R. H. BOWMAN.

HAND MOTOR.

APPLICATION FILED JUNE 3, 1908.

906,685.

Patented Dec. 15, 1908.

3 SHEETS—SHEET 1.

Fig 1.

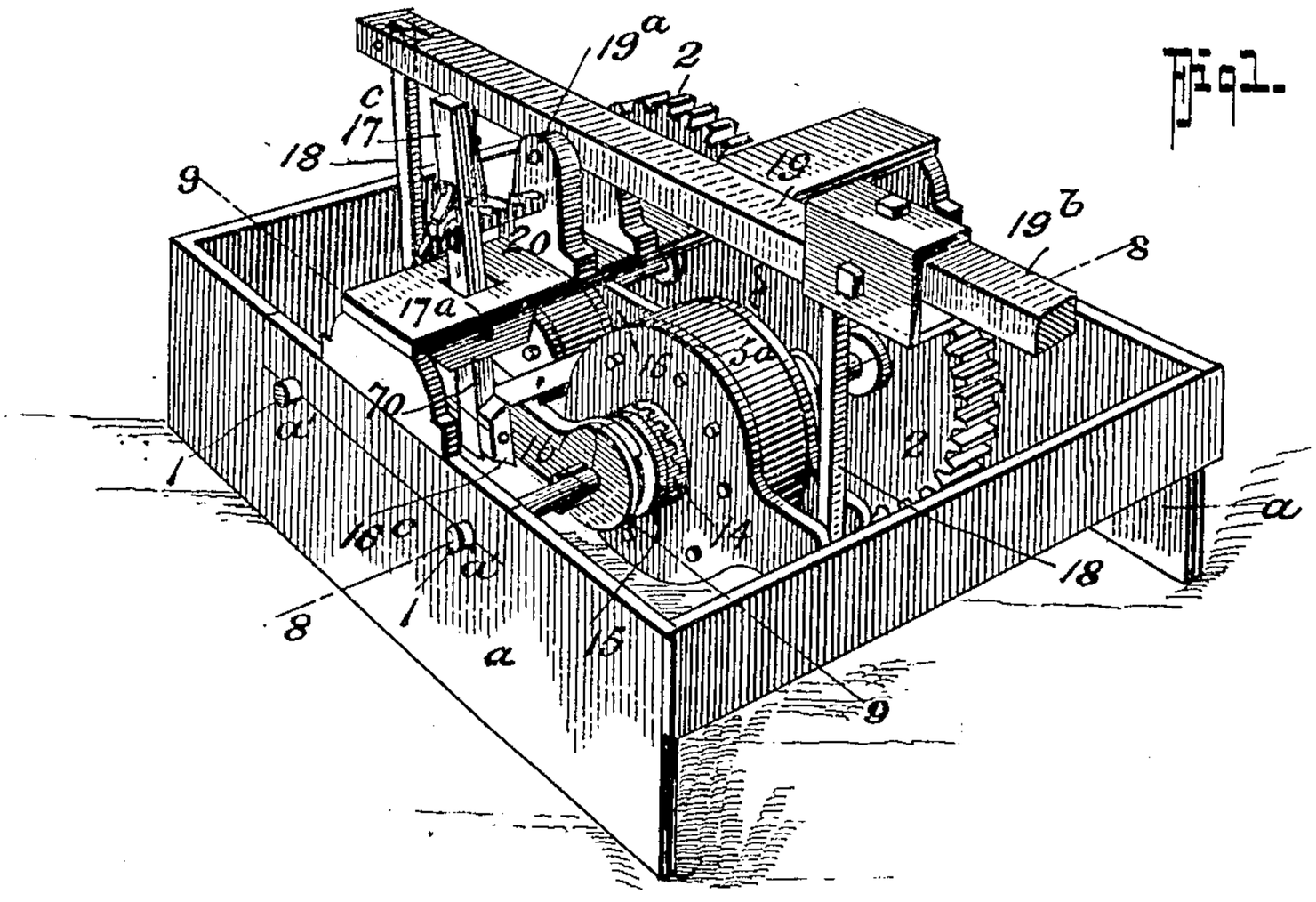


Fig. 2.

