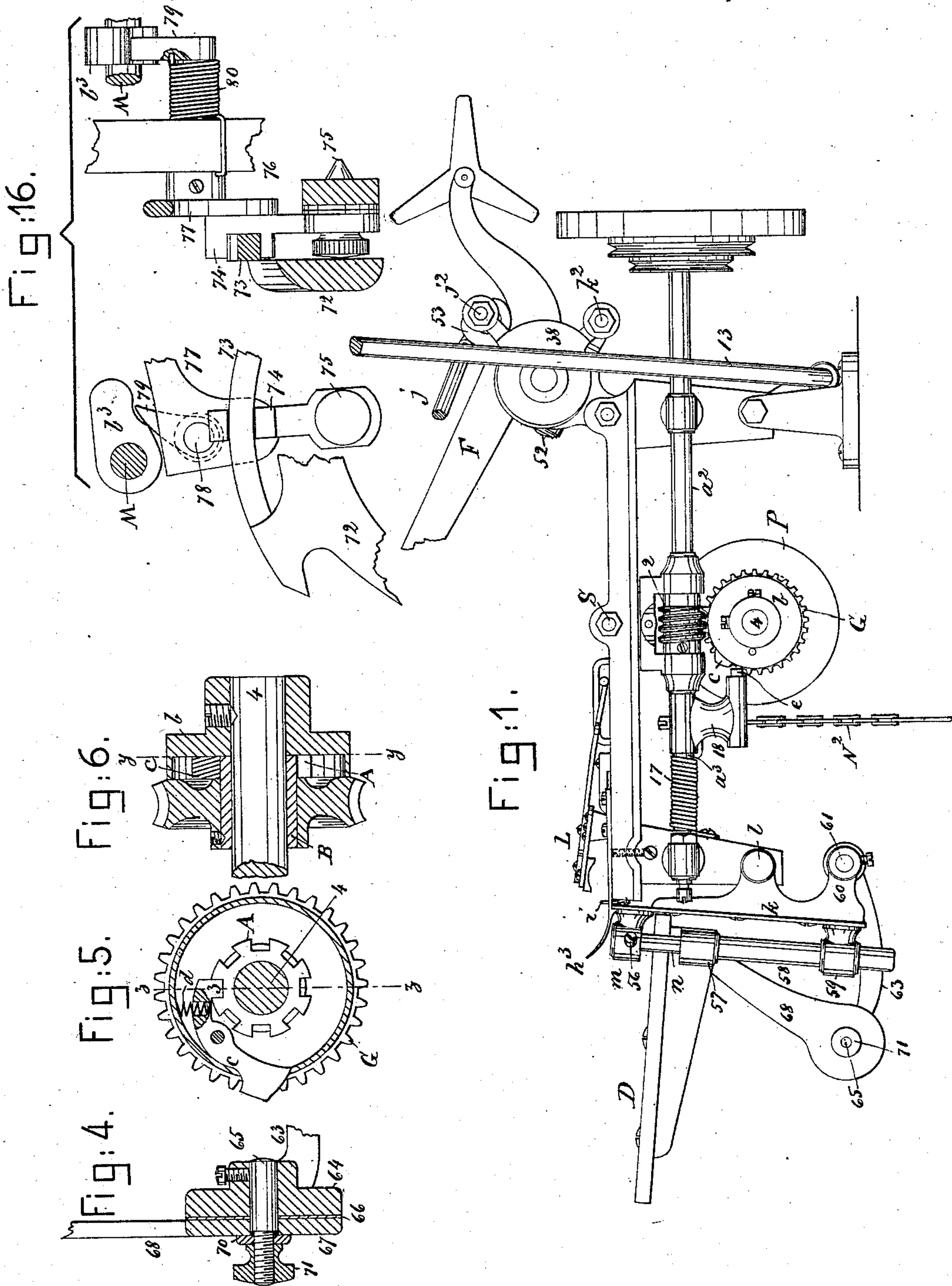


E. S. BOYNTON.
Book Sewing Machine.

No. 232,447.

Patented Sept. 21, 1880.

