No. 887,418. PATENTED MAY 12, 1908.

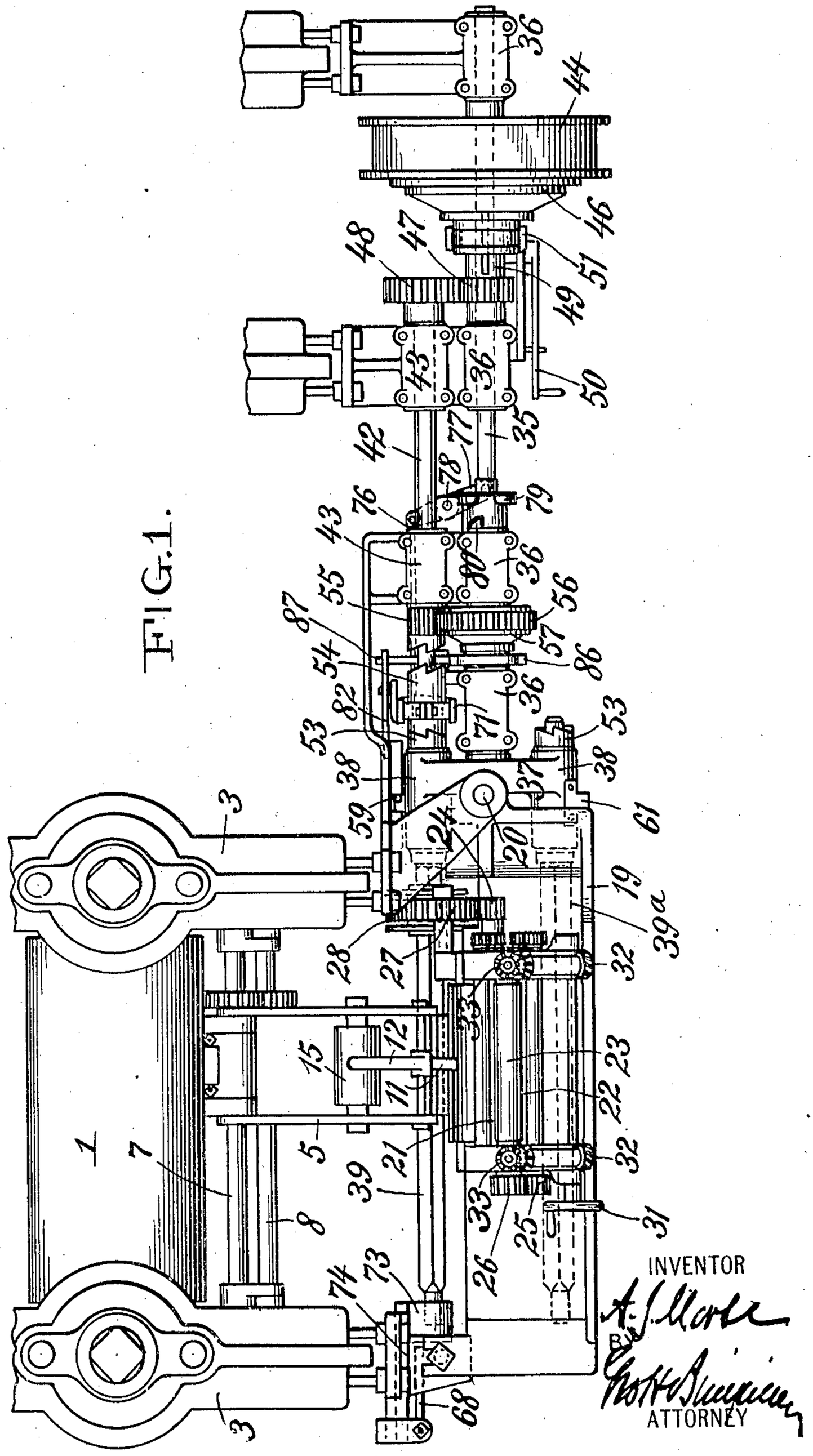
A. J. MORSE.

DOUBLE BLOCKER.

APPLICATION FILED JUNE 20, 1906.

6 SHEETS—SHEET 1.

FIG. 1.



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5 SHEETS—SHEET 2.

FIG. 2.

