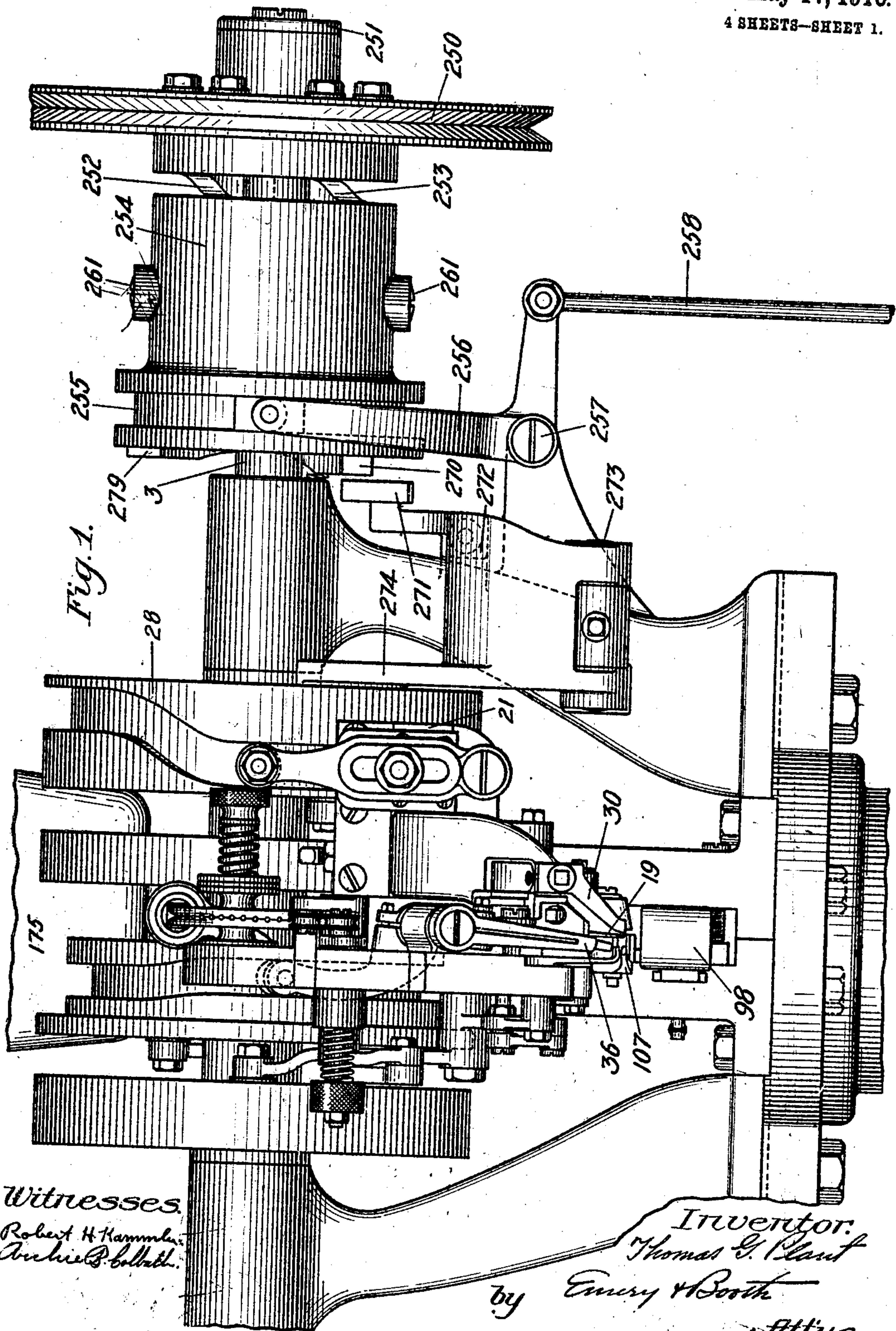


T. G. PLANT.
 STARTING AND STOPPING MECHANISM.
 APPLICATION FILED OCT. 4, 1906. RENEWED NOV. 22, 1909.

958,290.

Patented May 17, 1910.
 4 SHEETS—SHEET 1.



