No. 875,532. PATENTED DEC. 31, 1907.

J. P. KARR & J. D. RAUCH.

COMPOUND GEARED FRICTION HOISTING ENGINE.

APPLICATION FILED FEB. 12, 1907.

3 SHEETS—SHEET 1.

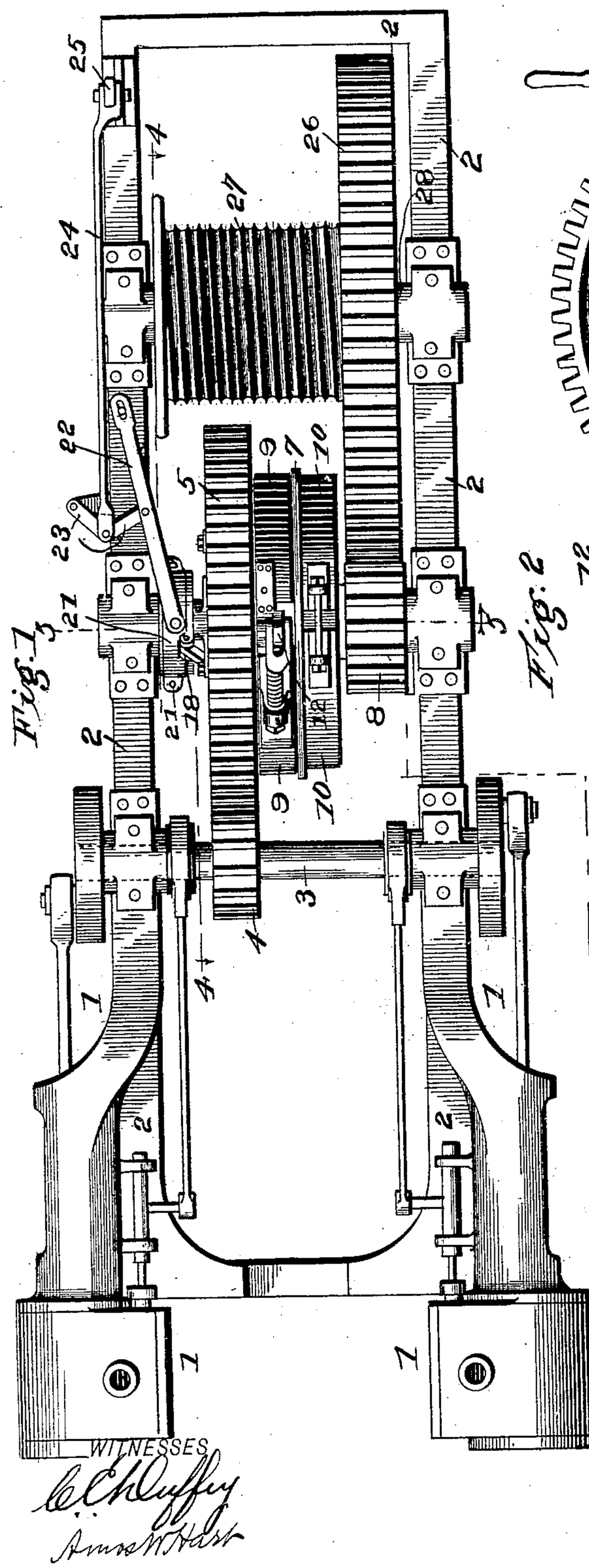

Fig. 1.

