

No. 638,291.

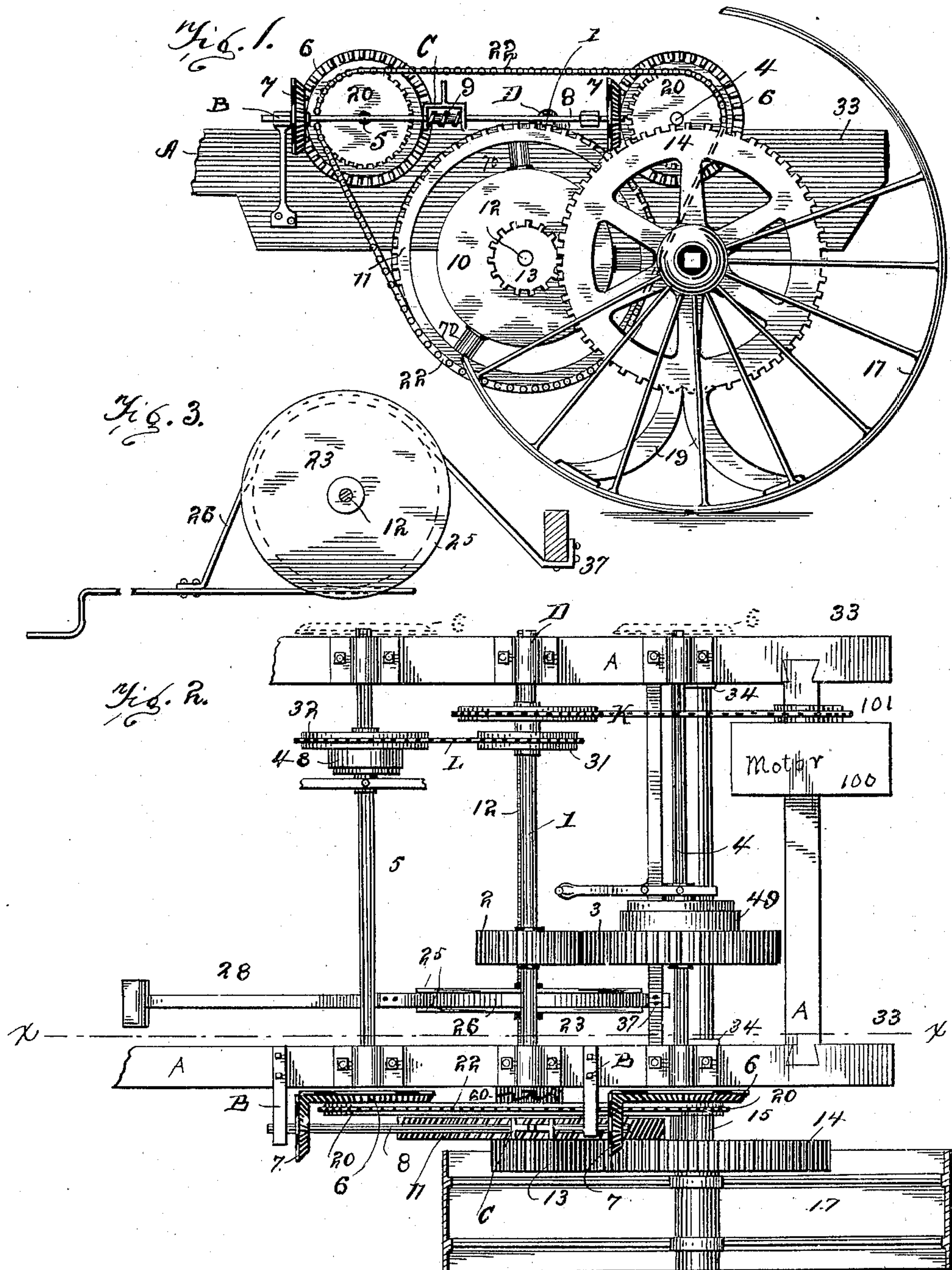
Patented Dec. 5, 1899.

O. R. SMITH.
DITCHING MACHINE.

(Application filed Apr. 10, 1897.)

(No Model.)

