No. 636,654. Patented Nov. 7, 1899.

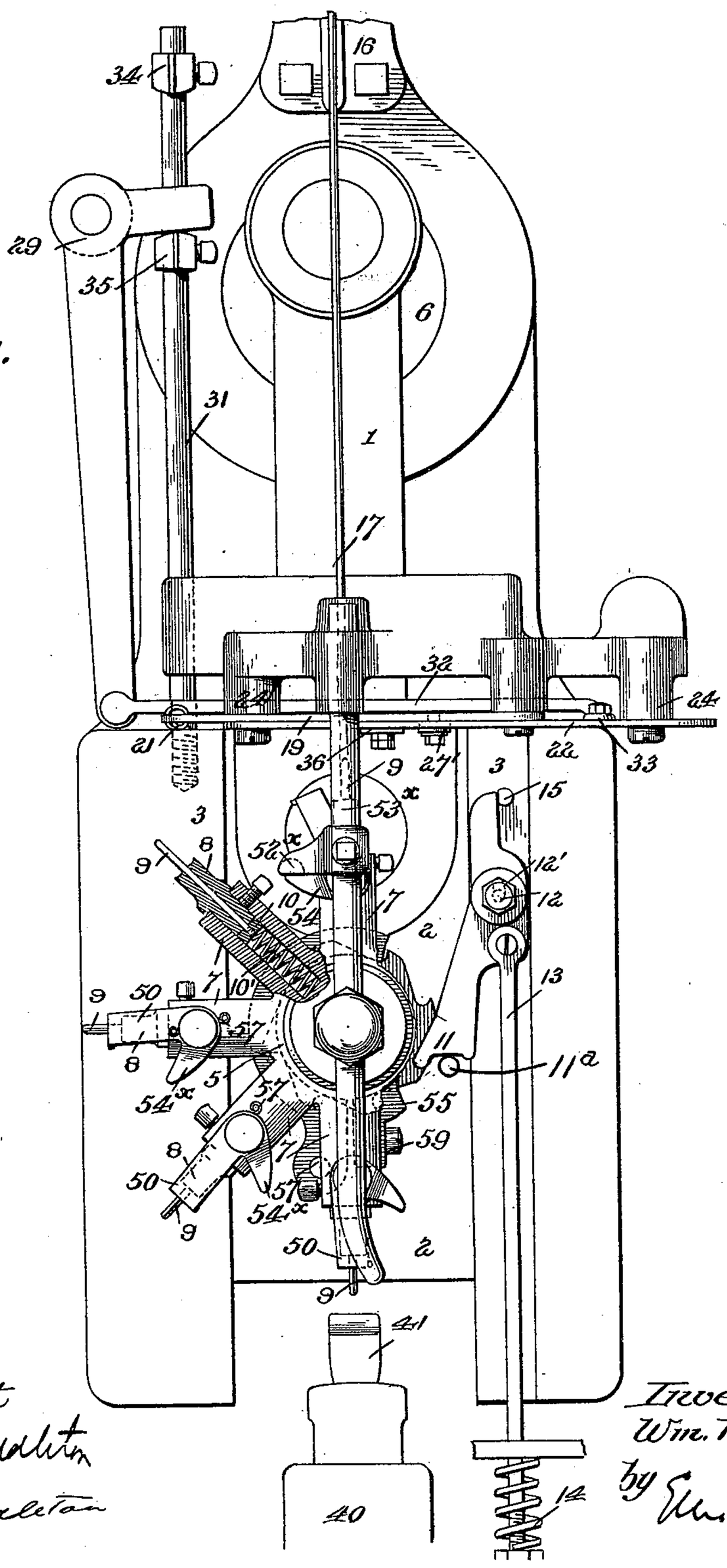
W. R. FOX.

MACHINE FOR APPLYING NIPPLE WASHERS TO BICYCLE RIMS.

(Application filed Nov. 29, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



Attest,
F. L. Middleton
C. Sinclaletan

Inventor
Wm. R. Fox
by Ellis Spear
Atty.

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Fig. 2.

