

No. 775,574.

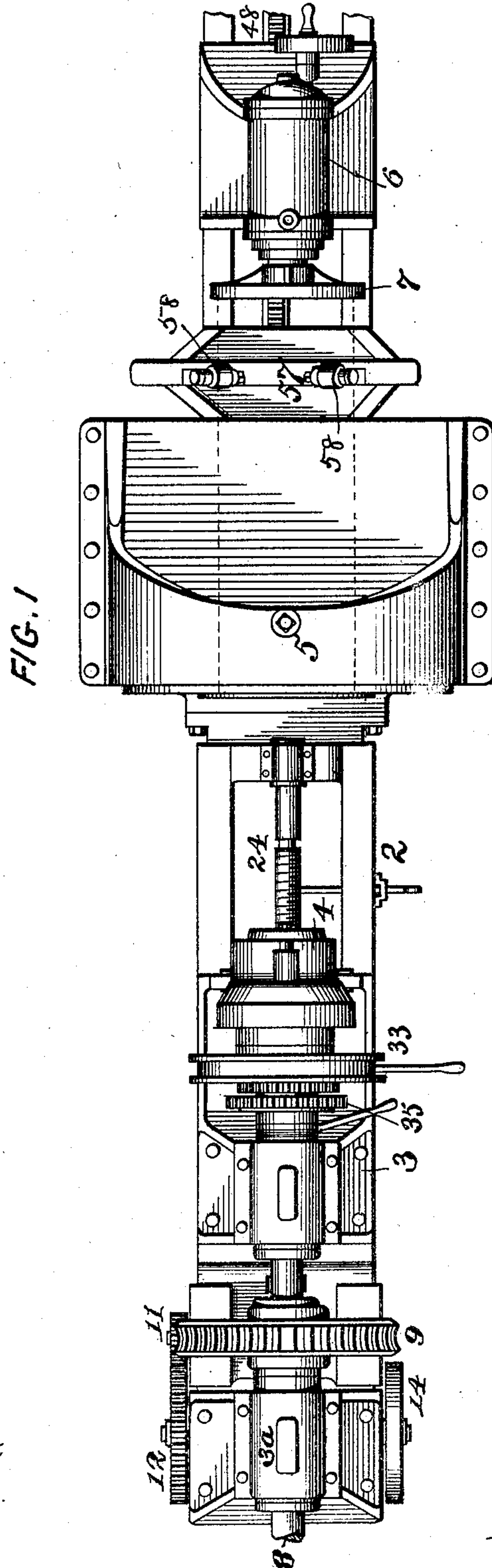
PATENTED NOV. 22, 1904.

L. D. LOVEKIN.
MACHINE FOR EXPANDING AND FLANGING METAL PIPE.

APPLICATION FILED APR. 15, 1904.

NO MODEL.