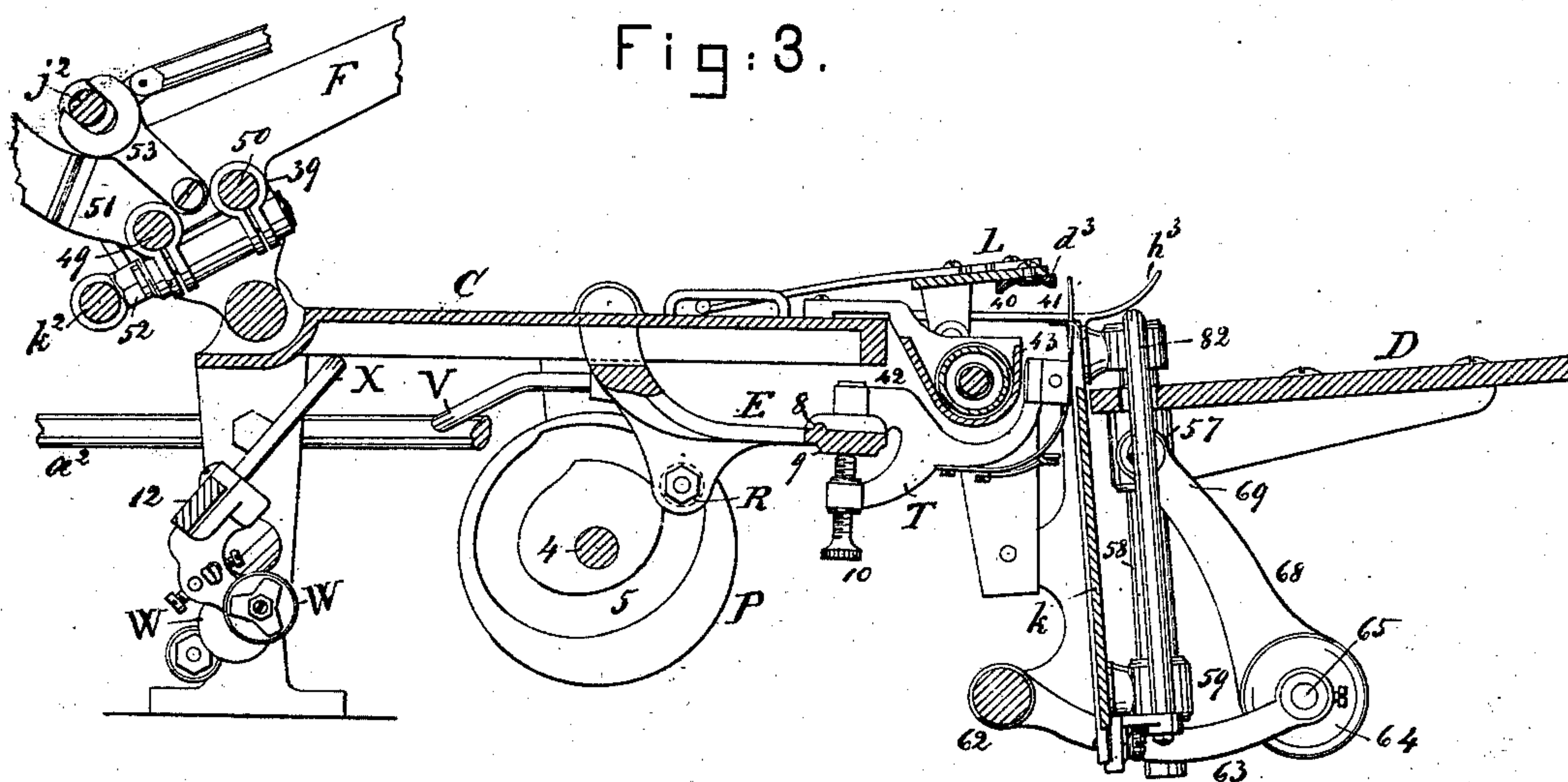
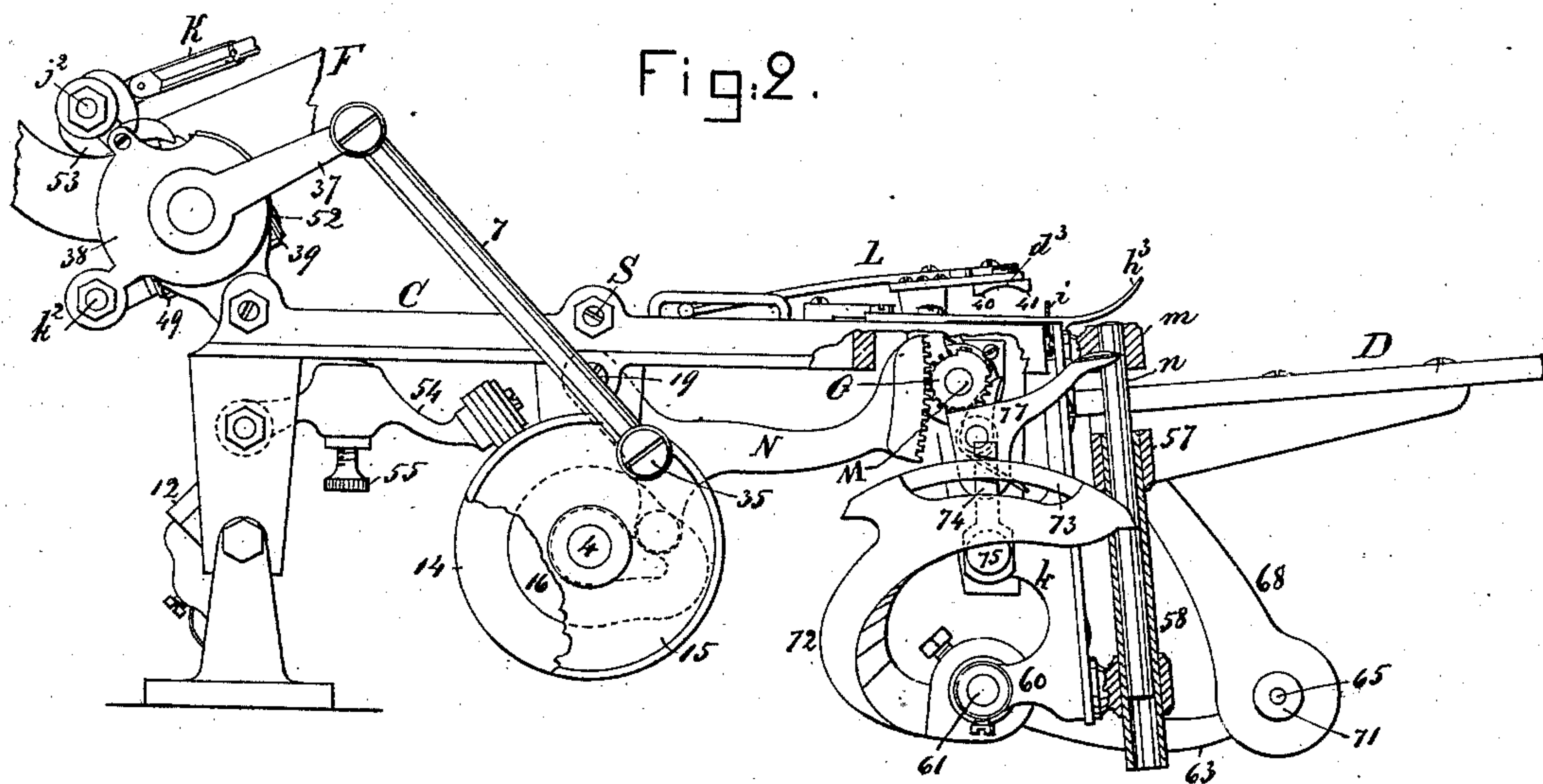


Witnesses.
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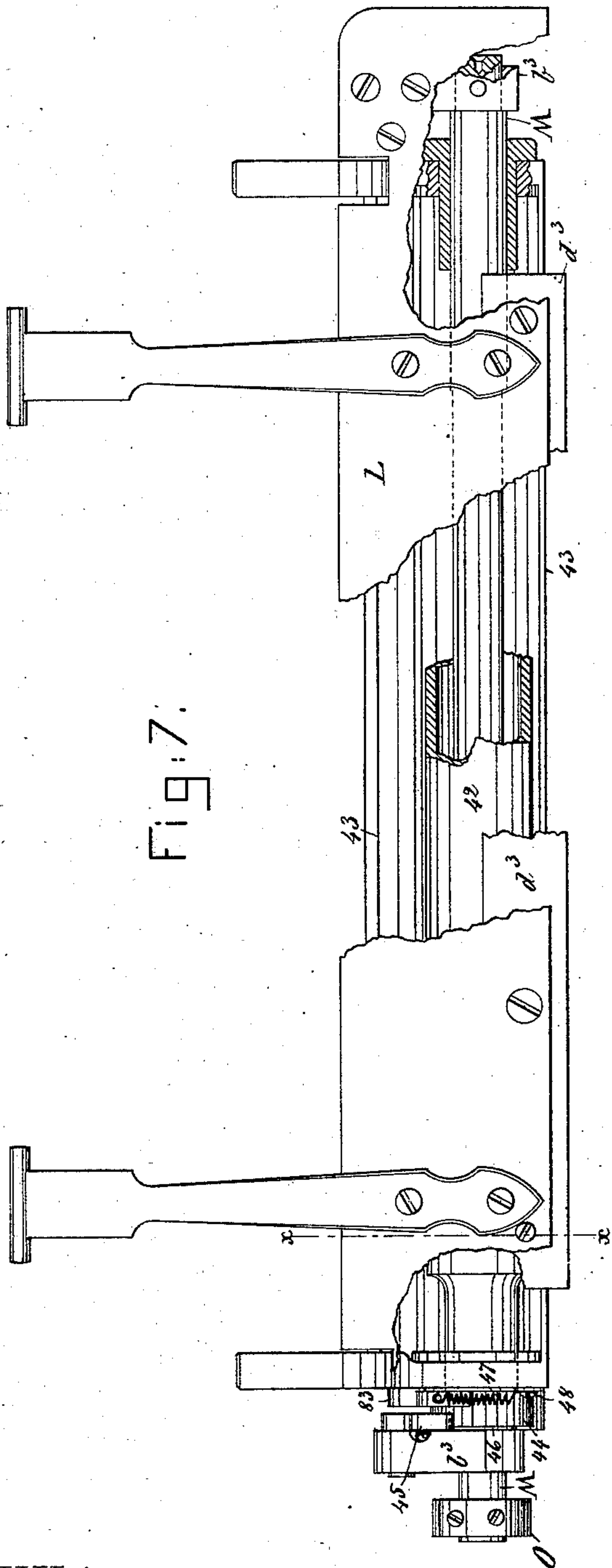


