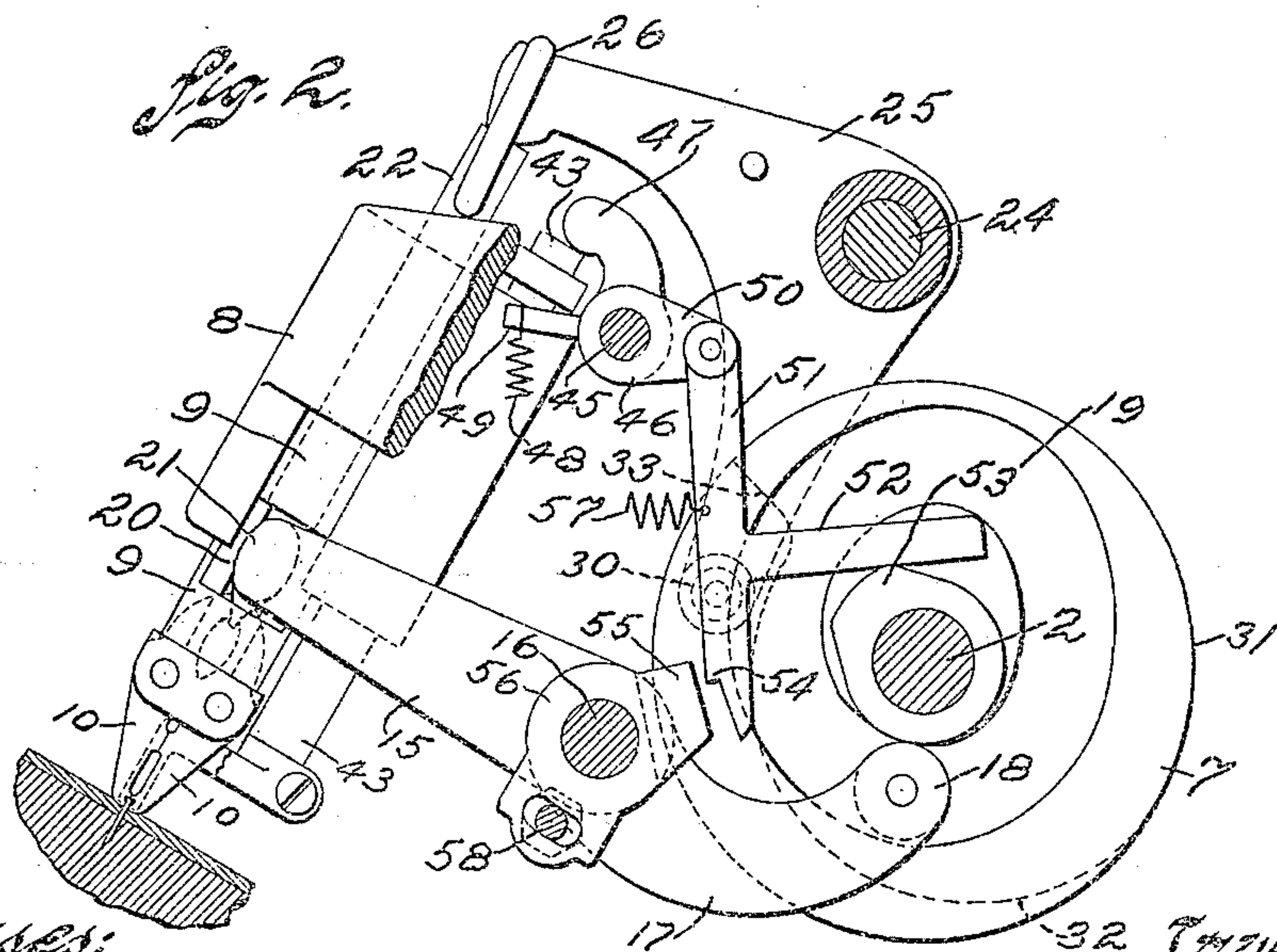
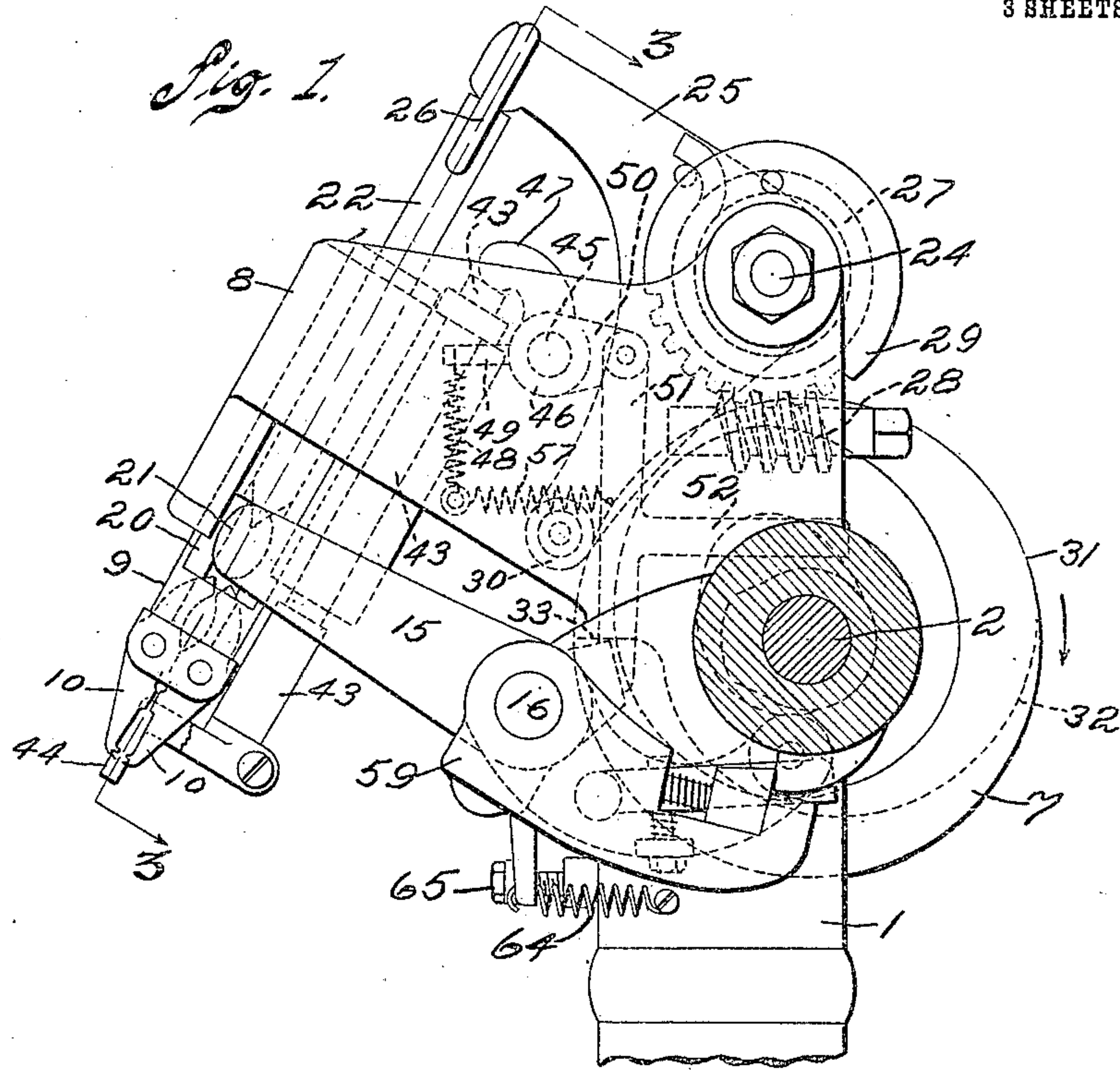