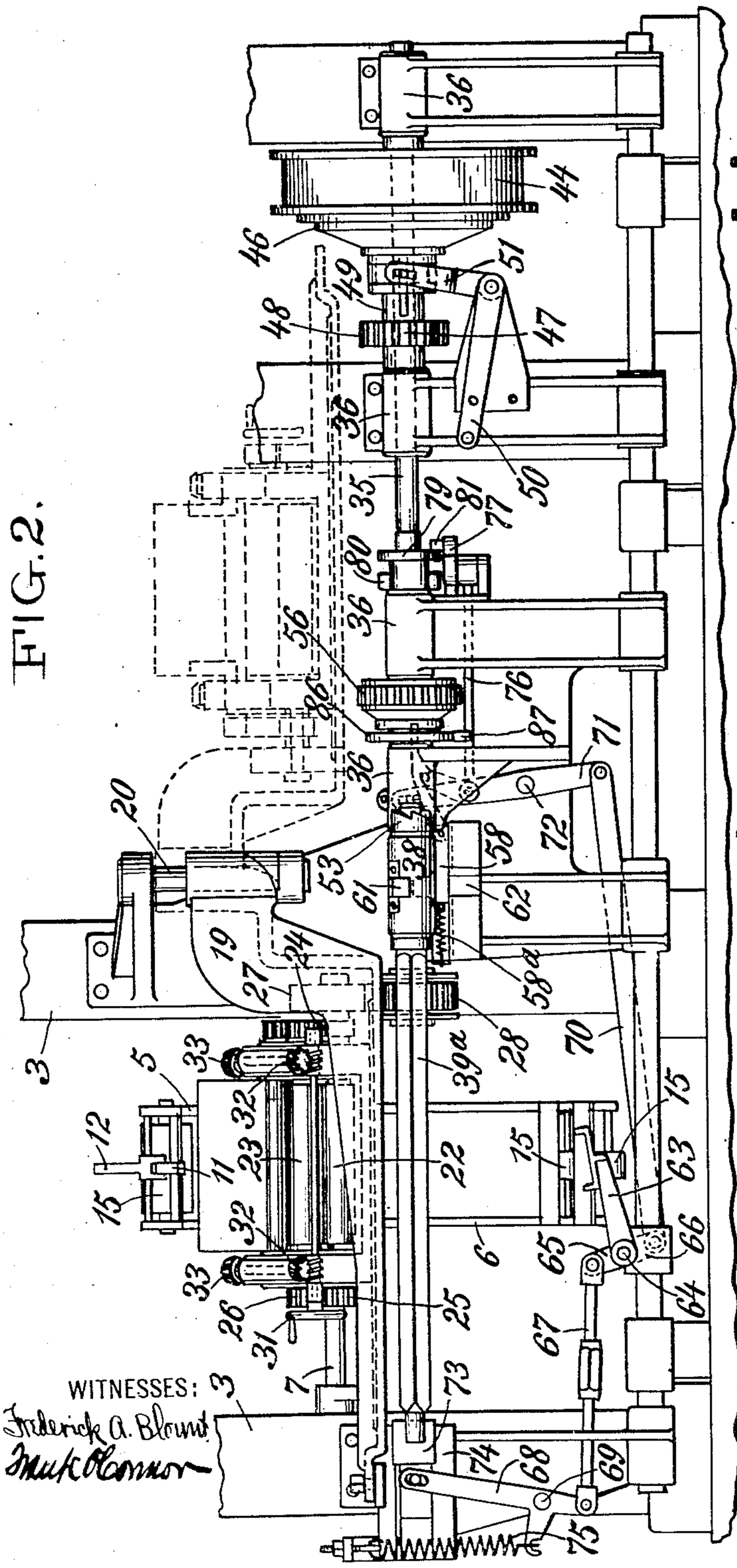
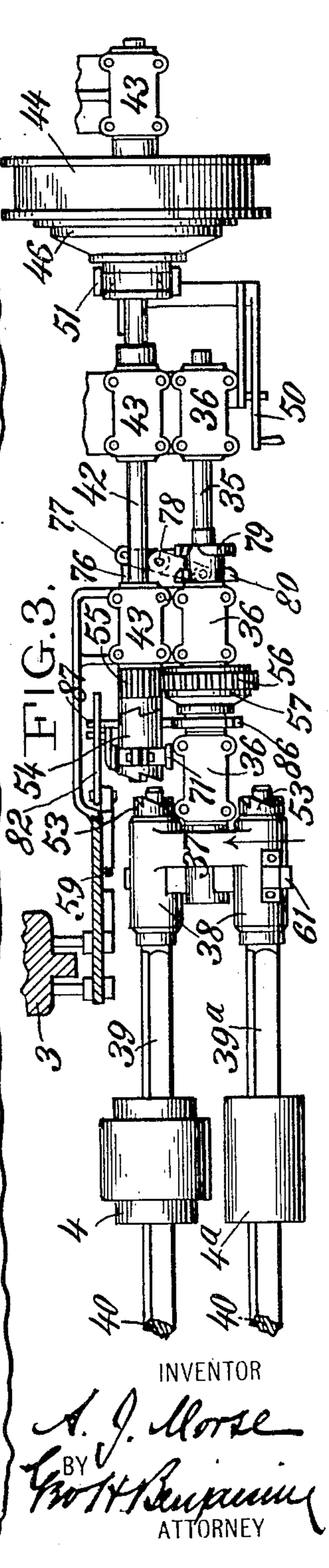


FIG. 3.



