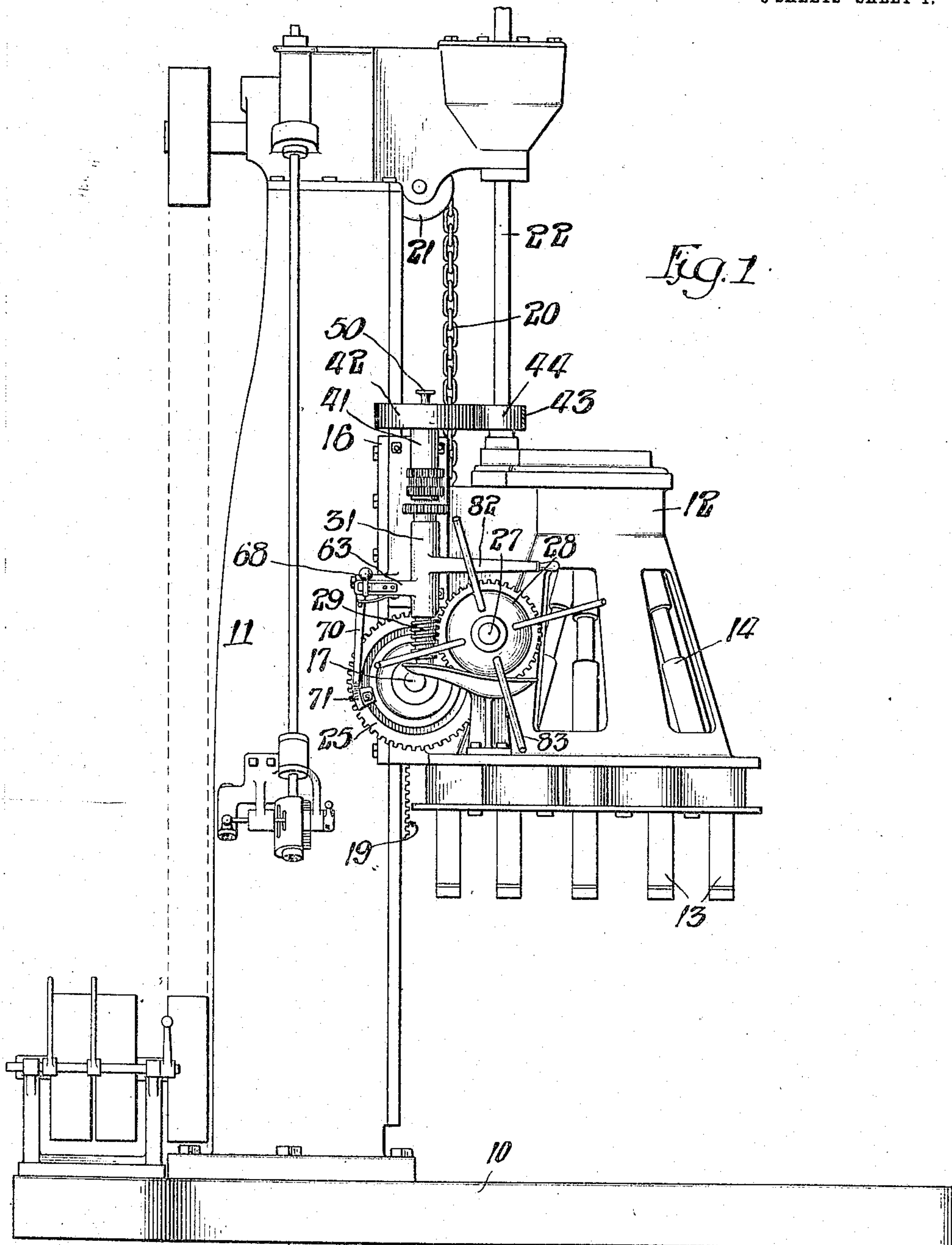


A. W. WIGGLESWORTH.
 AUTOMATIC FEED STOP DEVICE FOR DRILLING MACHINES.
 APPLICATION FILED MAY 31, 1907.

924,120.

Patented June 8, 1909.
 8 SHEETS—SHEET 1.



