No. 764,954. PATENTED JULY 12, 1904.

F. MILLER.

DRIVING MECHANISM.

APPLICATION FILED NOV. 19, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 2.

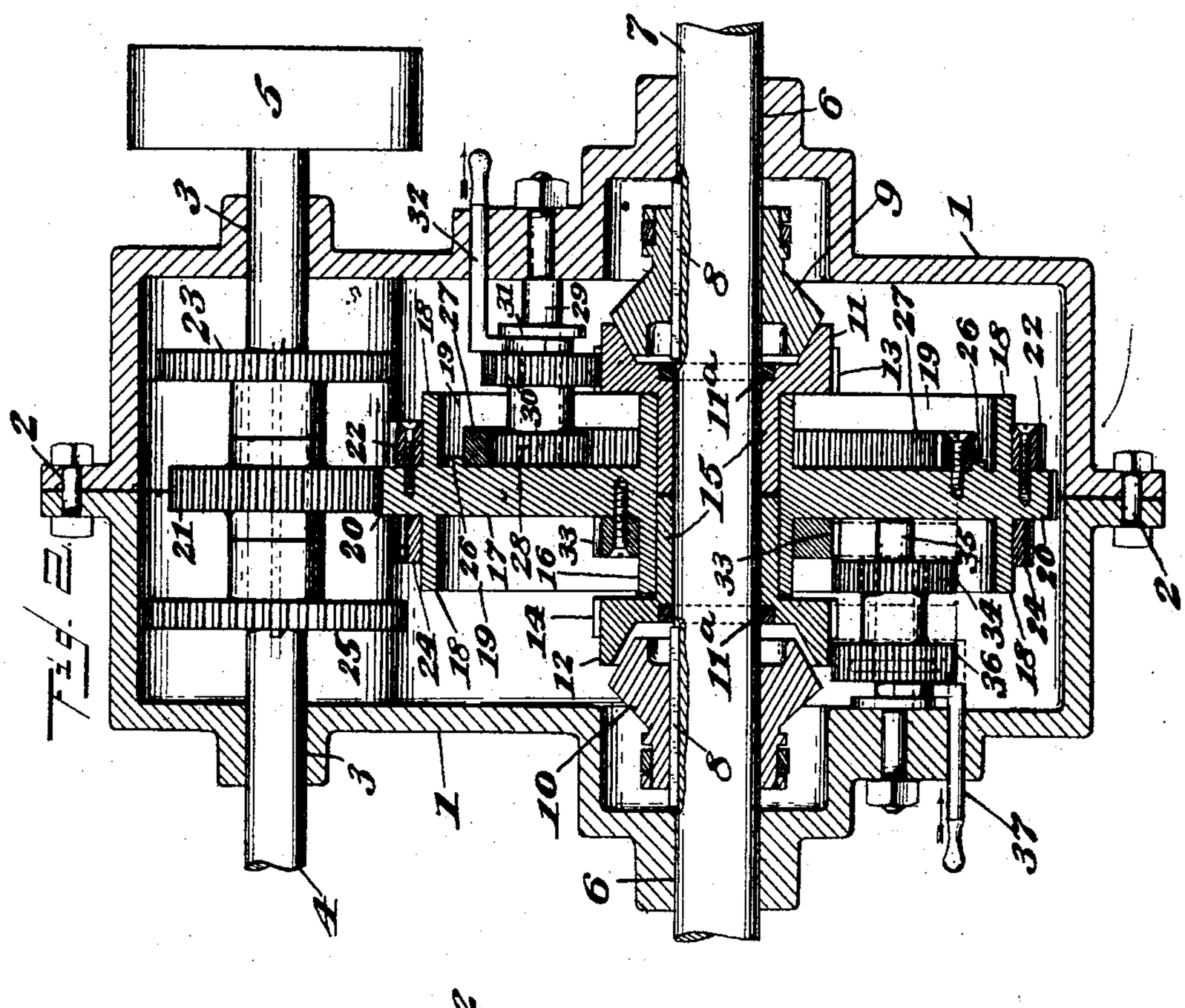
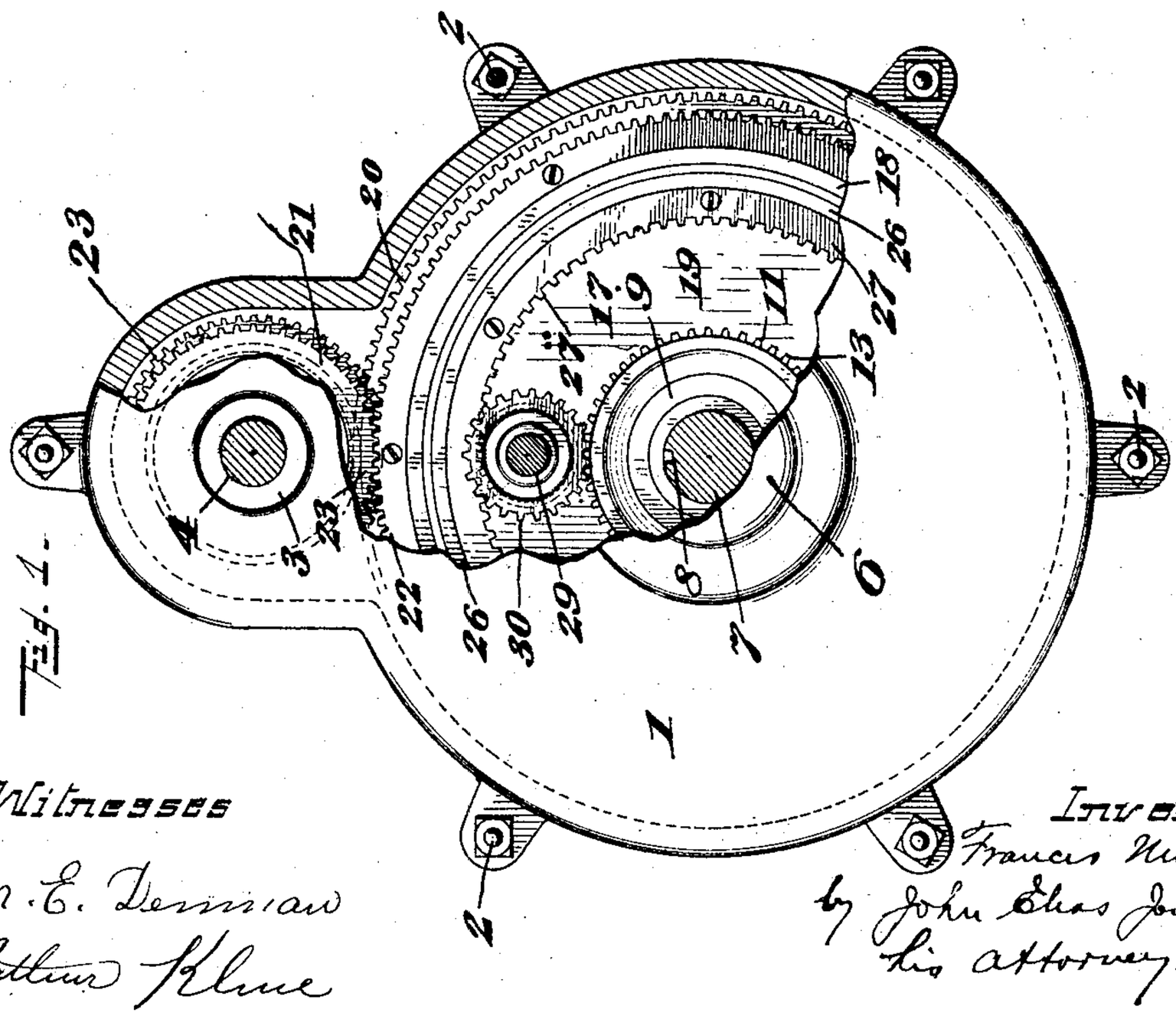


