No. 638,184.

Patented Nov. 28, 1899.

A. E. NORRIS.

DRIVING APPARATUS.

(Application filed June 17, 1899.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 3.

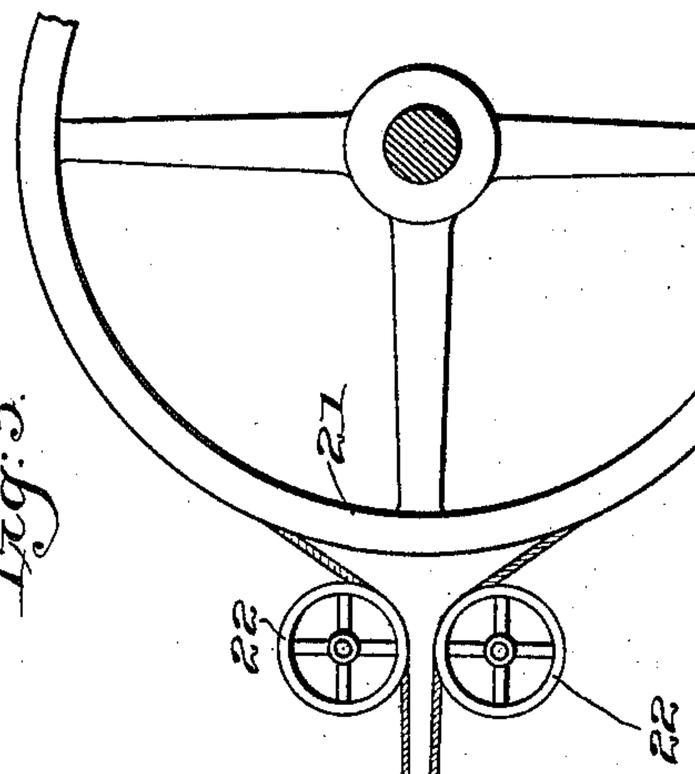
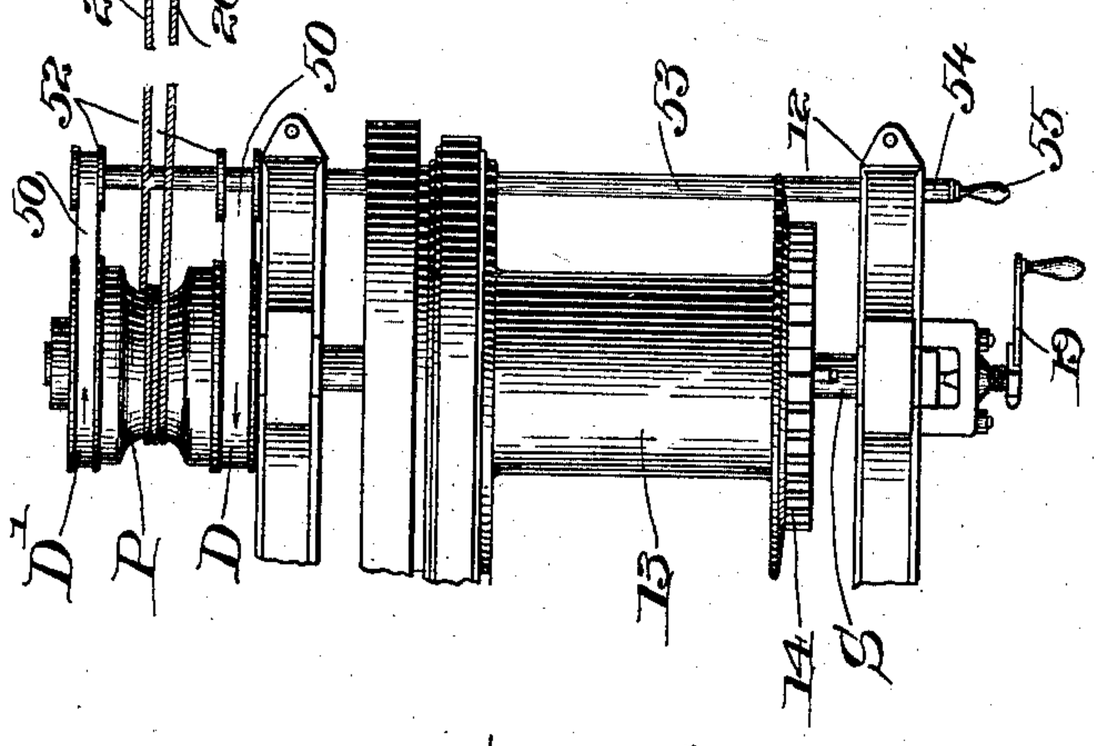