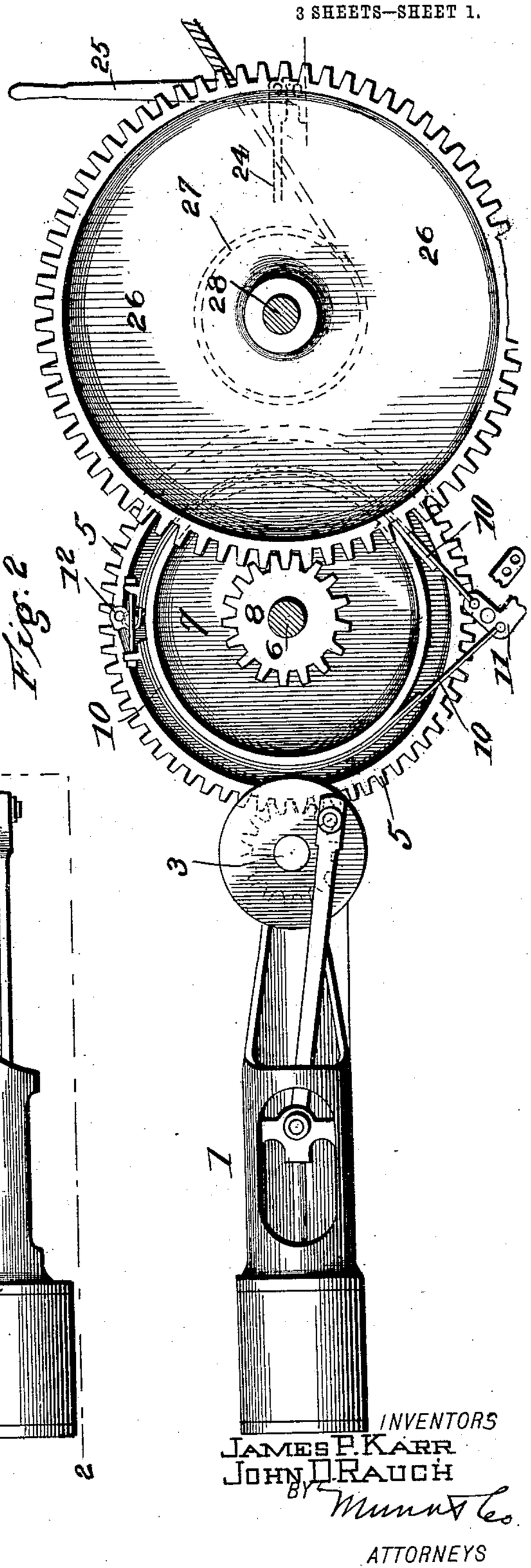

Fig. 2.

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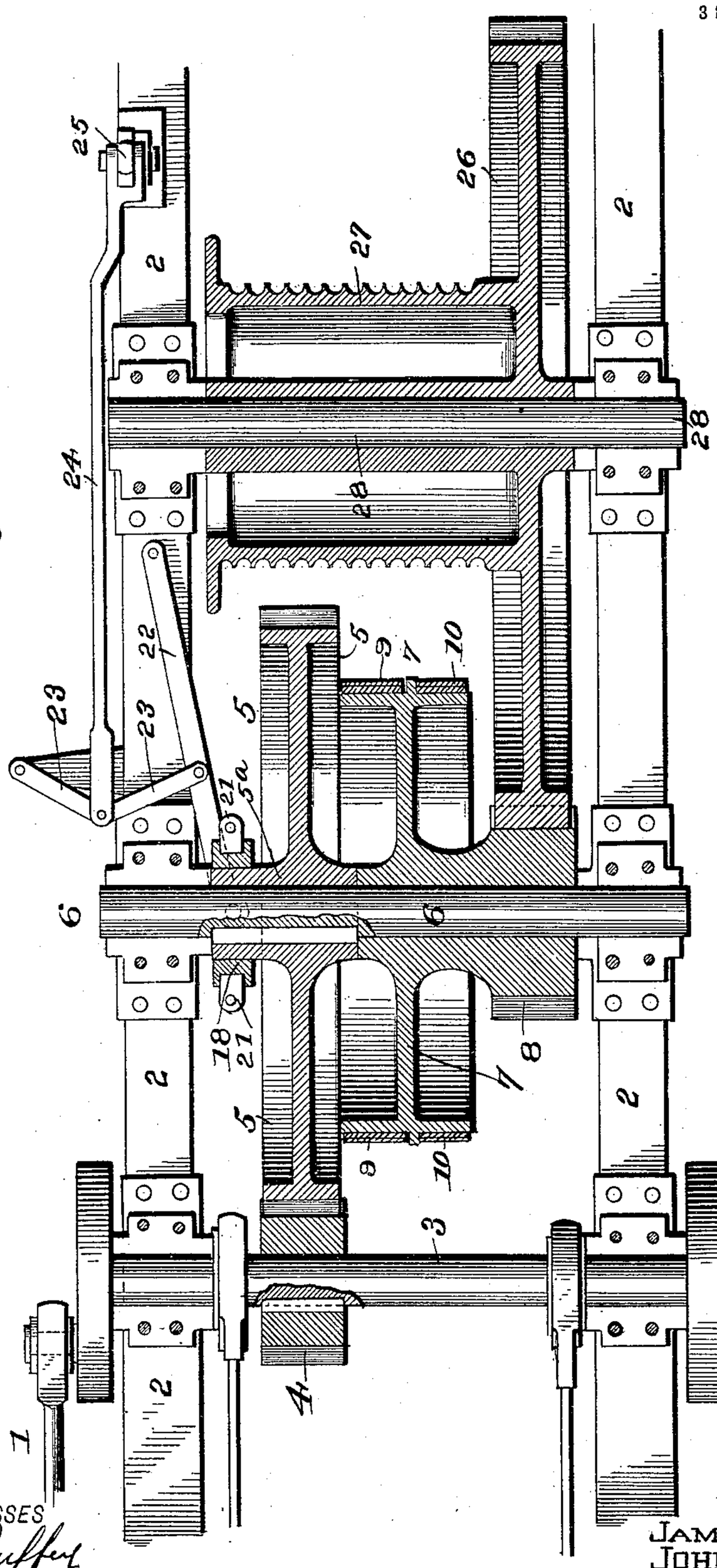
Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4