T. G. PLANT.
FASTENER PULLER.
APPLICATION FILED JULY 23, 1908.

958,279.

Patented May 17, 1910.

3 SHEETS—SHEET 1.



Witnesses:
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3 SHEETS—SHEET 2.

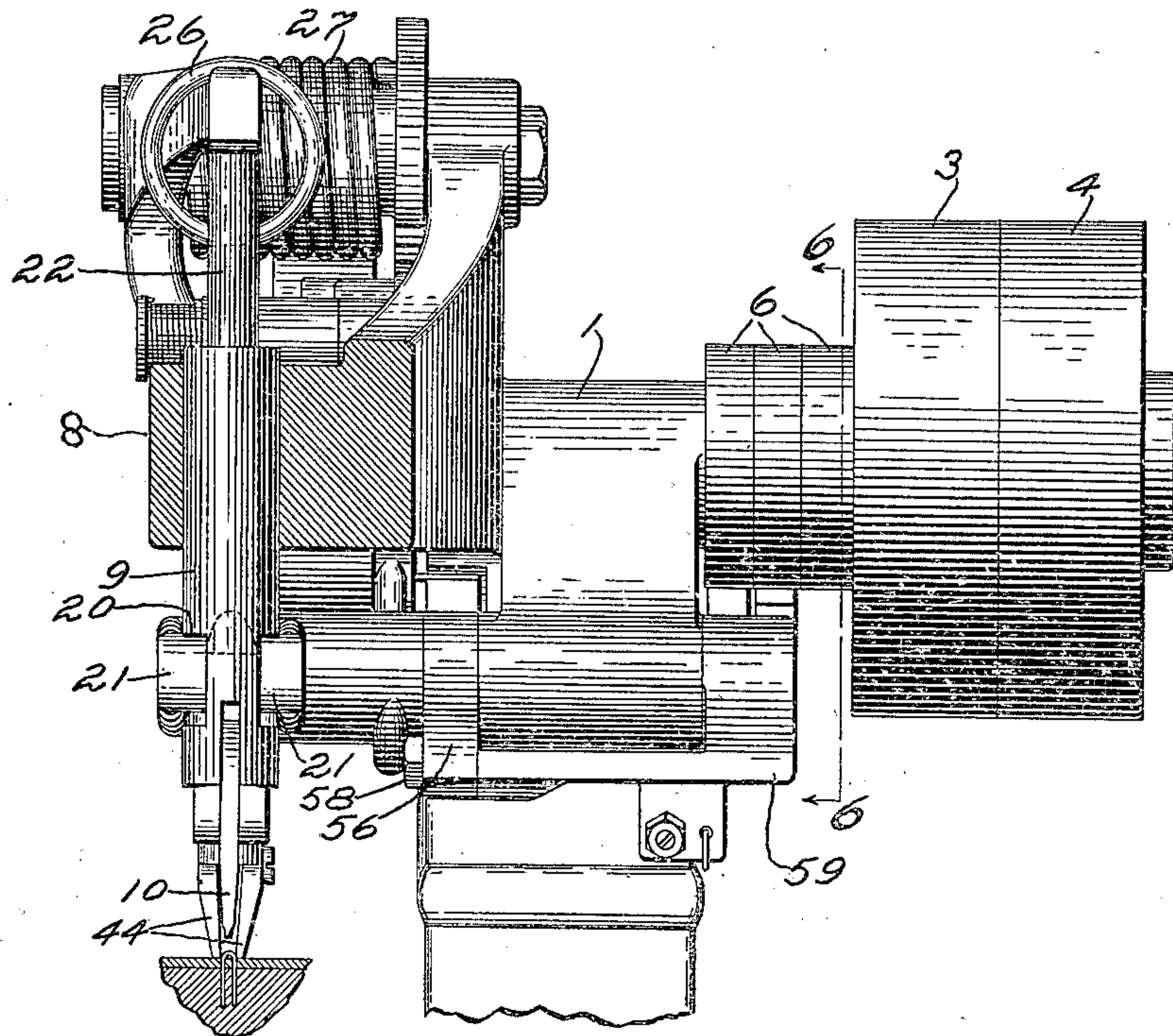


Fig. 3.