Fig. 2.



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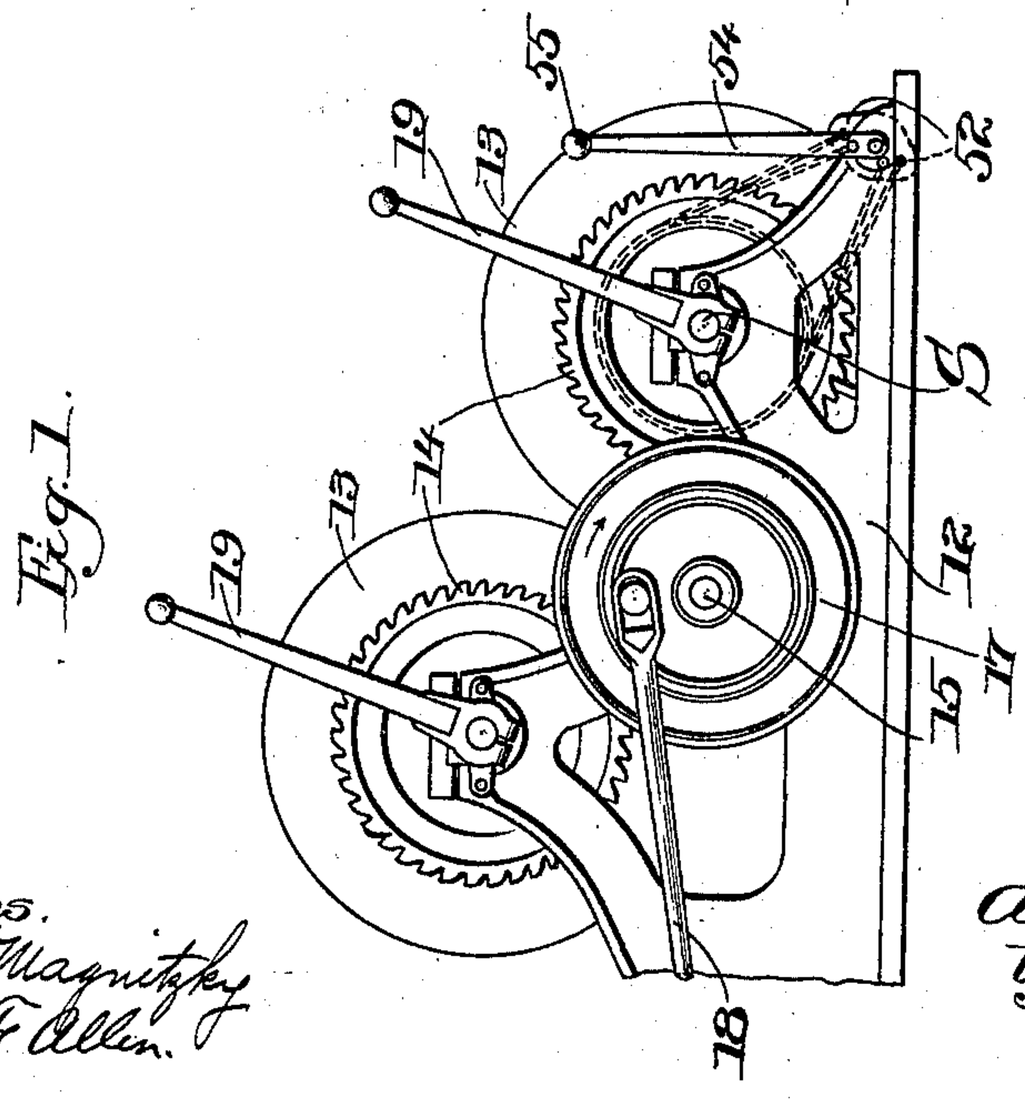

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Fig. 4.