7 SHEETS—SHEET 1.



WITNESSES:
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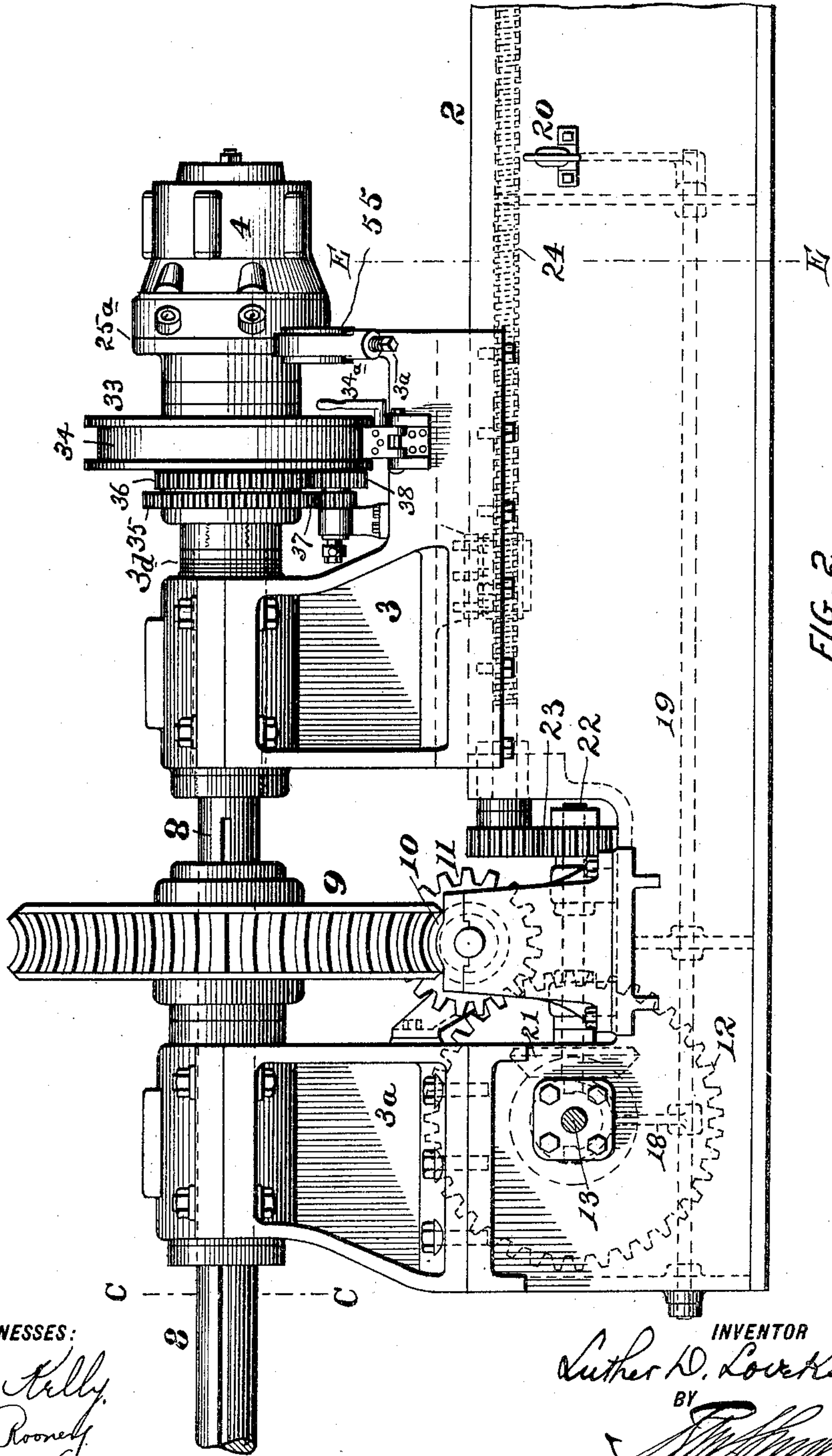
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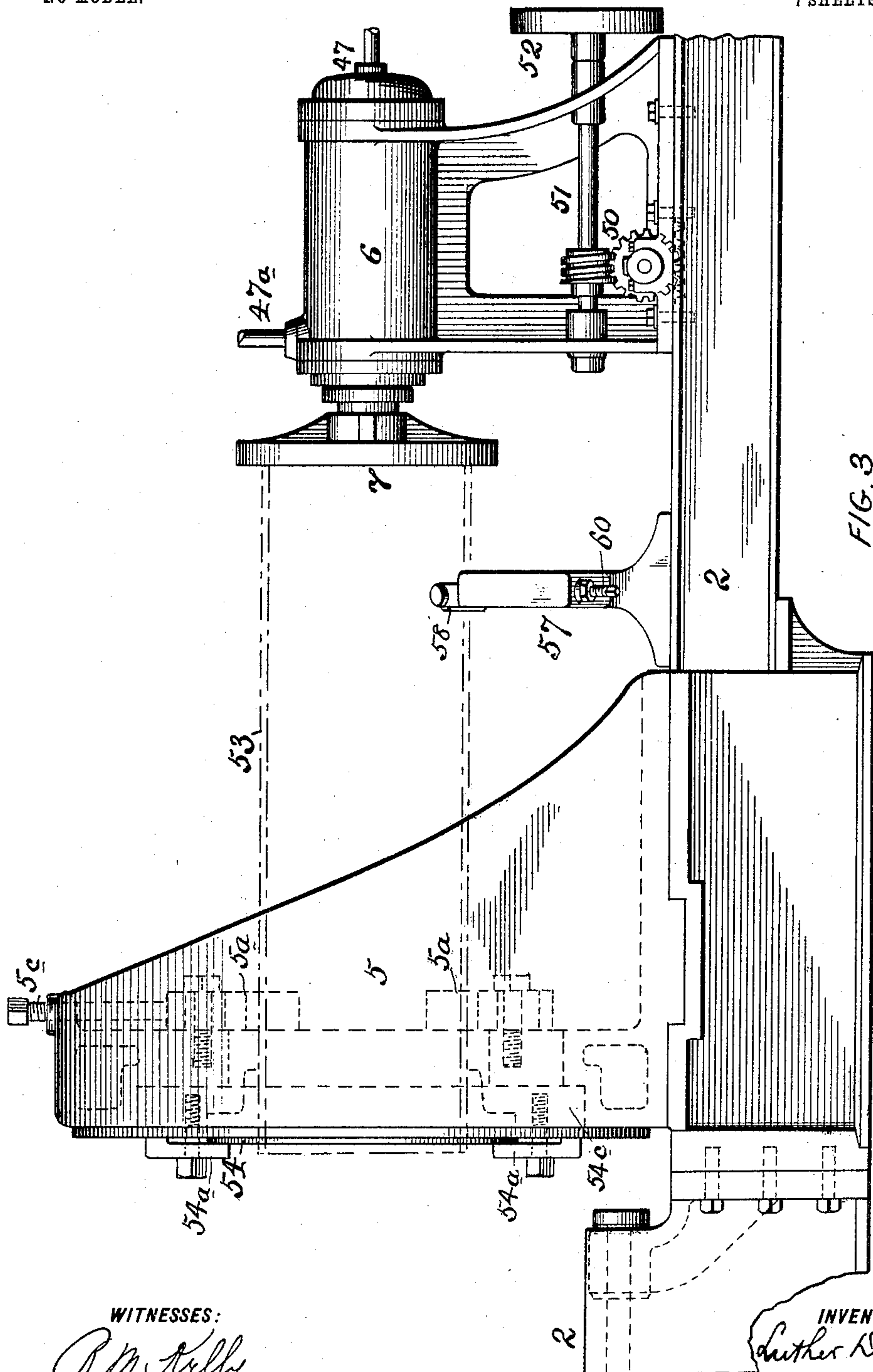
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