Witnesses.
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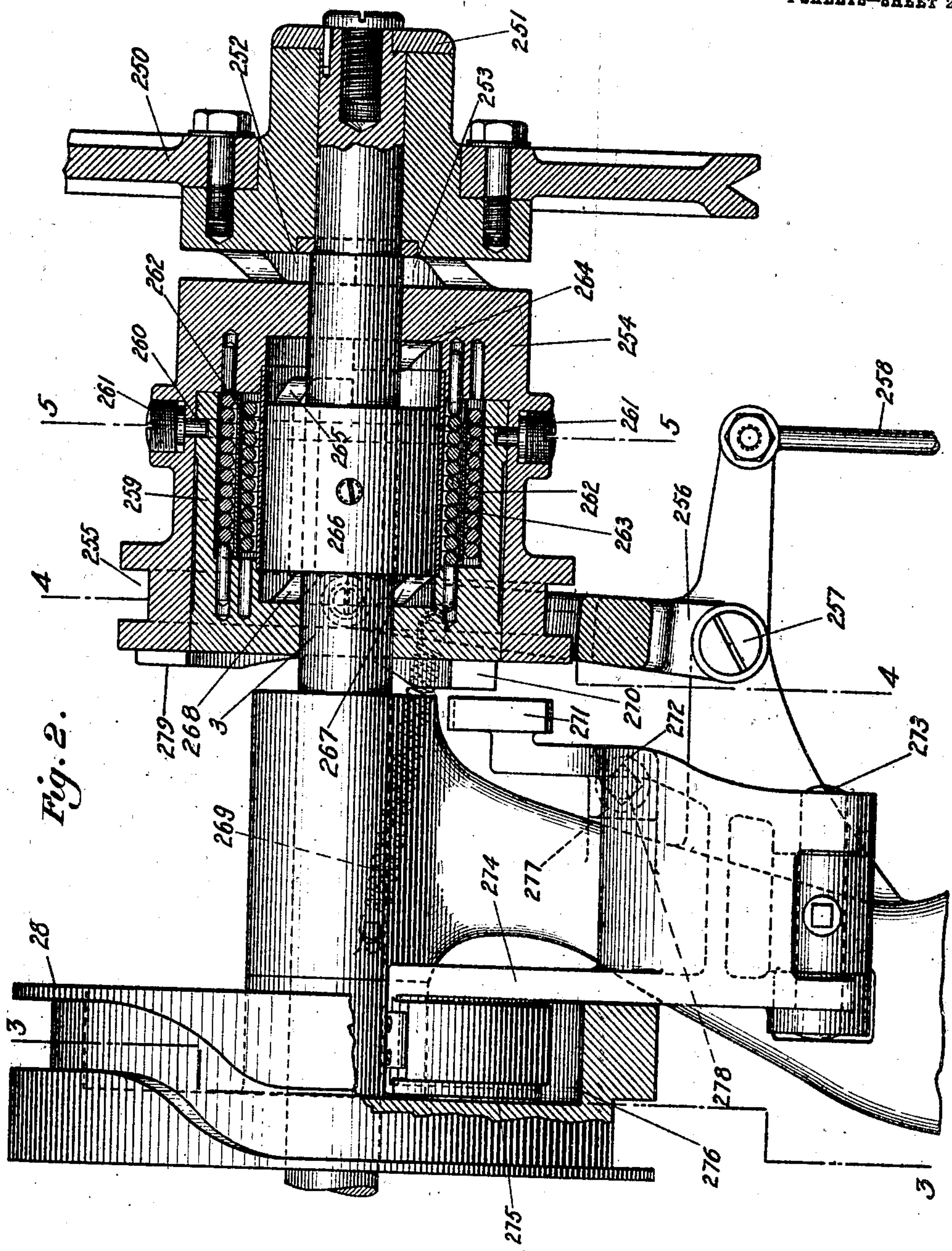


Fig. 2.

