No. 840,127. PATENTED JAN. 1, 1907.

C. E. GLESSNER.

TRIPPING MECHANISM FOR MACHINERY.

APPLICATION FILED JAN. 22, 1906.

5 SHEETS—SHEET 1.

Fig. 1.

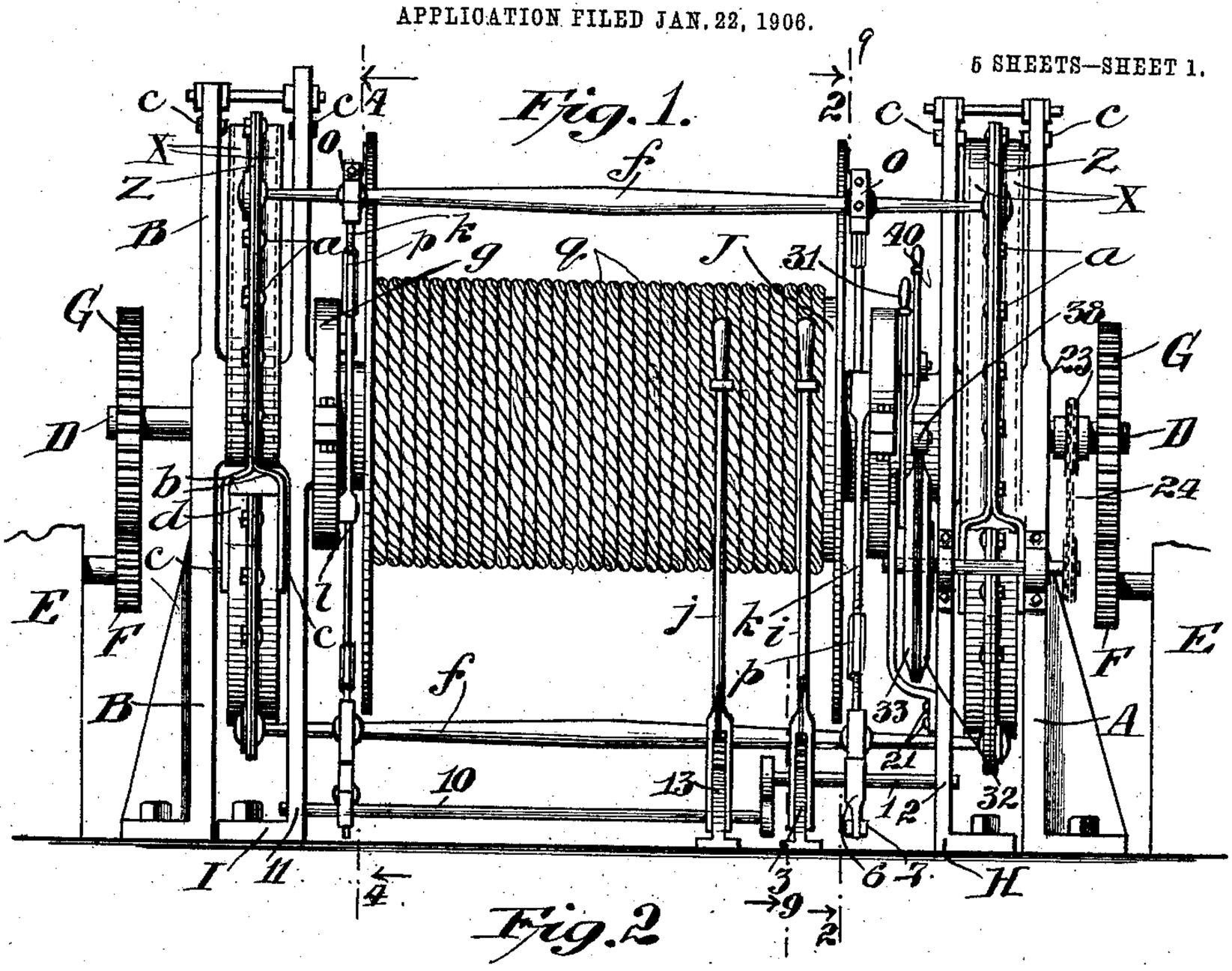
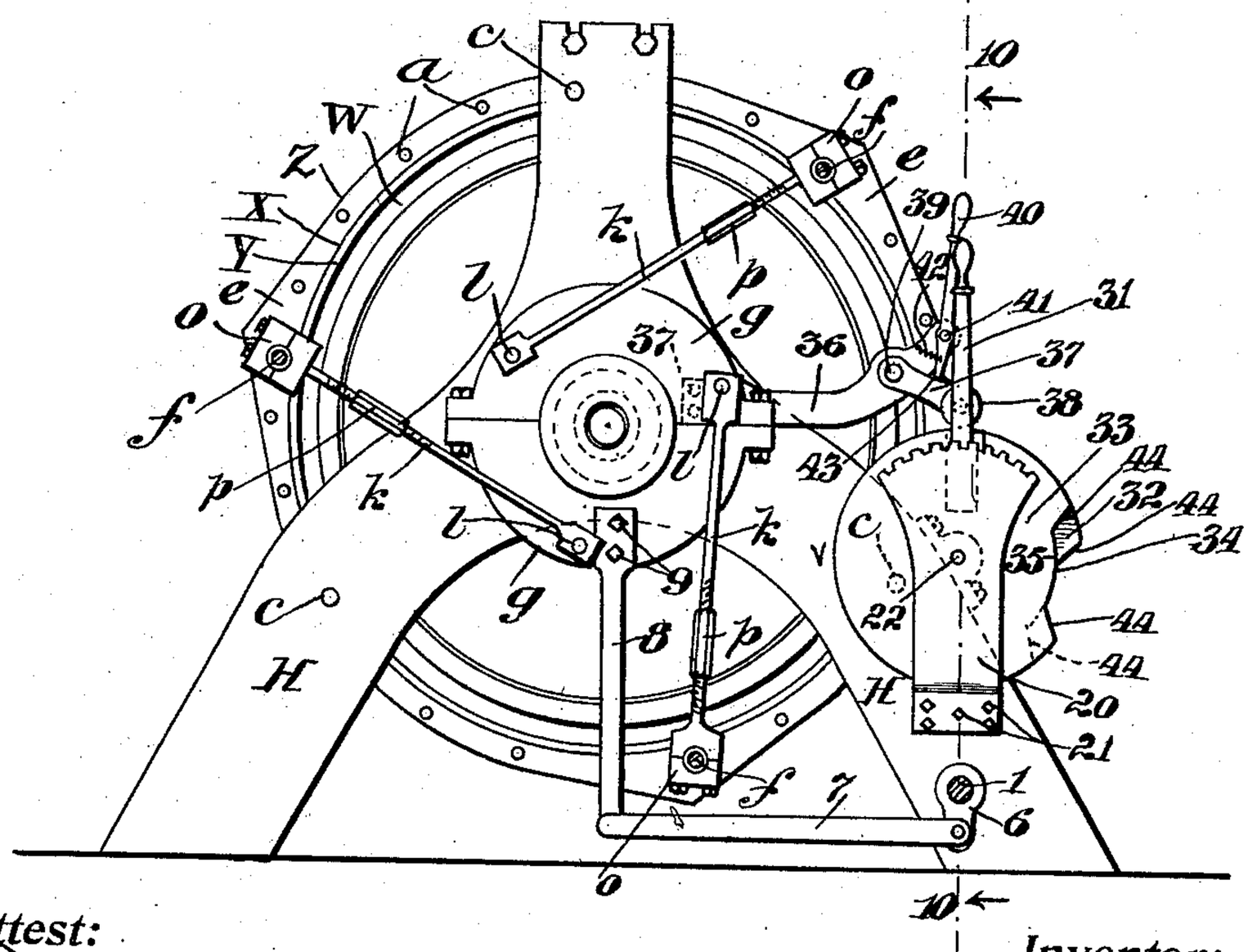


