

(No Model.)

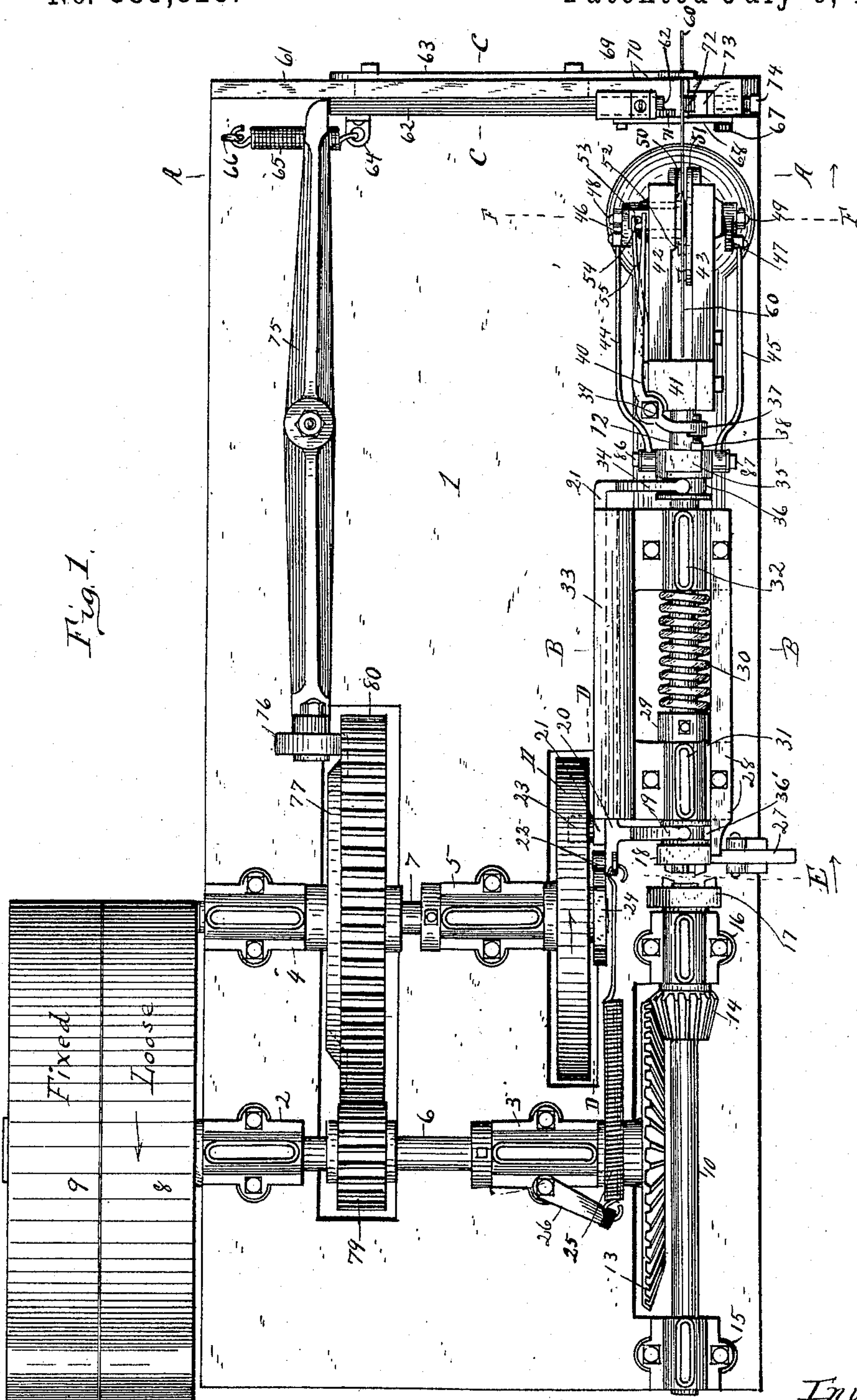
3 Sheets—Sheet 1.

G. LEHBERGER.

MACHINE FOR FORMING HOOKED HEADS ON WIRE BALE TIES.

No. 585,823.

Patented July 6, 1897.



Witnesses.
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(No Model.)

3 Sheets—Sheet 2.

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Fig. 2.