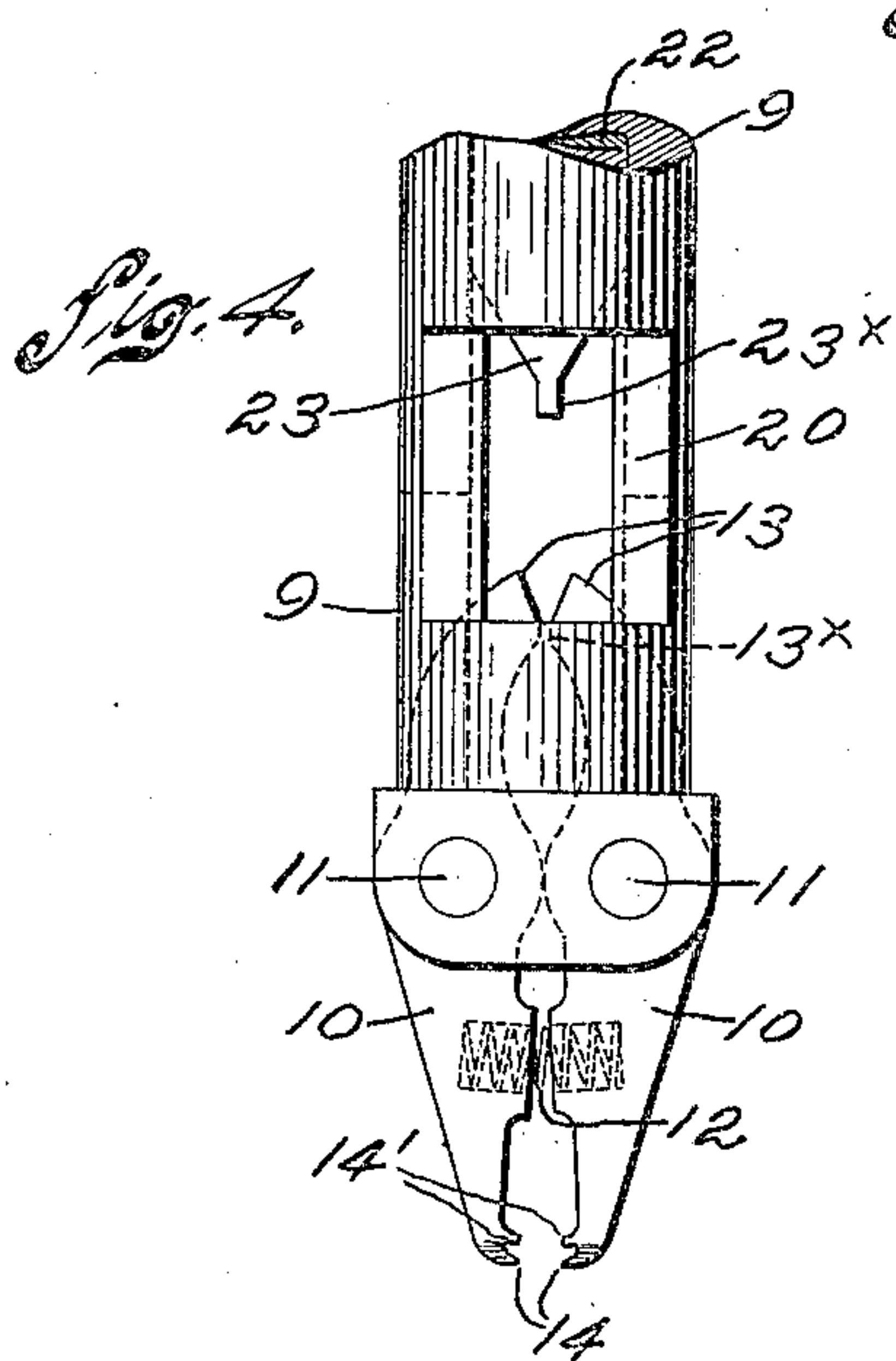


Fig. 4.