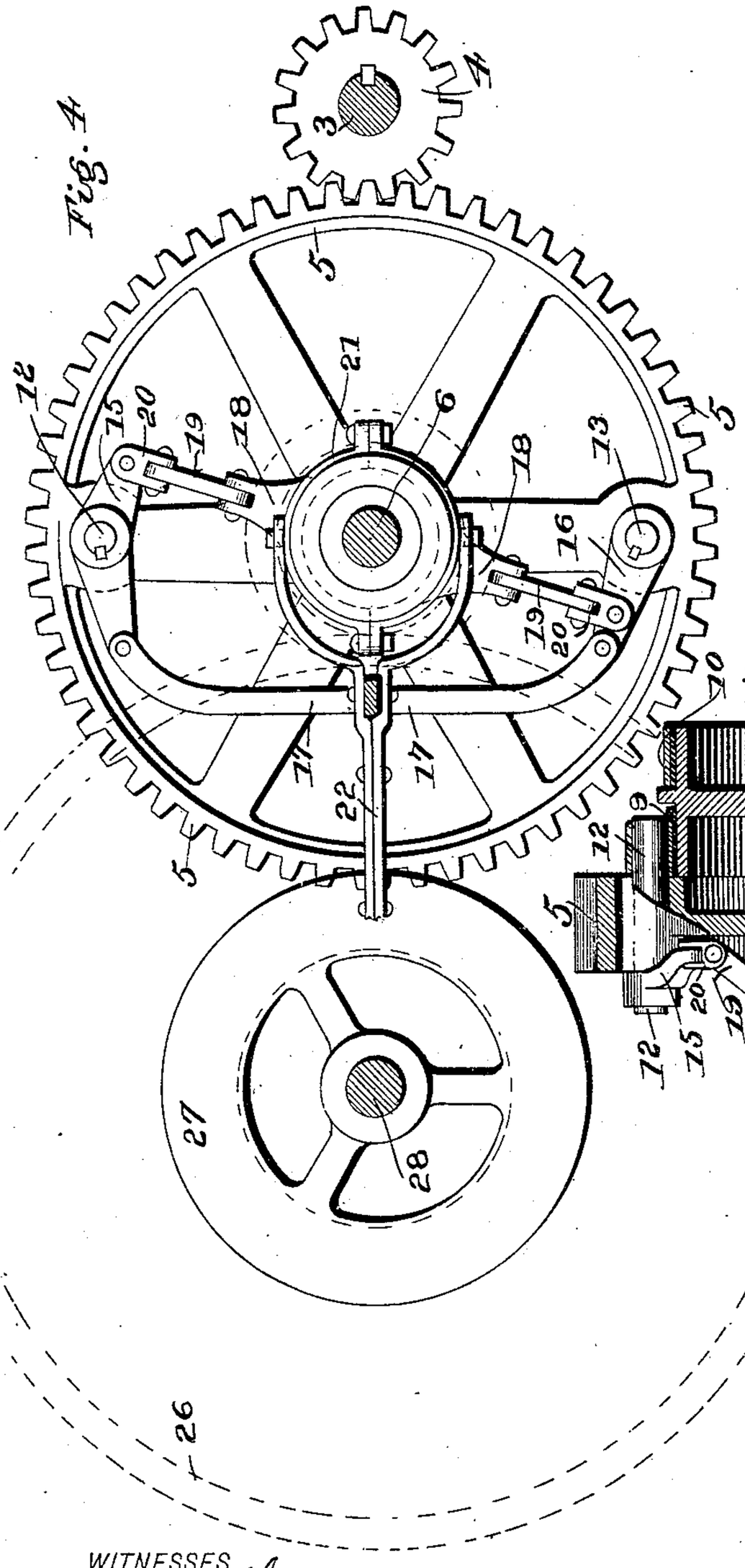