2 Sheets—Sheet 1.



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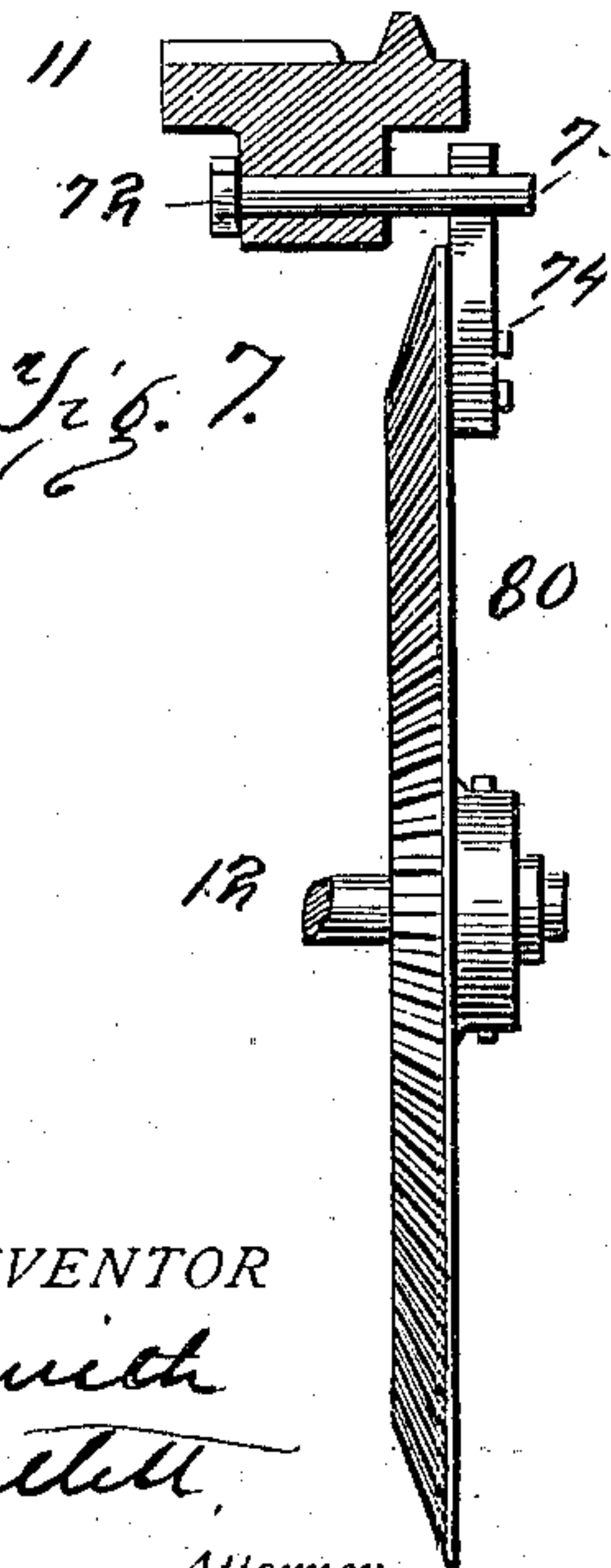