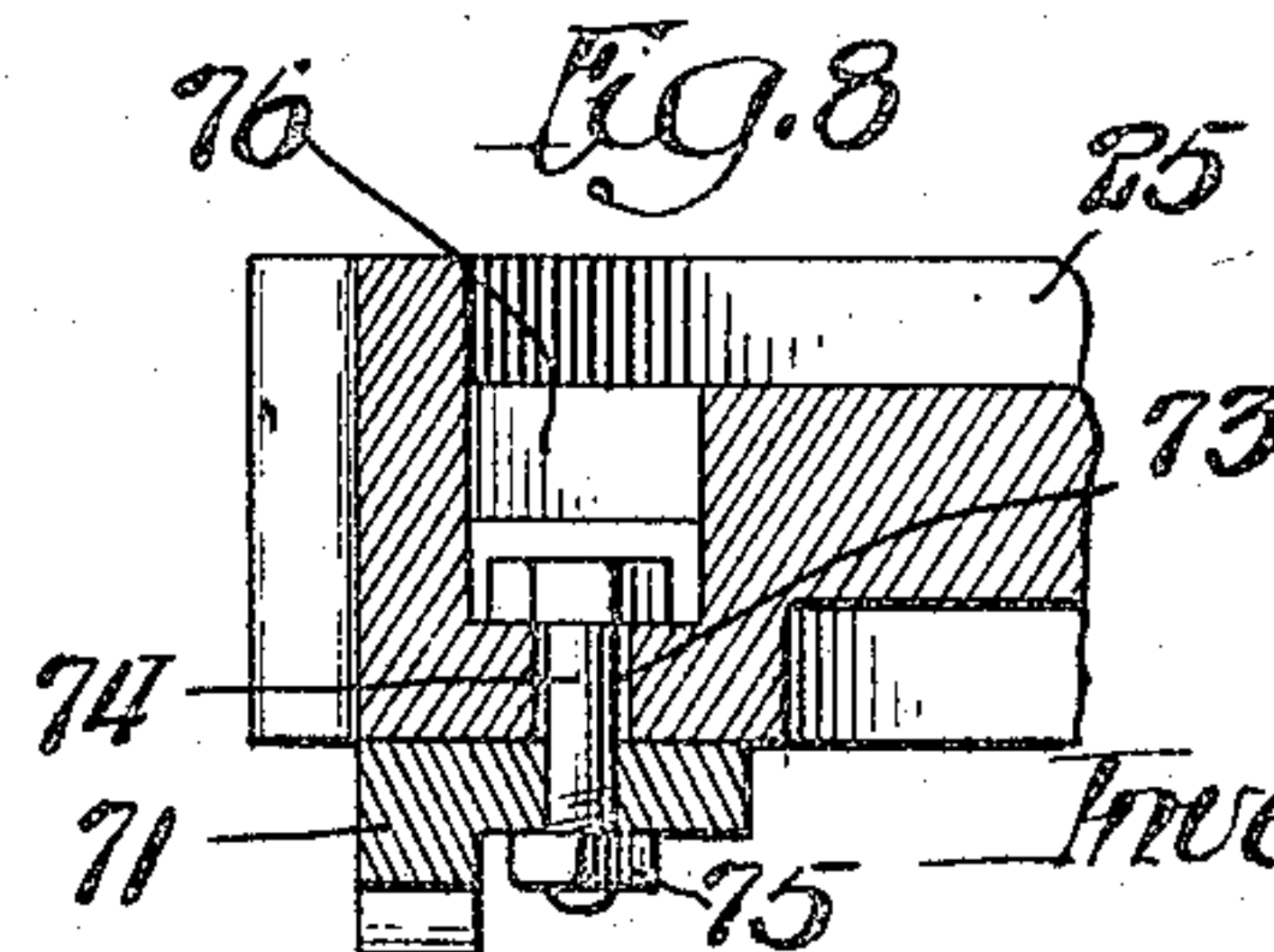
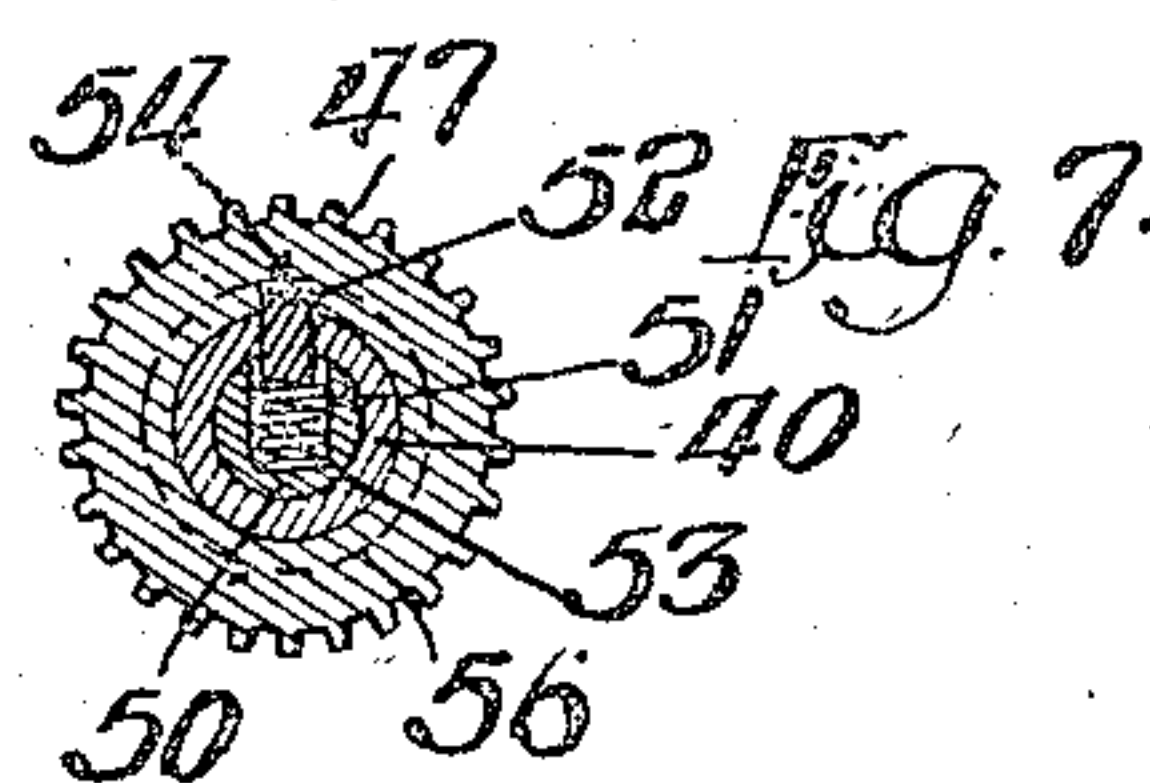