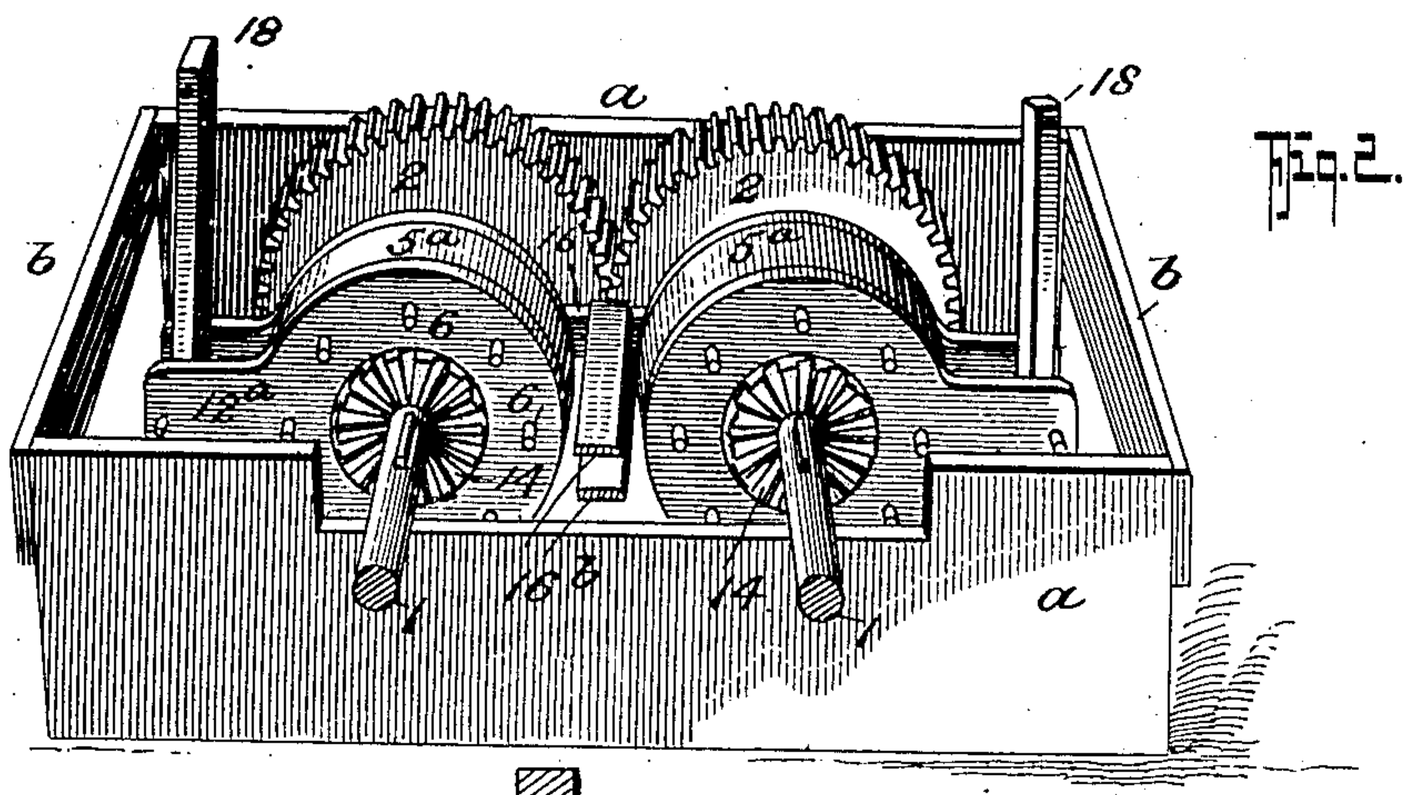
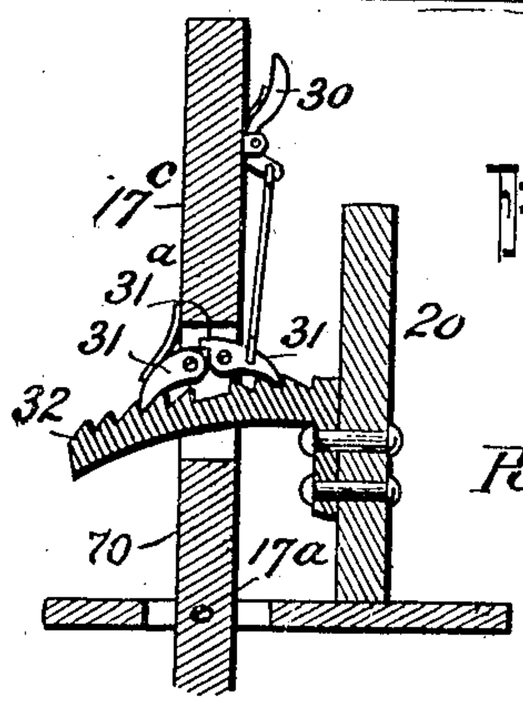


Fig 10.



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3 SHEETS—SHEET 2.

Fig. 3.