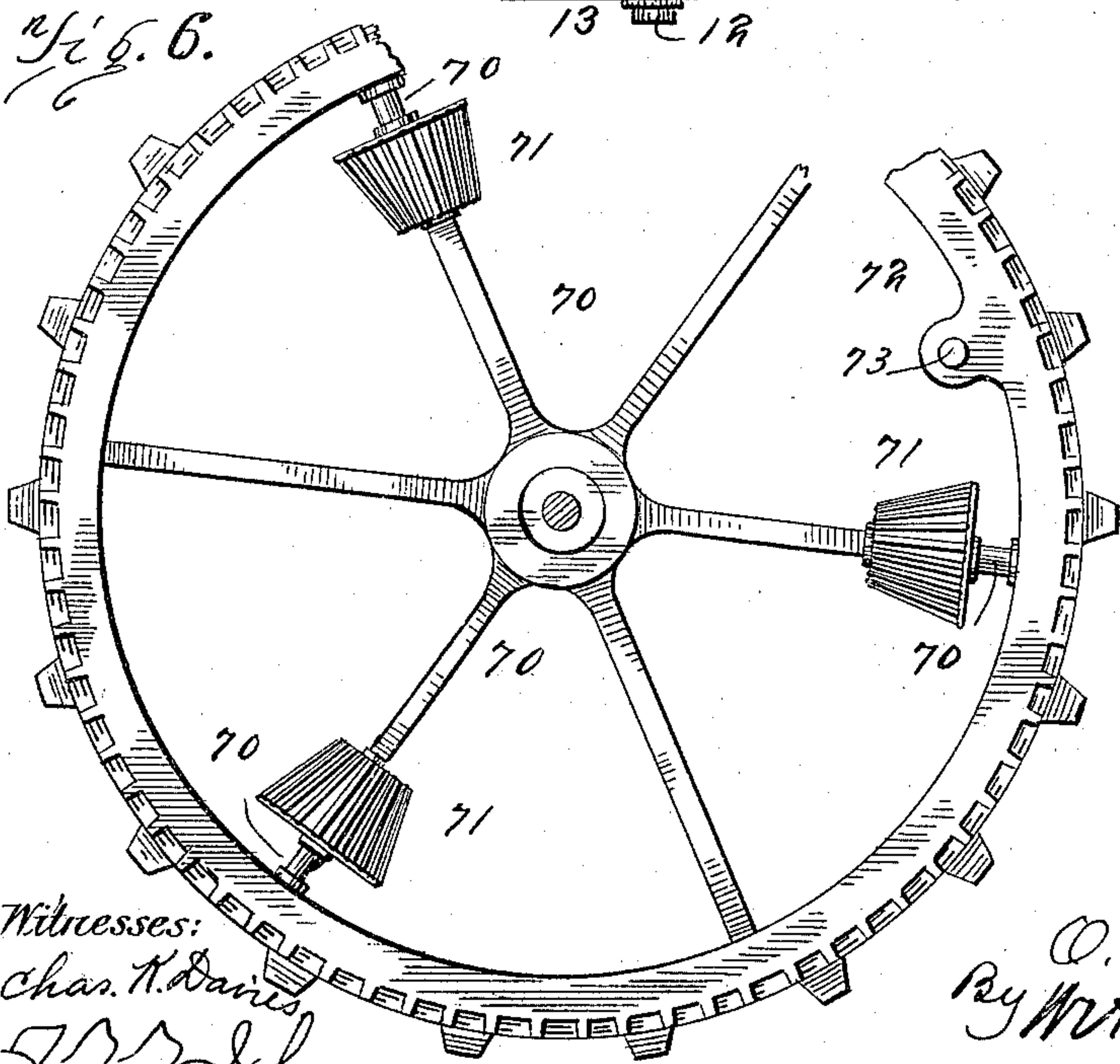
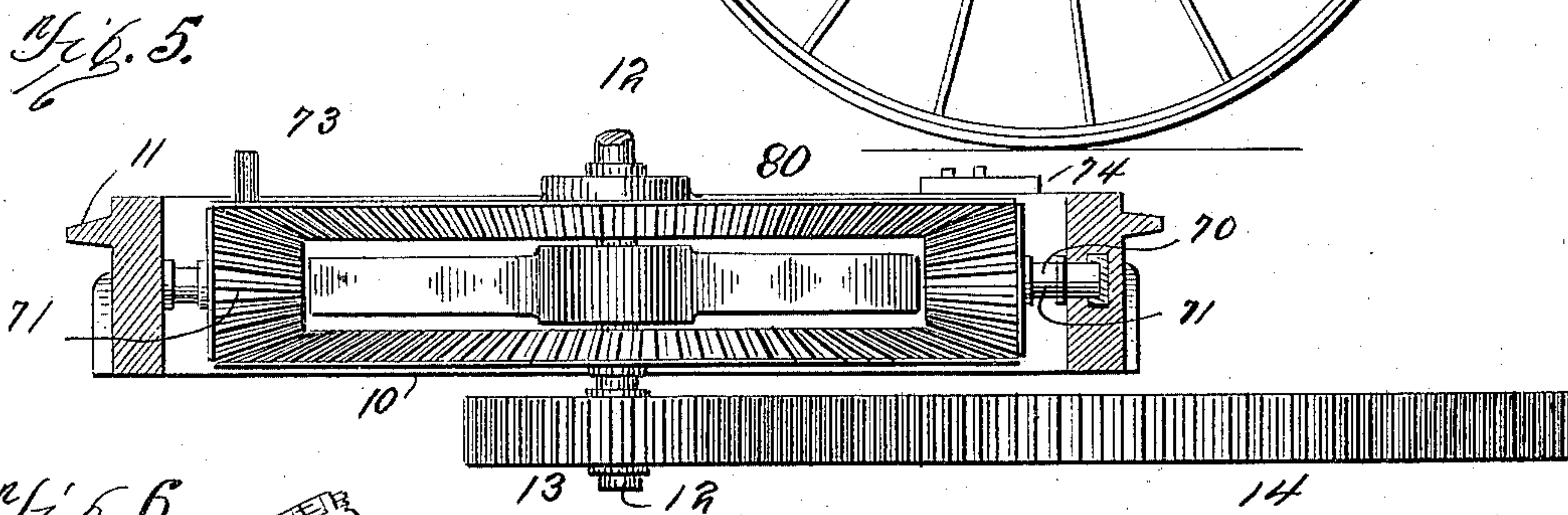
