

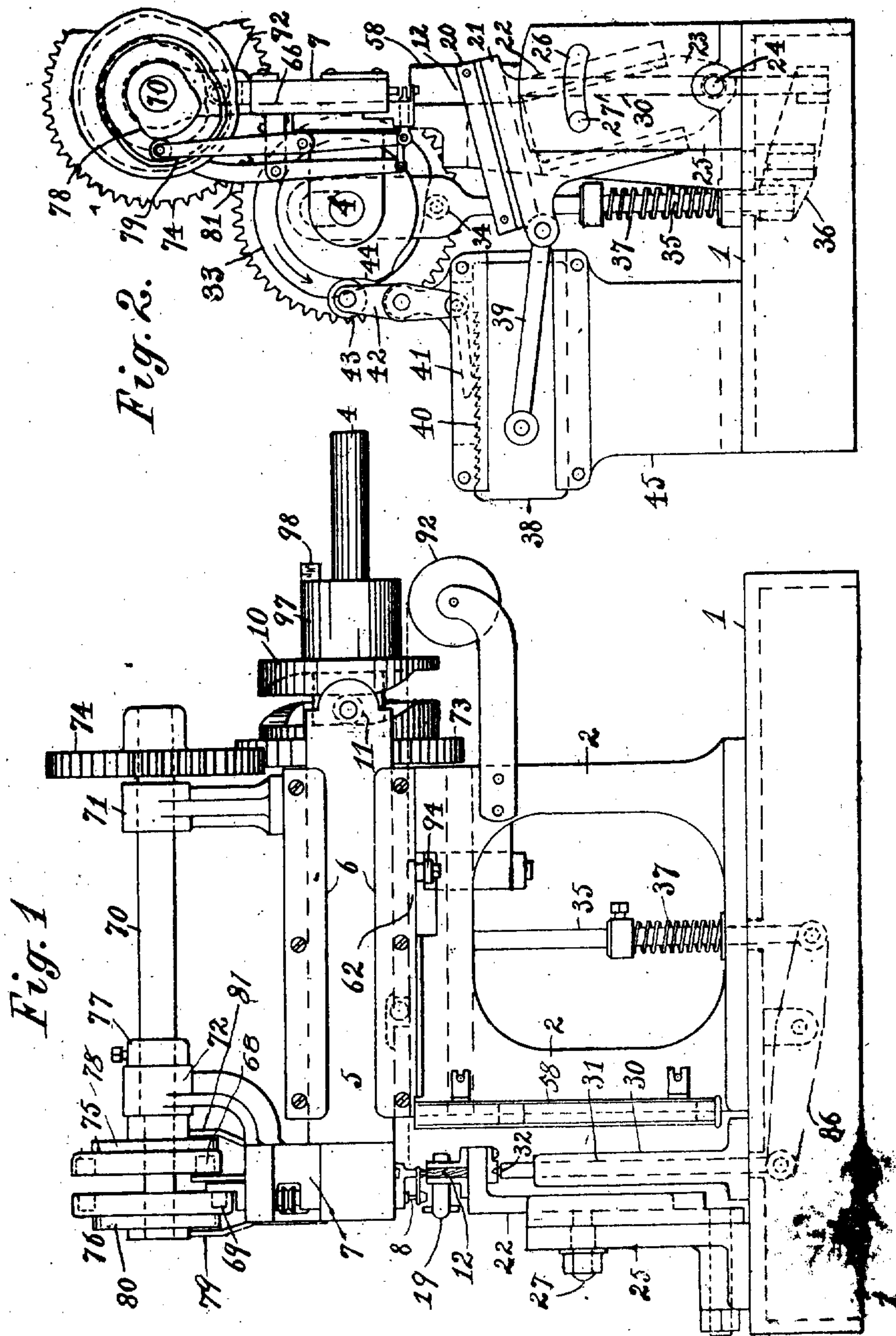
No. 896,970.

PATENTED AUG. 25, 1908.

E. F. BUCH & K. STEINBACH.
BRUSH DRILLING AND TUFTING MACHINE.

APPLICATION FILED JULY 17, 1907.

6 SHEETS—SHEET 1.



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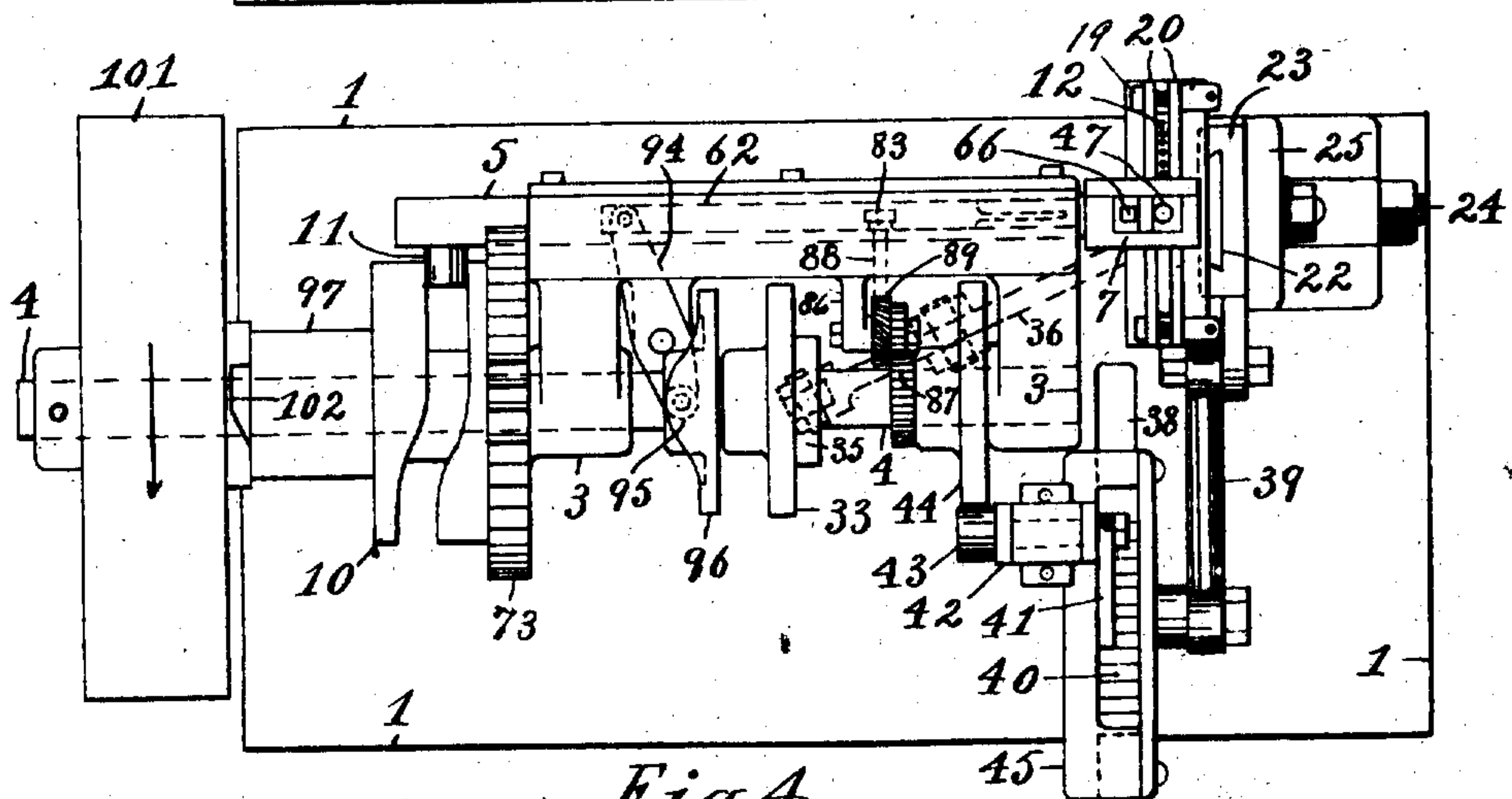
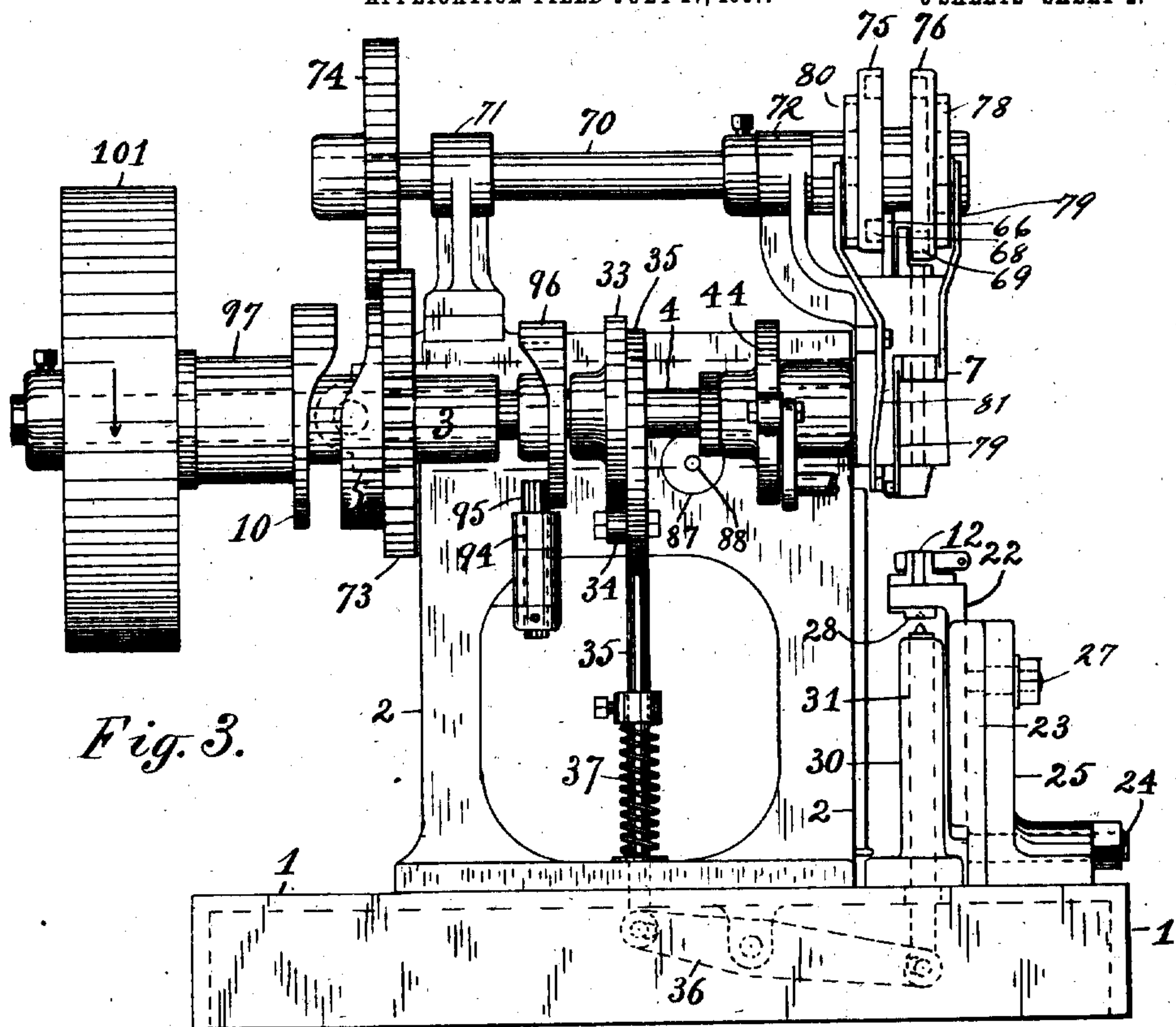
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6 SHEETS—SHEET 2.