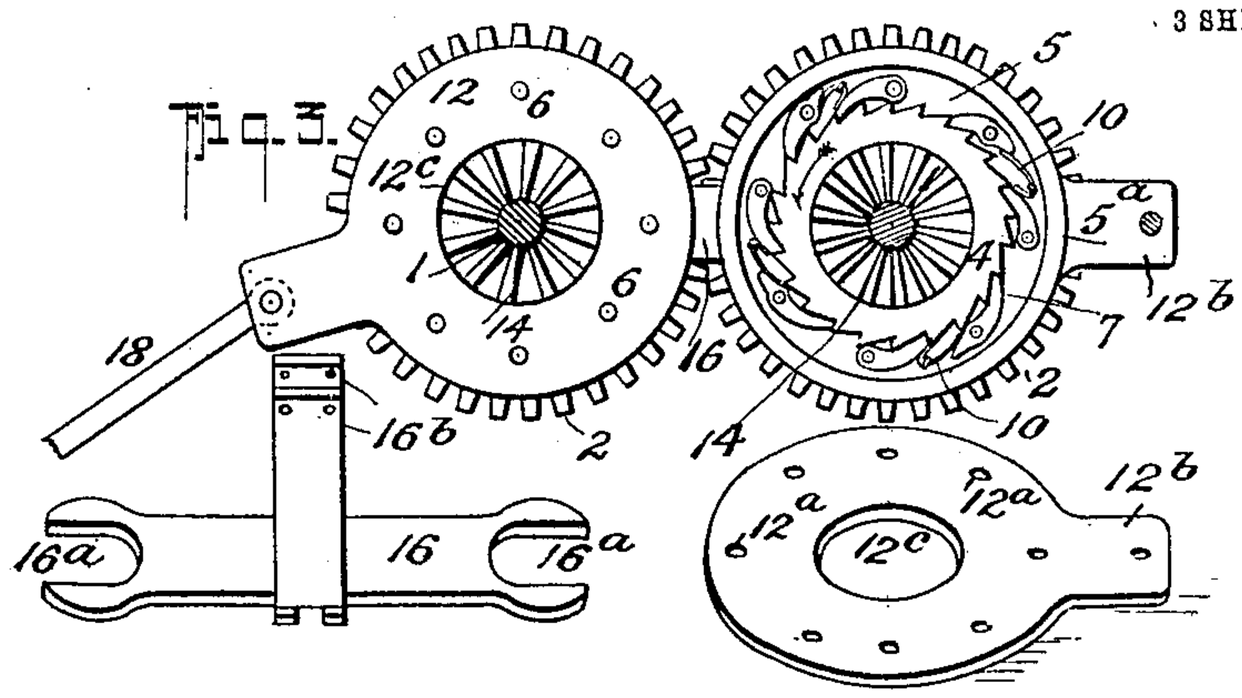


Fig. 4.

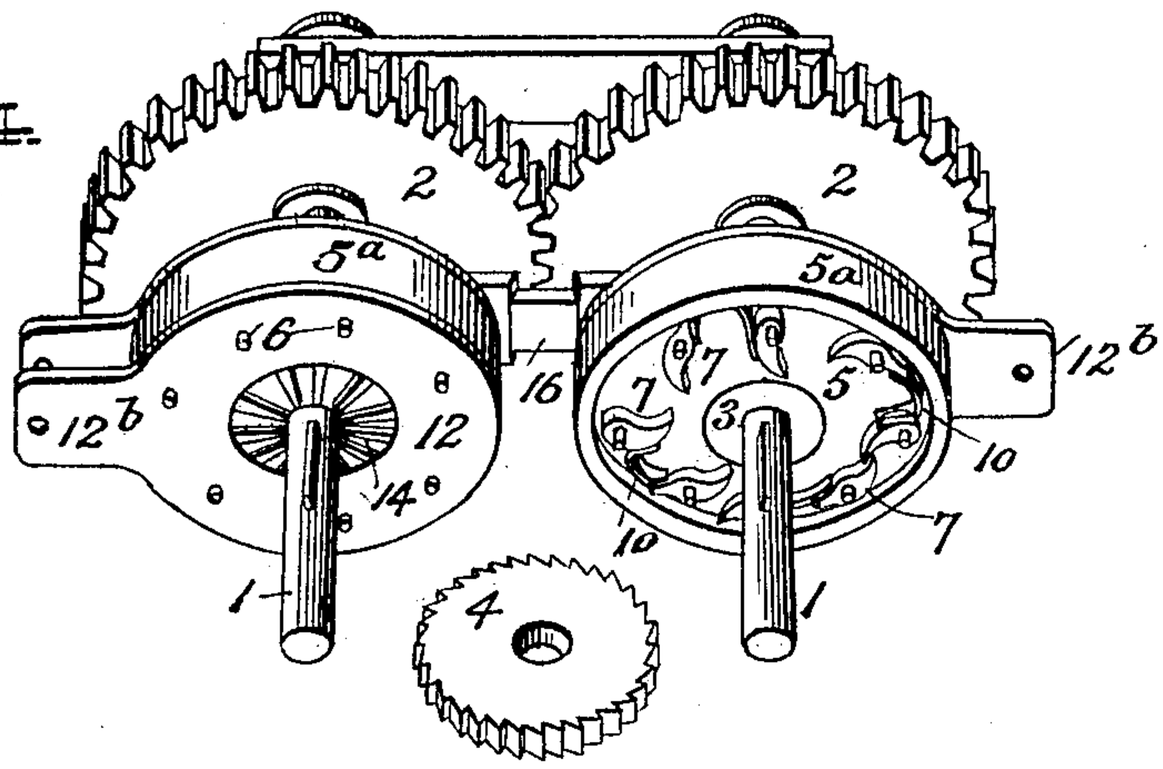
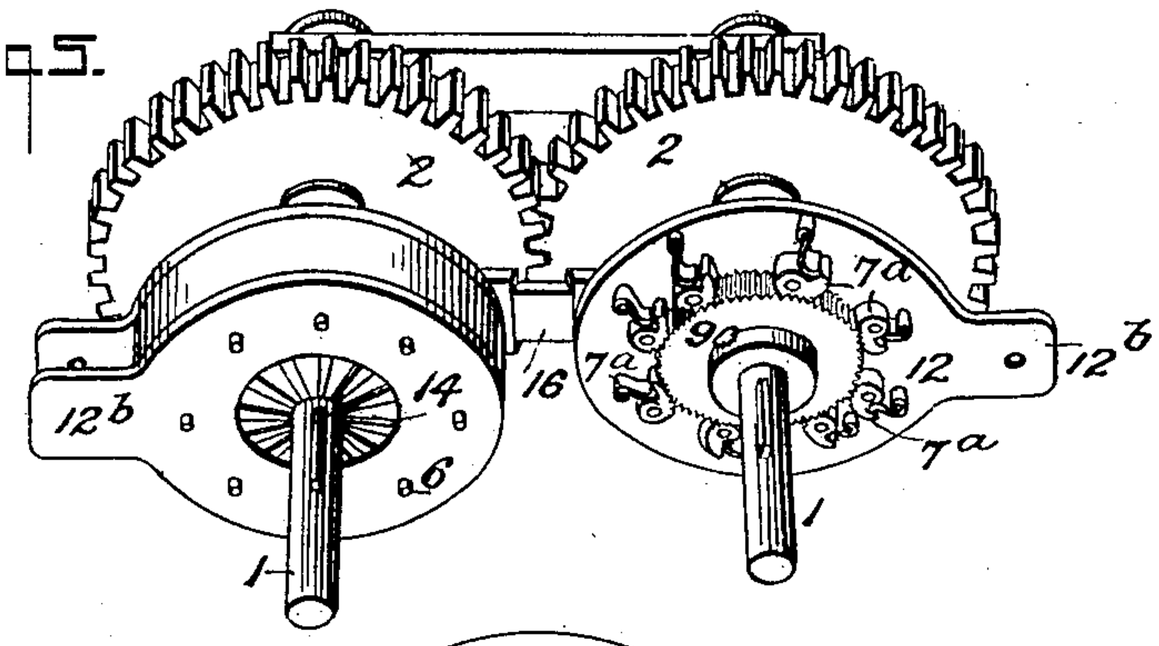
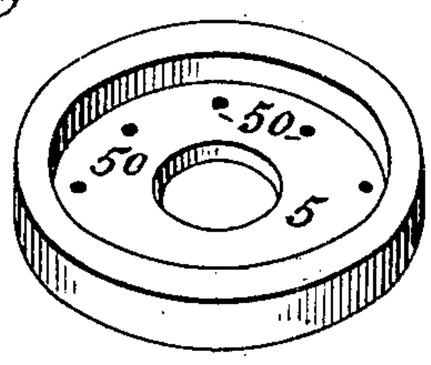


