No. 719,354. PATENTED JAN. 27, 1903.

H. MOON.

REVERSING GEAR.

APPLICATION FILED JUNE 25, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

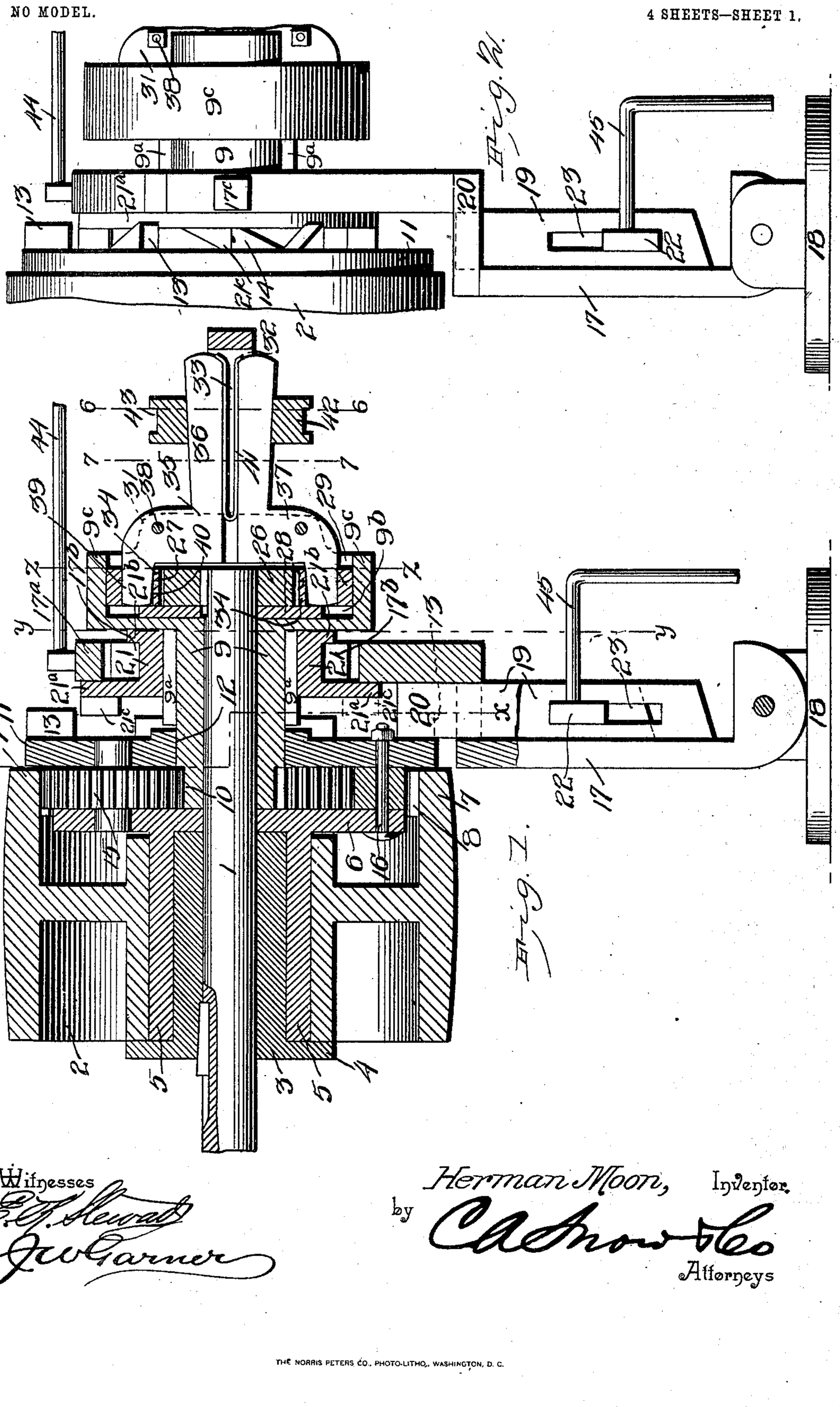


Fig. 1.

Witnesses
E. F. Stewart
J. W. Garner

Herman Moon, Inventor.
by Church & Co
Attorneys

No. 719,354. PATENTED JAN. 27, 1903.

H. MOON.

REVERSING GEAR.

APPLICATION FILED JUNE 25, 1902.

NO MODEL. 4 SHEETS—SHEET 2.

Fig. 4.

