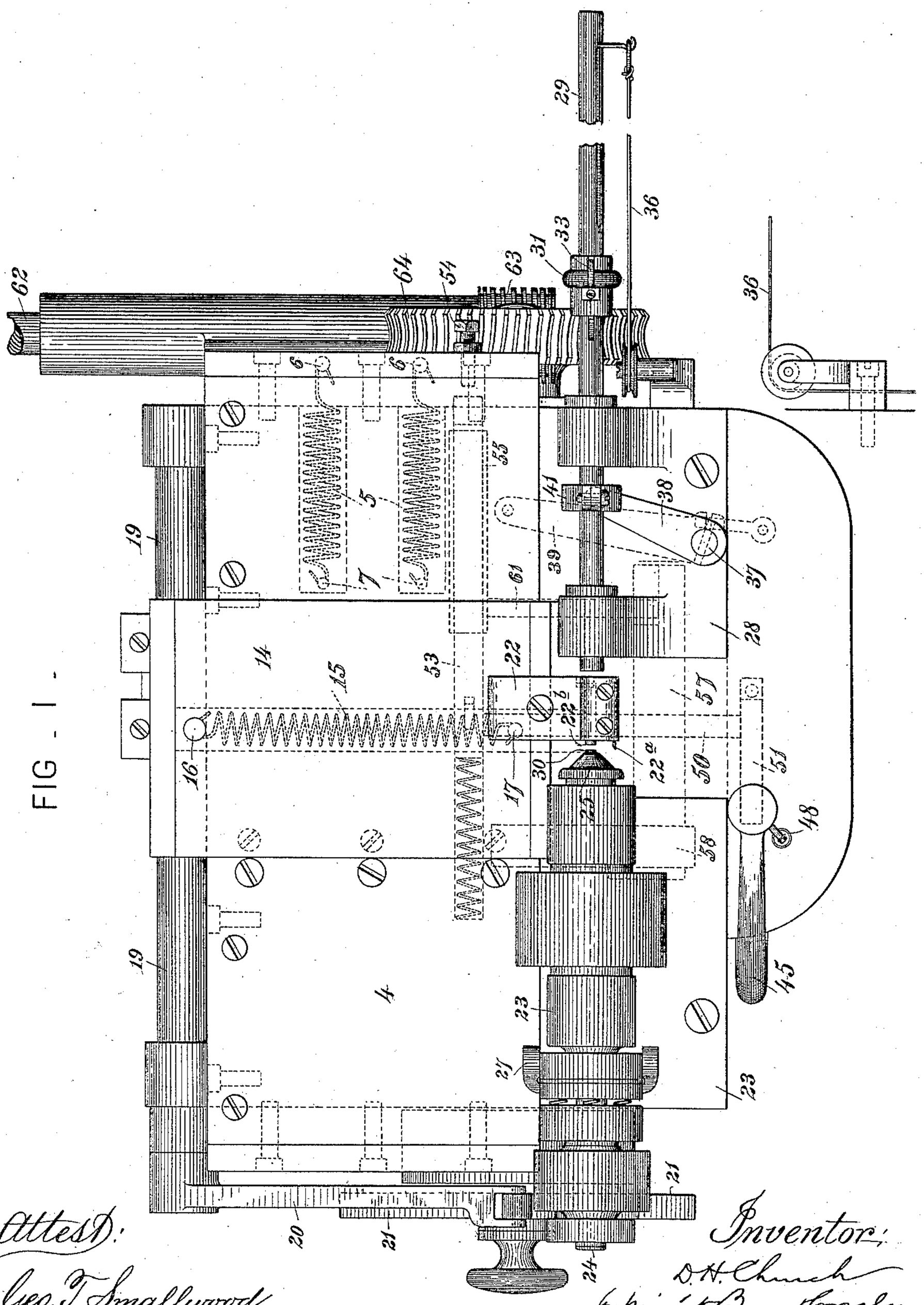
(No Model.) 5 Sheets—Sheet 1.

D. H. CHURCH.

JEWEL SETTING MACHINE.

No. 488,240. Patented Dec. 20, 1892.

FIG. 1.



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JEWEL SETTING MACHINE.