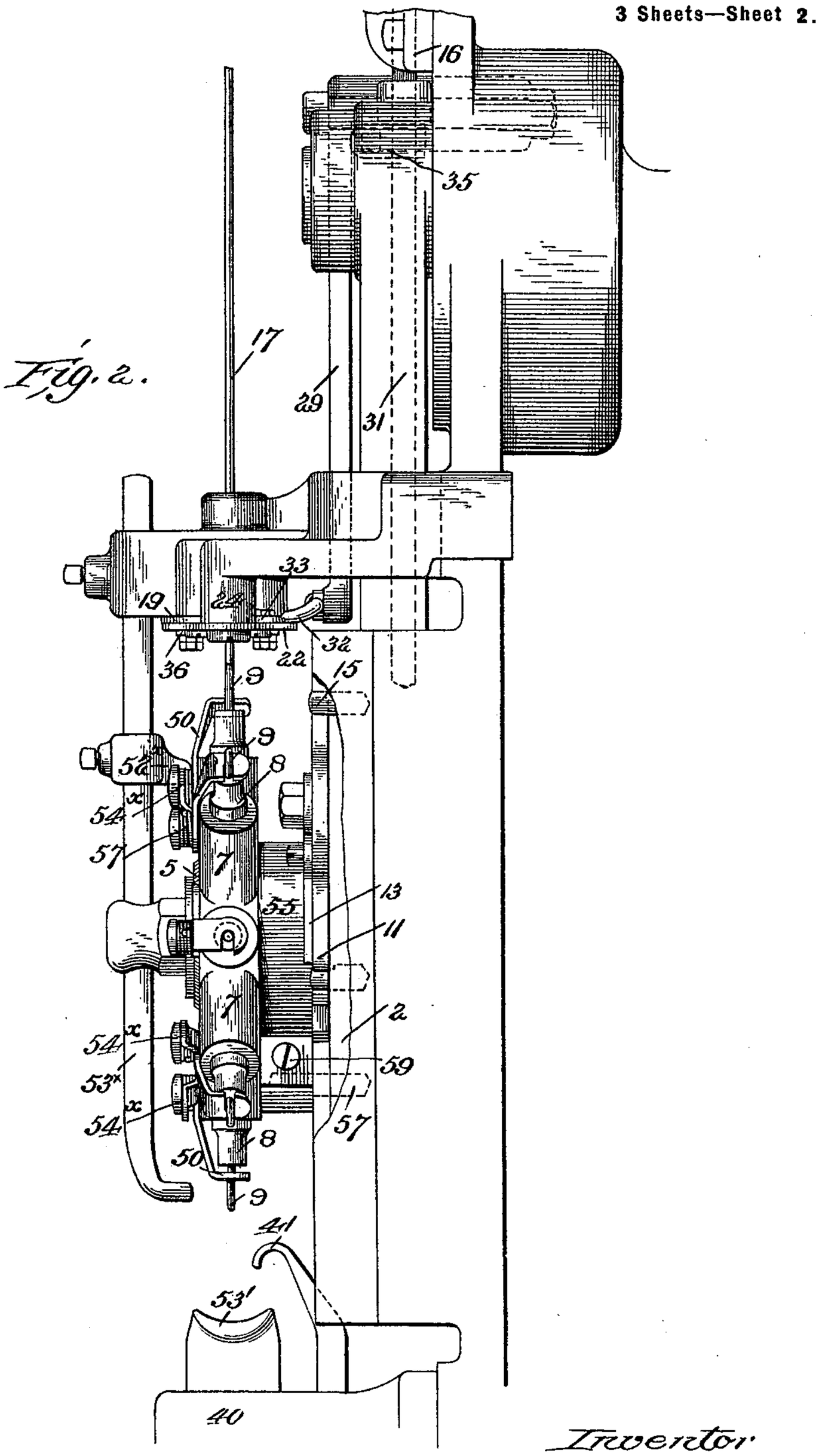

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Fig. 4.