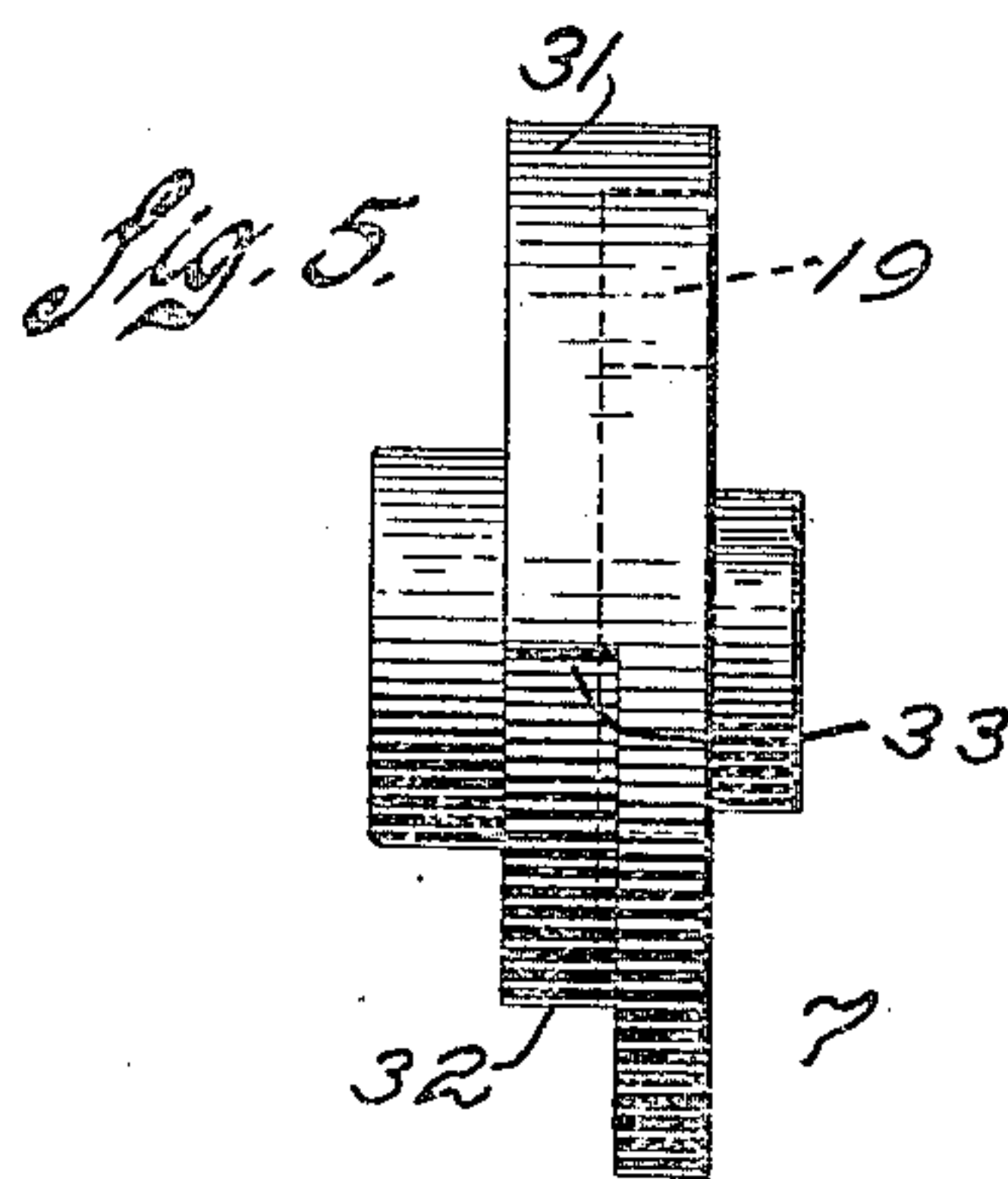


Fig. 5.