Fig. 7.

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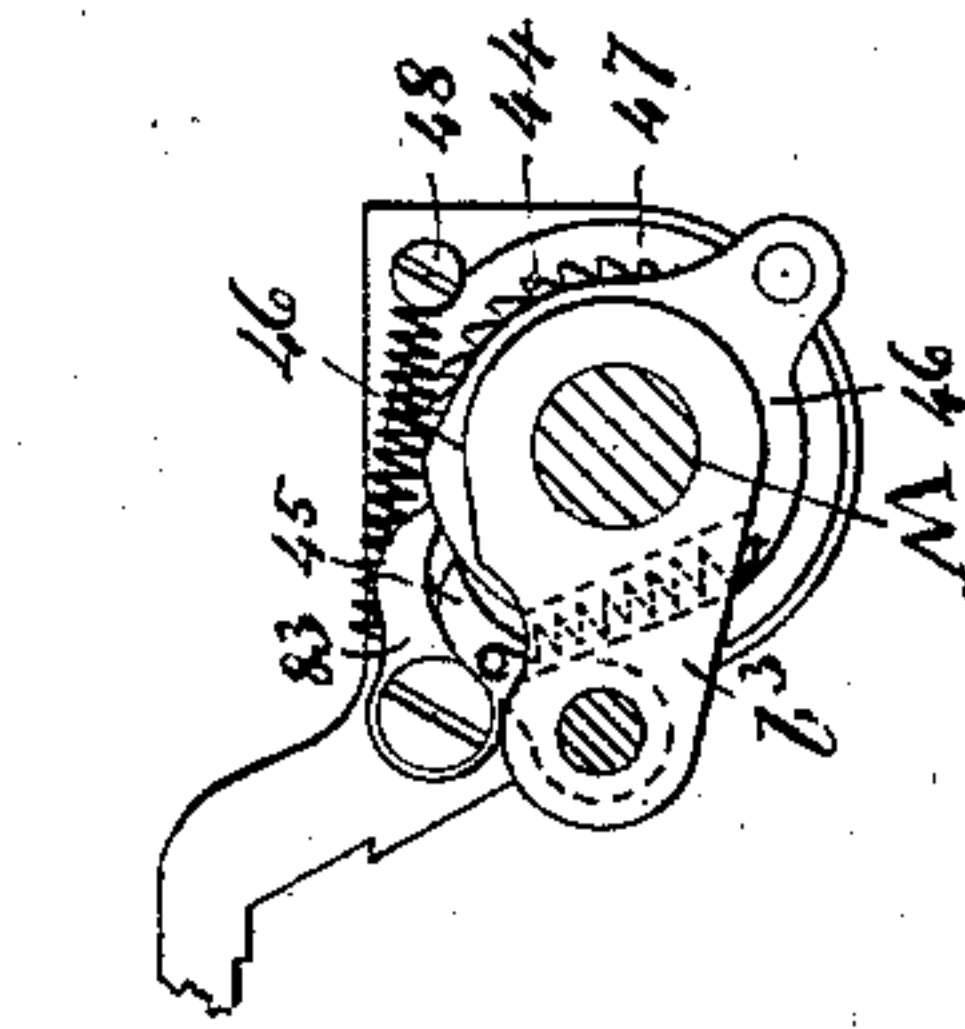