Fig. 2.



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5 SHEETS—SHEET 2.

Fig. 3.

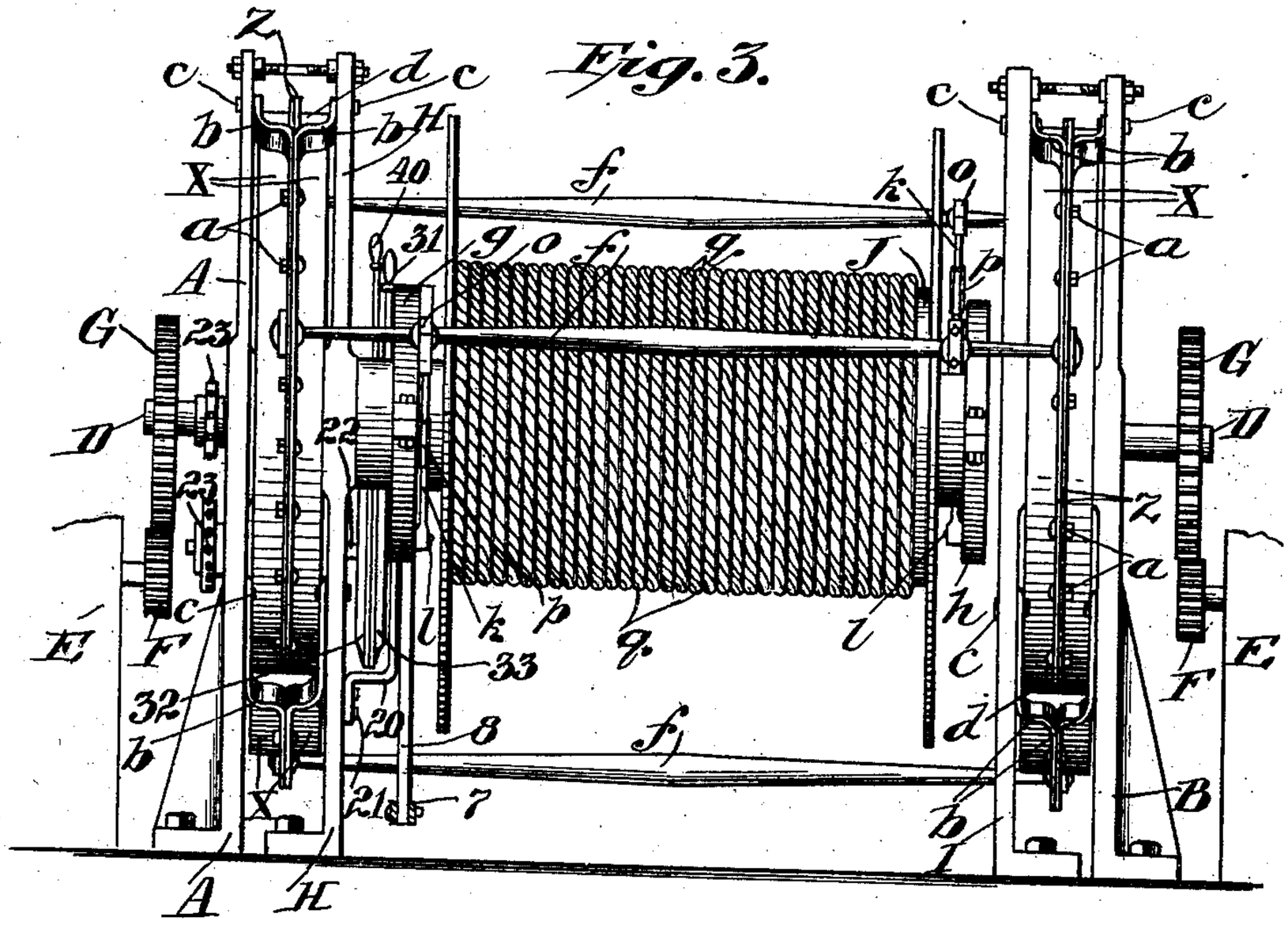
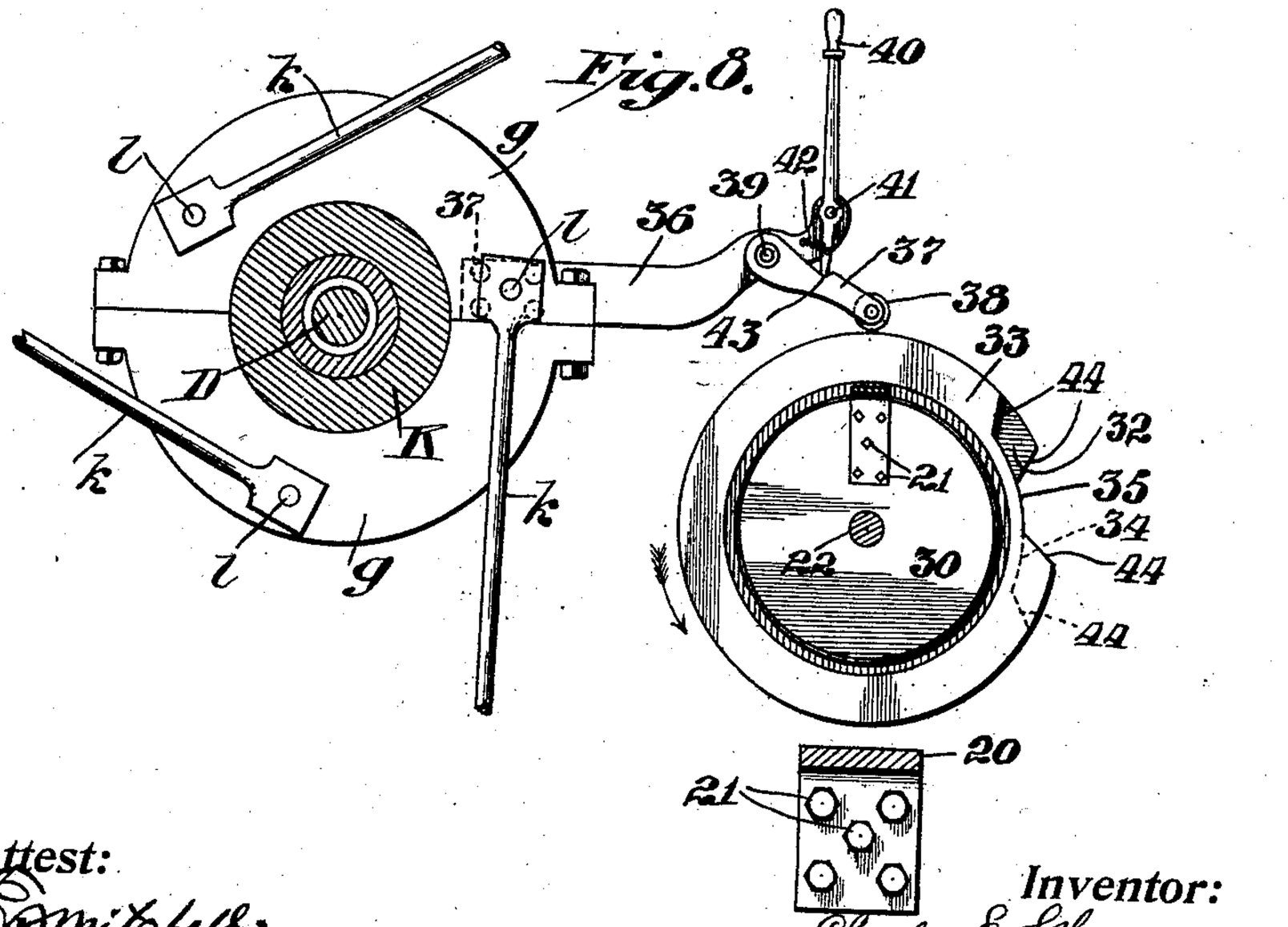