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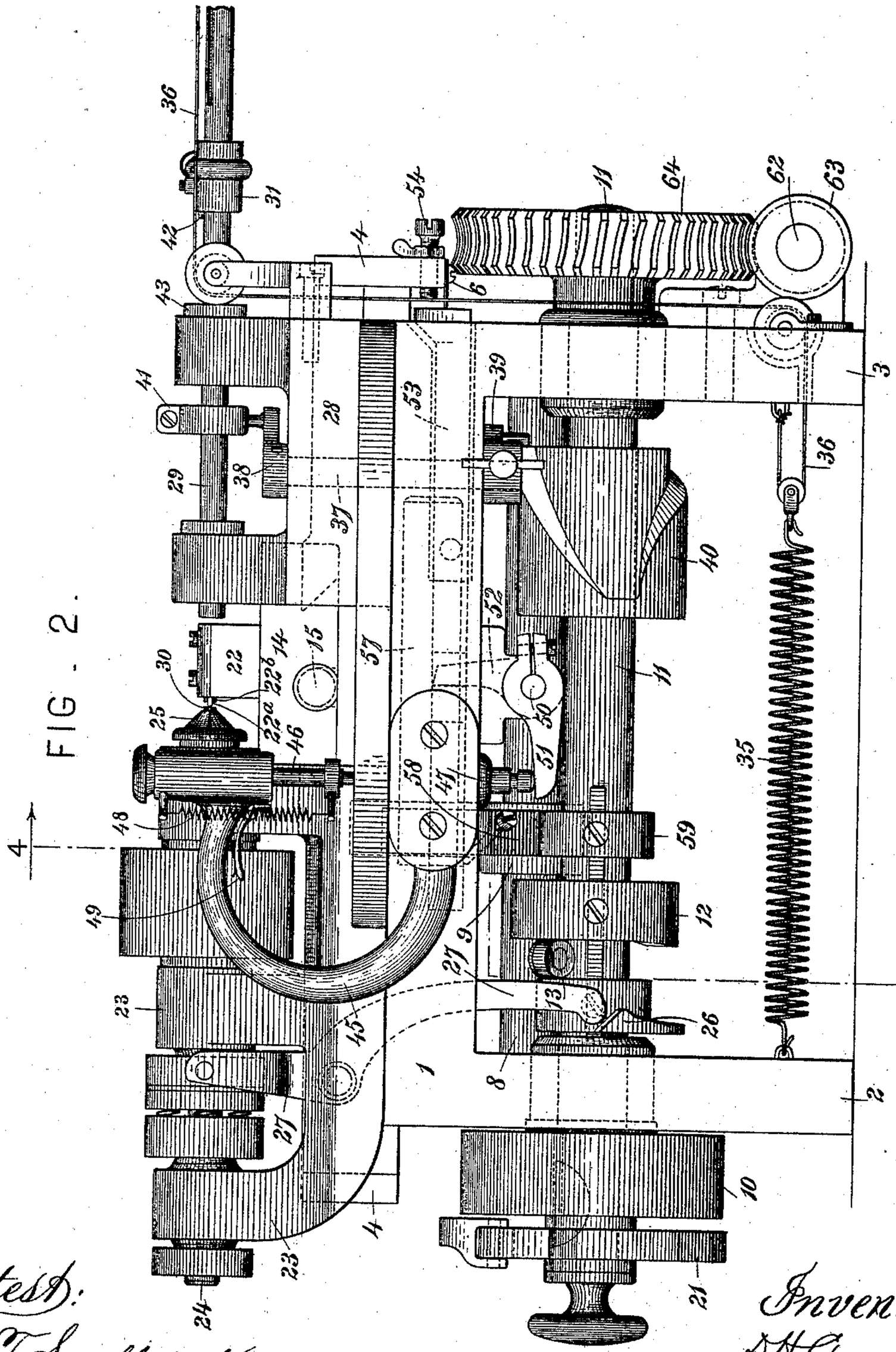
FIG. 2.



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JEWEL SETTING MACHINE.