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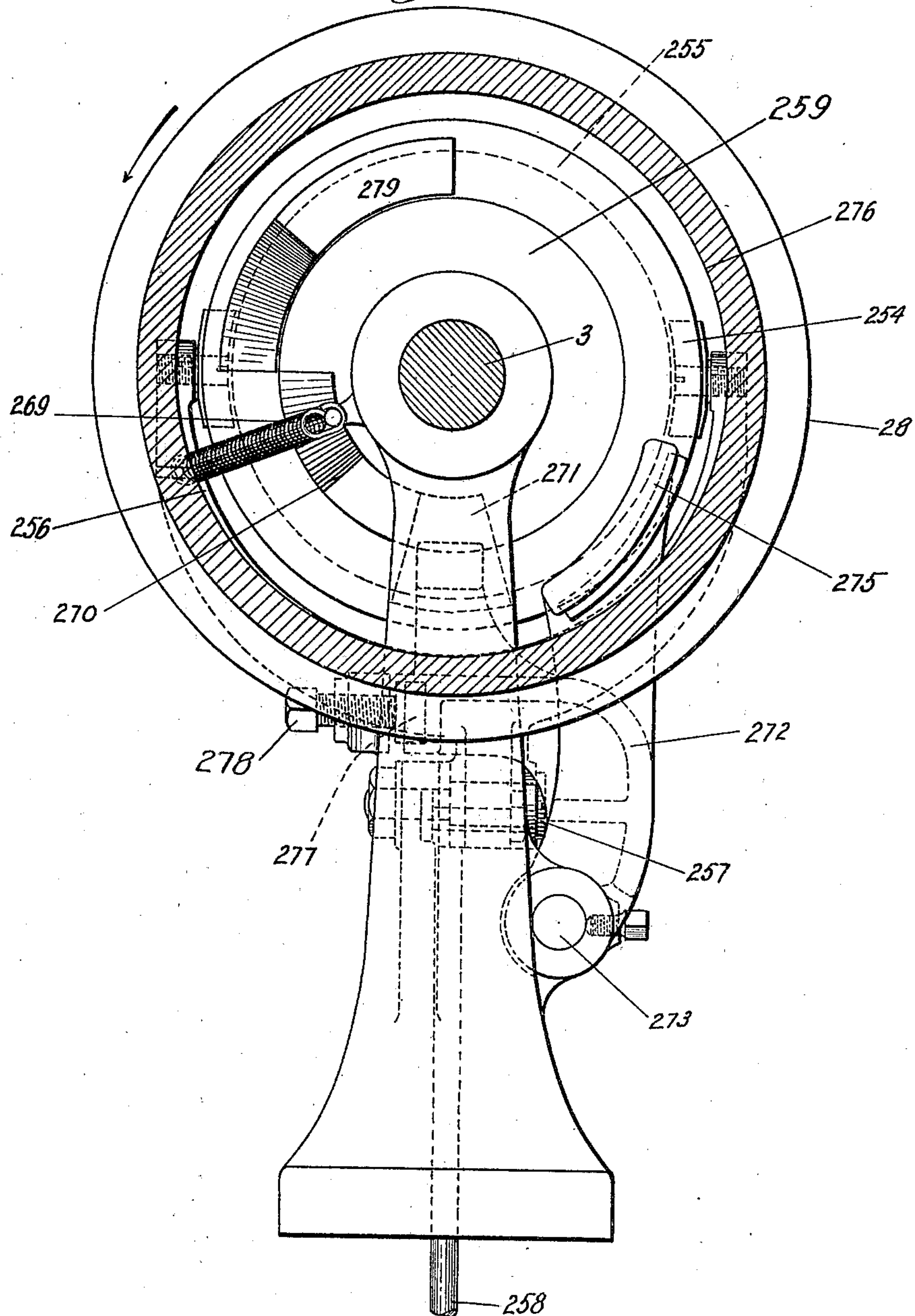
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4 SHEETS—SHEET 3.

Fig. 3.



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Fig. 4.