Fig. 8.



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5 SHEETS—SHEET 3.

Fig. 4.

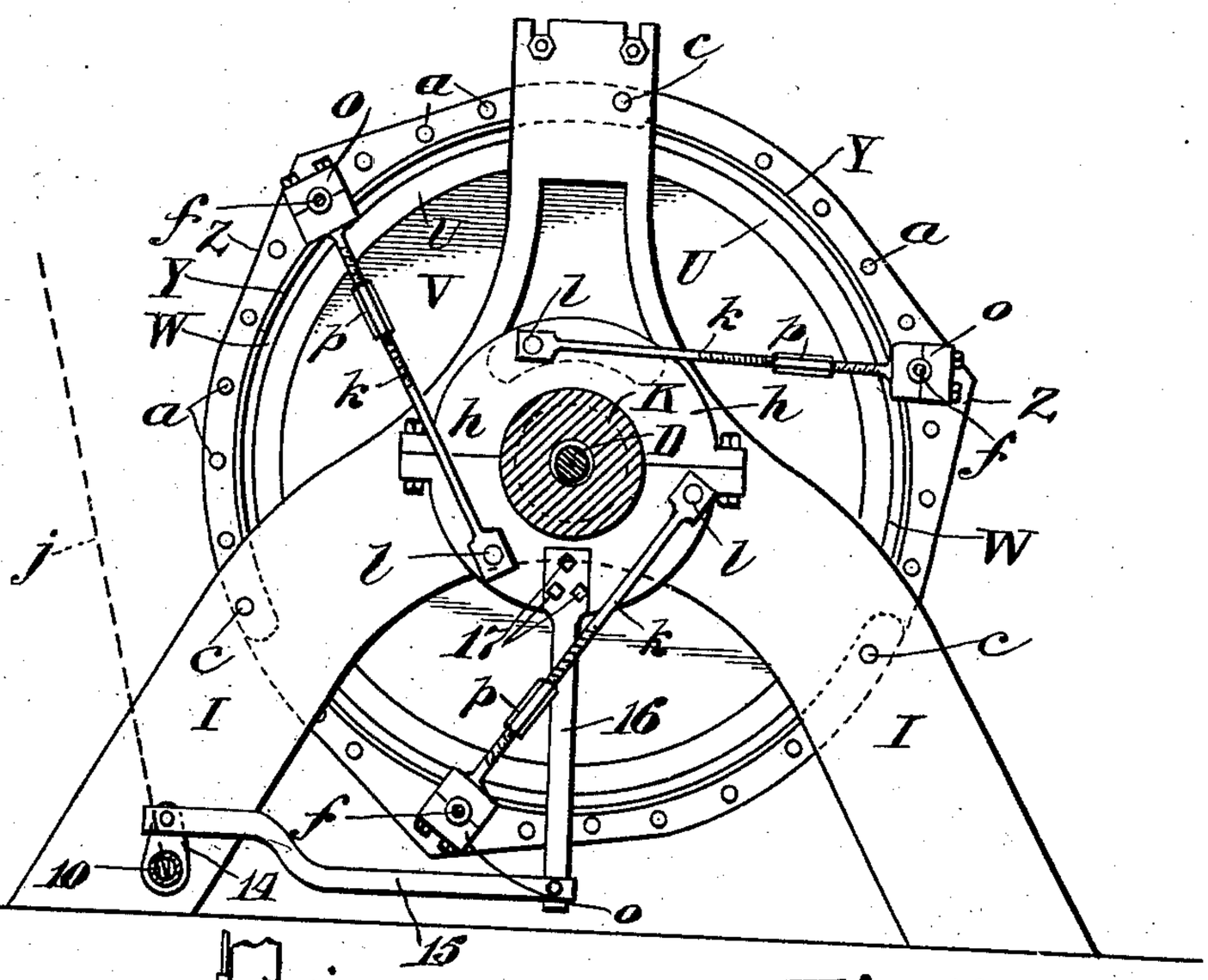


Fig. 9.

