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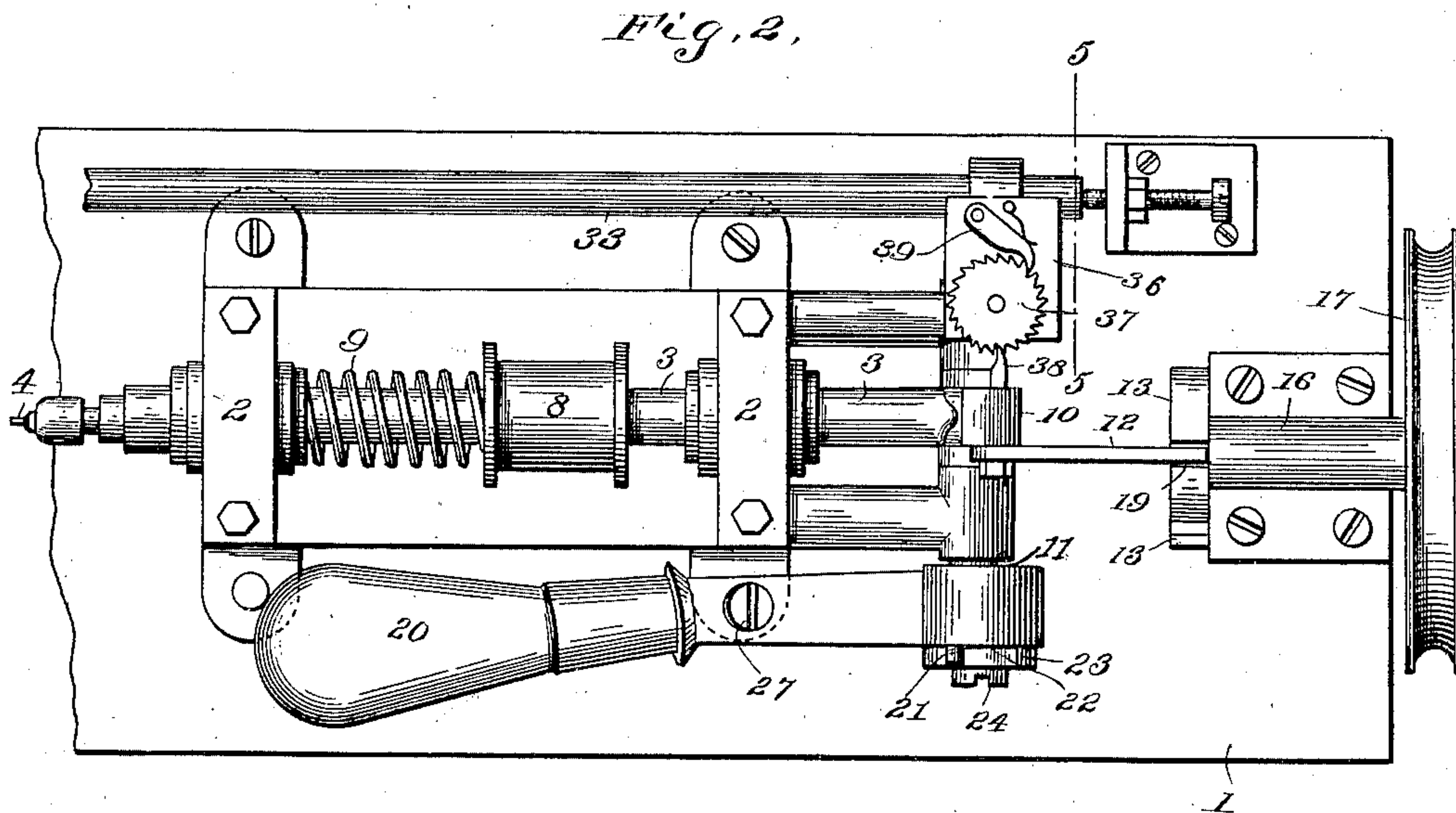