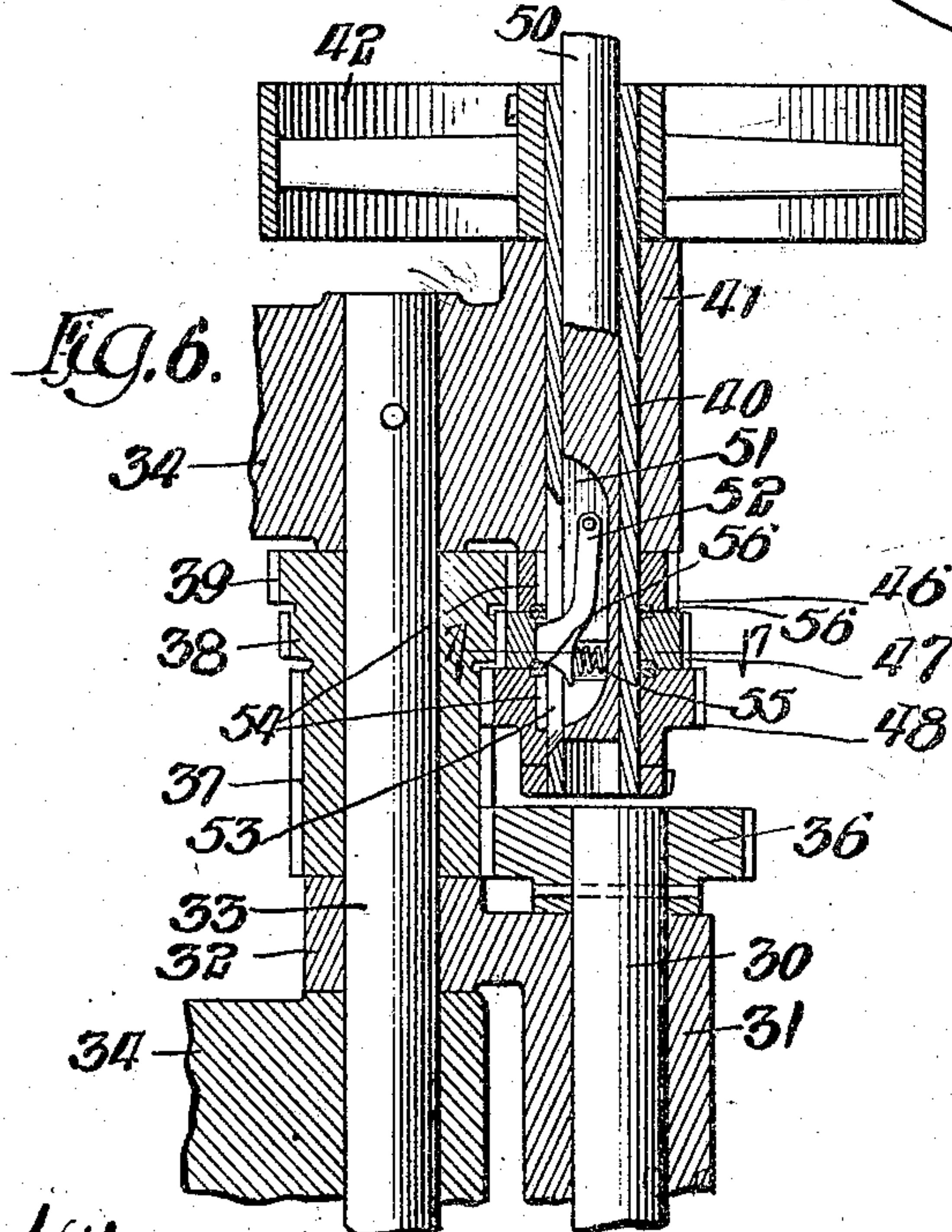
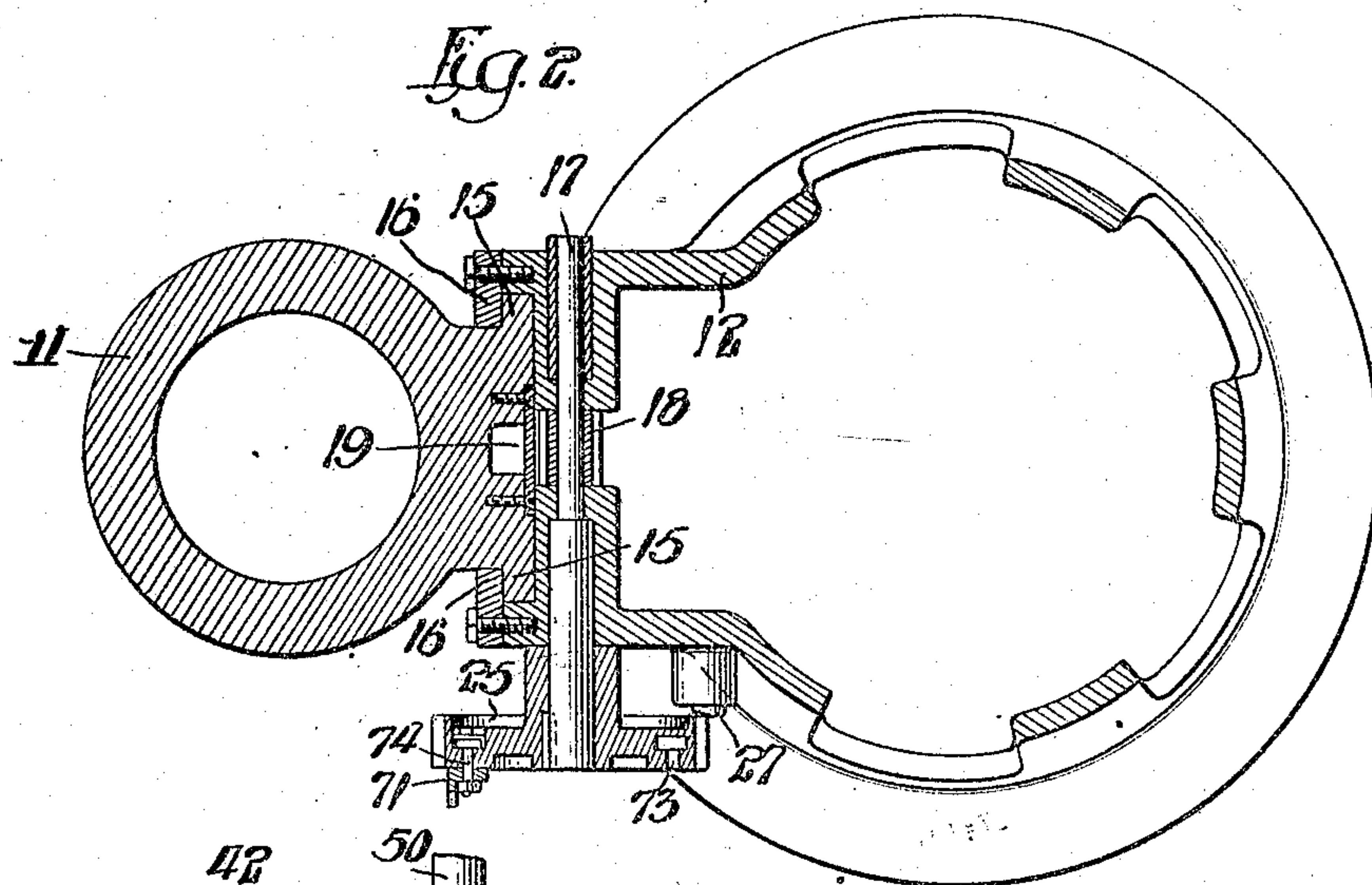
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 3 SHEETS—SHEET 2.

