

R. MILNE.
TRIP MECHANISM FOR DRILLING MACHINES.
APPLICATION FILED MAR. 16, 1909.

Patented Jan. 17, 1911.

2 SHEETS—SHEET 1.

981,870.

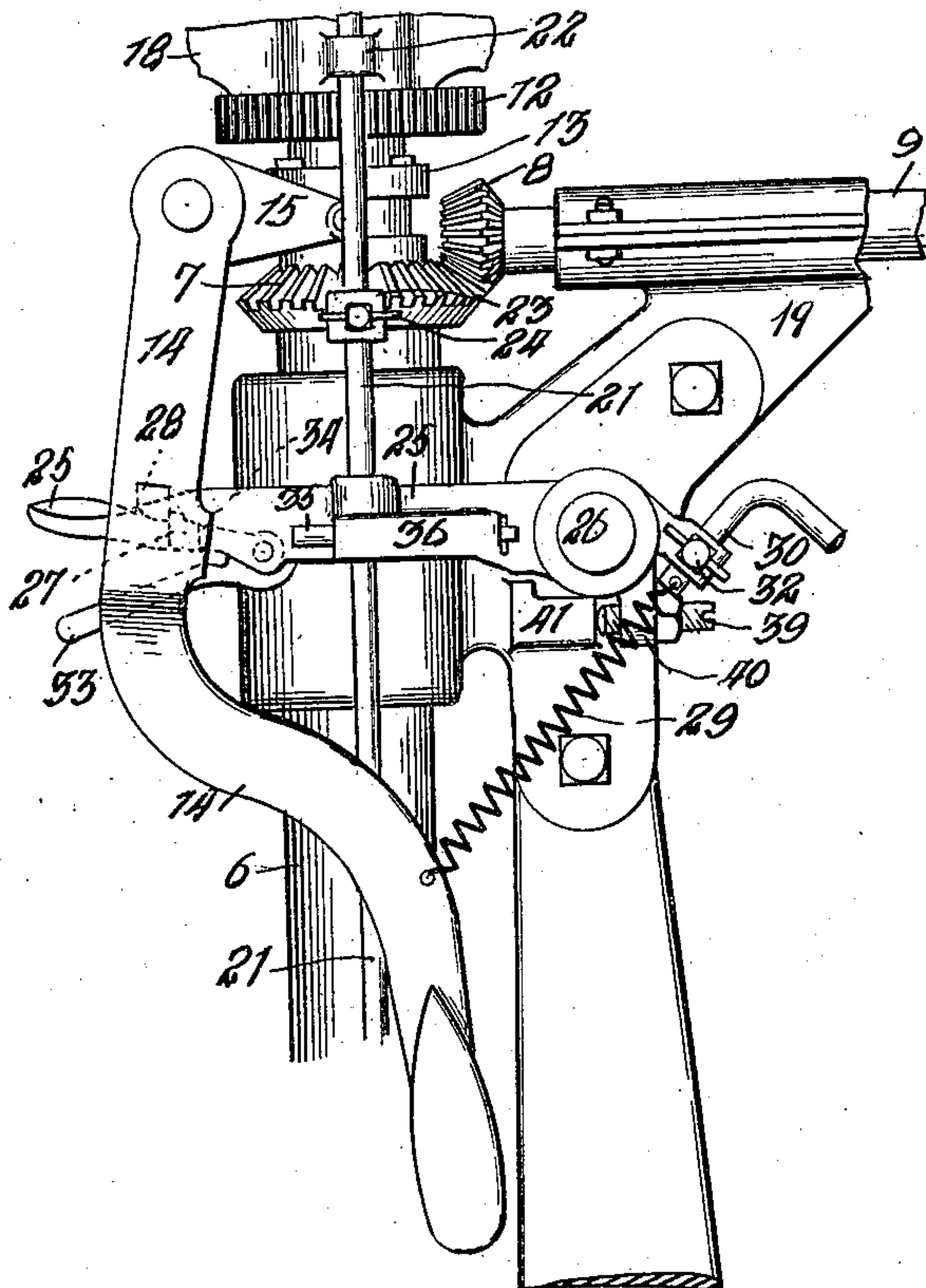


Fig. 1.