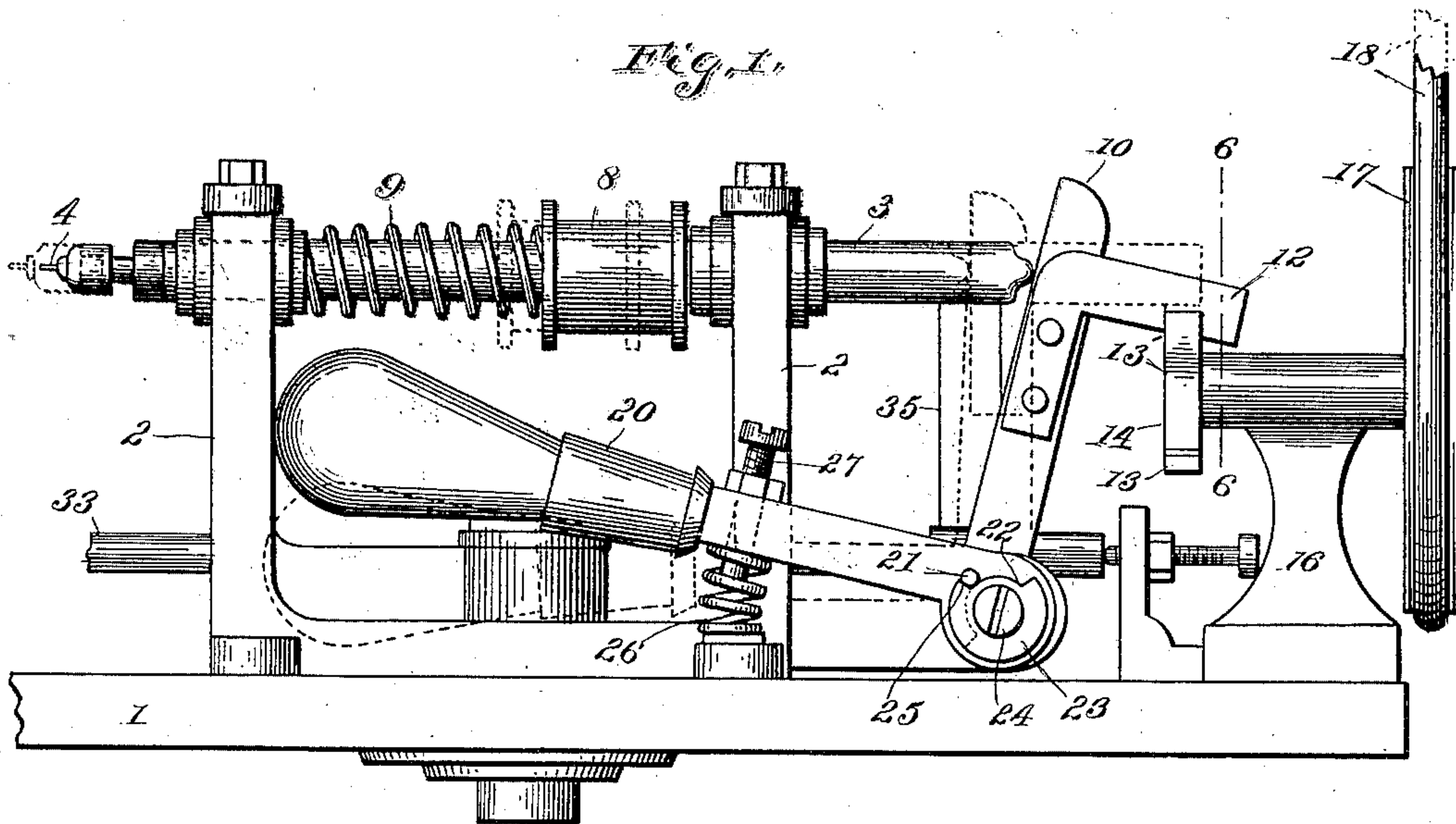
Patented June 26, 1900.