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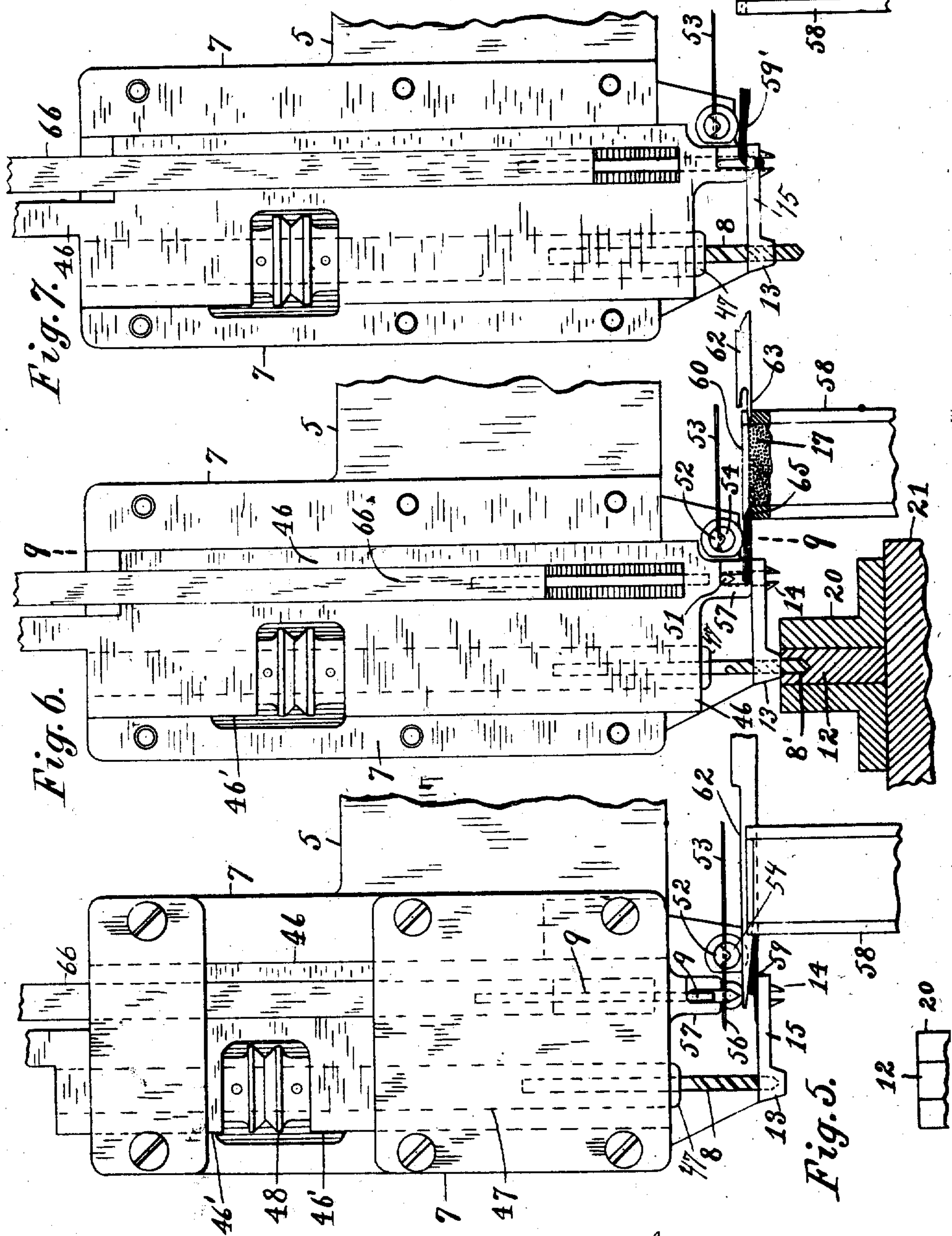
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6 SHEETS—SHEET 3.