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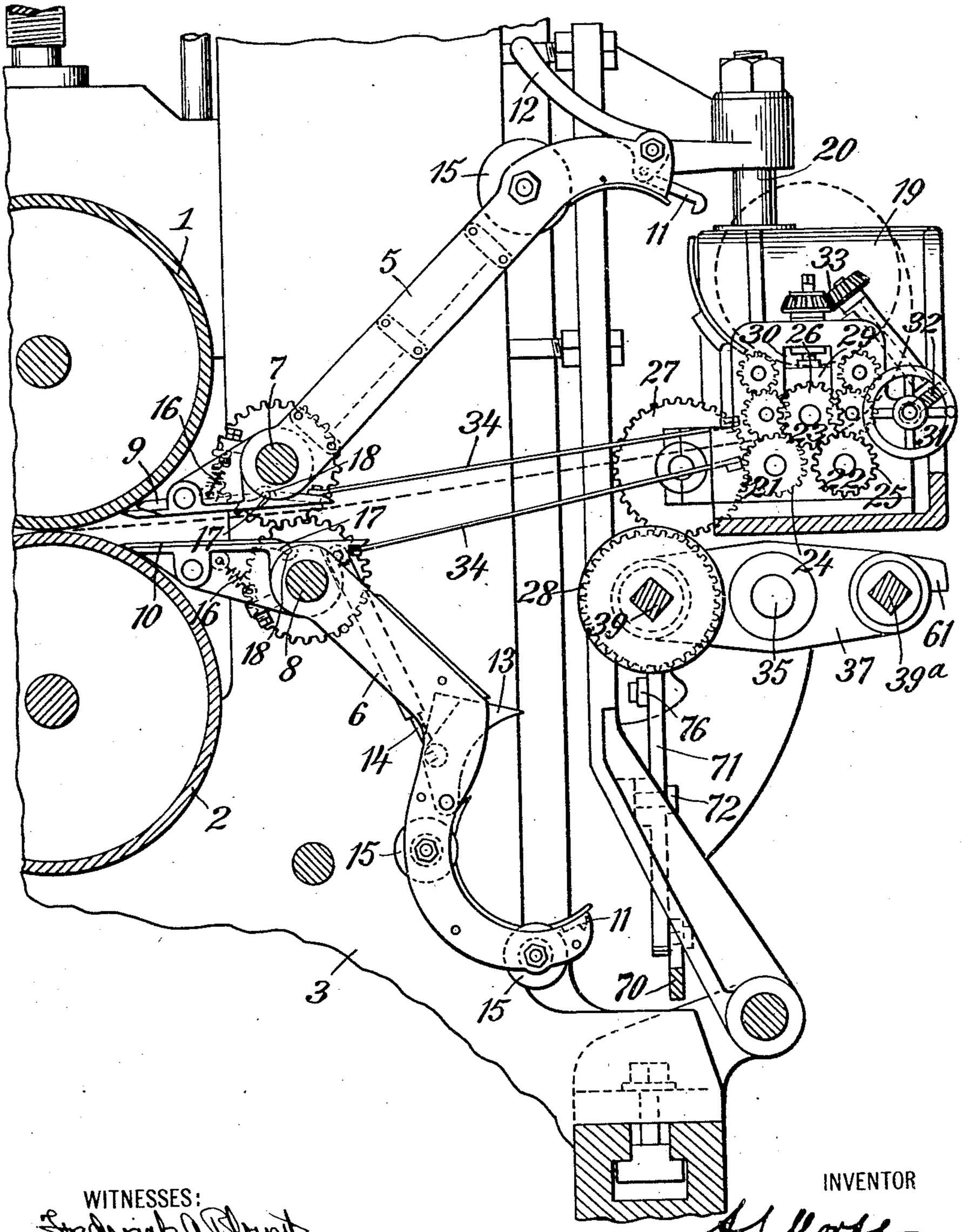
5 SHEETS—SHEET 3.

FIG. 4.



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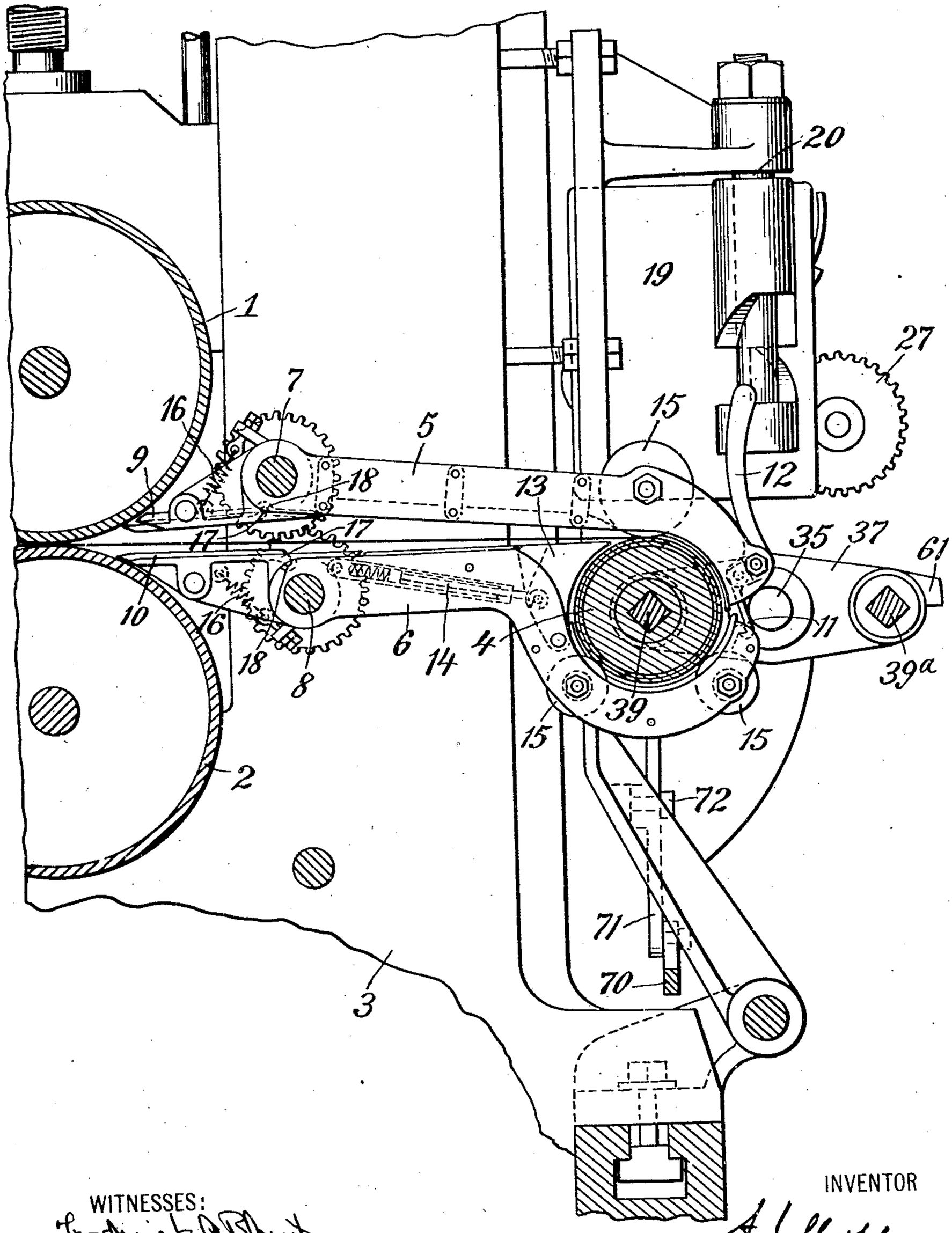
5 SHEETS—SHEET 4.