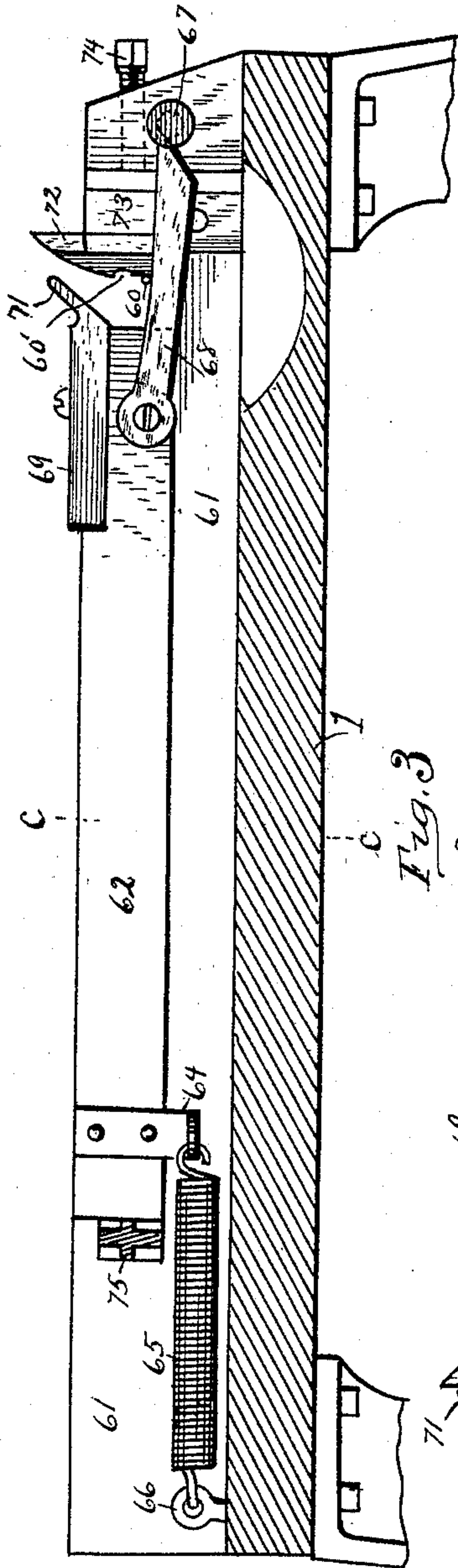


Fig. 3.

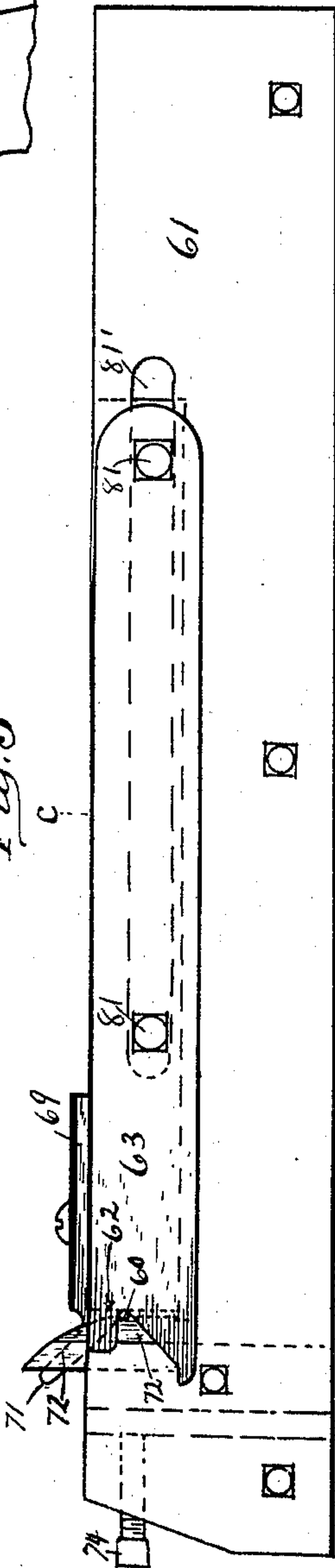


Fig. 6.