H. CHALMERS.  
BUTTON DRILLING MACHINE.

(Application filed Dec. 21, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:  
E. M. O'Reilly  
G. H. Curtis

Inventor:  
Harvey Chalmers  
By Mosher & Curtis  
Attys

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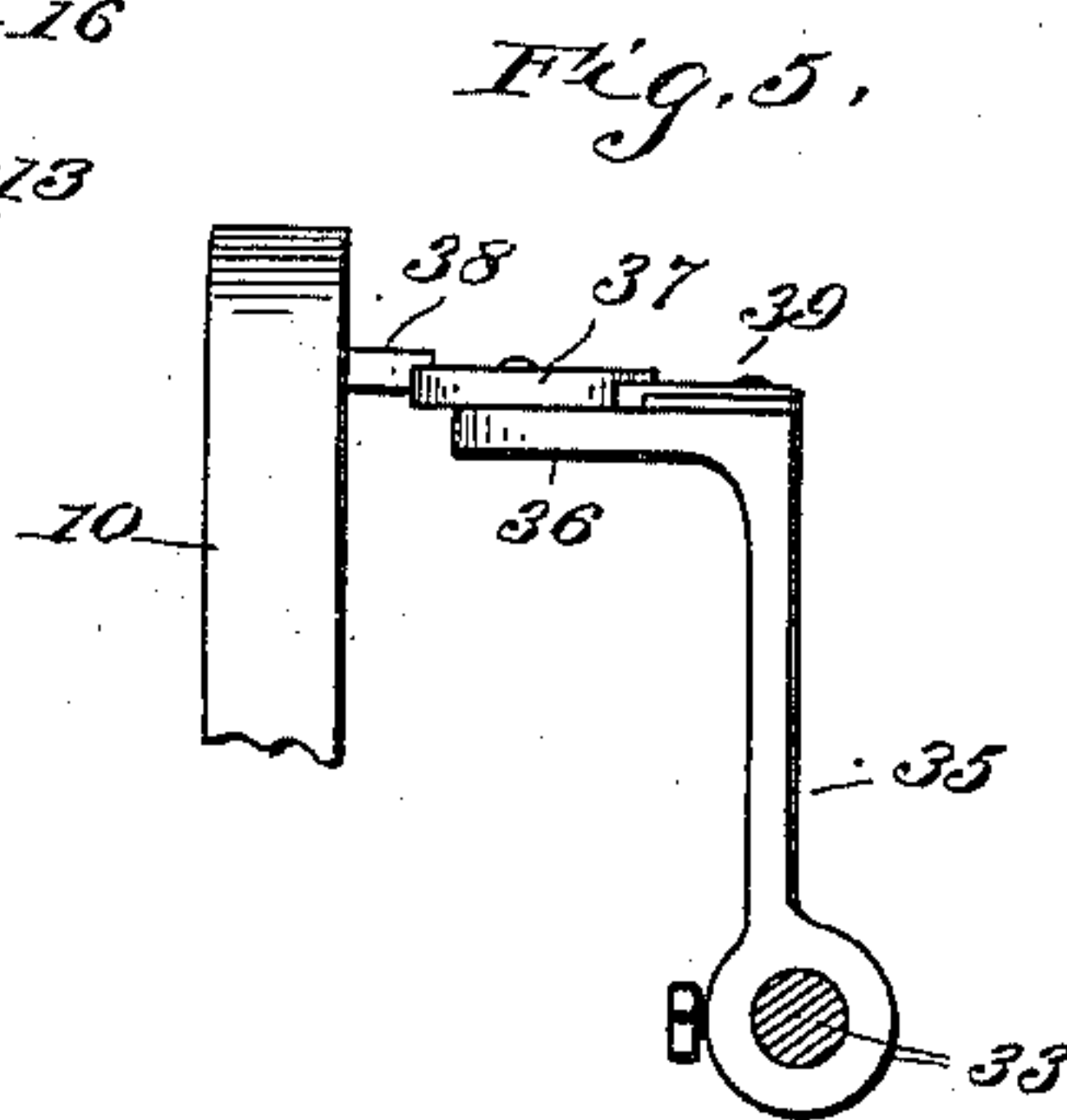