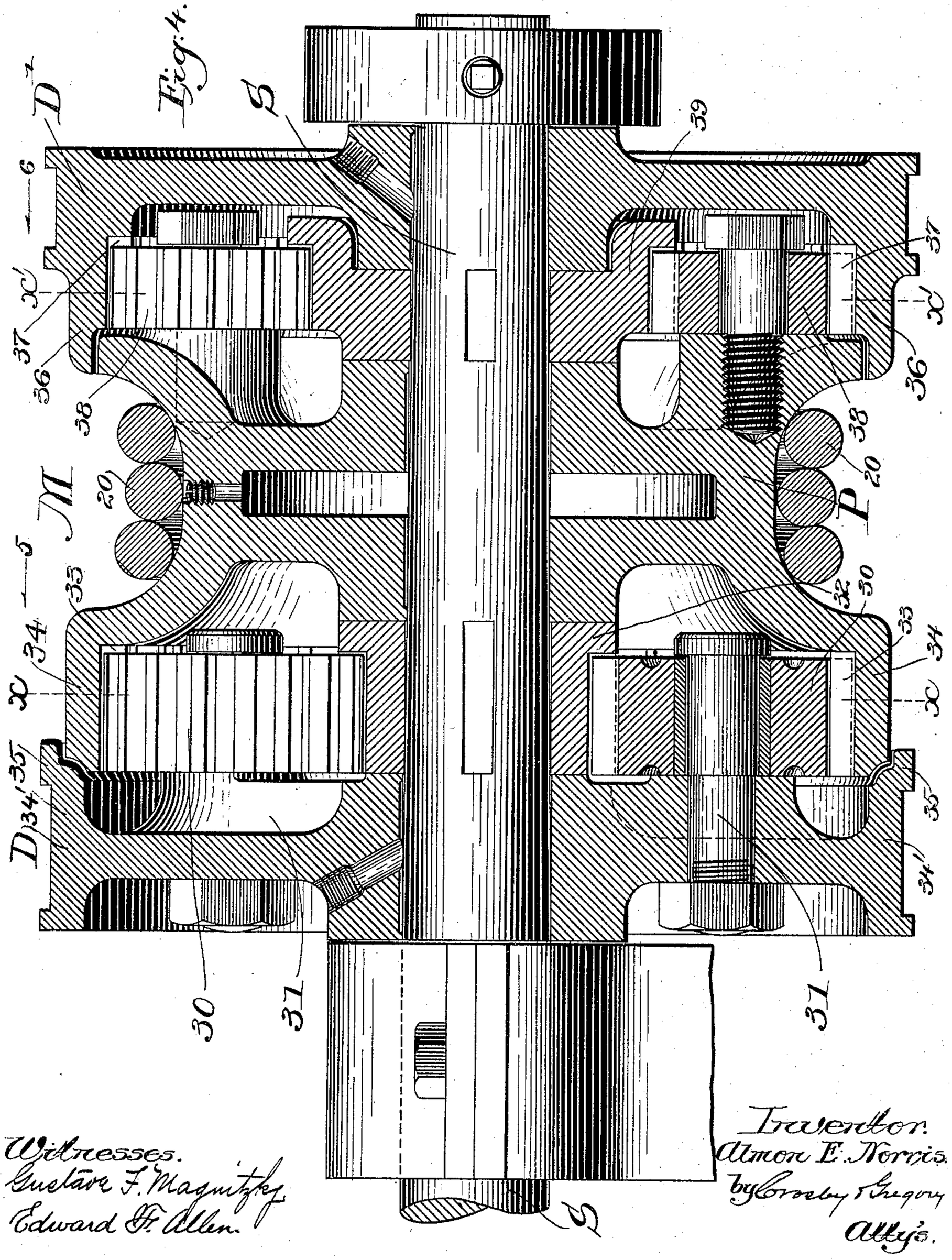

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Fig: 5.