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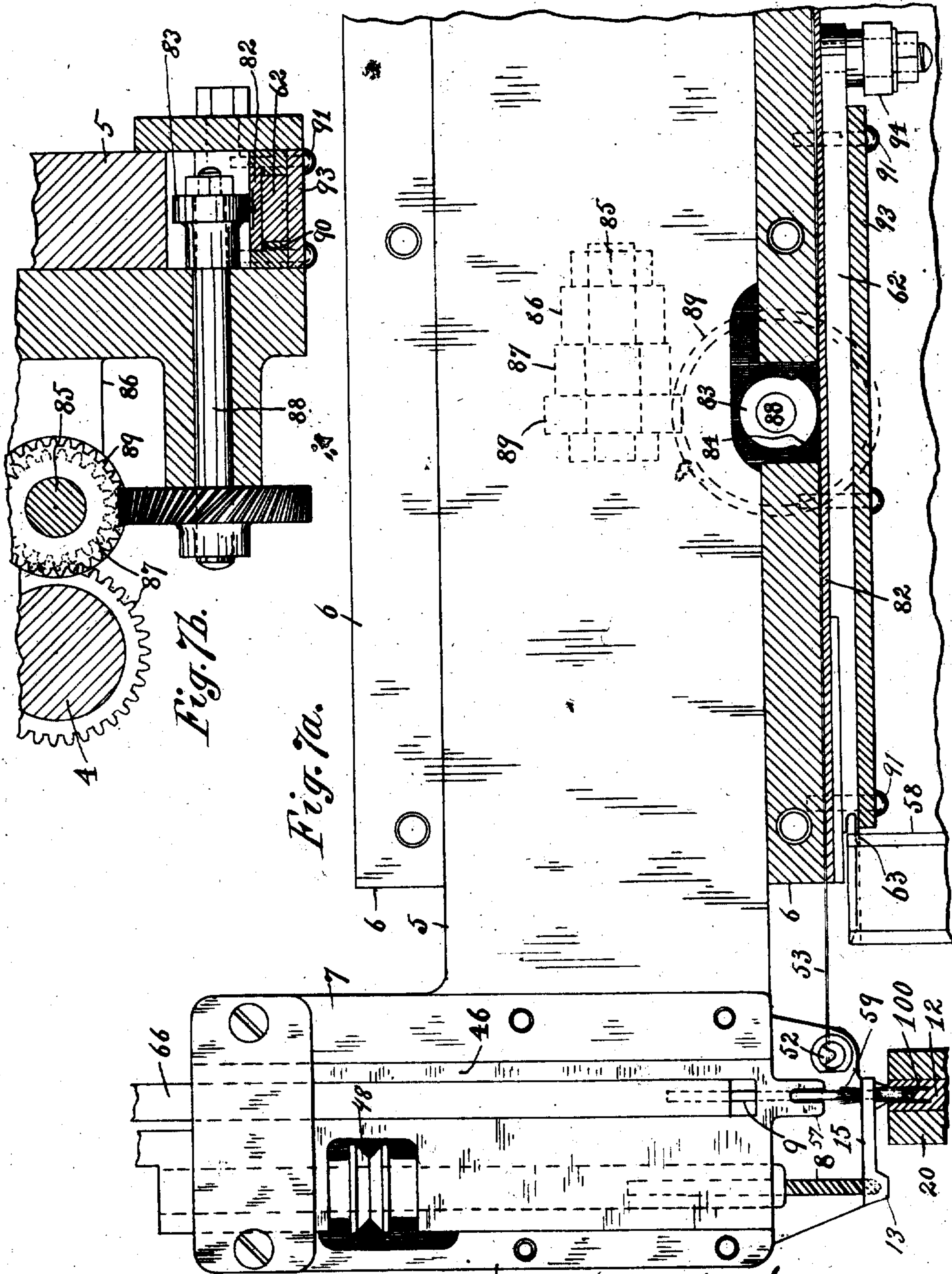
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8 SHEETS—SHEET 4.



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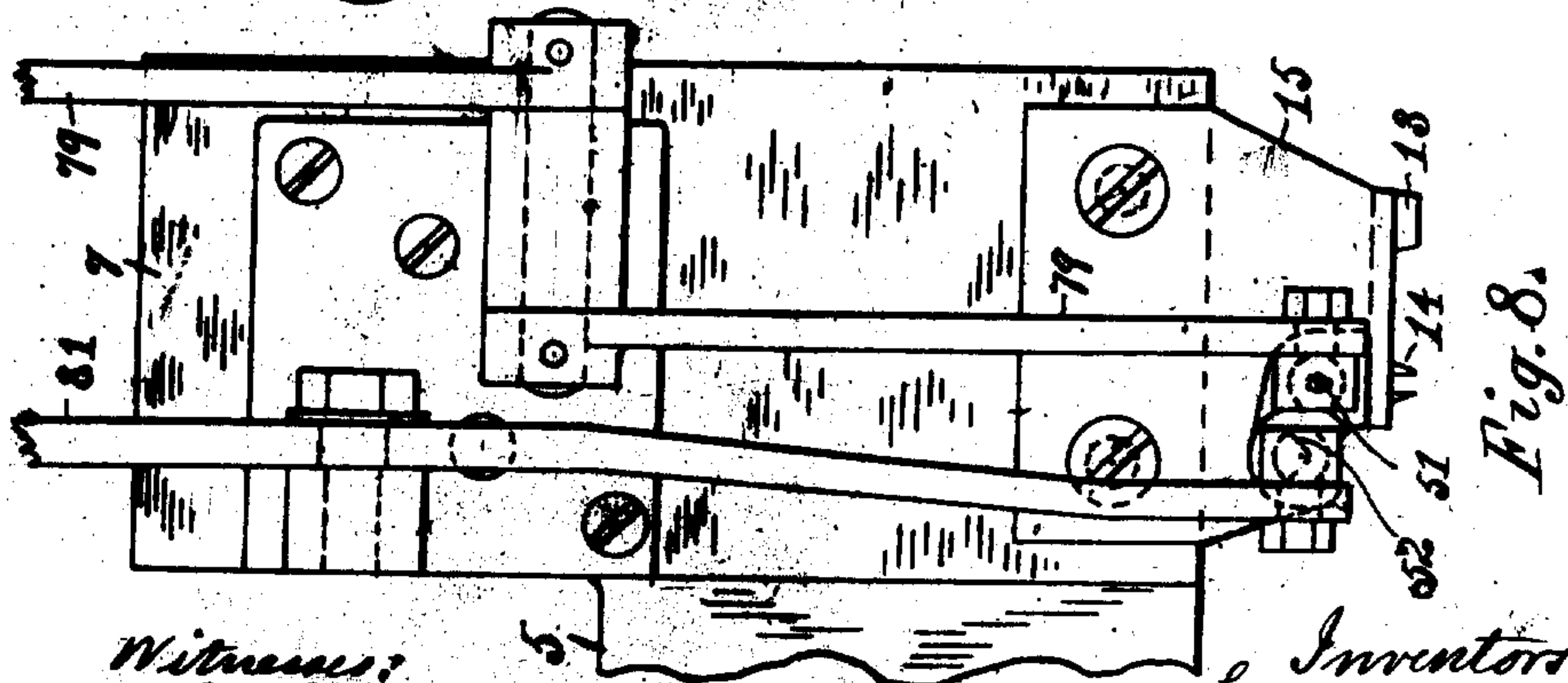
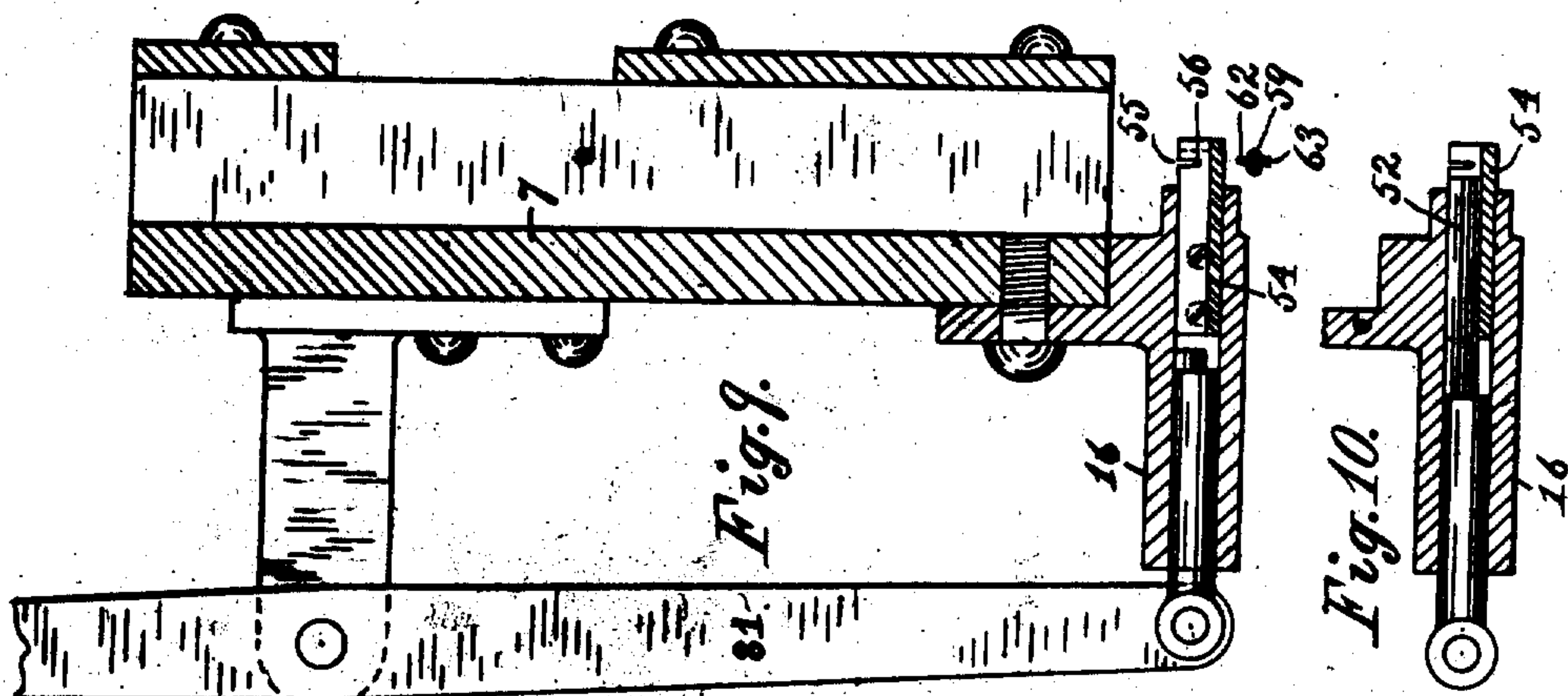
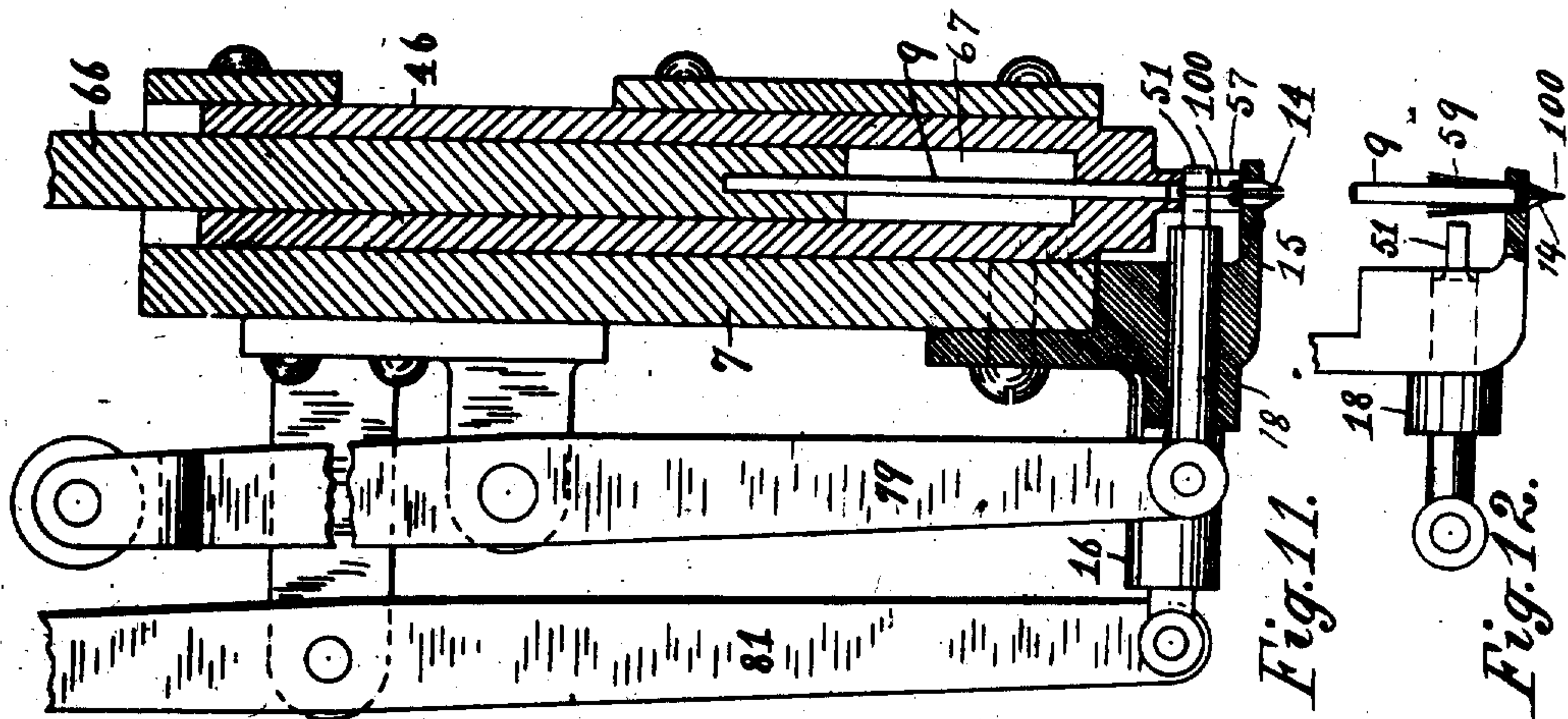
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6 SHEETS—SHEET 6.