Fig. 4.



Witnesses

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APPLICATION FILED NOV. 19, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

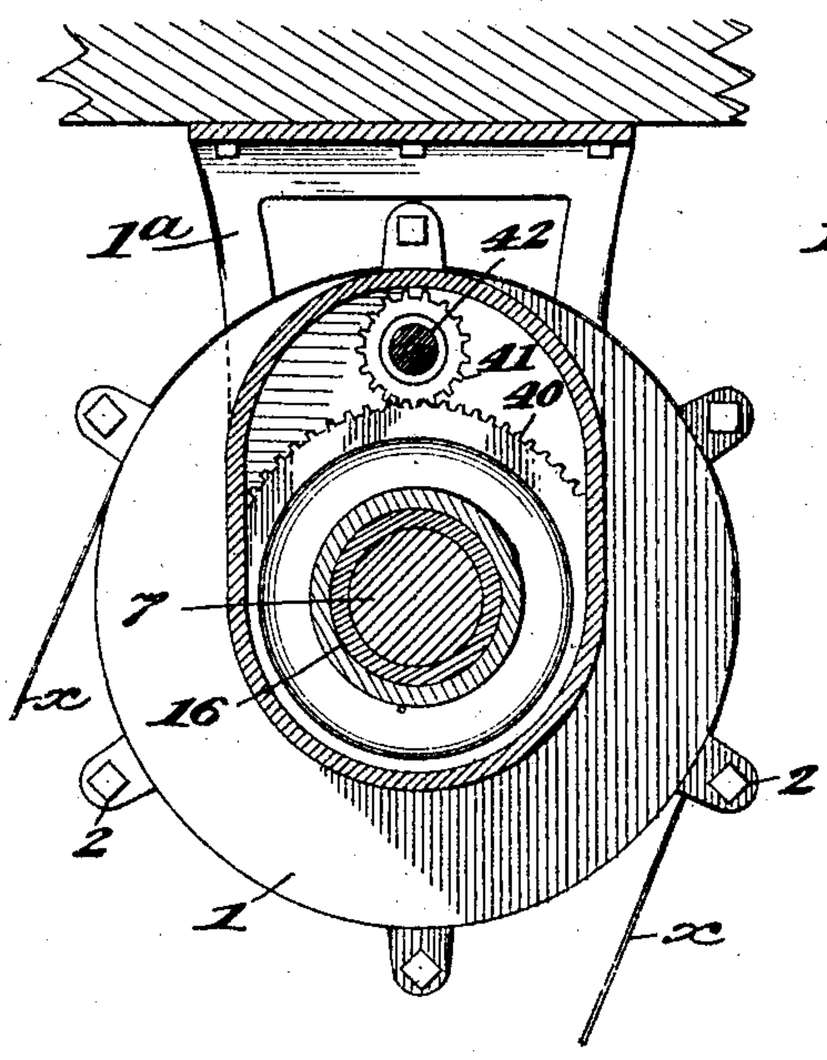


Fig. 4.

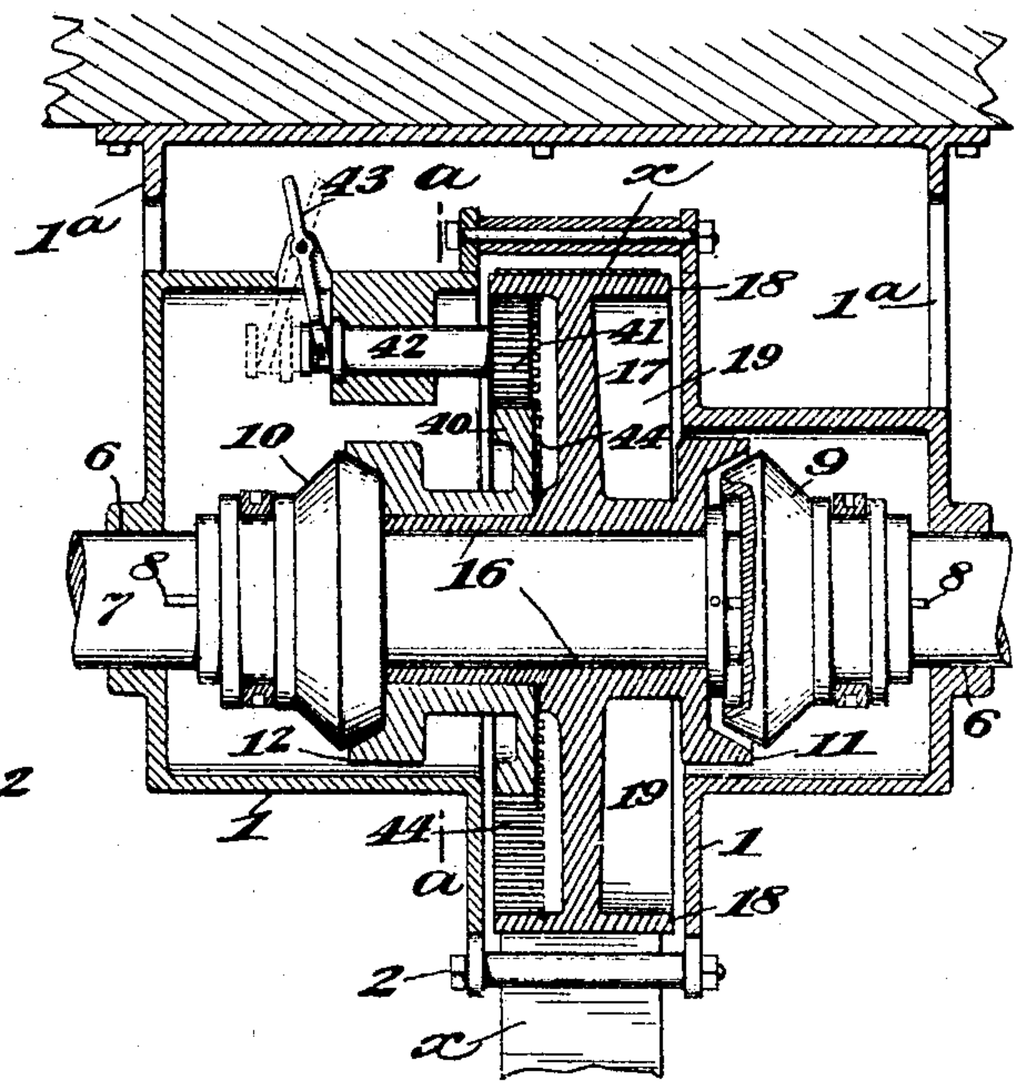


Fig. 5.