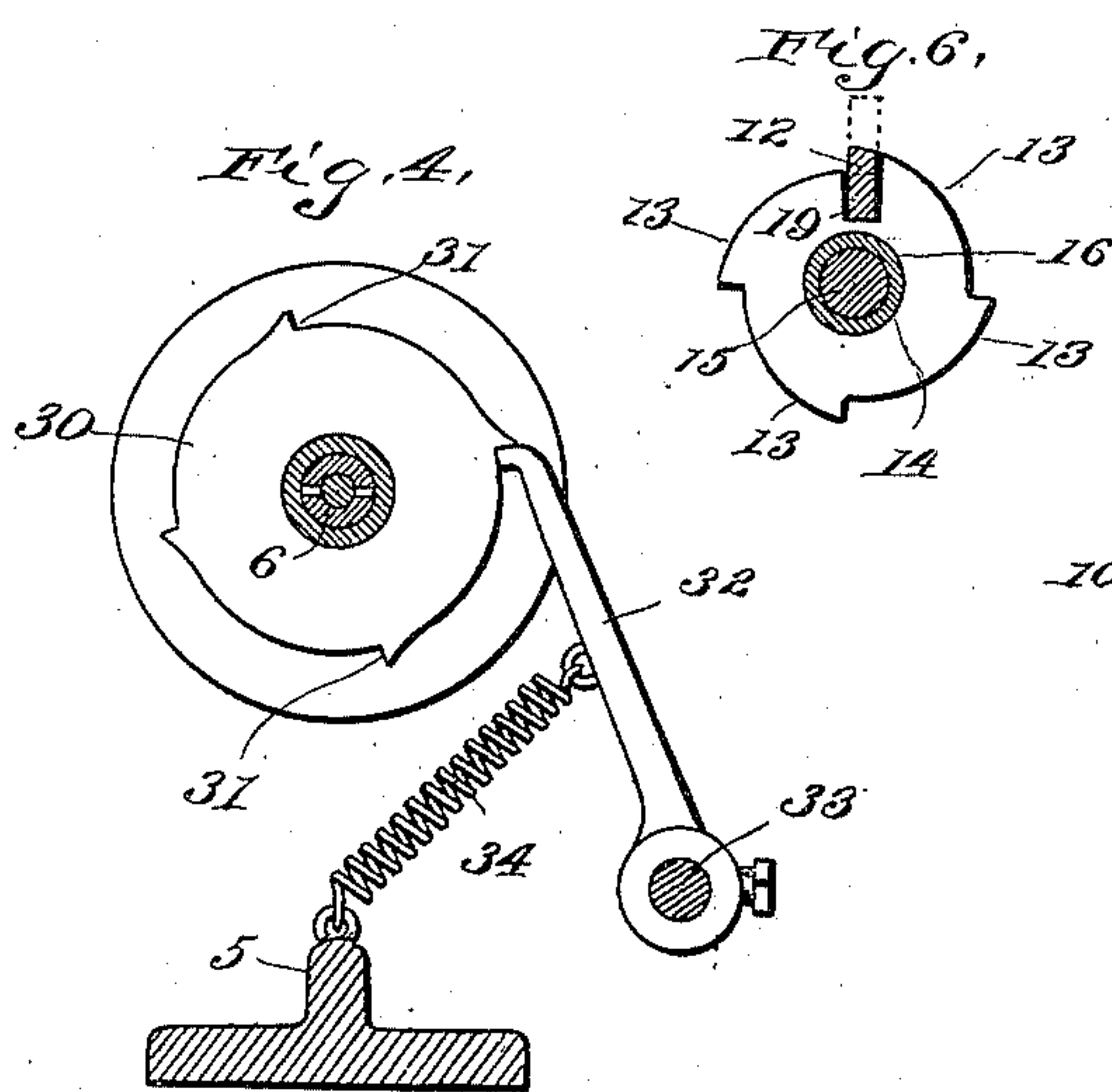
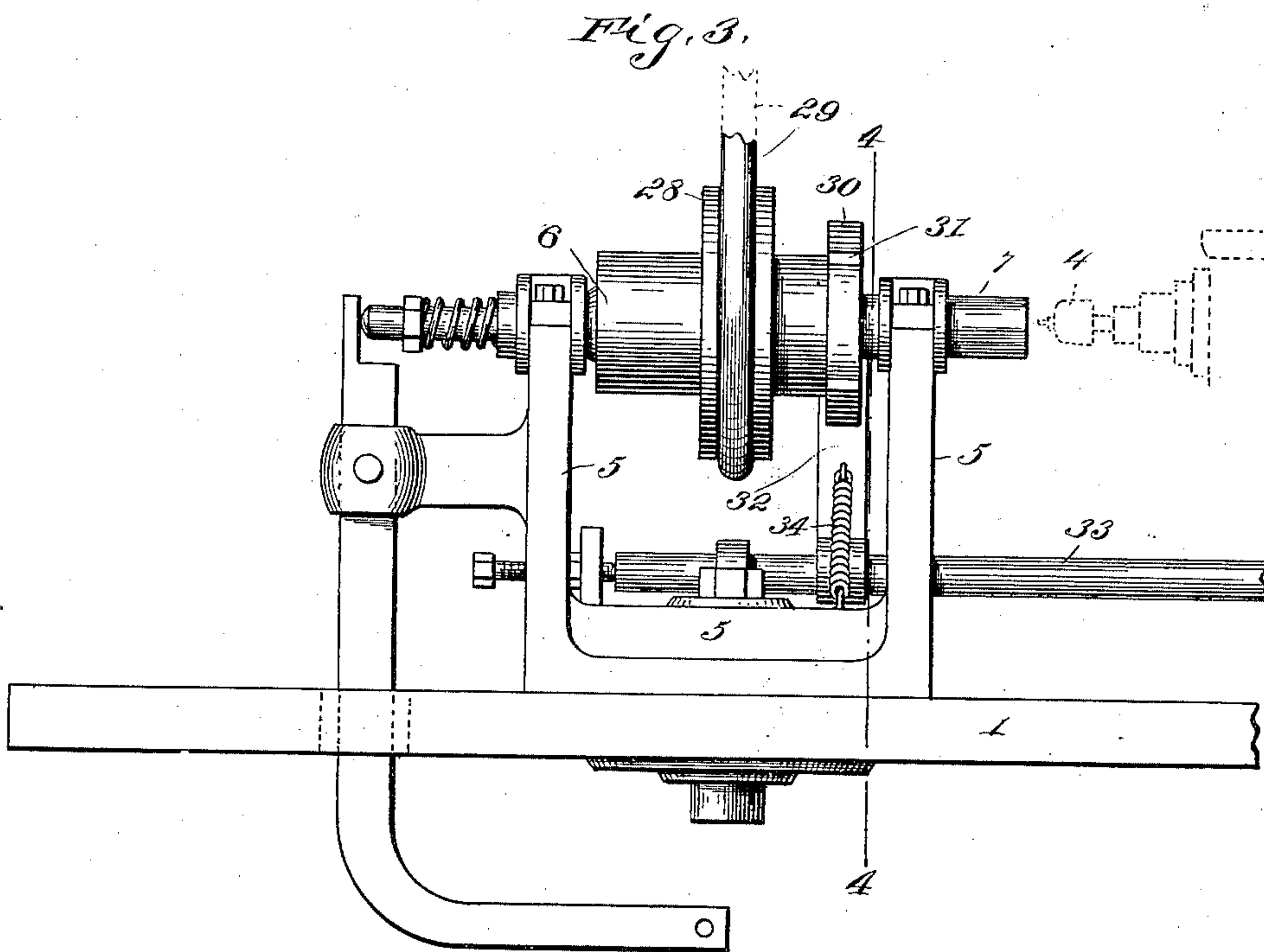
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# UNITED STATES PATENT OFFICE.