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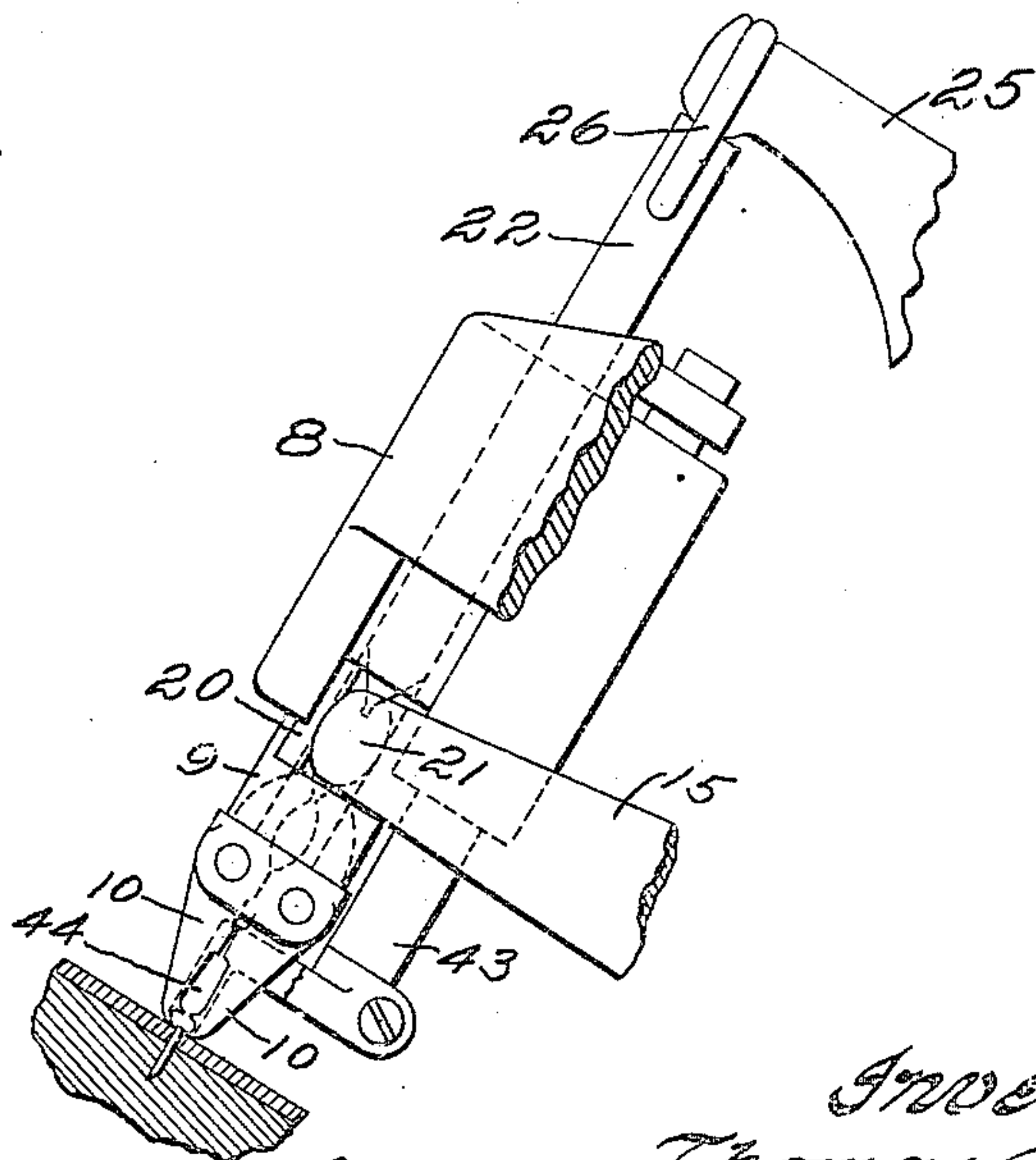
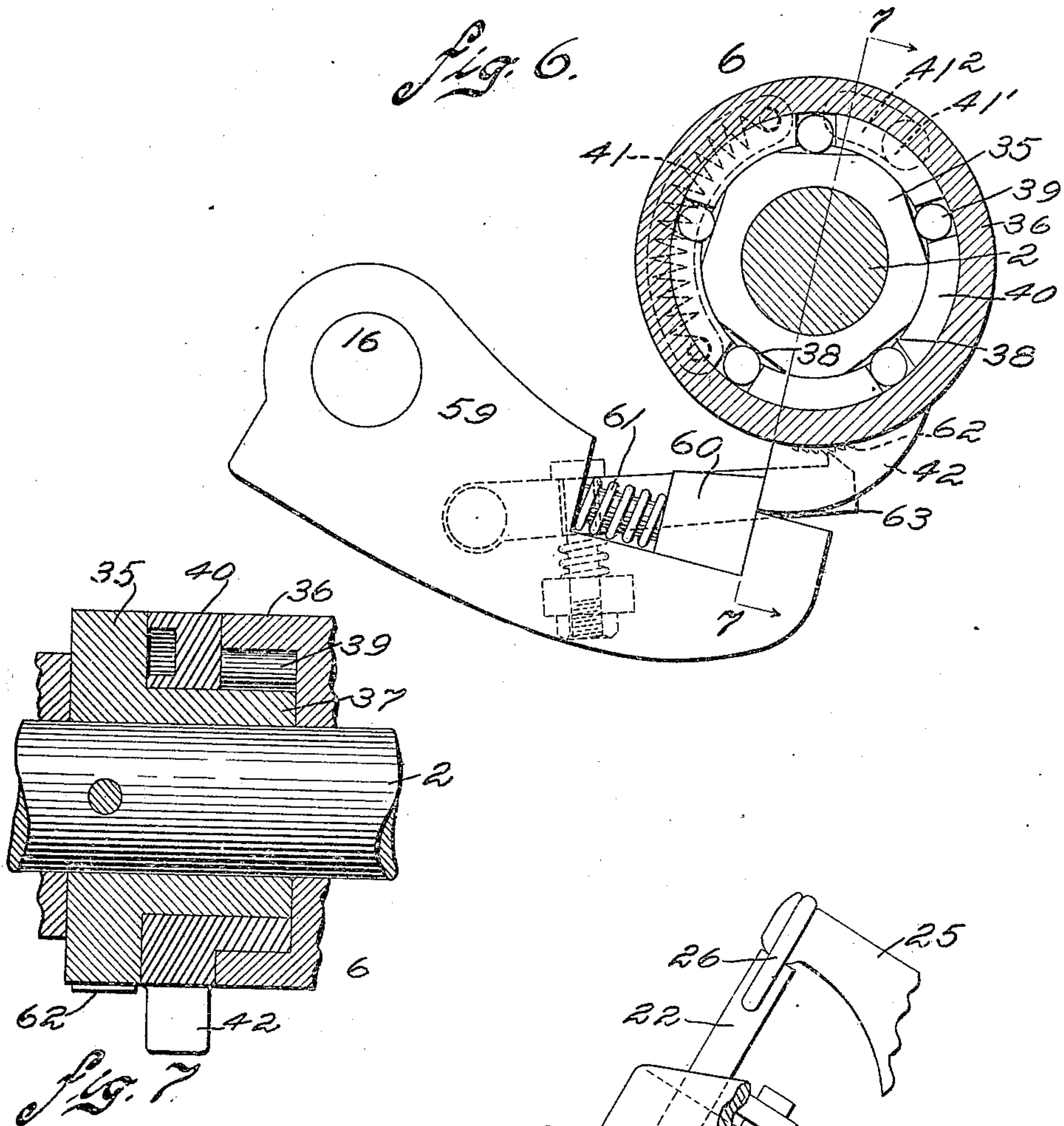
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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FASTENER-PULLER.

958,279.

Specification of Letters Patent.

Patented May 17, 1910.

Application filed July 23, 1908. Serial No. 444,915.

To all whom it may concern:

Be it known that I, THOMAS G. PLANT, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Fastener-Pullers, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

This invention relates to machines for pulling fasteners, and the same is herein shown and described as embodied in a machine for removing the lasting and insole securing staples or other fasteners from the uppers and soles of lasted boots and shoes, it being obvious that many features thereof are equally useful in other relations and for other purposes.

The objects and aims of the present invention will best be understood from the following description of one general form or embodiment thereof taken in connection with the accompanying drawings; it being understood, however, that the illustrated details may be varied by those skilled in the art, and within the true field of the invention which is definitely pointed out in the claims.

In the accompanying drawings, which illustrate one construction in which the invention may be embodied, Figure 1 is a side elevation of the machine with the parts in normal position of rest, the driving shaft being shown in section, and the driving pulleys being omitted; Fig. 2 is a view similar to Fig. 1 showing the parts in the positions which they assume after the fastener pulling device has engaged the fastener and before commencing to withdraw the same, certain parts being broken away to show the controlling mechanism hereinafter described; Fig. 3 is a front elevation of the machine, certain parts being shown in section taken substantially on the line 3—3, Fig. 1; Fig. 4 is an enlarged detail view of the fastener pulling device and certain associated parts, as viewed from the left in Fig. 3; Fig. 5 is a front elevation of the actuating cam hereinafter described; Fig. 6 is a detail sectional view taken substantially on the line 6—6, Fig. 3; Fig. 7 is a detail sectional view of the clutch, taken substantially on the line 7—7, Fig. 6; and Fig. 8 is a side elevation of the fastener pulling device and associated parts, showing the positions assumed

by these parts immediately after starting the machine.