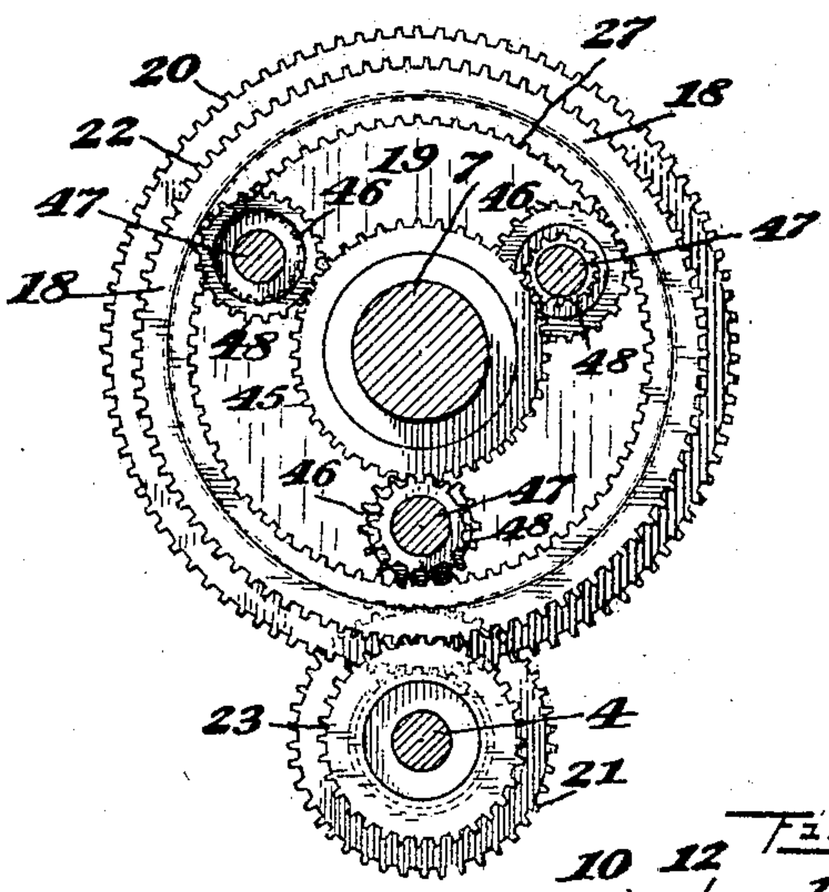


Fig. 6.