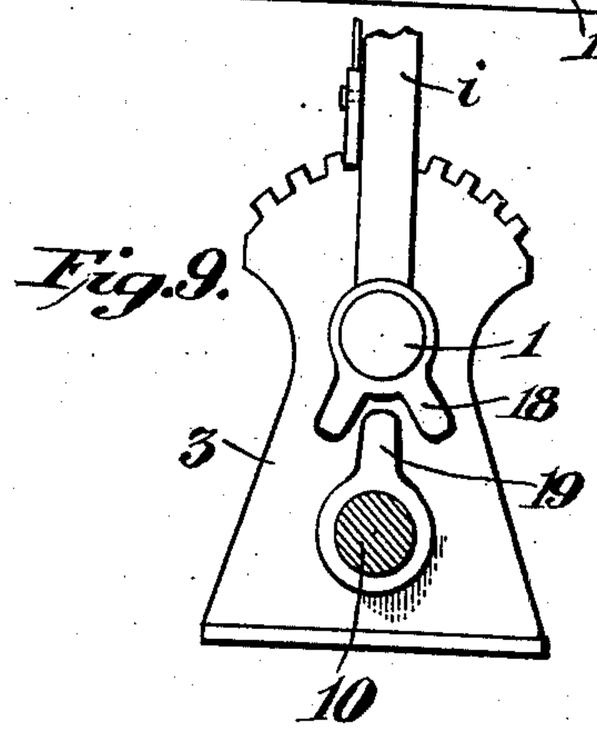
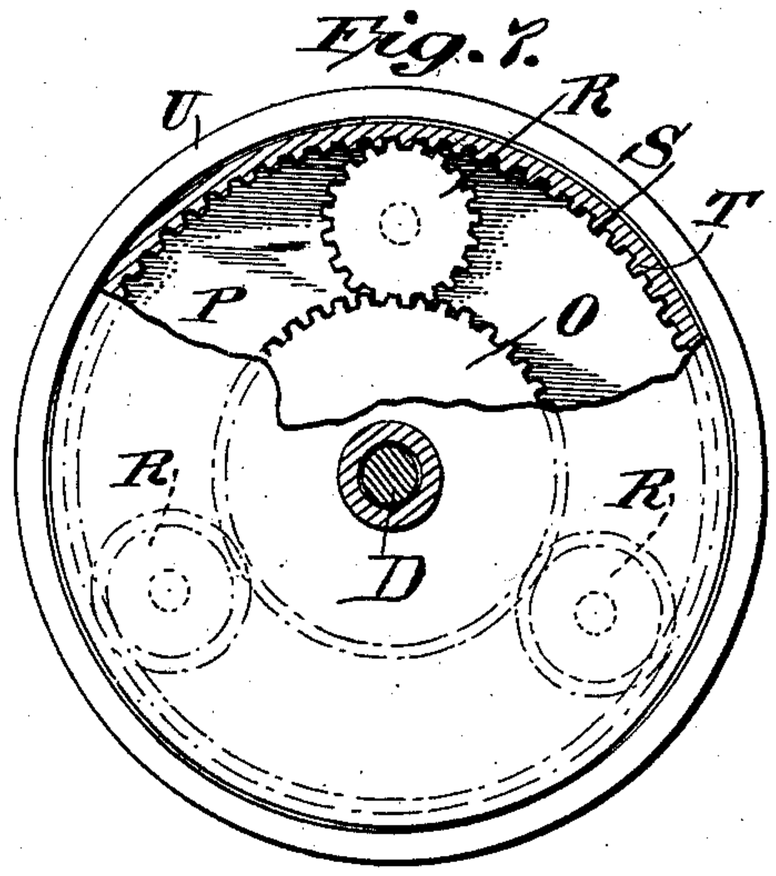


Fig. 7.



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5 SHEETS—SHEET 4.

Fig. 5.

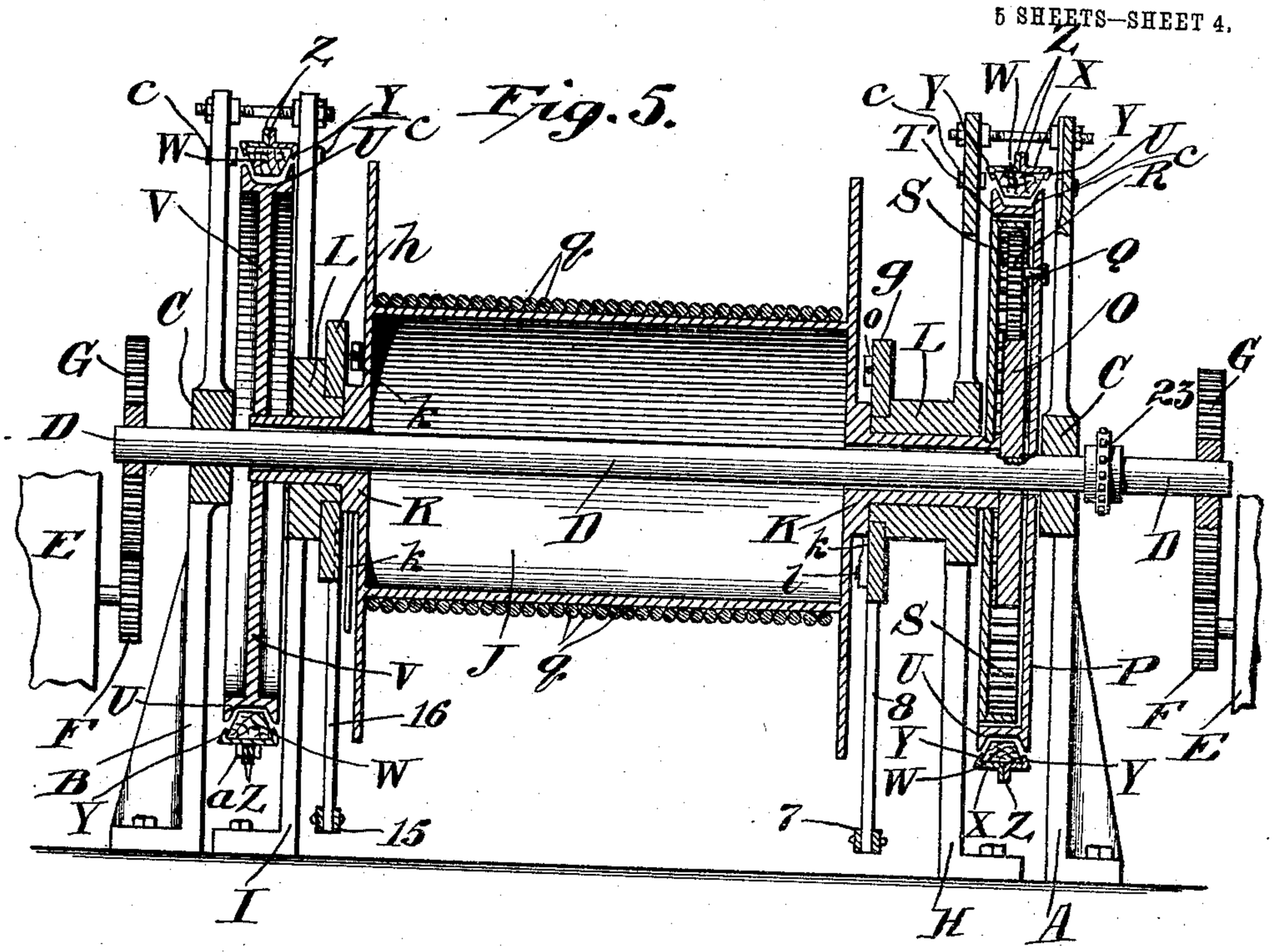
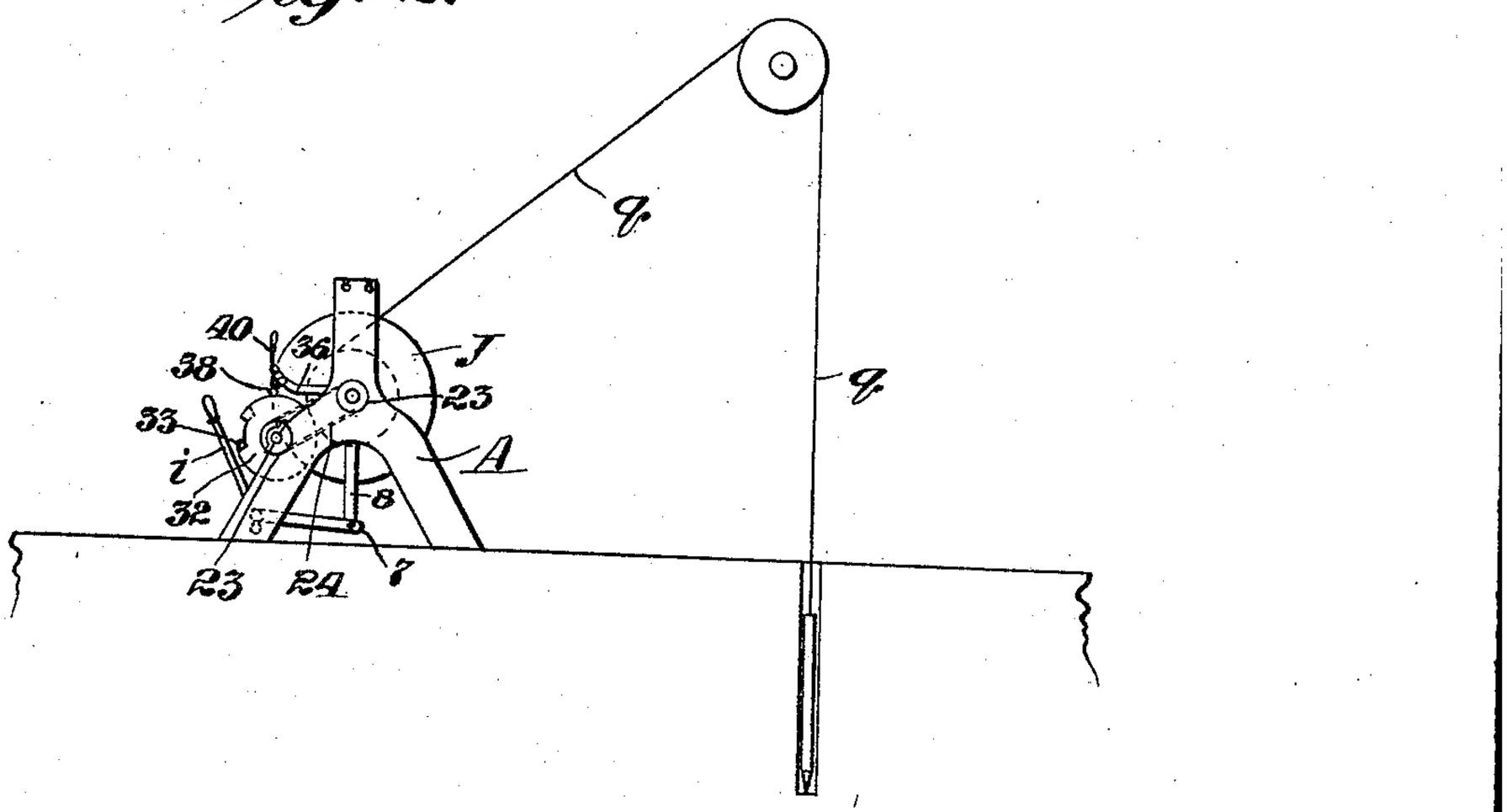


