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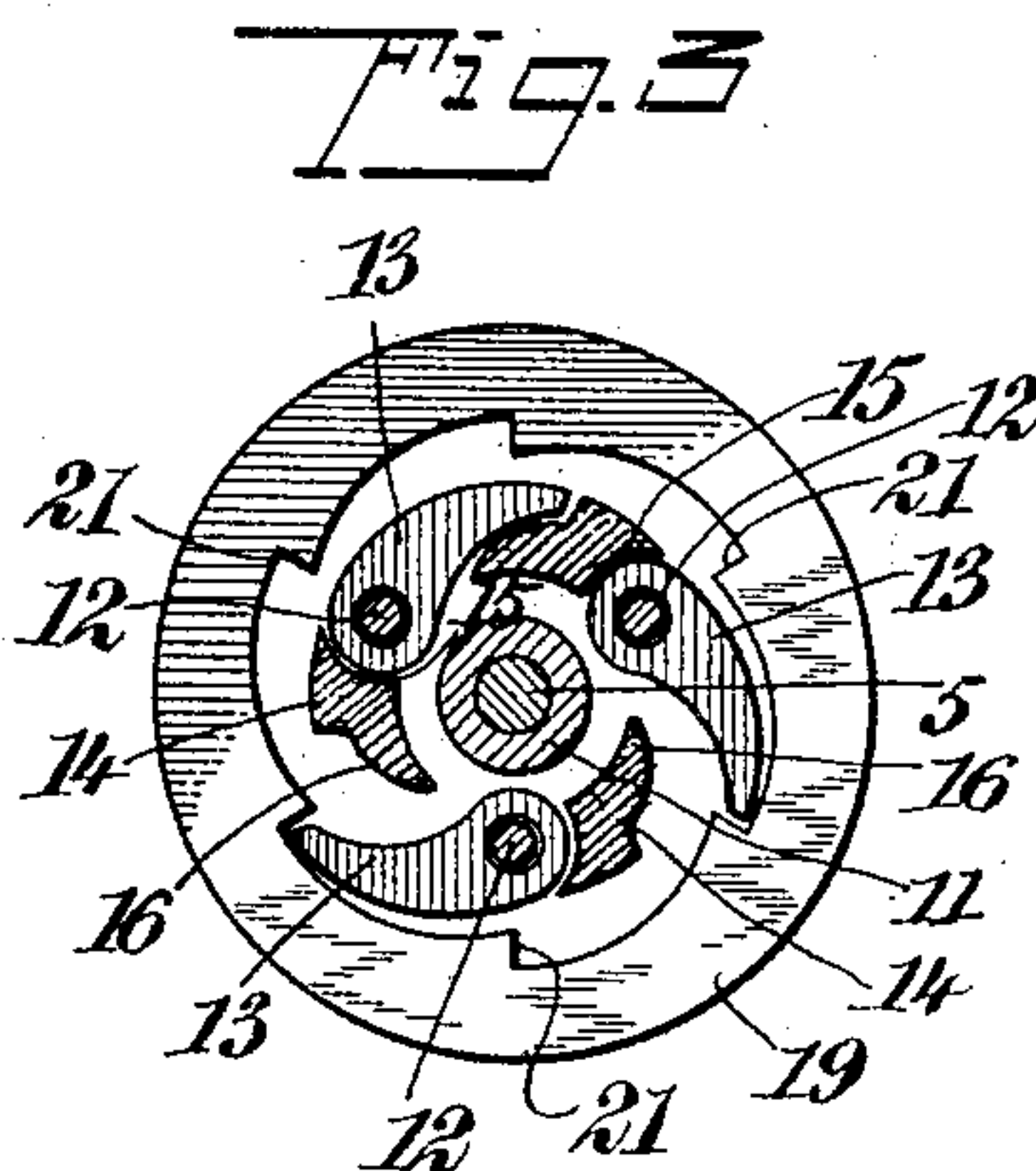