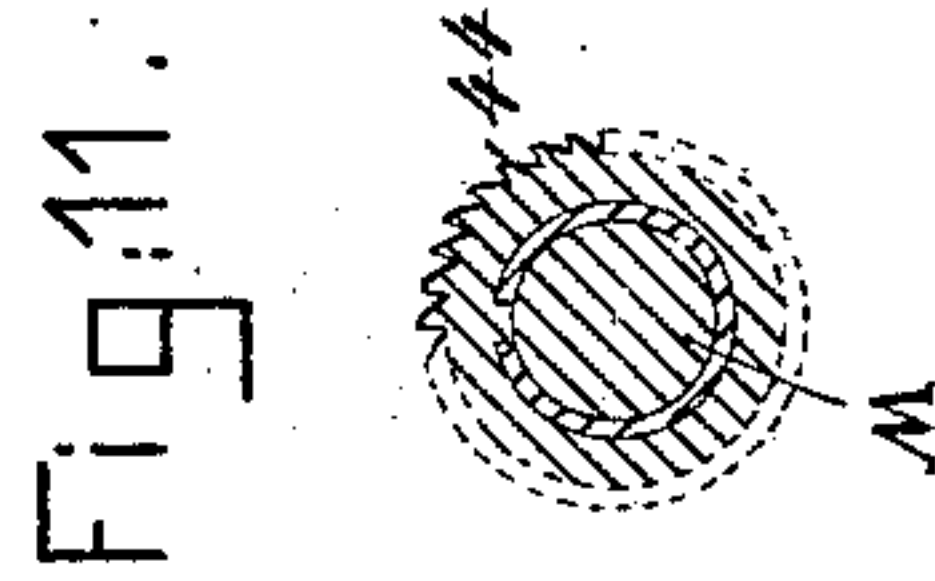
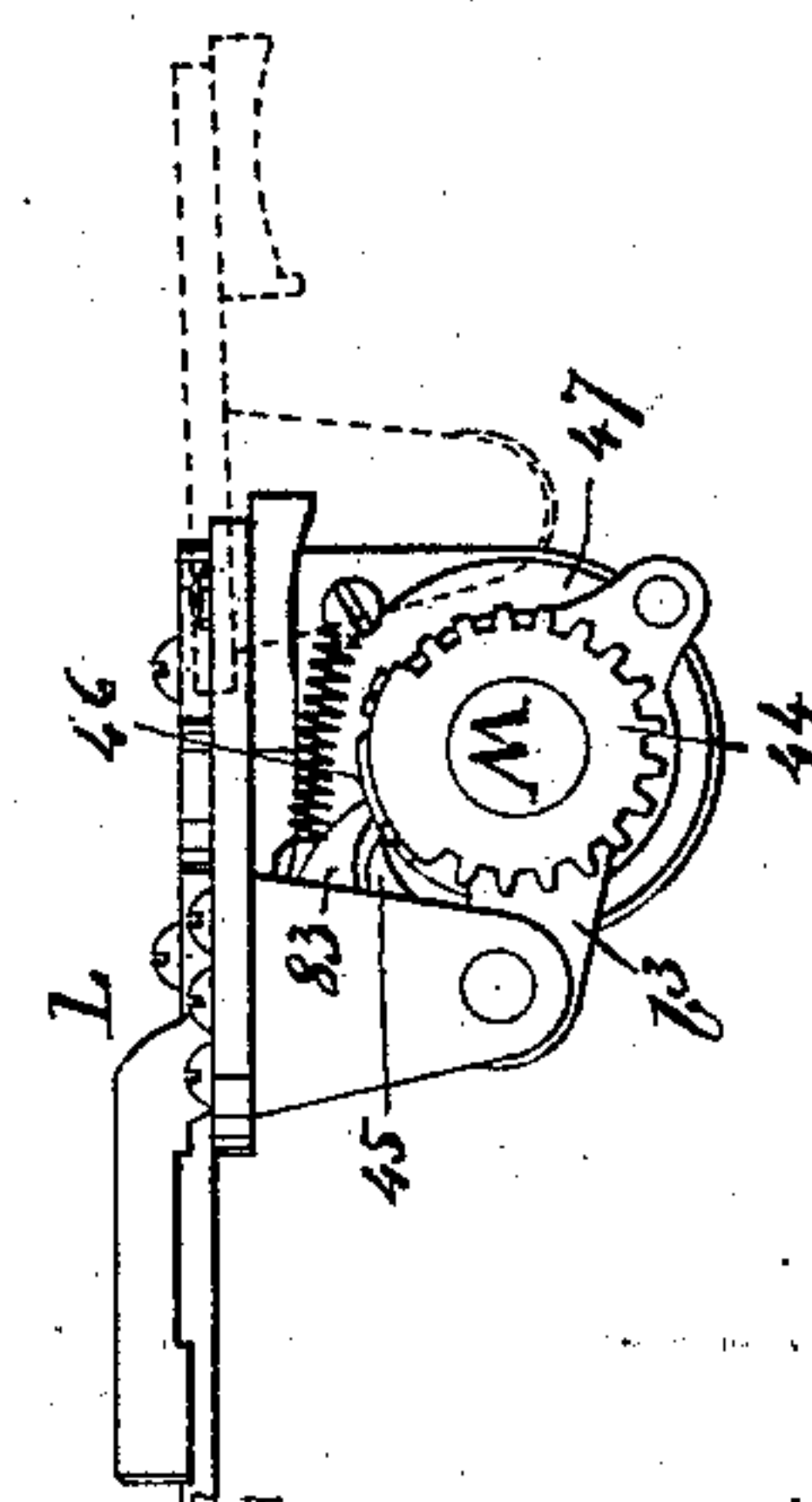
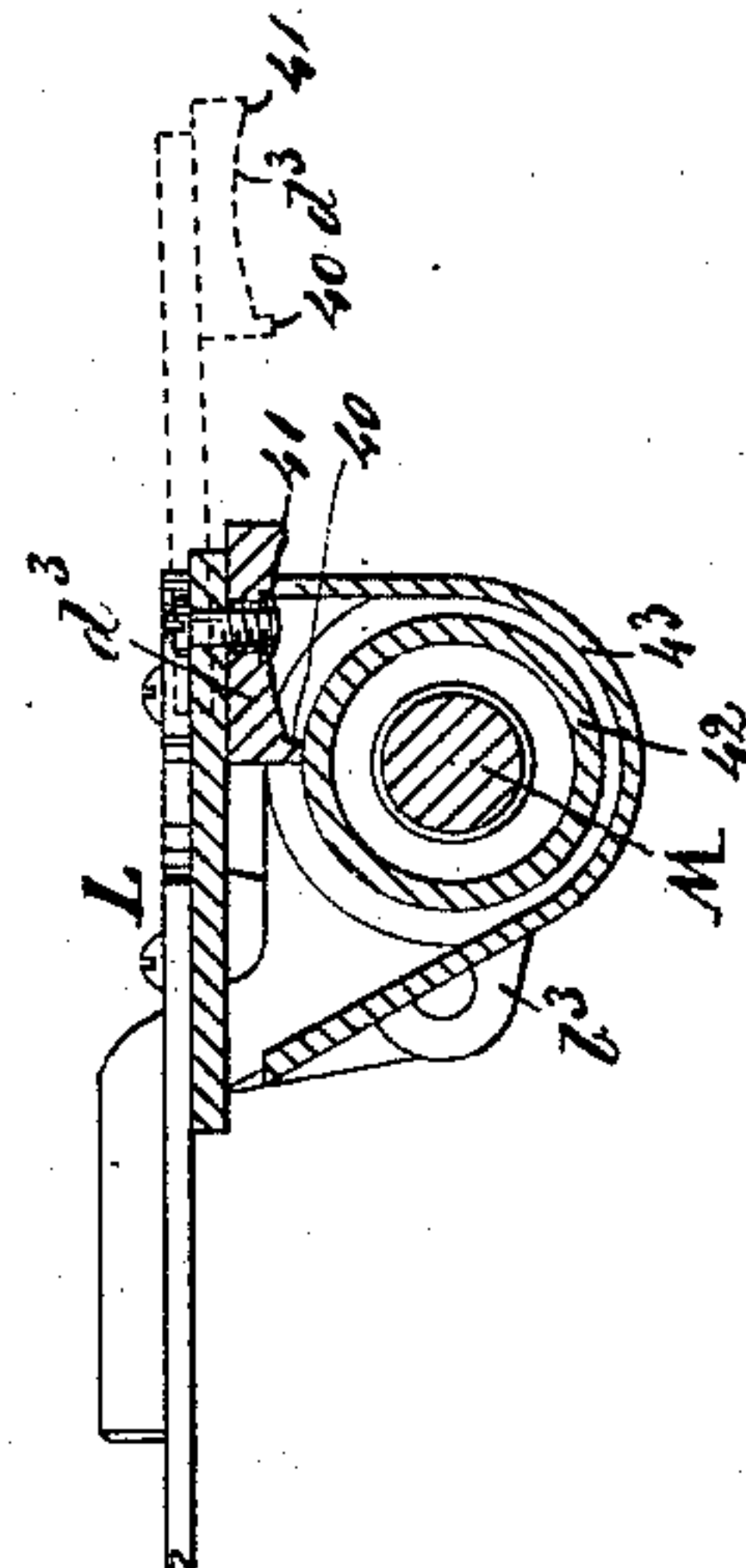


Fig. 10.