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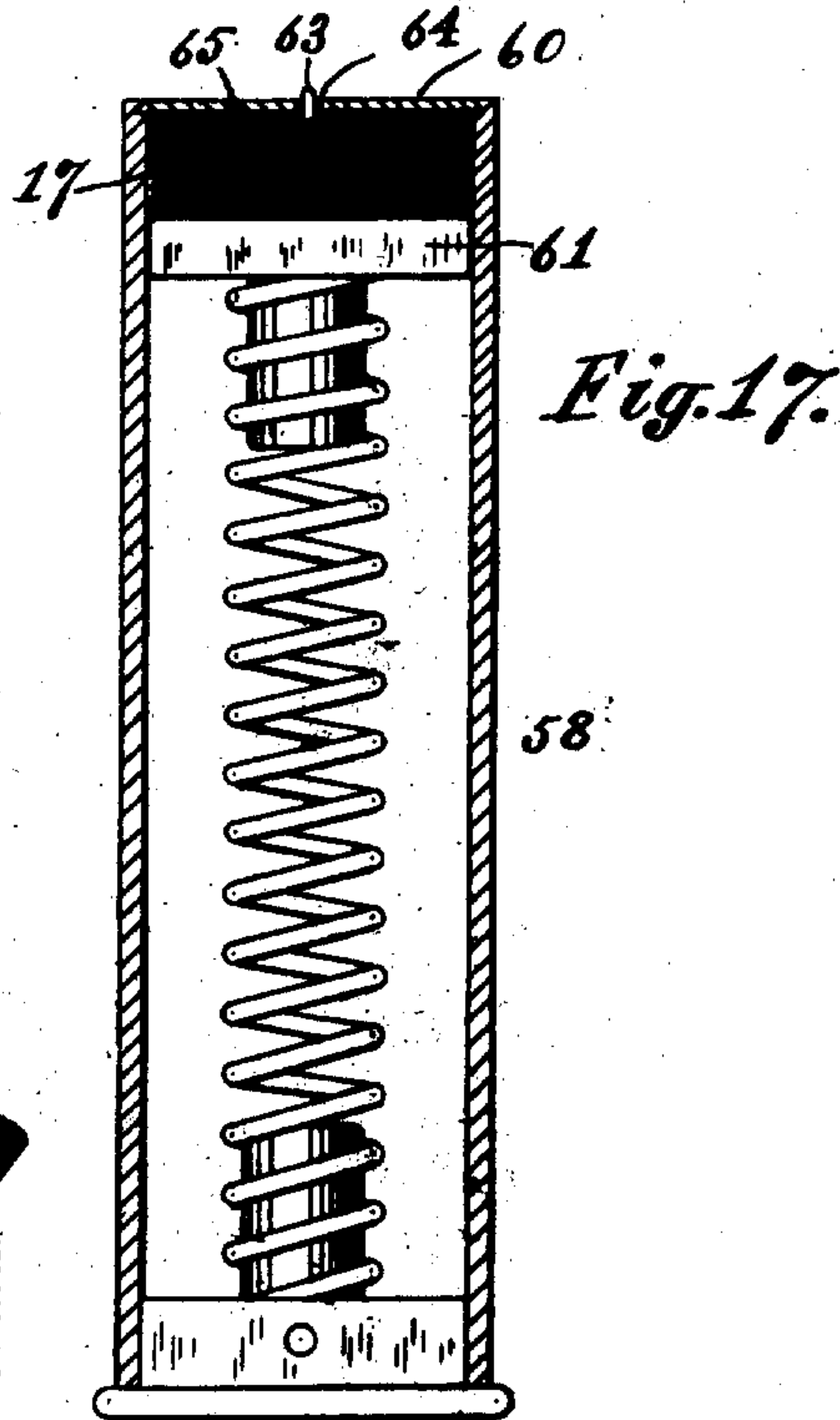
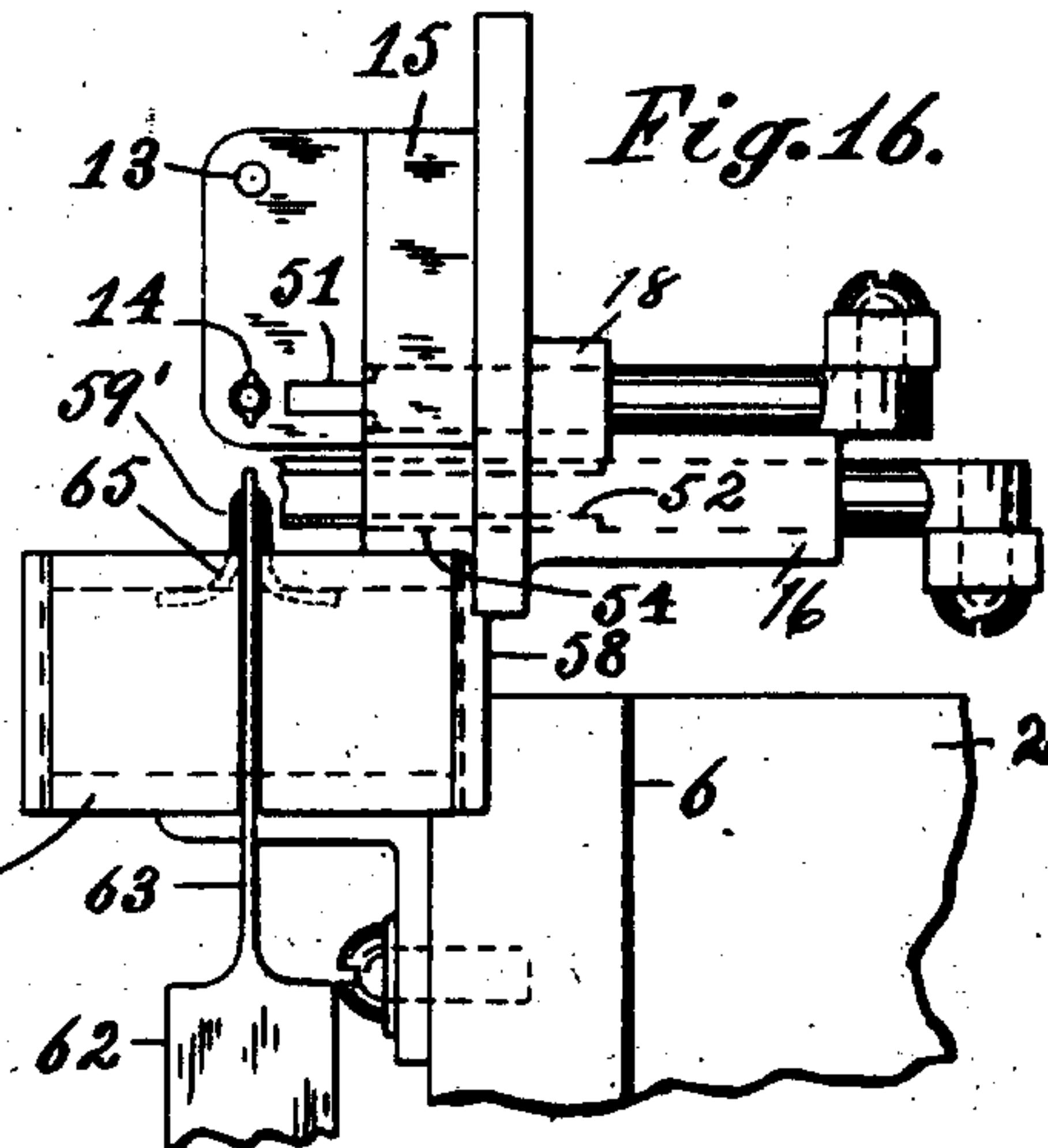