FIG. 5.



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5 SHEETS—SHEET 5.

FIG. 6.

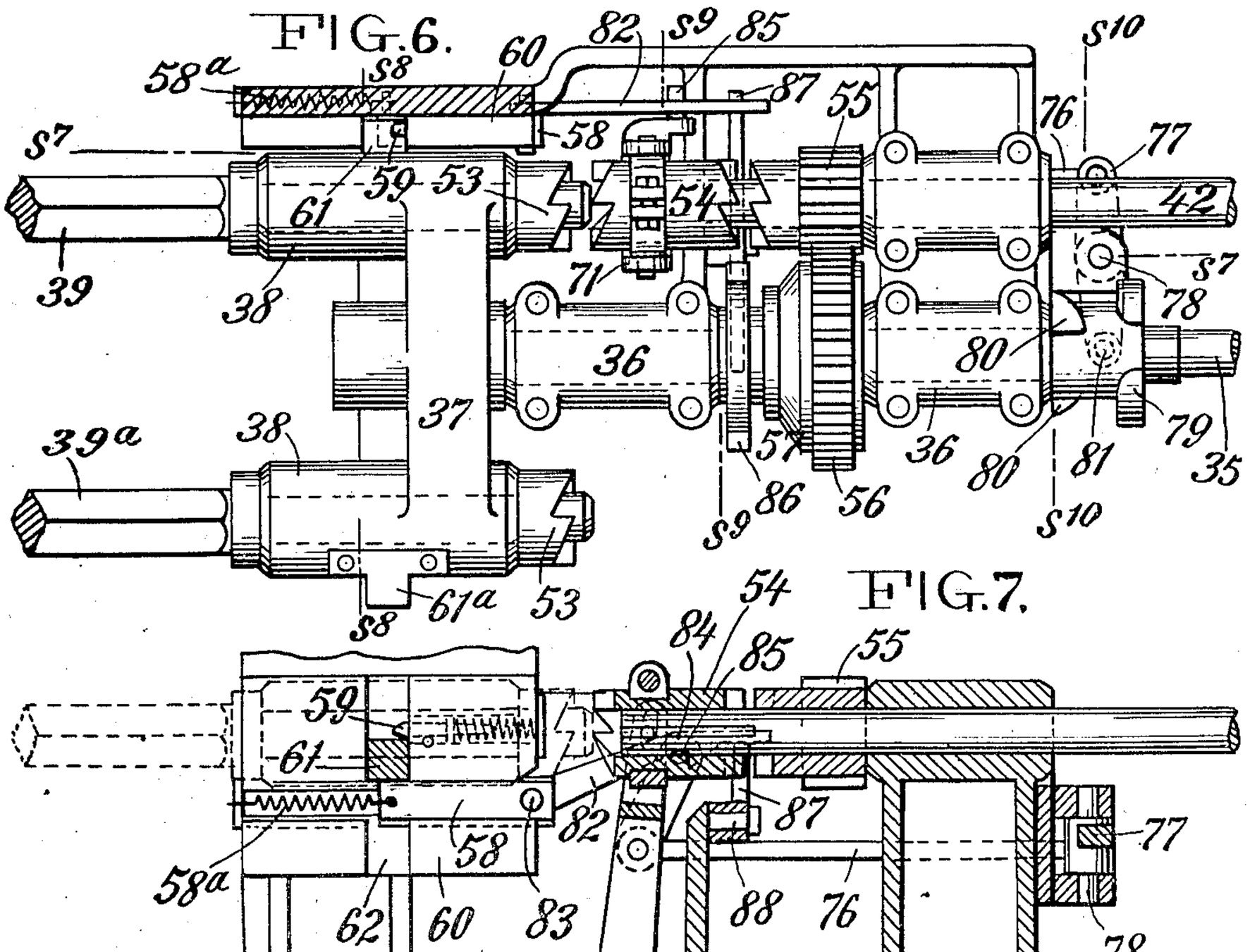


FIG. 7.

FIG. 8.