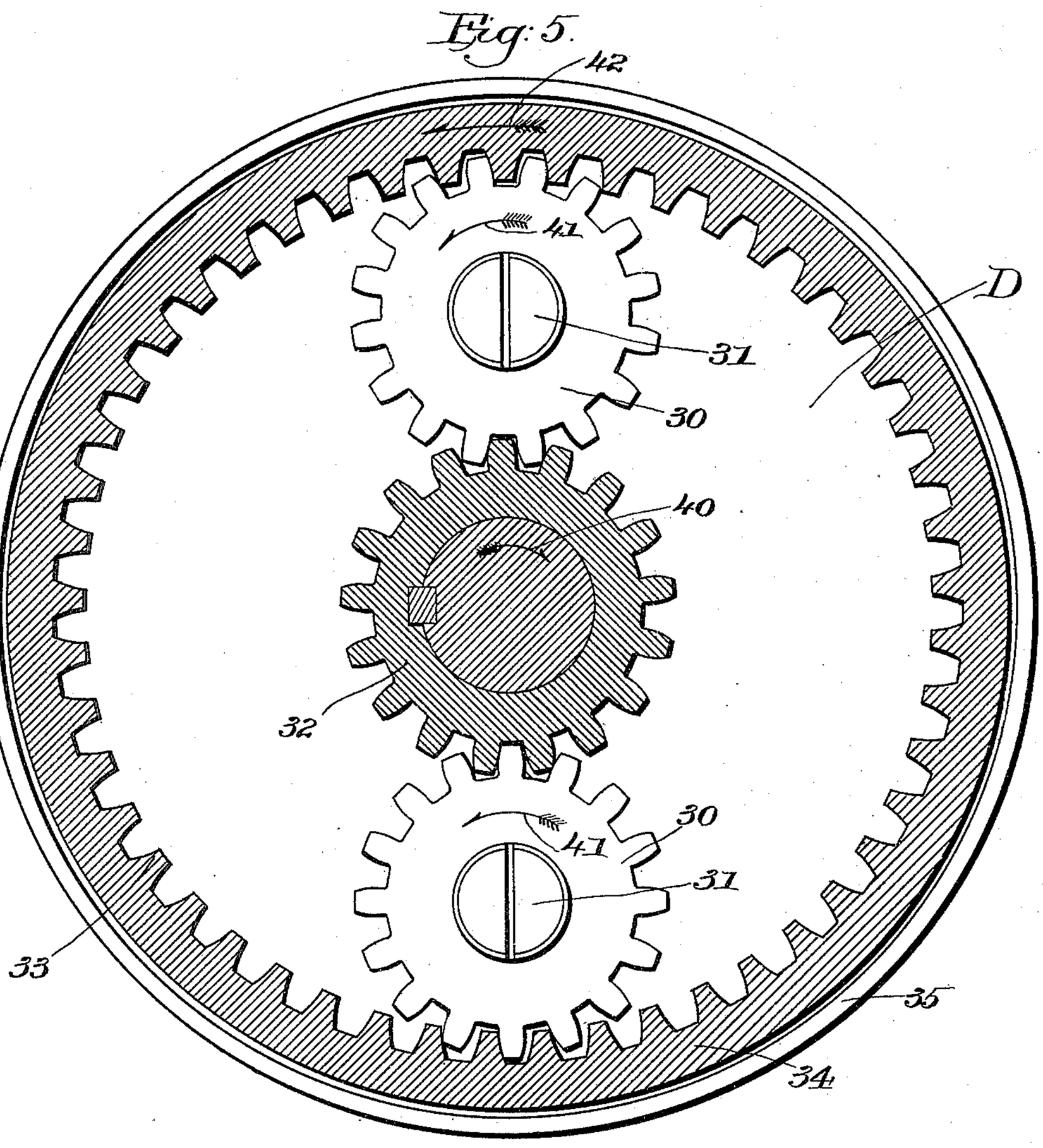

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