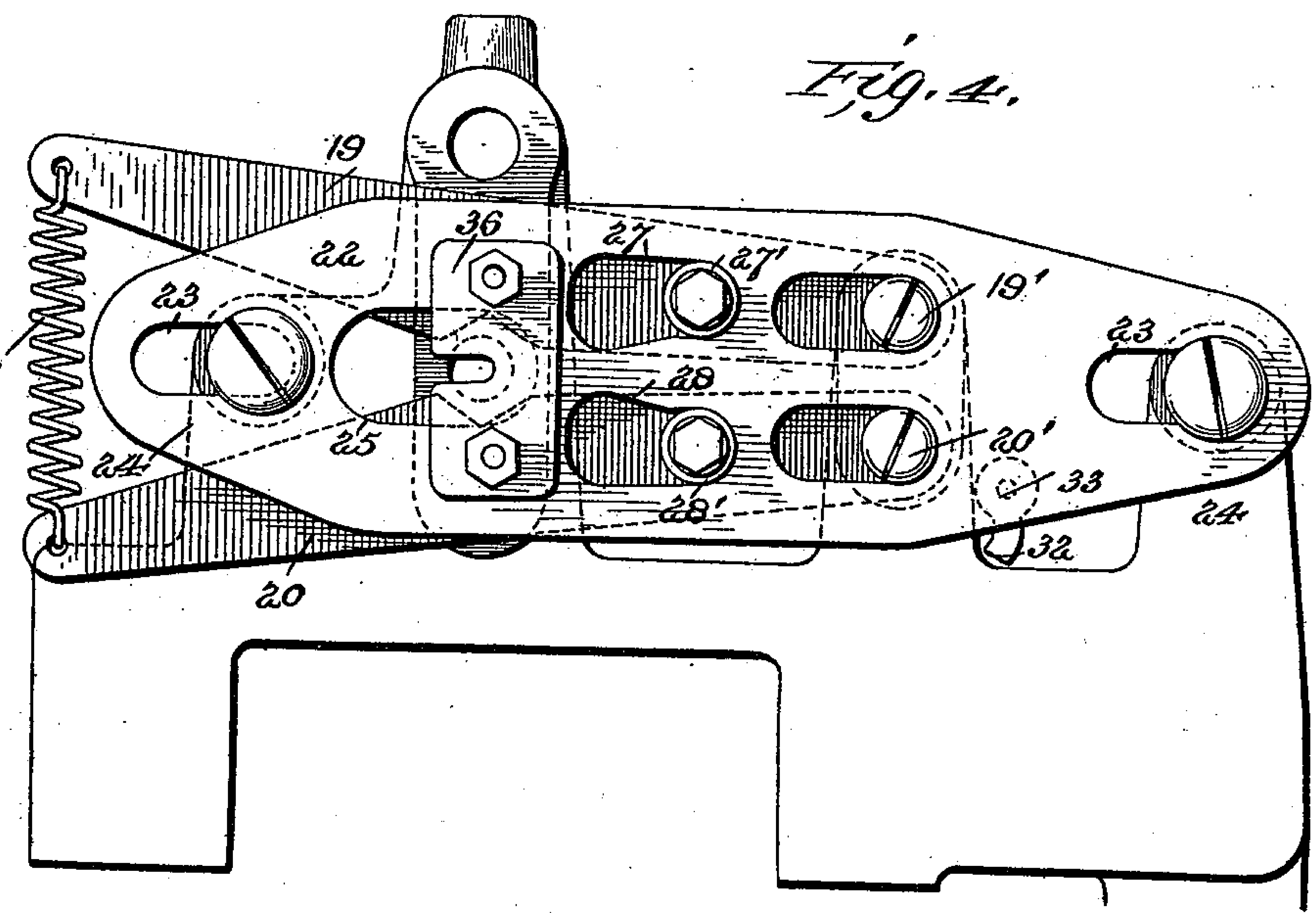


Fig. 5.