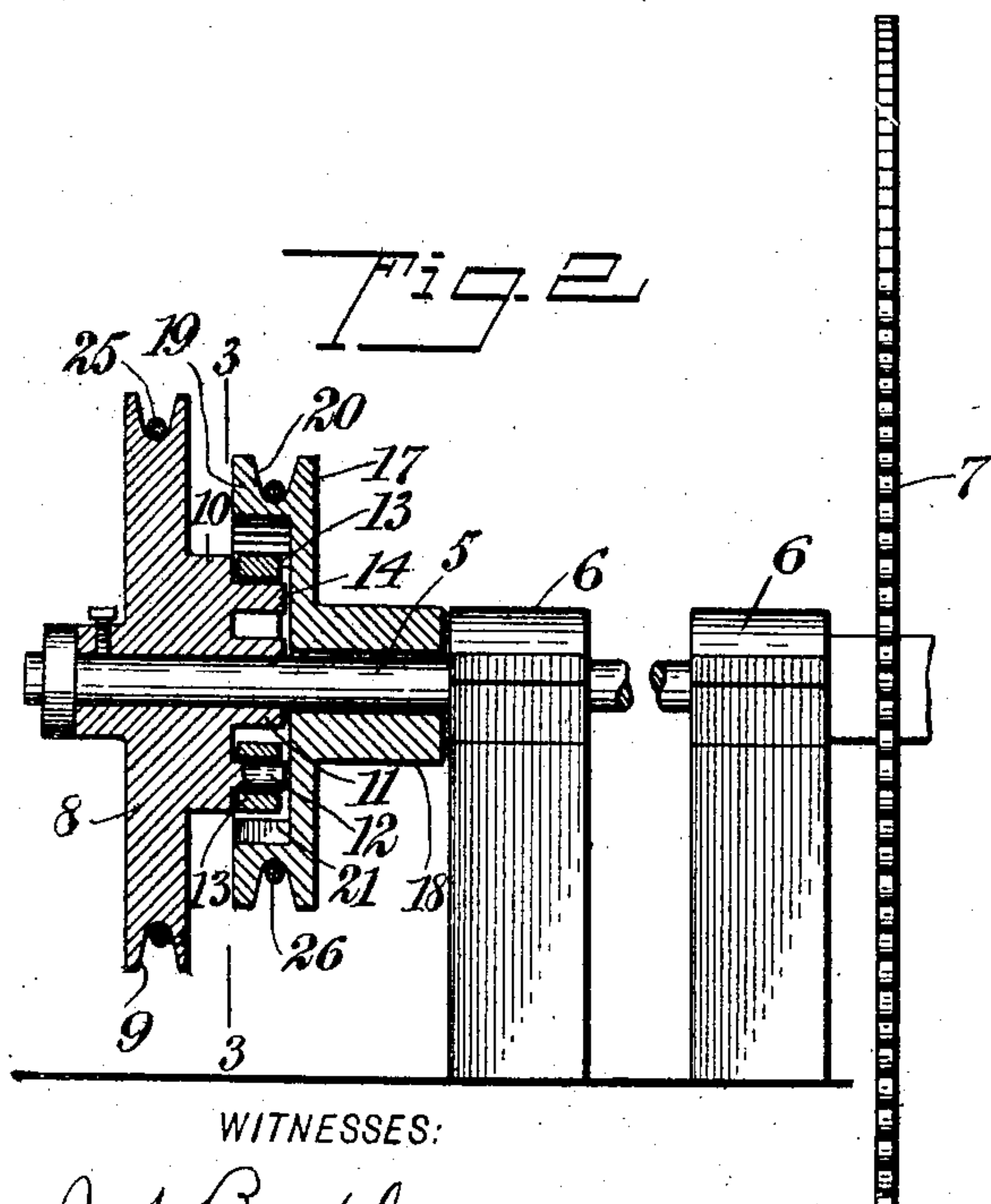
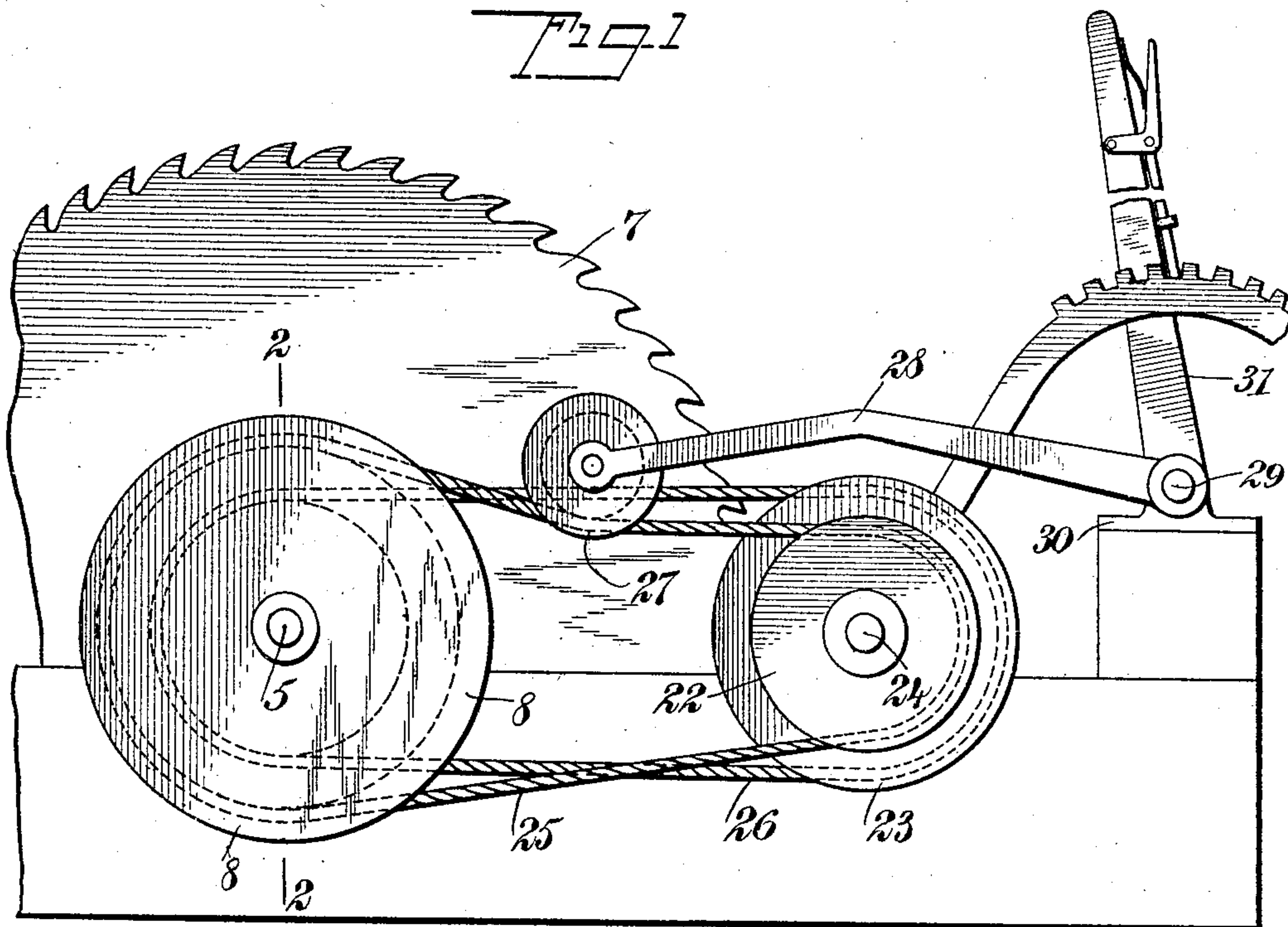
PATENTED JULY 12, 1904.