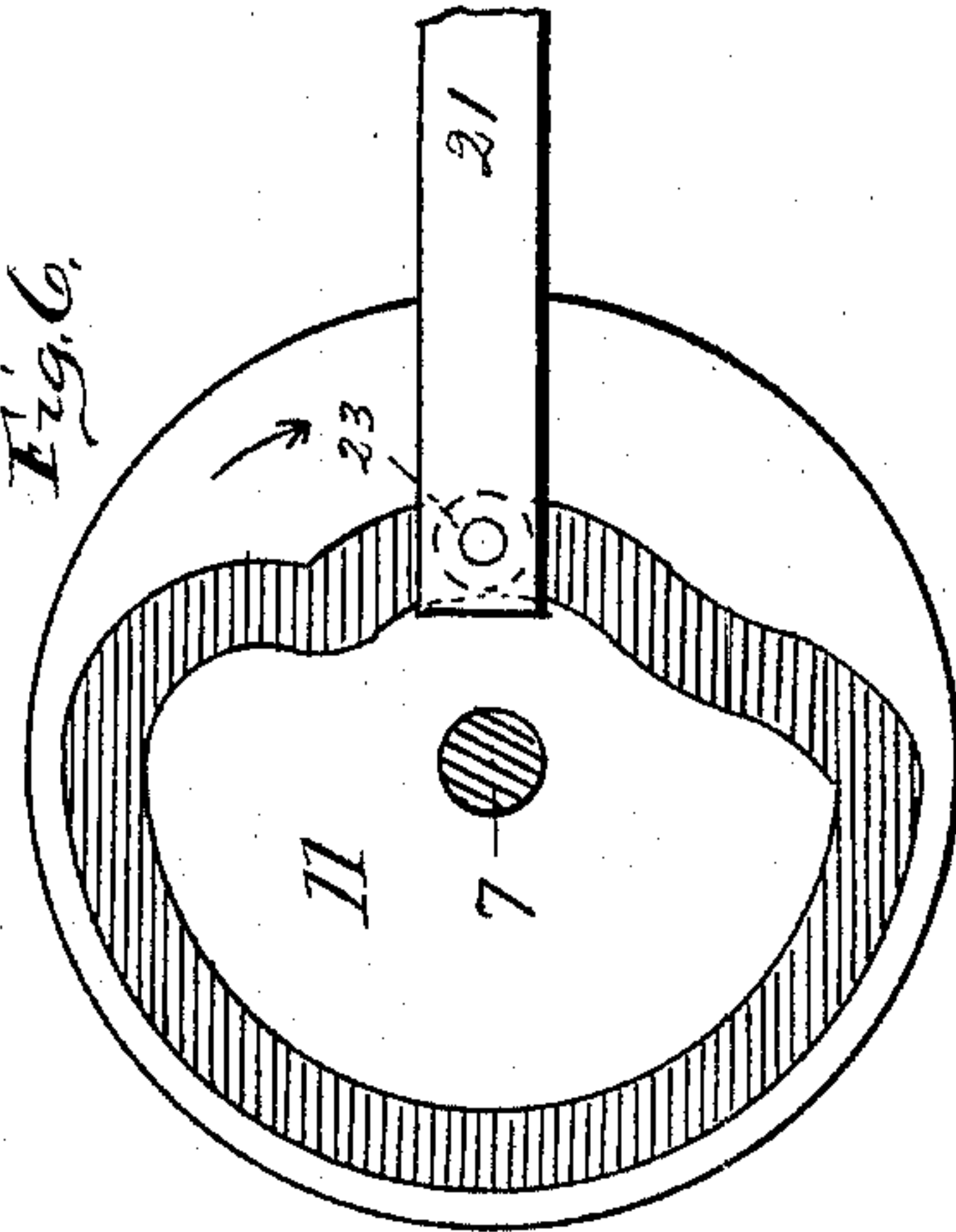


Fig. 7.



Fig. 5.