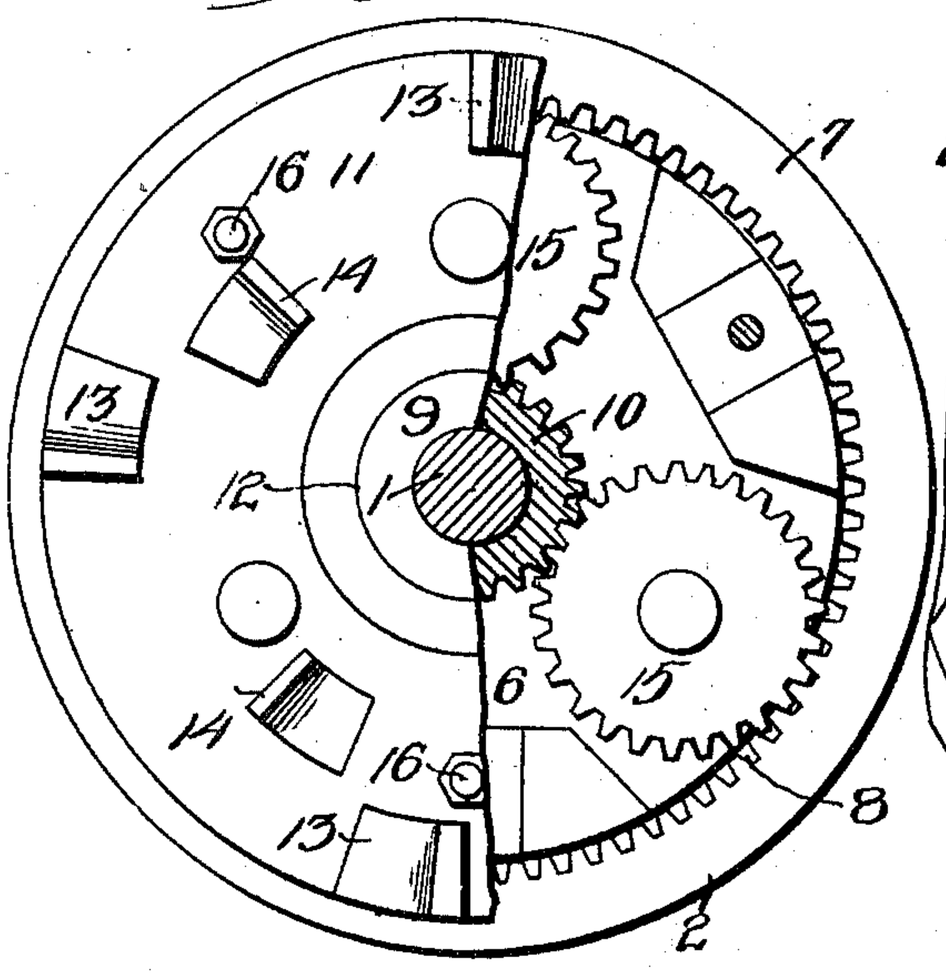
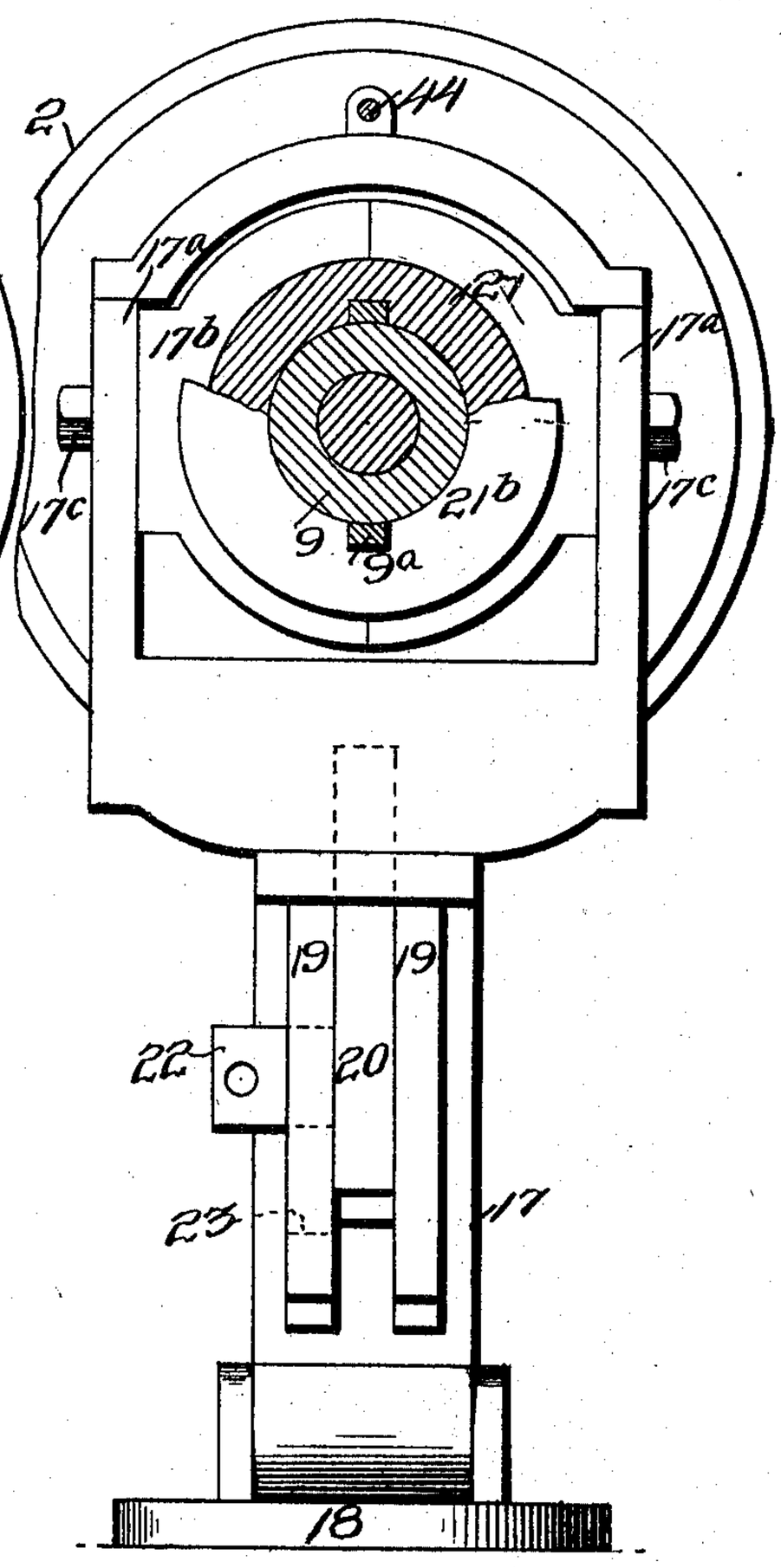