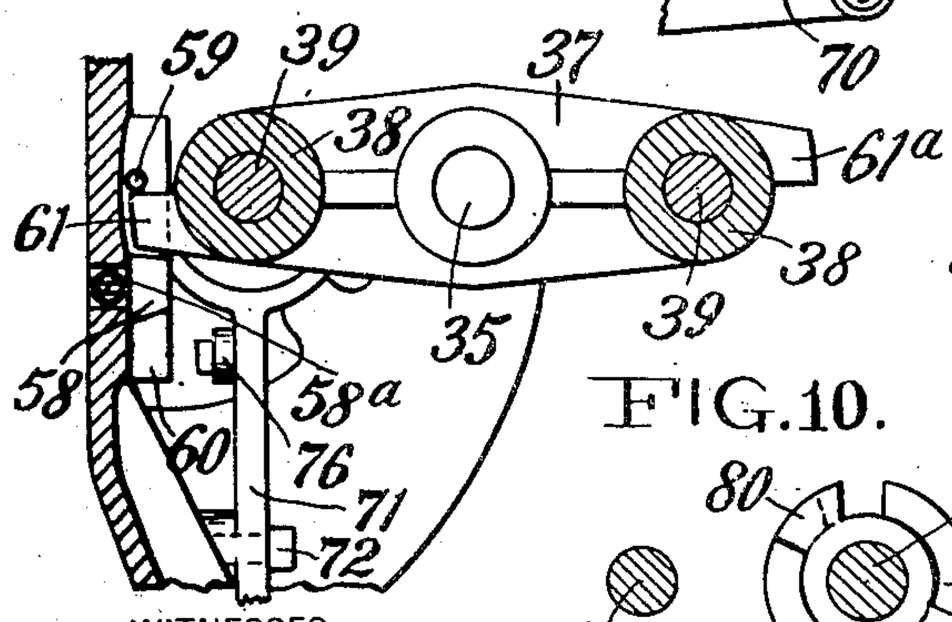


FIG. 10.

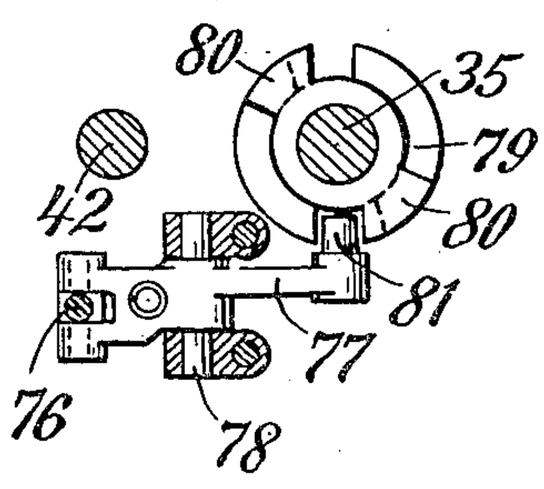
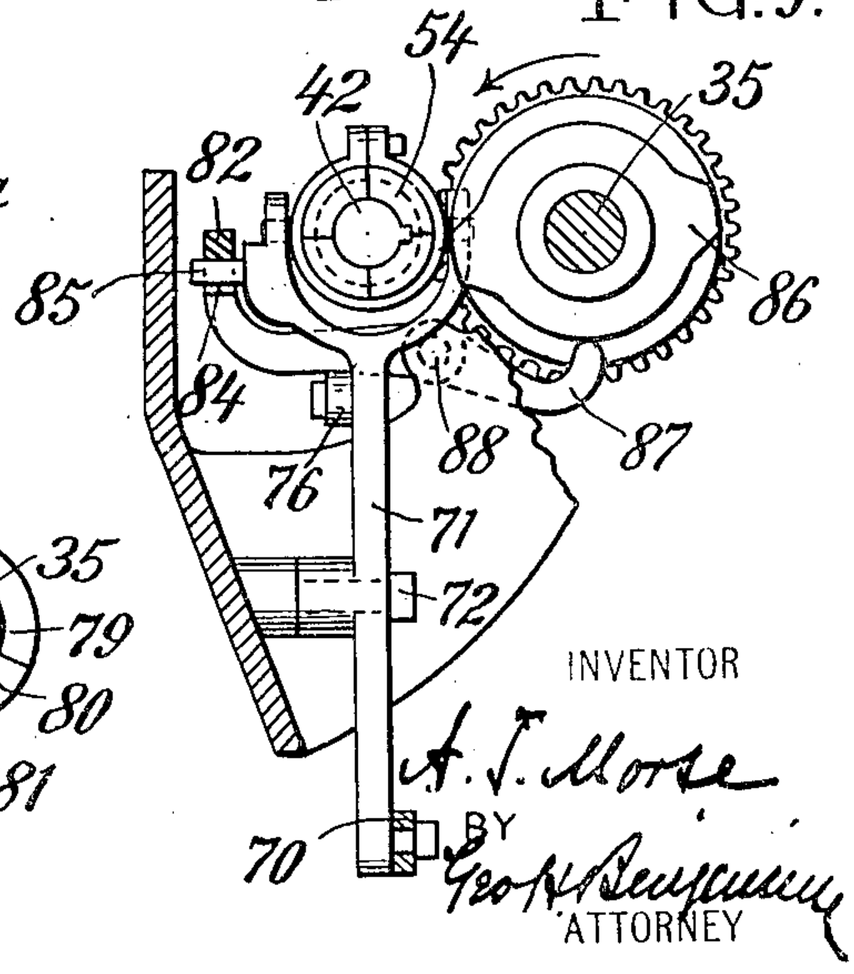


FIG. 9.



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UNITED STATES PATENT OFFICE.

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DOUBLE BLOCKER.

No. 887,418. Specification of Letters Patent. Patented May 12, 1908.

Application filed June 20, 1906. Serial No. 322,625.

To all whom it may concern:

Be it known that I, ARTHUR JACOB MORSE, a citizen of the United States, residing at Torrington, county of Litchfield, State of Connecticut, have invented certain new and useful Improvements in Double Blockers, of which the following is a specification.

My invention relates to automatic blocking and coiling attachments for rolling mills.

As herein embodied, my invention is designed to provide means for causing sheet metal as it passes from the rolls, to assume a coil form either by winding upon a block or upon itself, depending upon the thickness of the sheet.

An important feature of my invention consists in the employment of a plurality of interchangeable blocks, together with manually controlled means for automatically substituting one for another, the object being to avoid interruption and make the operation practically continuous.