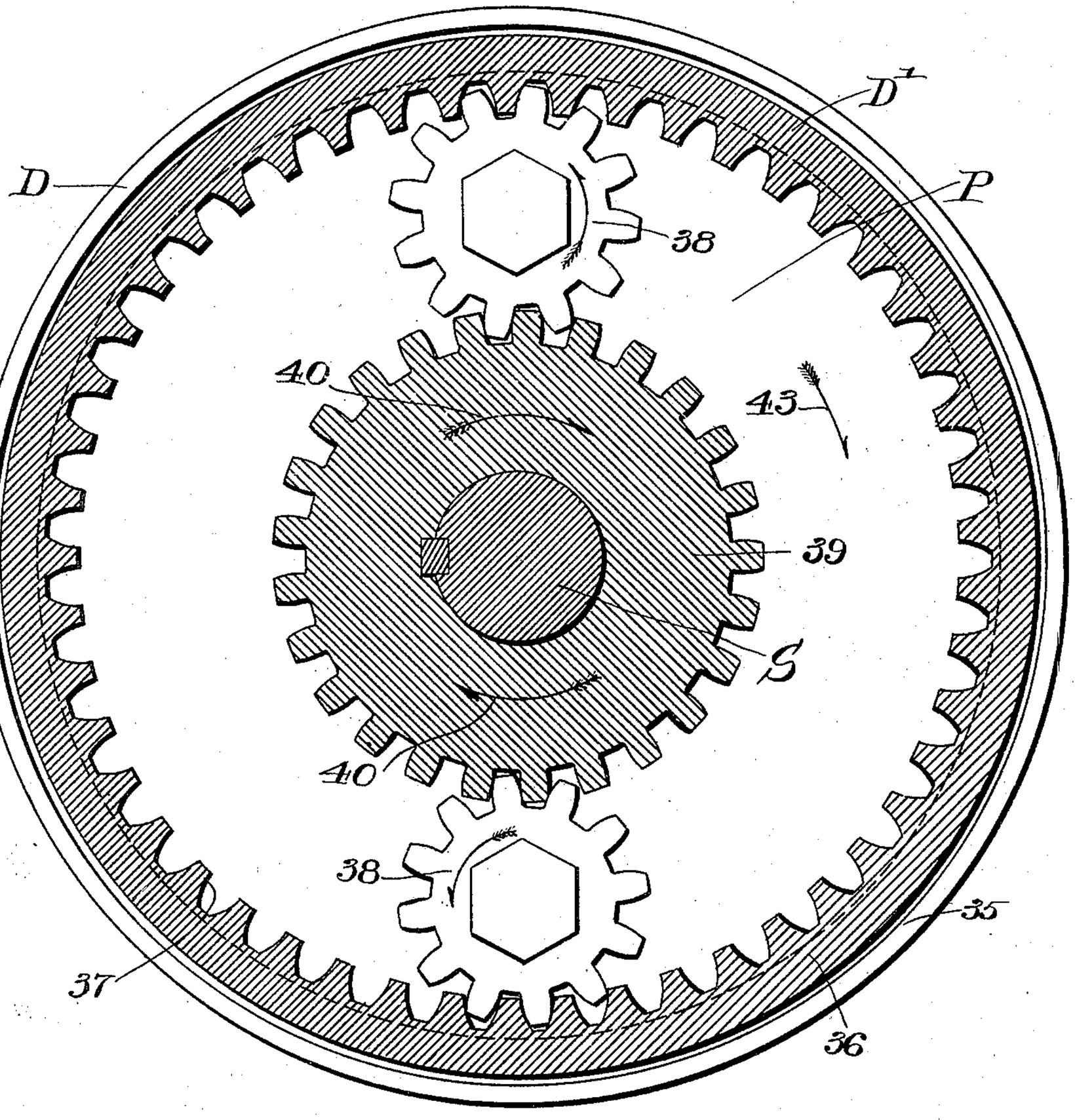
Fig: 6.