Fig. 12.



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5 SHEETS—SHEET 6.

Fig. 6.

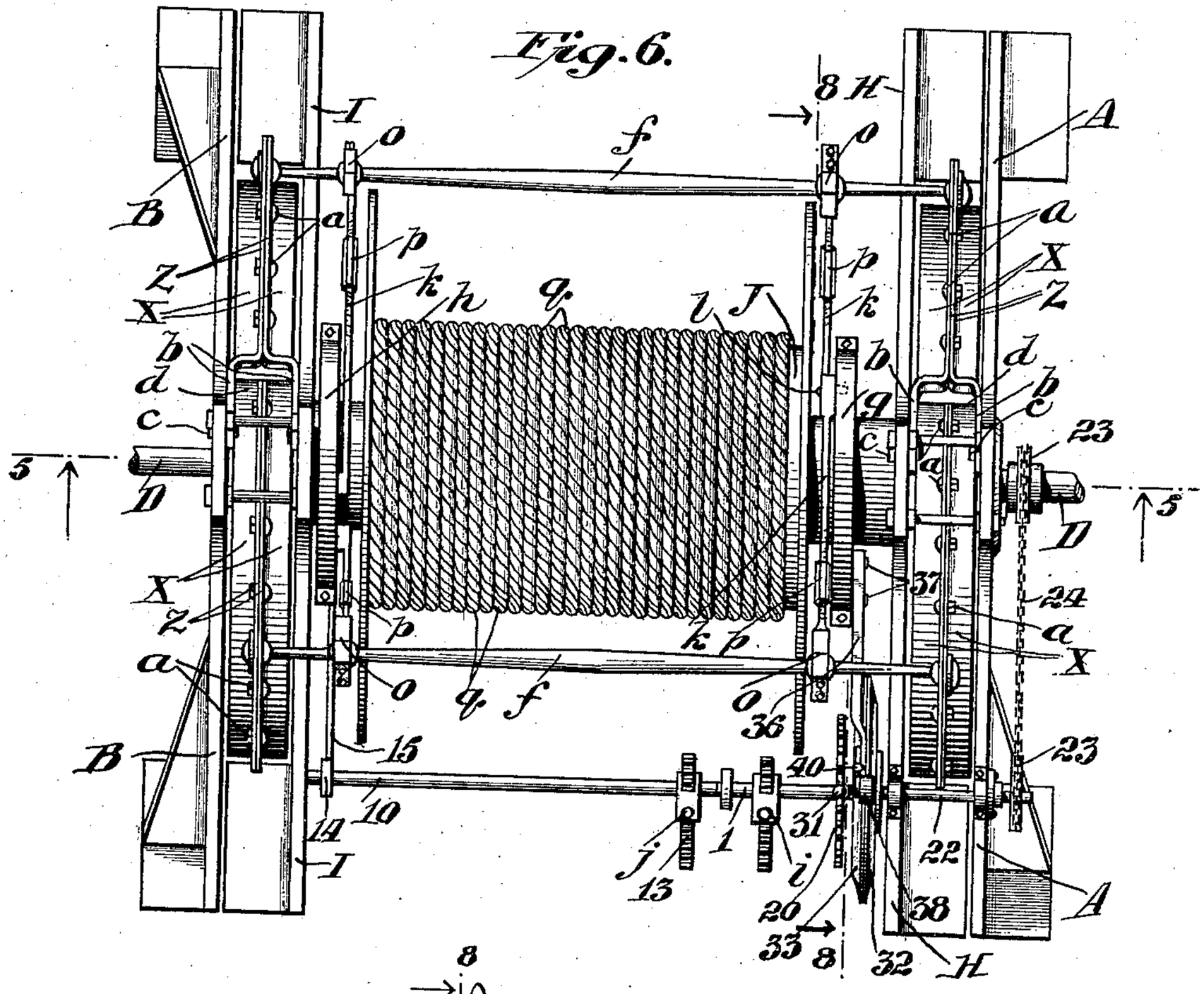


Fig. 10.