The accompanying drawings will serve to illustrate mechanism suitable for carrying my invention into effect.

Referring to the drawings: Figure 1, is a plan view showing the blocking and coiling attachments applied to a strip mill. Fig. 2, is a view in front elevation thereof. Fig. 3, is a plan view of the block driving and shifting mechanism. Fig. 4, is a vertical section showing the coiling attachment in use. Fig. 5, is a similar view illustrating the use of the blocking attachment. Fig. 6, is an enlarged detail view of the block driving and shifting mechanism shown in Fig. 3. Fig. 7, is a detail sectional view taken on the line s^7, s^7, of Fig. 6. Fig. 8, is a detail cross section taken on the line s^8, s^8, of Fig. 6, and Figs. 9 and 10 are similar views taken respectively on the lines s^9, s^9, and s^{10}, s^{10}, of Fig. 6.

In the drawings, 1 and 2 represent the rolls of a strip mill and 3, 3, the side frames thereof, in which the rolls are mounted in the usual manner.

Ordinarily in the operation of the mill, sheet metal in strip form is fed between the rolls, and carried forward in suitable guides to a rotating block, such as is indicated at 4 upon which it is wound under more or less tension and the block with the strip wound thereon is then removed, and another block placed in position and the operation continued.

Owing to the difficulty, uncertainty and danger incidental to hand blocking, provision is made herein for automatically starting the strip upon the block that is to say, giving it the first few turns necessary to cause the block to take hold and continue the winding. For this purpose, I employ the mechanism illustrated in Figs. 4 and 5. The blocker shown consists of two separable guide arms 5 and 6, which are mounted free to turn upon cross rods 7 and 8, and as arranged, form continuations of fixed strip guides 9 and 10, the parts 5 and 9 constituting the upper sectional guide and the parts 6 and 10, constituting the lower sectional guide. The guides 9 and 10 are arranged one in contact with each roll and are beveled or tapered to serve as strippers. At their free ends, the guide arms 5 and 6, are curved and combine as shown in Fig. 5, to loosely encircle the block, being connected and held thus by a latch 11 operated by a lever 12. A plate 13, pivoted upon the lower guide arm 6, has a curved edge conforming approximately to the circumference of the block and a straight edge tangential thereto. Co-acting with the plate, there is a spring pressed telescoping rod 14, which forces the same toward the block. The arrangement is such that as a strip comes from the rolls, it passes through the guides, then outward between the arms 5 and 6 to the block and around the same until it meets the curved edge of the plate 13, which presses the end of the strip in close contact with the block until it is caught under the horizontal moving portion of the strip. As the block is usually driven through a friction clutch, hereinafter referred to, at a slightly greater speed than the rolls, the strip is at once drawn taut and wound thereon under more or less tension. In order to avoid unnecessary friction, each of the guide arms 5 and 6 is provided with one or more rollers 15, which are preferably secured to the curved ends thereof and co-act with the block, but may also be employed throughout the straight portions if desired. After the strip has been properly started upon the block, the latch 11 is released by pressure upon the lever 12, and the arms 5 and 6 are swung

clear of the block by means of springs 16, connected to their inner ends and take the position shown in Fig. 4, being yieldingly held thus, by spring dogs 17, engaging notches 18, thereof.

Owing to the practical difficulties of blocking metal exceeding a certain thickness, such metal as it comes from the rolls, is preferably run through a coiler by which it is given the required "set" to cause it to wind upon itself or assume a coil form. A device suitable for this purpose is shown in Figs. 1, 2 and 4, mounted upon a frame 19, which is hinged at 20 to one of the side frames 3, and as arranged, may be swung around across the front of the mill, as shown in Figs. 1 and 4 to receive the strip as it comes from the rolls. The coiler, as shown in Fig. 4, consists essentially of three coöperating rolls 21, 22, 23, which are provided with terminal intermeshing gears 24, 25, 26, driven through gears 27, 28, from the block spindle. The rolls 21 and 22 arranged side by side, at a suitable distance apart, are mounted in fixed bearings in the frame 19. The roll 23, extending parallel with the rolls 21 and 22, is mounted in bearing block 29, movable in ways 30, of the frame 19.

A well known form of screw adjustment is employed for moving the roll 23 relative to the rolls 21 and 22 and is operated by means of a hand wheel 31, through suitable gearing, such as the worm and bevel gearing indicated at 32, 33. When the guide arms 5, 6, are swung clear of the block and the coiler is in use, as shown in Fig. 4, temporary guides 34, are employed, leading from the fixed guides 9 and 10 to the rolls of the coiler. Such guides may be in the form of strips, plates, or the like, and are bolted or otherwise secured in position as shown.

Heretofore the time occupied in removing a block upon which the strip is wound and in placing another block in position has greatly reduced the effective period of operation of the mill as the latter runs idly while the exchange is being made, and the resulting loss constitutes an item of considerable expense to the operating company. In order to avoid such interruptions and make the operation practically continuous, I employ two or more blocks and arrange the same in such relation that one is moved into operative position by the removal of the other.

Referring to Figs. 2, 3 and 6, of the drawings, a shaft 35 is shown mounted in bearings 36 and fixed upon the projecting end of the shaft, there is a cross-arm 37 provided with terminal bearings 38, in which twin block supporting spindles 39, 39ª are mounted free to turn. The spindles 39, 39ª are square throughout the greater portion of their length, as indicated at 40, and the blocks 4, 4ª, etc., are bored out and similarly shaped to fit the spindles. The blocks are thus secured in driving relation and caused to rotate with the spindles, and being free to slide thereon, may be slipped on or off the spindles at will.