Fig. 5.





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3 SHEETS—SHEET 3.

Fig. 6.

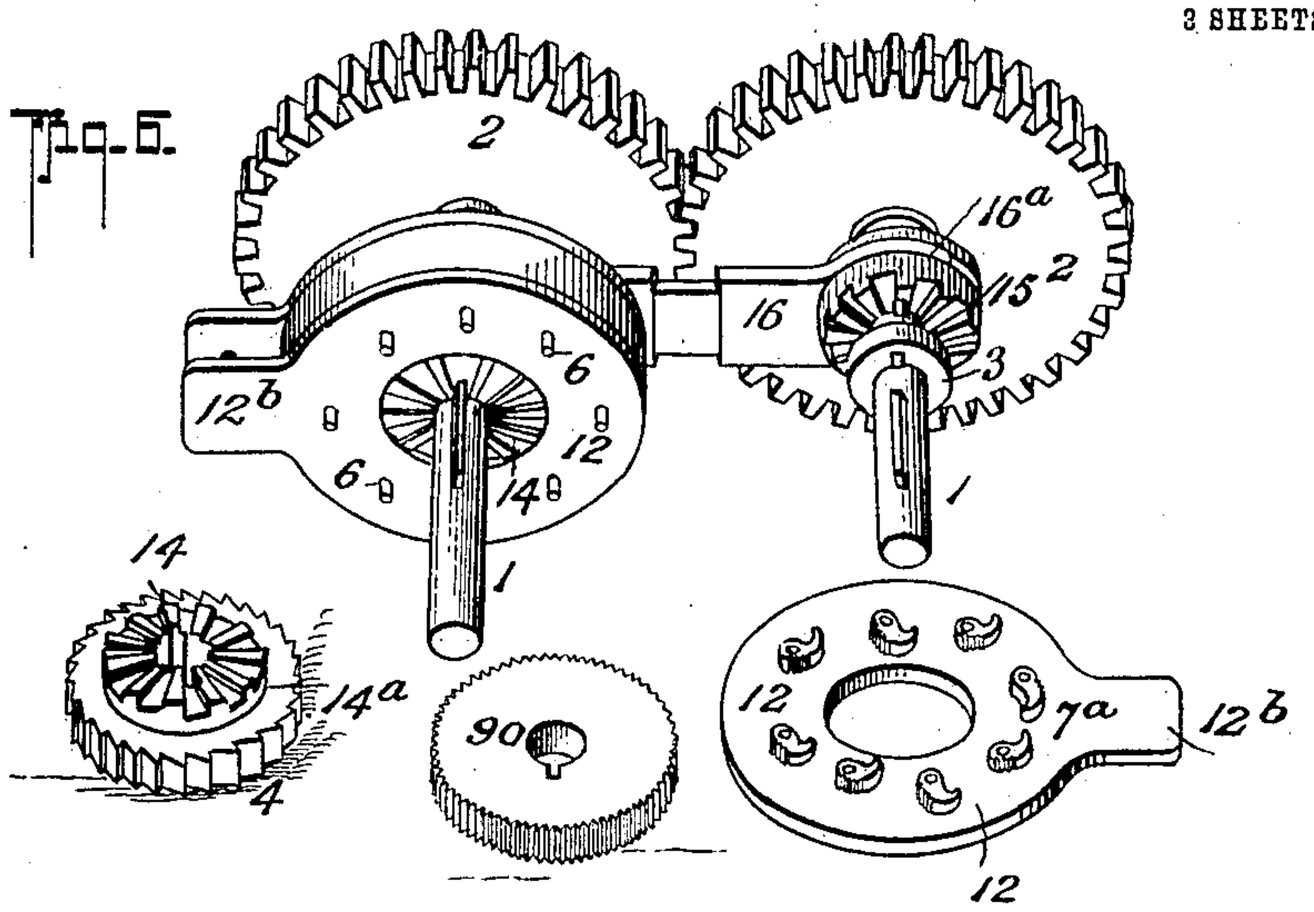


Fig. 7.