Fig. 8.

Fig. 9.



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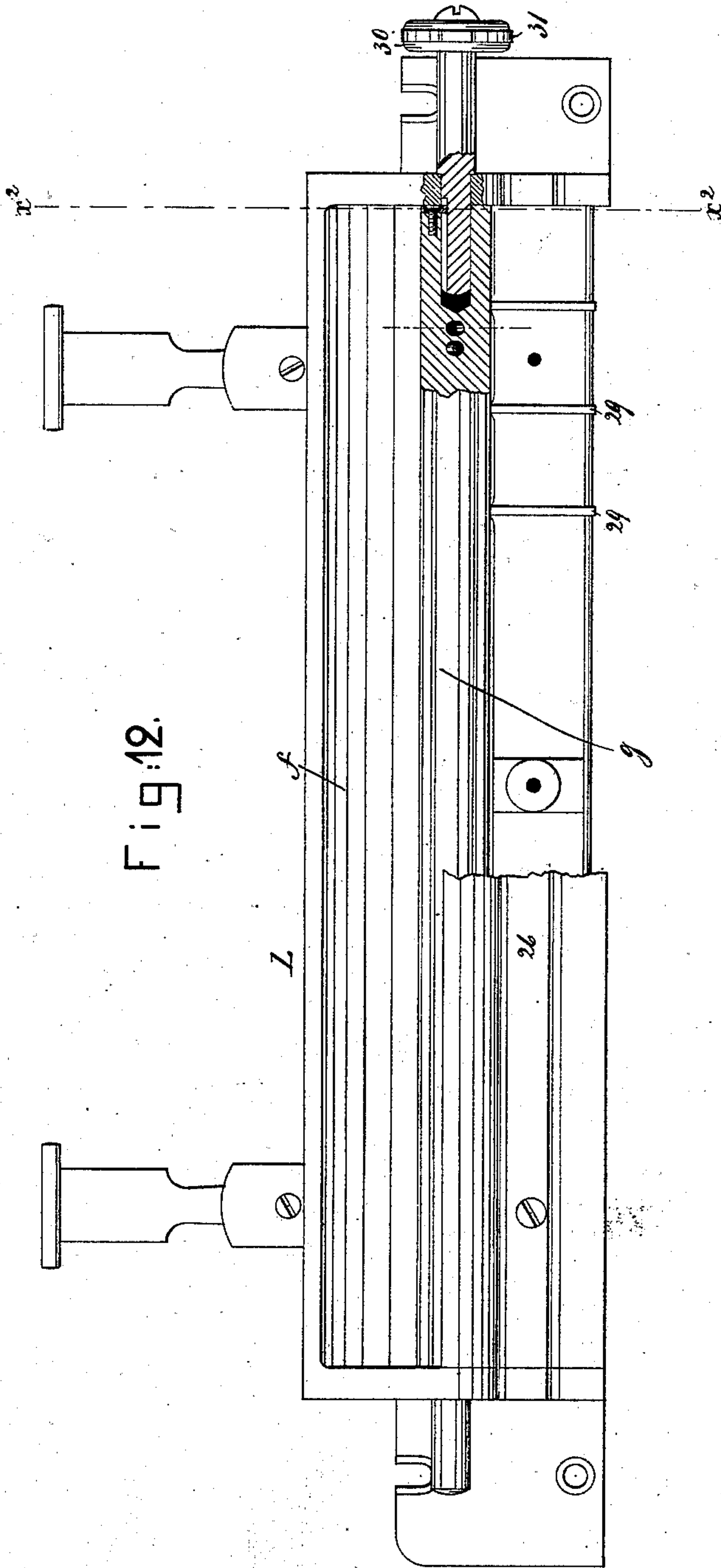


Fig. 12.

Fig. 15.

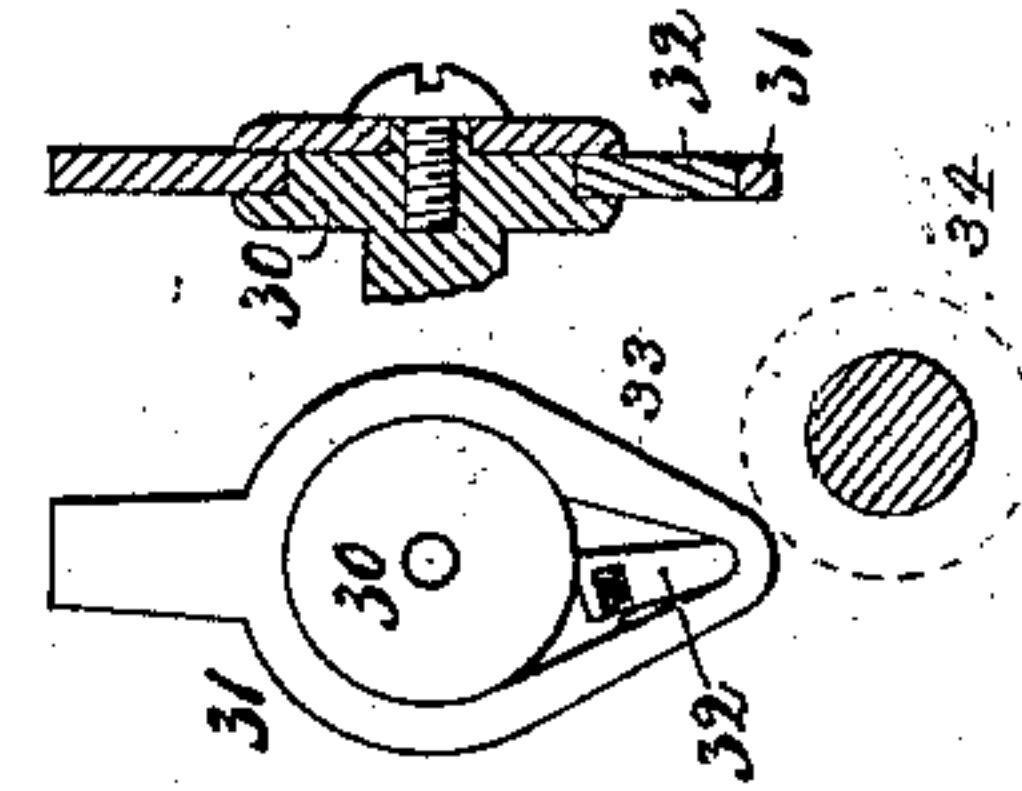
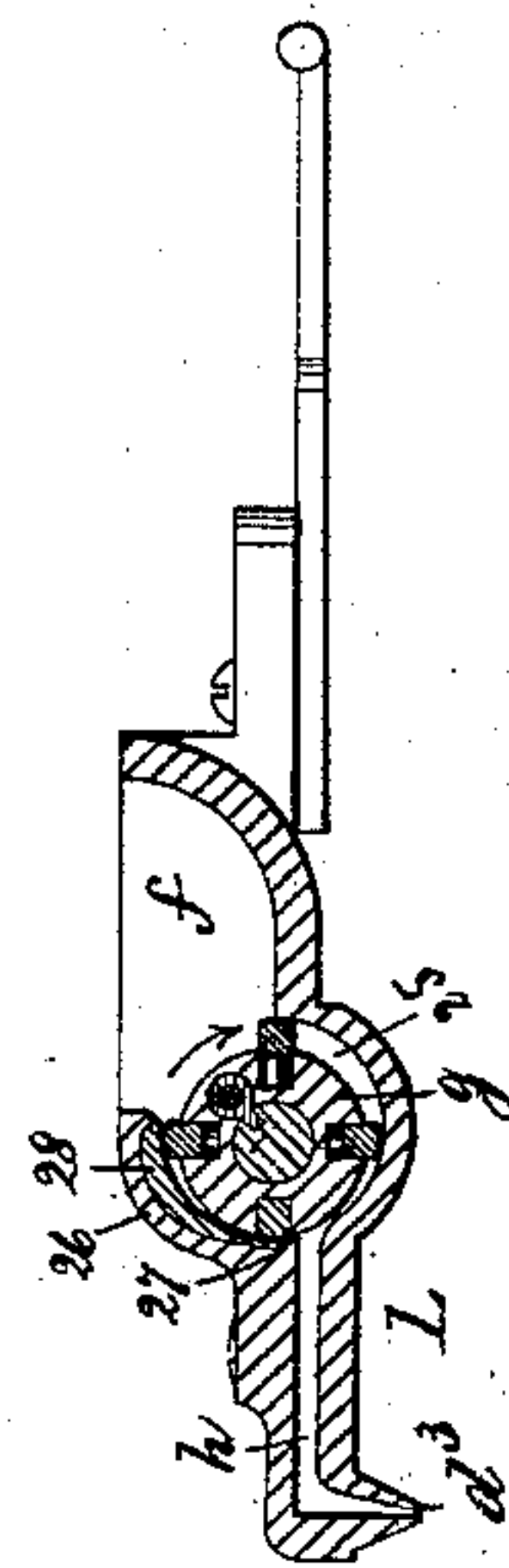