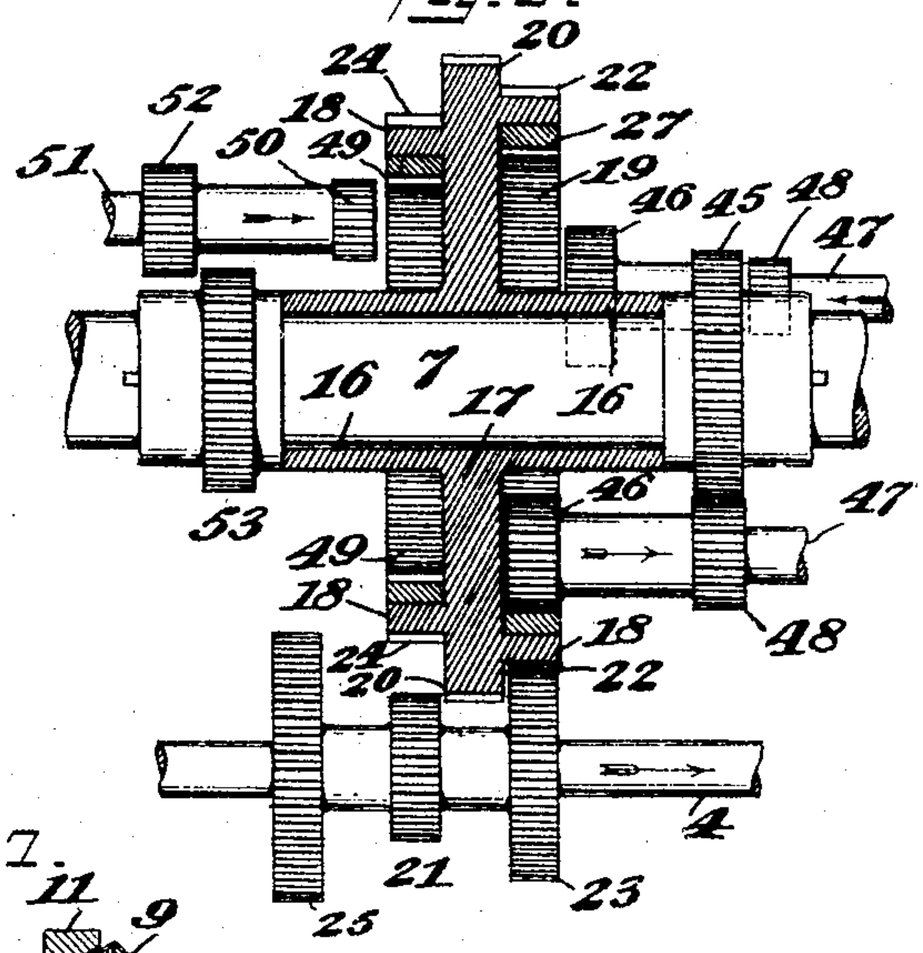
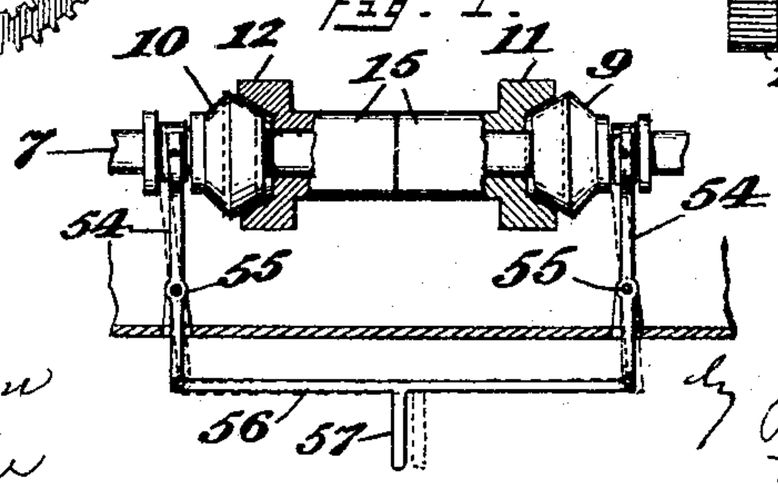


Fig. 7.



Witnesses

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UNITED STATES PATENT OFFICE.

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DRIVING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 764,954, dated July 12, 1904.

Application filed November 19, 1903. Serial No. 181,848. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS MILLER, a citizen of the United States of America, and a resident of Bellevue, in the county of Campbell and State of Kentucky, have invented certain new and useful Improvements in Driving Mechanism, of which the following is a specification.

This invention relates to certain improvements in driving mechanisms such as are especially designed for the transmission of power from any desired source to devices or machinery to be operated therefrom; and the object of the invention is to provide a driving mechanism of this general character of a simple and inexpensive nature and of a strong and compact construction by means of which one or more speed variations or changes may be effected, so that the devices or machinery to be operated may be driven at a speed or speeds different from or in a direction reversed to the speed and direction of movement which would be otherwise imparted from such source of power.

The invention consists in certain novel features of the construction, combination, and arrangement of the several parts of the improved driving mechanism whereby certain important advantages are attained and the device is made simpler, cheaper, and otherwise better adapted and more convenient for use than various other forms of such devices heretofore in use, all as will be hereinafter fully set forth.

The novel features of the invention will be carefully defined in the claims.

In the accompanying drawings, which serve to illustrate my invention and wherein I have illustrated several embodiments thereof, Figure 1 is an end elevation showing one form of the improved driving mechanism, one side of the casing or housing of the device being broken out to illustrate certain of the internal parts. Fig. 2 is a central transverse section taken lengthwise through the device shown in Fig. 1 in a plane passing through the axes of the driving and driven shafts. Fig. 3 is a sectional end elevation showing another modified form of the improved driving mechanism adapted for a less number of speed variations or changes. In this view the plane of the section is along the line *aa* in Fig. 4. Fig. 4 is a sectional view taken longitudinally and centrally through the device as shown in Fig. 3. Fig. 5 is a view showing a form of the device especially designed for affording a large number of speed variations or changes, the operative parts being illustrated in end elevation with the casing or housing removed. Fig. 6 is a longitudinal section taken through the device as shown in Fig. 5 and in the plane of the axes of the driving and driven shafts. Fig. 7 is a fragmentary view showing an arrangement of lever mechanism for shifting certain parts to accomplish certain speed changes, as will be hereinafter described.