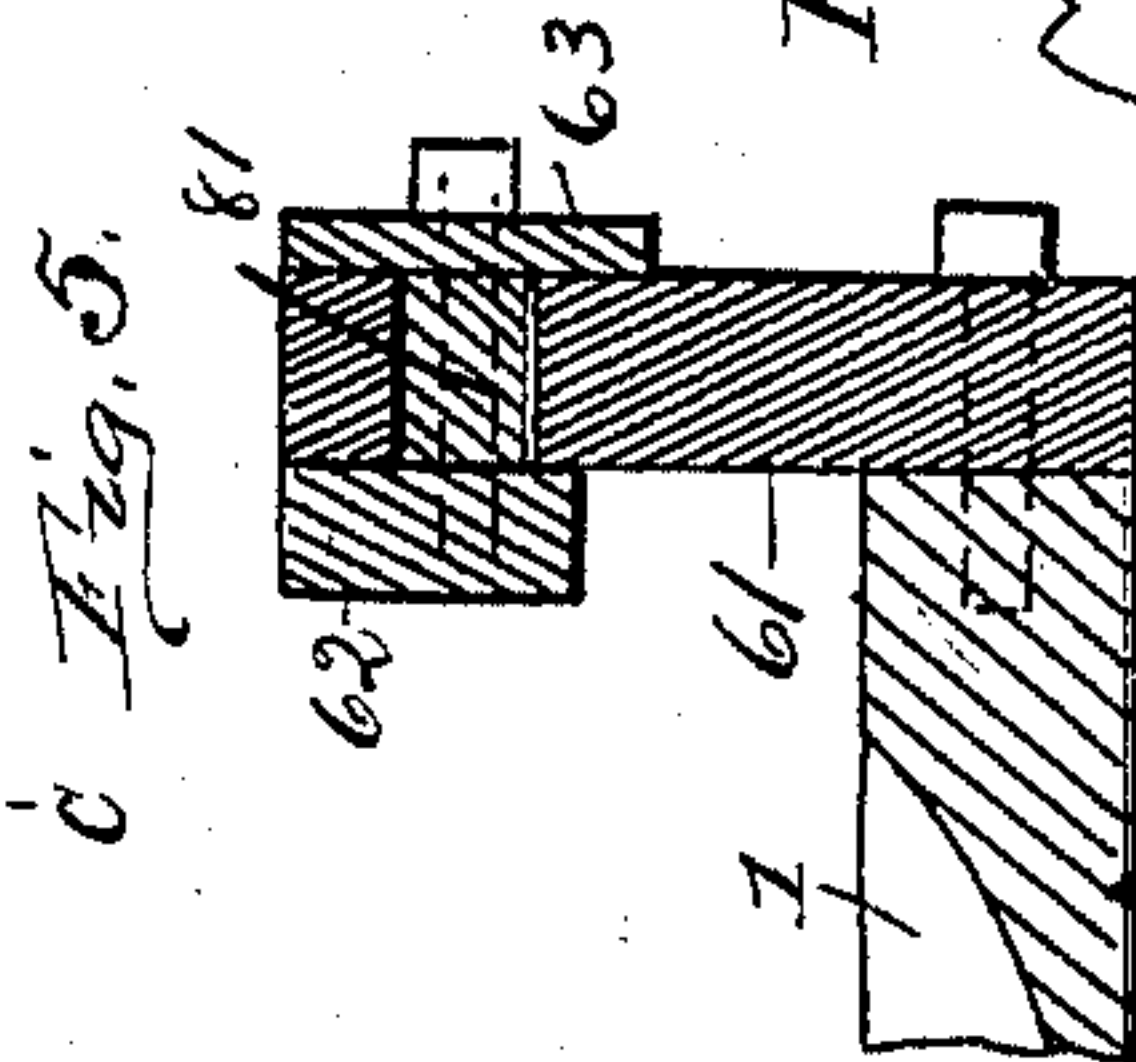
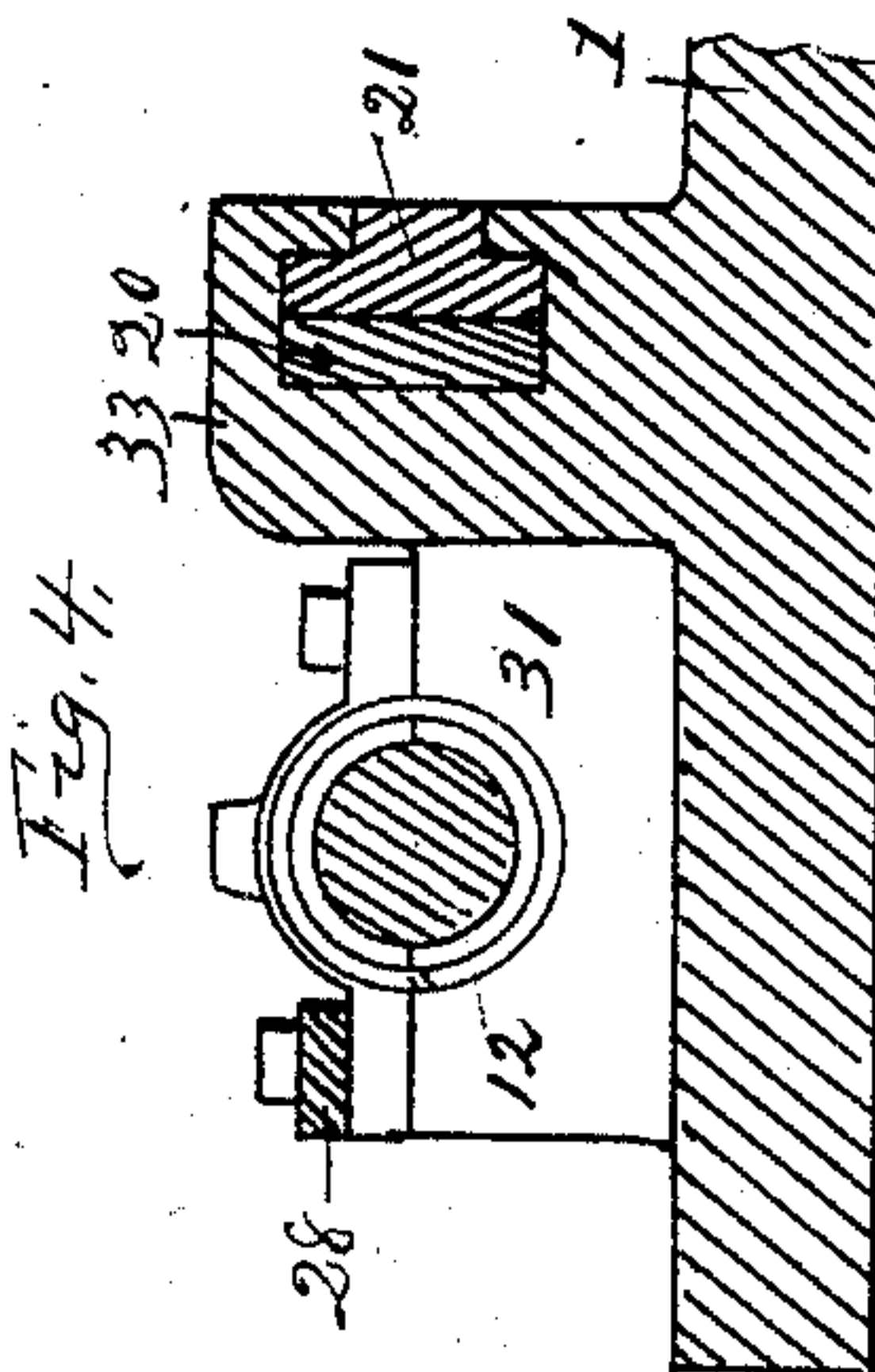


Fig. 4.