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FIG. 3.

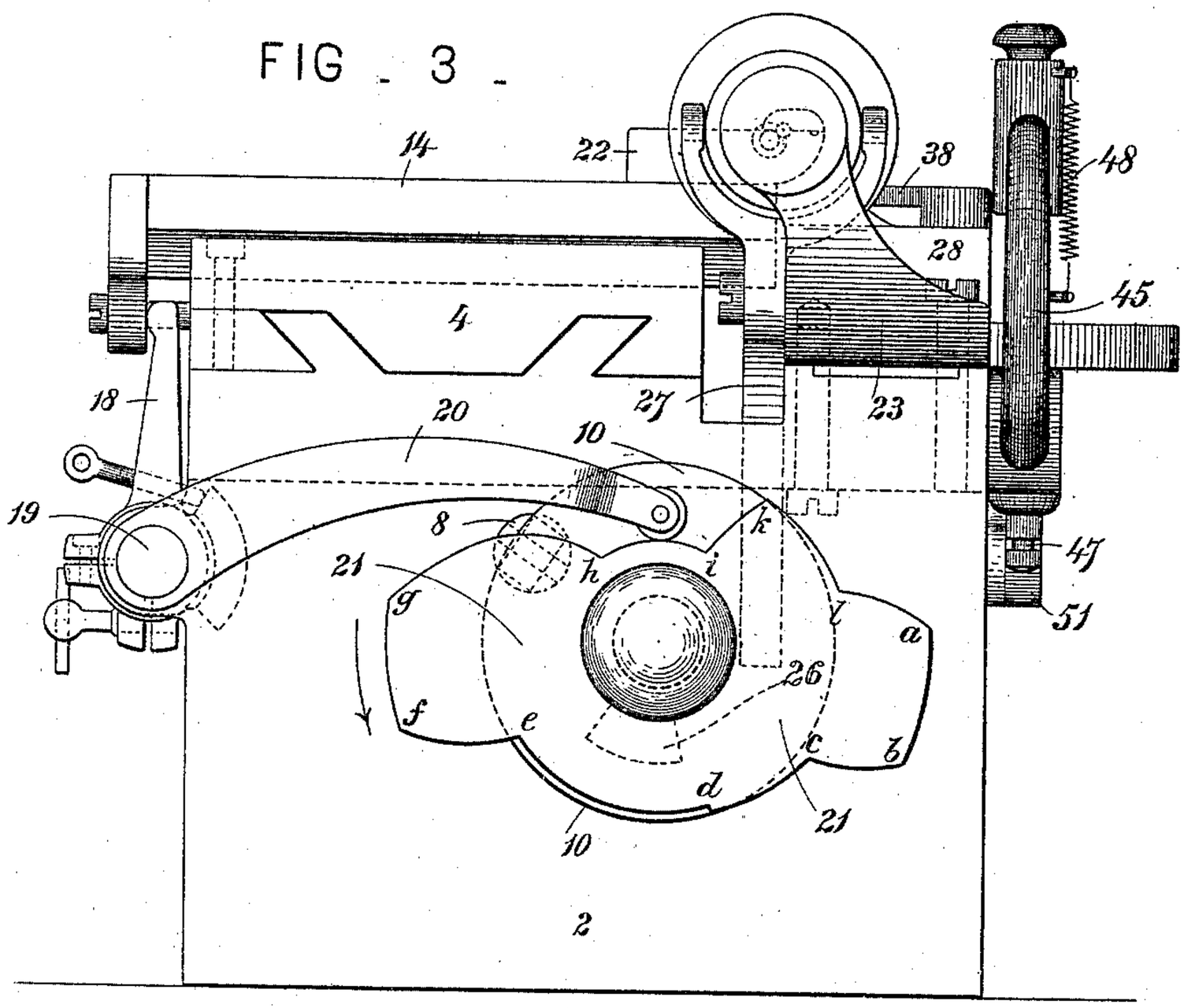
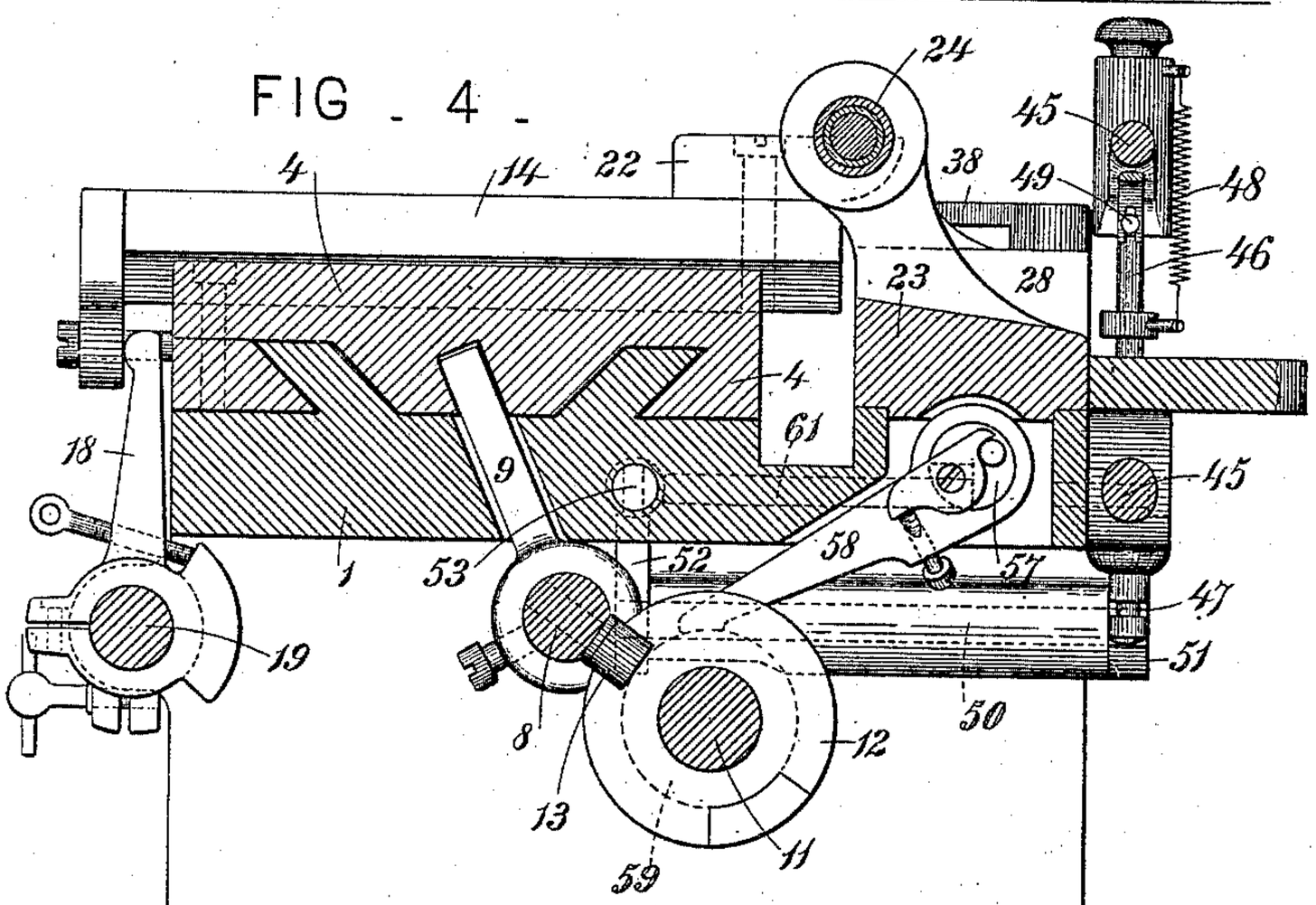