Fig. 14.



Fig. 13.



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UNITED STATES PATENT OFFICE.

EDWARD S. BOYNTON, OF BRIDGEPORT, CONNECTICUT.

BOOK-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 232,447, dated September 21, 1880.

Application filed February 16, 1880.

To all whom it may concern:

Be it known that I, EDWARD S. BOYNTON, of Bridgeport, county of Fairfield, State of Connecticut, have invented an Improvement in Book-Sewing Machines, of which the following description, in connection with the accompanying drawings, is a specification.

This invention relates to book-sewing machines, and is an improvement on United States Patent No. 203,530, dated May 14, 1878, to which reference may be had.

This my present invention refers to various improvements in the details of construction, whereby the mechanism is greatly simplified, made more positive in its operation, and more easily adjusted to different-sized books.

One of my improvements consists in a set of telescopic guides to control the vertical movement of the work-supporting plate, whereby great compactness of parts is gained; also, in the combination, with the book-supporting plate and a segmental or arcal flange made movable with it, of a clamping dog adapted to quickly release or grasp the said flange, as hereinafter described; also, in details of mechanism for connecting the pressers with their carrying-shafts; also, in a book-sewing machine, in the employment of a pasting or gumming mechanism, as hereinafter described, so as to both stitch and paste or gum the signatures together or "tip" them.

In sewing books by machines it is customary to sew together several books in succession, forming what is called a "bench," the several books being connected by long threads or bands, and after being separated the end bands of the book are turned back and interlaced with a portion of the thread or band in the book, this being possible because of the signatures being loosely connected.

In my patented machine referred to the signatures are so closely joined by the sewing that the end bands cannot be easily passed between the signatures to be interlaced, and without the interlacing the outer signature is liable by careless handling of quantities of books to become loosened or displaced.

In the manufacture by hand of the better class of books it is customary to tip or paste the signatures as they are sewed upon the bands.

In order to produce by the sewing-machine a book which shall have all the advantages of the best hand-made work, I have by experiment succeeded in adding to the sewing mechanism a pasting or gumming mechanism to tip or gum each signature consecutively as it is being sewed, such tipping avoiding the necessity of fastening or kettle-stitching the end bands, which is a matter of considerable expense.

Many of the parts of this my present machine, such as the pressers and the wire-feeding and the wire-cutting devices, are the same as in my patented machine hereinbefore referred to, and are not shown in the drawings.

Figure 1 represents a partial right-hand end view of a machine containing my present improvements; Fig. 2, a similar left-hand end view; Fig. 3, a central vertical section; Fig. 4, detail of one of the friction-joints to sustain and hold the work-supporting plate. Fig. 5 is a section on the line *y y*, Fig. 6, and Fig. 6 is a section on the line *z z*, Fig. 5, these two figures showing the clutch or stop mechanism for the cam-shaft on an enlarged scale; Fig. 7, a top view, partly in section, of the folder and paster removed from the machine; Fig. 8, a cross-section of Fig. 7 on line *x x*; Fig. 9, an end view of Fig. 7; Fig. 10, an end view of Fig. 7, the pinion at its left-hand end being removed; Fig. 11, a detail of the ratchet-wheel on the paste-roller journal; Fig. 12, a modification of the folding and pasting mechanism; Fig. 13, a section thereof on the line *x² x²*; Fig. 14, a section of the paste-roller; Fig. 15, details of the pawl for operating the paste-roller intermittently, and Fig. 16 details of the clamping mechanism for the plate D.

The table C or frame-work, presser-arm F, work-supporting plate D, connecting-rod J, for operating the wire-cutting device, (not shown,) connecting-rod K, for operating the wire-feeding devices, (not shown,) needles *i*, throat-plates *a*, catches *h³*, driven shaft *a²*, its worm 2, and the connections between the presser-carrying shaft and the shafts or rods *j² k²* are all as described and shown in the said patent.

The cam-shaft 4 has secured to it (see Figs. 1 and 6) a hollow hub, *b*, upon which is pivoted a pawl, *c*, having a lug, 3, that, by a spring, *d*, is kept in engagement with one of

the notches of a toothed ratchet, A, fast on a sleeve, B, loose on the shaft 4. The worm-toothed pinion G is made fast upon this loose sleeve.