Referring first to Figs. 1 and 2, 1 indicates a casing or housing wherein the operative parts of the improved driving mechanism are contained, this casing or housing being, as herein shown, formed in two parts or sections united and held together by bolts 2 or equivalent means and having alined bearings 3 3, wherein turns a driving-shaft 4, having a pulley 5, adapted to receive a belt or band, whereby said shaft may be driven from any desired source of power. Below the bearings 3 3 the casing or housing is also provided with other alined bearings 6 6, wherein is journaled the driven or machine shaft 7, which is parallel to the driving-shaft 4 and will be connected outside the casing or housing with the devices or machinery to be driven. Within the casing or housing are contained certain parts to be hereinafter described and adapted for operation to drive the shaft 7 from shaft 4 either in the same or in a reversed direction and at varying relative speeds.

It will of course be obvious that either one of the shafts 4 and 7 may be a driven shaft and may be connected with and driven from a suitable source of power, the other shaft of course being connected with the devices or machinery to be operated, and for this reason I do not desire to be understood as limiting myself to the precise connection of these shafts with the source of power above described, since it will be evident that this is immaterial to my invention.

The shaft or member 7 is provided near op-

posite ends of the casing or housing 1 with keys 8 8, along which are adapted to be moved clutch members 9 and 10, held by said keys to turn with shaft 7, but capable of movement lengthwise of the shaft toward and away from each other.

For moving the members 9 and 10 endwise of shaft 7 a lever mechanism such as is shown in Fig. 7 may be employed, said mechanism comprising levers 54 54, each having a forked end engaged with a groove of one of said clutch members 9 and 10, the levers 54 54 being each pivoted, as seen at 55, and having their opposite ends pivotally connected by a link or cross-bar 56, having a handle 57, by means of which said levers may be pivotally moved first in one direction and then in the other. By this means it will be seen that the clutch members 9 and 10 may be moved in unison first in one direction along shaft 7 and then in an opposite direction.

Upon shaft 7 between the clutch members 9 and 10 are arranged other corresponding clutch members 11 and 12, reversely arranged and held in position by collars 11^a 11^a on shaft 7 and provided on their outer sides with friction-surfaces adapted to be engaged by similar friction-surfaces produced upon members 9 and 10, respectively, the arrangement being such that when members 9 and 10 are moved in one direction on shaft 7—as, for instance, toward the left as the parts are seen in Fig. 2—member 9 will be engaged and frictionally locked to turn with member 11, while member 10 will be disengaged from the member 12, and when the members 9 and 10 are moved in an opposite direction a reverse location of the parts will be effected, whereby the member 12 will be locked frictionally to member 10 and will turn in unison with shaft 7, while members 9 and 11 will be withdrawn from engagement. The members 11 and 12 are of course loose upon shaft 7, and said members have reduced bosses 15 extended toward each other and forming on their outer faces a bearing or journal concentric with shaft 7. The members 11 and 12 are also provided, respectively, with gear-surfaces 13 and 14 upon the perimeters.

Upon the journal or bearing formed by the bosses 15 of the members 11 and 12, as above described, is held for loose turning movement a master-wheel having a hub 16 turning on said journal or bearing, and from the hub 16 extends a central web 17, whereon is held the rim or perimetral portion of the master-wheel, which portion or rim is extended in opposite directions from web 17, as seen at 18 18, so that cavities or recesses 19 are formed in opposite sides of the master-wheel.

The rim or perimeter of the master-wheel has a central external gear-surface 20 extended round it and adapted for engagement with a gear-wheel 21, held on shaft 4, but adapted for movement lengthwise of the shaft in such a way that it may be engaged with or disengaged from said external gear-surface 20 of the master-wheel at will, and on the perimeter of the master-wheel at each side of said central gear-surface 20 are arranged other external gear-surfaces 22 and 24, respectively, which are of different diameters, but are each of less diameter than the said central gear-surface 20.

The gear-surface 22 at one side of the central gear-surface 20 of the master-wheel is adapted to be engaged by the teeth of a gear-wheel 23 on shaft 4 alongside wheel 21, but of a different diameter relative thereto, and the gear-surface 24 is similarly adapted to be engaged by the teeth of a gear-wheel 25 at the opposite side of wheel 21 on shaft 4, and said wheels 23 and 25 are spaced from the central wheel 21 in such a way that when wheel 21 is engaged with gear-surface 20 of the master-wheel gears 23 and 25 will be outside of and out of engagement with gear-surfaces 22 and 24, so that the master-wheel will be driven from shaft 4 through the medium of gear 21 and surface 20.