R. C. KILLAM.  
CHANGEABLE SPEED GEAR.

APPLICATION FILED JULY 8, 1903. RENEWED JUNE 21, 1904.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

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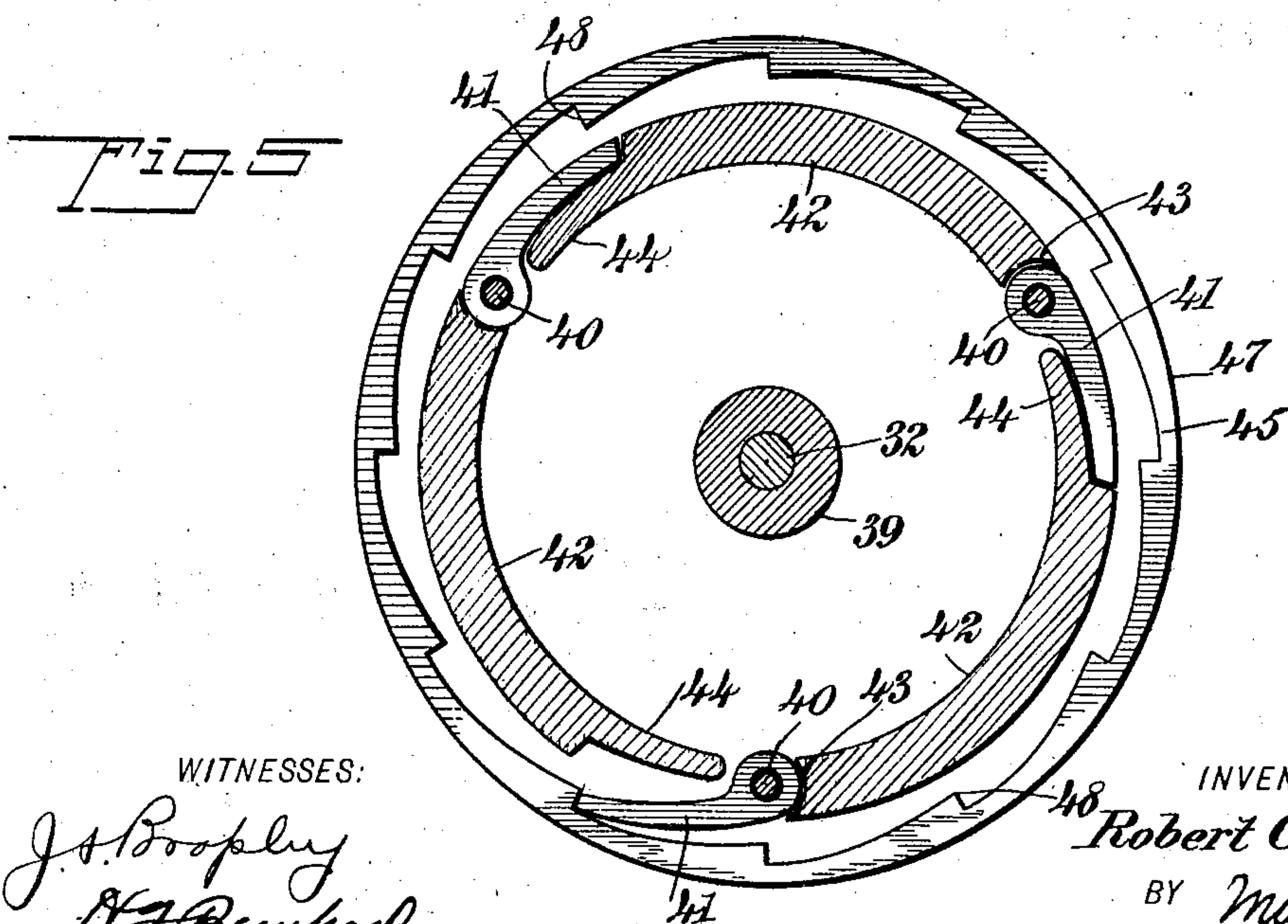
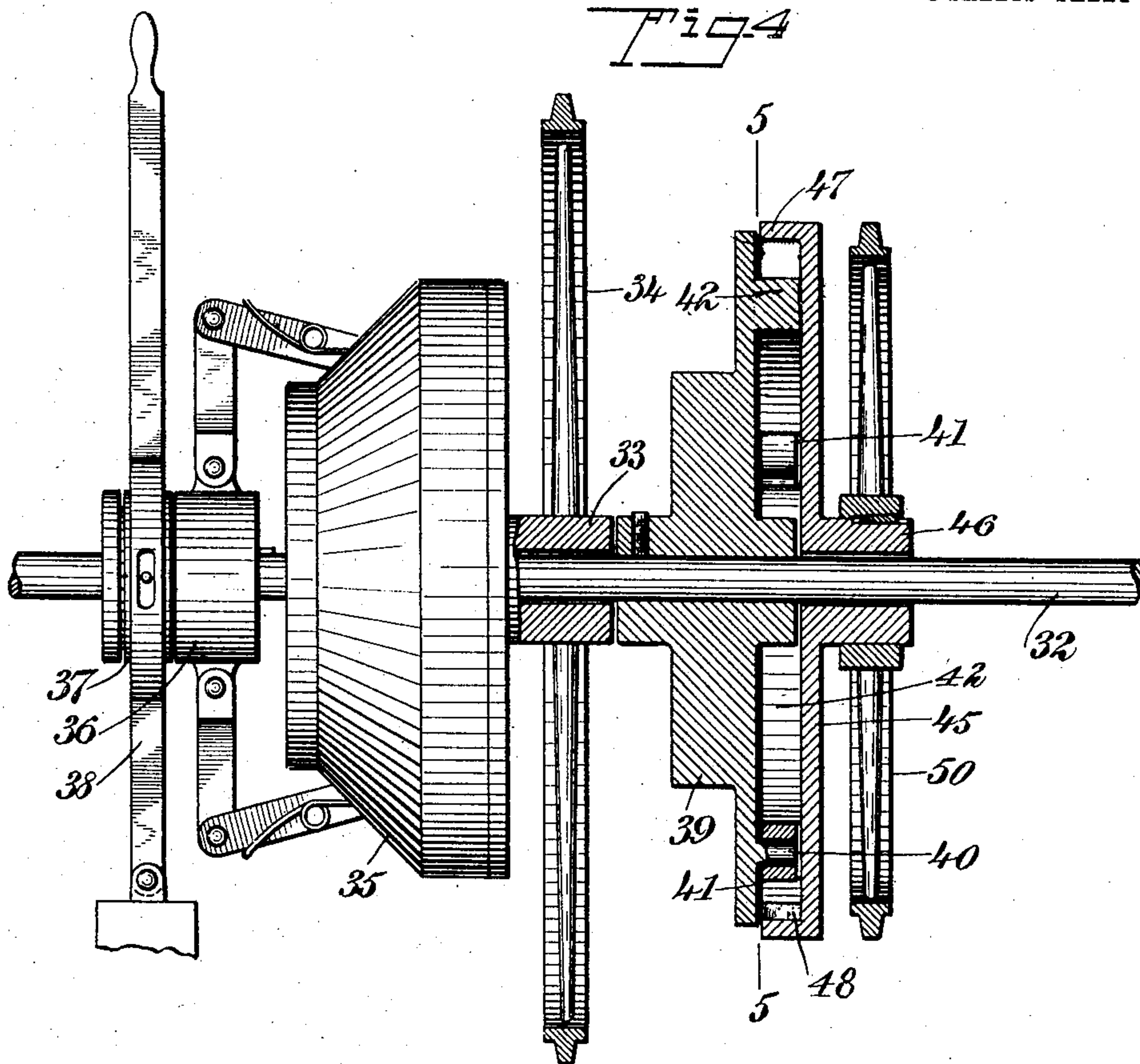
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WITNESSES:

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# UNITED STATES PATENT OFFICE.

ROBERT C. KILLAM, OF FAUST, NEW YORK, ASSIGNOR TO URBAN W. KILLAM, OF SANTA CLARA, NEW YORK.

## CHANGEABLE-SPEED GEAR.

SPECIFICATION forming part of Letters Patent No. 765,141, dated July 12, 1904.

Application filed July 8, 1903. Renewed June 21, 1904. Serial No. 213,506. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT C. KILLAM, a citizen of the United States, and a resident of Faust, in the county of Franklin and State of New York, have invented a new and Improved Changeable-Speed Gear, of which the following is a full, clear, and exact description.

My invention relates to improvements in changeable-speed gear, the same being adapted for use in machinery generally and in connection with different styles of transmission devices—such as belts and pulleys, sprocket-gearing, spur-gearing, and the like. One field wherein the changeable-speed gearing may be used advantageously is in sawing machinery and in connection with a friction-feed for circular saws or in planing-mill edgers wherein light or heavy lumber is to be edged.

The object of the invention is to provide a simple, compact, and durable form of changeable-speed gear wherein the desired change from high speed to slow speed, and vice versa, may be easily and quickly effected by the adjustment of a single lever, which is placed within convenient reach of the operator.

Further objects and advantages of the invention will appear in the course of the subjoined description, and the novelty will be defined by the annexed claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of one embodiment of a changeable-speed gear constructed in accordance with my invention and showing the same applied to a sawmill. Fig. 2 is a cross-section in the plane of the dotted line 2 2 of Fig. 1. Fig. 3 is a section at right angles to Fig. 2 on the line 3 3 thereof. Fig. 4 is an enlarged sectional elevation illustrating another embodiment of my improved changeable-speed gear, and Fig. 5 is a transverse section on the line 5 5 of Fig. 4.