FIG. 4.



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JEWEL SETTING MACHINE.

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FIG. 5.

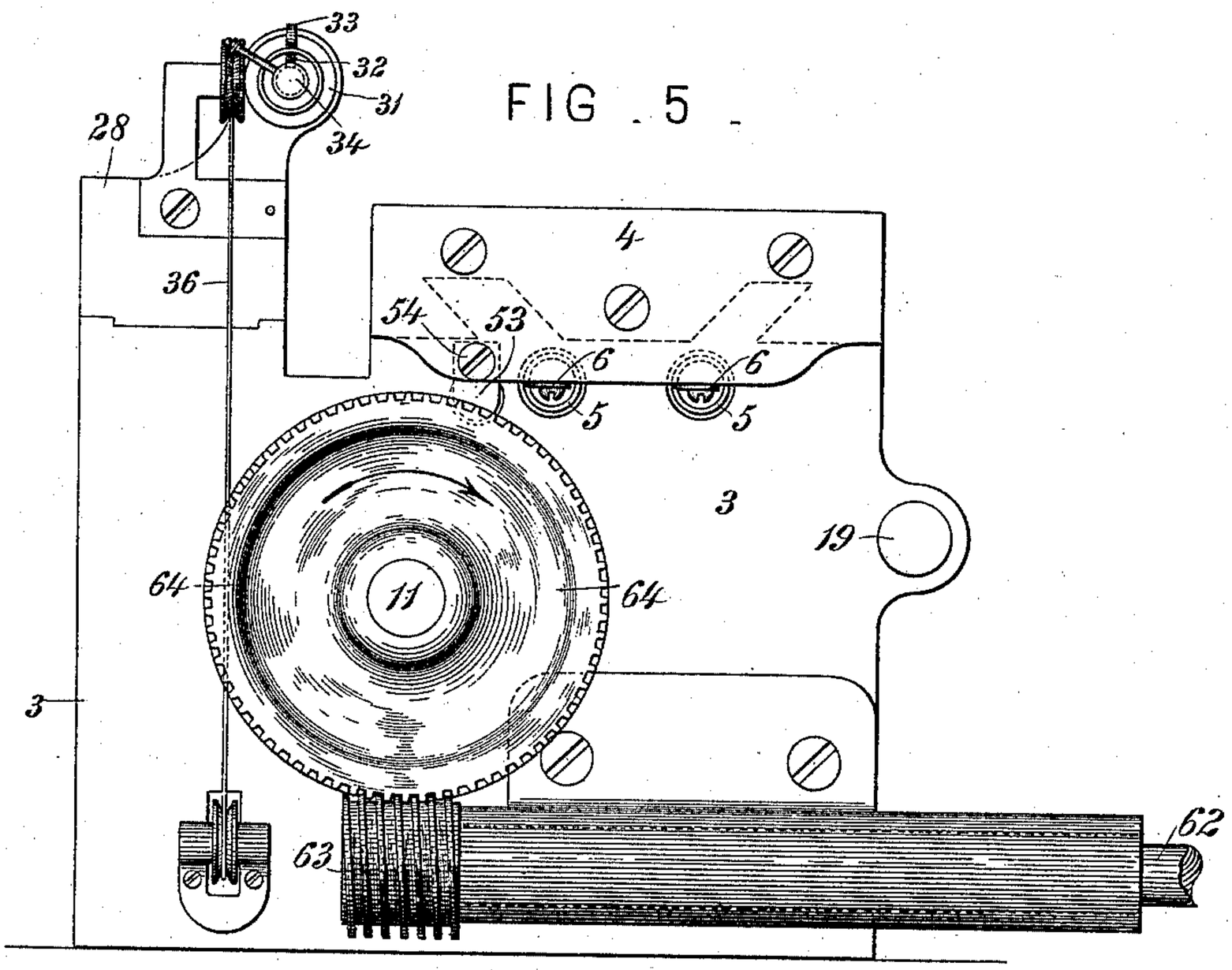

FIG. 6.

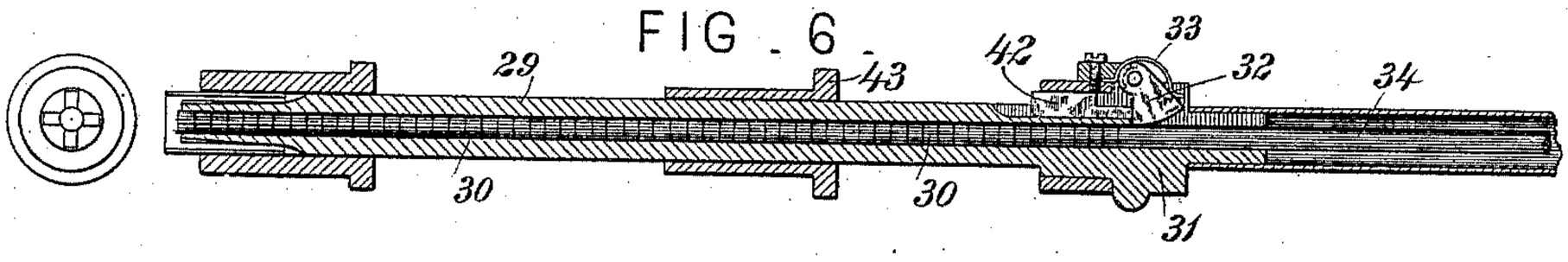

FIG. 7.

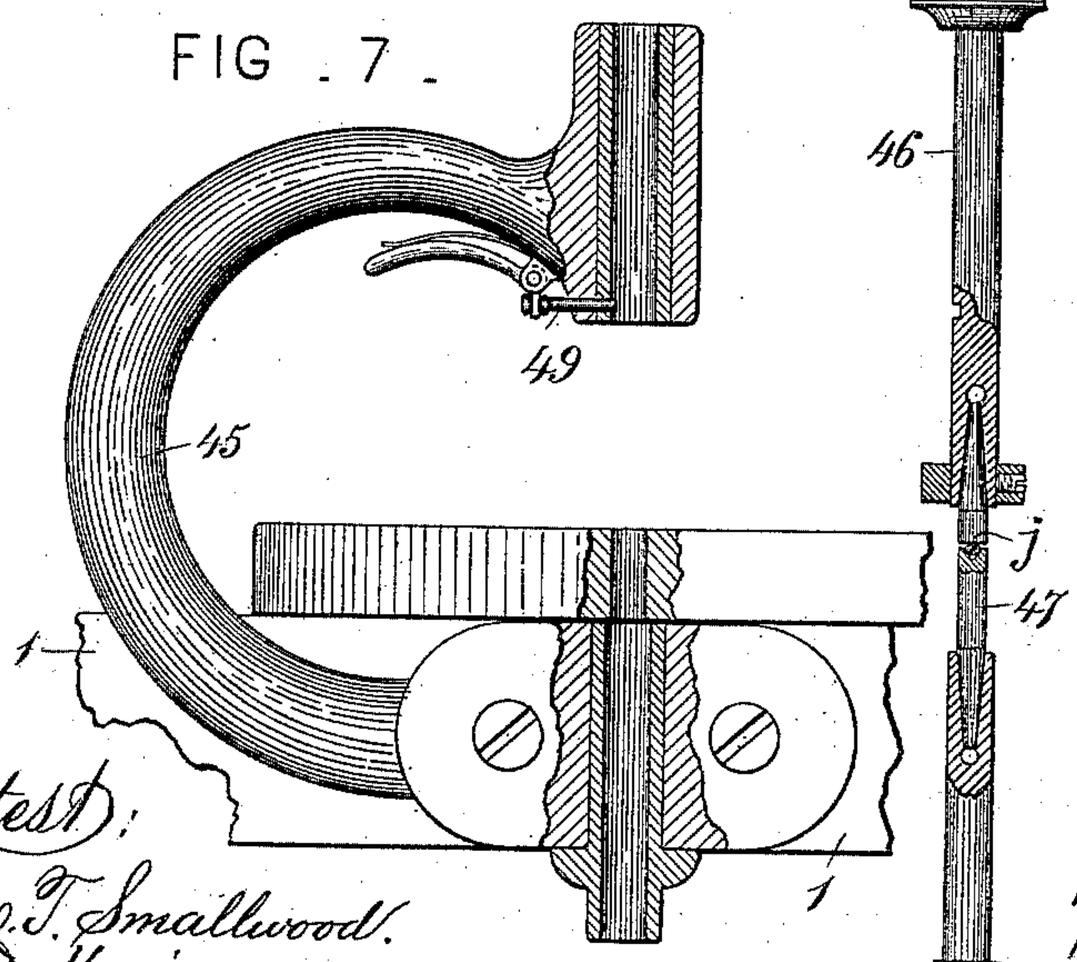

FIG. 8.