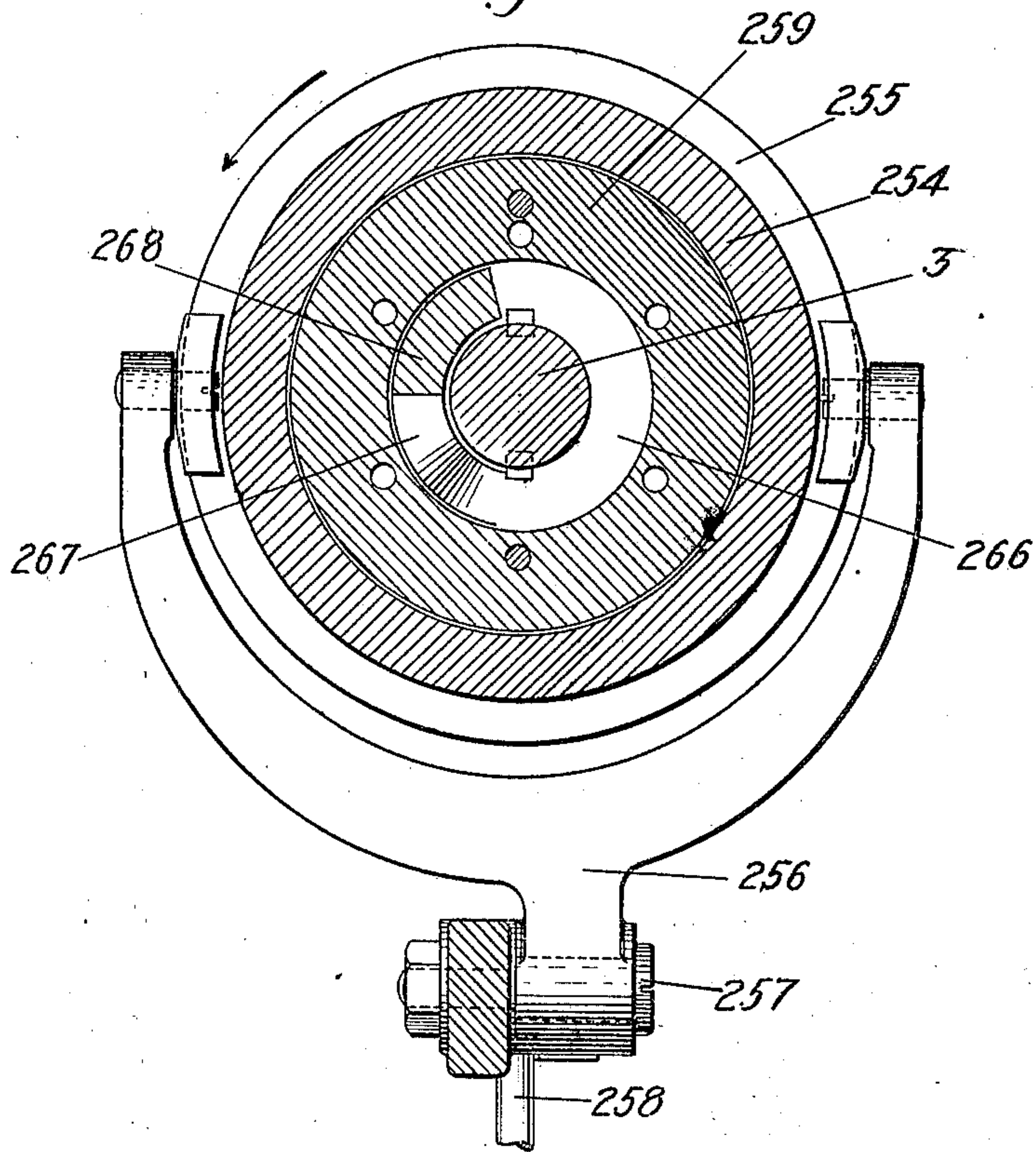