Fig. 3.



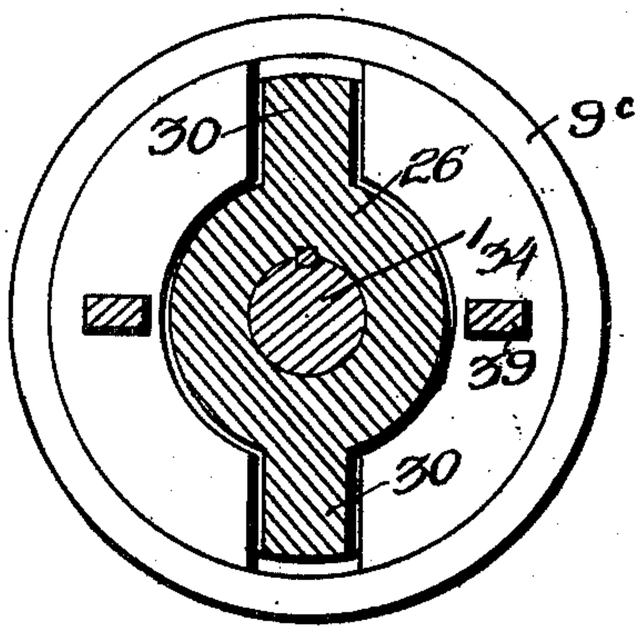


Fig. 5.

Witnesses
E. F. Stewart
J. W. Garner

Herman Moon, Inventor.
by Cushman & Co
Attorneys

No. 719,354. PATENTED JAN. 27, 1903.

H. MOON.

REVERSING GEAR.

APPLICATION FILED JUNE 25, 1902.

NO MODEL. 4 SHEETS—SHEET 3.

Fig. 7.

