

G. B. COCKER.
MACHINE FOR LINKING WARPS.
APPLICATION FILED NOV. 13, 1908.

969,155.

Patented Sept. 6, 1910.

2 SHEETS—SHEET 1.

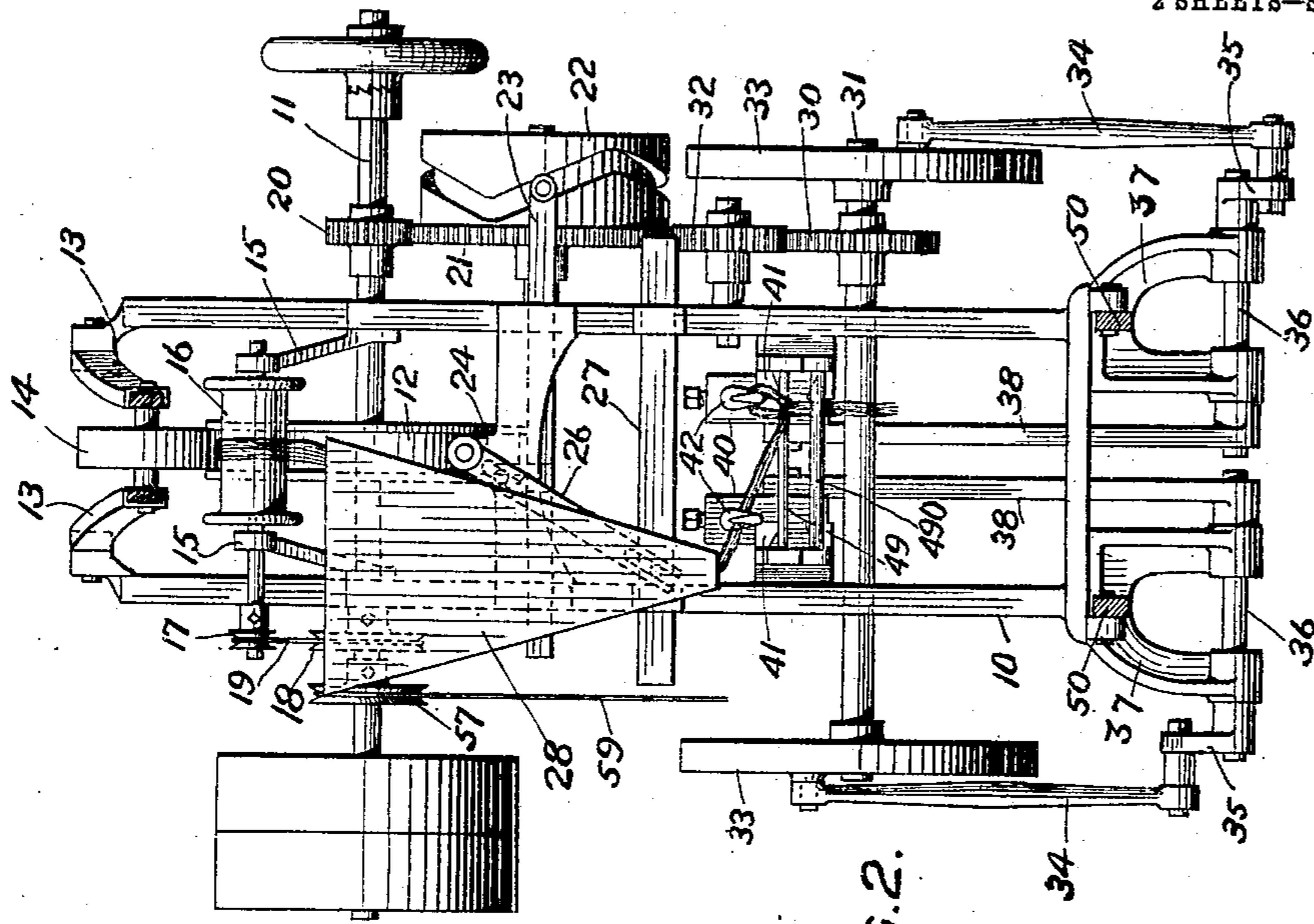


FIG. 2.