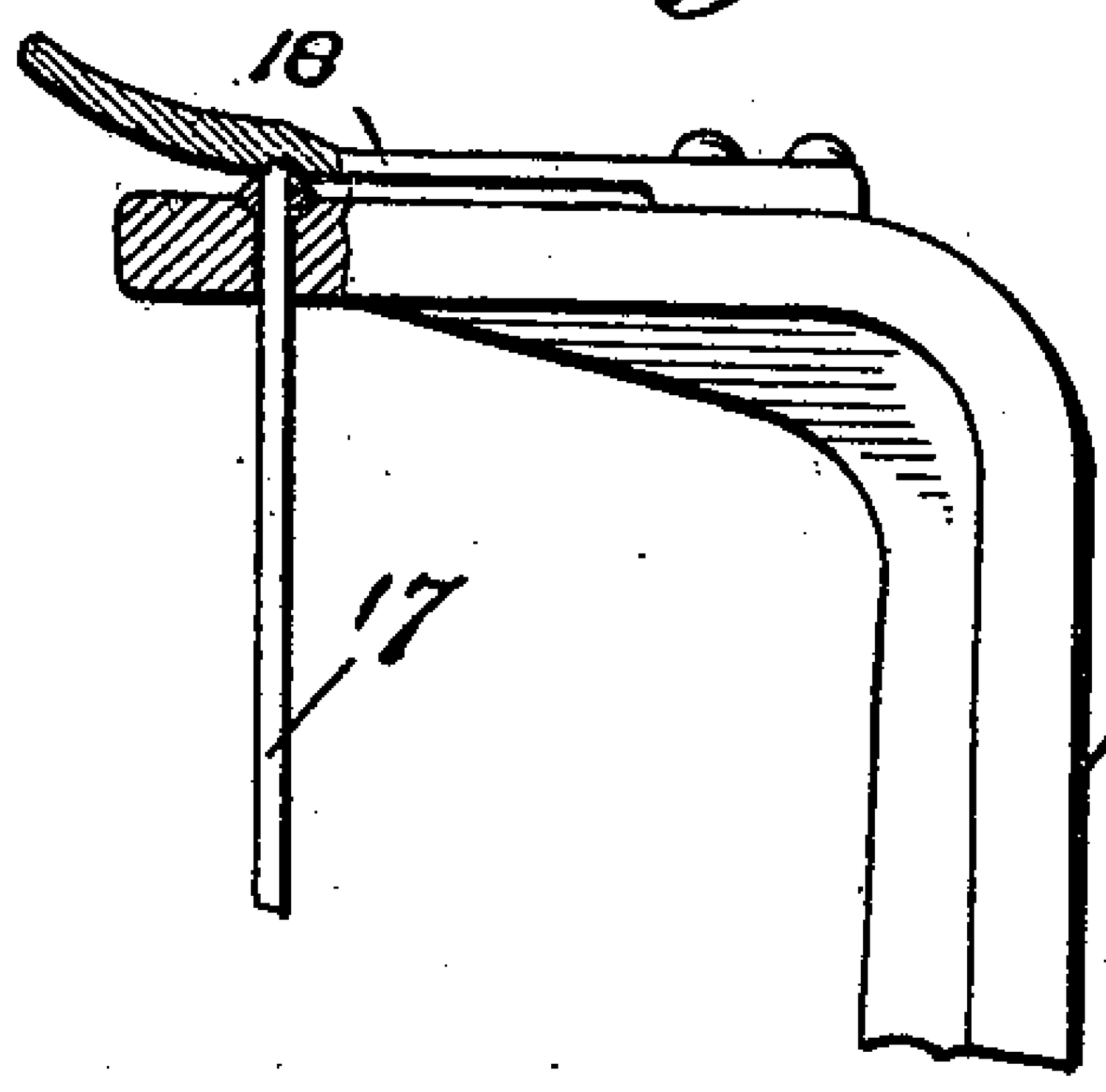


Fig. 3.

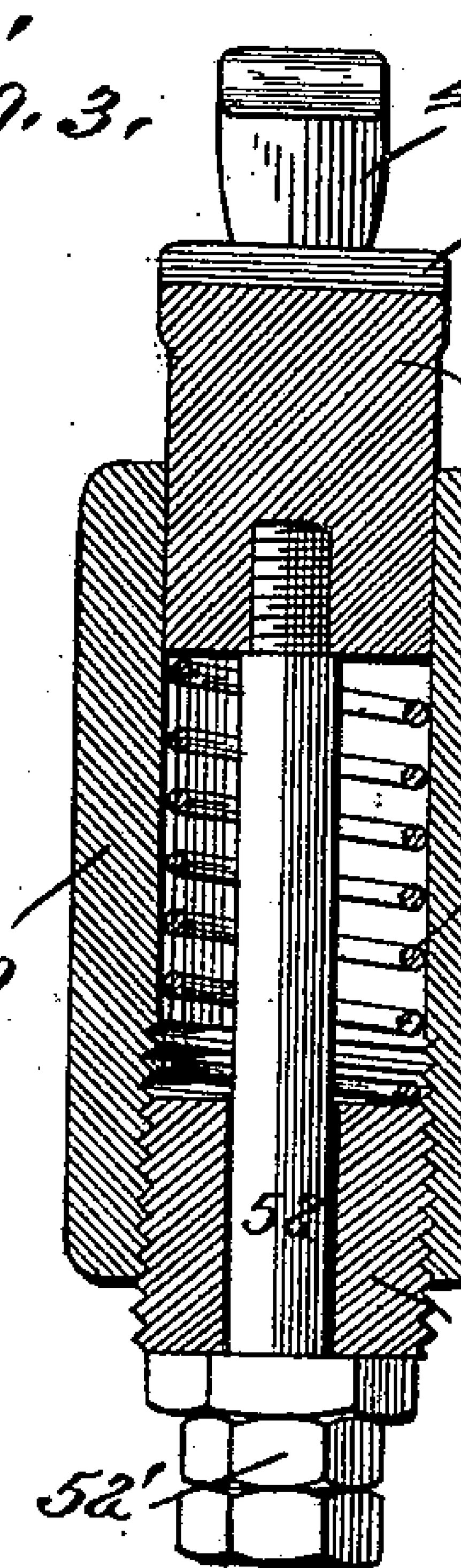
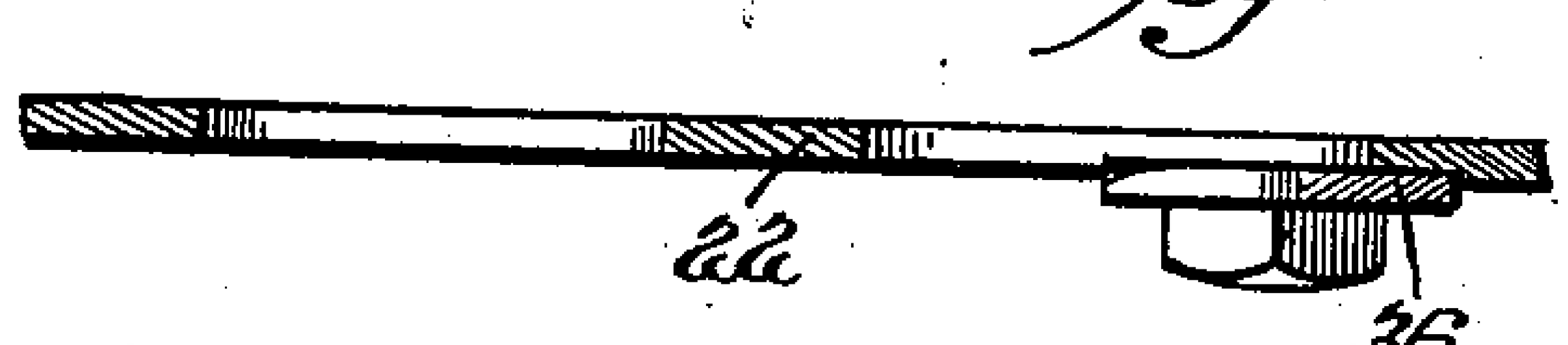