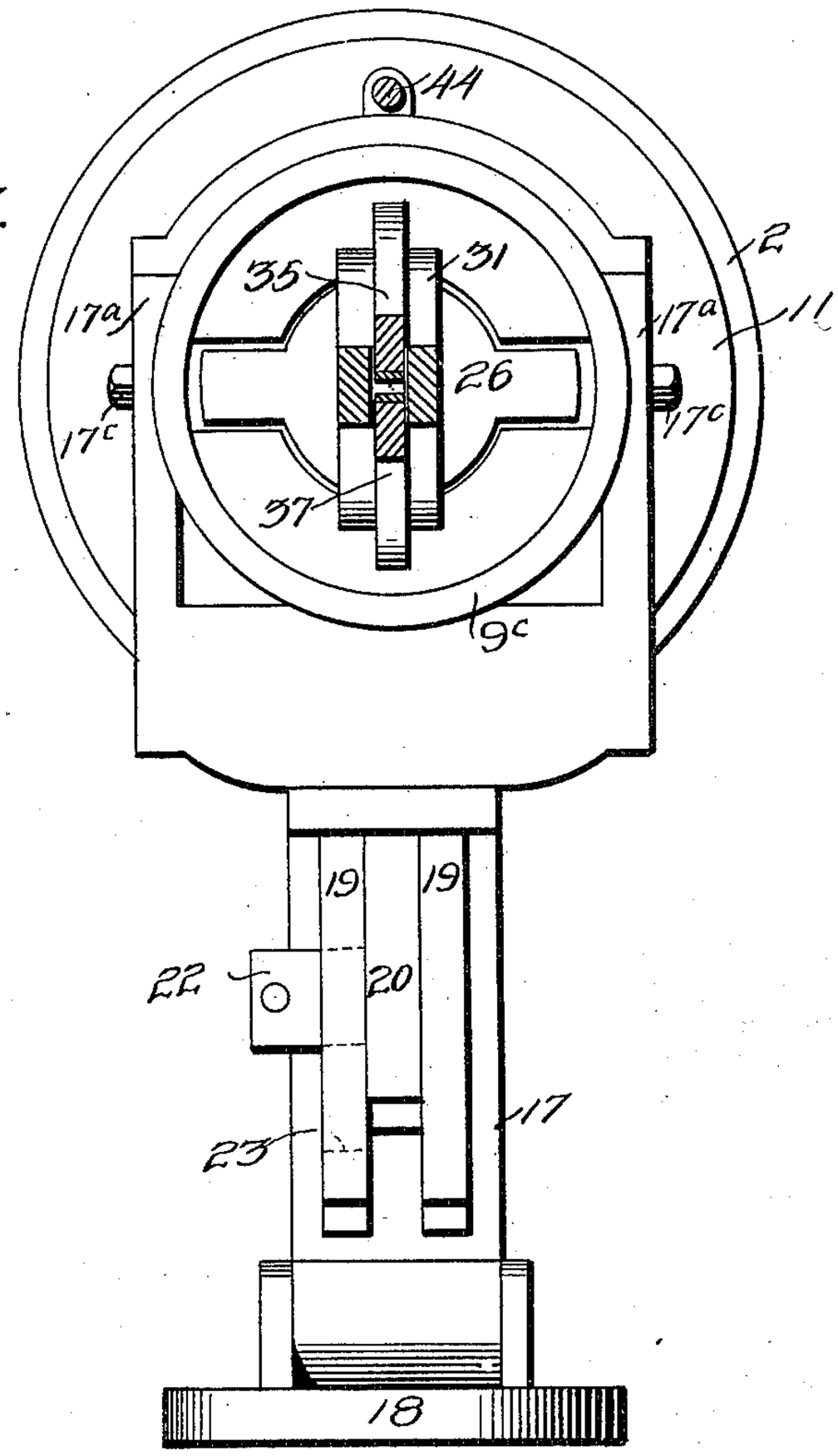
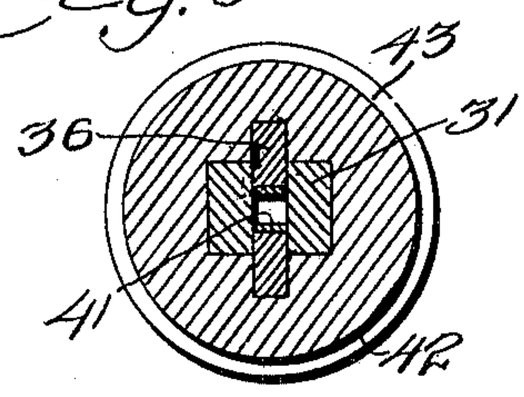


Fig. 6



Witnesses
E. K. Stewart
C. E. Doyle

Herman Moon, Inventor.
by Church & Church
Attorneys

No. 719,354. PATENTED JAN. 27, 1903.

H. MOON.

REVERSING GEAR.

APPLICATION FILED JUNE 25, 1902.

NO MODEL. 4 SHEETS—SHEET 4.

Fig. 8.