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UNITED STATES PATENT OFFICE.

ALMON E. NORRIS, OF CAMBRIDGE, MASSACHUSETTS.

DRIVING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 638,184, dated November 28, 1899.

Application filed June 17, 1899. Serial No. 721,005. (No model.)

To all whom it may concern:

Be it known that I, ALMON E. NORRIS, of Cambridge, county of Middlesex, State of Massachusetts, have invented an Improvement in Driving Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates to driving apparatus; and the objects and advantages of the same will be hereinafter more particularly described, and the novel features thereof will be set forth in the claims.

Figure 1 is a side elevation of a portion of a hoisting device to which my driving apparatus is peculiarly adapted. Fig. 2 is a plan view of one of the hoisting-drums and illustrates the driving apparatus as carried by the shaft of the drum. Fig. 3 is a plan view of the bow wheel of a derrick, around which passes a band connected with one of the elements of the driving apparatus. Fig. 4 is a longitudinal section of the driving apparatus. Fig. 5 is a transverse sectional elevation of the driving apparatus, the section being taken on the line $x\,x$, Fig. 4, and looking in the direction of the arrow 5. Fig. 6 is a similar view looking in the direction of the arrow 6, the section being taken on the line $x'\,x'$, Fig. 4.

The driving apparatus constituting the subject-matter of this application is capable of various and different uses, and in the present case it is represented as a means for effecting movements in opposite or reverse directions of a device which may be of any character, but which is conveniently represented as a mast of a derrick.

In Fig. 1 I have shown a portion of a derrick hoisting mechanism of usual form, the parts being mounted upon a bed or framework 12 and involving two drums 13, the shafts of which are disposed in parallelism and are mounted in suitable bearings or uprights upon the bed, and said shafts carry the usual gears 14, intermeshing with a driving-gear (not shown) on the power-shaft 15, which carries a crank-disk 17, connected by the pitman 18 with a suitable motor, (not shown,) and means are provided, as customary, for clutching or coupling the drums to their supporting-shafts, and said shafts carry the hand-cranks 19, by which the drums can be manually operated, and a pawl-and-ratchet mechanism coöperates with said shafts, as usual, to prevent back or retractive motion thereof.

In Fig. 1 I have indicated by arrows the direction of rotation of the power-wheel 17 and what is represented as the right-hand drum 13 of the two, and the shaft S, which supports said right-hand drum, is provided with the driving apparatus, which, as hereinbefore stated, includes a power-transmitting factor. This power-transmitting factor is denoted by P, and it is loose on the shaft S and is grooved or concaved to receive the rope or cable 20, said rope or cable being also wrapped one or more times around the bow wheel 21 of the derrick and traveling in contact with the parallel sheaves or guides 22, located adjacent to the bow wheel, the latter, as customary, serving as means for rotating the derrick-mast.

The driving apparatus is denoted in a general way by M, and the power-transmitting factor P, to which allusion has previously been made, constitutes one of the elements of such driving apparatus, and it is loosely mounted upon the shaft S between the disks or plates D D′, and while I have herein represented the two independent driving mechanisms as consisting, respectively, of intermeshing trains of gears, it is evident, of course, that other instrumentalities might be employed for securing the necessary differential motions of the part P, and consequently of the member to be driven thereby.