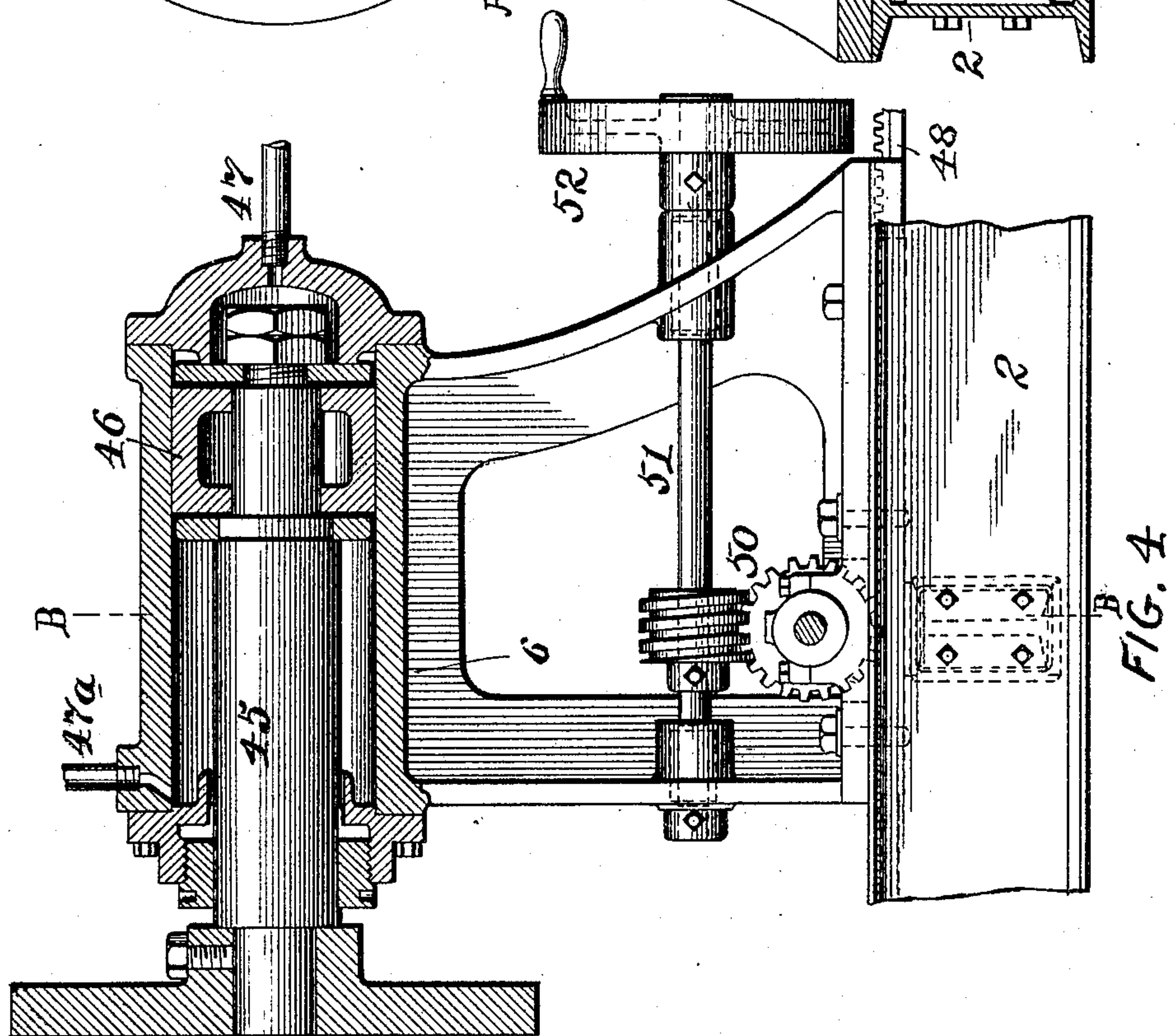
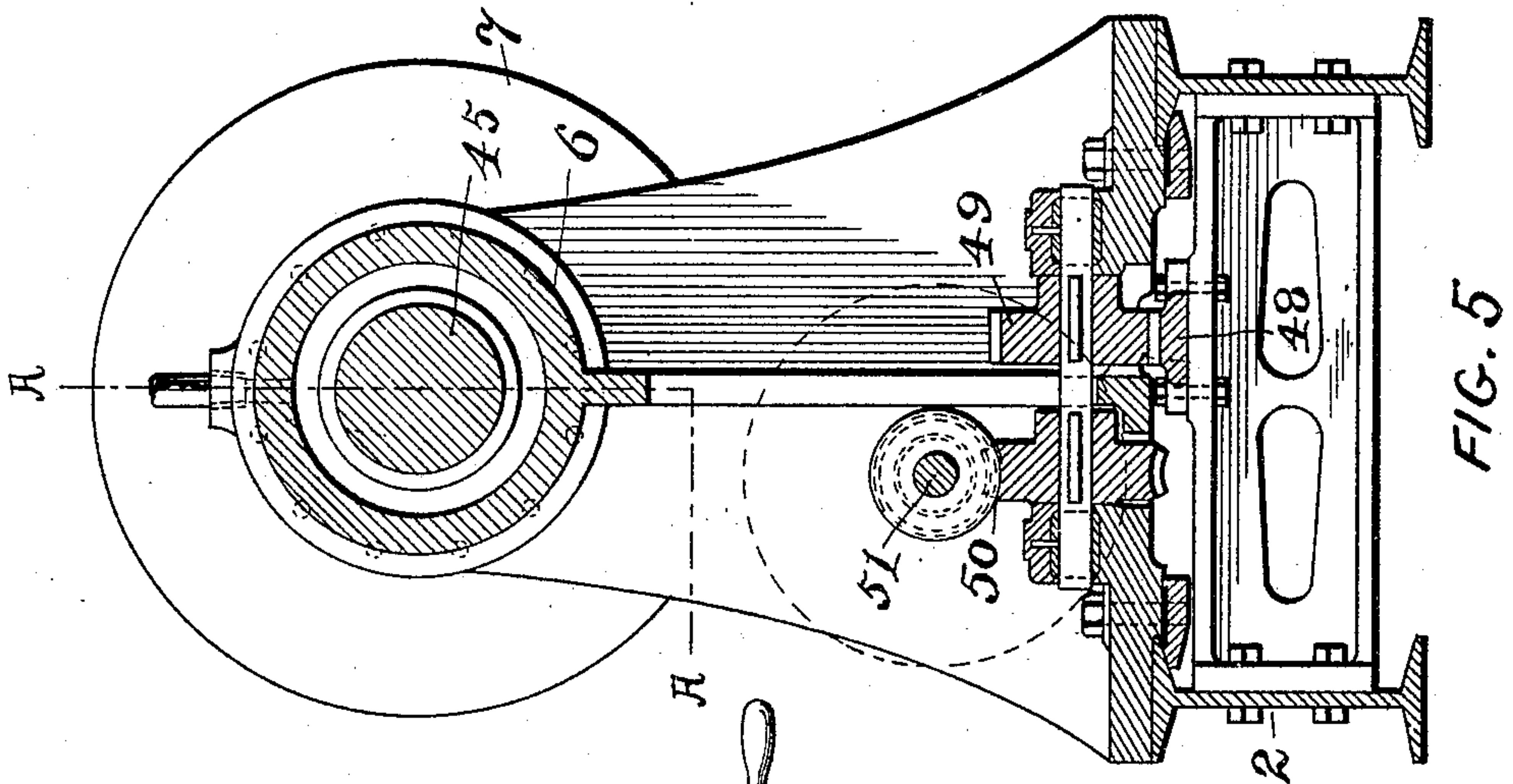
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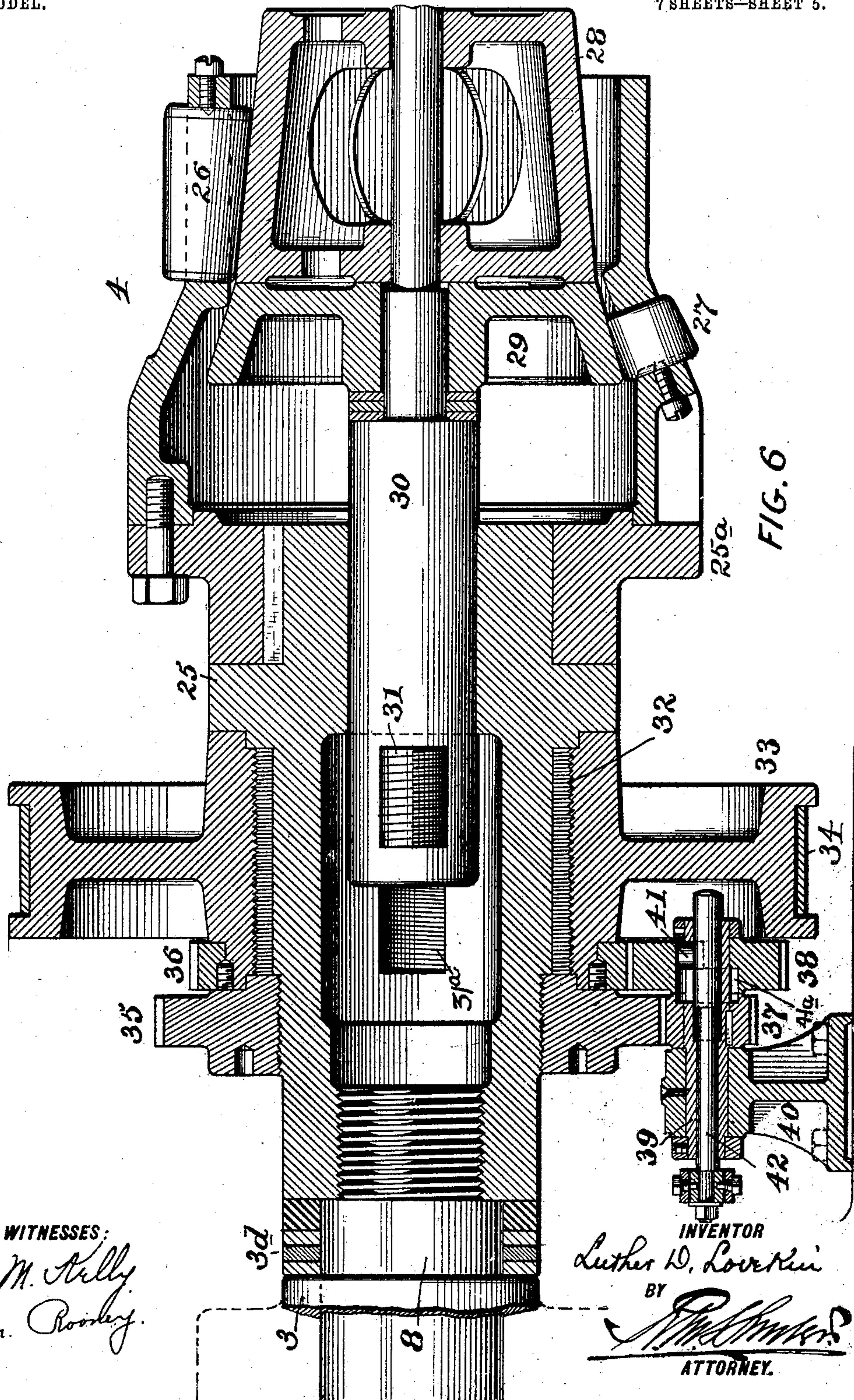
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7 SHEETS—SHEET 5.