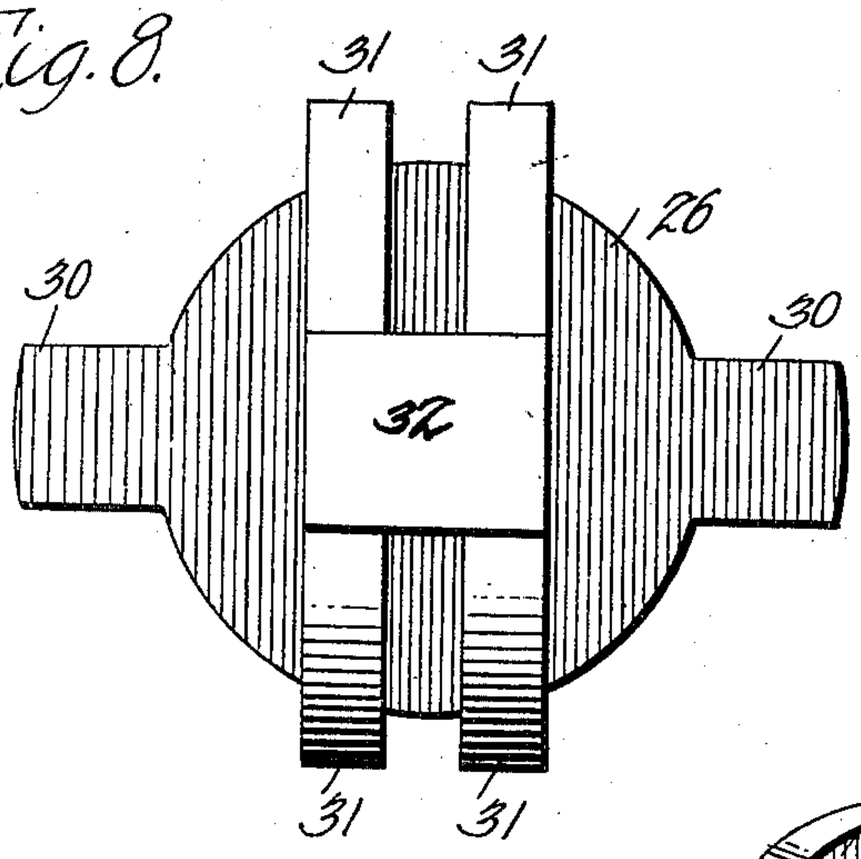
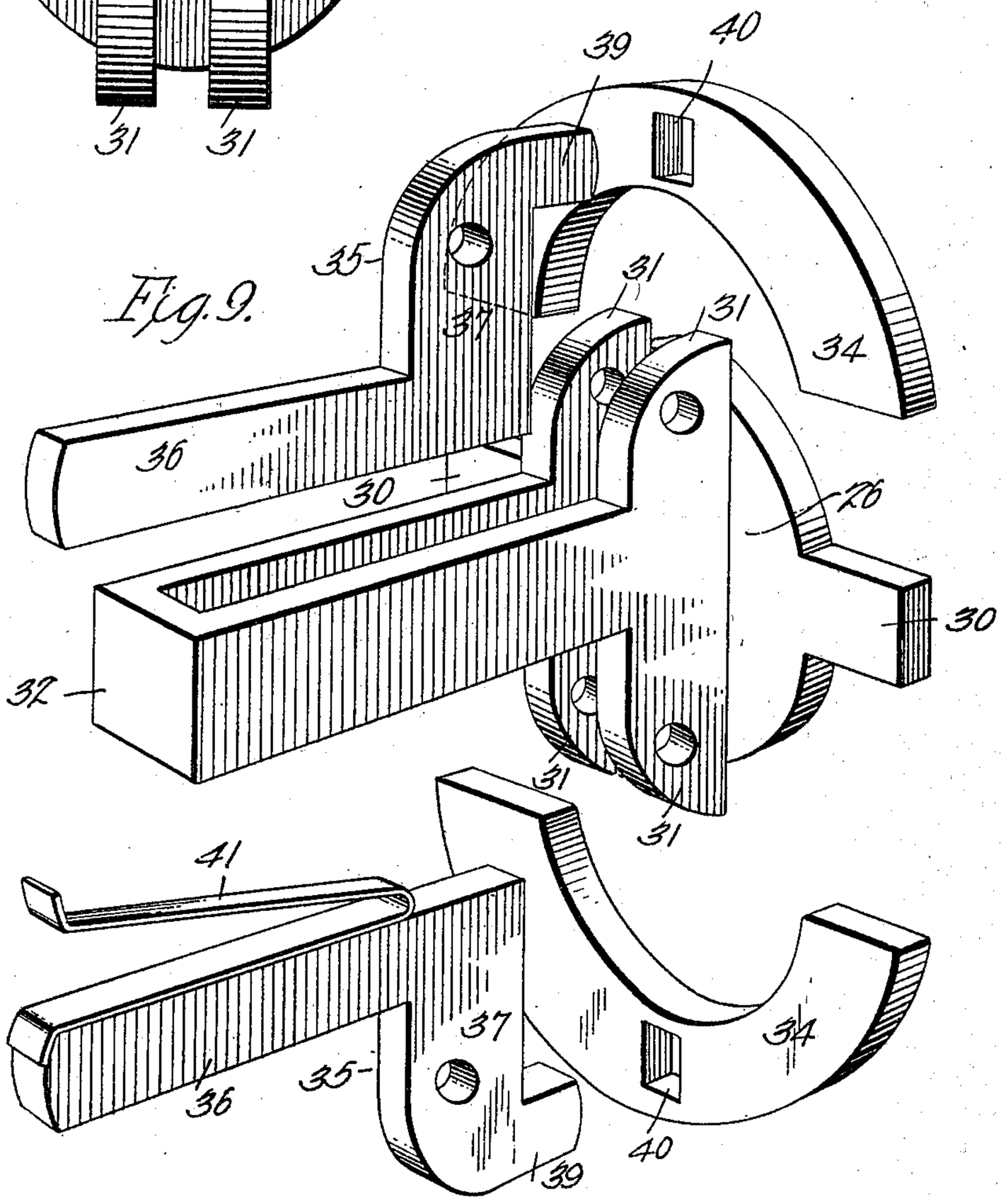


Fig. 9.