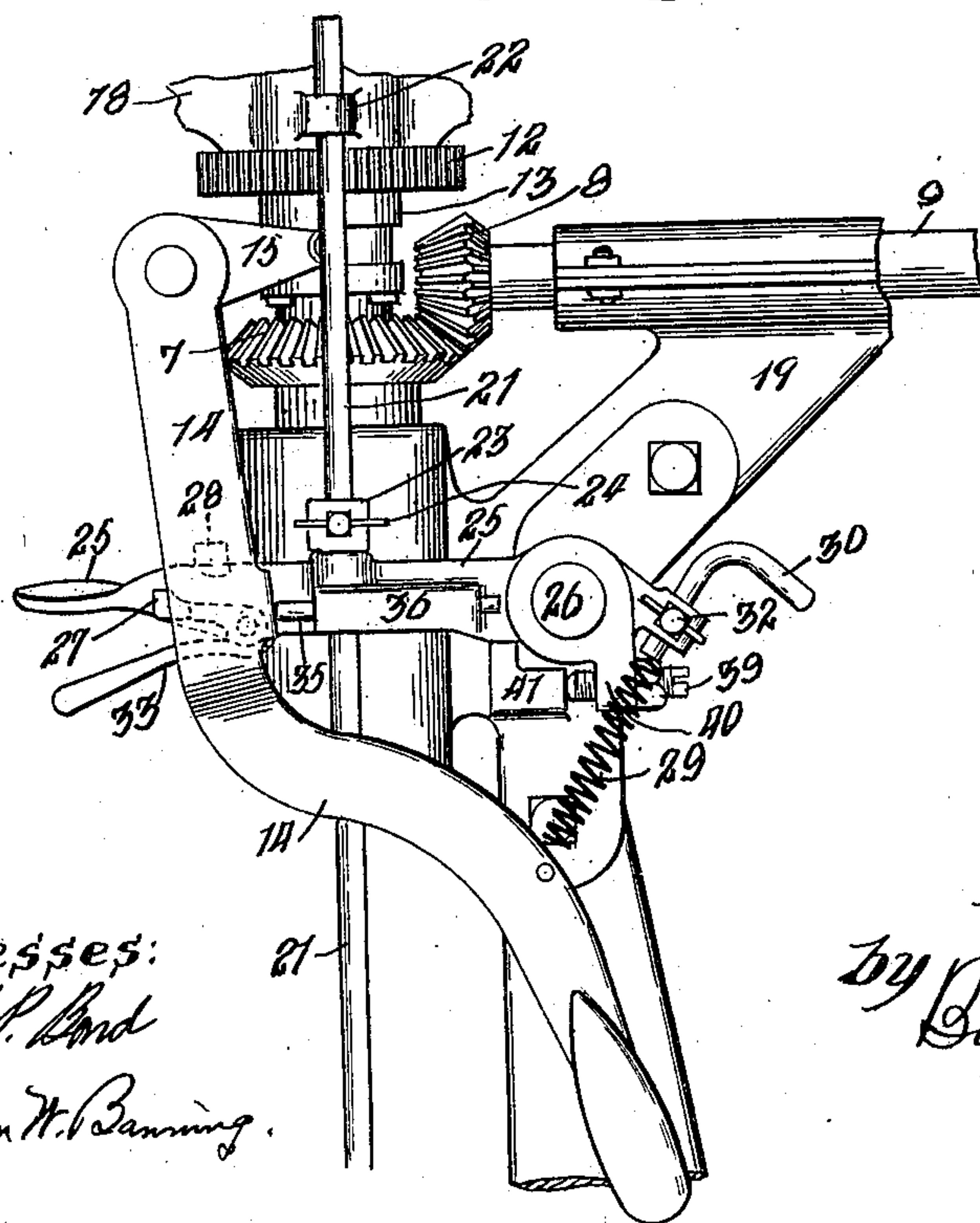


Fig. 2.

Witnesses:
W. P. Lord
Person H. Banning.

Inventor:
Robert Milne
by *Dominic Banning*
Attys.