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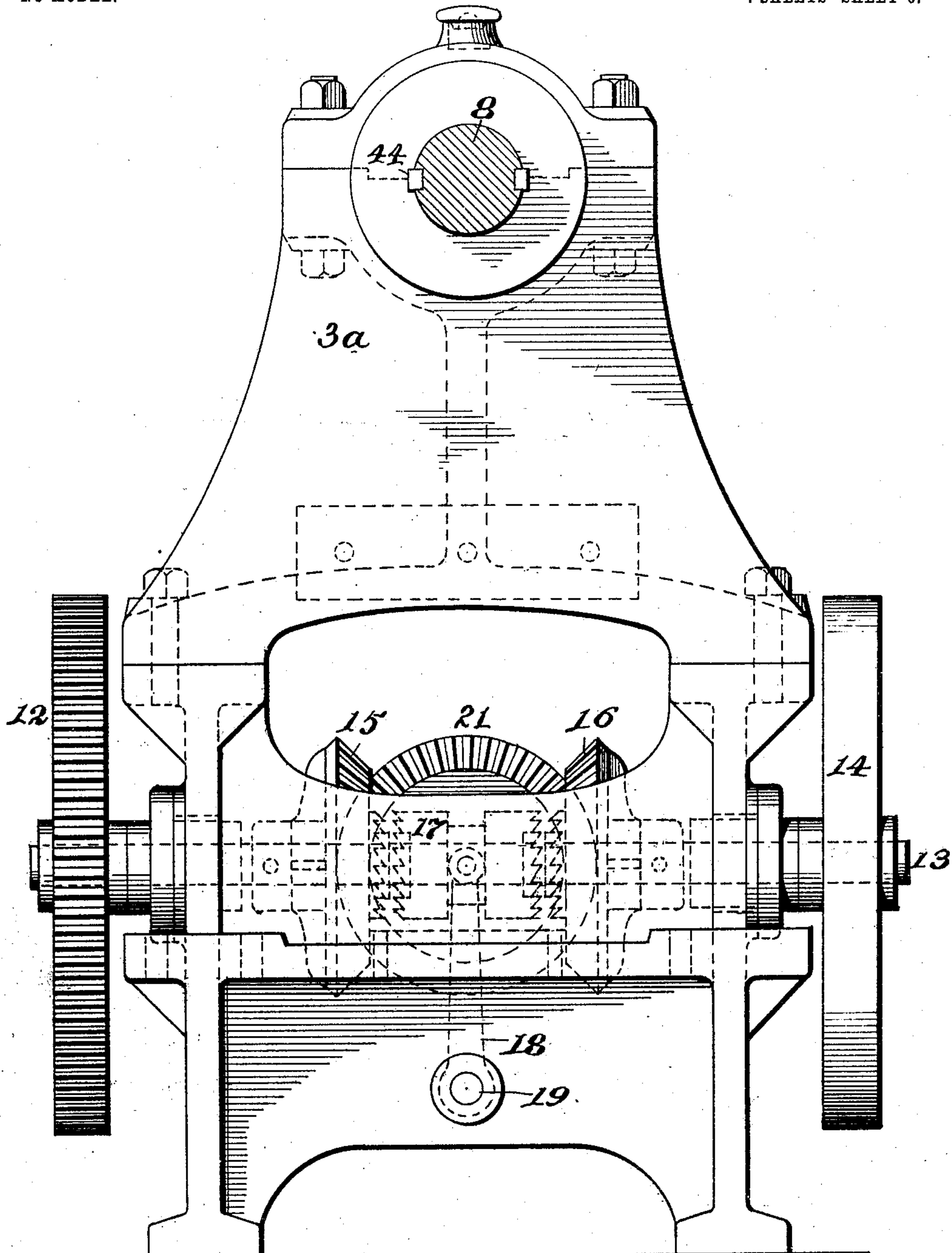
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NO MODEL.