Witnesses
C. F. Stewart
L. M. McCall.

Herman Moon, Inventor:
by Cushman & Co
Attorneys

UNITED STATES PATENT OFFICE.

HERMAN MOON, OF GROVE CITY, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO HARVEY B. HEASLET, OF GROVE CITY, PENNSYLVANIA.

REVERSING-GEAR.

SPECIFICATION forming part of Letters Patent No. 719,354, dated January 27, 1903.

Application filed June 25, 1902. Serial No. 113,154. (No model.)

To all whom it may concern:

Be it known that I, HERMAN MOON, a citizen of the United States, residing at Grove City, in the county of Mercer and State of Pennsylvania, have invented a new and useful Reversing-Gear, of which the following is a specification.

This invention relates to an improved reversing-gear for a motion-transmitting mechanism.

The object of the invention is to provide a reversing-gear by means of which a driven member may be driven either with or reversely with reference to the driving member and may be permitted to rotate independently thereof or to remain idle while the driving member is in rotation; and the invention consists in the peculiar construction and combination of devices hereinafter fully set forth and claimed.

Figure 1 of the accompanying drawings represents a longitudinal vertical section of a reversing-gear embodying these improvements, showing the mechanism thereof so adjusted that the driven member will be rotated in the reverse direction from the driving member. Fig. 2 represents a partial side elevation thereof so adjusted that the driving and driven members will rotate in the same direction. Fig. 3 represents a transverse sectional view thereof on two planes indicated by the dotted line *x x* of Fig. 1. Fig. 4 represents a similar view taken on line *y y* of Fig. 1. Fig. 5 represents a similar view taken on line *z z* of Fig. 1. Fig. 6 represents a similar view taken on line 6 6 of Fig. 1. Fig. 7 represents a sectional view taken on line 7 7 of Fig. 1, showing the head of the motion-transmitting member and the clutch-head disposed therein in elevation and the other parts of the gear at the rear thereof. Fig. 8 represents a transverse section taken on line 8 8 of Fig. 1. Fig. 9 represents enlarged detail views of the clutch members in position ready to be assembled.

The same reference-numerals indicate corresponding parts in all the figures.

The shaft 1 will be assumed for the purposes of this specification to be the driving member and to be continuously in rotation. The pulley 2 will be assumed to be the driven member, to which motion is communicated from the driving member by means of a motion-transmitting member, hereinafter to be described.

On the shaft 1 is keyed a sleeve 3, which has a circular flange 4 at one end thereof, which will be called the "inner" end. A sleeve 5 is loose on the sleeve 3 and is provided at the end opposite the flange 4 with a laterally-disposed flange 6, which constitutes one member of a support for the orbitally-movable revoluble elements of the planetary gearing, which connects the motion-transmitting member with the driven member and which will hereinafter be described in detail. The pulley 2 is loose on the sleeve 5 and has a flange 7, which overhangs the flange 6 and is provided on its inner side with spur-teeth 8, which extend entirely around the inner circumference of said overhanging flange.

The motion-transmitting member comprises a sleeve 9, loosely mounted on the driving-shaft 1, and, as shown, it is provided at its inner end with a gear 10, which is concentrically disposed with relation to the gear 8, formed by the flange of the pulley. This sleeve 9 has at its outer end a head 9^b, having an annular friction-flange 9^c. A head 11 is free to rotate on the sleeve 9, as at 12, and is provided on its outer side near its periphery with outstanding stops 13, of which any suitable number may be employed, and the said stops may be disposed at any desired distance apart. Within the radius of the stops 13 are stops 14, which face in the reverse direction from the stops 13. The head bears against the outer side of the pulley 2, and said head, together with the flange 6 of the sleeve 5, constitutes a support for the trunnion-shafts of a series of orbitally-movable revoluble pinions or planetary gears 15. These gears engage both the gear 10 and the internal gear 8, and thereby connect the motion-transmitting member with the driven member. Three of said gears 15 are here shown, although a single one will suffice under some conditions, and any suitable number may be employed within the scope of the appended claims.