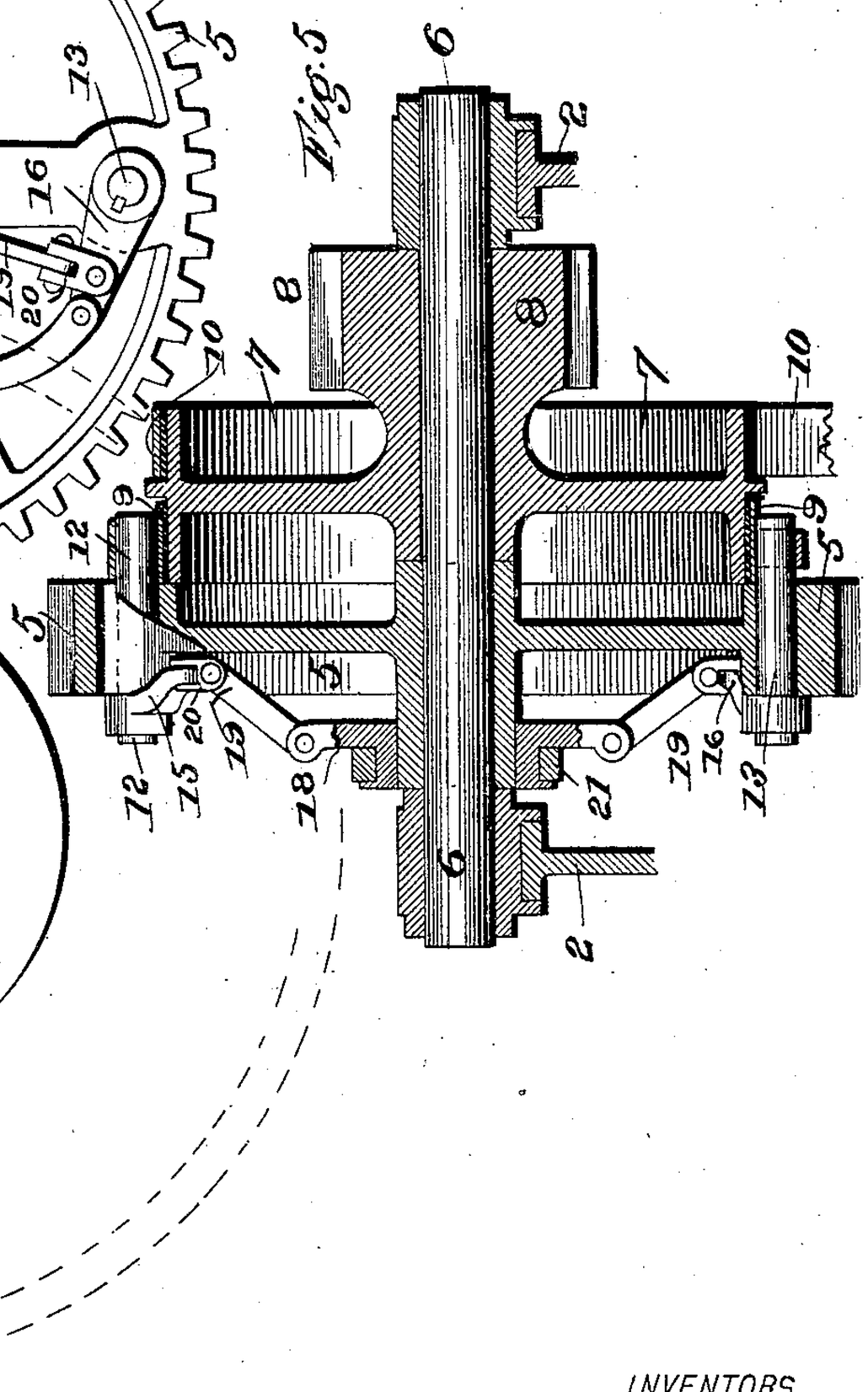