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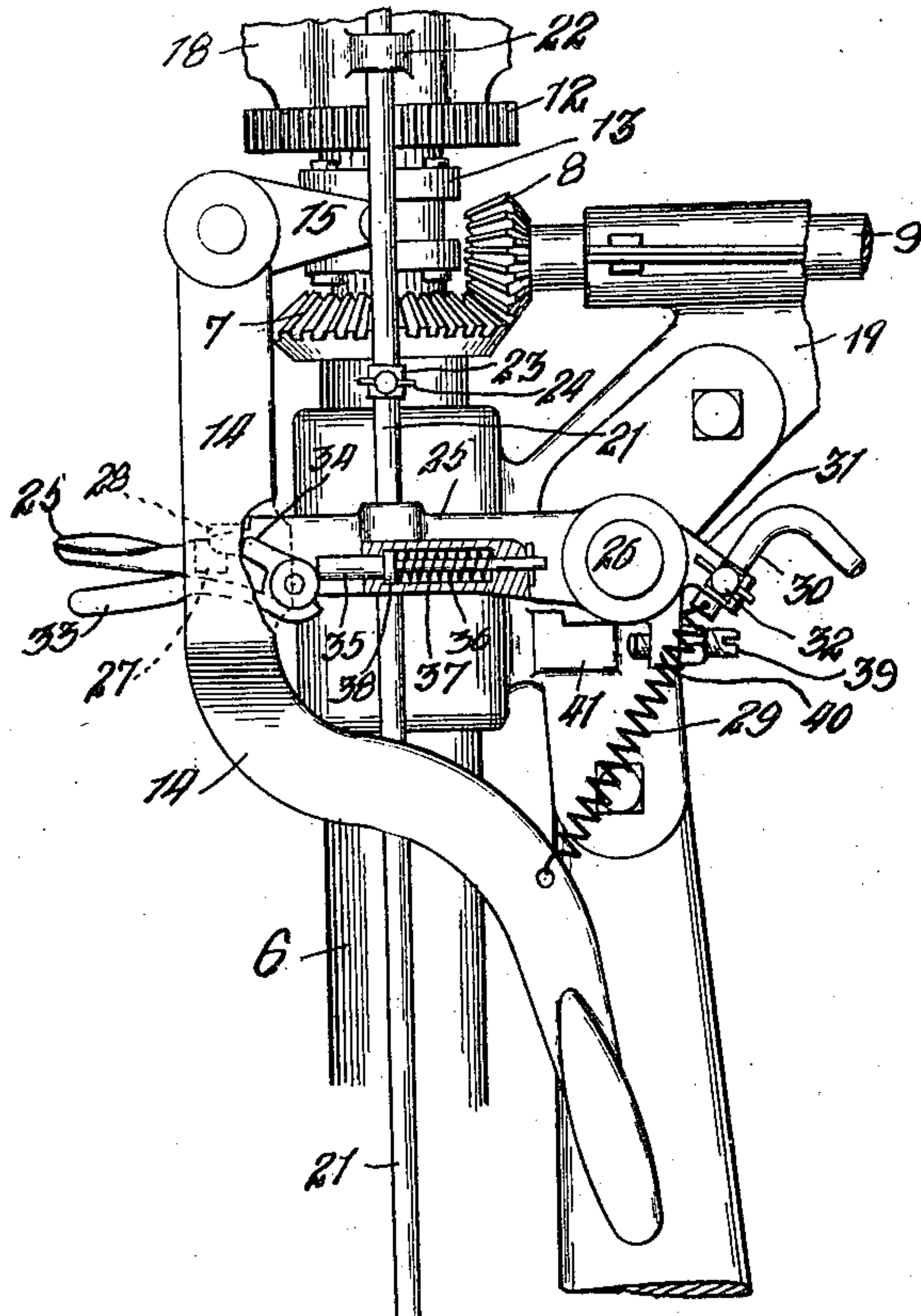