Extending parallel with the shaft 35 and alined with the inner block spindle 39, there is a shaft 42, which is mounted in bearings 43, and is driven either directly by a belt pulley 44, through a friction clutch 46, as shown in Fig. 3, or indirectly through such a clutch and the gears 47, 48, as in Figs. 1 and 2. When the direct drive is employed, the pulley and clutch are mounted upon the shaft 42, the pulley being loose and the sliding member of the clutch splined thereon. When the drive is indirect, the pulley and clutch are carried by the shaft 35, the pulley being loose thereon and the sliding member of the clutch and the gear 47, mounted upon a sleeve 49, which is free to turn upon the shaft. The sliding clutch member is splined upon the sleeve and is shifted by means of a lever 50, connected therewith through a forked arm 51, in the usual manner.

From the foregoing it will be seen that when the clutch is thrown in, the shaft 42 is connected in driving relation with the pulley 44, and that as the clutch is thrown out, there is no further transmission of power, and the shaft ceases to rotate.

The block spindles 39 and 39ª are driven direct by the shaft 42, through a second clutch of the positive type. As shown in Figs. 3 and 6, each spindle is provided with a terminal clutch member 53, with which a sliding clutch sleeve 54, splined upon the shaft 42, is designed to co-act as a spindle is brought into alinement therewith. This clutch sleeve 54 also controls the transmission of power from the shaft 42 to the shaft 35, through the gears 55, 56, and friction clutch 57. The arrangement is such that as the clutch sleeve is shifted in one direction, it interlocks with the terminal clutch member of the alined block spindle and connects the same in driving relation with the shaft 42, and when shifted in the opposite direction, it interlocks with the gear 55 and through this gear and the gear 56, the shaft 35 is rotated as required to withdraw the block upon which the metal is wound and move the other into operative position relative to the shaft 42 and the guides through which the metal passes as it comes from the rolls.

The shaft 35 is normally locked against rotation by means of a spring bolt 58, and a spring seated pin 59, which are mounted in suitable guides 60 secured or formed upon one of the side frames, and as arranged, the bolt and pin co-act with oppositely disposed lugs or projections 61 on the terminal cross arm 37 of the shaft.

A groove 62 is formed transversely of the

guides 60, and through this groove the lugs 61 pass as the shaft 35 is rotated. The end of the spring-seated pin 59 projects into the groove and is rounded to yield in the direction of its length as the lug strikes it, permitting the lug to pass and being thereafter returned to position by the action of its spring. At a point below the pin, the bolt 58 extends across the groove and serves as a positive stop to limit the movement of the lug, which in being thus caught between the pin and bolt holds the shaft 35 against further rotation until the bolt is withdrawn.

The release of the shaft 35 by the withdrawal of the bolt and the throwing in of the clutch 54 for the transmission of power from shaft 42 to shaft 35, is controlled by a foot lever 63, fast upon a shaft 64. Mounted upon this shaft, there are two crank arms 65 and 66, one of which is connected through link 67, with a lever 68, pivoted at 69, and the other is similarly connected by a link 70, with a lever 71, pivoted at 72.

The lever 68, is slotted at its free end and projecting through the slot there is a pin or stud of a block 73, which is movable in guides 74, and is bored out or shaped to serve as a bearing for the free end of each block spindle when in operative position. The bearing block, as mounted, is alined with shaft 42. It is advanced toward the spindle by means of a spring 75, acting through the lever 68, and is given motion in the opposite direction and shifted clear of the spindle by the foot lever 63 through the connection described.

The lever 71 is forked at its upper end to coöperate with the sliding clutch sleeve 54, and is connected through a link 76 and lever 77, pivoted at 78, with a cam 79, fast upon the shaft 35, which is designed to assist the spring 75, acting through the levers, links, etc., described, to throw the clutch 54 out of engagement with the gear 55.

The cam is provided at diametrically opposite points with shaped portions 80, which co-act with a pin or stud 81 of the lever 77. As the clutch sleeve 54 is thrown in with the gear 55, the period of engagement is limited by the operation of the cam acting through the lever 77, link 76 and lever 71, to the time required for the shaft 35 to rotate through half or such portion of a revolution as is necessary to move one block out and another block into position.

When the foot lever is depressed to throw in the clutch for the transmission of power from shaft 42 to shaft 35, through the gears 55, 56, it is necessary at the same time to withdraw the bolt 58 clear of the groove 62 to release the terminal lug of the cross-arm 37. For this purpose a connection is provided between the bolt 58 and the lever 71, in the form of a latch 82, which is pivoted to the bolt at 83 and is provided with a hooked end 84, which normally takes over an off-set pin or stud 85 of the lever, 71. As arranged, the first part of the movement of the lever 71 to throw in the clutch, serves to carry the bolt 58 clear of the groove 62, leaving the lug of the cross-arm 37 free to pass out as the shaft begins to rotate.

The release of the bolt is effected automatically by means of a second cam 86, fast upon the shaft 35, which coöperates with a trip-arm 87, pivoted at 88. The cam 86 acts after the lug 61 has passed out of the groove 62, to rock the trip-arm 87, and the latter engaging the free end of the latch 82, lifts the same clear of the pin 84 of lever 71. Thereupon the spring 58^a acts to return the bolt 58 to position to check the movement of the opposite lug 61^a, as the cross-arm is turned over by the rotation of the shaft 35, which again becomes locked as the lug is caught between the pin and bolt, as above described.