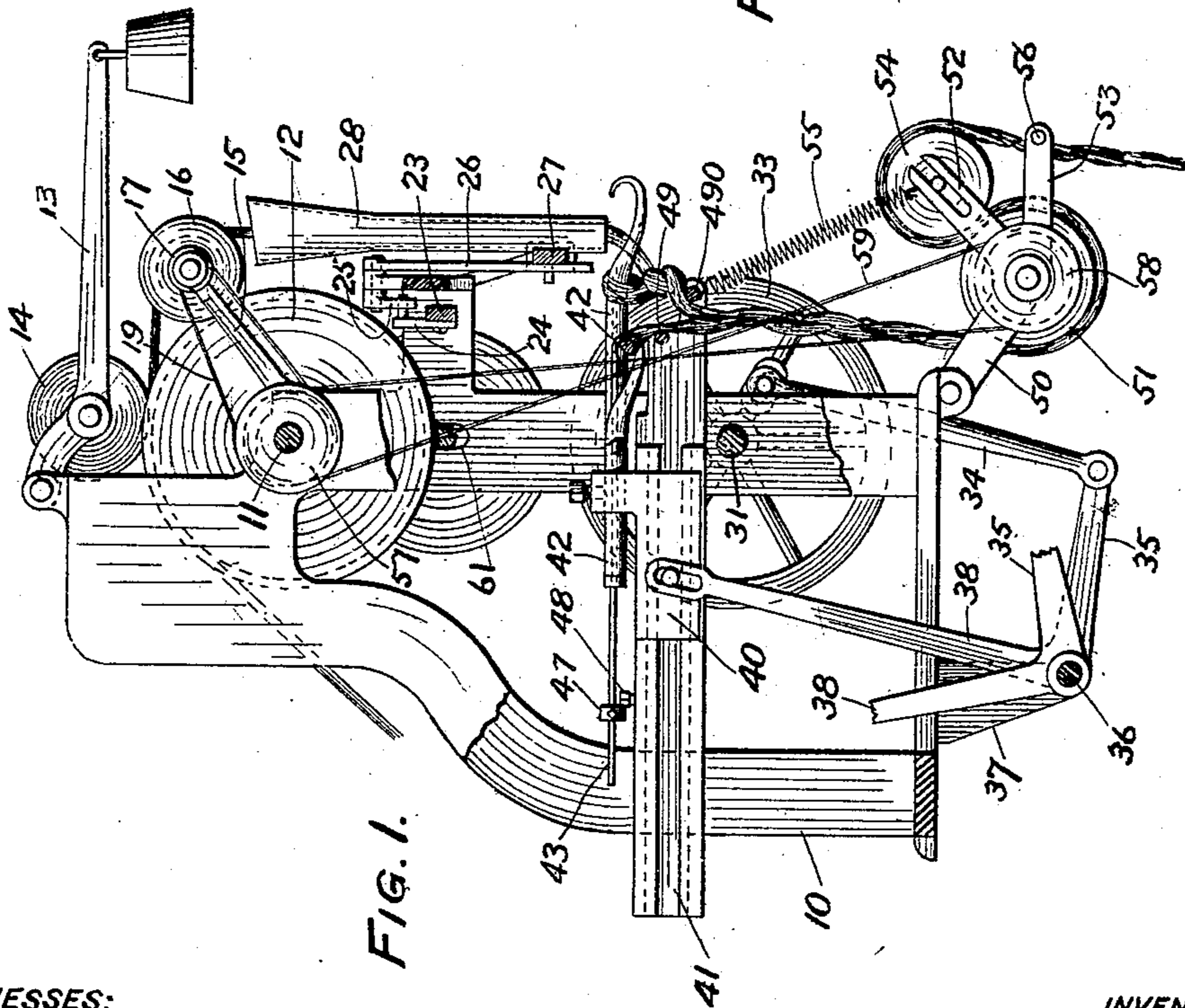


FIG. 1.