Fig. 3

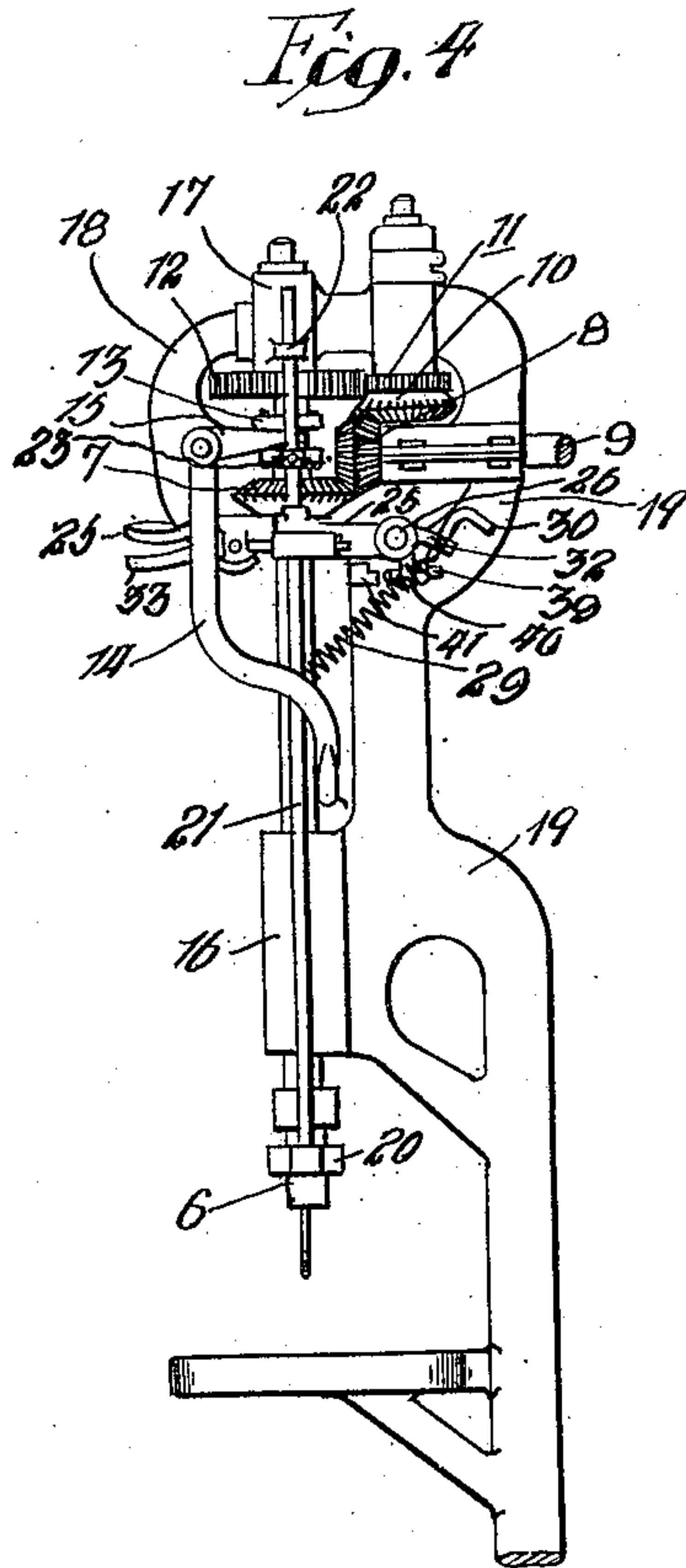


Fig. 4

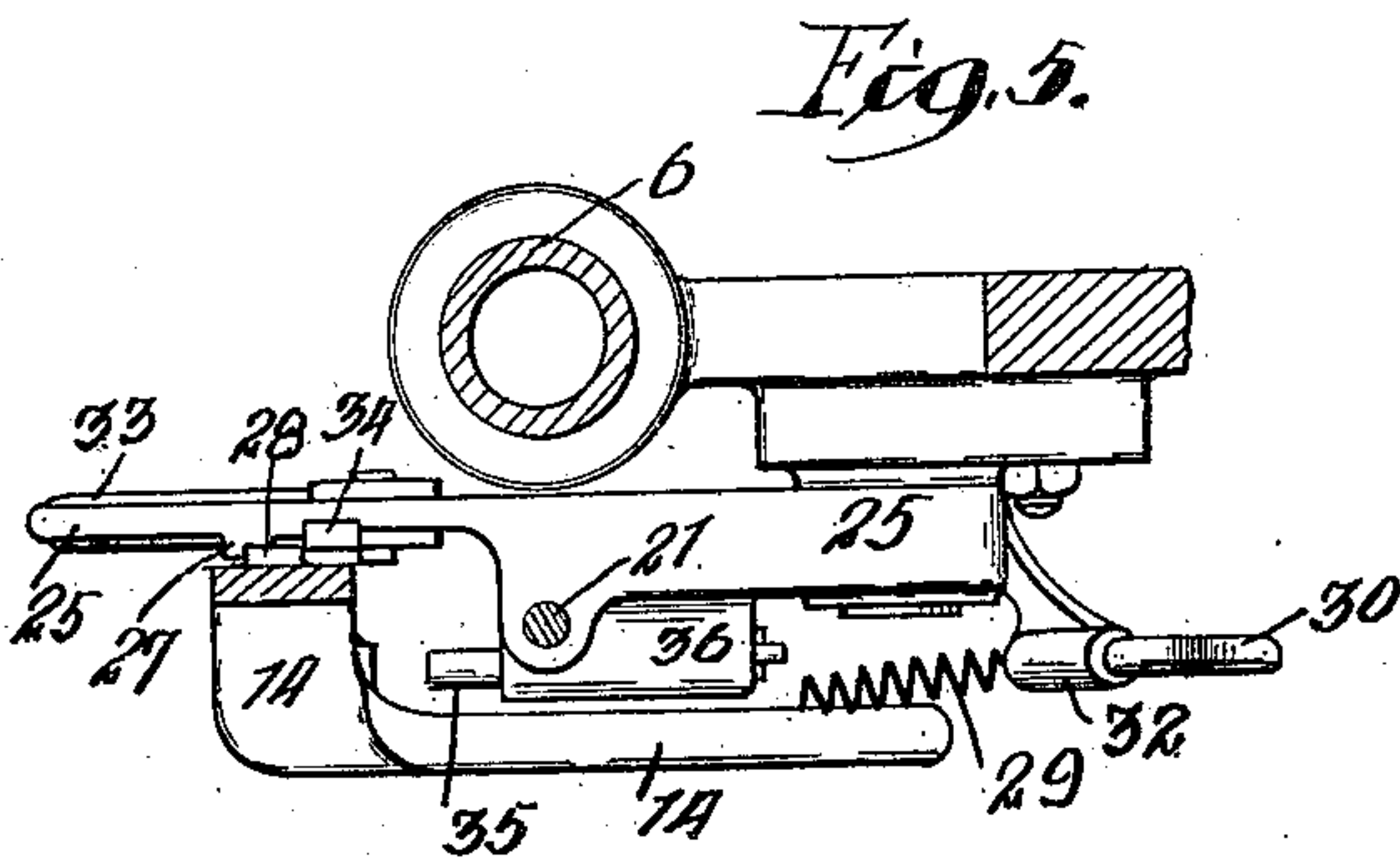


Fig. 5

Witnesses:

[Signature]

Person N. Banning.

Inventor:
Robert Milne
by Banning Banning
Attys.

UNITED STATES PATENT OFFICE.

ROBERT MILNE, OF ROCKFORD, ILLINOIS, ASSIGNOR TO ROCKFORD DRILLING MACHINE COMPANY, OF ROCKFORD, ILLINOIS, A CORPORATION OF ILLINOIS.

TRIP MECHANISM FOR DRILLING-MACHINES.

981,870.

Specification of Letters Patent.

Patented Jan. 17, 1911.

Application filed March 16, 1909. Serial No. 483,810.

To all whom it may concern:

Be it known that I, ROBERT MILNE, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Trip Mechanism for Drilling-Machines, of which the following is a specification.

The trip mechanism of the present invention is adapted more particularly for use in drilling machines provided with tapping attachments, and the object of the invention is to regulate the rotary movement of the tap bit in accord with the feeding of the bit, so that the machine may be adjusted to tap holes of a given depth and automatically throw the drill spindle out of clutch after it has descended to a predetermined depth in the metal, thereby reversing the feed and permitting the tap bit to travel back out of the hole. In tapping certain classes of work, more particularly in tapping small holes, it is difficult to regulate the depth of the hole, to reverse the spindle at the proper point, and withdraw the tap; and the device of the present invention is intended to permit this work to be performed automatically and with greater exactness than is possible even with the exercise of skill and care on the part of the operator.