Fig. 6.



Attest
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C. S. Middleton

Inventor
Wm. R. Fox
by Ellis Spear
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM R. FOX, OF GRAND RAPIDS, MICHIGAN, ASSIGNOR TO THE FOX MACHINE COMPANY, OF SAME PLACE.

MACHINE FOR APPLYING NIPPLE-WASHERS TO BICYCLE-RIMS.

SPECIFICATION forming part of Letters Patent No. 636,654, dated November 7, 1899.

Application filed November 29, 1898. Serial No. 697,792. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. FOX, a citizen of the United States, residing at Grand Rapids, Kent county, Michigan, have invented certain new and useful Improvements in Machines for Applying Nipple-Washers to Bicycle-Rims, of which the following is a specification.

The object of my invention is to provide a machine for applying nipple-washers to bicycle-rims; and to this end the device comprises means for holding a plurality of the washers and for automatically carrying the same to the rim and pressing them in position therein, it being necessary only for the operator to hold the rim in the proper position on a support of improved construction, which forms a part of the invention.

The invention therefore includes a holder for the washers, an adjustable yielding support for the rims, means for automatically feeding the washers from the holder, and a carrier for delivering the same to the rim and means for pressing them in place therein.

The invention further includes the details of construction, as will be hereinafter described, and particularly pointed out in the claims.

The machine is illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation. Fig. 2 is a side elevation; Fig. 3, a detail section view of the rim-support; Fig. 4, a detail bottom view of the washer-feeding mechanism, and Figs. 5 and 6 are other detail views.

The shaft 6, which operates the machine and is driven by any suitable means, (not shown,) has the pitman 1 connected eccentrically thereto, which carries a slide 2, guided in ways 3, forming a part of the main frame of the machine. From the face of the slide a stud projects, upon which the hub of a carrier 5 is journaled, provided with a series of radial arms 7, spaced an equal distance apart. Each arm is socketed and receives in the end thereof a hardened-steel plunger 8, through which freely passes an arbor 9, having a head 10 to form a bearing for a spiral spring 10′, interposed between the same and the rear wall of the socket to yieldingly support the arbor, for a purpose to be hereinafter stated. The hub of the carrier has a toothed wheel fixed thereto, with which the pawl 11 engages to rotate the carrier step by step. The pawl is pivoted on a stud 12, projecting from the slideway 3, and has a slight longitudinal movement, as the opening 12′ therein, through which said stud 12 extends, is slightly elongated. A rod 13, which is pivoted to the pawl below its pivotal point, extends through the bed-plate of the machine and has a nut adjustable thereon, between which and the bed-plate a spring 14 is interposed to yieldingly support the rod and exert a downward pull on the pawl. The pawl is also provided with an upward extension, which is adapted to strike against a pin 15, fixed in the frame to limit the pivotal movement thereof and to cause the same to move vertically, as will be described. As shown in Fig. 1, the slide 2 is in its retracted position and the pawl is in engagement with the toothed wheel. When the slide is moved down, the toothed wheel is carried away from the pawl and the rod 13 causes the pawl to follow the same to the extent of the length of the opening 12′. Now on the return movement the next tooth of the ratchet or the tooth above the one previously engaged will be engaged by the pawl and the carrier will be rotated one step, the carrier receiving its full rotating movement before it reaches the extreme limit of its upward stroke, and in its final vertical movement the pawl will move therewith against the tension of the spring on the rod 13. In order to prevent the rotation of the carrier on such final upward movement, a stop-pin 11^a is provided, projecting from the slide in the path of the lower end of the pawl 11, the stop-pin acting in the final upward movement to lift the pawl, which movement is permitted by the elongated opening 12′.