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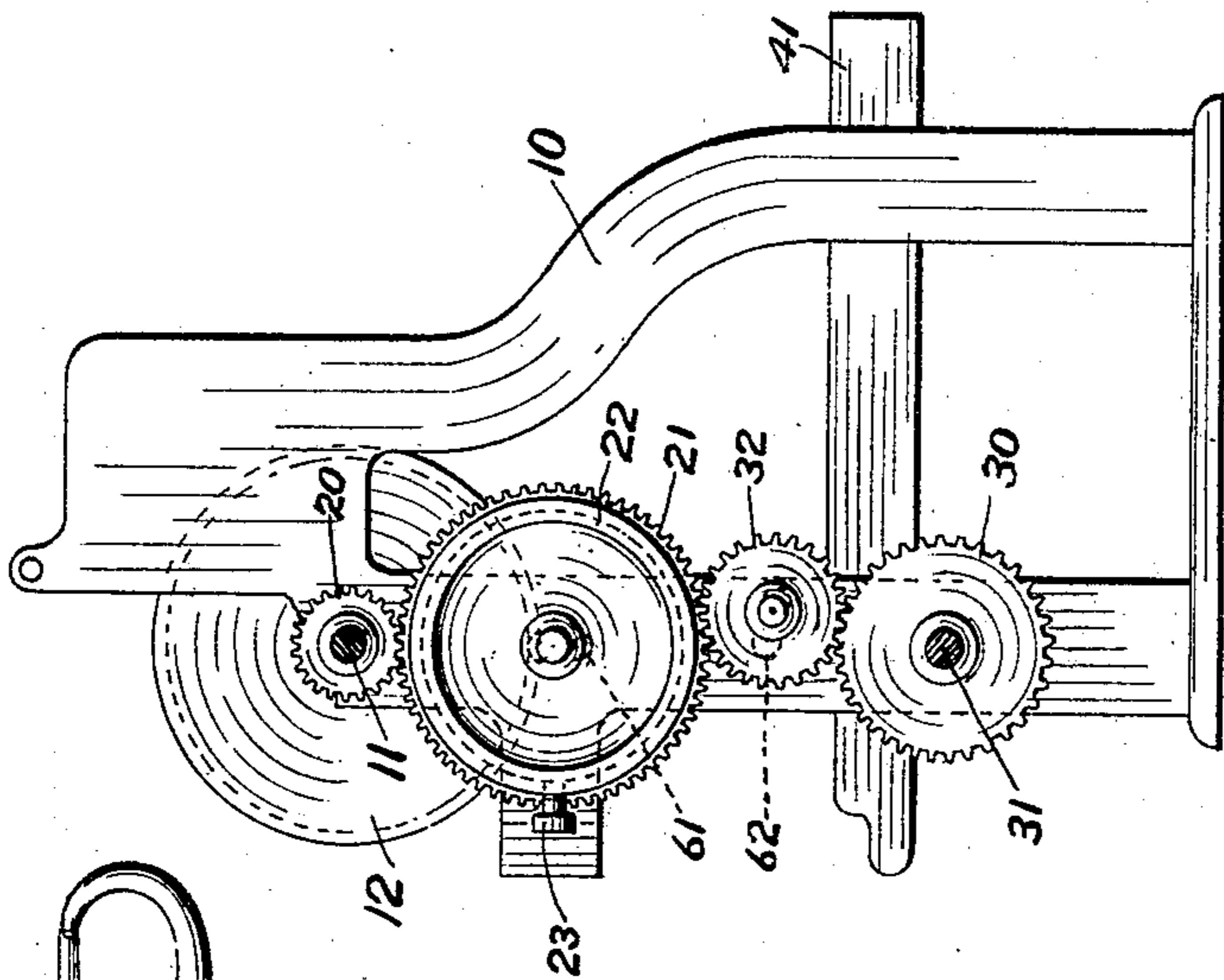


FIG. 3.

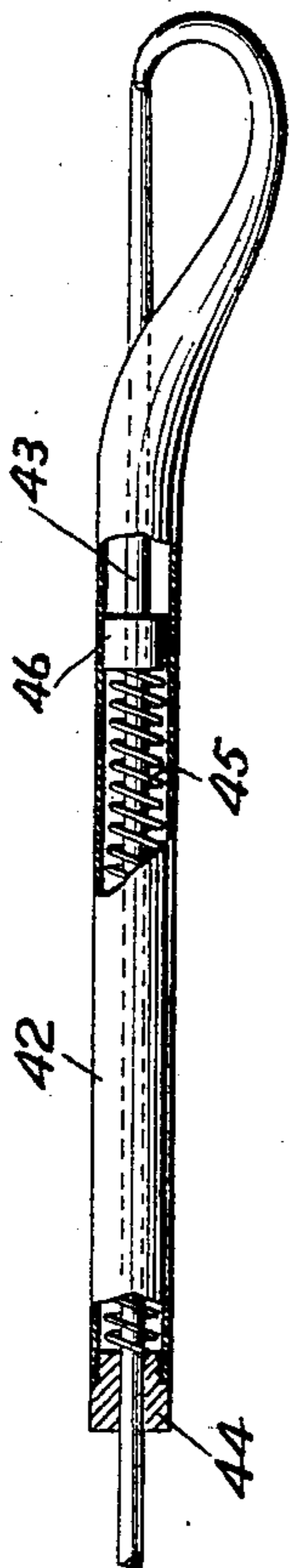


FIG. 4.