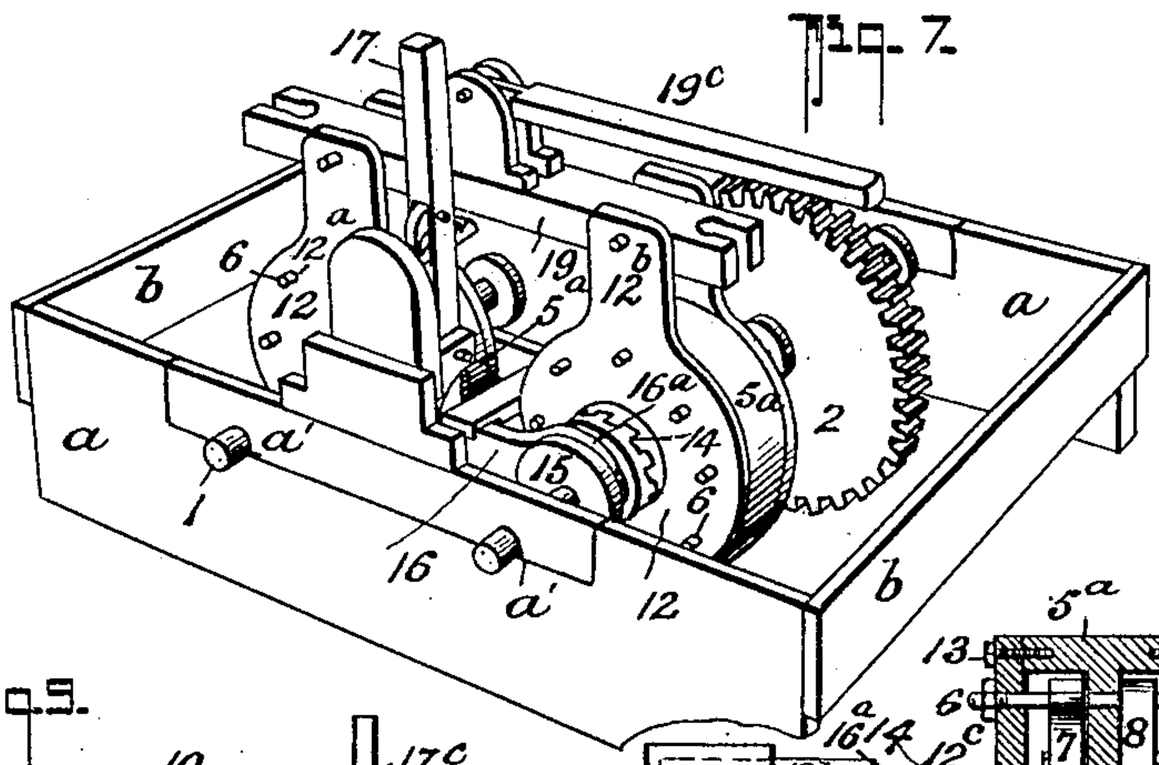


Fig. 9.