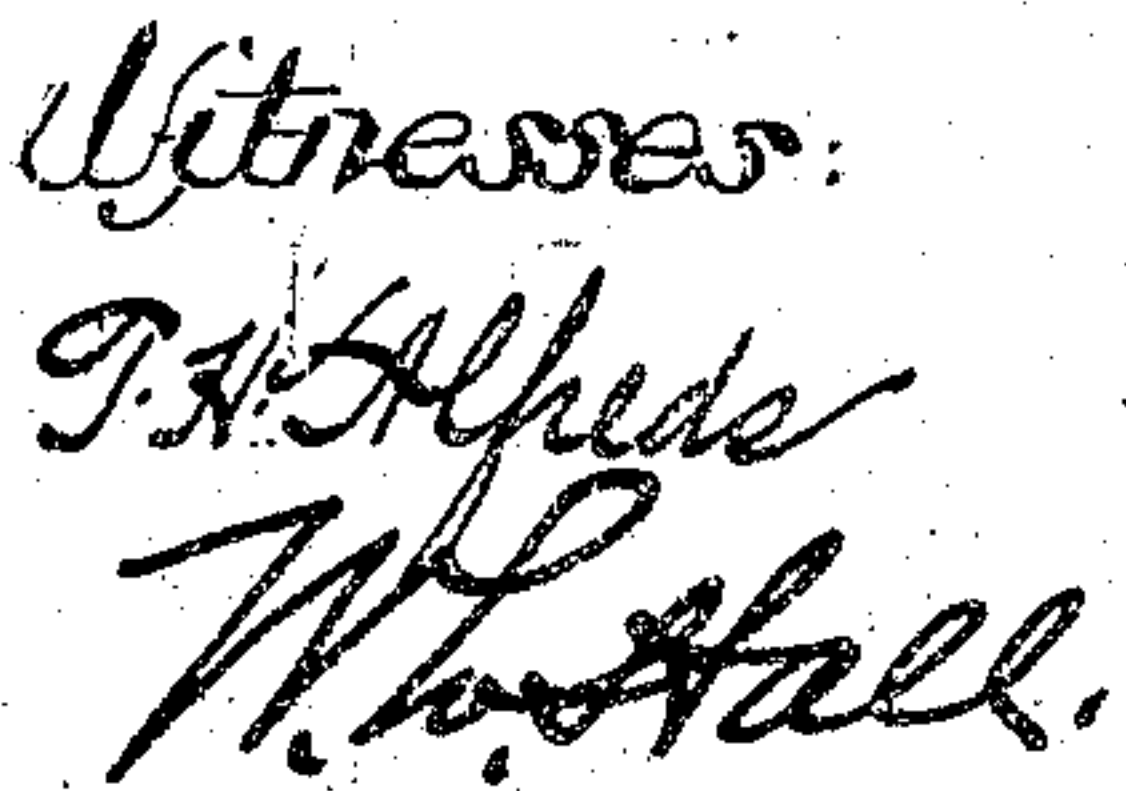


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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

ALBERT W. WIGGLESWORTH, OF CHICAGO, ILLINOIS.

AUTOMATIC FEED-STOP DEVICE FOR DRILLING-MACHINES.

No. 924,120.

Specification of Letters Patent.

Patented June 8, 1909.