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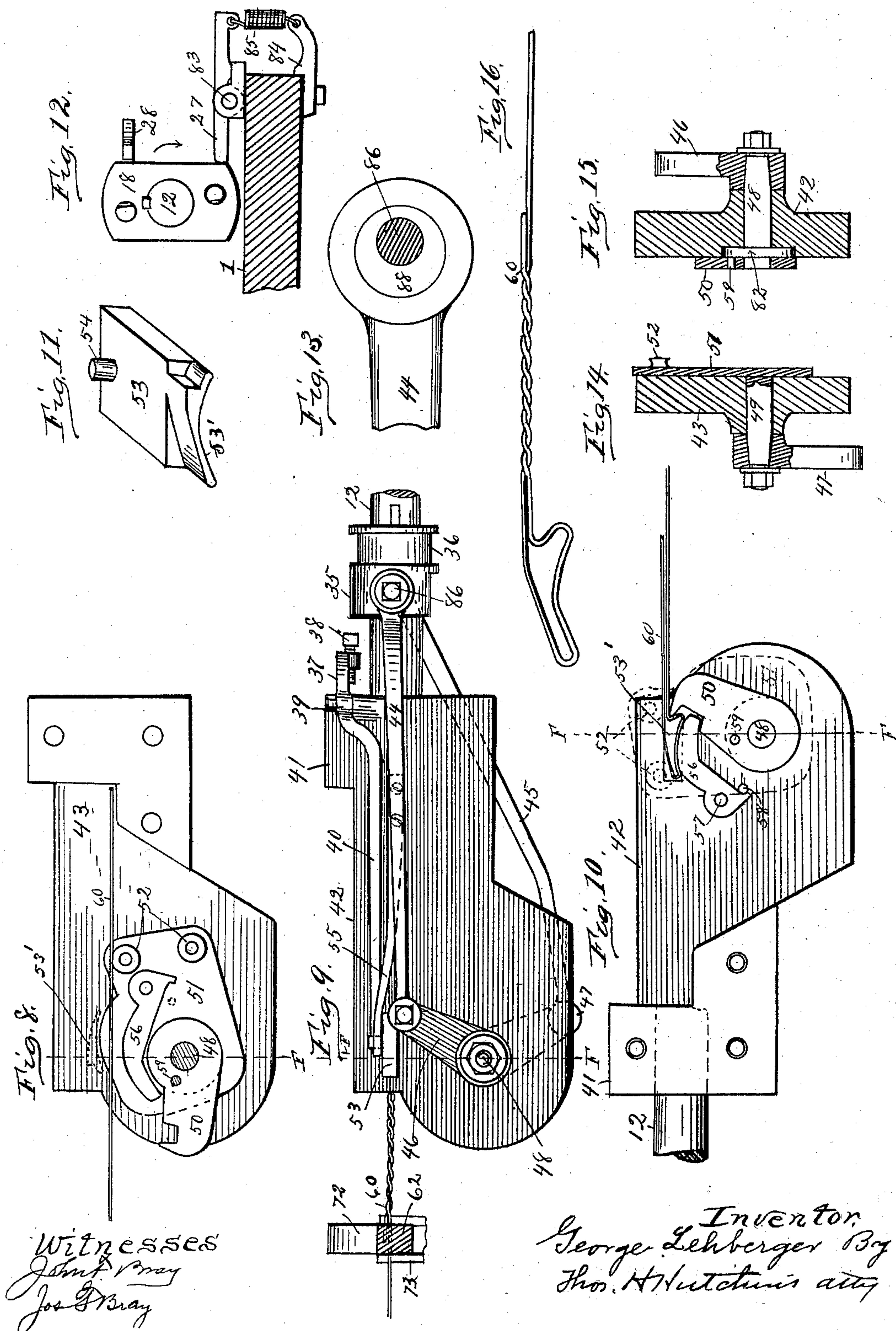
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MACHINE FOR FORMING HOOKED HEADS ON WIRE BALE TIES.

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Patented July 6, 1897.



UNITED STATES PATENT OFFICE.

GEORGE LEHBERGER, OF JOLIET, ILLINOIS, ASSIGNOR TO THE KILMER
BALE TIE COMPANY, OF CHICAGO, ILLINOIS.

MACHINE FOR FORMING HOOKED HEADS ON WIRE BALE-TIES.

SPECIFICATION forming part of Letters Patent No. 585,823, dated July 6, 1897.

Application filed August 3, 1896. Serial No. 601,500. (No model.)