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FIG. 9.

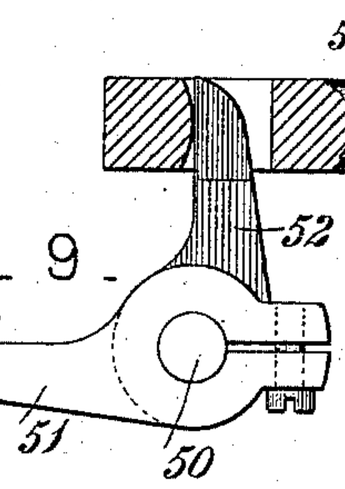


FIG. 10.

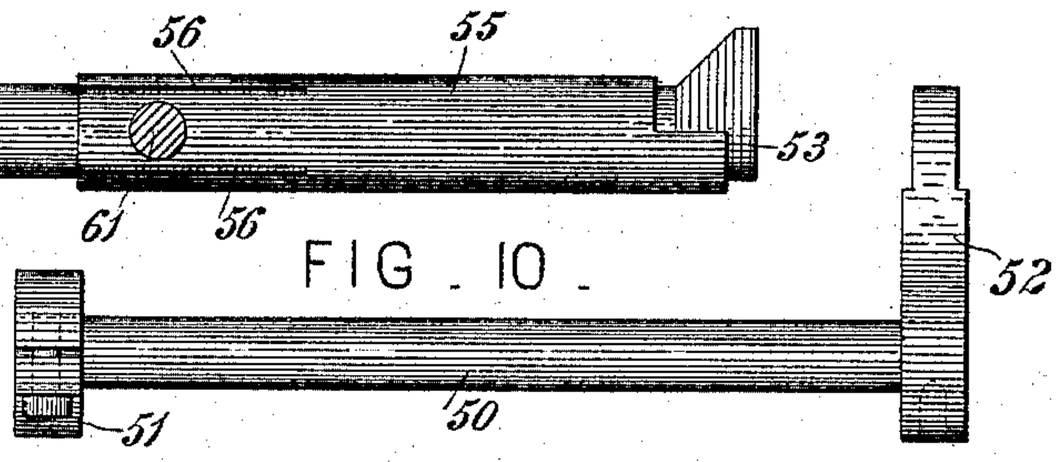


FIG. 11.