Application filed May 31, 1907. Serial No. 376,687.

To all whom it may concern:

Be it known that I, ALBERT W. WIGGLESWORTH, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Feed-Stop Devices for Drilling-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof; reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in drilling machines and refers more specifically to a novel automatic mechanism for arresting the feed of the head or frame carrying the drill spindle or spindles, whereby the tool or tools operated by the machine may be automatically arrested after being fed a predetermined distance into the work, thus securing uniform action of the drills on the work.

The invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims.

In the drawings:—Figure 1 is a side elevation of a multiple drilling machine embodying my invention. Fig. 2 is a horizontal section taken through the column and the drill carrying frame, showing a part of the feed mechanism. Fig. 3 is an enlarged detail of the automatic stop devices for the feed mechanism. Fig. 4 is a horizontal section, taken on line 4—4 of Fig. 3. Fig. 5 is a side elevation of the parts shown in Fig. 3, as viewed from the left-hand side of Fig. 3. Fig. 6 is a vertical section taken through the variable speed device of the feeding mechanism. Fig. 7 is a cross-section, taken on line 7—7 of Fig. 6. Fig. 8 is a detail illustrating one of the gears of the feed mechanism and a tripping lug thereon for tripping the feeding mechanism out of action.

As shown in the drawings, 10 designates the base of the machine, 11 a vertical column supported thereon, and 12 designates, as a whole, a frame or head which carries a plurality of drill spindles 13, as herein shown, the gearing (not shown) for driving said spindles from a common source of power and the flexible shafts 14 for connecting said gearing with the spindles. The construction

of said head and the manner of mounting the spindles and their operating gear mechanism therein constitute no part of my present invention and are not shown in detail. Said head has vertical sliding engagement with the column, in the manner shown in Fig. 2, said column being provided with oppositely directed, vertical flanges 15 engaged by the head, and the head is provided with detachably secured vertical plates or guides 16, thereby connecting the head to the column in a manner to permit vertical movement but holding it laterally in place on the column.

17 (Fig. 2) designates a horizontal feed shaft that is rotatively mounted in the head and carries a pinion 18 that meshes with a vertical rack 19 on the column, whereby rotation of the feed shaft moves the head vertically with respect to the column to advance the drill carrying head to or retract it from the work. The said head is counterbalanced in the usual manner by means of the counterbalancing chain 20 attached at its lower end to the head and which is trained over a pulley 21 and extends down into the hollow column for attachment to a suitable counterweight (not herein shown). Power is transmitted to the drill spindle gears through the medium of a shaft 22 that is connected at its upper end in any suitable manner with a source supplying power through the medium of the usual change speed device, not shown in detail.

My present invention relates to a novel mechanism which coöperates with the feed mechanism in a manner to automatically arrest the feed movement of the drill spindle carrying head or frame at a predetermined time in its advance movement relatively to the work being done.

I will now describe an approved arrangement or embodiment of my invention and the manner of operating the same. It is to be understood, however, that the essential features of the invention may be embodied in constructions differing widely in details from that herein shown.

The rotative feed shaft 17 carries at its forward end a gear wheel 25 which meshes with a pinion 26 (shown in dotted lines in Fig. 3) rotatively mounted on a stud 27 extending forwardly from the head, (Figs. 2