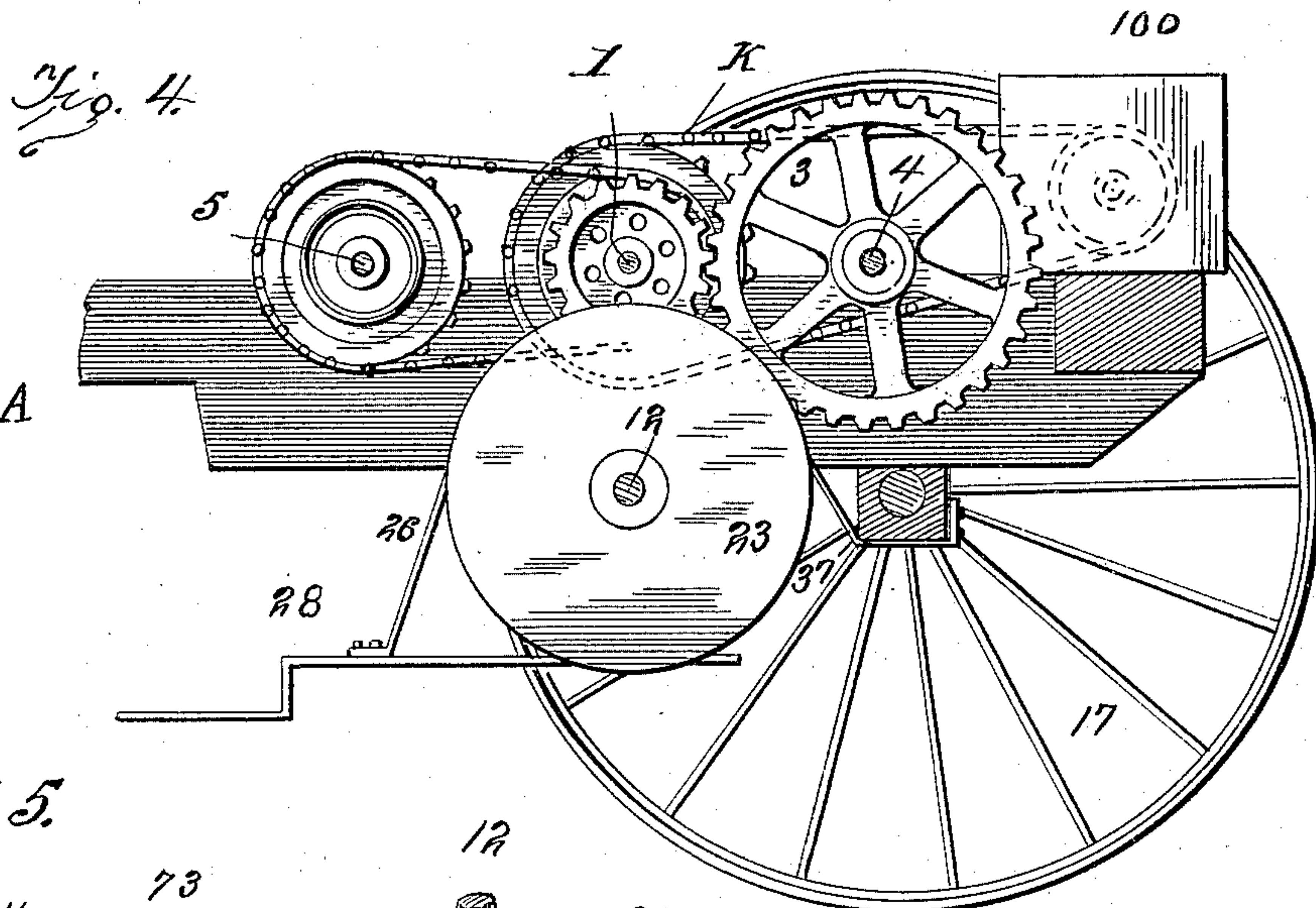
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