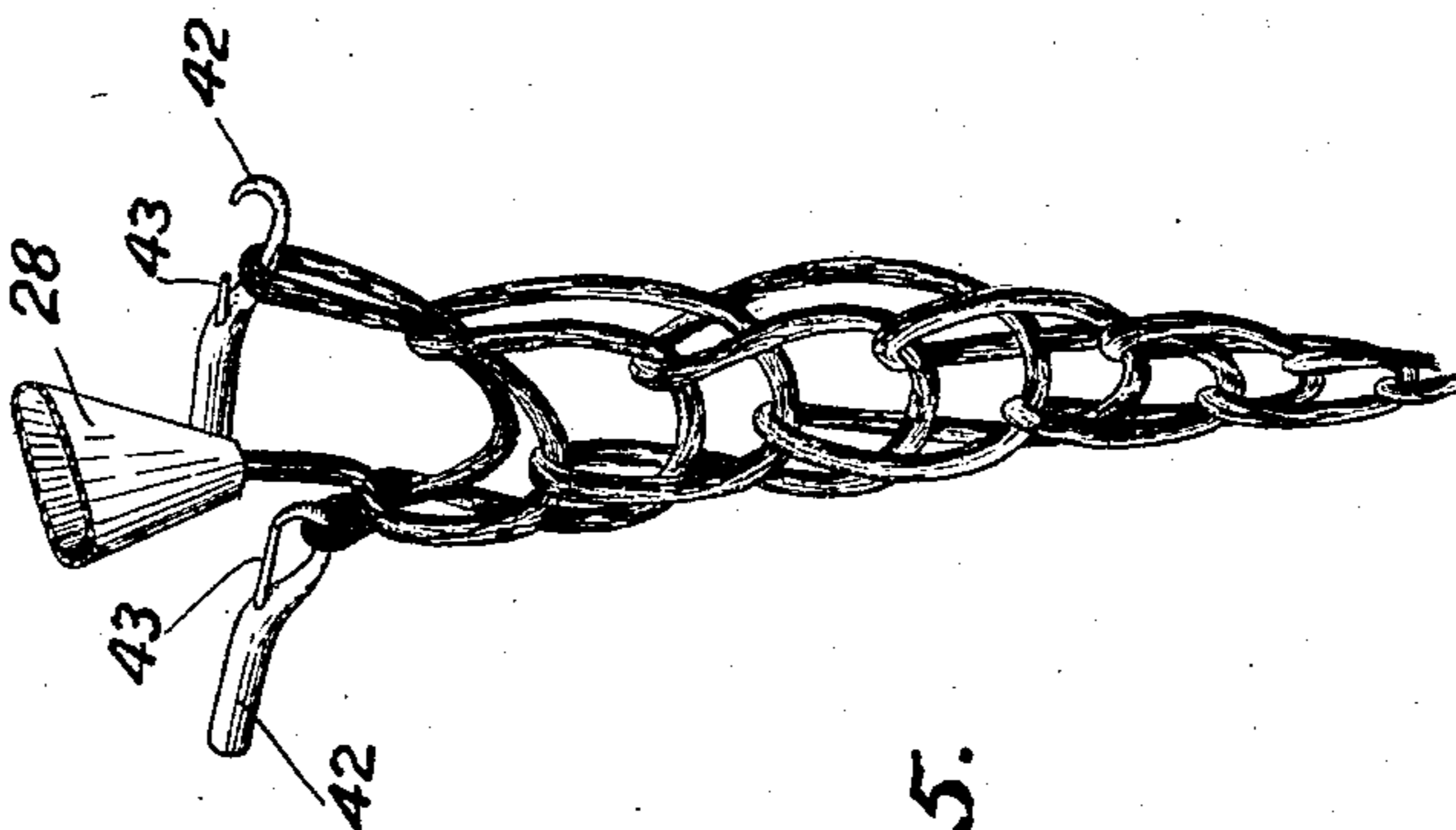


FIG. 5.