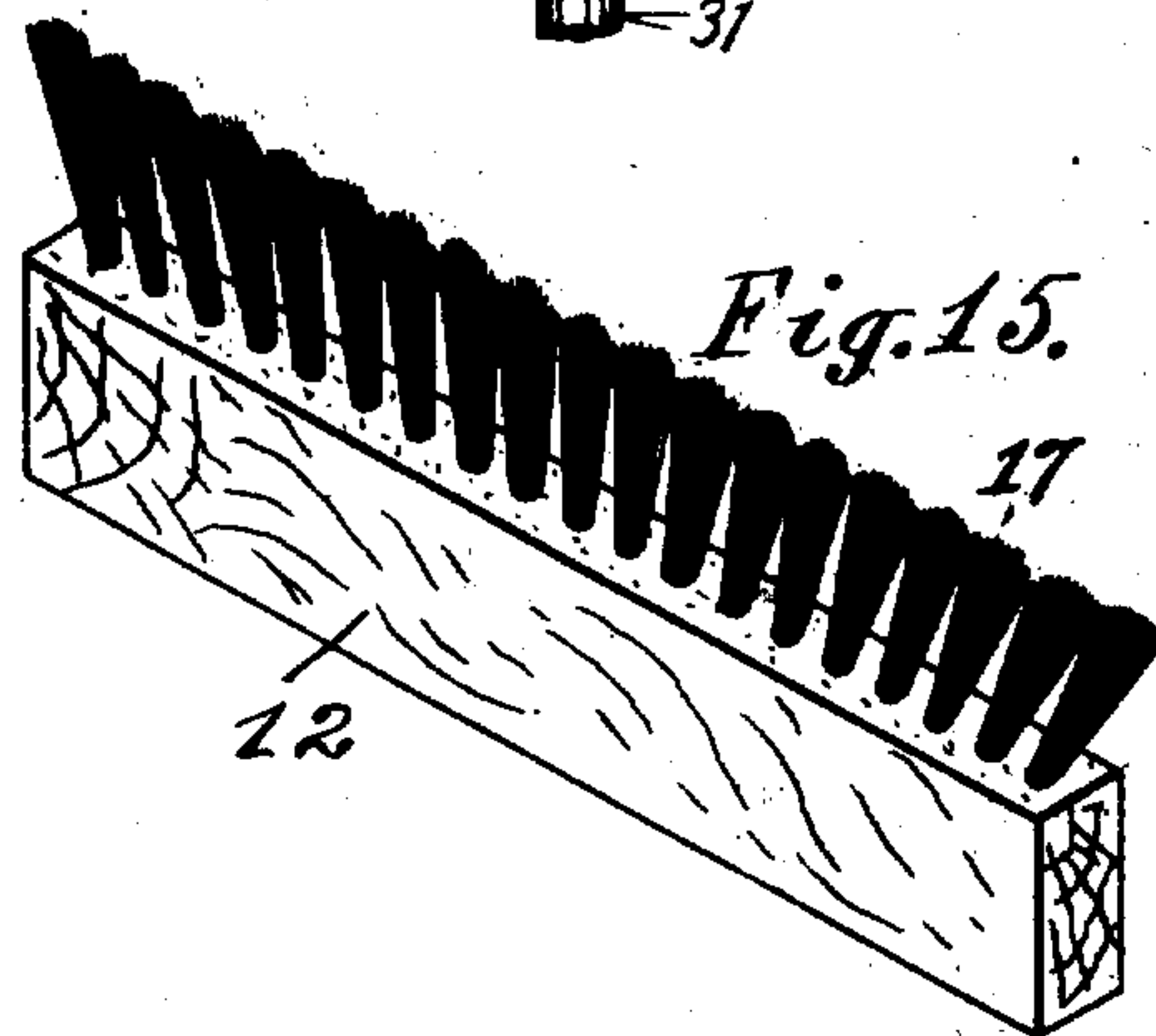
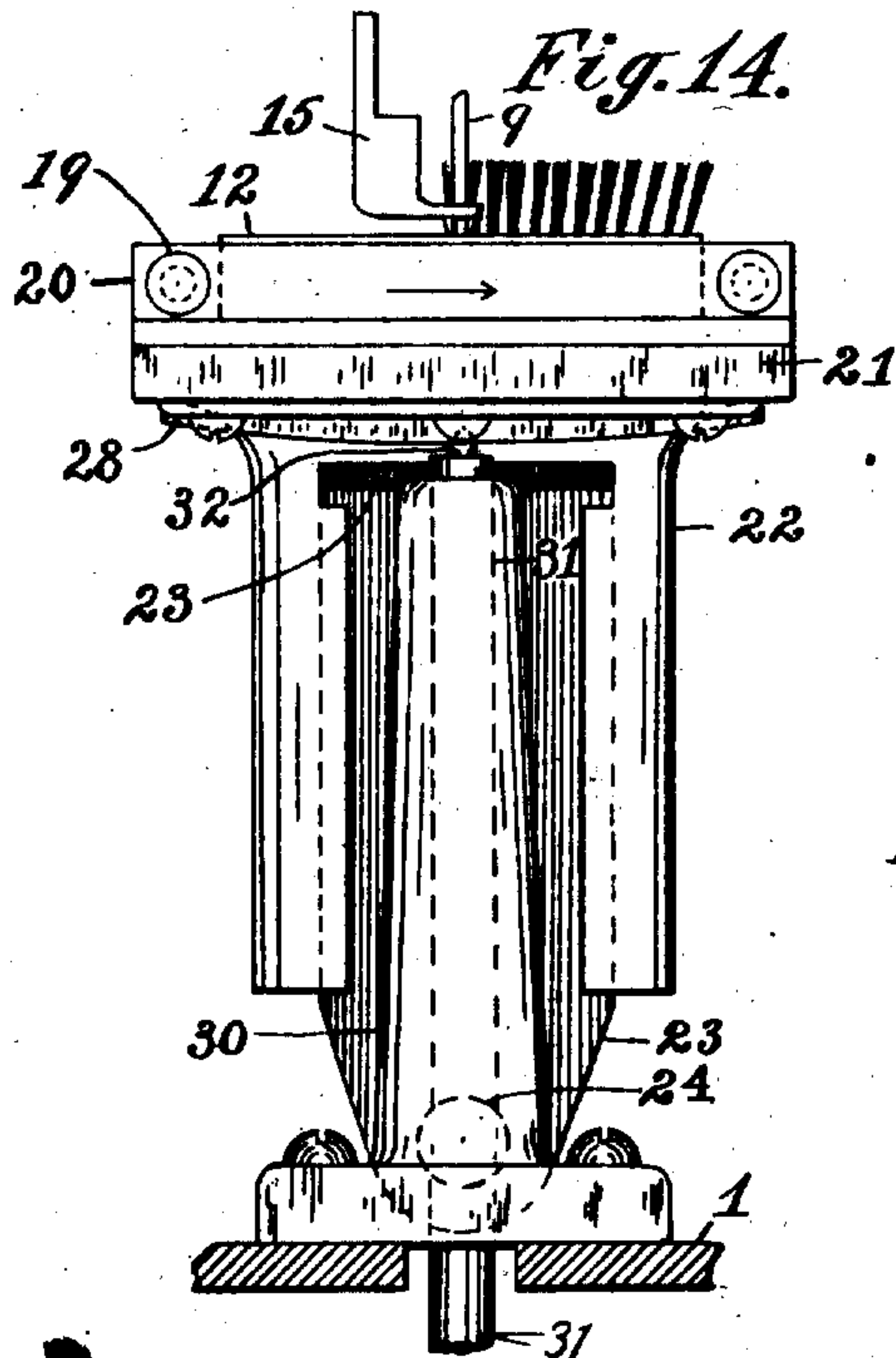
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APPLICATION FILED JULY 17, 1907.