Further objects will appear from a detailed description of the invention, which consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of the trip device of the present invention in raised position; Fig. 2 a similar view showing the device in lowered or tripped position; Fig. 3 a similar view showing the parts in neutral position; Fig. 4 a side elevation of the head of a drilling machine showing the relation of the tripping device to the other parts of the machine; and Fig. 5 a cross sectional view taken on line 5—5 of Fig. 3.

The device of the present invention is applied to a drilling machine having a drill spindle 6 which can be fed down in any suitable and well known manner, which spindle is provided with a bevel crown gear 7 meshing with a bevel driving gear 8 on the forward end of a power shaft 9. The gear 8 is a double faced one, and also meshes with

a reversing bevel pinion 10, which is connected with a spur gear 11 meshing with a spindle spur gear 12 located above the crown gear 7. The crown gear 7 and the spur gear 12 are both loosely mounted on the spindle and either is adapted to be thrown into clutch therewith by the action of a clutch member 13, which is adapted to be thrown in either direction by means of an operating lever 14, the short arm 15 of which engages the clutch member and is adapted to impart a vertical movement thereto. The forward drive is through the crown gear 7 which is thrown into clutch with the spindle when the long arm of the operating lever is thrown into its outermost position, as shown in Fig. 1.

The reversing mechanism herein shown constitutes what is ordinarily termed a tapping attachment for a drilling machine, and since the particular details form no part of the present invention it is not necessary to describe them more in detail.

The drill spindle operates through a lower sleeve 16 and its upper end projects through an upper sleeve 17 projecting in an arch frame 18 which carries the reversing gears, and which is bolted or otherwise secured to the top of the main frame 19 of the machine, the upper portion only of which is shown in the drawings. The sleeve or drill spindle, near its lower end, carries a loosely mounted collar 20, which moves up and down with the feeding of the spindle, and which receives the lower end of a trip rod 21, the upper end of which is slidably entered through a lug 22 formed on the side of the upper sleeve 17. The trip rod has slidably mounted thereon an adjustable block 23 adapted to be held in adjusted position by the clamping action of a thumb screw 24 which can be set at any suitable position to regulate the depth of the hole to be tapped. The trip rod passes through a trip lever 25 which is pivoted or hung at its inner end to a stud 26, which outwardly projects from the frame of the machine. The trip lever is provided near its outer end with a lug 27 which, when the lever is raised to its normal position, is adapted to engage with a lug 28 on the inner side of the operating lever 14 when the latter is thrown to its outermost position, as shown in Fig. 1, which indicates the forward driving position of the drill spindle. A depres-

sion of the lever 25, however, serves to throw down the lug 27 out of engagement with the lug 28 on the operating lever 14, thereby releasing the latter and permitting it to be swung into the position shown in Fig. 2 under the tension of a spring 29, the lower end of which is connected with the operating lever and the upper end of which is connected with an adjustable handle 30 which is entered through a lug 31 on the rear or pivoted end of the lever 25. The handle 30 is held in adjusted position by means of a thumb screw 32 which permits the tension of the spring to be regulated.

In order to hold the parts in a neutral position, if desired, the lever 25 is provided with a supplemental lever 33 which is pivoted to the main lever 25 near its outer end, and is provided with a stop finger 34 adapted to engage the lug 28 on the operating lever 14, so that when desired, the lug 28 can be held in engagement with the stop finger even after its release from engagement with the lug 27. A cushion for the lever 14 is afforded in the form of a forwardly projecting plunger 35 which works within a chambered lug 36 on the side of the lever 25 and is backed by a spring 37 which bears against a shoulder 38 formed on the plunger.

In use, in a tapping operation, the block 23 is adjusted on the trip rod 21 in accordance with the depth of the intended hole, after which the operating lever 14 is pulled back against the tension of the spring 29 into the position shown in Fig. 1, which causes the lug 28 to lie and engage with the lug 27 on the trip lever 25, the swing of which will be limited by means of an adjusting screw 39 which is entered through a lug 40 located immediately below the lug 31 on the lever 25, which screw is adapted to abut against a stop lug 41. As the tapping operation proceeds, the trip rod will travel down with the drill spindle until the block 23 is brought into engagement with the lever 25, which serves to depress the lever sufficiently to carry the lug 27 below the edge of the lug 28, thereby releasing the latter and permitting the operating lever to be thrown to its extreme inward position in which the crown gear will be thrown unclutched, and the reversing gears thrown into clutch, which serves to reverse the movement of the drill spindle and allow the tap to retreat from the hole already tapped. When it is desired to maintain the parts in neutral position the supplemental lever 33 will be moved to bring its stop finger into position to engage the lug 28 on the operating lever so that the latter will be locked in a neutral position.