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MACHINE FOR LINKING WARPS.

969,155.

Specification of Letters Patent.

Patented Sept. 6, 1910.

Application filed November 13, 1908. Serial No. 462,380.

To all whom it may concern:

Be it known that I, GEORGE B. COCKER, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Machines for Linking Warps, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to machines for linking warps, and more particularly to that class of machines adapted to form a double instead of a single link, such as are set forth in Patents No. 407,514 of July 23rd, 1889, and No. 412,482 of October 8th, 1889, both issued to Clayton Denn, and No. 460,098 of September 22nd, 1891, issued to William A. Denn. The object of so forming the warp into links or chains is to prevent the entanglement of the same, particularly where it is handled repeatedly, as in transportation.

The object of my invention is to remedy certain existing defects in machines of this class; more specifically, to prevent severance of, or other injury to, the individual warp threads by the action of the linking-needles and their latches, and to insure an even feed and delivery of the warp to the linking-needles.

In the drawings: Figure 1 is a side elevation of the machine, one of the linking-needles and its actuating mechanism being partly cut away; Fig. 2 is a front view of the machine with parts of the machine removed and showing the linking-needles and delivery tube in a different position from that shown in Fig. 1; Fig. 3 is a side view of the chain of driving gears between the driving shaft and the crank shaft; Fig. 4 is a detail side view, partly in section, of one of the linking needles; Fig. 5 is a perspective view showing the delivery tube, linking-needles, and a chain of double warp links formed thereby.

10 is the frame of the machine; 11 the main driving shaft. On the shaft 11 is a grooved drum 12. Pivoted on the frame is a weighted lever 13 carrying between its forked ends a roller 14 resting upon the grooved periphery of drum 12. Turning in bearings in brackets 15 secured to the frame is a shaft

to which is secured a delivery roller 16 and a pulley 17. On the main shaft is a pulley 18 from which the pulley 17 is driven, through the belt 19 at a speed somewhat exceeding that of the drum 12.

The warp from the warping machine is fed over the drum 12 between it and the weighted roller 14 and thence over the roller 16 down to the delivery tube. While roller 16 has a somewhat greater speed than drum 12, the yarn cannot be pulled from between drum 12 and roller 14 faster than the speed of drum 12 because of the resistance imposed by weighted roller 14, and what slippage occurs is between the warp and roller 16, thus insuring the feed of the warp from the drum 12 under proper tension.

On the driving shaft 11 is a gear 20 driving a gear 21 on the shaft of a grooved cam wheel 22. The bearings of the cam shaft are secured in slots 61 in the machine frame. 23 is a horizontal bar slidable in guides on the frame and having at one end a roller engaging said cam groove. On the bar 23 is a projection 24 having a pin engaging a slotted finger 25 secured to a shaft turning in bearings on the frame. Also secured to this shaft is an arm 26 whose lower slotted end engages a pin on a horizontal bar 27 slidable in guides on the frame. Secured to the bar 27 is the delivery tube 28, whose upper end is of substantially greater width than its lower end, as shown.

By the arrangement just described, a reciprocating movement in a straight horizontal direction is imparted to the delivery tube, as distinguished from an oscillating movement on a pivot, such as has heretofore been employed. The width of the tube 28 at its receiving end, measured in the direction of its reciprocation, should be substantially equal to, or slightly greater than, the length of stroke of the tube. By reason of these features, the tube feeds the warp to the linking-needle mechanism with evenness and regularity, whereas when the tube is oscillated so that the lower end thereof describes in its movement the arc of a circle, the feed is at a varying speed, with a tendency on the part of the tube in each upward stroke toward the end of an oscillation to pull the warp upwardly out of

engagement with the linking-needle mechanism.

The gear 21 drives a gear 30 on the crank shaft 31 through an intermediate gear 32 5 turning on a stud adjustable in slot 62 in the frame. On the ends of the shaft 31 are crank disks 33, 33, to which are attached 10 connecting-rods 34, 34, jointed to arms 35, 35, on the shafts 36, 36, turning in bearings on the brackets 37, 37. To the shafts 36, 36, 15 are secured the arms 38, 38. The slotted upper ends of these arms engage pins on the slides 40, 40, sliding in guides 41, 41 on the frame. The linking-needles 42, 42 are 20 secured to the slides 41, 41. Thus, the linking needles are reciprocated forwardly and backwardly at the same time that the delivery tube is reciprocated from side to side. Owing to the crank pins on the crank disks 25 33, 33, being arranged respectively on opposite sides of the axis of the shaft 31, the linking-needles 42, 42 will always move in reverse directions. The operation of these needles relatively to each other and to the 30 delivery tube need not be particularly described, as the operation is essentially the same as in machines of the prior art.