7 SHEETS—SHEET 6.



WITNESSES:

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FIG. 7

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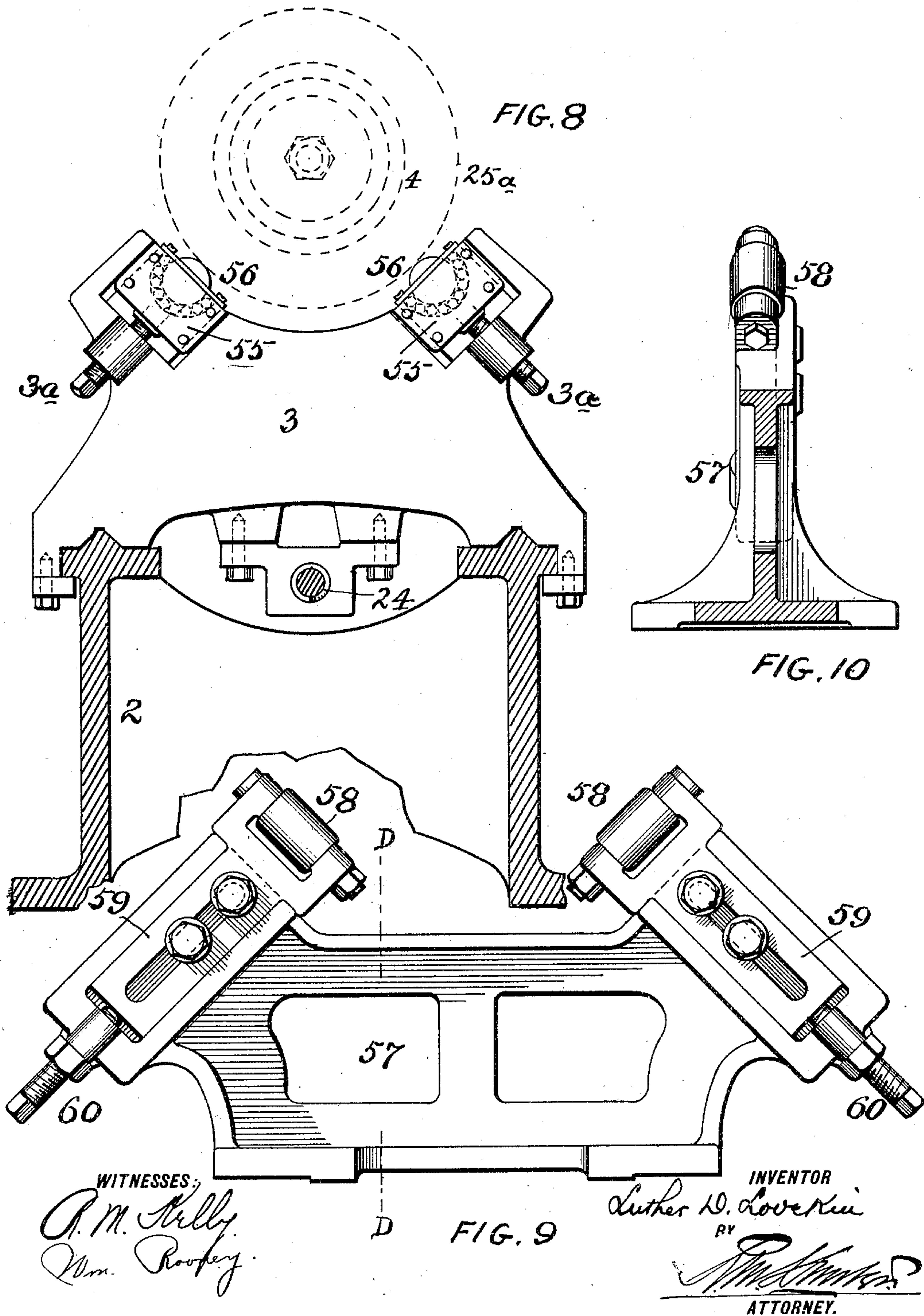
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APPLICATION FILED APR. 15, 1904.