In the construction herein shown, the main frame or head 1 of the machine is formed with suitable bearings for the driving shaft 2, provided with pulleys 3, 4, and clutch 6, hereinafter more fully described, and having mounted thereon a cam 7 for actuating or controlling certain parts of the machine. The frame 1 is preferably further provided with an arm or extension 8 furnishing a guideway for a slide 9.

The fastener pulling device is carried by the slide 9, and as herein shown comprises a pair of fastener pulling jaws 10, 10, shown in detail in Fig. 4, pivoted at 11, 11 to said slide 9, and normally held separated by suitable means, as a spring 12. The jaws 10, 10 are provided with arms 13, 13, extended beyond their pivots, for a purpose hereinafter described, and at their fastener engaging ends are suitably formed to grasp the fastener to be pulled, the lower prongs 14, 14, being adapted for drawing staples or fasteners driven well into the stock, and prongs 14', 14', being adapted for drawing tacks partially driven.

The slide 9 is reciprocated in its guideway in the arm 8 by suitable means, as a lever 15, fulcrumed on a stud 16, mounted in the frame or head 1, said lever having an arm 17 provided with a cam roll 18 entering a path 19 formed in the cam 7. It is desirable, for reasons hereinafter explained, that a loose connection be provided between the slide 9 and its actuator, thereby permitting a certain amount of lost motion between these parts, and to this end, in the construction shown, the said slide is provided with cut away side portions 20, 20, adapted to receive embracing fingers 21, 21, formed on the end of the lever 15, the construction being such that some relative movement is permitted between the slide and fingers 21 in the general axial direction of the slide.

It is not unusual, particularly in the case of fasteners driven by some types of machinery, that the fasteners are driven down quite close to, and sometimes substantially flush with or slightly below the surface of the work. In the machine herein shown, mechanism is provided for causing the fastener pulling device to engage and pull a fastener however closely the latter may be driven to the surface of the work, said mechanism preferably, and as shown, comprising

a controlling device adapted to impart to said pulling device a percussive impulse toward the work, to cause the pulling device to enter the work, to a greater or less extent, adjacent the fastener to be pulled, and to engage or close upon said fastener below the surface of the work. In the particular embodiment of the present invention herein illustrated, said controlling device is formed as a plunger 22 provided with a wedge shaped end 23 (Fig. 4) adapted to enter between and separate the arms 13, 13 of the jaws 10, 10, thereby closing said jaws. To prevent any possibility of the jaws 10, 10 being opened by a force tending to separate their fastener engaging ends and consequently slide the plunger upward by acting on the wedge shaped inclines, a shoulder 23^x projects downward from the end of the plunger and engages corresponding seats 13^x, 13^x formed in the ends of the jaw arms 13, 13, Fig. 4. These seats and the projection form a lock which effectually prevent opening movement of the jaws until the projection is finally withdrawn from the seats. The slide 9 is preferably made hollow to provide an interior guideway for said plunger 22.

The mechanism for actuating and controlling the plunger 22 is preferably constructed substantially as follows:—Fulcrumed on a suitable stud shaft 24, mounted in the machine frame 1, is a lever 25 having an arm connected with the plunger 22 by suitable means, as a link 26. The lever 25 is actuated to cause the plunger 22 to engage the jaws 10 by a strong spring 27 surrounding said stud shaft 24. Means may, if desired, be provided for adjusting the tension of said spring 27, said means, as herein shown, comprising a worm 28, formed on a short shaft suitably mounted in the frame 1, and a cooperating gear 29 to which one end of the spring 27 may be connected. The arm of said lever opposite that to which the plunger 22 is connected is provided with a cam roll 30, Figs. 1 and 2, adapted to engage a cam surface 31 formed on said cam 7, said cam surface comprising a gradually rising portion 32 and an abrupt shoulder 33. As will be seen from an inspection of Figs. 1 and 2, upon rotation of the cam 7 in the direction of the arrow on Fig. 1, from the position shown in Fig. 1 to that shown in Fig. 2, when the abrupt shoulder 33 reaches the cam roll 30, the spring 27 is permitted to impart to the plunger 22 a quick downward throw, causing the same to strike the fastener pulling device a sharp blow, thereby forcing the latter into the work, as shown in Fig. 2, and engaging a fastener therein, said engagement, in the present construction, being caused by the closing of the jaws 10, 10 by the wedge shaped end 23 of the plunger 22, as hereinbefore described. The movement

of the pulling device toward and into the work, under the influence of the plunger 22, is permitted by the lost motion connection between the slide 9 and lever 15, as indicated in Fig. 2. The play or lost motion between the slide or jaw carrier and its actuator, will ordinarily be sufficient to permit the ends of the jaws to be properly embedded in the material or work under the action of the plunger 22 without danger of the upper walls of the cut-away portions 20, 20 striking the fingers 21, 21, but to further insure that the actuator 15 and its fingers 21, 21 will not interfere with the desired downward movement of the slide or jaw carrier at the time the plunger 22 acts, as stated, the cam path 19 is so formed that just prior to the action of the plunger, the actuator 15 is moved slightly downward to the position indicated in Fig. 8. Thereafter the slide engaging end of the lever 15 is moved away from the work, carrying with it the slide 9, jaws 10, 10, and plunger 22. During this movement of the plunger 22 under the influence of the lever 15, the cam roll 30 is caused to move away from the cam surface 31 and against the force of the spring 27, which serves to hold the plunger 22 in close engagement with the arms 13, 13, thereby maintaining the jaws closed upon the fastener and causing them to remove the same in their movement away from the work. After the fastener has been removed from the work, the slide engaging end of the lever 15 commences its movement toward the work. At this time, however, the cam roll 30 on the lever 25 is engaged by the cam surface 31 which prevents movement of the plunger 22 toward the work. The jaws 10, 10 are therefore moved away from said plunger, and are opened to release the pulled fastener by the spring 12.