To the frame of the machine an arm 16 is bolted, which extends upwardly, and is provided with an overhanging angular extension, (see Fig. 5,) having a socket therethrough in line with the center of the carrier, through which a wire 17 depends. Upon this wire a

quantity of the nipple-washers are strung, said wire having an enlarged head, which is seated in a depression in the upper face of the angular extension around the opening therein, the head being retained in this seat by a flat spring 18, pivoted to said extension, which bears on the top of said head, the lower part of the wire passing through a guide extending from the frame. The lower end of the wire extends down to position in close proximity to the path of travel of the arbors 9, feeding mechanism being located along said wire to regulate the feed of the washer from the wire to said arbors. On the upward movement of the carrier as the pawl rotates the same one of the arbors 9 is brought into alinement with the rod, and in the final upward movement of said carrier this arbor is brought in contact with said end and slightly raises the wire 17 against the tension of the spring 18, so that a firm joint or connection between the end of the arbor and the rod 17 is secured. As before stated, the elongated opening 12′ in the pawl permits the same and the carrier to move together in the final upward movement of the carrier without giving any rotary movement whatever to the latter, so that the arbor will remain in alinement with the wire during this movement.

The feed mechanism before mentioned, which permits of but a single washer being transferred to each arbor as it registers with the wire 17, is located near the lower end of the latter and is actuated by the reciprocatory movement of the slide to which the carrier is secured. This mechanism comprises a pair of jaws 19 20, (see Fig. 4,) between which the wire passes and which are independently pivoted at 19′ 20′ to a lateral extension from the main frame and are provided with angular seats in their opposing edges intermediately of their lengths, which are adapted to clamp the washers on the wire 17. The jaws are normally drawn together, so that these seats or recessed portions will embrace a washer on said wire by means of a spiral spring 21, which connects the free ends of said jaws. Directly below these jaws and in contact with the same a shuttle 22 is located, which is retained in position by means of headed screws, which pass through elongated openings 23 in opposite ends of the same into the stationary extensions 24 of the main frame. The shuttle has a slot 25 therein, through which the wire 17 extends, so that the feed of the washer will not be interfered with thereby in any position of the same, and in rear of said slot two elongated slots 27 and 28 are located. In these slots rollers 27′ 28′, carried by the jaws 19 20, respectively, project. The inner or opposing walls of these slots, as will be seen on reference to Fig. 4, are inclined, so that they diverge from each other. The shuttle is reciprocated longitudinally by a bell-crank lever 29, pivoted to a stationary part of the frame, through the horizontal member of which a vertical rod 31 passes, the lower end of which is secured in the slide 2 and moves therewith.

The vertical member of the bell-crank is connected to the shuttle by a link 32, pivoted at one end to said vertical member and at its opposite end to the shuttle at 33. The rod 31 carries two adjustable blocks 34 35, one being located above and one below the horizontal member of the bell-crank, so that as the slide is reciprocated the bell-crank will be rocked and the shuttle operated. The shuttle carries a plate 36, which arrests the fall of the washer when released from the pivoted jaws by the spreading of the same, said plate in the normal position of the shuttle being directly below the seat in the jaws and having a slot therein for the passage of the wire 17 as the shuttle is reciprocated.

In the forward position of the shuttle the rollers 27′ 28′ rest in the rear end of the slots 27 28 and the jaws are held apart; but as the plate 36 is then directly below the seat in the jaws the washers are prevented from slipping down on the wire 17. The shuttle is in the forward position just described when the slide is down, as then the block 34 is in engagement with the horizontal arm of the bell-crank, holding the same down; but as the slide rises the horizontal member of the bell-crank is released from the block 34, and in the final upward movement the block 35 strikes said member and lifts the same. Thus through the link connection the shuttle is retracted, withdrawing the plate 36 from beneath the line of feed of the washers on the wire 17 and bringing the forward part of the slots 27 28 in the path of the rollers 27′ 28′, thus permitting the spring 21 to draw the jaws together and clamp between them the washer which is directly above the washer supported by the plate 36. As the shuttle reaches its extreme rearward movement the plate 36 slips from beneath the lowermost washer on the wire 17 and the same slides down said wire onto the arbor, which is in contact with the end of the same until it rests against the plunger through which said arbor extends. As the jaws now clamp the washer next above the washer just released and prevents its feeding down, of course all washers on the wire 17 are supported. On the return of the shuttle the jaws are again spread by the diverging walls of the slots 27 28, pressing on the rollers 27′ 28′, and the washer held thereby is released therefrom; but as the plate 36 is then beneath the jaws it arrests the fall of the washer held thereby, supporting the same as well as the body of washers superimposed thereon. After a washer has been received by one arbor 9 the carrier is rotated one step, which brings the next arbor in place to receive a washer, and so on continuously.