Fig. 5



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UNITED STATES PATENT OFFICE.

JAMES P. KARR AND JOHN D. RAUCH, OF LOGANSPORT, INDIANA.

COMPOUND-GEARED FRICTION HOISTING-ENGINE.

No. 875,532. Specification of Letters Patent. Patented Dec. 31, 1907.

Application filed February 12, 1907. Serial No. 357,013.

To all whom it may concern:

Be it known that we, JAMES P. KARR and JOHN D. RAUCH, citizens of the United States, and residents of Logansport, in the county of Cass and State of Indiana, have invented an Improved Compound-Geared Friction Hoisting-Engine, of which the following is a specification.

Our invention is an improvement in that class of hoisting engines in which a rope or cable is wound on a rotatable drum for hoisting a dipper, shovel, or digger. Ordinarily, in this class of machines, the rope attached to the dipper and extending back to the hoisting drum is run several times intermediately over sheaves journaled in blocks which thus form a tackle by which the traction or power applied to the hoisting rope may be multiplied, and thus the hoisting engine may raise the load by application of say one-third the power which would otherwise be required. The result is, however, obviously obtained at the expense of speed. We have devised an improved hoisting mechanism by which we are able to increase or compound the power within the machine itself, whereby more advantages are attained; and this we effect by means of a simple arrangement of a single gear and pinion and friction wheel on the shaft which is intermediate the hoisting drum and driving shaft.

The details of construction, arrangement, and operation of parts are as hereinafter described, and illustrated in the accompanying drawings, in which

Figure 1 is a plan view of a hoisting engine embodying our improvements. Fig. 2 is a vertical longitudinal section on the line 2—2 of Fig. 1. Fig. 3 is a horizontal section. Fig. 4 is a vertical longitudinal section on the line 4—4 of Fig. 1. Fig. 5 is a vertical transverse section on the line 5—5 of Fig. 1.

An engine 1 is mounted upon a suitable frame 2, and drives a transverse shaft 3 upon which is keyed a pinion 4 that constitutes the primary driver for the hoisting mechanism. It engages a large spur gear 5 which is shown in Fig. 3 as keyed upon the counter shaft 6. This is, however, perfectly immaterial, since the operation of the apparatus will be the same whether the gear 5 be fast or loose on the shaft. In other words, if it be keyed to the shaft, the latter revolves with it; but if loose on the shaft, the shaft of course remains stationary. On the shaft 6, alongside the large gear 5, is mounted a friction wheel 7 and a pinion 8, the same being cast or secured together so as to constitute practically one rotatable member and both being loose on the shaft. It will be noted that the friction wheel 7 has two friction surfaces, and to one of these we apply a driving friction-band 9 and to the other a brake-band 10. As shown in Fig. 2, a pivoted lever 11 is connected with the brake-band 10, and by manipulation of said lever the band may be tightened or loosened, as will be readily understood. The band 9, as is shown best in Fig. 1, is divided, and its ends are connected by a device which may be operated for contracting or relaxing the band as required in the operation of the apparatus.