6 SHEETS—SHEET 6.



Witnesses
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UNITED STATES PATENT OFFICE.

EDWARD F. BUCH AND KURT STEINBACH, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS
TO SANITARY SECTIONAL BRUSH COMPANY, A CORPORATION OF NEW YORK.

BRUSH DRILLING AND TUFTING MACHINE.

No. 896,970.

Specification of Letters Patent.

Patented Aug. 25, 1908.

Application filed July 17, 1907. Serial No. 384,293.

To all whom it may concern:

Be it known that we, EDWARD F. BUCH and KURT STEINBACH, both citizens of the United States, the said E. F. BUCH residing at 1820 Clearfield street, Philadelphia, county of Philadelphia, and State of Pennsylvania, and the said K. STEINBACH residing at 2419 South Darien street, Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Brush Drilling and Tufting Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same. The present invention is an improvement upon patent to Reh fuss and Buch on June 4, 1907 with No. 855,810 and title, Machine for Drilling and Tufting Brushes.

The present invention relates to a machine in which a head sustained movably above the brush-block is provided with a drilling device and a tuft-driver both movable vertically in the head, and the head shifted intermediate to the drilling of the holes, to bring the tuft-driver over the holes.

The invention embraces means for lifting the brush-block to the drill for drilling each hole therein, and means operating intermittent to the movements of the drill to force the tuft-driver into the tuft-hole while the block is thus lifted. The block is then depressed and shifted so that when raised again it may present a new surface to the drill.

The invention embraces various combinations for actuating the drill-carrier and tuft-driver, and for supplying the wire staples and bristles for forming the tufts, and other details of mechanism as hereinafter set forth and claimed.

The invention will be understood by reference to the annexed drawing, in which

Figure 1 shows the front side of the machine; Fig. 2 is an end elevation of the same; Fig. 3 shows the rear side of the machine with the block-feeding device removed to expose the block-holder; Fig. 4 is a plan of the machine with cam-shaft 70 and its bearings omitted; Fig. 5 shows the front side of the shifting-head and the parts for forming and driving the tuft, the parts being in readiness to form a staple, to engage the loop of the tuft; Fig. 6 is a similar view with the brush-block raised to the drill-guide, the drill depressed in the block and a staple formed. Fig. 7 is a similar view with the

tuft and staple shifted to the tuft socket; Fig. 7^a shows the head, its bar 5 and the wire feeding roll; Fig. 7^b is a section where hatched at the center of the roll in Fig. 7^a. Fig. 8 shows the rear side of the shifting-head with connections for operating the anvil and wire-cutter; Fig. 9 is a section of the head on line 9—9 in Fig. 6 with the cutter stem broken off and its shank advanced as when cutting the wire; Fig. 10 is a similar section of the wire-cutter with the cutter stem and its shank retracted; Fig. 11 is a vertical section of the head, where hatched, at the middle line of the tuft-driver, with the anvil advanced and a staple bent over the same, and Fig. 12 is a side elevation of the anvil, the tuft-socket in section, and the tuft and staple carried into the socket by the tuft-driver. Fig. 13 shows the under side of the gage-plate 100 upon the foot of the brush-block holder; Fig. 14 shows the rear or inner side of the brush-block holder and the lifter 30; Fig. 15 is a perspective view of a brush-block strip or section with a single row of tufts therein; Fig. 16 is a plan of the bristle-magazine, tuft-guide and adjacent parts, and Fig. 17 is a section of the magazine, with its contents not in section.

The machine is especially designed to operate on a strip or section of a brush-block and is shown with a bed 1, a frame 2 having bearings 3 carrying upon the rear side a driving-shaft 4, and upon the front side a horizontally reciprocating bar 5 moving in guide 6 and carrying upon its outer end the head 7 in which the drill 8 and tuft driver 9 are operated. The driving-shaft carries several cams and is connected by gears with a special cam-shaft carried by the reciprocating bar 5, as hereinafter described. The driving-shaft carries a cam 10 engaging a roller 11 upon the bar 5 to reciprocate the same and shift the drill and the tuft-driver alternately over the same spot upon the brush block 12. A drill-guide 13 and tuft-socket 14 are formed upon a bracket 15 secured at the bottom of the head, and carrying on the rear a guide 16 for the wire cutter 52 and a guide 18 for the anvil 51. The bar 5 is shifted at each rotation of the driving-shaft a distance equal to the space between the center of the drill and the center of the tuft-driver, and the drill-guide and the tuft-socket are thus brought alternately to the same point.

The machine is shown operating upon a brush-block in the form of a narrow strip adapted to receive a single row of bristle-tufts, as shown in Fig. 14, the strip being held in clamps 20 upon the foot 21 of the brush-block-holder. One of the clamps is fastened to the foot 21, and the other is clamped thereto by screws 19, and in practice the movement of the block-holder is regulated to make the rows of tuft-holes of different lengths in different strips, so that when the strips are assembled together to make a complete brush-block the outline of the holes may conform to the usual oval form of a brush-block.

The holder is mounted to move vertically with a holder-slide 22 fitted, as shown in Fig. 4, to an oscillating holder-guide 23 having a pivot 24 at its lower end, on which it may be oscillated and thus gradually tip the brush-block so as to make the holes in the block incline outwardly from the center hole. The holder oscillates always in the same plane, so as to form only one row of holes in the block. A stand 25 is supported upon the bed adjacent to the holder-guide 23, and the pivot 24 is fitted to the lower part of such stand and the holder-guide. The stand has a slot 26 in its upper part concentric with the pivot, and a stud 27 is projected from the holder-guide through the slot and held movably by a nut, thus steadying the upper part of the guide in its oscillating movements. This construction inclines all the holes and tufts radially to the pivot 24, as shown in Figs. 14 and 15.

A gage-plate 28 is shown upon the under side of the block-holder foot 21 and is formed as shown in Fig. 13 with a row of conical sockets 99 corresponding to the location of the holes in the brush-block, and a lifter 31 is fitted to a stationary socket 30 below the block-holder and provided with a pin 32 to enter the sockets 99 as shown in Fig. 1, when the block-holder is intermittently oscillated.

The lifter is reciprocated, to lift the brush-block to the drill and the tufting device, by a cam 33 on the driving-shaft shown in Fig. 2, 3 and 4 acting upon a roll 34 on a vertical rod 35 which is connected with a lever 36 below the bed, as shown in Fig. 3. A spring 37 is provided to normally raise the rod 35 and depress the lifter 31 as shown in Fig. 3.

The brush-block holder is oscillated step by step to shift the brush-block beneath the drill by a feed-slide 38 connected to the holder by a link 39. The feed-slide has teeth 40 spaced like the holes in the brush-block, and engaged by a reciprocating pawl 41 which is actuated by a lever 42 having a roll 43 fitted to the periphery of a cam 44 upon the driving shaft.

As shown in Fig. 2, the movements of the block-holder are controlled by the connec-

tion of the link 39 with the feed-slide 38, and the friction of the block-holder upon the stand 25 and the friction of the feed-slide 38 in its stand 45, suffice to hold the block-holder in its last adjusted position until moved to a new position by the pawl 4. When thus moved, the block-holder is locked by the pin 32 upon the lifter 31, which enters the sockets 99 in the gage-plate 28 upon the under side of the block-holder foot.