It is also known in the art to use latches 35 to permit a loop that has been transferred from the hook to the shank of a needle to be 30 slipped off the hook end of the needle. In my invention, the principle of the latch is retained, but the construction and operation of the same is altered with the object in 35 view of preventing the cutting or injury of the warp threads during the action of the needles upon the warps. To this end, I rely entirely upon positively actuating means to 40 operate the latch devices, as contrasted with arranging them to be operated by the warp itself.

One of the linking-needles 42 embodying my invention is shown in Fig. 4. The shank 45 of the needle is made hollow to receive a latch-pin 43. The front end of the latch-pin when it is in its forward position contacts with the point of the hook of the 50 needle. Thence the pin extends back across the hooked end of the needle and thence through the hollow interior of the needle shank and through a plug 44 in the rear end of the needle. A coil spring 45 surrounds 55 the latch-pin 43 and is confined between the closed end 44 of the needle and a collar 46 fitting and loosely sliding within the needle. On the rear end of the pin 43 is a collar 47 adapted, when the pin 43 moves forwardly, 60 to engage a stop 48 on the frame.

The operation of each of the needles is as 60 follows: As the needle moves backwardly from its forward position, its hooked end engages the warp that the tube 28, in its transverse movement, has laid upon the shank of the hook and draws the warp back-

wardly to form a loop. In the forward 65 movement of the needle, the collar 47 engages the stop 48 and limits the forward movement of the latch-pin 43, causing the latter to be retracted relatively to the needle. As the needle nears its forward limit of 70 travel, the loop slips backwardly over the shank of the needle and back of the forward end of the latch-pin. As the needle again moves backwardly, and after its hooked end again engages the warp to form 75 another loop, the latch-pin moves forward relatively to the needle and closes the forward end of the hook. At the same time the first loop slips over the latch and off the point of the hook. As the needles operate 80 alternately, it will be understood that a loop is first formed on one needle, then the previously formed loop of that needle is cast off, then the loop just formed is moved 85 onto the shank of the needle and another loop is formed on the second needle, and then the previously formed loop on the second needle is cast off. As the warp, after 90 being looped on one needle, is moved by the delivery tube over the hooked end of the other needle, it will be understood that the loop formed on one needle is looped upon the loop formed on the other needle and so 95 on continuously, thus forming the double link chain shown in Fig. 5.

Secured to the machine frame are cross-bars 49, 490, between which the links pass as they are fed from the needles. The cross-bar 49 insures that the loop on the shank 100 shall slip off the needle when the latter nears its rearward position.

The following take-up mechanism is provided for the links after they leave the 105 needles. Pivoted on the frame are levers 50 carrying the take-up roller 51 and having arms 52 and 53. Arms 52 are slotted longitudinally to receive the axle of take-up roller 54 and are upheld by being connected 110 to the frame by means of the tension springs 55. The outer ends of the arms 53 are connected by the cross-bar 56. The shaft of take-up roller 51 carries a pulley 58, which is driven from the pulley 57 on the main driving shaft by means of the belt 59. 115 The chain of warp links, after leaving the needles, passes down under roller 51, thence up between rollers 51 and 54, and thence over roller 54 and down back of cross-bar 56. By thus positively actuating the take-up mechanism at a speed conforming to the 120 feed of the feed mechanism, the desired tension is imposed upon the chain as it leaves the needles, so as to insure the proper stripping of the links from the needles.

Different sized gears 20 may be employed 125 and the cam shaft adjusted vertically in the slots 61 to place the gear 21 carried by it in mesh with the gear 20. The stud carrying

gear 32 is adjustable in the slot 62 to maintain it in mesh with gears 21 and 30. Thus the size of the links may be regulated by the size of gear 20.