The invention is one which secures uniformity in the tapping operation, and this is especially desirable in the tapping of

small holes where it is impossible for the operator to gage the depth of the hole with great exactness, and to reverse the feed at the proper time.

The invention is one which is adapted for application to machines of standard construction, and it is so constructed and fitted that it interferes in no way with the proper manipulation of the other working elements of the machine.

What I claim as new and desire to secure by Letters Patent is:

1. In combination with a drill spindle, forward and reverse driving mechanisms therefor, a clutch adapted to engage the spindle with either of said mechanisms, an operating lever for moving said clutch to either engaging position, a trip lever adapted when in normal position to hold the operating lever in position to bring the clutch into engagement with the forward driving mechanism, a member forwardly movable with the drill spindle and adapted to engage the trip lever to throw the same into position to release the operating lever, a spring adapted to move the operating lever when released into position to throw the clutch into engagement with the reverse driving mechanism, and means adapted when adjusted to hold the operating lever in a neutral position when released by the trip lever, substantially as described.

2. In combination with a drill spindle, forward and reverse driving mechanisms therefor, a clutch adapted to engage the spindle with either of said mechanisms, an operating lever for moving said clutch to either engaging position, a trip lever adapted when in normal position to hold the operating lever in position to bring the clutch into engagement with the forward driving mechanism, a member forwardly movable with the drill spindle and adapted to engage the trip lever to throw the same into position to release the operating lever, a spring adapted to move the operating lever when released into position to throw the clutch into engagement with the reverse driving mechanism, and a supplemental lever pivoted to the trip lever and adapted to be moved to a position to engage the operating lever when released by the trip lever, for holding the operating lever in neutral position, substantially as described.

3. In combination with a drill spindle, forward and reverse driving mechanisms therefor, a clutch adapted to engage the spindle with either of said mechanisms, a swinging lever for moving said clutch to either engaging position, a trip lever, a lug upon the swinging lever, a lug upon the trip lever, the lugs cooperating to hold the swinging lever in position to maintain the clutch member in engagement with the forward driving mechanism, a member mov-

able with the drill spindle and adapted to engage the trip lever to throw the same into position to move the lug on the trip lever free from engagement with the lug on the swinging lever, and a spring adapted to move the swinging lever when released into position to throw the clutch into engagement with the reverse driving mechanism, substantially as described.

4. In combination with a drill spindle, forward and reverse driving mechanisms therefor, a clutch adapted to engage the spindle with either of said mechanisms, a swinging lever for moving said clutch to either engaging position, a trip lever, a lug upon the swinging lever, a lug upon the trip lever, the lugs cooperating to hold the swinging lever in position to maintain the clutch member in engagement with the forward driving mechanism, a member movable with the drill spindle and adapted to engage the trip lever to throw the same into position to move the lug on the trip lever free from engagement with the lug on the swinging lever, a spring adapted to move the swinging lever when released into position to throw the clutch into engagement

with the reverse driving mechanism, and a supplemental lever adapted to be moved into position to engage the lug on the operating lever when the latter is released by the trip lever, for holding the operating lever in neutral position, substantially as described.

5. In combination with a drill spindle, forward and reverse driving mechanisms therefor, a clutch adapted to engage the spindle with either of said mechanisms, an operating arm of bell crank formation carrying the clutch member a locking member in engagement with the depending portion of said arm for holding the clutch into engagement with the forward driving mechanism, means for releasing the operating arm from locked position, a tension member for moving said operating arm after it has been released from locked position, to permit the clutch to be thrown into engagement with the reverse driving mechanism, substantially as described.

ROBERT MILNE.

Witnesses:

WALTER B. BRINE,
AMY DENMAN.