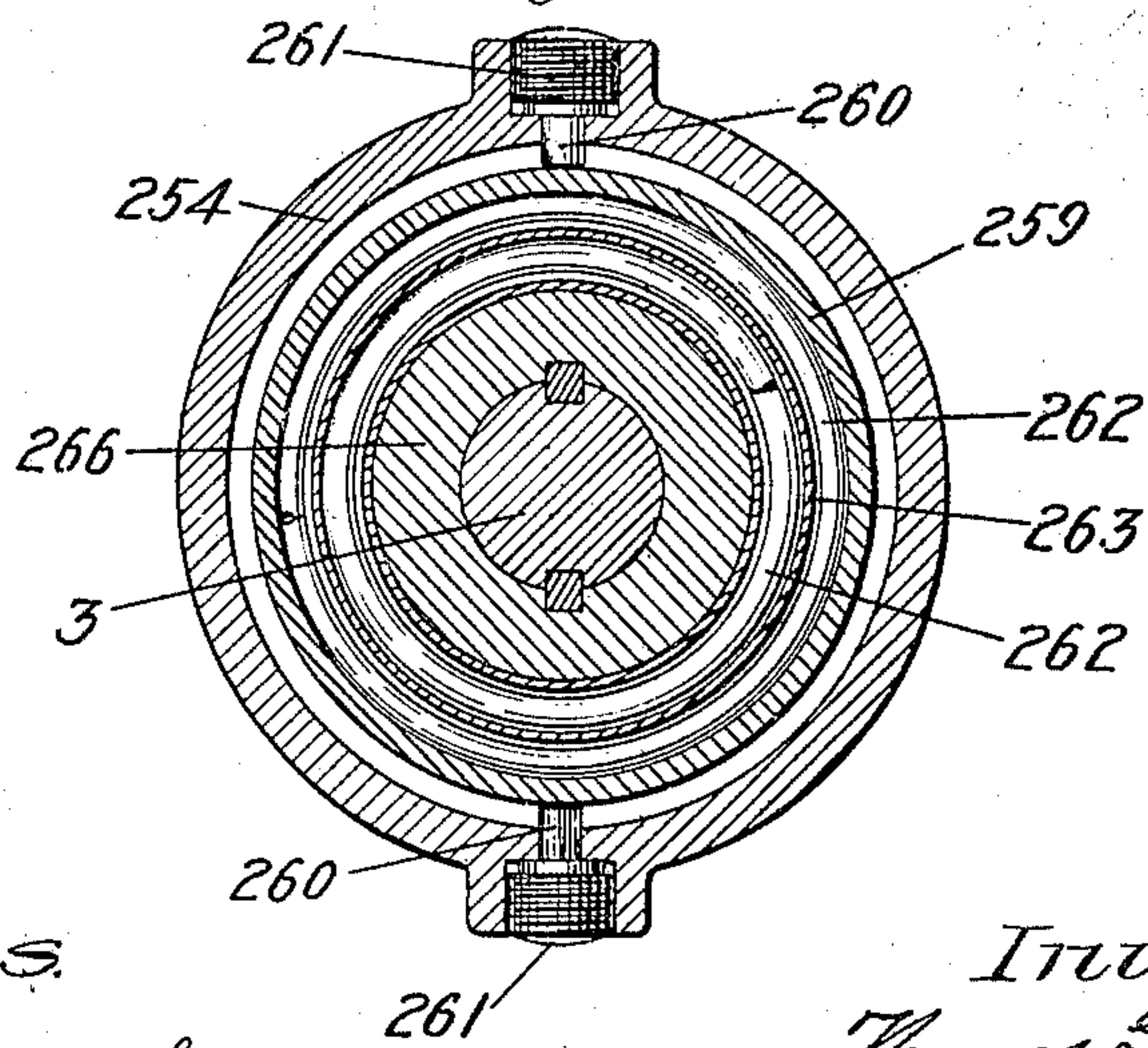