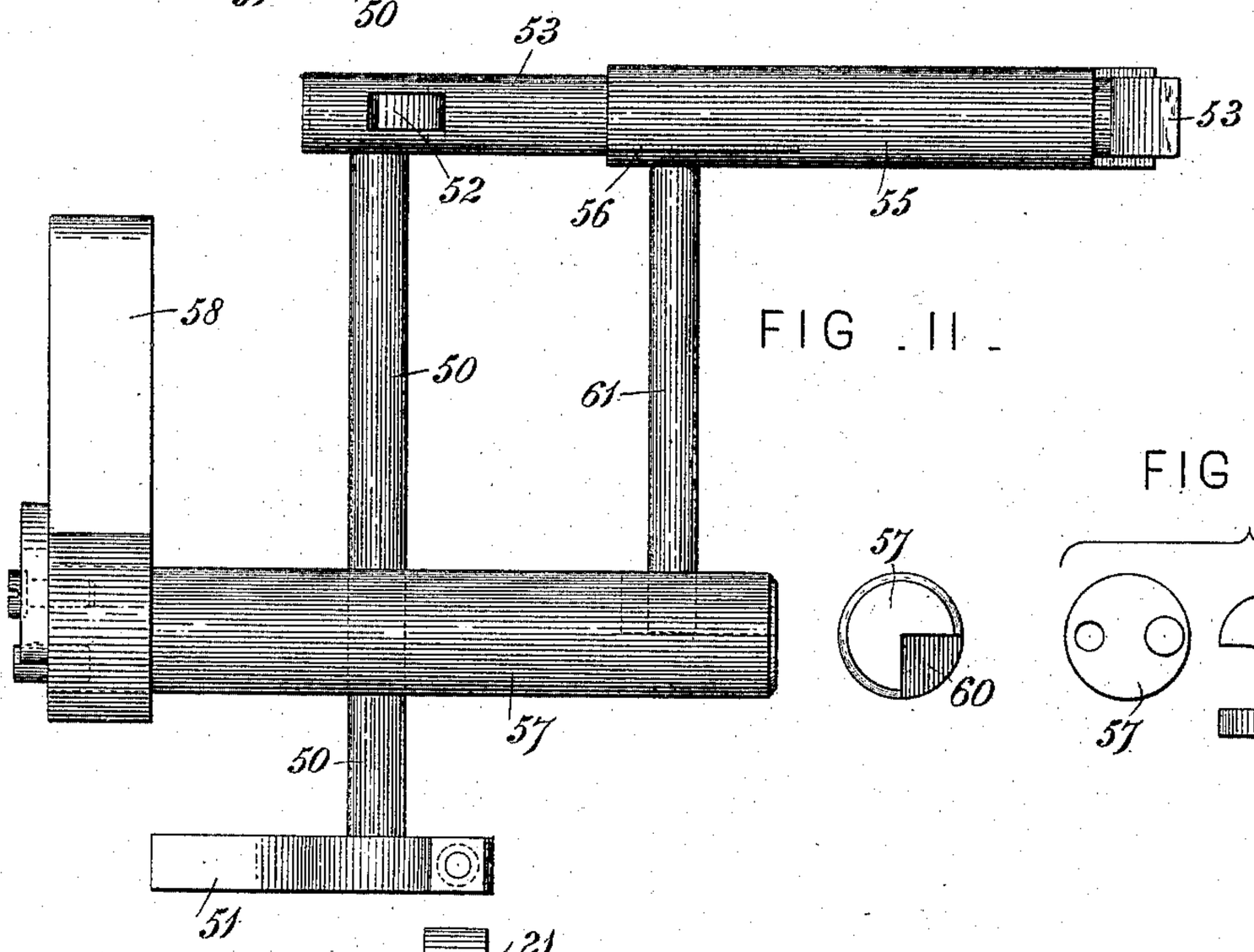
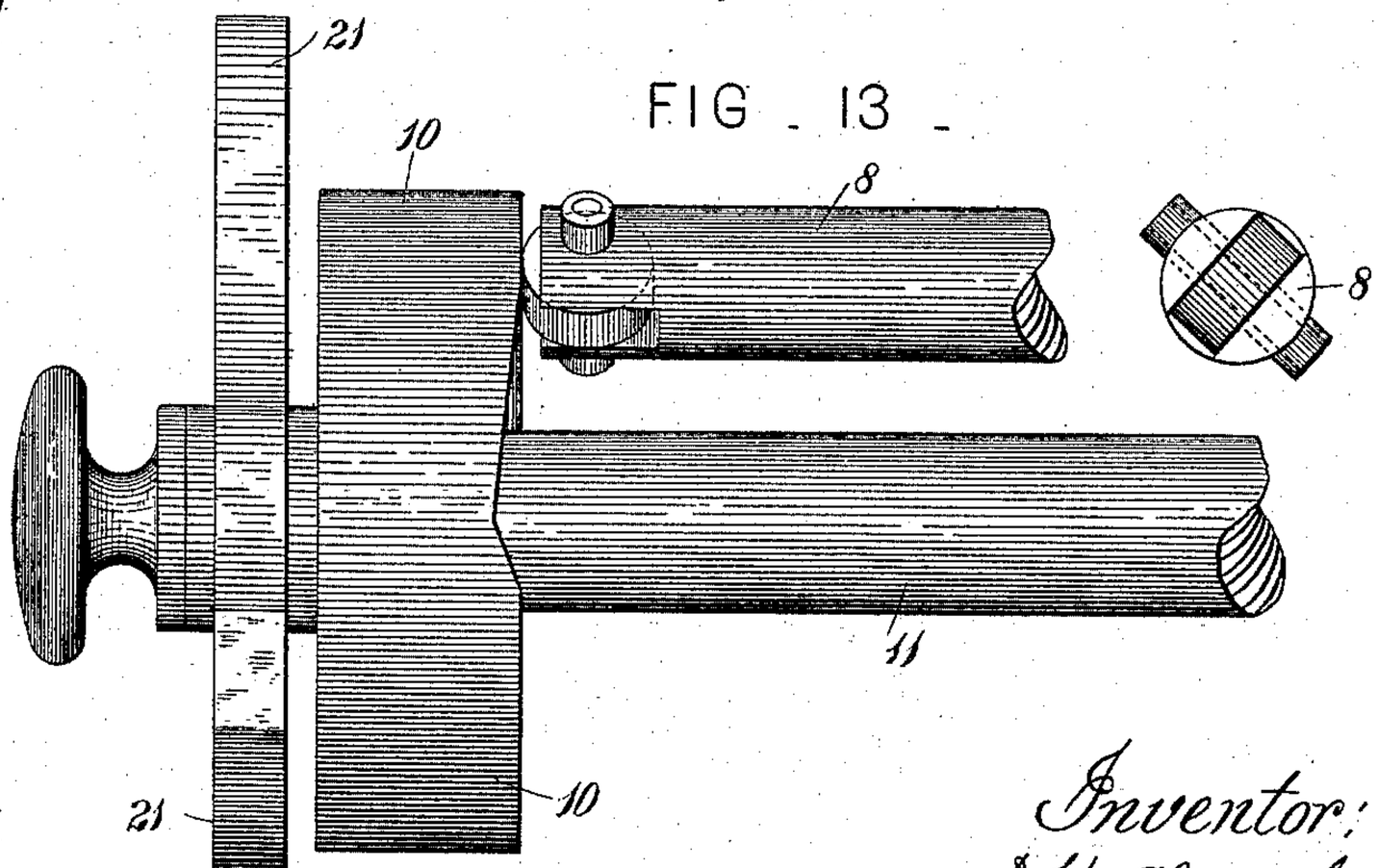


FIG. 12.

FIG. 13.



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Inventor:
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by Wright Brown Quinby & Atty.

UNITED STATES PATENT OFFICE.

DUANE H. CHURCH, OF WALTHAM, MASSACHUSETTS.

JEWEL-SETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 488,240, dated December 20, 1892.

Application filed March 1, 1892. Serial No. 423,415. (No model.)

To all whom it may concern:

Be it known that I, DUANE H. CHURCH, of Waltham, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Jewel-Setting Machines, of which the following is a specification.

This invention relates to a class of machines designed for the purpose of setting jewels, being more particularly adapted for setting small stones such as are used in watches for the bearings of the respective arbors.

The object of the invention is to produce a machine that will perform the work more rapidly, effectively and accurately than has been done heretofore, thus saving labor and lessening the cost of manufacture.

The invention consists in certain features of novelty which are more particularly pointed out in the claims, being first described with reference to the accompanying drawings, in which

Figure 1 represents a plan view of a machine constructed according to my invention. Fig. 2 represents a front elevation of the same. Fig. 3 is a view taken at the left of the machine, showing the transverse and longitudinal slide-operating cams. Fig. 4 is a transverse section on line 4, 4 of Fig. 2. Fig. 5 is a view taken to the right of the machine, the top or transverse slide and operating parts being omitted. Fig. 6 is a detail in section, on a larger scale, of the setting-carrier. Fig. 7 is an enlarged detail of the caliper-supporting frame. Fig. 8 represents the calipers proper projected from the frame and in operative position, as in Fig. 2. Fig. 9 is an enlarged detail, in front elevation, of the mechanism for gaging the movement of the longitudinal slide. Fig. 10 is an enlarged detail of a portion of the same. Fig. 11 is an enlarged detail plan of the parts shown in Fig. 9, showing also the mechanism for locking the gage after it has been set to position by the calipers. Fig. 12 represents in detail the device employed for adjusting the gage-locking mechanism relatively to its operating cam (see Fig. 4). Fig. 13 represents an enlarged detail plan of the longitudinal and transverse slide-operating cams.