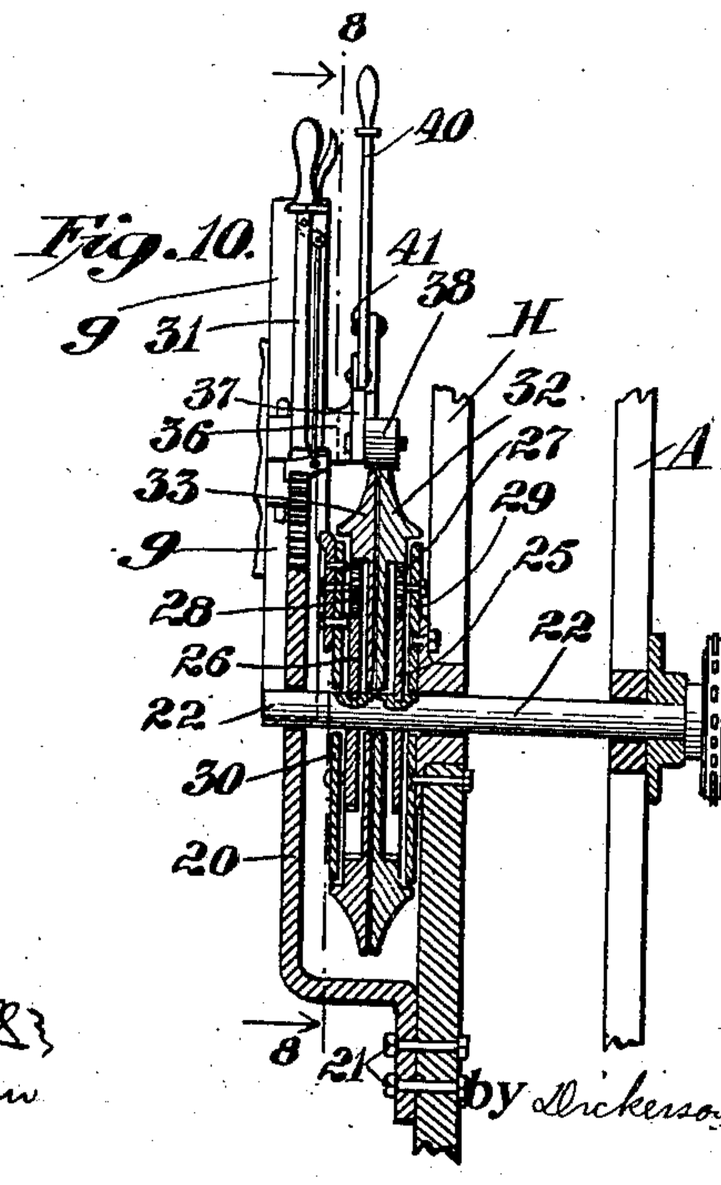
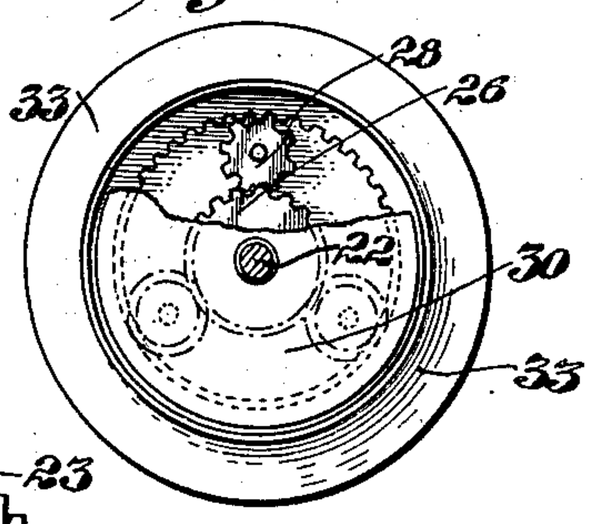


Fig. 11.



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UNITED STATES PATENT OFFICE.

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TRIPPING MECHANISM FOR MACHINERY.

No. 840,127. Specification of Letters Patent. Patented Jan. 1, 1907.

Application filed January 22, 1906. Serial No. 297,156.

To all whom it may concern:

Be it known that I, CHARLES E. GLESSNER, a citizen of the United States, and a resident of Ouray, county of Ouray, State of Colorado, have invented certain new and useful Improvements in Tripping Mechanism for Machinery, of which the following is a specification accompanied by drawings.

This improvement relates to tripping mechanism for machinery which operates intermittently or periodically—as, for instance a well-drill—although the invention is not limited to such drills and may be applied in any connection in which it is found useful.

The invention more particularly relates to tripping or controlling devices for controlling the intermittent movements of the apparatus.

In a well-drill the drill is intermittently raised and dropped by means of machinery which is constantly rotating in the same direction, and this invention contemplates improvements in the tripping device by means of which the drill is thus automatically raised and dropped.

The improvement in tripping devices may also be applied to many different uses—as, for instance, to mechanism adapted to be set to act at certain times and in general in automatic machinery which is adapted to operate intermittently or periodically.

The objects of this invention are primarily to improve upon the construction and operation of tripping devices adapted to be applied to different classes of automatic machinery and also to improve upon the construction of well-drills, I having illustrated the tripping devices in connection with a well-drill in this instance, and thereby I am enabled to do away with the ordinary walking-beam in such well-drilling machinery.