Fig. 5.



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UNITED STATES PATENT OFFICE.

THOMAS G. PLANT, OF BOSTON, MASSACHUSETTS.

STARTING AND STOPPING MECHANISM.

958,290.

Specification of Letters Patent.

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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 Starting and Stopping Mechanism, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

In many machines, particularly in sewing and other machines employed in boot and shoe work, it is desirable at the end of any piece of work to stop the machine always at a given and certain point in its cycle of movement. In some machines, particularly in chain-stitch sewing machines, it is desirable after the forward motion of the machine is arrested to give to it a return or retractive movement, to cause its needle to cast off the last loop thereon, to permit the work to be withdrawn.

My present invention aims to provide novel and improved means for arresting or stopping a machine, particularly a sewing machine, always at a given, predetermined, or normal position, and also means automatically to produce in connection with such stopping of the machine a predetermined or sufficient return or retractive movement thereof, or of such part thereof as may be necessary or desired, for the purpose above mentioned or otherwise.

My invention will be understood best from a description of a machine illustrating one embodiment thereof, such for instance as shown in the accompanying drawings, wherein—

Figure 1 is a front elevation of a curved needle wax thread sewing machine of the type commonly used in the manufacture of boots and shoes and known as a "welter;" Fig. 2 is mainly a vertical section along the axis of the driving shaft showing the principal parts of the mechanism illustrating the embodiment of my invention here shown; Fig. 3 is a vertical section on the dotted line 3—3, Fig. 2, looking to the right; Figs. 4 and 5 are vertical sections on the lines 4—4 and 5—5 respectively, of Fig. 2, looking to the right.

In the particular embodiment of my invention selected for illustration herein and shown in the drawings the sewing machine illustrated and in connection with which my invention is especially, but not exclusively,

adapted may be of any desired type, so far as my invention is concerned.

The main shaft typified at 3, the needle, its carrier and actuating means therefor, the feed-slide 21, the awl 19, arranged to be moved therewith, and the awl-actuating means, the channel feed-guide 30, also carried by said feed-slide, the looper 36, the back-gage 107, slide-rest 98 and locking means therefor, the waxing means 175, with the operating means for these parts together with any associated or concomitant parts are or may be of desired construction. It is assumed that machines of this type are understood by those skilled in the art and that no further description is necessary herein.

Referring now particularly to Fig. 2 *et seq.*, the main shaft 3 is shown extended to the right beyond the endmost shaft bearing and has loosely journaled about its outer end a suitable belt or driving-pulley 250, said pulley being restrained at the right against outward movement on said shaft by a cap or washer 251. At its inner side face the hub of said pulley is provided with a driving-lug 252 adapted to cooperate with an oppositely facing driving-lug 253 on the end of a hollow or cup-shaped cylindrical sleeve 254 mounted to slide endwise on said shaft. At its inner end said sleeve is provided with a circumferential groove 255 which receives the forked arm of a bell-cranked lever 256, fulcrumed at 257 and controlled by a rod 258 depending to a treadle or other suitable member, not shown. Centrally arranged within and having rotative movement relative to said sleeve 254 is a second sleeve 259 circumferentially grooved to receive one or more guide-studs 260 seated in and projecting through said outer sleeve 254 and held in position by screws 261 tapped in said outer sleeve. The studs may be screwed to a seat in said outer sleeve so as to hold them firmly in position, but their heads prevent the ends of said studs from contacting with the bottom of the groove which they enter, thus insuring at all times free running engagement between the studs and the walls of said groove.

The inner sleeve 259 is counter-bored interiorly to receive a pair of nested coil-springs 262 separated if desired by a spacing ring 263, the opposite ends of said springs being respectively engaged with or entered into the ends of said outer and inner sleeves 254 and 259, so that said springs will

be put under or relieved of tension by relative rotation of the sleeves.

The inner end face of the outer sleeve 254 is provided with an internal lug 264 adapted when in proper position to engage with an oppositely-facing cooperative lug 265 on the adjacent end of a collar 266 fastened upon said shaft 3. At its opposite end said collar is provided with an oppositely-facing lug 267 adapted when in proper position to cooperate with a corresponding lug 268 on the inner face of the end of said inner sleeve 259. The length of said collar 266 is such that only one of its end lugs can be in engagement at a time with the cooperating and opposed lugs upon the inner and outer sleeves described, said sleeves being mounted to slide on said shaft to cause their respective internal end lugs alternately to engage the end lugs of said collar. In the drawing, Fig. 2, the lug at the left end of said collar is shown in engagement with the lug on the end of the inner sleeve 259.

In the position shown, rotation of the driving or belt-pulley 250 will act correspondingly to rotate the outer sleeve 254, causing the whole when first set in rotation to operate through the connecting springs 262 to drag after it the correspondingly rotating inner sleeve 259. The inner sleeve in turn, through its lug 268, acts upon the lug 267 of the collar 266 to impart rotation in the same direction to the shaft 3 and to the machine. The effort required to start the shaft and the machine through the springs described will cause the latter at first to be put under tension, but as the machine gathers speed said springs will gradually recover and resume their normal condition in which they are sufficiently strong to operate the machine continuously.