In Fig. 5, pins 12 and 13, are shown passing through the peripheral portion of the gear 5, one, 13, engaging the band 9 at its center, and the other being connected with the ends of the band through the medium of a spring-encircled rod 14—see Fig. 1. The pin 12 is provided with a crank, so that upon rotating the pin, the band will be tightened or loosened, according to the direction of rotation. As shown in Fig. 4, a double crank 15 is applied to the pin 12, and a single crank 16 to the pin 13, and the cranks are connected on the left of the pins by a bar 17, which, in view of its function, is termed an equalizing bar. On the extended hub 5^a of the gear 5—see Fig. 3—is mounted a yoke 18 which is connected by toggle links 19 and knuckles 20 with the cranks 15, 16. A collar or ring 21 is applied to the yoke 18 in a groove thereof, and a forked lever 22, which is preferably termed a "shifter," is operatively connected with such band. The shifter is in turn operated—see Fig. 3—by toggles 23 and a rod 24 connected with a hand lever 25—see Fig. 2.

It is obvious that by adjusting the lever 25, the toggle 23 may be so operated as to throw the lever 22 toward or from the gear 5; and when thrown inward, or toward the same, the yoke 18 is moved close to the gear 5 so that the toggle links 19 force the cranks 16, 15, apart, and thereby rotate the pin 12 so that the band 9 is tightened. When so tightened, the friction wheel 7 is caused to revolve with the gear 5 which it will be understood is in constant rotation at a required uniform speed, by its connection with the driving pinion 4 of the engine shaft 3. The pinion 8 being fast with the friction wheel 7,

it is rotated therewith, and thus communicates like motion to the large spur gear 26 that is fast with the hoisting drum 27 upon the shaft 28. In this manner, rotation is imparted from the engine shaft 3 to the hoisting drum 27 through the intermediary of the gear 5, the friction wheel 7, and its friction-band 9, the pinion 8 and the gear 26.

It is necessary that the friction wheel 7 shall be made of much greater diameter than the pinion 8 in order to multiply, or compound, the power and thus render the friction-band 9 effective for locking the two, to-wit, the friction wheel 7 and pinion 8, with the adjacent driving gear 5, for the latter is the driving member proper for the hoisting drum, although itself deriving rotation from the pinion of the engine shaft. We have thus applied to the shaft arranged intermediate the driving shaft and the hoisting drum, a simple but highly effective mechanism for driving the drum when required, by the operation of the simple mechanism which applies the friction-band to the wheel 7. We also make the same wheel 7 the medium for braking the drum, that is to say, for arresting the rotation of the latter when required, or for controlling its rotation as when lowering a load. It will be understood that in all cases the friction-band 9 must be loosened or released from its grip on the wheel 7, when the brake band 10 is tightened thereon for controlling the rotation of the drum and the descent of a load. In other words, the band wheel 7 and the pinion 8 must then be free and independent of the gear 5, which, as before stated, revolves continuously by reason of its connection with the driving pinion 4.

By our construction, arrangement, and combination of parts, we are able to dispense with supplemental shafts or mechanism which have usually been employed heretofore in operating the hoisting drum from a motor shaft, and besides simplifying the construction and reducing the cost and weight of such hoisting apparatus. We have compounded or multiplied the power of the friction wheel and the friction apparatus applied thereto, relative to the pinion 8 by which power is transmitted from the engine shaft to the drum.

In a companion application of like date herewith, we have shown, described and claimed the special mechanism also herein illustrated and described, by which the band 9 is applied or released from engagement with the friction wheel 7.

It will be understood that while preferring the mechanism shown and described for applying or releasing the friction-band 9 to the wheel 7, we propose to use any efficient substitute, and do not limit ourselves to any particular mechanism for this purpose.

What we claim is—

The combination, with a hoisting drum 27, and a large gear 26 fast therewith, and a driving shaft 3 having a pinion 4 fast thereon, of an intermediate shaft 6, a driving gear 5 thereon which meshes with such driving pinion, and a double friction wheel 7 and pinion 8 which are fast together but mounted loose on the intermediate shaft, the pinion 8 meshing with the hoisting gear 26, and the friction wheel having two friction surfaces, a driving friction band 9 applied to one of such surfaces, means connected with the adjacent driving gear for tightening or releasing such band, and a brake band applied to the other surface of the friction wheel, and a device for tightening or releasing the same, substantially as described.

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