Machines of this character, as heretofore constructed, have usually been arranged to run continuously, the constantly operating fastener pulling devices being arranged to pull such fasteners as may be brought into their path of movement. It is difficult, however, properly to locate a fastener to be pulled with respect to a continuously moving device, so that this device has a tendency to mar or otherwise injure the work by reason of unnecessary operations thereupon, while the fasteners are frequently imperfectly removed. Such auxiliary positioning devices as have been employed to position the fastener with respect to the pulling device have necessitated, for the proper operation of the machine, a still greater projection of the fastener beyond the surface of the work than that heretofore mentioned.

The machine herein illustrated comprises mechanism which not only serves to actuate the fastener pulling devices as heretofore described, but also acts to maintain said pull-

ing devices normally, or when not operating to pull a fastener, stationary and in a position to receive a fastener to be pulled. To this end the construction shown includes

5 controlling means for the actuating mechanism whereby the machine, after the operation of pulling one fastener is completed, is automatically stopped and the machine brought to rest in a position which forms

10 the starting point in the cycle of operations of said pulling device, and in which the fastener to be pulled can be accurately positioned with respect thereto. Said controlling means are preferably provided with a

15 part arranged to be engaged by the work upon presentation thereof to the machine, and to be actuated thereby to start the machine. In the present embodiment of my invention the means referred to are constructed and arranged as follows:—Inter-

20 posed between the driving pulley 3 and the actuating and controlling cam 7 is a suitable clutch mechanism, said mechanism as herein shown comprising a "Horton"

25 clutch 6 arranged to connect the pulley 3 with the shaft 2 upon which the cam 7 is fixed. The construction of this clutch is a usual one, but will be briefly described in its relation to the present machine. The

30 clutch comprises an inner member 35 fast on the shaft 2, and an outer member 36 secured to or formed integral with said pulley 3. The member 35 is constructed with a sleeve like portion 37 extended within a

35 corresponding recess formed in the member 36, said portion 37 being formed with suitable cam surfaces 38 between which and the inner surfaces of the member 36 are interposed suitable rollers or similar devices 39.

40 Also interposed between the members 35 and 36 is a clutch controlling ring 40 connected with the member 35 for limited movement with respect thereto and arranged to engage said rollers 39 and control the position thereof with respect to the cam surfaces 38. As will be seen turning the ring

45 40 with respect to the member 35 in one direction will cause the rollers 39 to be tightly engaged between the member 36 and the part 37 of the member 35, to close the clutch, whereas movement of said member 40 in the opposite direction to central position will cause the clutch to be released. Interposed

50 between the member 35 and the ring 40 is a spring 41 tending normally to close the clutch, a pin 41' and slot 41² serving to limit the relative movement of member 35 and ring 40, as usual. Said ring 40 is provided with a projecting lug 42 adapted in

60 its rotation to engage a stationary abutment hereinafter described, thereby causing the ring 40 to turn with respect to the member 35 in opposition to the spring 41 and stopping the rotation of the shaft 2.

65 The clutch just described is of well known

form, and in lieu thereof any other suitable clutch mechanism adapted to be operated for substantially the same purpose may be employed.

The mechanism employed in the present 70 embodiment of the invention for controlling the clutch 6 is constructed and arranged as follows:—Mounted to slide in suitable guide-

ways in the portion 8 of the frame 1, Figs. 1, 2 and 8, is a movable member 43 having 75 one or more projecting arms or feelers 44, Figs. 1 and 3, extended to a point substantially adjacent the fastener pulling device and in a position to be engaged by the work upon presentation thereof to said pulling de-

80 vice. Mounted to rotate freely upon a stud 45, carried by the frame 1, is a hub 46 having an arm 47, adapted to engage the movable member 43, and normally held in engagement therewith by a spring 48 con-

85 nected to a second arm 49 of said hub 46. Said hub 46 is provided with a third arm 50 having pivoted thereto a link 51 having a portion 52 thereof extended into the path of movement of a tappet 53, Fig. 2, formed

90 on said cam 7 or secured to the shaft 2. Said link 51, Fig. 2, is preferably provided with a shoulder 54 adapted to engage a co-operating shoulder 55 formed on a hub 56 loosely mounted on the stud 16, said shoul-

95 der 54 being normally held in engagement with said shoulder 55 by a suitable spring 57, and being moved away therefrom in opposition to said spring 57 by the engagement of said tappet 53 with the portion 52.

100 Loosely mounted on said stud 16 adjacent said hub 56, and adjustably connected to the latter by a suitable bolt 58, is an arm 59, Figs. 1 and 6, provided with means for engaging the lug 42 on the ring 40, to release

105 the clutch and stop the machine. The means just referred to are preferably constructed to cushion the impact between said lug 42 and lever 59 and to this end the construction shown comprises a block 60 slidably mount-

110 ed on said lever 59 and backed by a suitable spring 61. In order to prevent recoil of the parts under the influence of the spring 61, the member 35 is preferably provided with a series of ratchet teeth 62, adapted to

115 be engaged by a suitable pawl 63, carried by the lever 59. The lever 59 is normally held in position to cause the block 60 to engage the lug 42 by means of a suitable spring 64, Fig. 1, the normal position of said lever

120 being controlled by an adjustable abutment screw 65.