When it is desired to stop the machine the treadle, which has been maintained depressed in the position shown in Fig. 2 during the operation of the machine, is released to permit the spring 269, Fig. 2, to lift the same and shift the concentric sleeves 254, 259, to the left on said shaft and relative to said collar to disengage the outer sleeve lug 253 from the hub lug 252 of the driving-pulley, and thereby to cut off the driving power to permit the machine to stop. This movement of said concentric sleeves at the same time throws the inner lug 264 of the outer sleeve into the path of and for engagement with the end lug 265 of the collar 266, simultaneously disengaging the opposite collar lug 267 from the inner sleeve lug 268. As has been stated, the lugs at opposite ends of the collar 266 face in opposite directions, one being adapted to rotate said collar and its connected shaft in one direction and the other in an opposite direction; and also, as stated, the lugs upon the ends of the outer and inner sleeves 254, 259, face in opposite

directions properly to cooperate with the end lugs upon said collar; so that whereas the engagement of the outer sleeve lug with the driving-pulley and the inner sleeve lug with the shaft collar was adapted to drive the said shaft in one direction, when said sleeves are shifted to disengage the inner sleeve lug from the collar and connect the oppositely-facing outer sleeve lug with said collar, the parts are now in condition to permit of opposite rotation of the shaft by said concentric sleeves. In other words, said sleeves which are connected by the contained springs to constitute a yielding single member or unit, so to speak, when moved into position at the right, as in Fig. 2, are adapted to drive the shaft 3 in one direction, and when shifted into an opposite position at the left are adapted to drive said shaft in an opposite direction. When in position at the right, as shown, said sleeves are connected, also as shown, with the driving-pulley to drive them and the contained shaft in one direction to operate the machine. When slid to the left into opposite engagement with said shaft they are adapted, if restraint be exercised upon rotation of the sleeves, either gradually to stop the shaft in engagement therewith or, if desired, to impart opposite or retractive movement thereto. For this purpose the inner sleeve is provided at its outer end face (see Figs. 2 and 3) with a segmental lug or cam 270 upwardly inclined at one end and abruptly terminating in a stop face at its opposite end, and adapted when said sleeve is in its position at the left, Fig. 2, to be brought into the path of the stop end 271 of a lever 272 fulcrumed at 273 on one of the standards of the machine. Said lever has a second arm 274 which (see Fig. 2) is fitted at its end with an upwardly-facing brake-shoe 275 adapted to engage an internal cylindrical brake surface 276 on one of the cams 28, or on some other disk or member of the machine that rotates or is in motion when the machine is in operation.

The lever 272 (see Fig. 3) has a laterally extended arm, shown in dotted lines, which is fitted at its outer end with a cushion or rubber plug 277 adapted, when the lever is thrown to the left (see Fig. 3), to contact with an adjustable stop-screw 278 on the machine standard referred to.

The corresponding end of the outer sleeve 254 is likewise provided with a segmental cam or stop surface lug 279 inclined at one end and abruptly terminated or provided with a stop surface at its other end; the stop surfaces of the two lugs 270 and 279 on the two sleeves, also the inclined surfaces thereof, face in opposite directions, said lug 270 being also preferably somewhat higher than the lug 279.

When now the machine is in operation with the parts as shown in Fig. 2, the opera-

tive releases the treadle, the two concentric spring-connected sleeves 254 and 259 are slid to the left, disengaging the outer sleeve from the driving-pulley and the inner sleeve from the shaft collar, and by the same movement engaging the outer sleeve with the shaft collar and placing the inner sleeve lug 270 in the plane of the brake-lever 271, so that before the machine has completed a full revolution after the sleeves have been thus shifted the rotating lug 270 on the inner of the two sleeves will strike the end 271 of the brake-lever and throw the brake-shoe against the rotating brake surface on the cam or part 28 to arrest the machine. In arresting the machine the first frictional contact of the brake-shoe with its brake surface serves to slow down the machine by the braking action thus produced; and the moment the brake-shoe becomes firmly and finally seated upon its cooperating braking surface, so that no further movement of the brake-shoe is permitted, then the said lever end becomes in effect a rigid or fixed stop to prevent further rotative movement of the inner sleeve 259.