The feed-slide and the lever 42 are mounted upon a stand 45 on the bed 1.

The means for drilling the brush block, for forming the tuft of bristles, and setting it in the holes of the brush-block, is constructed as follows: A slide 46 is movable vertically in a channel in the head 7 and carries bearings 46' for a drill-spindle 47 having a pulley 48 to receive a driving-cord. The cord is not shown herein, as the means for driving the drill-spindle is immaterial, and a cording and driving-pulley for such purpose are shown in the above mentioned Patent No. 855,810. The slide is furnished with a vertical passage 67 to receive a driving-bar 66 for the tuft-driver 9, and plates upon the front side of the head which are clearly shown in Figs. 1 and 6, hold the slide movably in its channel and the driving-bar movably in the passage 67. An upward movement of the slide retracts the drill 8 into the guide 13 as in Fig. 5, and a downward movement carries it into the brush-block 12 when the latter is elevated as shown in Fig. 6. Over the tuft-socket 14 the anvil 51 is movable horizontally in the guide 18 upon the bracket 15, and a wire-cutter is mounted adjacent to the anvil and the wire 53 fed to the same over a seat 54. The seat is formed with an angular groove, as shown in Fig. 6, and a transverse notch 55 to receive the wire 53, and the cutter stem 52 is made of longitudinal angular form and fitted to such groove, so that when forced forward it cuts a short section out of the wire leaving beveled ends upon the wire at both ends of such section, thus forming points upon the staple where cut. The wire 53 is fed through the notch 55 in the cutter-seat so as to project across the anvil as shown in Fig. 5, and when severed is bent over the anvil by a fork 57 upon the lower end of the slide 46, forming the staple 100.

A bristle magazine 58 is supported upon the frame 2 close to the head 7, with the bristles 17 all disposed at right angles to the movement of the bar 5 and the head 7, as shown in Figs. 16 and 17.

When the head is moved inwardly, as shown in Fig. 6, the cutter-seat stands close to the edge of the magazine so that a tuft of bristles can be pushed from the magazine directly to the tufting socket, with a horizontal loop 59 of the bristles 17 lying below the anvil, as shown in Figs. 5, 6 and 11.

The magazine has a flat cover against which the bristles are pressed upwardly by a spring-plunger 61. This cover is shown in Figs. 16 and 17 formed of two plates with an opening or slot 64 between their adjacent edges for the passage of the tuft-hook. These plates are in Fig. 7 shown dovetailed into the opposite edges of the top of the magazine so that they may be withdrawn when necessary, to facilitate an inspection of the bristles. A bristle-feedbar 62 having a tuft-hook or separator 63 upon the end is arranged to reciprocate across the top of the magazine through the slot 64, and narrow notches 65 are formed in the wall of the magazine next the slot, through which the side wings 59' of the bristle-tuft are drawn and in which they are held by friction when the bristle-feed-bar is retracted, as shown in Fig. 6.

The tuft-driver 9 is carried by a driver-bar 66 which reciprocates in a vertical passage 67 in the slide 46, and projects above the top of the slide to carry a roll 68. The slide itself projects above the top of the head 7 to carry a roll 69. A cam-shaft 70 is mounted in a bearing 71 over the top of the ram-guide 6 and in a bearing 72 attached to the head 7, and is driven from the shaft 4 by cog-wheels 73 and 74. The shaft 70 is provided with a cam 75 to act upon the roll 68 and reciprocate the tuft-driver as required, and with a cam 76 to engage the roll 69 and actuate the slide 46 and the drill spindle 47, as required. A collar 77 adjacent to the bearing 72 causes the cam-shaft to move longitudinally through the bearing 71 when the bar 5 and head 7 are reciprocated the teeth of gear 74 then sliding over the teeth of the gear 73, as indicated in their respective positions in Figs. 1 and 3. The shaft 70 is also provided with a cam 78 operating upon a lever 79 to reciprocate the anvil as required, and with a cam 80 operating upon a lever 81 to reciprocate the wire cutter stem 52. These cams, like the cams 75 and 76, are located directly above the head 7 so that the levers extend directly from the cams to the parts which are to be operated and form very direct connections from the cams thereto.

The wire feed illustrated in Fig. 7^a and Fig. 7^b is constructed to grip and feed the wire positively so as to produce a uniform motion of the wire, when fed. To effect this object, a grooved bed 82 is arranged in one of the guides 6 below the bar 5, and a feed-roll 83 is journaled above the same and provided with a feeding face 84 of suitable length to propel the wire for a single staple.

Figs. 7^a and 7^b show the gearing for driving this roll from the shaft 4; a stud 85 being carried by a bracket 86 adjacent to the shaft 4, and the stud and shaft provided with gears 87 which are rotated by the shaft.

One of these gears (that upon the stud) is attached to a spiral gear 89, and a corresponding spiral gear upon the roll-spindle 88 meshes with the same, thus transmitting the motion of the shaft to the roll. The several gear-wheels are proportioned to rotate the roll once for each rotation of the shaft. The feed-roll 83 rotates continuously during the operation of the machine, and the feeding face 84 is slightly roughened so as to engage the wire 53 and feed it positively forward.

The wire-bed 82 is supported upon packings 90 and held in place by screws 91, so that it can be adjusted toward the feeding surface of the roll 83 to produce the pressure required for feeding the wire. The packings 90 are shown in Fig. 7^b as thin layers of suitable material of which a greater or less number may be used to adjust the bed 82 toward the roll 83. The wire, as shown in Fig. 1, is supplied to the grooved guide 82 from a reel which is indicated merely by a dotted circle 92 in Fig. 1.

The shank or operating bar 62 for the tuft-hook or separator 63 is fitted within the guide 6 immediately below the grooved wire-bed 82; lying between the bed and a cap 93 held by the screws 91. The bar 62 is actuated by a lever 94 having a roll 95 upon the end engaging a cam 96 upon the driving-shaft 4, as shown in Figs. 3 and 4.

The operation of the apparatus is as follows; The magazine is supplied with bristles which are pressed up toward the cover-plate 60, and the wire is carried through its grooved guide 82 to the cutter, and a brush-block section 12 attached to the holder by screws 19. The head 7 being moved inward by its cam 10 so as to stand next the frame 2, the anvil is projected as shown in Fig. 11, and the wire and the tuft-separator are operated to place the wire over the anvil and the loop of a tuft over the tuft-socket 14, as shown in Fig. 5. The block-holder is then raised by the lifter 31, bringing the block against the drill-socket 13, and the slide 46 is then depressed by the cam 76, as shown in Figs. 6 and 11, forcing the drill into the brush-block, as shown in Fig. 6, and bending the staple over the anvil as shown in Fig. 11. The anvil is then retracted by the cam 78, as shown in Fig. 12, and the tuft-driver 9 depressed by the cam 75 sufficiently to carry the staple and loop 59 of the tuft into the tuft-socket 14, as shown in Figs. 7 and 12. The cam 76 then raises the slide 46, restoring the drill and the fork 57 to the position shown in Fig. 5, the tuft-driver remaining in the position shown in Figs. 7 and 12. The drill being thus retracted from the hole 8' formed in the brush-block, the head 7 is moved outwardly by the cam 10, bringing the tuft-socket 14 over the hole just formed; and the tuft-driver is again actuated by the cam 75 to force the staple and tuft into the

hole in the brush-block, as shown in Fig. 7^a. When such hole is tufted, the tuft-driver is retracted and the brush-block is dropped, as shown in Fig. 2, by the operation of the cam 33 and lifter 31. The pawl 41 is then actuated by the cam 44 to shift the slide 38 one tooth, which oscillates the brush-holder upon its pivot and presents a succeeding portion of the brush-block to the drill. The successive movements of the block, during the drilling and tufting of the successive holes, tips the block into different angles to the horizontal, to incline the tufts as desired, and the movement which is indicated by the arrow shown upon the clamps 20 in Fig. 14, operates also to move the tufts which have been already inserted, clear from the drill-guide and tuft-socket, so that a fresh portion of the brush-block may be presented thereto. The head 7 is then moved into the position shown in Figs. 3 and 4, and the anvil is advanced, as shown in Fig. 11, and the wire fed forward over the anvil, and the cycle of movements renewed as already described, to drill and tuft another hole.