ORIEN R. SMITH, OF ATHENS, MICHIGAN.

DITCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 638,291, dated December 5, 1899.

Application filed April 10, 1897. Serial No. 631,510. (No model.)

To all whom it may concern:

Be it known that I, ORIEN R. SMITH, of Athens, county of Calhoun, and State of Michigan, have invented certain new and useful Improvements in Ditching-Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form part of this specification.

This invention relates to ditching - machines.

The object of the invention is to provide a variable-speed mechanism whereby the machine may be given a slow propelling movement while ditching or a quicker movement while traveling free; also, to improve various parts of the machine in various particulars.

The machine belongs to the general class shown in my Patent No. 592,101, dated October 19, 1897, and it is considered unnecessary to describe herein such parts as are not closely related to the present invention. The ditching mechanism and connections are fully described in my said patent.

Figure 1 is a broken side elevation of so much of the frame and driving-gear as is thought necessary to show the present improvements, only one driving-wheel being shown. It should be understood that the frame is supported on four wheels, as in the patent referred to. Fig. 2 is a top plan of so much of the frame and driving-gear as is necessary to illustrate the present improvement. It must be understood that the driving-wheel and gears connected thereto are duplicated at opposite sides of the frame. Fig. 3 is a detail side elevation of brake mechanism shown in the plan in Fig. 2. Fig. 4 is a section on line *xx*, Fig. 2. Fig. 5 is an enlarged horizontal section of wheel 11 and its inclosed gearing and connections. Fig. 6 is a broken side elevation of wheel 11 and the internal bevel-gears carried thereby. Fig. 7 is a broken detail section of wheel 11 and means for connecting the same to the bevel-gear when the contact-pieces of the two are in engagement.

The drawings are not made to scale, and

the proportion of parts is not maintained in the various figures.

A indicates the frame of the machine, which is of suitable or usual construction. On the frame the main shaft 1 is mounted in suitable bearings. The pinion 2 rotates with shaft 1, and this pinion intermeshes with gear-wheel 3, which normally rotates with shaft 4, said shaft 4 being also supported in suitable bearings on the frame. A shaft 5, at the other side of shaft 1 from shaft 4, is also supported in bearings, so that these three shafts, as shown, are substantially parallel and extend across the frame from side to side.

Shafts 4 and 5 carry bevel-gears 6 6 outside the frame. These are preferably duplicated at opposite ends of the shafts; but as the operation is similar whether one or two sets be employed it is considered unnecessary to show or describe the duplicate sets of gears 6 6 and the shaft 8 and connections. The second set of gears is indicated in dotted lines, Fig. 2.

Shaft 8 extends lengthwise of the machine and is supported in bearings B B. Bevel-gears 7 7 on this shaft 8 are in position to engage with the bevel-gears 6 6 before referred to.

A worm-gear 9 is loosely mounted on shaft 8, said worm being shown as inclosed within the frame C, by which frame the worm may be shifted lengthwise on the shaft, as in the patent referred to.

A worm-gear 11 on counter-shaft 12 is in position for engagement with the worm 9 on shaft 8 when the parts are shifted for such engagement.

The worm and sprocket wheel 11 has spokes 70, on which bevel-gears 71 are journaled.

The bevel-gear 80 is keyed to shaft 12 and rotates therewith in engagement with bevel-gears 71. Bevel-gear 10 is loose on shaft 12, but is integral with or rigidly connected to pinion 13, which pinion drives gear 14, and so propels drive-wheel 17.

The wheel 11 has an integral boss 72, from which projects a strong pin 73. The wheel 80 has a contact-piece 74 which will be engaged by pin 73 when wheel 11 rotates. This will permit almost a full rotation of wheel 11 in reverse direction before pin 73 will engage piece 74 to move wheel 80 in reverse direction. The wheel 80 by such engagement drives wheel 10 and pinion 13, fixed thereto,

by what I term a "differential connection;" but I do not herein claim the construction and combination of gears 80, 71, &c., but show them to explain that the pinion may be
 5 driven from wheel 11 other than by a direct connection with said wheel 11. With this explanation to a person skilled in the mechanical arts it is believed that it may be understood that pinion 13 may be driven by mechanism which will permit a lost motion between the driving and the driven wheel.

The rear axle 15 bears a gear-wheel 14, which engages the gear 13 before referred to. The wheel 14 preferably has branching arms
 15 19, which are secured to the inner face of the drive-wheel 17, so that the drive-wheel 17 shall rotate with the gear-wheel 14; but the connection between this driving-gear and the drive-wheel might be otherwise made, so that
 20 the two revolve in unison.