To all whom it may concern:

Be it known that I, GEORGE LEHBERGER, a citizen of the United States of America, residing at Joliet, in the county of Will and State of Illinois, have invented certain new and useful Improvements in Machines for Forming Hooked Heads on Wire Bale-Ties, of which the following is a specification, reference being had therein to the accompanying drawings, and the figures of reference thereon, forming a part of this specification, in which—

Figure 1 is a top plan of the machine. Fig. 2 is a cross-sectional view of the machine, taken on line A A of Fig. 1, looking in the direction of the arrow. Fig. 3 is an end view of Fig. 1, looking at the right end of the figure. Fig. 4 is a cross-section of a portion of Fig. 1, taken on line B B through the slides and their box. Fig. 5 is a cross-section of a portion of Fig. 1 and of Figs. 2 and 3, taken on line C C. Fig. 6 is a side view of one of the cam-wheels of the machine, taken on line D D of Fig. 1, showing the cam-channel of said wheel and a portion of the slide operated thereby. Fig. 7 is a side view of a cam located adjacent to said last-named cam-wheel on the opposite side of said line D D. Fig. 8 is an interior side plan of one of the arms of the forming-head of the machine and also showing the wire-forming arms of the opposite arm of said head. Fig. 9 is an exterior side plan of the wire-forming head, also a cross-section of the wire-holding vise. Fig. 10 is an interior side plan of the opposite arm of the forming-head of the machine to that shown in Fig. 8. Fig. 11 is a detail perspective view of the block around which the bale-wire is bent to form the hooked head on the end of the bale-wire. Fig. 12 is a cross-section of a portion of Fig. 1, taken on line E, looking in the direction of the arrow, showing a side view of the movable clutch-head and a side view of its stop mechanism. Fig. 13 is a detail side view of a portion of one of the connecting-rods of the wire-forming head, showing a cross-section of its connecting-stud and a plan of an eccentric wrist on said stud. Figs. 14 and 15 are cross-sections of said forming-head parts, taken on lines F F of Figs. 1, 8, 9, and 10; and Fig. 16 is a view of the

formed end of a bale-tie forming a hook, it being the product of the machine.

This invention relates to certain improvements in a machine for forming a hooked head on the end of a wire bale-tie, which improvements are fully set forth and explained in the following specification and claims.

Referring to the drawings, 1 is the bed of the machine, intended to be supported on suitable legs.

6 is the drive-shaft, properly journaled in the boxes 2 and 3 and having a loose pulley 8 and a fast pulley 9 on its outer end and a drive bevel-gear 13 secured on its inner end and a drive-pinion 79 secured thereon between its said boxes.

10 is a counter-shaft properly journaled at its ends in the boxes 15 and 16, and has secured thereon the bevel-pinion 14 for meshing with drive-gear 13, and has also secured on its inner end a clutch-head 17.

7 is a shaft arranged parallel with shaft 6 and is properly journaled in boxes 4 and 5 on said bed and has secured thereon between said boxes the gear-wheel 80, having a cam 77 on its side, which gear-wheel meshes with and is driven by said pinion 79. Said shaft 7 has secured on its inner end the cam 24, (shown in Figs. 1 and 7,) and has also secured thereon next adjacent to said cam 24 the cam-wheel 11, having a side cam-channel, as shown in Fig. 6.

12 is a shaft arranged in line with shaft 10 and is properly journaled in boxes 31 and 32 on said bed and in such manner that it may reciprocate therein within certain limits. Said shaft 12 has splined on its inner end a clutch-head 18, the pins of which are intended to engage those of clutch-head 17 on shaft 10 when clutch-head 18 is moved near enough to shaft 10, and when said clutches are connected shaft 12 will be rotated by shaft 10 until the said clutches are released from each other. Said shaft 12 has also secured on its outer end the part of the machine that forms the hooked head on the end of the bale-wire and twists the return end of the bale-wire back upon itself, which part is called the "forming-head" and which consists of the head 41 and the parallel arms 42 and 43, hav-

ing an open space between them, and the wire-bending parts attached to said arms and which will be hereinafter described. Said shaft 12 has also splined thereon between its box 32 and the head 41 the sliding head 35, provided with an annular channel 36 for the reception of the forked arm of the slide 21, adapted to slide in the long box 33 (see Fig. 4) through the medium of a roller-wrist 23 on its opposite end, which wrist travels in the channel of cam-wheel 11. (See Figs. 1 and 6.) Said head 35 is connected by means of the pitmen 44 and 45, arranged opposite each other, with the oppositely-arranged cranks 46 and 47 of the wire-bending parts. (See Figs. 1, 9, 14, and 15. Said shaft 12 has secured on it between its boxes, but near box 31, a collar 29, and has sleeved on it between said collar and its box 32 a coil-spring 30, which spring returns said shaft after it has been moved forward by reason of the bale-wire being twisted, as the twisting of the bale-wire necessarily shortens it, and the twister-head must move toward the wire a short distance during the twisting operation. Said shaft 12 is provided on its rear end with a clutch 18, splined thereon, which clutch is provided with an annular channel 36' for receiving the forked arm 19 of the slide 20. Said slide 20 is provided on its side near its inner end with a roller 22, which engages and is held in contact with the periphery of cam 24 on shaft 7 by means of a coil-spring 25, which connects said slide with a fixed arm 26 of the machine. Rotation of said cam will permit slide 20 to move clutch 18 toward shaft 10 until the clutches 17 18 connect said shafts, and thus cause shaft 12 to rotate until the form of said cam causes it to move slide 20 backward, and with it clutch-head 18, and thus disconnect said clutches and cause said shaft 12 to cease to rotate.