In the form of construction shown by Figs. 1 to 3, inclusive, the saw-arbor 5 is journaled in appropriate bearings 6 and equipped at one end with a circular saw 7. This saw-arbor is adapted to be driven by a pulley or

any other well-known means, and on this arbor is rigidly secured the fast high-speed member 8 of my improved changeable-speed gear. Said member 8 is shown in the form of a pulley having a grooved rim 9, and the member is made fast with the arbor 5 by a key or set-screw. The hub 10 of the fast high-speed member 8 is extended or prolonged laterally in order to form a disk 11, and from the face of this disk projects a series of studs 12, on which are loosely hung a series of pawls 13. The disk 11 is provided between the pawls with a series of abutments 14, each of which is provided with a recess 15, adapted to receive the curved heel of a pawl. The abutments 14 are tapered toward their other ends and provided with curved faces 16, which lie in the path of the free ends of the pivoted pawls 13, said pawls being adapted in their closed positions to engage with said faces of the abutments, which serve as stops in limiting the inward movement of the pawls, thereby preventing the latter from moving out of positions for engagement with the internal ratchet on a slow-speed member 17 of the changeable-speed gear. This member 17 is represented by Figs. 1 to 3, inclusive, in the form of a loose pulley having an elongated hub 18 and a laterally-extended flange 19. The periphery of the pulley is provided with an annular groove 20. The flange 19 extends from the slow-speed member 17 toward the high-speed member 8, and said flange forms a housing or casing for the disk 11, the pawls 13, and the abutments 14, whereby the members 8 and 17 of the changeable-speed gear may be arranged compactly and the working parts on one member are housed within and protected by the flange of the other member. This housing-flange 19 is provided on its inner surface with a series of curved faces which form a series of shoulders 21, the latter constituting an internal ratchet which is adapted for engagement by the free ends of the pawls 13. In this style of changeable-speed gear I employ belts for the purpose of driving the driven members 22 23 on the friction feed-shaft 24 of an ordinary sawmill. The pulley 22 is disposed in the same vertical plane as the



high-speed member 8, said pulley being of less diameter than the member 8 and the parts 8 22 being operatively connected by a belt 25. The other pulley, 23, is in the same vertical plane as the slow-speed member 17, and these parts 17 23 are connected operatively by a belt 26. The belt 25 is shown as having a permanent allowance of abundant slack in order to allow the pulleys 8 22 and the belt 25 to remain idle; but the slack in this belt 25 may be taken up by the operation of the tightener-pulley 27, the latter being mounted on the free end of an arm 28, which is carried by a rock-shaft 29, the latter being mounted in appropriate bearings 30 on the sawmill-frame and having the operating-lever 31 made fast with said shaft. Under the prevailing conditions of slow speed the pawls 13 on the member 8 engage with the internal ratchet within the housing-flange 19 of the loose slow-speed member 17, thereby making the latter fast with the saw-arbor 5 and driving the belt 26, which transmits the motion to the pulley 23 and operates the shaft 24 to drive the friction-feed of the sawmill-carriage at the required slow speed. If it is desired to increase the speed of the carriage and the shaft 24, the operator moves the lever 31 toward the left in Fig. 1 and adjusts the tightener-pulley 27 into engagement with the belt 25, thus taking up the slack therein. The motion of the arbor 5 is now transmitted through the high-speed member 8, the belt 25, and the pulley 22, thereby driving the shaft 24 at an increased rate of speed owing to the difference in the diameters of the pulleys 8 22. During the prevalence of high-speed conditions the slow-speed member rotates loosely over the pawls which are carried by the high-speed member, because said member 17 runs faster than the arbor 5, on which it is mounted.

In the embodiment of the invention shown by Figs. 4 and 5 I have represented the preferred form of changeable-speed gear, wherein a friction-clutch is employed to make the high-speed member fast with the driving-shaft at will. This driving-shaft is indicated at 32, and on it is loosely mounted the hub 33 of the high-speed member 34, the latter being represented in the form of a sprocket-wheel. With this member 34 is associated any suitable form of friction-clutch, (indicated generally by 35 in Fig. 4,) and this clutch is controllable by a suitable collar 36, which is splined to the shaft 32. Said collar is provided with an annular groove to receive a loose ring 37, that is carried by a controlling-lever 38, and by moving this lever in one direction the clutch is operated to make the member 34 rotate with the shaft 32, although a reverse movement of the lever operates the clutch to disengage said member 34 and allow it to remain loose on said shaft. The slow-speed member of the improved changeable-speed gear consists of a number of parts, one