Further objects of the invention will hereinafter appear; and to these ends the invention consists of apparatus for carrying out the above objects embodying the features of construction, combinations of elements, and arrangement of parts having the general mode of operation substantially as hereinafter fully described and claimed in this specification and shown in the accompanying drawings, in which—

Figure 1 is a front elevation of a well-drill embodying the invention. Fig. 2 is a transverse sectional elevation on the line 2 2 of Fig. 1 looking in the direction of the arrows. Fig. 3 is a rear elevation of the machine. Fig. 4 is a transverse sectional elevation on the line 4 4 of Fig. 1 looking in the direction of the arrows. Fig. 5 is a longitudinal sectional view of the machine on the line 5 5 of Fig. 6 looking in the direction of the arrows. Fig. 6 is a top plan view of the machine. Fig. 7 is a face view, partly in section and partly broken away, of the main transmission-gearing of the machine. Fig. 8 is an enlarged detail transverse sectional view of the tripping device on the line 8 8, Fig. 6, looking in the direction of the arrows. Fig. 9 is an enlarged detail transverse sectional view on the line 9 9 of Fig. 1 looking in the direction of the arrows, showing the means for tying the two main controlling-levers together. Fig. 10 is an enlarged detail vertical longitudinal sectional view through the tripping device on the line 10 10 of Fig. 2 looking in the direction of the arrows. Fig. 11 is a face view, partly in section and partly broken away, of the transmission-gearing shown in Fig. 10. Fig. 12 is a diagrammatic view showing the relation between the drill and the drilling machinery.

A and B are frames having bearings C for the shaft D, connected to be driven by the motors E, geared thereto by the pinions F and gears G.

Arranged inside of the frames A and B are the main frames H and I for supporting the hollow drum J, provided with hollow trunnions K, loose upon the shaft D and turning loosely in bearings L in the frames H and I. The drum J is connected to be driven from the shaft D by means of suitable transmission-gearing, by means of which the engine or motor may run continuously, while the drum may be connected to be operated from the engine or permitted to run idly about the shaft D in the drum-bearings L in the frames H and I. As shown, there is a gear O connected to the shaft D, as by a key, and loose on the shaft D is a disk P, to the periphery of which is adapted to be applied a brake, so that said disk may be held from rotation or permitted to rotate freely or permitted to slip under the brake-shoes.

Pivoted to the rotatable disk P on studs Q are planetary pinions R, meshing with the gear O and also meshing with the internally-toothed gear S, having a toothed rim T,

adapted to fit beneath the rim U of the brake-disk P. The internally-toothed gear S is fast upon the sleeve K of the hoisting-drum J and rotated therewith. According to whether or not the brake-disk P, carrying the pinions R, is held from rotation or permitted to rotate at varying speeds, the power will be transmitted from the shaft D to the drum J. If the brake-pressure on the brake-disk P is entirely relieved, the engine may continue operating, while the drum J can be held stationary or permitted to rotate in the opposite direction to drop the drill. Means are provided for applying a brake to the drum J, as by means of the brake-disk V, connected to rotate with the hollow trunnion K of the drum J, by means of which the drum may be stopped. Both disks P and V are provided with grooved peripheries U, to which the brake-shoes conform.

W represents a wooden shoe gripped between steel angle-irons having inwardly-projecting flanges Y. The upright legs Z of the angle-irons are connected together by means of bolts *a*, and means are provided for pivoting said angle-irons around the periphery of the brake-disks P and V, and operating means are also provided for tightening and loosening said brake-shoes upon the peripheries of said disks. The upright legs Z of the angle-irons X are bent outwardly at the heel of each shoe to form lugs or ears *b*, which are pivoted on the pins *c* between the frames A and H and B and I around the peripheries of the disks P and V. The toe *d* of each shoe preferably extends between the forked ears *b* of the shoe immediately in front. The webs or vertical legs Z of the shoe angle-irons are provided with bearings for the brake-beams *f* at their middle portions *e*.

Disks *g* and *h* are provided, one adjacent each drum and rotatably seated in bearings on frames H and I, respectively, and connected to be rotated by the hand-levers *i* and *j*. The disks *g* and *h* are pivotally connected by brake-levers *k* to the brake-beams *f*. By adjusting the hand-lever *j* the throw and position of the brakes with relation to the disk P may be varied, thereby adjusting the brakes and relative parts to meet the varying conditions under which the machine may be operated.

The levers *k* for the brake-shoes on the periphery of the brake-disk P are pivoted at the points *l* to the disk *g* and are pivoted, by means of ball-and-socket joints *e*, to the brake-beams *f*. The levers *k* are provided with turnbuckles *p*. The levers *k*, connected to the disk *h* at the other side of the drum, are constructed in the same manner and connected to the brake-beams by similar ball-and-socket joints. The brake-shoes for each brake-disk P and V are pivoted on the frames of the machine at the point *c*.

Operating-lever *i* is fast to the shaft 1, which is rotatably supported in a bearing 2 in the main frame H and in a bracket 3. The lever *i* is forked and straddles the bracket 3. The outer end of the shaft 1 is provided with a downwardly-extending arm 6, fast thereto, to which is pivotally connected one end of the link 7, the other end of said link being pivotally connected to an arm 8, in turn connected to the disk *g* by means of the bolts 9, so that the arm 8 turns with the disk *g*. By operating a hand-lever *i* the disk *g* may be rotated. By pressing the lever *i* inward the disk *g* will be rotated in a direction to tighten the brake-shoes upon the periphery of the disk P, and by pulling the brake-lever outward the brake-shoes on the lever P will be loosened. The hand-lever *j* is connected to a longitudinally-extending shaft 10, supported in the bearing 11 in the frame I and in the bracket 12. The lever *j* straddles the toothed segment 13, and a spring-pressed pawl connected to the lever *j* coöperates with said teeth. The shaft 10 is provided with an upwardly-extending arm 14 at its outer end, having one end of a link 15 pivotally connected to an arm 16, connected to the disk *h* by bolts 17, so that the disk and arm 16 move together. By pulling the hand-lever *j* outward the disk *h* will be rotated in a direction to loosen the brakes upon the disk V, and by pushing the arm *j* inward the brakes will be tightened on said disk. The shaft 1 is provided with a fork 18, and the shaft 10 has a coöperating lug or ear 19, which enters the fork 18 and has a certain play therein. According to this construction the rotation of one shaft will cause rotation of the other shaft in an opposite direction.

I have thus far described a suitable machine which may be manually operated to raise a load or weight by the power applied and permit the load to fall of its own weight. These operations are to be automatically accomplished in a well-drill, for instance. The hoist, briefly described in this application, forms the subject-matter of my copending application, Serial No. 293,922, filed December 30, 1902, and is not claimed herein. By throwing the brakes onto the disk P the drum is caused to wind up the rope and raise a weight. By loosening said brakes the transmission-gear is allowed to run idle, and the drum rotates in the opposite direction to permit the rope to unwind and let the weight fall. The reverse rotation of the drum may be arrested at any desired moment by means of the brakes operated from the hand-lever *j*. In accordance with this invention controlling apparatus in the form of a tripping device is combined with the machine in such manner that the hand-lever *i* becomes in a sense an auxiliary lever for emergency purposes and is, in fact, made subordinate to the control and operation of the tripping device. I have shown and will describe my improved

form of tripping device which may be readily applied not only to this machine, but to other machines and will cause the intermittent movement desired of the drill. This tripping device is constructed and devised to automatically apply the brakes W to the disk P during the time that it is desired the drill shall be raised and then automatically release said brakes and permit the drill to fall, thereafter automatically picking the drill up and raising it, and thus continuing the operations indefinitely. The engine for operating the machine will be continuously running. The apparatus is also contrived to shut off the tripping device at any desired time; but the hand-lever *i* becomes a secondary feature, because it cannot be operated until the tripping device is thrown out of operative relation. The advantage of having the lever *i* is to enable the machine to be used as a hoist or for hauling, if desired.