NO MODEL.

7 SHEETS—SHEET 7.



UNITED STATES PATENT OFFICE.

LUTHER D. LOVEKIN, OF PHILADELPHIA, PENNSYLVANIA.

MACHINE FOR EXPANDING AND FLANGING METAL PIPE.

SPECIFICATION forming part of Letters Patent No. 775,574, dated November 22, 1904.

Application filed April 15, 1904. Serial No. 203,272. (No model.)

To all whom it may concern:

Be it known that I, LUTHER D. LOVEKIN, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Machines for Expanding and Flanging Metal Pipe, of which the following is a specification.

My invention has reference to machines for expanding and flanging metal pipe; and it consists of certain improvements which are fully set forth in the following specification, and shown in the accompanying drawings, which form a part thereof.

The object of my invention is to provide a machine adapted for expanding and flanging pipe of large diameters which shall be easily manipulated and controlled.

In carrying out my invention I provide a rotating expanding and flanging tool and means for rotating the same, said tool being adjustable to and from a head which holds the pipe and pipe-flange. In the expanding and flanging tool the central follower-shaft is adapted to be fed forward under the control of a brake-wheel in such a manner as to cause the expanding-rollers to move outward, and is also arranged with suitable gearing for causing the said central follower-shaft to move backward, and thus cause the rollers to collapse. The essential feature of this large tool is to have powerful means for expanding large piping and at the same time to utilize this same power for collapsing the rollers while the machine is revolving the tool continuously in one direction. To do this, it is essential to form the gears on the tools so as to cause a reversal of the brake-wheel at a velocity in excess of the body of the tool itself.

The machine is further provided with a hydraulic cylinder and plunger for forcing the pipe into the flange prior to expanding, thus providing convenient and speedy handling of large and heavy pipes. This enables the pipe to snugly fit the pipe-flange, and yet be quickly adjusted prior to the expanding operation. The hydraulic devices are adjustable as a whole longitudinally upon the bed-frame of the machine and relatively to and from the pipe-clamps, being located upon the opposite

side of said clamps to that occupied by the expanding and flanging tool.

My invention embodies the foregoing features separately and in combination, and in addition thereto comprehends details of construction which, together with the above-described features, will be better understood by reference to the drawings, in which—

Figure 1 is a plan view of my improved machine. Fig. 2 is a side elevation of one end of same. Fig. 3 is a similar side elevation of the other end of same. Fig. 4 is a sectional elevation of a portion of Fig. 3, taken on line A A of Fig. 5. Fig. 5 is a cross-section of same on line B B of Fig. 4. Fig. 6 is a sectional elevation through the expanding and flanging tool. Fig. 7 is a cross-section of Fig. 2 on line C C. Fig. 8 is an elevation of the sliding head and support for the expanding and flanging tool and shows the base in section taken on line E E of Fig. 2. Fig. 9 is an elevation of the support for the pipe, and Fig. 10 is a cross-section of Fig. 9 on line D D.

2 is the bed or base-frame of the machine.

3 is a longitudinally-adjustable head supported upon the guides of the base-frame and adjustable under the action of a screw 24. This head supports the rotating expanding and flanging tool 4 and moves it toward or from the pipe and flange clamping devices 5. The movable head is provided with a rearwardly-extending shaft 8, which passes through a sleeve or hub of the worm-wheel 9, being caused to rotate with said worm-wheel by the employment of the splines 44, Fig. 7, working in grooves in the shaft. The worm-wheel 9 is rotated by a worm 10, which is driven by a pinion 11 and spur-gear 12, the latter being secured to a shaft 13, having a belt-wheel 14, to which power is applied. The expanding-tool is secured to the shaft either by being screwed thereon or in any other way, so as to allow the tool itself to be detached.

Loosely supported upon the shaft 13 are two bevel-gears 15 and 16, which mesh with a connecting bevel-gear 21 upon a shaft 22, the latter being geared by pinions 23 to the screw feed-shaft 24, above described. The

shaft 13 also carries a clutch 17, adapted to connect the shaft with either the gear 15 or 16 to cause the screw-shaft 24 to be rotated in either direction for the purpose of feeding the head 3 and tool 4 to or from the clamp 5 and the tube held thereby. The clutch 17 is adjusted by an arm 18, secured to a rock-shaft 19, which may be moved by a hand-regulator 20. From this it will be seen that the support of tool 4 may be moved in either direction by the main power or may be held at rest, as desired.