of which is a disk 39, that is made fast with the shaft 32 by a set-screw or key. The disk 39 is provided with a series of studs 40, on which are loosely hung the pawls 41. Said disk 39 is furthermore provided with a series of abutments 42, which are fast with one face of said disk, each abutment having a curved recess 43 and a reduced end 44. The recessed end of each abutment forms a seat for the heel of one pawl of the series, while the reduced end of the same abutment serves as a stop for limiting the inward movement of another pawl of the series, as clearly shown in Fig. 5. Another part of the slow-speed member is a disk 45, having an extended hub 46 and a lateral flange 47, said flange extending from the disk 45 toward the disk 39 and housing or inclosing the pawls which are carried by said disk 39. The inner surface of the flange 47 on the disk 45 is provided with a series of curved faces forming the shoulders 48, the latter constituting an internal ratchet which surrounds the series of pawls 41 and said pawls being adapted to engage with said shoulders 48 for the purpose of making the disk 45 rotate with the disk 39. The hub 46 of the disk 45 is mounted loosely on the shaft 32, and said hub is extended for the reception of a sprocket-wheel 50, which is secured rigidly to said hub 46 by a key or set-screw. It will be understood that sprocket-chains engage with the high-speed member 34 and the sprocket-wheel 50, which is fast with one part of the slow-speed member, said sprocket-chains serving to transmit the motion of the high and slow speed members to the machinery which it is desired to drive at different speeds. When slow-speed conditions prevail, the member 34 remains loose on the shaft 32 by disengagement of the clutch 35. The disk 39 of the slow-speed member rotates with the shaft 32, and the pawls 41 of said member 39 engage with the internal ratchet of the disk 45, thus making said disk 45 rotate with the disk 39 and the shaft 32, whereby the motion will be transmitted by the sprocket-wheel 50 and the chain which engages therewith to the driven part. The sprocket-wheel 50, it should be remarked, is of less diameter than the sprocket-wheel forming the high-speed member 34. For driving the driven part at a higher rate of speed it is only necessary for the operator to adjust the clutch in a way to make the member 34 fast with the shaft 32, and this member, together with the chain which engages therewith, transmits the motion of the shaft 32 to the driven part at a higher rate of speed, owing to the difference in diameters of the sprocket-wheels on the driven part which are connected by chains with the sprocket-wheels 34 50, respectively. When the high-speed member 34 is in service, the slow-speed member 50 and the disk 45 rotate idly with respect to the pawls 41.

My improvements provide a simple, strong,



and durable construction which is cheap to manufacture and is capable of use advantageously as a changeable-speed gear adapted for use on the friction-feed of circular-saw mills or in planing-mill edgers. The required rate from high to slow speed, and vice versa, can be easily and quickly secured by the simple operation of a lever which controls a clutch, and consequently operates the high-speed member. It is to be understood that normally the slow-speed member transmits the motion from the driving-shaft to the driven part; but to bring the high-speed member into service it is only necessary to operate the lever which controls the clutch or tightener pulley.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A changeable-speed gear consisting of a driving-shaft, a driven shaft, driven members of different diameter revoluble with said driven shaft, a high-speed member operatively connected to one of said driven members and mounted on the driving-shaft for rotation therewith, means whereby the high-speed member and its companion driven member may be made ineffective in propelling the driven shaft, a slow-speed member mounted idly on the driving-shaft and normally in coop-

erative relation to the other driven member, said slow-speed member having an internal ratchet, a member revoluble with the driving-shaft and the high-speed member, and a plurality of pawls rotating with said last-mentioned member and coöperating with the ratchet of the slow-speed member.

2. A changeable-speed gear having a shaft, a high-speed member, a slow-speed member loose on said shaft and provided with an internal ratchet, a plurality of abutments on a part revoluble at the same speed as the high-speed member, each abutment having a curved pawl-seat, and a plurality of pawls seated individually in the pawl-seats of the abutments for rotation with the high-speed member, said pawls having coöperative relation to the internal ratchet and disposed relatively to the abutments for the free ends of the pawls to be limited in one direction thereby.

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

ROBERT C. KILLAM.

Witnesses:

AMOS J. LYTLE,  
GEORGE S. CLARK.