The driving apparatus M, it will be understood, includes in the present instance three devices located side by side on the shaft S, and certain members of each train are mounted on each of said three parts, while other members of said trains are connected with said shaft, and the organization of parts is such that when one of the terminal members of the three devices is held the part P will be rotated in one direction, and when such member is freed and the other terminal member is blocked partially or wholly said part P will be oppositely driven, and of course any convenient mechanism can be employed for thus limiting the action of said terminal members, although I prefer for simplicity to use independently-active friction-brakes each manually controlled.

The disk or member D of the driving mechanism carries two pinions, as 30, located at equidistant points from the axis of motion of the shaft S and conveniently carried by journals 31 on the web of the disk, the journals ordinarily consisting of bolts, and these pinions 30 mesh with a third pinion 32, keyed to the shaft S, and also with the internal ring-gear or circular rack 33, formed on the flange 34 of the intermediate member or drum P of the driving apparatus, and the disk D is peripherally grooved, as at 34′, to receive a strap or band constituting a convenient holding apparatus for said disk, and by forming this groove the annular projections 35 are produced upon the outer surface of the disk, which serve to prevent side motion of the strap-brakes, hereinafter described, and the disk D′ is similarly constructed for the same purpose. The inwardly-extended flange 36 of the disk D′ is toothed, as at 37, to form a circular rack, and the teeth mesh with the pinions 38, which in turn mesh with a larger gear 39, keyed to the shaft S, said pinions 38 being located at similar distances from the axis of the shaft S and are journaled on the drum P. Both trains of gearing are of the planet-and-sun type, this being a convenient form; but it is obvious, of course, that this organization is not essential to carrying out the advantages of the invention.

From the preceding description it will be evident that when both disks D and D′ are free from any restraining influences the intermediate drum or power-transmitting member of the combination is not operated; but when either of them is blocked the motion of the said part P will follow, and it will be in reverse directions, respectively, in accordance with the element D or D′ that is limited.

Let it be assumed that a friction-brake passing around the periphery of the disk D is thrown into action. This will result in holding said disk, and consequently will prevent orbital movement of the two pinions 30 about the shaft S, which shaft rotates in the direction of the arrow 40 in Fig. 5, the pinion 32, which is keyed to said shaft, being of course moved in a corresponding direction, and as the pinions 30 are for the time being fixed against revolution they are caused to rotate in the direction of the arrow 41 in said figure and being in mesh with the internal ring-gear or circular rack 33, formed on the flange 34 of the power-transmitting member P, they cause said power-transmitting member to rotate in the direction of the arrow 42. When the disk D is freed and the brake applied to the disk D′, it of course will be prevented from rotating, although, of course, the shaft S and the gear 39 move in the direction of the arrow 40 in Fig. 6, and as the disk D′ is blocked the gear 37 will also be held, so that by reason of the intermeshing of the teeth of the gears 39 and 37 with the intermediate pinions 38 the latter will be caused to travel orbitally about the shaft S in the direction of the arrow 43 in said Fig. 6. The power-transmitting member P is correspondingly operated, and the direction of course will be exactly opposite to that taken by the shaft S when the brake of the disk D was set. When no resistance is applied to either disk, of course they are oppositely rotated.

It will be evident that by turning the power-transmitting member P the bow wheel 21 can be moved in a similar direction for the purpose of turning the mast of the derrick or a similar appliance through the intermediate band or rope 20.

As hereinbefore stated, any convenient means can be employed for holding the two disks alternately, although for quickness of action I prefer to employ separately-effective brakes, both manually controlled and each comprising a strap or band, as 50, adapted to pass around the peripheries of the disks D and D′ and to be connected at their ends to rockers, as 52, secured to the rock-shaft 53, journaled in suitable bearings upon the framing 12 of the hoisting apparatus hereinbefore briefly described, and said rockers of course are alternately effective, and the ends of the strap-brakes are connected to said rockers, and the operation is such that by turning the shaft 53 in one direction one of the brakes will be tightened and by turning said shaft in the opposite direction the other brake will be set, whereby the disks D and D′ can be rendered effective, and it will be understood that when one disk is blocked the other will be released, and vice versa.