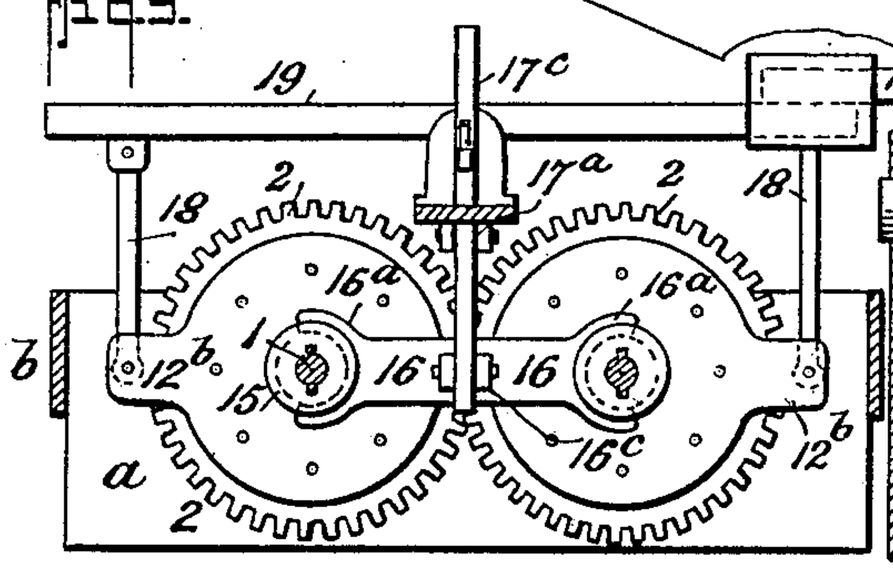
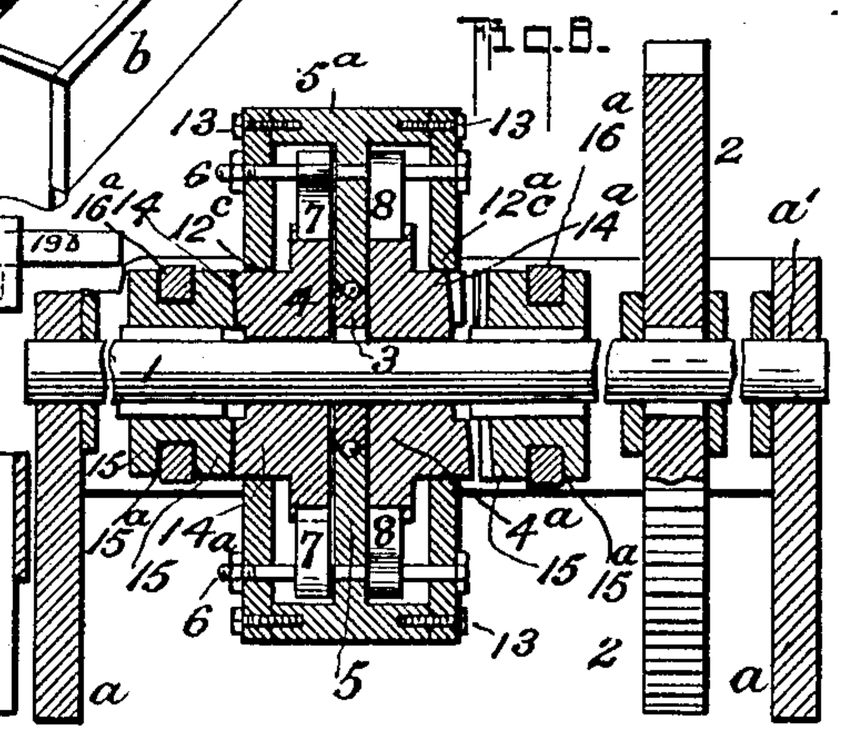


Fig. 8.



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UNITED STATES PATENT OFFICE.

ROBERT HENRY BOWMAN, OF CANON, COLORADO.

HAND-MOTOR.

No. 906,685. Specification of Letters Patent. Patented Dec. 15, 1908.

Application filed June 3, 1908. Serial No. 436,513.

To all whom it may concern:

Be it known that I, ROBERT HENRY BOWMAN, residing at Canon city, in the county of Fremont and State of Colorado, have invented a new and Improved Hand-Motor, of which the following is a specification.

My present invention has for its object to provide a simple, inexpensive and easily manipulated hand operated mechanism for transferring oscillatory to rotary motion and which can be utilized in running vehicles, hand cars, for forming a coöperative part of wave motors or for other desired machinery and in such manner as to produce practically a noiseless motor mechanism and in which lost motion is reduced to the minimum.

My invention therefore comprehends a new and improved detailed arrangement and coöperative combination of parts, all of which will be hereinafter fully explained, specifically pointed out in the appended claims and illustrated in the accompanying drawings, in which:—

Figure 1, is a perspective view of my improved hand motor mechanism, the several parts being combined for use, Fig. 2, is a similar view of the parts thereof, and hereinafter more specifically referred to. Fig. 3, is a perspective view that illustrates in detail parts hereinafter fully described. Fig. 4, is a detail view in perspective of the ratchet gear, the shafts and the directly meshed cog gears on the shafts, the ratchet gear devices on one shaft being incased. Fig. 5, is a view similar to Fig. 4 with the "center plate" hereinafter described removed from its coöperative ratchet devices. Fig. 6, is a further similar view with the ratchet gear and the outer plate removed from the ratchet shafts, the fixed disk and the sliding clutch being shown on the shaft, the different kinds of gears hereinafter referred to being shown in this view. Fig. 7, is a perspective view of the complete motor as shown in Fig. 1 with a slightly modified arrangement of parts hereinafter explained. Fig. 8, is a transverse section taken on the line 8—8 on Fig. 1. Fig. 9, is a longitudinal section of the same on the line 9—9 on Fig. 1. Fig. 10, is a detail section of the hand lever latch mechanism.

In the practical application, my present invention embodies a suitable framing, the general construction and arrangement of which is such as to suit the requirements for which the motor mechanism, sustained thereon, may be designed, the said framing in the drawing, consisting of two oppositely disposed side bars *a*—*a*, joined at the ends by cross pieces *b*—*b*. In bearings *a'*—*a'* in the side bars *a*—*a* are journaled two parallel shafts 1—1, each of which has keyed on it a cog gear 2—2 the said gears being held to mesh directly with each other, as shown.

At a suitable point in advance of the gears 2—2 each shaft 1 carries a smooth disk 3 that is securely keyed or bolted thereon as clearly shown in Figs. 8 and 4, by reference to which it will also be seen that a set of ratchet gears 4—4[a] are loosely mounted on the axle, one ratchet gear at each side of the disk 3.