As the operation will be generally understood from the foregoing, I will describe the same briefly: When the metal rolled is of a thickness such as to admit of being blocked, the frame carrying the coiler is swung around to one side, as indicated by dotted lines in Fig. 2, and after a block has been placed upon one of the spindles, such as 39 for example, and moved into position, as shown in Fig. 5, the guide arms 5 and 6 are closed about the same and locked by the latch 11. The mill is then started up and the lever 50 is shifted to throw in the gearing by which the block spindle is driven. As the strip comes from the rolls, it is carried by the guides to the rotating block upon which it winds under more or less tension, as above described, and after it has been fairly started upon the block, the latch 11 is disengaged and the guides are swung clear as shown in Fig. 4. Thereafter the winding continues until the entire strip is blocked.

During the operation just described, another block is placed upon the adjoining spindle 39^a, and in order now to move the same into position and remove the block on which the strip is wound, the foot lever 63 is depressed and through the connection described, shifts the bearing block 73 and clutch 54 clear of the block spindle 39 and throws the clutch in with the gear 55, for the transmission of power to the shaft 35. The automatic release of the locking mechanism follows and the shaft 35 is given a half turn as required to substitute one block for the other, and is then locked against further rotation until the foot lever is again depressed. Through the action of the spring 75, the bearing block 73 is advanced toward the block spindle 39^a, the free end of which enters the socket or opening therein and the cam 80 acts to shift the clutch 54 to connect the spindle 39^a in driving relation with the

shaft 42. After the guides 5 and 6 have been moved into position and secured about the block, the operation is repeated.

When the rolled strip exceeds a certain thickness, it is preferably run through the coiler, which is swung around into position, as shown in Figs. 1 and 4, and is operatively connected with the mill by means of the guides 34. The strip as it comes from the rolls is directed by the guides to the coiler and in passing through the same is given the required "set", causing it to wind upon itself and assume coil form, as indicated by the dotted lines in Fig. 4.

Having thus described my invention, I claim:

1. A blocking attachment comprising a plurality of driving spindles for blocks, rotatable supporting means for one end of each of said spindles, a movable support adapted to engage the other end of said spindles in succession, and requisite gearing for imparting motion to said support and to said spindles.

2. A blocking attachment comprising a plurality of rotatable driving spindles for blocks, a support common to the several spindles and provided with bearings for the contiguous ends of the spindles, a movable support adapted to engage the other ends of the spindles in succession, and requisite gearing for imparting motion to the spindles.

3. A blocking attachment comprising a plurality of driving spindles for blocks, said spindles being movable collectively about a common axis and separately rotatable about their respective axes, a support common to the several driving spindles provided with sockets to hold the spindles in parallel relation, a movable socket to receive the opposite ends of the spindles as they are successively rotated into operative position, and requisite gearing for imparting motion to the spindles.

4. A blocking attachment comprising a plurality of driving spindles for blocks, separable guides for directing metal to and around one of the blocks and for causing it to wind upon the blocks, said guides being arranged to encircle the blocks and to be disengaged therefrom, a rotatable support for the driving spindles, and requisite gearing for imparting motion to the spindles.

5. A blocking attachment comprising a plurality of driving spindles for blocks, sectional guides for directing metal to one of the blocks, means for holding the guides in proximity to the periphery of a block until the metal has been engaged by the block, means for retracting the forward sections of the guides from the blocks, rotatable supporting means for the driving spindles, and requisite gearing for imparting motion to the spindles.

6. A blocking attachment comprising a plurality of driving spindles for blocks, separable guides having pivoted sections for directing metal to each of the blocks in succession, means for holding the guides in proximity to the periphery of a block until the metal has been engaged by the block, means for retracting the forward sections of the guides from the blocks, a rotatable support common to the several driving spindles, and requisite gearing for imparting motion to the spindles.

7. A blocking attachment comprising a plurality of driving spindles for blocks, guides for directing metal to each of the blocks in succession, means for separably locking the guides, means for unlocking and separating said guides, a rotatable support common to the several spindles, and requisite gearing for imparting motion to the spindles.

8. A blocking attachment comprising a plurality of driving spindles for blocks, a rotatable support for one end of each of the several driving spindles, said support being normally locked against movement, requisite gearing for imparting motion to the several spindles and to said support, a movable support adapted to engage the outer end of said spindles in succession, means for unlocking said rotatable support and connecting it with said gearing and for simultaneously disengaging said movable support, and means for disengaging said gearing and for locking said rotatable support after a predetermined movement thereof.

9. A blocking attachment comprising a plurality of driving spindles for blocks, a rotatable support for the several driving spindles, normally locked against movement, requisite gearing common to the several spindles and their support, means for releasing said support and connecting it with said gearing during a predetermined movement, and a means connected with said rotatable support arranged to disengage the gearing from the support and connect it with a spindle.

10. A blocking attachment comprising a plurality of driving spindles for blocks, a rotatable support having bearings for the contiguous ends of said spindles, a movable bearing arranged to engage successively the opposite ends of the spindles, requisite gearing common to the several spindles and their support, means for disengaging said movable bearing from a spindle and for connecting said support with the gearing, automatic stop mechanism coöperating with the support, and means connected with said support for bringing said mechanism into operative relation.

11. A blocking attachment comprising a plurality of driving spindles for blocks, a rotatable support having bearings for the contiguous ends of said spindles, a movable bearing arranged to engage successively the

opposite ends of the spindles, requisite gearing common to the several spindles and their support, means for disengaging said movable bearing from a spindle and for connecting said support with the gearing, and mechanism for disengaging said gearing and for stopping said support.

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

ARTHUR JACOB MORSE.

Witnesses:
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M. G. CRAWFORD.