The flange 6 of the sleeve 5 is here shown as secured to the head-plate 11 by bolts 16,

and together they form a bearing member or support for the pinions 15, and, as before stated, the said support may rotate with the shaft 1 and pulley 2, or it may be locked against rotation. Within the scope of the appended claims any suitable means may be employed to thus lock the bearing member or support of the pinions 15 against rotation. For the purpose of this specification a locking device is shown which comprises an arm 17, pivoted at one end thereof to a fixed point, here indicated as a bearing-plate 18, transversely disposed with reference to the shaft 1, and the said arm 17 has guideways 19, in which a longitudinally-movable stop 20 is guided and retained. Said stop may be moved into position to engage one of the stops 13, and thereby prevent rotation of the sleeve 5 and head 11 and prevent the pinions 15 from moving orbitally, as shown in Fig. 1, to cause the pulley 2 to be driven in the reverse direction from that in which the shaft 1 rotates. When the stop 20 is disengaged from the stops 13, the pinions 15 are free to move orbitally with the shaft 1 and pulley 2. The stop 20 has an arm 22, which operates in a slot 23 in one of the guides 19.

At the upper ends of the arms 17 is a fork 17^a, in which is pivotally mounted a bearing 17^b, the pivots of which are shown at 17^c. The said bearing comprises a pair of separable sections, retained with their opposing sides in contact by the fork 17^a and the pivots 17^c, as shown in Fig. 3. A longitudinally-movable collar 21 is carried by and rotates in the said bearing and has flanges 21^a and 21^b on opposite sides thereof. The flange 21^a has stops 21^c, adapted to engage the stops 14 of the head 11 when the collar is moved toward said head, as shown in Fig. 2. The said collar is connected to the sleeve 9 by splines 9^a and is hence caused to rotate therewith.

The clutch mechanism which communicates motion from the driving member to the motion-transmitting member or releases said member therefrom is here shown as a head 26, keyed to the shaft 1 and disposed within the annular flange 9^c of the sleeve 9. The said head has radial stops or wings 30, of which there are two formed integral with the head 26 in line with each other. From the outer side of the head projects a slotted spindle 32, which extends in line with the shaft 1. In the arc-shaped spaces of the head 9^b, formed between the inner walls of its flange 9^c and the stops 30, projecting radially from the head 26, are radially-movable brake-shoes 34, which are adapted to frictionally engage the flange 9^c of said head 9^b.

A pair of bell-crank levers 35, having outwardly-extending arms 36, have their inner arms 37 pivoted between the bearings 31, formed by the ends of the spindle 32, as at 38, and the ends of said arms 37 are downturned, forming studs 39, that enter openings 40 in the friction-jaws 34, so that said jaws are carried and operated by said bell-crank levers. The outer sides of said arms diverge outwardly for a purpose soon to be described. Disposed between the arms 36 is a spring 41, that normally presses the said arms apart, and thereby draws inwardly the arms 37 and the friction jaws or shoes 34, engaged thereby, and causes said jaws to be released from the friction-flange 9^c.

A cam 42, which is here shown as circular in form, has a central opening to receive the spindle 32, so that said cam may be carried by and is adapted to be moved longitudinally on said spindle, and said cam has radial notches that communicate with its central opening and in which the outer portions of the arms 36 slide. The cam 42 has also an annular peripheral groove 43, adapted to be engaged by a shifting-lever of the usual construction for moving the cam longitudinally on the arms 36 to cause the latter to approach or recede from each other. When the cam is moved outwardly, the bell-crank levers swing on their pivots 38 in such manner as to cause the friction-jaws 34 to engage the flange of the friction-sleeve, and thereby cause said sleeve to rotate with the shaft 1, as will be understood. When the pulley is being driven by the shaft either in the same or in the reverse direction, the friction-jaws are in engagement with the flange of the sleeve 9. Prior to changing the direction of rotation of the pulley the cam 42 must be moved inwardly on the arms 36 of the bell-crank levers to cause the spring to operate said levers, disengage the friction-jaws from the friction-flange, and hence permit the shaft 1 to rotate in the sleeve 9 independently thereof. When the collar 21 is moved toward the head 11, which may be done by means of the arm 17, to engage the stops 21^c with the stops 14, as hereinbefore stated and as shown in Fig. 2, and the cam 42 has been moved outwardly to cause the friction-jaws 34 to engage the flange 9^c, the pulley 2 will be driven in the same direction as the shaft 1.

Suitable rods 44 and 45 or other devices may be attached to the upper end of the fork of the arm 17 and to the arm of the stop 20, respectively, to enable them to be operated as may be required from a distant point.

The invention is not limited to the precise construction and combination of devices hereinbefore described, as it is evident that modification may be made therein without departing from the spirit of the invention as the same is defined by the appended claims.

I claim as my invention—

1. A reversing-gear having driving, driven, and motion-transmitting members, revoluble mechanism connecting the motion-transmitting member and the driven member, interchangeably-operative means for respectively locking said mechanism against orbital movement and for locking it to the motion-transmitting member, and means for locking said motion-transmitting member to said driving member.