The arm 42 of head 41 is provided near its outer end with a short transverse shaft 48, to the outer end of which is attached a crank 46, which is connected with said sliding head 36 by means of a connecting-rod 44. The said shaft 48 has secured to it near its inner end a disk 82, carrying a pin 59, which disk is seated in a recess in arm 42, so that it will be flush with the inner face of said arm. (See Fig. 15.) 50 is a hooked arm which fits on the outer end of said shaft 48 and said pin and is held in place by being in contact with the side of arm 51 of the opposite arm 43.

56 is a cam-lever having its inner end pivoted on the stud 57 on the inner side of arm 42, and is formed on its inner end to fit the hollow on the under side of the former 53', and is operated by the hooked arm 50 to press the bale-wire up under and into the hollow on the under side of said former, as shown in Fig. 10.

The arm 42 is provided with a transversely-arranged sliding block 53, having on its inner end a former 53', around which the wire

is passed to form the hooked head of the bale-tie 60. (See Figs. 1, 8, 10, and 11.)

The arm 43 is provided with a transversely-arranged shaft 49, substantially in line with shaft 48, which shaft has attached to its outer end the crank 47, set at an angle to crank 46, as shown in Figs. 1 and 9, and the said crank 47 is connected with the sliding head 35 by means of a connecting-rod 45. (See Fig. 9.) The inner end of said shaft 49 has secured to it an arm 51, carrying a pair of sheave-rollers 52 on its inner side near its outer end, as shown in Figs. 8, 10, and 14, said sheave-wheels being adapted to bend the end of the bale-wire back over said former 53', as shown in Fig. 10. When said arm 51 is operated by means of crank 47 after the end of the bale-wire has been passed around the former 53', as shown in Fig. 10, it is in order for the clutches 17 and 18 to be connected and cause the former-head 41 42 43 to be rotated to twist the returned end of the bale-wire back upon itself in the form shown in Fig. 16. A vise is used to grasp the return end of the bale-wire and the body-wire together firmly while the twisting operation is taking place. Said vise is shown in Figs. 1, 2, and 3, and consists of the slide 62 and the permanent die-block 72. Said slide 62 is held rearward out of contact with said die-block 72 by means of a coil-spring 65, which connects at one end with said slide at 64 and has its opposite end connected at 66 with the bed 1. Said slide receives its forward movement from cam 77 on the side of gear-wheel 80 through the medium of lever 75. Said lever is fulcrumed at about its center on bed 1, and is provided on one end with a friction-roller 76, which travels on cam 77, and its opposite end is in contact with the outer end of said slide 62. The form of said cam causes said lever to oscillate and thus move said slide 62 forward, so as to cause the bale-wire to be compressed and held between the inner end of said slide and die-block 72 while the twisting operation is going on, and the said slide will be returned by means of said spring 65 on being relieved from pressure on its outer end by lever 75, due to the form of said cam 77. Said slide is connected to the bracket 61, secured to the end of bed 1, as shown in Figs. 1 and 5, by means of stud-bolts 81, that pass through a slot 81' in said bracket. Said slide has pivotally connected to it near its inner end on one side an arm 68, extending forward beyond the end of the slide and under the bale-wire, and is inclined on its outer end and arranged to engage a stud-pin 67, and thus elevate its outer end as the slide closes against die-block 72 and carry the bale-wire up to the transverse groove 60' on the face of die-block 72, to be held in said groove while the twisting operation is taking place. It is necessary to thus elevate the bale-wire before being twisted to the plane it is left after being coiled upon the former 53'.

69 is a plate secured on the top of the inner end of slide 62 and is provided with a forwardly-extending inclined arm 71 for carrying the return end of the bale-wire down to the said groove 60' to be held in connection with the body-wire to be twisted therewith.

63 is a plate attached to the slide 62 through the medium of the stud-bolts 81, as shown in Fig. 3 and 5, and reciprocates with it. The forward end of said plate is forked, as shown in Fig. 3, for the purpose of centering the bale-wire in the transverse groove 60', so the said slide and die-block may hold the wire at that place while the twisting operation is going on and locks the wire so it will not escape while it is being coiled around the former.