Loosely mounted upon each of the disks 3 is a central or disk plate 5 that has a series of concentric perforations 50 near its peripheral edge through which extend bolts 6 that project to each side of the said disks 5. On each end of the bolts 6 are placed inside and outer sets of pawls, designated respectively 7 and 8, one set, (the inside ones 7) being arranged to engage with the ratchet gear 4 that is loosely mounted upon the shafts 1—1, and a number or all of the said pawls 7 have springs 10 connected therewith in such manner that they serve to normally throw the pawls into engagement with the ratchet gears 4—4[a]. One set of pawls 8 which are projected reversely of the inside pawls 7 engage the ratchet gears 4[a] loosely mounted on their respective shafts 1—1. The pawls 7 and 8 may be of the form shown in Fig. 3 for engaging the usual type of ratchet gears, or they may be cam shaped as shown at 7[a] on Fig. 6 and provided with serrated faces for engaging the serrated periphery of the disk designated 90, see Fig. 6.

The pawls and ratchet mechanisms just described are closed in by cover plates 12—12 one on each side of the center plate and which have apertures 12[a] for receiving the outer end of the pawl carrying bolts, the said plates being secured to the rims 5[a] of the center or disk plate 5 by screws or bolts 13 and each of the plates 12 has an outwardly projecting crank arm 12[b] that connects with the actuating lever device, which preferred form is best shown on Fig. 1 and which will be again presently referred to. The cap or cover plates 12 have axial openings 12[c], into which project hubs 14[a] formed on the ratchet members 4 and 4[a] and whose outer ends form clutches 14—14[a] as clearly shown in Fig. 2. So far as described, it will be apparent that since the pawl carrying bolts extend

through the central as well as the outside or cover plates, they aid in securing the three parts together, to form, as it were, one solid wheel hollow at the opposite sides with the pawls and ratchet gears mounted within the hollow portions thereof and thereby fully incased. By providing smooth central disks fixedly mounted on the shafts, keeps the ratchet and pawl mechanisms and the supporting casings therefor properly in place and the central disks may each have an annular groove to form a ball race, and in this case the annular opposing bearing on the pawl carrying central disk would be similarly grooved to accommodate the bearing balls, see Fig. 8.

Coöperating with the clutch members 14—14 loosely mounted on the shafts 1 are clutch hubs 15—15 that are slidably mounted on the said shafts 1 and said hubs have annular grooves 15^a—15^a with which engage the forked end 16^a—16^a of a pair of yoke members 16—16 that are connected by parallel members 16^b—16^b that extend at right angles to the yoke pieces proper, and between the two sets of ratchet and pawl mechanisms. One of the yoke pieces 16 has a bifurcated bearing 16^c in which is pivotally connected the lower end of a lever 70 that is fulcrumed at 17^a on the framing and which has its upper end projected to form a handle 17^c, as shown, the several parts being so arranged that shifting the lever to the limit in one direction will move the two yokes and all of the sliding clutch members in such manner as to throw the clutch members at one side into a clutch engagement with the shaft, the shifting of the lever to the limit in the opposite direction, throwing out the said clutches at one side and bringing the clutch at the other side into a locked engagement with the shaft and a midway position to the lever serving to throw both clutches out of gear.

It will be noticed by referring to the drawings that each set of crank arms of the cap plates 12 for the ratchet and pawl mechanism is connected by a pivoted link rod 18 with the opposing ends of an oscillating bar 19 fulcrumed at 19^a on the bracket 20 projected upwardly on the cross member *f* of the main frame, the said bar 19 having handle extensions 19^b, as shown.

From the foregoing, taken in connection with the accompanying drawings, the complete construction, the advantages and the manner in which my present invention operates it is believed, will be readily understood.

It will be noticed that since the ratchet mechanisms are constructed alike or relatively reversely arranged that the up stroke of the lever connection with the oscillating pawl carrying members, causes the pawls that engage the ratchet gear on one shaft to rotate the said shaft forwardly in the direction indicated by the arrow on Fig. 3 and since the like faced pawls and ratchet gear coöperating therewith on the other shaft are reversely positioned, it follows that the said pawls will slip over the ratchet, thus leaving the other shaft free at this time for being positively rotated inwardly through the cog gears that join the two shafts 1—1, it being also understood that when the lever is swung in the reverse or down position the clutch and pawl devices on the said other shaft will now direct to actuate the said other shaft as the rotation of the opposing shaft is now continued through the cog wheel connection above referred to. Since the several pawls take hold alternately, when one set is in engagement with its respective ratchet gear, the other set slips back over the ratchet teeth of its gear and takes hold when the lever is on the other stroke. The handles of the oscillating lever preferably are telescopically connected with the said lever as shown, so that they may be drawn out for increasing the leverage.

The hand lever that controls the shifting of the cutch adjusting yokes carries a hand latch 30, and has a slot for the passage therethrough of a rack 32, projected from the bracket 20, and on the said lever is fulcrumed two pawls or dogs 31—31, one of which has a shoulder 31^a for engaging the other in such manner that as it is lifted through the adjusting of the latch, the other dog that it engages will also be lifted, suitable springs being provided for holding the pawls down to their rack engaging position. The rack has two sets of teeth, one set for each dog, the extreme ones of the two sets are for holding the clutches in engagement and the center ones for holding the clutches out of engagement.

Instead of arranging the crank members of the outer plates of the ratchet and pawl mechanisms, the parts may be assembled as shown in Fig. 7, by reference to which it will be seen that when thus arranged, the link members are dispensed with and the said cranks are directly and pivotally joined with oscillating arm 19 to which is joined a handle 19^c that can be swung in either direction so the bar 19 can be oscillated from either end of the machine.