HARVEY CHALMERS, OF AMSTERDAM, NEW YORK.

## BUTTON-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 652,533, dated June 26, 1900.

Application filed December 21, 1899. Serial No. 741,204. (No model.)

*To all whom it may concern:*

Be it known that I, HARVEY CHALMERS, a citizen of the United States, residing at Amsterdam, county of Montgomery, and State of New York, have invented certain new and useful Improvements in Button-Drilling Machines, of which the following is a specification.

The invention relates to such improvements; and it consists of the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings and the reference characters marked thereon, which form a part of this specification.

Similar characters refer to similar parts in the several figures therein.

Figure 1 of the drawings is a view in side elevation of one end of my improved button-drilling machine, showing the drill and means for operating the drill-supporting shaft. Fig. 2 is a top plan view of the same. Fig. 3 is a view in side elevation of the other end of the machine, showing the chuck and means for operating the same. Fig. 4 is a view in the vertical cross-section taken on the broken line 4 4 in Fig. 3. Fig. 5 is a vertical cross-section taken on the broken line 5 5 in Fig. 2. Fig. 6 is a vertical cross-section taken on the broken line 6 6 in Fig. 1.

My invention relates more particularly to the means for imparting to the rotary drill-supporting shaft reciprocatory movements toward and from the chuck and the means for imparting to a chuck arranged eccentrically to the drill-shaft intermittent rotary movements, whereby a plurality of holes may be formed in a chuck-supported button in predetermined angular relation to each other.

Referring to the drawings, 1 is the bed of the machine, from which are erected the uprights 2, which support the rotary and slide bearings for the drill-supporting shaft 3, provided at one end with the drill 4, and the uprights 5, which support the bearings for the rotary chuck-supporting shaft or spindle 6, provided at the end adjacent to the drill with a chuck 7, which may be of any well-known form adapted to support a button-disk in position to be operated upon by the drill. The chuck is preferably arranged eccentrically to

the drill, and means are provided, as will be hereinafter more particularly set forth, for imparting to the chuck intermittent partial-rotary movements, whereby different portions of the button-disk are successively brought into line with the drill for the purpose of forming a plurality of holes in the button, and the drill-shaft is caused to reciprocate toward and from the chuck to accomplish the drilling operation during each interval between two successive partial rotations of the chuck. The chuck may be intermittently rotated in any known manner.

Continuous rotary movements are imparted to the drill-shaft by means of the belt-pulley 8, and in the operation of the machine this rotating shaft is given a reciprocating slide movement in its bearings, whereby the drill is moved to its work and removed therefrom alternately. Reciprocating movements are imparted to the drill-shaft by means of the spring 9, acting to move and maintain the shaft with its drill withdrawn from the work and the lever 10 engageable with said shaft and adapted to move the same to its work. The lever 10 is fixed upon the transverse shaft 11, supported in bearings on the frame of the machine, and is provided with a projecting cam-follower 12, adapted to engage and ride upon the several cams 13, formed on the supporting-disk 14, fixed upon the shaft 15, rotary in bearings 16, erected from the base of the machine, which shaft is frictionally driven by means of the belt-pulley 17 and the friction driving-belt 18. The number of cams 13 corresponds with the number of holes which it is desired to drill in the button, and the cams are arranged in a series disposed about the center of the supporting-disk, whereby a cam-follower located upon the initial cam of the series will as the cam-disk is rotated ride to the highest point of said initial cam, from which it will fall by gravity or be forced by spring mechanism to the lowest point of the next cam of the series, and so on to the final cam. It will thus be seen that when the cam-follower 12 has been thus located upon the initial cam of the series a single rotation of the cam-disk will cause the cam-follower through its lever 10 and the action of the spring 9 to impart to the drill-shaft 3 a plurality of distinct and com-



plete reciprocating movements. The cams are so constructed that the movement of the drill-shaft induced by each will cause the drill to be projected past the plane of the chuck-supported button-disk. I have shown the cam-disk provided with four cams, whereby four successive reciprocating movements are imparted to the drill-shaft during each rotation of the cam-disk, and it will be readily seen that if the button-disk be given intermittent partial-rotary movements of ninety degrees properly timed with relation to the reciprocating movements of the drill-shaft four symmetrically-disposed holes will be drilled in the button.