The connecting wrists or studs 86 of the cranks 46 47 are provided with eccentric wrists 88, sleeved thereon, as shown in Fig. 13, which eccentric wrists carry the connecting-rods 44 45. By rotating said eccentric wrists any wear of the said parts may be taken up, so the formers will operate accurately. In operation the end of the bale-wire 60 is placed in the machine between the arms 42 and 43 of the head in the groove of one of the sheave-wheels 52 of the oscillating arm 51, as shown in Figs. 1 and 8. The sliding head 36 by reason of its connection with cam-wheel 11 through the medium of slide 21 will move rearward from the bale-wire and permit the spring 55 to move the former 53' in immediately over the bale-wire and simultaneously said sliding head through the medium of cranks 46 and 47 and the connecting-rods 44 and 45 will cause the oscillating arm 51 to turn from the position shown in Fig. 8 to that shown in broken lines in Fig. 10 and bend the extending end of the bale-wire over the top of said former and back upon itself, while at the same time the hooked arm 50 has moved to the position shown in Fig. 10 from that shown in Fig. 8 and carried with it the cam-arm 56, thus compressing the bale-wire to the form of said former, as shown in Fig. 10. The form of the channel of cam-wheel 11 is such as to hold the parts in the position shown in said Fig. 10 until the head with the end of the bale-wire thus formed around the former is rotated to twist the return end of the bale-wire back upon itself, as shown in Figs. 9 and 16, and simultaneously the bale-wire and its return end are held by means of the vise 62 72 until the twisting is done. As soon as the vise has closed upon the wire the form of cam 24 permits the spring 25 and slide 20 move clutch 18 rearward, so the clutches 17 and 18 will engage each other and cause shaft 12 and its head 41 42 43 to rotate to twist the wire the desired number of times, when cam 24 will operate slide 20 to return clutch 18 and disconnect it from clutch 17, and thus stop further rotation of shaft 12 and its head and discontinue the twisting operation. The rotation of shaft 12 must be arrested at the proper time to leave the head in the position shown in Fig. 1, so the next bale-wire can be

placed in, as before. This is accomplished by means of a pair of stops 27 and 28. (Shown in Figs. 1 and 12.) The form of the clutch-head 18 is shown in Fig. 12 as being flattened on its opposite sides. The stop 28 is secured to the bed 1, as shown in Fig. 1, and before said clutches are connected clutch 18 is in contact with it, but as the said clutch moves toward its fellow clutch it becomes disconnected from said stop and free to rotate until it returns again and is arrested by said stop and held in the position shown in Fig. 12. The lower stop 27 is in contact with said clutch continuously and permits the said clutch to turn forward, but not backward. The coil-spring 85 connects the outer end of said stop with the extending arm 84 of the bed, and thus holds the opposite end of said stop in contact with the clutch 18. Said clutch and its shaft can only rotate when clutch 18 is moved rearward so it is free from stop 28, and when in the position shown in Fig. 12 said clutch cannot rotate in either direction, and the twister-head is held right side up, so a bale-wire can be placed in it, as stated.

As a bale-wire is being twisted it is of necessity shortened in its twisted part, and it is necessary to permit the twister-head and its shaft to move forward a little during the twisting operation in order to prevent injury to the wire and machine. Such limited forward movement is permitted by means of shaft 12 moving forward against the coil-spring 30, sleeved thereon, as shown in Fig. 1. The form of the cam of wheel 11 is such as to permit said shaft to move forward for such purpose without changing the position of the formers. After the end of the bale-wire has thus been bent or formed around the former 53' and the return end twisted back upon the body-wire a head has been formed on the end of the bale-wire, such as is shown in Fig. 16, which forms a hook to catch into a loop formed on the opposite end of the bale-wire, but not shown, thus forming a very strong durable hook made of the wire itself for connecting the two ends of the bale-tie around a bale.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows, to wit:

1. In a machine for forming hooked heads on the end of wire bale-ties, the combination of the twister-head 41, 42, 43 and its shaft 12, reciprocating former 53, 53', oscillating arm 51 having the sheave-wheels 52, oscillating hooked arm 50, cam-arm 56 operated by said arm, shafts 48, 49, sliding head 36, connecting-rods 44, 45, lever 40, spring 55, the means for rotating said shaft 12, and the vise mechanism for holding the bale-wire while being twisted, all arranged to operate substantially as and for the purpose set forth.

2. In a machine for forming hooked heads on the end of wire bale-ties, the combination of the twister-head 41, 42, 43 and its shaft, the former-block 53, 53' arranged to reciprocate in a transverse box in arm 43, the wire-bend-

ing arms 50, 51, 56, and the means for rotating said head and for operating said wire-bending arms and cam, and for operating said former-block, all arranged to operate substantially as and for the purpose set forth.

3. In a machine for forming hooked heads on wire bale-ties, the combination of the shaft 12, the twister-head 41, 42, 43 secured on its outer end and having the means for bending the bale-wire around the former 53', clutch-head 18 feathered on the inner end of said shaft, collar 29 secured on said shaft, coil-spring 30 sleeved on said shaft and bearing against the forward side of said collar, driven shaft 10 arranged in line with shaft 12 and having the matching clutch-head 17 for engaging clutch 18, shaft 7 having cam 24, slide 20 for engaging clutch-head 18, coil-spring 25, the stop mechanism 27, 28, and the vise mechanism for holding the bale-wire while being

twisted, all arranged to operate substantially as and for the purpose set forth.

4. In a machine for forming hooked heads on the ends of wire bale-ties, the combination of a forked head secured on the end of an intermittently-rotating shaft, a former-block arranged in a suitable box in one of said forks or arms in such manner as to reciprocate across the space between them, the bending-arms and cam-arm for bending the end of the bale-wire around said former, the means for operating said bending-arms and former-block and for holding the return end of the bale-wire with the body-wire while being twisted together, all arranged to operate substantially as and for the purpose set forth.

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Witnesses:

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