In the drawings a bracket 20 is suitably connected to the frame H, as by means of bolts 21, and a counter-shaft 22 is supported in bearings in this bracket 20 and in the frame A. The counter-shaft is connected to be driven from the main shaft D, as by means of the sprockets 23 and chain 24, although any other suitable form of driving connections may be provided. The counter-shaft 22 supplies power to the tripping device, which is continuously operating and comprises, broadly, a duplex transmission-gear of substantially the same character as the transmission-gear for the main machine. The tripping device may be placed in any convenient position relative to the machine, and in this instance, as shown, is carried on the side of the frame toward the operator, so that the controlling-levers of the tripping device may be readily accesssible.

On the counter-shaft 22 are two gears 25 and 26. Meshing with these gears are planetary pinions 27 and 28, carried on studs connected to disks 29 and 30. The disk 29 is connected to the frame H in any suitable manner so that it is held rigidly, while the disk 30 is rotatable about the shaft 22 as a center and is provided with an operating lever-arm 31 for rotating said disk 30 through an angle. Meshing with the planetary pinions 27 and 28 are internally-toothed disks 32 and 33, loose on the shaft 22, so that said disks continuously rotate in the same direction with the same speed and side by side Each of these disks 32 and 33 is provided with a high portion and a low portion, said low portion being formed by the slots 34 and 35. Since the disk 32 is fixed by means of disk 29, the position of its slot remains fixed; but the disk 33 may be rocked or rotated through an angle relatively to disk 32 by means of disk 30, and therefore the position of its slot 35 relative to the slot 34 may be varied, and thus the low portion on the periphery of both disks may be entirely eliminated, if desired, or varied in amount as desired while the machine is running.

The brake-disk *g* is provided with an arm 36, suitably connected thereto, as by means of the bolts 37. This arm extends outwardly over the revolving disks 32 and 33 and is provided with a small pivoted arm or finger 37, provided with a bearing-roller 38, adapted to bear upon the peripheries of the disks 32 and 33 and follow the high and low portions therewith, so that whenever the low portion formed by the slots comes under the roller 38 said roller drops therein. By this means the disk *g* is adapted to be rocked slightly and operate the brakes on the disk P.

Means are provided for throwing the roller 38 out of operative relation with the revolving disks, and in this instance the arm 37 is pivoted to the arm 36 at 39, and a stop or lever 40 is pivoted at 41 to the outer end of the arm 36 and is provided with a spring 42, which is adapted to draw the lower end of the arm 40 inward and cause its lower end to bear against the top of the arm or finger 37, thus forming an abutment for said finger and making the arms 36 and 37 as one piece. The upper surface of the arm 37 is preferably provided with a slight socket or depression 43, into which the lower end of the locking-lever 40 is adapted to snap. This lever 40 may be moved out of operative relation whenever desired, in which case the finger 37 will rotate on its pivot 39 relatively to the arm 36, and the brakes on the disk P will not be operated by the rotation of the disks 32 and 33. The direction of rotation of the disks 32 and 33 is in the direction of the arrow, and the slope of the edges 44 of the slots 34 and 35 is such that the drill will be picked up gradually.

In the operation of the machine let it be assumed that a well is being drilled, as is shown diagrammatically in Fig. 12. The brake-lever *j* will be locked, so that the brakes on the disk V will not be applied in order to permit the drum to rotate freely. The other lever *i* will be loose or floating and will have no effect on the operation of the machine unless an emergency occurs. The tripping device will be operating, and let it be assumed that the locking-arm 40 is in operative relation so that the roller 38 is bearing upon the peripheries of the disks 32 and 33 and forms a rigid part of the arm 36. Under these conditions and with the shaft D being driven from the source of power the brakes will be applied to the disk P as long as the roller 38 bears upon the high portions of the disks of the tripping device, and when the low portion or slot falls under the roller 38 the roller will drop therein and the arm 36 will fall slightly, thereby rocking the brake-disk *g* and releasing the brakes on the disk P. This operation will continue automatically

and the drill will be automatically raised and dropped. By varying the width of the slot in the periphery of the disks the time of the fall may be regulated. In order to raise the drill entirely out of the hole, so that other tools may be attached to the drill-rope, the slot in the tripping device is entirely closed up and the machine is permitted to wind up the rope to the desired point, and the brakes may be applied by the lever *j* to hold the drum with the drill in its raised position.

Obviously some features of this invention may be used without others and the invention may be embodied in widely-varying forms.

Therefore without limiting the invention to the devices shown and described and without enumerating equivalents, I claim, and desire to obtain by Letters Patent, the following:

1. In tripping mechanism for machinery, the combination of a plurality of continuously-rotating disks having high and low portions, means for varying the angular position of one disk relatively to the other and a follower adapted to bear upon the peripheries of said disks.

2. In tripping mechanism for machinery, the combination of at least two continuously-rotating disks, each having a high and a low portion, means for varying the angular position of one disk relatively to the other, and a follower adapted to bear upon the peripheries of said disks.

3. In tripping mechanism for machinery, the combination of two continuously-rotating disks, each provided with a gap in its periphery, means for varying the relative position of said gaps, and a follower adapted to bear upon the peripheries of said disks.

4. In tripping mechanism for machinery, the combination of two disks adapted to be continuously rotated, each provided with a gap in its periphery, said gaps being arranged opposite each other, means for varying the width of the gap formed in the periphery of said two disks, and a follower adapted to bear upon said periphery.

5. In tripping mechanism for machinery, the combination of two disks adapted to be continuously rotated, each disk having a gap in its periphery, means for varying the width in the gap of the periphery of the two disks and for entirely closing said gap, and a follower adapted to bear upon the periphery of the disks.

6. In tripping mechanism for machinery, the combination of a shaft adapted to be continuously rotated, two planetary transmission-gears, mechanisms adapted to be arranged side by side and adapted to be operated by said shaft, each of said transmission mechanisms having continuously-rotating disks, said disks being provided with high and low portions, means for varying the angular position of one disk relatively to the other and a follower adapted to bear upon the peripheries of said disks.

7. In tripping mechanism for machinery, the combination of a shaft adapted to be continuously rotated, two planetary transmission mechanisms adapted to be operated by said shaft, each of said mechanisms being provided with continuously-rotating disks rotating at substantially the same speed side by side, each of said disks being provided with a gap in its periphery arranged substantially opposite each other, means for varying the width of the gap formed in the periphery of said disks, and a follower adapted to bear upon the said periphery.

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

CHARLES E. GLESSNER.

Witnesses:

E. VAN ZANDT,

A. L. O'BRIEN