The expanding and flanging tool is largely of a construction similar to that set out in my application Serial No. 195,232 and filed February 25, 1904, but includes reversing mechanism and brake devices as novel features, said constructions being clearly shown in Fig. 6. The mandrel 25 is secured upon the end of the shaft 8 which is journaled in the head 3, and the end thrust of the expanding-tool is taken by the head 3 through the antifriction rings and collars 3^d. This mandrel is fitted with a hollow forward portion, in which are journaled the expanding-rollers 26 and the inclined flanging-rollers 27. These rollers are usually employed in sets of three or more equally distributed around the mandrel. The hollow end of the mandrel contains a conical roller 28 for expanding the rollers 26 and a conical thrust-roller 29 for receiving the thrust of the flanging-rollers 27. The rollers 27 are outwardly adjustable, as well as the expanding-rollers 26, and the expansion of these rollers is secured by adjusting the rollers 28 and 29 forwardly by the follower-shaft 30, carried in the mandrel. This shaft is provided with a transverse key 31, screw-threaded on its ends and working with the internal screw-thread 32 on the hub of the brake-wheel 33. The key 31 is guided in slots 31^a in the mandrel, so that it cannot rotate therein, and consequently the rotating of the wheel 33 moves the shaft 30 longitudinally. The mandrel is provided with a gear 35, and the wheel 33 is provided with a somewhat smaller gear 36. These gears respectively mesh with pinions 37 and 38, the former being secured to a shaft 39, journaled in the bracket 40, rigidly held to the head 3, and hence relatively stationary to the rotating tool. The pinion 38 is loose upon the shaft 39, but may be caused to rotate with it and its pinion 37 by a key 41, secured to a rod 42, extending through the shaft 39 and adjusted by a hand-lever. In the position of the key 41 (shown in Fig. 6) the pinions 37 and 38 are both fast to the shaft 39, and consequently when the mandrel and its gear 35 rotate the gear 36 and wheel 33 are caused to rotate in the same direction, but at a higher speed. This feeds the follower-shaft 30 backward. If the rod 42 and its key 41 be pulled backward, (to the left,) the key runs freely in the annular groove 41^a, and the pinion 38 revolves idly upon the shaft 39. When this disengagement is made,

the rotation of the wheel 33 is caused by the frictional contact at the threads only, and by applying the brake 34, consisting of a steel brake-band and a lever 34^a to operate it, wheel 33 may be held fast, and thereby cause the follower-shaft 30 to advance and spread the rollers 26 and 27 outward.

The pipe and flange-ring clamping devices 5 may be of any suitable construction—such, for example, as set out in my application Serial No. 195,231 and filed February 25, 1904. These clamping devices may be of any suitable construction, those shown in Fig. 3 consisting of the clamps 54^a for holding the pipe-flange 54 to a frame 54^c, and grips 5^a for holding the pipe 53. The grips may have V-shaped jaws and adjusted to or from each other in any suitable manner, one form of means being the adjusting-screw 5^c. These devices support and hold the flange-ring 54 and also the end of the pipe 53, leaving the end projecting through the flange to a small extent, as indicated in Fig. 3.

It is necessary in large pipe to provide some means to force the pipe into the flange and also to take the end thrust of the pipe in a machine of this class when operating upon pipes of large diameters, and such means is shown in Figs. 3, 4, and 5. The base-frame 2 is provided with a guideway upon which is longitudinally adjustable a head having a hydraulic cylinder 6. Working in this cylinder is a piston-rod 45 and piston 46. The piston-rod is provided on its end with a disk 7, against which the end of the pipe rests. This disk 7 and the piston-rod is moved forward or backward by admitting water under pressure by pipes 47 or 47^a to either side of the piston 46 desired. The pipe 53 is supported upon a suitable support 57, Fig. 9, whereby it is held in proper alinement, so as to be received on the disk 7. This support, as shown, consists of the two rollers 58, carried in radially-adjustable carriers 59, adjusted by screws 60. In this manner the support will be adjustable for tubes of various diameters. The rollers 58 are employed to permit more easy longitudinal adjustment of large and heavy pipes.

To adjust the hydraulic devices, the following mechanism is provided: A rack 48 is secured along the base-frame 2, and meshing with it is a pinion 48, which is rotated by a worm and worm-wheel gear 50, the latter being operated by a shaft 51 and hand-wheel 52. The worm of the worm-wheel acts as a lock to hold the hydraulic devices in any adjusted position assumed upon the base-frame 2.

If desired, a support may be employed to sustain the rotating expanding and flanging tool 4, and such a support is shown in Fig. 8. It consists of lugs, which are part of head 3, having radially-adjustable slides 55, provided with rollers 56, upon which the cylindrical part 25^a of the mandrel 25 rotates. These slides may be adjusted by screws 3^a.

I do not confine myself to the details of construction, as it is evident that they may be modified in various ways without departing from the spirit of the invention.

5 Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

10 1. In a machine for expanding and flanging pipe, the combination of means to hold the pipe, a sliding head movable to and from the means for holding the pipe, a revolving expanding and flanging tool journaled in said sliding head and held against longitudinal movement relatively to it, power devices for
15 rotating the said tool while permitting its adjustment with the sliding head to and from the means for holding the pipe, feeding means for the sliding head, and power-transmitting connections between said power devices and feed-
20 ing means.

2. In a machine for expanding and flanging pipe, the combination of means to hold the pipe, a sliding head movable to and from the means for holding the pipe, a revolving ex-
25 panding and flanging tool journaled in said sliding head so as to move positively with it, power devices for rotating the said tool while permitting its adjustment with the sliding head to and from the means for holding the
30 pipe, feeding means for the sliding head, power-transmitting connections between said power devices and feeding means, and hand-controlled devices for putting the said power-transmitting connections into or out of oper-
35 ation.

3. In a machine for expanding and flanging pipe, the combination of means to hold the pipe, a sliding head movable to and from the means for holding the pipe, a revolving ex-
40 panding and flanging tool journaled in said sliding head so as to move positively with it, power devices for rotating the said tool while permitting its adjustment with the sliding head to and from the means for holding the
45 pipe, feeding means for the sliding head, power-transmitting connections between said power devices and feeding means, hand-controlled devices for putting the said power-transmitting connections into or out of oper-
50 ation, and reversing devices for causing the power-transmitting connections to feed the sliding head to or from the means for holding the pipe.

4. In a machine for expanding and flanging
55 pipe, the combination of an expanding and flanging tool having a rearwardly-extending shaft, power devices for rotating the said shaft, an adjusting-wheel rotatably supported on the expanding and flanging tool, gearing for ro-
60 tating the adjusting-wheel from the rotating expanding and flanging tool whereby the tool may be adjusted by the same power that rotates the tool, and hand-controlled devices for putting said gearing into or out of action.