and 3). 28 designates a worm wheel which is also rotatively mounted on said stud 27 and is fixed to, in any suitable manner, and rotates with the pinion 26. Said worm wheel meshes with a worm 29 carried by or formed on the lower end of a vertical rotative shaft 30 which is mounted in a vertical sleeve or bearing 31. Said sleeve or bearing 31 is swingingly or rotatively connected with the frame in such manner that the worm 29 may be swung out of mesh with the worm wheel 28, and thereby disconnect or throw out of gear the feed device. As herein shown the sleeve is provided at its upper and lower ends with arms 32, 32 which are rotatively mounted to swing on a vertical shaft or stud 33 that extends downwardly through and is fixed in brackets 34, 34 extending forwardly from the spindle carrying frame. The said vertical feed shaft 30 is connected at its upper end with power by which the feeding operation is effected through a suitable variable or change speed mechanism of which the shaft 30 constitutes the secondary shaft, and is made as follows: 36 designates a gear wheel which is fixed to the upper end of the shaft 30 and meshes with a pinion 37 which is adapted to freely rotate on the stationary stud or shaft 33. Said pinion 37 constitutes one member of a cone gear, the other gradually increasing diameter members being 38 and 39. 40 (Fig. 6) designates the primary shaft of the variable speed gear referred to which is rotatively mounted in an extension 41 of the upper bracket 34 carrying the intermediate shaft or stud 33. Said primary shaft extends above and below its bearing bracket and is provided at its upper end with a belt pulley 42 that is driven through the medium of a belt 43 from a belt pulley 44 on the shaft 22 that transmits power to the gear mechanism of the drill spindles. On the lower end of the shaft 40 is mounted a plurality of varied diameter gear wheels 46, 47, 48, which mesh, respectively, with the gears 39, 38, 37 on the intermediate shaft 33. Said gear wheels 46, 47, 48 are normally loose on the shaft 40, and means are provided for severally locking them to said shaft, constructed to lock one gear to the shaft at a time thus providing three different speeds under which the secondary shaft may be driven through the gears 39, 38 and 37. The means herein shown for thus locking the gear wheels to the primary shaft is made as follows: The said primary shaft is tubular and contains a sliding pin 50 which is provided near its lower end with a recess 51 in which is pivotally mounted a key 52 that is adapted to project at its free end outwardly through a slot 53 at one side of the hollow primary shaft for engagement with recesses or notches 54 formed in the bores of the gear

wheels 46, 47 and 48, as more clearly shown in Figs. 6 and 7. The said key is normally pressed outwardly through said slot for engagement with said notches of the gear wheels through the medium of a spring 55 interposed between the free end of the key and the bottom of the recess 51. The notches of said gear wheels are separated by collars 56 interposed between the wheels and contained, as herein shown, in annular recesses on the adjacent ends of the wheels. As the pin 50 is shifted endwise, the engaging end of the key slides under said partition collars and is held in its retracted position, against the action of the spring 55, until it is brought into full register with one of the notches in the next adjacent gear wheel, whereupon the spring forces the key into engagement with said notch to lock the gear to the primary shaft. The slot 53 in the hollow primary shaft is made of such length that the adjusting pin 50 may be moved a distance to shift the key entirely away from the gear wheels, thus disconnecting the primary shaft from the secondary shaft of the variable speed gear.

As before stated, the sleeve 31, carrying the secondary shaft of the variable speed gear on which is mounted the worm pinion 29, is adapted to swing about the axis of the stud 33 which, in this instance, constitutes the intermediate shaft of the variable speed gear. This particular arrangement is best shown in Fig. 4. Means are provided for normally locking said shaft in position to hold the worm 29 engaged with the worm-wheel, which comprises, in the present instance a horizontal, vertical swinging latch lever 60 that is hinged at its rear end to a bracket 61 extending forwardly from the drill carrying head or frame, by means of a pivot 62.

63 designates an arm which extends laterally from and is rigid with the bearing sleeve 31 of the shaft 30, and said arm extends beneath the latch lever 60. The latch lever 60 is provided with an outwardly or forwardly facing shoulder 64 (Fig. 5) which is adapted to fall behind the arm 63 and to lock said arm in a position to hold the worm 29 against the worm-wheel. 65 designates a flat spring attached at one end to the front face of said arm 63 and adapted to bear at its free end against a pin 66 extending downwardly from the latch lever 60 beyond or forwardly from the arm 65. It will thus be noted that when the outer end of the latch lever 60 is swung or raised to release the shoulder 64 from the arm 65, said spring 65, which is normally under tension, acts to force the arm 63 rearwardly and thereby swing the sleeve 31 and the shaft 30 carried thereby to the position shown in dotted lines in Fig. 4 with the result of releasing the