5 The outer or longer end of the pawl *c*, beveled, as shown, projects through a slot in the hub *b*, and just at that stage when the needles *i* are most elevated and in position to have applied to them a new signature to be united to
10 the book-pile a dog, *e*, of an arm, 18, projected from a rock-shaft, *a*³, in line with the shaft *a*², meets the pawl, throws its longer end partially within the hub, and releases the ratchet A and worm-toothed gear, leaving the shaft 4 at rest
15 while the signature is applied to the needles, the shaft *a*² continuing its movement. This arm 18 is connected with one end of the torsional spring 17, the other end of which is connected with the frame-work of the machine, and the
20 spring acts at all times to keep the arm and stop *e* in the position shown in Fig. 1; but when it is desired to permit the shaft 4 to again start, the arm 18 may be moved to one side to permit the pawl *c* to operate by pulling upon
25 the connected chain N², the lower end of which will, in practice, be joined with a treadle under the control of the operator.

The shaft 4 has upon it a cam-disk, P, having a cam-groove, 5, (see Fig. 3,) that receives
30 a roller or stud, R, on the needle-actuating arm E, having its center of motion on point-screws S, held in the table.

The needles *i* are attached to carriers T, (herein shown as forked,) grooved at 8 to embrace a longitudinal spline (see Fig. 3) on the
35 long bar 9, which extends substantially the length of the machine, and upon which the carriers (two or more) are adjustably attached by means of the set-screws 10.

40 The spline and groove prevent side twisting of the carriers on the needle-arm, and by removing the carriers from the bar 9 the needles may be quickly and readily applied or removed, whereas in my patented machine it is
45 a matter of considerable trouble to remove and replace a needle or adjust the same laterally according to the positions of the saw-scarfs in the signatures.

Connected with the needle-actuating arm E
50 is a bar or rod, V, over which the threads of the needles extend on their way from the usual thread-tension devices W and thread-slacking bar X, they being attached to a rocking bar, 12, which, when the machine is in regular operation, stands as in Fig. 3, the lever 13, (see
55 Fig. 1,) connected with it, then extending upward.

When a book is to be withdrawn all the threads have to be made slack, and to do this
60 at one operation the lever 13 has only to be turned forward, which lowers the rod X, causing it to act upon and slacken all the threads preparatory to commencing the sewing of another book. The shaft 4 has a cam-disk, 14,
65 (see Fig. 2,) at the rear of the disk 15, also connected with the said shaft.

The cam-groove 16 of the cam-disk 14, shaped as shown partially in dotted lines, receives a suitable roller or stud connected with the sector-lever N, pivoted at 19, which lever,
70 with the pinion O, oscillating shaft M, and arms *b*³, (see Figs. 9 and 16,) are the same as in my patent referred to, these devices being employed to operate the folder L, which acts to carry that half of the signature laid upon
75 table C over upon the other half, resting on the supporting-plate D or book-pile thereon.

The folder L, as herein shown, besides folding the signature, as in my patent referred to, is also adapted to apply gum upon or to tip
80 the signatures as they are piled one upon the other, the gum being supplied from a suitable roller in a gum-box, and in this specification I shall at times refer to the device L, which at the proper time descends upon the folded parts
85 of the signature, as a folder and as a tipping device, according to the function it performs. The folder L is constructed substantially as shown and described in my said patent; but instead of having a fixed lip I have provided
90 it with a lip, *d*³, which I prefer to make adjustable and of wood or other non-metallic substance having preferably two longitudinal ribs, 40 41, to act upon and press down the signatures and also gum them.
95

The rib or part 41 first strikes the signature in the act of folding it and presses it down, after which, in the further descent of the folder, the rib 40 applies gum to the signature, provided it has had gum applied to it by the roller
100 42, located in the fountain 43. This oscillating shaft M, having upon it the cranks *b*³, passes through and supports this roller and partially supports the fountain.

The roller-journal beyond the fountain at
105 the left of Fig. 7 has upon it a ratchet, 44, which is engaged by the pawl 45 on one of the cranks *b*³, the said ratchet moving the roller intermittingly for a greater or less distance, according to the position of the pawl-controlling shield 46, which is herein shown as a cam-shaped ring connected with a base-ring, 47,
110 made adjustable by the screw 48, the position of the pawl-controller with relation to the ratchet against which it rests determining the time of the engagement of the pawl with the said ratchet. The slower the movement of the roller the less gum will be held upon its surface at top where the ridge part 40 of the lip strikes it. Each time that the device which
115 carries the lip descends in its backward position, as in Figs. 7 and 8, it is supplied with gum by contact with the roller 42, which it applies to the uppermost signature as the lip descends in its most forward position.
125

In Figs. 12 to 15 I have shown a modification of the folding and tipping mechanism more especially adapted for thick gum or paste. In the said modification the folder is provided with a paste or gum receptacle, *f*, and a paste-regulating roller, *g*, to regulate the quantity of
130 paste which shall pass along through the chan-

nel h and be delivered at the lip d^3 upon the signature, the said lip in this instance, as in my said patent, passing over the top of the throat-plate a and descending upon the signature as it is folded over upon the book-pile.

The paste-delivering orifice of the lip d^3 is very fine, and the paste or equivalent is readily forced out through it in regulated quantities by the roller g , which acts as a rotary forcing-pump. This roller has four movable bars or wings, 20, 21, 22, and 23, those opposite each other being connected together by suitable rods 24, so that they move radially in opposite directions with relation to the axis of the roller g , as the roller, rotating in the direction of the arrow near it, is made to turn in the curved space in the paste-receptacle f . These bars act in succession upon and carry the paste from the receptacle f along the space 25 into the channel h .

The corner 27 (see Fig. 13) of the cover-plate 26 serves as a doctor or clearer for the roller g , and within the cover-plate is a removable Babbitt-metal or other enduring face, 28, which may be removed and a new one supplied when necessary.

The passage-way h (see Fig. 13) is divided at suitable intervals by transverse ribs 29, forming thereby several independent channels instead of one broad one, in order that the narrow channels or ways may be filled in with suitable plates or blocks and prevent the outward passage of paste when the signatures are short. This construction of the pasting apparatus of the folder enables the same pasting device to be used for the signatures of books of different sizes.

The roller g has at one end of it a smooth-faced pulley, 30, (see Fig. 15,) which is embraced by a yoke, 31, carrying a friction-pawl, 32. This yoke has a nose, 33, which, as the folder-plate descends in its forward and backward positions, strikes first at one and then at the other side of a suitable roller, 34, (see dotted lines,) which will then be placed loosely upon the shaft M .

The disk 15 has a crank-pin, 35, connected, by a link, 7, with the arm 37, to impart motion to the presser-arm F and its connected parts 38 and $k^2 j^2$ $K J$, as in my said patent.

In this present machine I have provided the presser-arm with two open sockets, 39 49, (see Fig. 3,) to embrace two parallel rods, 50 51. The presser-arms F are adjustably clamped to the said rods 50 51 by a single clamping-screw, 52, extended through ears of both the sockets, so that they may be moved horizontally when necessary in order to place them in position to properly co-operate with the needles. Each presser-bar has pivoted upon it a yoke, 53, slotted at its outer end to embrace the rod j^2 , the said rod guiding the yoke and permitting it to be moved longitudinally with the presser. Connected with this yoke are the rods $J K$, before described, which are moved longitudinally at the proper times through the rod j^2 ,

which turns the yokes 53 independently of the movement of the presser F about its center of motion or pivot.