The shaft 53 is provided at one end with a lever 54, equipped with a handle 55, by which it can be readily operated to control the two strap-brakes.

From the preceding description it will be evident that my improved apparatus involves a shaft, two main members (shown as parts D D′) loose thereon, an auxiliary member (shown as the intermediate part M) also loose upon said shaft, and two independent power-transmitting mechanisms, each including three elements, the three elements of one power-transmitting mechanism being carried, respectively, by the said shaft, a main member and the auxiliary member and the three elements of the other power-transmitting mechanism being carried, respectively, by the shaft, said auxiliary member and the other main member and the first elements of each power-transmitting mechanism being fixed to said shaft and the intermediate ones being rotative upon their supports.

The invention described is not limited to the exact elements specified, for it is obvious that others may be substituted therefor without departing from the scope of the invention, and it should be understood that the term "shaft" is employed as a generic one and includes within its meaning any and all structures capable of coöperation with the two independent sets of driving mechanisms.

It will be understood that when neither of

brakes to which I have hereinbefore referred is set the disks D and D′ will be oppositely rotated through the intermediate gears; but these motions will not be transmitted to the intermediate part P, which is held against operation by the resistance imposed by the band or cable 20 thereon.

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

1. In a driving apparatus a shaft, two main members loose on said shaft, an auxiliary member also loose on said shaft, and two independent power-transmitting mechanisms each including three elements, the three elements of one power-transmitting mechanism being carried respectively by said shaft, a main member and the auxiliary member, and the three elements of the other power-transmitting mechanism being carried respectively by the shaft, said auxiliary member and the other main member, and the first elements of each power-transmitting mechanism being fixed to said shaft and the intermediate ones being rotative upon their supports.

2. In a driving apparatus a shaft, two main members loose on said shaft, an auxiliary member also loose on said shaft, two independent power-transmitting mechanisms each including three elements, the three elements of one power-transmitting mechanism being carried respectively by said shaft, a main member and the auxiliary member, and the three elements of the other power-transmitting mechanism being carried respectively by the shaft, said auxiliary member and the other main member, and the first elements of each power-transmitting mechanism being fixed to said shaft and the intermediate ones being rotative upon their supports, and means for alternately limiting the motion of the main members.

3. In a driving apparatus a shaft, two main members loose on said shaft, an auxiliary member also loose on said shaft, two independent power-transmitting mechanisms each including three elements, the three elements of one power-transmitting mechanism being carried respectively by said shaft, a main member and the auxiliary member, and the three elements of the other power-transmitting mechanism being carried respectively by the shaft, said auxiliary member and the other main member, and the first elements of each power-transmitting mechanism being fixed to said shaft and the intermediate ones being rotative upon their supports, two band-brakes located to peripherally engage said main members and means for alternately operating said band-brakes.

4. In a driving apparatus, a shaft, two main members loose thereon, an auxiliary member loosely supported upon the shaft between said main members, and two independent trains of intermeshing gears, the first members of each of said trains being keyed to the shaft and the other members of said trains being carried respectively by said auxiliary member and the main members.

5. In a driving apparatus, a shaft, two main members loose thereon and one of them having an annular gear device, an intermediate member also loose upon said shaft and provided with an annular gear device, two gears meshing respectively with said annular gear device, one of them being rotatively carried by said intermediate member, the other one being rotatively carried by one of the main members, and gears meshing with said rotatively-carried gears and fixed to said shaft.

6. In a driving apparatus, a shaft, two main members loose thereon, one of said members being provided with an inturned annular flange, provided upon its inside face with an annular gear device, a member intermediate said main members and also loose upon said shaft and provided with an outwardly-disposed flange having an annular gear device upon its inner face, two gears rotatively carried respectively by the intermediate member and by one of the main members and meshing with said annular gear device, and gears fixed to the shaft and meshing with said rotatively-carried gears.

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

ALMON E. NORRIS.

Witnesses:
HEATH SUTHERLAND,
FREDERICK L. EMERY.