The operation of the machine herein shown and described is as follows:—The parts being in the position shown in Fig. 1, 125 with the jaws 10—10 in their normal or lower position and open for the presentation of a fastener therebetween, the work is presented to the machine with the fastener to be withdrawn between said jaws 10, said pre-

130

sentation of the work causing an upward movement of the arms or feelers 44 and a corresponding movement of the movable member 43, the parts then being in substantially the position shown in Fig. 8. The movement of the member 43 results in turning the hub 46 and a consequent depression of the link 51, which, by its engagement with the shoulder 55 on the hub 56, causes the lever 59 to be turned and carry the block 60 out of engagement with the lug 42, the spring 41 thereupon closing the clutch and causing the machine to be started. Immediately after the starting of the machine, the tappet 53 is brought into engagement with the part 52 of the link 51 as shown in Fig. 2, thereby causing the shoulders 54 and 55 to be separated and permitting the lever 59, under the influence of the spring 64, to be brought into a position to cause the block 60 to engage the lug 42 upon the completion of one revolution of the driving shaft. The machine being thus started, the fastener pulling mechanism is operated substantially as hereinbefore described, and upon the arrival of the jaws 10 to their lowermost or fastener receiving position, the machine stops substantially as set forth. The work is now removed, permitting the movable member 43 carrying the feelers 44 and the hub 46, under the influence of the spring 48, to return to their normal positions, as shown in Fig. 1. The tappet 53 in the meantime has passed out of engagement with the portion 52 of the link 51, permitting the spring 57 to again bring the shoulders 54 and 55 into engagement, and the parts are now in position for a second operation upon the actuation of the arms or feelers 44 by work presented to the jaws 10.

From the foregoing it will be seen that the machine herein shown and described as a preferred embodiment of the present invention is capable of pulling fasteners irrespective of the depth to which said fasteners may be driven into the work, and will not mar or injure the work by unnecessary operation of the fastener pulling device thereon; that upon completion of a single fastener pulling operation the machine is brought to rest; is normally maintained in position for the presentation of work thereto for the immediate withdrawal of the fastener, thereby permitting the accurate location of the fastener to be pulled; and is capable of rapid and accurate operation.

What is claimed is:—

1. In a machine of the character described, the combination, with fastener pulling jaws normally positioned to contact directly with the surface into which fasteners are driven, of automatic actuating mechanism therefor including a driving shaft and operating connections adapted to actuate said jaws to engage, close upon, and pull a fastener and

thereafter to return said pulling jaws to rest in normal fastener receiving and open position.

2. In a machine of the character described, the combination, with fastener pulling jaws normally positioned to contact directly with the surface into which fasteners are driven, of a movable member adjacent said jaws and extending beyond the ends thereof, and mechanism, controlled by said movable member, adapted to actuate said jaws to engage and pull a fastener and thereafter to return said jaws to rest in normal fastener receiving position.

3. In a machine of the character described, the combination, with a pair of fastener pulling jaws, of automatic means to drive said jaws into the work and cause said jaws to close upon a fastener, and a shaft and operating connections for giving to the jaws a fastener pulling movement and then return them to fastener receiving position.

4. In a machine of the character described, the combination, with a fastener pulling device, of means to reciprocate said device toward and from the work, and means, independent of said reciprocating means, to impart to said device an additional movement toward the work.

5. In a machine of the character described, the combination with a slide, means to reciprocate said slide, and fastener pulling jaws carried by said slide, of a spring actuated plunger constructed and arranged to drive said jaws into the work and cause said jaws to close upon a fastener, and means for controlling said plunger.

6. In a machine of the character described, the combination with a slide, a fastener pulling device carried by said slide, and means for reciprocating said slide, of a reciprocating controlling device for causing said pulling device to engage and release a fastener, and means, independent of said slide reciprocating means, to actuate said controlling device.

7. In a machine of the character described, the combination with a slide, means to reciprocate said slide, and fastener pulling jaws carried by said slide, of a plunger having a part constructed and arranged to engage and move said jaws toward the work and control the opening and closing movements thereof, and means to actuate said plunger.

8. In a machine of the character described, in combination, fastener pulling jaws, a controlling device adapted to engage said jaws to close the same, means to move said controlling device into engagement with said jaws, means to move said jaws and controlling device away from the work to pull a fastener and thereafter return said jaws toward the work, means to restrain said controlling device from return movement with said jaws, and means to open said jaws to

release the pulled fastener as said jaws are moved away from said controlling device.

9. In a machine of the character described, the combination, with a reciprocating fastener pulling device and actuating means therefor having a loose operative connection therewith, of means for imparting to said device a percussive impulse in the direction of the work to cause the fastener pulling device to penetrate the work.

10. In a machine of the character described, the combination, with a reciprocatory slide and fastener pulling jaws carried thereby, of actuating means for said slide having a lost motion connection therewith, a spring actuated plunger having a portion adapted to engage and close said jaws, and means for controlling said plunger.

11. In a fastener pulling machine, the combination of fastener engaging jaws, means to impart to said jaws fastener engaging movement, means including a driving shaft and operating connections to impart to the jaws fastener pulling and releasing movements, and work engaging devices to control the operation of said means.

12. In a fastener pulling machine, the combination of fastener engaging jaws, means to impart to said jaws fastener engaging movement, means to impart to the jaws fastener pulling and releasing movements, and work engaging devices to start said means into operation, and means to bring the parts to rest after a fastener has been pulled.

13. In a fastener pulling machine, the combination of fastener engaging jaws,

means to impart to said jaws fastener engaging movement, means to impart to the jaws fastener pulling and releasing movements, a feeler device normally in the path of the work as it is presented to the said jaws, and means controlled by movement of the feeler to cause said jaws to be actuated to pull and release a fastener and then to stop the machine.

14. A fastener pulling machine having fastener pulling jaws and normally inoperative automatic actuating means therefor including a driving shaft and connections to give to the jaws a fastener pulling movement and then return the jaws to initial position for engaging another fastener, said machine having provision for rendering operative said actuating means upon pushing a tack between said jaws, whereby the fastener to be pulled may be accurately positioned relative to said pulling device before actuation of the latter.

15. A fastener pulling machine having fastener pulling jaws and automatic actuating means therefor, said machine having provision for automatically imparting a percussive action of said jaws against the work for causing said pulling jaws to be driven into the work adjacent a fastener prior to the pulling operation.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

THOMAS G. PLANT.

Witnesses:

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