The rim-support is located diametrically opposite to the washer-holder and comprises a vertical sleeve 40, fixed to the frame of the

machine, in the lower end of which a plug 51 is screwed, through which a rod 52 freely passes, having an adjusting-nut 52′ screwed on the lower end thereof and its upper end tapped in the lower end of a block 53, which is slidable in the sleeve 40, and has its upper end concave to provide a seat 53′ for the rim. A coiled spring 54 is interposed between the block 53 and the plug 51, so that the block may be yieldingly supported.

By adjusting the plug 51 and the nut 52′ any desired elevation of the seat 53′ can be secured to accommodate rims of varying thicknesses as well as to regulate the tension on the spring 54, so as to counteract the force of pressing the washer onto the rim, as will be now described.

The rim is rested on the seat of the holder, the operator tilting the same so as to bring the hole therein to receive the washer in proper alinement with the arbor and to assist in centering the same. A stripper-plate 41, bolted to the frame, is provided, having a curved end which extends over and above the seat and is adapted to engage with the rim. This stripper-plate also acts to prevent the rim following the arbor on the withdrawal thereof after the insertion of the washer as the carriage retracts and rotates as well as a centering device for the rim.

After a washer has been placed upon an arbor the carriage rotates step by step until the arbor carrying the washer is in alinement with the rim-support. When in this position, on the downward movement of the slide the arbor enters the hole in the rim with which it registers and guides the washer to its proper place, and on the continued downward movement the plunger presses the washer in position. The holder being yieldingly supported, it is adapted to give to allow for any variation in the thickness of the rim, so that all the washers will be set with a uniform pressure. When the slide moves upward, the arbor is withdrawn from the rim and the next arbor is brought into alinement with the support, the operator changing the position of the rim at this time to present the next hole to receive a washer. By supporting the arbor on the springs 10′ they are permitted to yield, so that the rim will not be injured should the operator fail to have the hole therein properly alined when the slide descends.

To retain the washer on the arbor after it leaves the holder, a catch 50, pivoted to each plunger, is provided, having a laterally-extending end, which passes above the washer just after the plunger leaves the position where it receives the washer, this end being slotted to permit it to pass the arbor as the said end passes over the washer. A spring 57 normally holds the end in alinement with the plunger to retain the washer between said end and said plunger; but it is moved out of the path of the washer, so that the latter may be seated against the plunger at the point where the washer is fed to the arbor by means of a projection $52^{\times}$, extending from a rod $53^{\times}$, which strikes the tail $54^{\times}$ of said catch and tilts the same on its pivot. After the tail passes the projection, which occurs when the arbor is moved past the washer-holder, the spring forces the catch back in place to hold the washer in position. This spring may be dispensed with and the catch operated by gravity by weighing the tail $54^{\times}$. The rod $53^{\times}$ is fixed at its upper end in a part of the frame, and its lower end is extended inwardly in a position above the rim-holder, so that as the carriage is depressed the tail $54^{\times}$ will strike against the same and tilt the catch, so that the washer may be released and the plunger may operate thereon unobstructedly. This inwardly-extending end of the rod $53^{\times}$ is necessary whether the catch is operated by the spring or gravity.

To prevent the carriage rotating except when it is moved positively by the pawl 16, a split friction-ring 55 encircles the hub thereof, one end of which is secured to the frame at 57 and its opposite and free end is adjustably held to the fixed portion by a bolt 59, which passes through said free end and is screwed into the opposite end of said ring.

I claim as my invention—

1. In a washer-applying machine in combination a washer-holder comprising a vertically-disposed removable and replaceable wire supported from its upper end and capable of yielding vertically, said wire having a plurality of washers strung thereon, means for feeding the washers singly from the wire, a rim-support, a carrier adapted to receive the washer from the wire and means for operating said carrier to convey the washer to the rim-support, substantially as described.

2. In a washer-applying machine, in combination, a washer-holder comprising a vertically-disposed wire having a plurality of washers strung thereon with means for feeding said washers singly therefrom, a rim-support, a carrier having an arbor adapted to aline with said wire and form a continuation thereof to receive the washer therefrom and means for operating said carrier to convey the washer to the rim-support, substantially as described.

3. In a washer-applying machine, in combination, a washer-holder comprising a wire having the washers strung thereon, means for feeding the washers singly therefrom, a rotary carrier having a plurality of radial arbors adapted to successively aline with said wire and enter the opening of the washers as they leave the wire, and means for operating said carrier, substantially as described.

4. In combination in a washer-applying machine, the stationary holder, the rim-support, a rotary carrier having a series of radial arms, an arbor carried by each of said arms adapted to receive a washer from said holder, and means for pressing the washer from said arbor

into the rims at the rim-support, substantially as described.