The gear-wheels 23, 21, and 25 on shaft 4 are adapted to be moved in unison and by means of suitable shifting devices first in one direction endwise along the shaft 4 and then in the opposite direction, and said wheels, together with the gear-surfaces 22, 20, and 24 on the master-wheel, are so arranged that when the said gears are moved in one direction—as, for instance, toward the left as the parts are shown in Fig. 2—the wheel 23 will be engaged with its corresponding gear-surface 22 on the master-wheel, the gear 21 being at the same time disengaged from the gear-surface 20, so that thereupon the master-wheel will be driven from shaft 4 through the medium of gear-wheel 23 and gear-surface 22 and at a speed different from that at which it was before driven. In a similar way when the wheels 23, 21, and 25 are moved in a reverse direction from the central position or toward the right from the position shown in Fig. 2 the wheel 25 will be engaged with the gear-surface 24 and wheel 21 will at the same time be disengaged from gear-surface 20, so that in this case the master-wheel will be driven from shaft 4 through the medium of wheel 25 and gear-surface 24 and again at a speed different from that at which it was driven when either of the other gears 23 or 21 was engaged with its corresponding gear-surface on the master-wheel. In this way it will be seen that I afford means for driving the master-wheel from the source of power at three different speeds, and the mechanism within the casing or housing comprises means for transmitting each speed at a further reduced rate to the driven shaft or member 7 and also for reversing the direction in which such movement is transmitted, so

that the shaft or member 7 may be driven ahead or reversed at either of three different speeds.

The mechanism for communicating the movement of the master-wheel to the driven shaft or member 7 comprises an internal gear-surface 27, formed upon a ring held in one of the recesses or cavities 19 at a side of the master-wheel, an integral circular ridge 26 being provided on the web 17 in said recess or cavity 19, within which ridge 26 the gear-ring is fitted, whereby the gear-ring may be readily and conveniently placed in position and alined concentric with shaft 7 and with the periphery of the master-wheel. The gear-surface 27 is adapted to be engaged by a pinion 28, slidable endwise on a stud 29 at an end of the casing, the pinion 28 having on its hub a second pinion 30, to be engaged with the gear-face 13 of member 11, located at that side of the master-wheel. The boss of pinion 28 also has a grooved part 31, with which is engaged the forked end of a shifting bar or slide 32, which when drawn in one direction, as indicated by the arrow in Fig. 2, serves to withdraw the pinions 28 and 30 from engagement with the gear-surfaces 27 and 13, so that no movement is then communicated to the clutch member 11, which was before driven from the master-wheel. In the recess or cavity 19 at the opposite side of the master-wheel is arranged an external gear-surface 33, held upon the hub 16, and this gear-surface 33 is adapted to be engaged by a toothed wheel or pinion 34, held for movement endwise on a shaft or stud 35 at that end of the casing or housing 1, the hub of said pinion 34 being provided with another gear-face 36, forming a second pinion, which when the pinion 34 is moved endwise of the stud 35 into engagement with the gear-surface 33 is adapted to engage the gear-surface 14 on the clutch member 12 at that side of the device in such a way that said clutch member 12 may be thereby driven from the master-wheel, but in a direction opposite or reversed to that in which the clutch member 11 was driven, as above described. The hub of the pinions 34 and 36 is also formed with a grooved collar engaged by the forked end of a shifting bar or slide 37, capable of endwise movement to engage the pinions 34 and 36 with their respective gear-surfaces or to disengage such parts. By this arrangement it will be seen that either one of the shifting-bars 32 and 37 may be operated to throw the corresponding pinions into engagement with their reciprocal gear-surfaces at each side of the master-wheel, so that either one of the clutch members 11 and 12 may be driven from the master-wheel or, if desired, both of said clutch members 11 and 12 may be simultaneously operated from the master-wheel, being driven in opposite directions, and the reverse or opposite movements of the respective clutch members 11 and 12 may be imparted to the shaft 7 by moving one or the other of the clutch members 9 and 10 into engagement with its reciprocal member 11 or 12. This construction permits of driving the shaft 7 in either direction at will, and the reversal of movement may be accomplished by merely throwing the members 9 and 10 endwise on the shaft or by such movement of said members 9 and 10 in conjunction with the operation of the shifting-bars 32 and 37 in case it be desired not to drive the members 11 and 12 continuously from the master-wheel. Also it will be seen that by the manipulation of the gear-wheels 23, 21, and 25 on the driving shaft or member 4 the shaft or member 7 may be driven either ahead or in reversed direction at three different rates of speed.

In some cases, and particularly for use in connection with counter-shafts, the modified form shown in Figs. 3 and 4 may be employed. In this construction the shaft 4 is dispensed with and the periphery of the master-wheel instead of being formed with one or more gear-surfaces is provided with a driving-face to be engaged by a belt or band x, the casing or housing being in the form shown combined with hangers 1^a, so as to be capable of being hung from a ceiling or other support. The line-shaft 7 is in this case the driving member, and the master-wheel is the driven member of the mechanism, the hub 16 of the master-wheel being held to turn loosely on the shaft 7 and having one end extended and formed to produce the clutch member 11, which is integral therewith, while the other end of said hub is formed into a journal, on which turns the loose clutch member 12, said loose clutch member having a gear-surface 40 adapted to be engaged by the teeth of a pinion 41, carried on a stud 42, held for sliding movement in the casing and adapted to be moved endwise by a shifting-lever 43, the teeth of said pinion 41 being also adapted when engaged with gear-surface 40 to engage an internal gear-surface 44, formed in the master-wheel. The clutch members 9 and 10 are present, as above described, and are capable of movement endwise of the shaft to engage them with or disengage them from the respective members 11 and 12, whereby a forward or reverse movement of the devices operated from belt x may be afforded, the shaft 7 being of course driven in one direction when member 9 is engaged with member 11 and in a reverse direction when member 10 is engaged with member 12.