All the detail figures are on a larger scale.

The frame of the machine consists of bed 1 and legs 2, 3; said bed is formed to support and guide a longitudinally reciprocating slide 4 deriving its motion, from right to left, from springs 5, Fig. 1, attached to said slide at 6 and to the bed of the machine at 7. Slide 4 derives motion from left to right from a shaft 8 through the medium of an arm 9, Figs. 2 and 4, said shaft 8 receiving its motion from cam 10, Figs. 2, 3, and 13, mounted on the main shaft 11. It will thus be seen that as cam 10 releases shaft 8, the springs 5 will move slide 4 from right to left; and as cam 10 acts on shaft 8 the slide 4 is moved from left to right against the tension of said springs 5. The motion of slide 4 from right to left may also be accomplished by dispensing with springs 5 and substituting in lieu thereof a cam 12, Figs. 2 and 4 mounted on main shaft 11, which cam acts on roller 13 carried by shaft 8. It may also be desirable to use springs 5 in combination with the cam 12 and roller 13, the latter acting to give a rigid or positive movement on the start, and the former to finish with a less rigid action; however, one is a substitute for the other and they may be used either separately or together, as desired.

Mounted in ways in the longitudinal slide 4 is a transversely reciprocating slide 14, Figs. 1, 3 and 4, deriving forward motion from a spring 15, Fig. 1, attached to slide 14 and 16 and to slide 4 at 17. Slide 14 derives backward motion from an arm 18, Figs. 3 and 4, attached to shaft 19, which is provided on its extremity with an arm 20 operated upon by cam 21 mounted on the main shaft 11. It will be seen that this slide 14 has a compound reciprocating motion; being mounted in the slide 4 it must necessarily receive the motion of said slide 4 in addition to the forward and backward motion imparted to it through cam 21 and connections described. This slide 14 is provided with a tool carrier 22, Figs. 1, 2, 3, and 4, and the compound motion is desired for the purpose of first moving the tool forward to position; second, advancing it to its work; third, withdrawing it when work is completed; and fourth, moving it backward to first position.

On the forward part of the bed 1 of the ma-

chine, to the left, is mounted a standard 23 for supporting a spindle 24 provided with a chuck 25 which is operated by cam 26, Fig. 2, through the medium of lever 27. This spindle is or may be of any suitable construction. Directly opposite standard 23, to the right, is mounted a standard 28 for supporting the setting-carrier, which consists of a tube 29, Figs. 1, 2 and 6, the bore of which is of a size sufficiently large to accommodate the settings 30. The tube 29 is provided at one end with an enlargement 31 for the accommodation of a latch 32 held downward by spring 33. This latch impinges against and holds firmly a rod 34 which is exerting a pressure upon the settings, through the medium of spring 35 and cord 36 (see Figs. 2 and 6). Extending vertically through the bed 1 and base of standard 28 is a shaft 37 Figs. 1 and 2 provided at top and bottom respectively with arms 38, 39. Mounted on shaft 11 is a cam 40 which operates upon arm 39 and holds the setting-carrier 29 against the tension of spring 35 through the medium of arm 38 and collar 41 on tube 29. When cam 40 releases arm 39, spring 35 throws the setting carrier forward, and as the forward end of tube 29 reaches the chuck 25, slide 42 comes in contact with bushing collar 43 of standard 28 (see Fig. 6) and trips latch 32, thus releasing rod 34 bringing, the entire tension of spring 35 to bear upon the settings and deposits one in the chuck 25. Cam 40 then acts to retract the setting carrier; the first movement of the latter releasing latch 32 which instantly binds rod 34, relieving the settings of pressure and the setting carrier is moved back to first position (see Fig. 2).

To the bed of the machine in front is attached the caliper frame 45, Figs. 1, 2 and 7, which carries the upper and lower members 46, 47 Fig. 8 of the calipers for measuring the depth of the jewel *j*. The upper member 46 is elevated by a spring 48 and is held in action with lower member 47 by spring catch 49 (see Figs. 2, 7 and 8).

Beneath the bed of the machine running transversely is a shaft 50, Figs. 2, 4, 9, 10 and 11, carrying at its front and rear extremities arms 51, 52, respectively. Arm 51 acts in connection with the lower member 47 of the calipers and, through the medium of shaft 50 and arm 52, moves the gage 53 to the position required by the jewel in the calipers, Figs. 2 and 9. The head of gage 53 is flattened and operates in connection with slide 4 through set screw 54 Figs. 1 and 2. For a portion of its length the gage 53 is incased in a tube 55 split at 56 Fig. 9 to form a spring-lip which is acted on by rod 61 of the locking mechanism now to be described.

In the bed 1 of the machine is mounted a shaft 57 Figs. 2, 4, 11, and 12, provided at one extremity with an arm 58 operating in connection with a cam 59 on the main shaft 11. At the other extremity shaft 57 is cut away or notched at 60 Fig. 11 to act upon a transversely disposed rod 61 which, when brought into action, binds spring-lip of tube 55 firmly against the gage 53, thus locking it securely to the position to which it is moved by the jewel in the calipers. It will thus be seen that by placing the jewel *j* (Fig. 8) in the lower member 47 of the calipers and bringing the upper member 46 to position shown in Fig. 2, the gage 53 will be moved inward more or less according to the depth of the jewel, where said gage is locked by rod 61 as described. Cam 10, now releasing shaft 8, allows springs 5 to act and slide 4 is moved until set screw 54 comes in contact with gage 53. Thus the slide 4 is moved to the left exactly the distance corresponding with the depth of the jewel, and the tool in carrier 22 cuts a cavity in the setting 30, also corresponding to the depth of the jewel in the calipers. The tool carrier 22 is provided with a tool 22^a for cutting the cavity for the jewel, and a tool 22^b for spinning the setting over and fastening the jewel to place. Leg 3 of the machine supports a shaft 62, Figs. 2 and 5, provided with a worm 63 which drives worm-wheel 64 mounted on the main shaft 11. Main shaft 11 derives its motion from worm-gearing 63, 64 at the extreme right of the machine. At the extreme left of the machine, mounted on the main shaft, are the slide operating cams 10 21. The outer cam 21 controls the movements of slide 14, and the inner cam 10 controls the movements of slide 4, as already described.