It will be observed that the cam 75 gives the tuft-driver 9 two independent movements, the first being effected upon the retraction of the anvil, (see Fig. 12) to carry the staple and bristle-tuft into the tuft-socket, while the staple-bending fork 57 is held close to the socket, as shown in Figs. 7 and 11. The sides of the tuft-socket are grooved, as shown in Fig. 16, and the sides of the fork 57 are similarly grooved to receive the arch of the staple when bending it over the anvil, and to guide the prongs of the staple into the grooves of the tuft-socket. The grooves in the fork 57 are so disposed as to carry one prong of the staple into the open loop 59 of the tuft, which lies upon the top of the tuft-socket, as shown in Fig. 6, and the tuft is thus positively engaged with the staple to be carried downward thereby when the tuft-driver is actuated the second time, and the staple forced into the hole in the brush-block, as shown in Fig. 7^a.

In the machine patented to Rehfuß and Buch on June 4, 1907, referred to above, the bristle-tufts after their removal from the magazine were carried by hooks upon a chain to the proximity of the tuft-socket, and transferred from the hooks to the tuft-socket by a tuft-placer; but it will be observed that in the present invention the tuft-socket 14 stands during the entire forming and driving of the tuft so close to the magazine 58 that a loop of the tuft can be placed beneath the tuft-driver without wholly drawing the ends of the bristles from the slot in the magazine. The shifting and handling of the tufts, is thus avoided between the magazine and tuft-socket, (including the actual setting of the tufts in the brush-block) and the derangement of the bristles is thus avoided, as well as

any displacement of the bristles, which is naturally caused by the elasticity of the bristles when transferred from one agency to another.

By the present construction, the elasticity of the bristles is utilized in a beneficial manner, by retaining the loose ends of the bristles in the slot 65 of the magazine, as shown in Figs. 5 and 6, to hold the loop of the tuft in place on the tuft socket until the prong of the staple has engaged the tuft-loop 59', which positively secures the tuft from derangement when it is pulled out of the magazine.

In practice it is necessary to provide automatic means for stopping the machine when one row of holes has been tufted in the brush-block, but such means are not fully shown herein, as they form no part of the present invention, and are fully shown in the patent to Rehfuß and Buch, No. 855,810, referred to above. A part of such mechanism is unavoidably shown, consisting of the clutch-hub 97 which is fastened rigidly to the shaft 4 and provided with the usual clutch-bolt shown at 98 in Fig. 1. A pulley 101 is shown, fitted to run loose upon the shaft 4, in Figs. 3 and 4, the hub of which pulley is in practice formed with a notch 102 to engage the bolt, and the bolt retracted by automatic mechanism to stop the driving-shaft when a row of holes is tufted, while the pulley revolves continuously. With such an automatic stop device, the operator starts the machine after placing a brush-block or section in the holder, and the drilling and tufting of the holes is continued until the machine is stopped, after the required number of holes has been tufted.

Having thus set forth the nature of the invention what is claimed herein is:

1. In a brush tufting machine, a bar, a head carried by said bar, the slide 46 movable vertically in the head, a drill carried by said slide, a tuft-driver movable vertically in said slide, means for reciprocating the tuft-driver, and means for reciprocating the slide which carries the drill.

2. In a brush tufting machine, a bar, a slide vertically movable in said bar, a drill device carried by said slide, a tuft-driver vertically movable in said slide, a shaft mounted over said slide in a support carried by the bar, and cams on the shaft operating directly on the slide and on the tuft-driver.

3. In a brush tufting machine, a frame having a base provided with means for supporting and means for feeding a brush-block, a bar mounted on the frame, means for reciprocating the bar, a slide vertically movable in said bar, a drill device carried by said slide, a tuft-driver vertically movable in said slide, a shaft mounted over said slide in a framing carried by said bar, and cams on the shaft operating directly on the slide and on the tuft-driver.

4. In a brush tufting machine, a frame

having a base provided with means for supporting and means for feeding a brush-block, the bar 5 mounted to reciprocate upon said frame, the head 7 carried by said bar, the slide 46 movable vertically in the head, a drill carried by said slide, a tuft-driver movable vertically in said slide, a shaft mounted over said head in a support carried by the bar, cams on the shaft operating upon the slide and on the tuft-driver, means for lifting the brush-block to the head for drilling the hole, means for reciprocating the bar when the hole is drilled, to shift the head to bring the hole under the tuft-driver, and means for lowering the brush-block after the tuft is driven.

5. In a brush tufting machine, the bar 5, the head 7 carried by said bar and having a vertical channel with the slide 46 therein, the slide having the drill-spindle 47 mounted to move therewith, and having a vertical groove with driver-carrier 66 movable therein, means for reciprocating the slide with the drill and means for reciprocating the driver-carrier intermediate to the movements of the slide and drill.

6. In a brush tufting machine, the bar 5, the head 7 carried by said bar and having a vertical channel with the slide 46 therein, the slide having the drill-spindle 47 mounted to move therewith and having a vertical groove with the driver-carrier 66 movable therein; a bearing 72 attached to the head 7 with a cam-shaft rotatable therein and held from longitudinal movement, and cams upon the shaft operating directly upon the slide and upon the driver-carrier.

7. In a brush tufting machine, a frame having a base provided with a brush-holder for supporting the brush-block, the bar 5 mounted upon said frame with means for reciprocating the bar, the head 7 carried by said bar, a drill device movable vertically in the head, a tuft-driver movable vertically in the head, means for reciprocating the tuft-driver, and means for reciprocating the drill, the means for reciprocating the bar operating to shift the drill and tuft driver alternately to the same point or position, the brush-holder having a horizontal pivot below such point, a rack mounted movably adjacent to the brush-holder and connected thereto, and a pawl with means for actuating the same step by step to shift the rack and brush-holder after each movement of the tufting device.

8. In a brush tufting machine, a frame having a base provided with a brush-holder for supporting the brush-block, the bar 5 mounted upon said frame with means for reciprocating the bar, the head 7 carried by said bar, the slide 46 movable vertically in the head, a drill-device movable vertically in the head, a tuft-driver movable vertically in the slide, means for reciprocating the slide and means for reciprocating the tuft-driver,

the means for reciprocating the bar operating to shift the drill and tuft-driver alternately to the same point or position, a carrier having a horizontal pivot below such point arranged parallel with the movement of the bar, a brush-block-holder having a slide movable vertically upon the carrier, means for raising the slide during the drilling and tufting of the brush-block, and means for rocking the carrier step by step to feed the brush-block-holder after each movement of the tufting device.

9. In a brush tufting machine, a frame having a base provided with a brush-holder for supporting the brush-block, the bar 5 mounted upon said frame with means for reciprocating the bar, the head 7 carried by said bar, the slide 46 movable vertically in the head, a drill-device movable vertically in the head, a tuft-driver movable vertically in the slide, means for reciprocating the slide and means for reciprocating the tuft-driver, the means for reciprocating the bar operating to shift the drill and tuft-driver alternately to the same point or position, a carrier having a horizontal pivot below such point arranged parallel with the movement of the bar, a brush-block-holder having a slide movable vertically upon the carrier, the holder having the row of sockets 99 upon its under side in the line of its movement, a lifter fitted to engage such sockets for elevating the slide during a drilling and tufting operation, means to raise the lifter, and means for rocking the carrier to fit the brush-block after each movement of the tufting device.

10. In a brush tufting machine, a frame having a base provided with means for supporting and means for feeding a brush-block, a bar mounted on the frame, means for reciprocating the bar, a tuft-driver movable vertically in the head, an anvil with means for moving it horizontally in the head below the tuft-driver, a staple bender movable in the head over the anvil, means for feeding the wire across the anvil, means for cutting off a staple-length, a socket for the staple and tuft fixed upon the head below the anvil and tapered upon its under side to fit the hole formed in the brush-block for guiding the staple and tuft into such hole, and means for pressing the tuft-driver downward upon the staple when formed.

11. In a brush tufting machine, a frame, the bar 5 mounted upon the frame with the head 7 carried by the bar, the tuft-driver movable vertically in the head, an inverted magazine closely adjacent to the tuft-driver with a cover having the slot 64 therein, means for pressing the bristles upwardly against such cover, the separator 63 with means for moving it through the slot and carrying to the tuft-driver a charge of bristles for a single tuft, and means for pressing the tuft-driver downward upon the tuft.

12. In a brush tufting machine, a frame having a reciprocating bar with a head having a device for drilling the brush-block and a device for tufting the brush-block, means
5 for reciprocating the bar to bring such drilling and tufting devices to the same point or position, a carrier having a horizontal pivot below such point, a brush-holder supported upon the carrier and having clamps for holding a section of a brush-block adapted to receive a single row of tufts, and means for
10 rocking the carrier always in the same plane beneath the drilling and tufting devices, for

drilling and tufting a single row of holes in the brush-block section.

15

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

EDWARD F. BUCH.
KURT STEINBACH.

Witnesses as to Edward F. Buch:

GEORGE ISUKSEN,
THOMAS S. CRANE.

Witnesses as to Kurt Steinbach:

C. ARTHUR FETTERS,
SAML. B. BURK.