5. In combination in a washer-applying machine, the holder, the rim-support, the carrier having radial arms, the arbors adapted to receive the washers, and the plungers for pressing the washer in position also carried by said arms, substantially as described.

6. In combination, in a washer-applying machine, the holder, the rim-support, a rotary carrier having radial arms, the arbors carried by said arms, the stationary plungers also carried by the arms, and means for reciprocating said carrier whereby said plungers will operate on the washers, substantially as described.

7. In combination, the holder, the rim-support, the rotary carrier having radial arms, means for imparting to said carrier a reciprocating movement, the plungers fixed in said arms and the arbors slidable in said plungers and yieldingly supported therein, substantially as described.

8. In combination, the holder, the rim-support, the carrier interposed between the holder and support and having radial arms with sockets therein, the plunger fixed in said sockets and the arbors slidable in said plungers having enlarged heads adapted to abut the end of the plungers and the springs interposed between the walls of the sockets and said heads, substantially as described.

9. In combination, the holder comprising a wire having a plurality of washers strung thereon, means for feeding said washers singly therefrom, a rim-support, a rotary carrier having arbors adapted to successively aline with the wire and form a continuation thereof to permit the washer to pass onto the arbor, and catches for retaining the washers on the arbors, substantially as described.

10. In combination, the holder, the rim-support, the carrier having radial arms, the arbors carried by said arms, a catch pivoted to each of said arms and a projection in the path of said catches adapted to tilt the same to release the washer held thereby, substantially as described.

11. In combination, the holder under spring tension, the rim-support, the carrier, the arbors carried thereby adapted to aline with said holder, the pawl loosely pivoted, and the reciprocating slide carrying the carrier with means for operating the same whereby on the upward stroke of said slide the carrier will be moved one step and the arbor alined with said holder will contact with the end thereof and provide an uninterrupted continuation of the same, substantially as described.

12. In combination, the holder comprising a vertically-disposed wire under tension, the rim-support, the carrier, the arbors carried thereby adapted to be alined with the end of said wire, the slide carrying the carrier, the toothed wheel fixed to the carrier, the pawl adapted to engage said toothed wheel loosely pivoted, means for exerting a tension on said pawl and means for reciprocating the slide whereby on the upstroke thereof the carrier on the first movement will be rotated one step and on the final movement the pawl and carrier will both move vertically to bring the end of the wire and the end of the arbor in alinement therewith into firm contact, substantially as described.

13. In combination, the holder for the washers comprising a wire having the washers strung thereon, the carrier having arbors adapted to aline with said holder, the rim-support, the reciprocating slide, the shuttle and means operated thereby actuated through the movement of the slide to feed the said washers singly to said carrier, substantially as described.

14. In combination, the holder for the washers comprising a wire having the washers strung thereon, the rim-support, the carrier having arbors adapted to aline with said wire, the reciprocating slide with means for operating the same, the shuttle and means operated thereby for feeding the washers and the bell-crank lever operated from said slide for actuating said shuttle, substantially as described.

15. In combination, the holder for the washers comprising a wire having the washers strung thereon, the rim-support, the carrier having arbors adapted to aline with said wire, the reciprocating slide with means for operating the same, the shuttle and means operated thereby for feeding the washers, a bell-crank lever, a link connecting the same to the shuttle, a rod carried by the slide, and blocks fixed to said rod adapted to operate said bell-crank as said slide is operated to reciprocate said shuttle, substantially as described.

16. In combination, the holder for the washers comprising a wire having the washers strung thereon, the rim-support, the carrier, the slide with means for operating the same, the shuttle with means for reciprocating the same operated from the slide, the pivoted jaws adapted to clamp a washer controlled by said shuttle, and a support carried by the shuttle, substantially as described.

17. In combination, the holder having washers strung thereon, the carrier, the rim-support, the slide, the shuttle operated from said slide, the independently-pivoted jaws controlled by said shuttle and the plate carried by said shuttle adapted to support the washers on said wire, substantially as described.

18. In combination, the holder, washers strung thereon, the carrier, the rim-support, the slide and the shuttle operated from the slide, and means controlled by said shuttle, said means and shuttle being adapted to alternately support the washers on said holders, substantially as described.

19. In a machine for applying nipple-washers to rims, a rim-support comprising a stationary sleeve, a plug adjustably secured in

the lower end of said sleeve, a block vertically movable in said sleeve and having a seat for the rim, a shank or rod extending from said block downward through the adjustable plug, a tension-nut on said rod, and a spring interposed between the block and plug, substantially as described.

20. In combination, the carrier, the holder, the rim-support and the stationary centering and stripping bar, substantially as described.

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

WILLIAM R. FOX.

Witnesses:

GEORGE S. MILLER,

GEO. R. MCMULLEN.