The operation of the machine is as follows: The machine starts with roller of arm 20 resting on cam 21 at *a*, Fig. 3. Just previous to this point, cam 26 operates on arm 27 and opens chuck 25. The chuck being opened, cam 40 now releases arm 39 and allows spring 35 to throw forward the setting carrier which deposits a setting 30 in the opened chuck 25. The setting being deposited, cam 26 releases arm 27 and chuck 25 secures setting 30. Cam 40 now returns the setting carrier to first position (see Fig. 2). While these operations are taking place the roller of arm 20 is traveling from *a* to *b*, Fig. 3 on cam 21, and the operator has placed a jewel in the calipers 46, 47 and moved the gage 53 to position. Cam 59 now acts on arm 58, rocks shaft 57, throws rod 61 backward, and locks the gage 53 to position, Fig. 11. While the locking action is taking place, roller of arm 20 is traveling from *b* to *c*, Fig. 3 and spring 15 acts to move slide 14 forward, which brings tool 22^a to position for squaring off the setting previous to drilling the cavity for the jewel. This squaring off takes place while the roller is traveling from *c* to *d*, and at *d* the tool is moved slightly forward and brought to position for drilling the jewel cavity. At this point of the operation cam 10 releases shaft 8 and allows springs 5 to act and move slide 4 to the left until set screw 54 comes in contact with the gage 53, thus allowing the tool 22^a to drill the cavity in setting 30 of a depth correspond-

ing to the depth of the jewel, as set by the gage 53. The cavity being bored, cam 10 instantly acts on shaft 8 and moves it to first position, thus, through the medium of arm 9, returning slide 4 which withdraws the tool 22^a. While this drilling is taking place, roller of arm 20 is traveling from *d* to *e* and slide 14 receives only the motion of slide 4 as the path from *d* to *e* of cam 21 is concentric with shaft 11. At *e* cam 21 acts on arm 20, and when the roller has reached point *f* slide 14 is returned to its first position. From *f* to *g* the path is concentric with the shaft 11 and slide 14 remains stationary. While the roller is traveling from *e* to *g* on cam 21, cam 59 releases the locking mechanism, and the operator removes the jewel from the calipers and places it in the cavity prepared for it in the setting; this being done roller of arm 20 travels from *g* to *h* and brings the tool 22^b to position, shown in Figs. 1 to 2. Cam 10 now again releases shaft 8 and allows springs 5 to move slide 4, which brings the tool 22^b in contact with the setting. This tool spins the metal over the edge of the jewel and burnishes it. The tool 22^b acts while the roller is traveling from *h* to *i*, and just previous to its reaching the point *i* cam 10 acts to relieve the pressure of tool 22^b, and from *i* to *k* cam 21 acts to move slide 14 back, which brings tool 22^a again to position for a second squaring off of the setting. This latter operation takes place while the roller of arm 20 is traveling from *k* to *l*. The setting is now completed and while the portion of cam from *l* to *a* is operating to return slide 14 to first position, cam 26 operates to open the chuck for the operator to remove the finished article. The chuck remains open, at *a*, ready for the operation to be repeated.

The entire operation above described takes place during one revolution of the main shaft 11.

Spindle 24 may be of any desired construction and is operated in any desired manner.

I believe it to be new with me to determine the depth of the jewel-receiving recess or cavity formed by the tool of a jewel-setting machine, by means of a calipering device which measures the depth of the jewel and means controlled by said calipering device for regulating the action of said tool; hence I desire to include within the scope of my claims any organization which includes a calipering device and means controlled thereby for determining the depth of the jewel-receiving recess.

I claim:

1. A jewel-setting machine provided with a calipering device for measuring the depth of the jewel, and means controlled by said calipering device for determining the depth of the recess formed to receive the jewel, as set forth.

2. A jewel-setting machine provided with a calipering device for measuring the depth of the jewel, and a gage controlled by said calipering device for limiting the movement of the setting-preparing tool, substantially as described and shown.

3. The combination in a jewel-setting machine, of a calipering device for measuring the depth of the jewel, a gage controlled by said calipering device for limiting the movement of the setting-preparing tool, and a locking device for securing the gage to position after it has been moved by the calipering device, as and for the purpose described.

4. The combination in a jewel-setting machine, of a calipering device for measuring the depth of the jewel, a gage controlled by said calipering device for limiting the movement of the setting-preparing tool, a locking device for securing the gage to position after it has been moved by the calipering device, and a longitudinally reciprocating slide, carrying a transversely reciprocating slide provided with a tool-carrier, said slides cooperating to advance and withdraw the tool-carrier, for the purpose shown and described.

5. The combination in a jewel setting machine, of a chuck for holding and rotating the setting, a setting-carrier provided with a feeding device and with a latch adapted to automatically lock said device to the carrier, means for moving said carrier longitudinally to first insert a setting in the chuck and then withdraw the carrier from the chuck and means for unlocking the feeding device when the carrier is moved to present a setting to the chuck, as set forth.

6. The combination in a jewel setting machine, of a chuck for holding and rotating the setting, a slide carrying tool adapted to operate successively on a setting held by the chuck, mechanism for operating said slide, substantially as described, a calipering device for measuring the depth of a jewel, a movable gage for limiting the first operative movement of the tool carrying slide, connections between said gage and the calipering device whereby the position of the gage is determined by the depth of the jewel and means for locking the gage in the position to which it is moved by the calipering device, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 31st day of October, A. D. 1891.

DUANE H. CHURCH.

Witnesses:
E. A. MARSH,
A. D. HARRISON.