While the brake-shoe, as stated, serves to retard or slow down the machine in coming to its bearing, the machine is not fully stopped until after the inner sleeve lug has met and been arrested by the brake-shoe lever, and then the machine is arrested only through the coiled springs connecting said inner sleeve with the outer sleeve, which is now in engagement with the shaft collar, the effect being, as the inner sleeve is brought to a state of rest, to cause said springs connecting it with the outer sleeve and the shaft collar to be coiled up or put under tension until the inertia of the running of the machine has been overcome and the machine brought to a state of rest. Of course, as these springs are gradually put under tension in the stopping of the machine their resistance or tension increases, giving a constantly increasing retarding effect in the direction opposed to the rotation of the shaft and tending to arrest it by a cushioning or yielding action on the one hand and bracing the brake-shoe with a constantly increasing pressure upon its braking surface on the other hand.

The machine having now been brought to a state of rest with the springs more or less under tension the said springs will recover and, in uncoiling to their former or normal condition, will rotate said outer sleeve in an opposite direction, correspondingly turning the machine in an opposite or retractive direction until the stop lug 279 on the outer sleeve is brought around against and is arrested by contact with the end 271 of the brake-lever which first disengages the brake-shoe from its braking surface, moving the braking-lever backward against the buffer

278 referred to, and bringing said outer sleeve, the collar shaft, and the machine to a final state of rest, which is invariably in the same position. This retractive, spring-actuated movement of the machine before it is finally brought to a state of rest, when the machine is a sewing machine of the class here shown, is sufficient to produce the desired retractive movement of the needle to cause it to cast off its loop to permit the work to be removed from the machine. Thus when the concentric sleeves are thrown to the right into full line position, Fig. 2, to start the machine the starting is effected yieldingly through the coiled springs referred to, thus eliminating any shock in starting. After the machine is in operation, when it is desired to arrest the machine and the sleeves are moved to the left, the machine first feels the retarding effect of the brake-shoe meeting its braking surface and substantially simultaneously therewith the cushioning or resilient stopping due to the winding up of the springs, followed immediately and automatically by a recovery or reverse movement under the action of the springs until the parts are finally brought to a state of rest in final position. This final, or spring-actuated, reverse movement which brings the machine to a final state of rest is in the machine shown so slight that there is no objectionable shock in bringing it finally to a state of rest in the one invariable position in which it is desired the machine shall be finally arrested.

My invention, of course, is not limited to the particular embodiment here shown nor is it limited in its use to the particular machine shown, or to a sewing machine even; my invention being applicable to any machine to which it may be found adapted.

Having described one embodiment of my invention, and without limiting myself to immaterial features and details, what I claim and desire to secure by Letters Patent is:—

1. In a sewing machine, the combination with a driving shaft, of a driving pulley loosely mounted thereon, a collar secured against rotation on said shaft, a pair of cup-shaped telescoping sleeves loose on said shaft and surrounding said collar, a yielding connection between said sleeves, means for connecting one of said sleeves with the driving pulley, and means for connecting said sleeves alternately with said collar.

2. In a sewing machine, the combination with a driving shaft, of means for driving the shaft including a yielding member, brake means for the shaft including a stop arm, a pair of stops carried by the driving means, and provision for moving the driving means into position for one of its stops to engage the brake stop arm to stop rotation of the shaft and tension said yielding

member, and for its other stop to engage said brake stop arm on relaxation of said yielding member after being tensioned.

3. In a sewing machine, the combination with a driving shaft, of a pair of sleeves loose on said shaft, a yielding connection between said sleeves, brake means including a brake stop arm, an oppositely facing lug on each sleeve constructed and arranged to coöperate with the opposite faces of said stop arm, means to connect said sleeves and shaft, means to rotate the sleeves, and provision for moving said sleeves to bring their lugs into operative relation with said brake stop arm.

4. In a sewing machine, the combination with a driving shaft and a driving pulley loose thereon, of a collar secured to said shaft, a rotary member loose on said shaft adjacent each end of said collar, a lug on

each end of said collar, said lugs facing in opposite directions, a lug on each rotary member for engaging said collar lugs, means to connect one of said rotary members and said driving pulley and simultaneously engage the other rotary member and collar, a yielding connection between said rotary members wherethrough the shaft is driven, and means to stop rotation of the shaft, including provision for disengaging the pulley and its rotary member and engaging said rotary member with the collar.

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

THOMAS G. PLANT.

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FRANCIS A. MILLS.