In some cases it may be desirable to provide means for attaining even a greater number of speed variations than is afforded by the structure illustrated in Figs. 1 and 2, and in such cases, as seen in Fig. 5, the single set of transmitting gear-surfaces and pinions 27, 11, 28, and 30 (shown at the right in Fig. 2) may be replaced by a plurality of similar de-

vices, there being a gear 45 corresponding with the member 11, but which may be either loose or fixed on shaft 7, with its teeth adapted to be engaged with either one of a series of pinions 48, slidable on studs 47 in unison with pinions 46, which are adapted to engage the internal gear-surface 27 of the master-wheel. By this arrangement when either of the pinions 48 is moved on its stud 47 to engage it with wheel 45 the corresponding pinion 46 will be engaged with gear-surface 27 to drive shaft 7 from the master-wheel, so that by moving one or another of said pinions 48 into engaged position three different speeds may be imparted to the shaft 7 from the master-wheel independent of the three speed variations afforded by the gears 21, 23, and 25 on the shaft 4. This construction may be used in connection with the reversing mechanism above described, or in cases where such reversing mechanism is not desirable it may be dispensed with, as indicated in Fig. 6, the external gear 33 being replaced by an internal gear-face 49, as seen at the left in Fig. 6, which gear-face 49 is adapted to be engaged by either one of a plurality of pinions 50, movable endwise of their studs or shafts 51 and having hubs whereon are carried other pinions 52, adapted when pinions 50 are engaged with gear-face 49 to engage a gear-wheel 53 on shaft 7. By this structure a plurality of speed changes may be afforded over and above the number of changes afforded by the preceding constructions, the space 19 at each side of the master-wheel being provided with a plurality of transmitting devices for driving shaft 7 from the master-wheel at different relative speeds and the changes thus afforded being augmented by the manipulation of the wheels 23, 21, and 25, above described.

The improved driving mechanism constructed as above described is of an extremely simple and inexpensive nature and is also very compact and strong and capable of employment for affording a wide variety of speed changes either in a forward or reversed direction, so as to adapt the invention especially for use in all situations and more especially in positions where a multiplicity of speed variations is desirable, and it will be readily understood from the above description that the device is capable of considerable modification without material departure from the principles and spirit of the invention, and for this reason I do not wish to be understood as limiting myself to the precise form and arrangement of the several parts of the device herein shown in carrying out my invention in practice.

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

1. A driving mechanism comprising two elements one of which is a shaft and the other of which is a master-wheel held to turn concentric about the shaft, and transmitting devices at each side of the master-wheel for driving one element from the other, each transmitting device comprising gears on the master-wheel and on the shaft and pinions capable of engagement with said gears and the transmitting device at one side of the master-wheel being adapted to drive one element in a direction reversed to that in which the same element is driven by the transmitting device at the other side of the master-wheel.

2. A driving mechanism comprising two elements one of which is a shaft and the other of which is a master-wheel held to turn concentric about the shaft, internal and external gears arranged, respectively, at opposite sides of the master-wheel, and driving devices comprising parts engageable with and disengageable from said gears for driving one element from the other.

3. A driving mechanism comprising two elements, one of which is a shaft and the other of which is a master-wheel held to turn concentric about the shaft, internal and external gears carried by the master-wheel, gears on the shaft and pinions engageable with and disengageable from the internal and external gears of the master-wheel and the gears on the shaft for driving one element from the other in reverse directions.

4. A driving mechanism comprising two elements one of which is a shaft and the other of which is a master-wheel held to turn concentric about the shaft, internal and external gears carried by the master-wheel, clutch members loose on the shaft and having gear-faces, other clutch members engageable with and disengageable from the first-named clutch members and held to turn with the shaft but capable of movement endwise thereof and pinions engageable with and disengageble from the respective internal and external gears on the master-wheel and the respective gear-faces of the clutch members loose on the shaft for driving one element from the other in reverse directions.

Signed at Cincinnati, Ohio, this 11th day of November, 1903.

FRANCIS MILLER.

Witnesses:
JOHN ELIAS JONES,
L. M. JONES.