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

1. In a mechanical motor, the combination of two shafts, connected for rotation in opposite directions simultaneously, a disk rotatably mounted on each shaft, a series of pawls disposed concentrically on each side of the disk, the pawls on one side of one disk being oppositely disposed to the pawls on the corresponding side of the other disk, the pawls on the similar faces of the two disks being oppositely disposed, means for impart-

ing reverse rotary movement of the disks on their respective shafts, a pair of clutch members on each shaft, one for each side of each disk, and that coöperate with the several sets of pawls, and means for simultaneously throwing one clutch member at one side of each of the disks into a fixed operative connection with its shaft as the other clutch members are operatively disengaged from the shafts.

2. In a mechanical motor, the combination of two shafts, connected for rotation in opposite directions simultaneously, a disk rotatably mounted on each shaft, a series of pawls disposed concentrically on each side of the disk, the pawls on one side of one disk being oppositely disposed to the pawls on the corresponding sides of the other disk, the pawls on the similar faces of the two disks being oppositely disposed, means for imparting reverse rotary movement of the disks on their respective shafts, a pair of clutch members on each shaft, one for each side of each disk, and that coöperate with the several sets of pawls, and means for simultaneously throwing one clutch member at one side of each of the disks into a fixed operative connection with its shaft as the other clutch members are operatively disengaged from the shafts and for throwing all of the clutches simultaneously out of gear.

3. In a mechanical motor, the combination of two shafts, said shafts having intermeshing gear wheels fixed thereon for rotation in opposite directions, a disk freely rotatable on each shaft, each disk having a chamber at each side and cap pieces that close over the said chambers, a series of pawls mounted on each face of the disks within the chambers, those at one side being reverse to those at the other side and all the pawls on one disk being disposed to operate oppositely to the like pawls on the other disk, a pair of ratchet wheels loosely mounted on each shaft, one in each chamber, said ratchets each having a clutch hub that project through the capped ends of the said chambers, the several ratchets and clutches being reversely arranged to coact with their respective sets of pawls other clutch members slidably mounted to turn with the shafts, one for each clutch member, means for imparting reverse rotary motion to the pawl carrying disks and means for adjusting the clutches for bringing predetermined ones of the clutches into direct connection with their respective shafts, as set forth.

4. In a mechanical motor, the combination of two shafts connected for rotation in opposite directions simultaneously, a disk loosely mounted on each shaft, said disk having lateral peripheral extensions, a cap plate secured upon each of the lateral extensions whereby to provide opposite chambers, each of the disks having a crank member or extension, a rocking lever mechanism connected to the said cranks whereby to oscillate the two disks simultaneously but reversely on their respective shafts, clutch members loosely mounted on each shaft, one to each side of the disks thereon, ratchet wheels formed with the said clutch members that rotate within the chambers aforesaid, pawls mounted in each side of the disks for engaging the ratchet, the pawls and ratchets on the like faces of the two disks being reversely arranged and those on one side of each disk being reverse to those on the other side, sliding clutch members rotatable with and slidable on the shafts for coöperating with the ratchet clutches, and a single mechanism for setting all the clutch and ratchet devices into or out of operative positions, for the purposes specified.

5. In a mechanical motor, a shaft, a disk loosely mounted thereon, said disk having concentrically arranged pawls on the opposite sides, the pawls on one side being disposed reversely to those on the other side, a pair of ratchets having clutch hubs loosely mounted on said shaft, one of said clutches to each side of the disk for coöperating with the pawls carried by the disk, two clutch members on the shaft for coöperating with the ratchet clutches, a yoke frame that connects with both clutches, said frame being transversely slidable, and a means for oscillating the disks.

6. In a mechanical motor, the combination of two shafts connected for rotation in opposite directions simultaneously, a disk loosely mounted on each shaft, each of said disks having concentrically arranged pawls on the opposite sides, the pawls on one side being disposed reversely to those on the other side and the sets of pawls on one disk being reversely to the sets of pawls on the other disk, a pair of ratchets having clutch hubs loosely mounted on each shaft, one of said clutches to each side of the disk for cooperating with the pawls carried by the disk, sliding clutch members on the shafts for cooperating with the ratchet clutches, a yoke frame that connects with all of the clutches, said frame being transversely slidable, a means for oscillating the disks, means for controlling the sliding clutch members, said means including a lever connected with the transversely slidable clutch controlling yoke, and a double pawl and ratchet mechanism combined with the lever, and having connection with the lever for holding it to its adjustments.

7. In a mechanical motor of the character described, the combination of a shaft carrying a transmitting gear, the disk 3 keyed to the shaft, the disk 5 loosely mounted to rotate on the shaft disk 3, said disk having an annular rim that projects to each side thereof, cap plates that close on the said rims so

as to provide an annular chamber at each side of the disk member 5, a series of pawls concentrically mounted on each face of the disk 5, the pawls at one side being disposed reversely to those on the other side, a pair of oppositely positioned ratchets loosely mounted on the shaft, one for each set of disk pawls, each of said ratchets having a clutch hub, said hubs being reversely positioned, means for oscillating the pawl carrying disk, and a pair of oppositely acting clutch members slidably mounted on the shaft, and means for simultaneously shifting both slidably mounted clutches whereby to bring either into gear with its corresponding clutch face on the ratchet member, as set forth.

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