5 Having now fully described my invention, what I claim and desire to protect by Letters Patent is:

1. In a machine for linking warps, the combination with the warp link-forming mechanism, of a positively actuated feed-drum, positively actuated delivery means in advance of the feed drum tending to deliver the warp to the link-forming mechanism at a higher speed than the feed-drum is adapted to feed to the delivery roller, and means coacting with the feed-drum to control the feed of the warp therefrom.

2. In a machine for linking warps, the combination with a feed-drum, of a delivery roller in advance of the feed-drum, means to actuate the delivery roller and the feed-drum, a tension roller between which and the feed-drum the warp is fed toward the delivery roller, and link-forming mechanism adapted to receive the warp from the delivery roller.

3. In a machine for linking warps, the combination with feeding mechanism, of linking-needle mechanism, a tube adapted to receive warp from the feed mechanism and deliver it to the linking-needle mechanism, said tube gradually decreasing in width substantially throughout its length from its upper to its lower end, and means to reciprocate said tube horizontally.

4. In a machine for linking warps, the combination with feeding mechanism, of linking-needle mechanism, a tube adapted to receive warp from the feed mechanism and deliver it to the linking-needle mechanism, means to reciprocate the tube in a substantially right line horizontally the distance between opposite walls of the tube in the direction in which the same is adapted to reciprocate gradually increasing from its lower part to its receiving mouth.

5. In a machine for linking warps, the combination with feeding mechanism, of linking-needle mechanism, a tube adapted to receive warp from the feed mechanism and deliver it to the linking-needle mechanism, and means to reciprocate said tube horizontally, said tube having a receiving mouth of a width in the direction of its reciprocation, substantially equal to the length of its reciprocating movement and relatively narrow measured in a direction at right angles thereto.

6. In a machine for linking warps, the combination with feeding mechanism, of linking-needle mechanism, a tube adapted to receive warp from the feed mechanism and deliver it to the linking-needle mechanism, a horizontally extending cross-bar secured to

said tube, guides in which said cross-bar is adapted to move horizontally, a lever pivoted on the frame, a pin and slot connection between the lever and the cross-bar, and means to oscillate the lever.

7. In a machine for linking warps, the combination with feeding mechanism, of linking-needle mechanism, a tube adapted to receive warp from the feed mechanism and deliver it to the linking-needle mechanism, a horizontally extending cross-bar secured to said tube, guides in which said cross-bar is adapted to move horizontally, a wheel having a peripheral cam, a second cross-bar engaging said cam, a shaft, a finger thereon, a pin on the last-named cross-bar engaging a slot in said finger, an arm on the shaft having a pin and slot connection with the first-named cross-bar, and means to rotate the cam wheel.

8. In a machine for linking warps, the combination with feeding mechanism, of linking-needle mechanism, mechanism reciprocable in a substantially right line horizontally, means for so reciprocating said mechanism, and a tube adapted to receive warp from the feeding mechanism and deliver it to the linking-needle mechanism, said tube being secured only to the horizontally reciprocable mechanism, thereby effecting an even and regular feed of warp to the linking-needle mechanism.

9. In a machine for linking warps, the combination with feeding mechanism, of linking-needle mechanism, a tube adapted to receive warp from the feeding mechanism and deliver it to the linking-needle mechanism, a cam, a frame on which the cam is supported, means to turn the cam, and horizontally reciprocable mechanism, adapted to be actuated by the cam, comprising two members and a pivoted lever connected to both members whereby the range of horizontal movement imparted by the cam is multiplied, said tube being secured to the member having the greater range of horizontal movement.

10. In a machine for linking warps, the combination with a warp feeding and delivery mechanism, of a needle having a hollow shank and hooked end, a latch-pin extending through the hollow shank and normally spanning and closing said hooked end, a collar on said pin within said shank, a spring confined between said collar and the closed rear end of said shank, a collar on that part of said pin extending back of the needle, means to reciprocate the needle, and a stop in the path of movement of the last-named collar in the forward movement of the needle.

11. In a machine for linking warps, the combination with the machine frame, of the linking-needles reciprocable thereon, warp

feeding and delivery mechanism, pivoted le-
vers having slotted arms, a take-up roller
carried between said levers, a take-up roller
whose shaft extends within the slots of said
5 arms, a cross-bar connecting said levers, and
springs between said slotted arms and the
frame.

In testimony of which invention, I have
hereunto set my hand, at Philadelphia, on
this 26th day of October, 1908.

GEORGE B. COCKER.

Witnesses:

M. M. HAMILTON,
A. M. URIAN.