I have shown the cam-disk provided immediately of the initial and final cams of the series with a depression or recess 19, adapted to receive the cam-follower 12 when the same reaches the end of the final cam and which follower upon entering said recess serves as a stop to arrest the movement of the cam-disk, the belt 18 being permitted to slip on the pulley 17 while the cam-disk is so held. As a convenient means for removing the cam-follower from this stop-recess I provide a hand-lever 20, fulcrumed independently of the follower-lever 10 and provided with a projection or pin 21, adapted to travel in an elongated groove 22 in the stop-disk 23, fixed upon the end of the shaft 11 by means of the screw 24. The disk 23 is so constructed that the projection 21 is adapted to bear against the abutment 25 at one end of the groove 22 and to impart movement there-through to the lever 10 and follower 12, while a movement in the same direction imparted to said lever 10 by other means will not be imparted to the hand-lever 20, the hand-lever being thus adapted to operate the cam-follower lever only in one direction adapted to release the cam-follower from the stop-recess 19. The hand-lever is supported by the spring 26 and is provided with a stop-screw 27, whereby the downward movement of said lever is limited, and this screw is so adjusted that the hand-induced movement imparted to the lever 10 and drill-shaft 3 while sufficient to release the follower 12 from the stop-recess 19 shall be less than the cam-induced movement imparted thereto. I am thus able to provide hand mechanism for setting the cam mechanism in operation and at the same time to prevent said hand mechanism from being used to complete the movement of the drill-shaft that projects the drill through the button-disk, the movement of the drill through the button-disk being thus induced only by a cam, which may be so formed as to give to the drill-shaft any desired speed of reciprocating movement, which movement can thus be regulated exactly as desired. By this means I am able to prevent the drill from being too suddenly forced against and through the button, so as to break the button, as frequently happens when the drill-shaft is reciprocated wholly by hand-operated mechanism.

Any desired number of cams may be formed on the cam-disk 14.

As a means for imparting to the chuck intermittent partial-rotary movements properly timed with relation to the reciprocating movements of the drill-shaft I provide the chuck-shaft with a friction-driven pulley 28, adapted to receive a belt 29, whereby the chuck-shaft is frictionally rotated, and fix upon the chuck-shaft the stop-disk 30, provided with a plurality of stop projections 31, corresponding in number with the cams on the cam-disk 14 and with the number of holes which it is desired to form in the button. The stops 31 are symmetrically disposed about the center of the disk 30 and are adapted to be engaged successively by the arm 32, fixed upon the rock-shaft 33, extending longitudinally along one side of the machine. The spring 34 tends to hold the arm 32 against the periphery of the disk 30 and in the path of the stops 31, so that upon engagement of one of the stops with said arm the rotation of the disk will be arrested, the belt 29 being permitted to slip on its pulley 28, while the chuck-shaft and chuck are maintained in a stationary position to cooperate with the drill. The rock-shaft 33 is also provided with an arm 35, provided at its upper end with a platform or support 36, upon which is rotatably mounted the ratchet-wheel 37, the teeth of which on the side adjacent to the cam-actuated lever 10 project into the path of the pawl 38, fixed upon and movable with said cam-actuated lever. The spring-actuated stop-dog 39 engages the ratchet 37 and is adapted to yield to the forward movement and oppose the return movement of the pawl 38 on the cam-actuated lever. During each forward movement of the lever 10 the pawl 38 engages the ratchet-teeth and imparts to the ratchet a partial-rotary movement permitted by the dog 39; but during the return movement of the lever 10 the pawl is again brought into engagement with the ratchet, which is prevented by the dog 39 from a reverse yielding rotary movement, with the result that the ratchet and its support are forced bodily out of the path of the pawl 38 as said pawl engages and rides over the beveled surfaces of the ratchet-teeth. This movement of the ratchet and its support is at right angles to the line of movement of the lever 10 and at right angles to the rock-shaft 33, whereby a rocking movement is imparted to said shaft, which movement serves to release the stop-disk 30 temporarily from the stop-arm 32 and leaves the same free to be frictionally rotated by means of the belt 29 and pulley 28. This movement of the ratchet-support, rock-shaft, and stop-arm is practically instantaneous, whereby the said stop-arm 32 is again brought, by means of the spring 34, into engagement with the periphery of the stop-disk 30 in time to be engaged by the next stop 31, a quarter-rotation only being thus permitted to be imparted to the chuck and its supported button-disk, this movement



being timed to correspond with the return movement of the drill-shaft-actuating lever, at which time the drill is out of engagement with the button-disk.