Shafts 4 and 5 carry sprocket-wheels 20, which are fixed to the shafts, and a sprocket-chain 22 may be passed around these sprocket-wheels and a sprocket-surface on worm-wheel 11. This sprocket-chain will not be
 25 in driving engagement with the sprockets 20, 20, and 11 at the same time the worm-gear 9 is in such engagement with wheel 11. When the worm-gear is in driving position, the sprocket-chain will be idle, and vice
 30 versa. Thus the wheel or differential gear 11 may be driven either by the sprocket-chain 21 from the sprocket-wheels 20 on shafts 4 5, or it may be driven at a different rate of
 35 speed by the bevel-gears 6 6 on the same shafts through the gears 7, shaft 8, and worm 9, and the sprocket-chain can be quickly put into or thrown out of gear and the worm-wheel 9 shifted either into or out of gear, as
 40 the circumstances may require.

When the machine is used in ditching, a slow backward movement is advisable, but when not engaged in ditching a more rapid movement is desirable. The worm-wheel 9,
 45 which is splined to shaft 8 or otherwise caused to rotate with said shaft, may be moved lengthwise on said shaft, as shown in Fig. 1, so as not to engage with worm-wheel 11. When in engagement, the worm-gear
 50 gives a slow movement well adapted to machines of this character.

The shaft 1 is driven by a sprocket-chain from the prime mover or engine 100 engaging wheel K, or it may be driven in any other
 55 suitable manner.

Sprocket-wheel 31 is fast to shaft 1, and sprocket-wheel 32 is loose on shaft 5, a sprocket-chain L connecting the two sprocket-wheels. A coupling-clutch 48, of usual construction, enables wheel 32 to be coupled with
 60 shaft 5, so as to drive said shaft in reverse direction, thus causing the machine to back. With this reversal of movement the clutch 49, by which gear-wheel 3 is coupled to shaft
 65 4, is uncoupled, so as not to drive said shaft, as is indicated in my patent referred to.

Shaft 12 rotates with the wheels 11 and 13 when coupled thereto, being supported in suitable bearings on the frame, and on shaft 12 there is a fixed drum 23, said drum having
 70 side flanges 25. A metallic friction-strap 26 rests in the groove between these flanges, said strap being secured at 37 to a cross-bar on the frame, and is connected to a foot-lever 28 or
 75 other mechanism by which the brake may be applied in usual manner for checking speed when either of the driving-gears may be in operation or even if the machine is traveling down hill by gravity. The brake will not be
 80 needed when the machine is ditching.

As the engine, driving-gears, and connections by which the ditcher is operated are all shown and described in my patent referred to, it is considered unnecessary to explain the operation of such parts of the machine herein.
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The wheel 11, as has been stated, has both a worm-face and a sprocket-face, and may be driven either by the worm 9 or by the sprocket-chain 21, but not by both at the same time.

What is herein claimed is—

1. In a machine of the character described, a driving-shaft, driven shafts parallel therewith and each having a bevel-gear and a sprocket-wheel thereon, a shaft connecting
 90 said parallel shafts and having bevel-gears engaging the gears on said shafts and an adjustable worm engaging a worm-gear connected to the drivers, and a sprocket-chain in position to engage said sprocket-wheels and
 95 a worm on the worm-gear, whereby the worm-gear may be thrown out and the sprocket-gear may be put into operation in the same train, substantially as described.

2. In a machine of the character described, the parallel shafts having bevel-gears and
 100 sprocket-gears thereon, the gear 11 having a worm and a sprocket and connected by suitable gearing to the drive-wheels, the sprocket-chain removably connected to the sprockets, the bevel-gears and worm removably connected to the worm-wheel, whereby the driver
 105 may be driven either by the sprocket-train or the worm-train, and means for reversing the movement of said driving-train, substantially as described.

3. In a ditching-machine, the main driving-shaft and two driven shafts parallel therewith, the sprocket-train and the worm-train, either of which may be thrown into driving
 110 relation as described, the counter-shaft to which motion is contributed by either the sprocket or worm train, said counter-shaft capable of connection with the driving-gear, and a brake mechanism operating on said counter-shaft, substantially as described.
 115

In testimony that I claim the foregoing as my own I hereby affix my signature in presence of two witnesses.

ORIEN R. SMITH.

Witnesses:

WILLIAM WEBSTER,
 MAUD SCHUMACHER.