To prevent the shaft 4 turning after the worm-toothed pinion is disengaged from it, I have applied to the machine an adjustable lever-brake, 54, controlled by a screw, 55, (see Fig. 2,) the brake bearing upon the periphery of the disk 14.

The back plate, k , with which the throat-plates a are adjustably connected, is pivoted at l , and has lugs m at each end, in which are secured, by set-screws 56, rods n , that extend down through ears 57, connected with the supporting-plate D , the said ears in turn having connected with them tubes 58, which are extended into guides 59, connected with the back plate at its lower ends, the said rods n and tubes 58 forming a telescopic guide to direct the plate D in its vertical movement.

The ears 60 of the back-plate supporting-frame have pointed studs 61, which serve as bearings for a shaft, 62, which, at each side of the machine, has an arm, 63, provided at its outer end with a disk, 64. Each of these disks receives a stud, 65, upon which is placed preferably a friction-washer, 66, and then there are applied to the said studs the disks 67, forming part of the arms 68, that at their upper ends, as at 69, are pivoted to the ears 57, forming part of the supporting-plate D . Each stud 65 is provided with a suitable washer, 70, and nut 71, which may be turned so as to force together more or less closely the friction-disks 64 and 67, which constitute the friction-joints to prevent the plate D descending more than the distance through which it is positively moved by the folder, as described, acting on a signature, the plate D at that time being held only by the friction-joints.

The shaft 62 at one end has an arm, 72, provided with a segment or areal flange, 73, which flange is engaged and locked by a clamping-dog, 74, loosely pivoted at 75, and adapted to turn in the arc of a circle less than that of the flange 73 in order that the dog, by a very slight movement, may quickly engage or release the said flange. This dog 74 has at its rear side a stud, 76, which is engaged by one arm of a lever, 77, on a short shaft, 78, having a toe, 79, which, at each descent of the folder L , when in forward position, is operated upon by the arm b^3 of the rocking shaft M , which causes the shaft 78 to so move the dog 74 as to release its hold upon the areal flange 73 and leave it and the shaft 62 free to turn as the supporting-plate D , by the action of the lip d^3 of the folder upon the folded signature, is pressed down, the downward movement of the said plate D being more or less, according to the thickness of the signature.

If it is desired to raise or lower the table by hand the friction-dog 74 may be released by depressing the lever 77.

The shaft 78 is surrounded by a torsional spring, 80, (shown in Figs. 2 and 16,) the tend-

ency of which is to so move the said shaft that the dog 74 will engage and hold the flange 73 locked.

By the employment of the clamping-dog, as described, in connection with the flange 73, they having different centers of motion, I am enabled to cause the plate D to descend automatically for just the proper distance with the thinnest or thickest signatures, which could not be done with accuracy were a pawl and ratchet employed.

I do not desire to limit this my invention to the particular sewing mechanism or mechanism for connecting the signatures together on a band when combined with pasting or gumming mechanism, as it will be obvious to one skilled in the art that any other usual form of the said signature-connecting mechanism might be used instead.

I have herein shown the tipping mechanism as forming part of the folder, as that is the most simple plan known to me to adapt it to my particular machine; but it is obvious that the tipping mechanism might be made separate from the folding mechanism, and be operated by independent devices; and it is also obvious should I place folded sheets or signatures one on the other by hand that I might by the apparatus herein described tip or gum them, and that the table would be automatically depressed with the increasing depth of the pile or sheets of signatures. In such a plan the folder would become only a tipping device.

When the machine is operated without the tipping mechanism the books, as they are removed from the plate D, are evened by rapping at the end; but when the signatures are tipped together, it is obvious, should they be uneven at the ends, that this could not be done; so I have provided the back plate with an adjustable end gage, 82, which is extended upward through an elongated slot in the plate D, it serving, as the ends of the signatures are drawn toward and against it by the pull of the band-threads, to even the signatures. The gumming-roller is prevented from turning backward by the detent 83.

I claim—

1. In a book-sewing machine, the movable work-supporting plate, the throat-plates, the needles, needle-carriers, needle-arm, the shaft 4 and cam thereon to move it, the hub and pawl connected with the said shaft, the ratchet and gear loose thereon, and the movable arm to meet and disengage the said pawl from the said ratchet at the proper time to free the gear and stop the needles in position to receive the signatures, all substantially as described.

2. The shaft 62, the connected arcal flange, the dog to lock and release it at the proper time, and the arms 63, combined with the work-supporting plate, the folder, and the arms 68, connected with the work-supporting plate and with the arms 63 by means of the friction-joints, to operate substantially as described.

3. The work-supporting plate and back plate and their telescopic connecting-rods n and 58, substantially as described.

4. The shaft 62, its connected segmental or arcal flange 73 and arms 63, and the plate D and its arm 68, to connect it with the arms 63, combined with the clamping-dog to grasp the said flange and hold the plate D fixed in position, or to release the flange and permit the said plate to be lowered, as described.

5. In a book-sewing machine, the presser-carrying arms F, provided with the two sockets and the two rods 50 51, combined with the set-screw to clamp the arm in adjusted position upon the said rods, substantially as described.

6. The combination, with the presser arm and rod j^2 , of the yoke 53, pivoted upon the presser-arm, adjustable therewith, and made to co-operate with the rod j^2 , from which it receives its motion, substantially as described.

7. In a book-sewing machine, the needles and their actuating devices, the bar V, and the thread tension devices, combined with the thread-slacking bar to operate simultaneously on all the threads, to permit the threads to be drawn from the needles to separate one book already sewed from another to be sewed without severing the said threads, substantially as described.

8. In a machine for uniting the signatures of books, the tipping or gumming mechanism to paste or gum only the uppermost sheet at its upper side as the said signatures are otherwise positively united or connected one with the other, substantially as set forth.

9. In a machine for uniting the signatures of books, a work-support and a folder provided with a lip, combined with means, substantially as described, to supply the lip with paste or gum to be applied to the signatures, substantially as set forth.

10. In a machine for uniting the signatures of books, a movable work-support for the signatures, combined with the lip d^3 , mechanism, substantially as described, to move it, and the gum-fountain to furnish gum for the said lip, the latter applying it to the signatures as they are being united together, substantially as described.

11. In a machine for uniting the signatures of books, a movable work-support and means, substantially as described, to release and lock it at the proper times to permit the said support to be lowered as the signatures accumulate in thickness, combined with the lip and mechanism, substantially as described, to move it to apply paste to the signatures, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD S. BOYNTON.

Witnesses:

G. W. GREGORY,
N. E. C. WHITNEY.