65 5. In a machine for expanding and flanging

pipe, the combination of an expanding and flanging tool having a rearwardly-extending shaft, power devices for rotating the said shaft, an adjusting-wheel rotatably supported on the expanding and flanging tool, gearing for rotat-
70 ing the adjusting-wheel from the rotating expanding and flanging tool whereby the tool may be adjusted by the same power that rotates the tool, hand-controlled devices for put-
75 ting said gearing into or out of action, and a braking device adapted to feed the central mandrel inside the tool and thus cause the rollers to expand.

6. In a machine for expanding and flanging pipe, the combination of a sliding head, means
80 to adjust the head, an expanding and flanging tool journaled in the head, power devices for rotating the expanding and flanging tool, and supporting means for sustaining the down-
85 ward thrust of the expanding and flanging tool arranged beneath it and movable with the slid-
ing head.

7. In a machine for expanding and flanging pipe, the combination of a sliding head, means
90 to adjust the head, an expanding and flanging tool journaled in the head, power devices for rotating the expanding and flanging tool, and supporting means for sustaining the down-
ward thrust of the expanding and flanging tool arranged beneath it and movable with the slid-
95 ing head, and consisting of radially-adjustable supports 55 having rollers 56.

8. In a machine for expanding and flanging pipe, the combination of a rotating expanding
100 and flanging tool, means to support a flange separable from the pipe, and hydraulic means for forcing the pipe into the pipe-flange and adjust it longitudinally and also to receive the
105 end thrust of the pipe consisting of a hydraulic cylinder a piston and piston-rod and a head against which the pipe is adapted to rest.

9. In a machine for expanding and flanging pipe, the combination of a rotating expanding
110 and flanging tool, means to support the pipe, hydraulic means for forcing the pipe into the pipe-flange and adjust it longitudinally and also to receive the end thrust of the pipe con-
115 sisting of a hydraulic cylinder a piston and piston-rod and a head against which the pipe is adapted to rest, and feeding means to feed the hydraulic cylinder longitudinally to and from
the means for supporting the pipe and to and from the expanding and flanging tool.

10. In a machine for expanding and flanging
120 pipe, the combination of a rotating expanding and flanging tool, means to support the pipe, hydraulic means for forcing the pipe into the pipe-flange and adjust it longitudinally and
125 also to receive the end thrust of the pipe consisting of a hydraulic cylinder a piston piston-rod and a head against which the pipe is adapted to rest, an auxiliary support for the pipe in-
termediate of the head of the piston of the hydraulic cylinder, and the means for supporting
130 and holding the pipe consisting of a frame 57,

radially-adjustable sliding parts 59, rollers 58, and adjusting-screws 60.

11. In a machine for expanding and flanging pipe, the combination of a rotating expanding and flanging tool having an adjustable follower-shaft for spreading its rollers, a rotating shaft therefor, a brake-wheel for adjusting the follower-shaft and carried by the expanding and flanging tool, and a brake device for holding said brake-wheel against rotation.

12. In a machine for expanding and flanging pipe, the combination of a rotating expanding and flanging tool having an adjustable shaft for spreading its rollers, a rotating shaft therefor, a brake-wheel for adjusting the follower-shaft and carried by the expanding and flanging tool, a brake device for holding said brake-wheel against rotation, and gearing connecting the brake-wheel and shaft for the tool whereby the brake-wheel is caused to rotate at a different speed than the tool to cause the said brake-wheel to reverse the adjustment of the follower-shaft to allow the expanding and flanging rollers to approach the axial line of the tool.

13. In a machine for expanding and flanging pipe, the combination of a rotating expanding and flanging tool having an adjustable shaft for spreading its rollers, a rotating shaft therefor, a brake-wheel for adjusting the follower-shaft and carried by the expanding and flanging tool, a brake device for holding said brake-wheel against rotation, gearing connecting the brake-wheel and shaft for the tool whereby the brake-wheel is caused to rotate at a different speed than the tool to cause the said brake-wheel to reverse the adjustment of the follower-shaft to allow the expanding and flanging rollers to approach the axial line of the tool, and hand-controlled devices for putting said connecting-gearing into or out of action.

14. In a machine for expanding and flanging pipe, the combination of a rotating expanding and flanging tool having adjusting devices for its rollers, a shaft to rotate the tool, and gears driven by the shaft, and connecting with the adjusting devices of the tool whereby they may be operated by the rotating shaft to re-

verse the adjusting devices when it is desired to withdraw the tool from the pipe.

15. In a machine for expanding and flanging pipe, the combination of a rotating expanding and flanging tool having adjusting devices for its rollers, a shaft to rotate the tool, gears driven by the shaft and connecting with the adjusting devices of the tool whereby they may be operated by the rotating shaft to reverse the adjusting devices when it is desired to withdraw the tool from the pipe, and hand-controlled devices for putting said gears into and out of power-transmitting operation.

16. In a machine for expanding and flanging pipe, the combination of a rotating power-shaft, an expanding and flanging tool carried by and rotating with said shaft and provided with an adjusting-wheel for spreading or contracting its rollers, a gear 35 secured to and rotating with the tool, a gear 36 secured to and rotating with the adjusting-wheel, pinions 37 and 38 respectively gearing with the gears 35 and 36 and so proportioned as to cause the adjusting-wheel to revolve at a higher speed than the tool and its shaft, and hand-controlled devices for connecting or disconnecting the pinions.

17. In a machine for expanding and flanging pipe, the combination of a rotating power-shaft, an expanding and flanging tool carried by and rotating with said shaft and provided with an adjusting-wheel for spreading or contracting its rollers, a gear 35 secured to and rotating with the tool, a gear 36 secured to and rotating with the adjusting-wheel, pinions 37 and 38 respectively gearing with the gears 35 and 36 and so proportioned as to cause the adjusting-wheel to revolve at a higher speed than the tool and its shaft, hand-controlled devices for connecting or disconnecting the pinions and braking devices for holding the adjusting-wheel stationary while the tool is revolving.

In testimony of which invention I hereunto set my hand.

LUTHER D. LOVEKIN.

Witnesses:

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R. M. KELLY.