2. A reversing-gear having driving, driven, and motion-transmitting members, mechanism connecting the motion-transmitting member and the driven member, said mechanism having orbitally-movable revoluble elements, interchangeably-operative means for respectively locking said elements against orbital movement and for locking them to the motion-transmitting member, and means for communicating motion from the driving member to the motion-transmitting member.

3. A reversing-gear having driving, driven and motion-transmitting members, revoluble mechanism connecting the motion-transmitting member and the driven member, interchangeably-operative means for respectively locking said mechanism against orbital movement and for locking it to the motion-transmitting member, a clutch for locking said motion-transmitting member to said driving member, and a cam member for engaging said clutch and throwing it into and out of operative connection with said motion-transmitting member.

4. A reversing-gear having driving, driven and motion-transmitting members, planetary gearing connecting the motion-transmitting member and the driven member, a revoluble support for the orbitally-movable elements of the planetary gearing, and interchangeably-operative means for respectively locking said support against rotation and for locking it to the motion-transmitting member.

5. A reversing-gear having driving, driven, and motion-transmitting members, planetary gearing connecting the driven and the motion-transmitting members, a revoluble support for the orbitally-movable elements of the planetary gearing, a stop for the revoluble support, locking devices for connecting the motion-transmitting member with the revoluble support, and means for communicating motion from the driving member to the motion-transmitting member.

6. A reversing-gear having driving and driven members, a motion-transmitting member movable concentrically with the driving and driven members, planetary gearing connecting the driven member with the motion-transmitting member, a revoluble support for the orbitally-movable elements of the planetary gearing, a stop for the revoluble support, locking devices for connecting the motion-transmitting member with the revoluble support, and clutch mechanism for communicating motion from the driving to the motion-transmitting member.

7. In a reversing-gear, the combination of a shaft, a pulley loose thereon and having an internal gear, a motion-transmitting sleeve loose on said shaft and having a central gear, orbitally-movable pinions engaging said central and internal gears, loose supporting members for said pinions, relatively fixed means for preventing rotation of said supports and orbital movement of said pinions, means connected to the motion-transmitting sleeve for connecting said supports thereto, and means for locking said sleeve to said shaft.

8. The combination of a shaft, a pulley loose thereon and having an internal gear, a motion-transmitting sleeve loose on said shaft and having a central gear and a friction-face, orbitally-movable pinions engaging said central and internal gears, loose bearing-supports for said pinions having stops, relatively fixed means for engaging said stops and preventing orbital movement of said pinions, means carried by said sleeve for locking said bearing-supports thereto and thereby causing said pinions to rotate with the shaft, a hub element fast to said shaft, expansion-jaws for engaging the friction-face of said sleeve, levers fulcrumed to said hub element and connected to said expansion-jaws, and means for operating said levers.

9. The combination of a shaft, a pulley loose thereon and having an internal gear, a motion-transmitting sleeve loose on said shaft and having a central gear and a friction-face, orbitally-movable pinions engaging said central and internal gears, loose supports for said pinions having stops thereon, relatively fixed means for engaging said stops and preventing orbital movement of said pinions, means carried by the motion-transmitting sleeve for locking the said supports thereto, and thereby causing said pinions to rotate with the shaft, a hub element fast to the shaft, expansion-jaws for engaging the friction-face of said sleeve, bell-crank levers fulcrumed to said hub element, connected to said expansion-jaws and having outwardly-extending arms, a spring for pressing said arms apart and thereby retracting the expansion-jaws, and a cam movable longitudinally on said arms.

10. The combination of a shaft, a pulley loose thereon and having an internal gear, a motion-transmitting sleeve loose on said shaft and having a central gear, orbitally-movable pinions engaging said central and internal gears, loose bearing-supports for said pinions, relatively fixed means for locking the pinions against orbital rotation, an element carried by and longitudinally movable on the motion-transmitting sleeve for orbital movement by the latter, and a clutch revoluble with said shaft for engaging and disengaging the motion-transmitting sleeve.

11. The combination of a shaft, a pulley loose thereon and having an internal gear, a motion-transmitting sleeve loose on the shaft and having a central gear, an orbitally-movable pinion engaging said internal gear and central gear, a loose bearing-support for said pinion, a pivoted arm having a movable stop for engaging the bearing-support of the pinion and locking the latter against orbital motion, an element movable longitudinally on the motion-transmitting sleeve by said pivoted arm, revoluble with said sleeve and

having a stop to engage the support of the pinion, when the first-mentioned stop is out of engagement with said support, to connect the pinion to the motion-transmitting sleeve for orbital movement by the latter, and a clutch for engaging and disengaging the said sleeve with and from the shaft.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

HERMAN MOON.

Witnesses:
N. R. CAMPBELL,
J. P. LOCKE.