worm 29 from the worm-wheel 28. Such release of the latch lever may be effected by hand, and the latch lever is provided with a hand-grip 68 for manual operation of said lever. In accordance with one feature of my invention, the release of the latch lever is automatically effected at a predetermined time relatively to the travel of the drills or other tools. The construction by which such automatic release is effected is as follows: Said latch lever is provided with a depending trip arm 70 which extends downwardly therefrom in front of the feed gear wheel 25 and is adapted for contact at its lower end with a tripping block 71 carried on the outer face of said feed wheel 25. Said tripping block is mounted on said wheel 25 by means permitting adjustment of the block angularly of the axis of the wheel. A convenient means for thus connecting the block with the wheel is shown in detail in Fig. 8 and consists in providing the wheel with a T-shaped annular groove 73 which receives a bolt 74 that extends outwardly through said groove and through a registering opening in the block 71. A nut 75 screw-threaded to the bolt clamps the block in place. The rear part of said T-shaped groove is cut away at one point, as indicated at 76 in Fig. 8, to permit the bolt to be inserted therinto and removed therefrom. Said tripping block 71 is formed with an inclined contact face that faces the direction toward which the wheel rotates, and the tripping arm is formed with a rounded surface or end to facilitate the engagement of the tripping arm with said block, as best shown in Fig. 5. The said tripping arm is normally held pressed with its free end toward the feed wheel 25, to maintain the same in the path of the tripping lug, through the medium of a spring 80 that is attached at one end to the under face of the arm 63 and engages at its outer or free end a pin 81 extending horizontally and forwardly from the tripping arm. The said secondary shaft of the variable speed gear carrying the worm 29 is swung into its operative or working position after having been tripped through the mechanism described, through the medium of an arm 82 carried by and extending laterally from the bearing sleeve 31 of said shaft. The worm-wheel 28 is provided with a plurality of radial arms or handles 83 by which the said wheel may be rotated and the spindle carrying head advanced to and retracted more quickly from its work than may be effected through the automatic feeding mechanism described.

I claim as my invention:—

1. An automatic feed stop for drilling machines comprising, in combination, a feed shaft, a wheel fixed thereto, a cam device attached to and angularly adjustable on said

wheel, mechanism for rotating the feed wheel 65 and its shaft embracing a worm wheel geared to said feed wheel, and a shaft provided with a worm meshing with said worm wheel, a swinging bearing for said latter shaft which swings on an axis parallel with said shaft, 70 whereby said worm may be swung toward and from the worm wheel, means for locking the worm shaft in position to hold said worm in mesh with the worm wheel, and means operated by said cam device for releasing the worm from said worm wheel. 75

2. An automatic feed stop for drilling machines comprising, in combination, a feed shaft, a gear wheel fixed thereto, a cam device attached to and angularly adjustable on said wheel, means for rotating said feed wheel and its shaft comprising a rotative shaft provided with a worm, a worm wheel meshing with said worm, and a pinion rotating with said worm wheel and meshing with said feed wheel, a swinging bearing for said worm shaft arranged to permit the worm to be swung toward and from said worm wheel, a swinging latch pivoted to a part stationary relatively to said bearing and adapted to engage a part rigid with the bearing to lock the worm in mesh with the worm wheel, and an arm rigid with said latch adapted for engagement by said rotative cam device. 95

3. An automatic feed stop for drilling machines comprising, in combination, a horizontal feed shaft, a wheel fixed thereto, a cam device attached to and angularly adjustable on said wheel, mechanism for rotating the feed wheel and its shaft embracing a worm wheel geared to said feed wheel, a vertical shaft provided with a worm meshing with said worm wheel, a horizontally swinging bearing in which said latter shaft is mounted, whereby said worm may be swung toward and away from the worm wheel, an arm rigid with said bearing, a vertically swinging latch adapted to engage said arm to lock said worm in mesh with the worm wheel, a downwardly extending trip arm carried by said latch adapted for engagement with said cam device, and a spring device between said latch and arm for swinging said bearing and worm shaft horizontally away from the worm wheel when the latch is released from said arm. 115

4. An automatic feed stop for drilling machines comprising, in combination, a horizontal feed shaft, a wheel fixed thereto, a cam device attached to and angularly adjustable on said wheel, mechanism for rotating the feed wheel and its shaft embracing a worm wheel geared to said feed wheel, a vertical shaft provided with a worm meshing with said worm wheel, a horizontally swinging bearing in which said latter shaft is mounted, whereby said worm may be swung 125

toward and away from the worm wheel, an
arm rigid with said bearing, a vertically
swinging latch arranged over said arm and
provided with a forwardly facing shoulder
5 adapted to engage said arm to lock said
worm in mesh with the worm wheel, means
carried by the arm adapted for engagement
with said cam device for raising the shoul-
der of said latch free from said arm, and a
10 spring on the arm adapted for engagement
with a part on the latch for swinging the

arm rearwardly when said shoulder is so
disengaged from said arm.

In testimony, that I claim the foregoing
as my invention I affix my signature in the 15
presence of two witnesses, this 22 day of
May, A. D. 1907.

ALBERT W. WIGGLESWORTH.

Witnesses:

GEORGE R. WILKINS,
T. H. ALFREDS.