5 In operating the machine it is only necessary to insert a button in the chuck and quickly press down the hand-lever 20 to its limit of movement, whereupon the machine will automatically proceed with the successive drill-  
10 ing operations until all four holes have been formed in the button-disk, whereupon the machine will automatically stop and remain inactive until again released, as by pressing down the hand-lever. The movement of the  
15 drill through the button will be gradual and the pressure exerted will be uniform in every case.

Any known form of rotary button-working tool may be substituted for what I have termed  
20 the "drill."

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

1. In a button-drilling machine, the combination with the rotary and longitudinally-reciprocatory drill-supporting shaft; of an intermittent shaft-reciprocating mechanism comprising a movable member engageable with said shaft; a cam-follower on said member; a cam engageable with said follower; means  
30 for operating the cam; means for automatically arresting the movement of the cam at the end of a predetermined movement thereof; and mechanism capable of manipulation for releasing the cam, substantially as described.  
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2. In a button-drilling machine, the combination with the rotary and longitudinally-reciprocatory drill-supporting shaft; of an intermittent shaft-reciprocating mechanism comprising a lever, a cam-follower on said lever; a cam engageable with said cam-follower; and having a stop at the end of said cam adapted to be engaged by said follower; a support for said cam; frictional driving means for said  
40 cam-support; and hand-operated mechanism for releasing the cam-support, substantially as described.  
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3. In a button-drilling machine, the combination with a rotary and longitudinally-reciprocatory drill-supporting shaft; of a lever engageable with said shaft; a cam-follower on said lever; a cam-support fixed on a frictionally-driven shaft; a cam and a stop on said support adapted to be engaged by said cam-follower and formed by a depression in said support adapted to receive said cam-follower at the end of the cam movement; and means for removing the cam-follower from said depression and engagement with said stop, substantially as described.  
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4. In a button-drilling machine, the combination with a rotary and longitudinally-recip-

rocating drill-supporting shaft; of a lever engageable with said shaft; a cam-follower on said lever; a cam-disk fixed on a frictionally-driven shaft; a plurality of cams arranged in series on, and disposed about the center of said support and adapted to be successively engaged by said cam-follower; a stop on the cam-support at the end of said cam series  
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formed by a recess in said disk between the initial and final cams adapted to receive said cam-follower; a hand-lever fulcrumed independently of the cam-operated lever; a connection between said levers whereby the hand-lever is adapted to move the shaft-reciprocating lever toward said shaft; and a stop for limiting the movement of the hand-lever, whereby the hand-induced movement of the reciprocatory shaft is limited to less than its cam-induced movement, substantially as described.

5. In a button-drilling machine, the combination with a rotary and longitudinally-reciprocatory drill-supporting shaft; a reciprocatory member engageable with said shaft; means for reciprocating said member; and a pawl mounted upon and movable with said member; of a movable support; a ratchet mounted upon said support in the path of  
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said pawl; a stop-dog in engagement with said ratchet adapted to yield to the forward movement and oppose the return movement of said pawl; a chuck arranged eccentrically to the drill-shaft; and intermittent chuck-rotating mechanism connected with and controlled by said movable support for said ratchet, substantially as described.

6. In a button-drilling machine, the combination with a rotary and longitudinally-reciprocatory drill-supporting shaft; a reciprocatory member engageable with said shaft; means for reciprocating said member; and a pawl mounted upon and movable with said member; of a rock-shaft; an arm fixed upon  
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said rock-shaft a ratchet-support on said arm; a ratchet mounted upon said support and in the path of said pawl; a stop-dog in engagement with said ratchet adapted to yield to the forward movement and oppose the return movement of said pawl; a rotary chuck arranged eccentrically to the drill-shaft; friction mechanism for rotating said chuck; a plurality of stops connected with said chuck and an arm fixed upon said rock-shaft, and movable into and out of the path of said stops, substantially as described.

In testimony whereof I have hereunto set my hand this 20th day of November, 1899.

HARVEY CHALMERS.

Witnesses:

FRANK C. CURTIS,  
E. M. O'REILLY.