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FORWARD AND REVERSE DRIVE MECHANISM.

APPLICATION FILED APR. 21, 1917.

1,274,781. Patented Aug. 6, 1918.

Fig. 1.

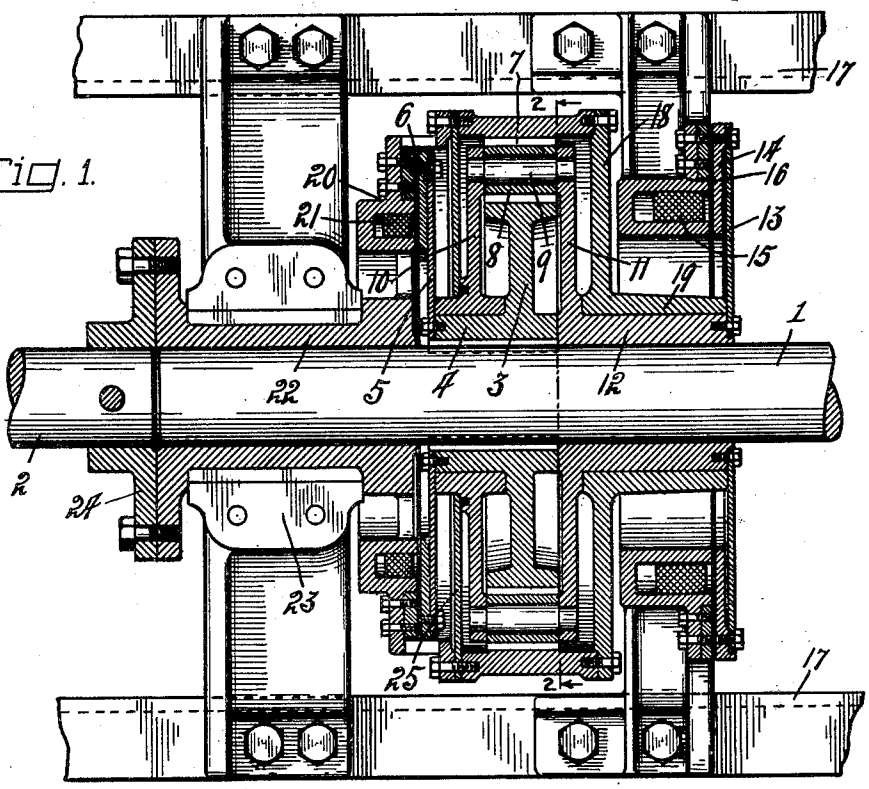
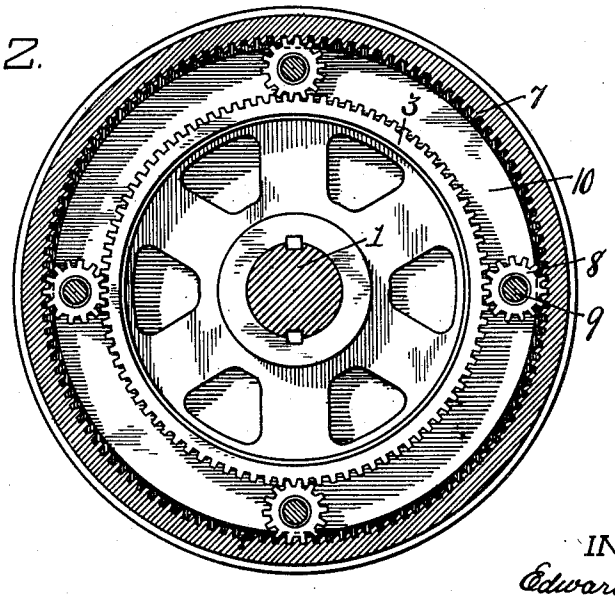


Fig. 2.



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FORWARD AND REVERSE DRIVE MECHANISM.

1,274,781. Specification of Letters Patent. Patented Aug. 6, 1918.

Application filed April 21, 1917. Serial No. 163,621.

To all whom it may concern:

Be it known that I, EDWARD RATHBUN, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have invented a certain new and useful Forward and Reverse Drive Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to power transmission mechanisms of the direct and reverse drive type, and particularly to an electro-magnet-controlled mechanism of this character.

The object of my invention is the provision of a simple, efficient and compact mechanism of the character described wherein the direct and reverse driving is accomplished by the use of only two clutches, and the direct drive is not effected through the teeth of any gear nor are any gears running idle. Further objects and advantages of the invention will be apparent to persons skilled in the art from the following detailed description thereof.

While the invention, in its broader aspect, is capable of embodiment in numerous forms, a preferred embodiment thereof is illustrated in the accompanying drawings, in which,

Figure 1 is a horizontal section of a mechanism embodying the invention, and Fig. 2 is a cross-section on the line 2—2 in Fig. 1.

Referring to the drawings, 1 and 2 designate the drive and driven shafts which are connected through the intermediate mechanism embodying my invention.

A spur gear 3 is keyed or otherwise suitably fixed to the shaft 1 for continuous rotation therewith, and fixed to one end of the hub 4 of this gear is an annular plate or collar 5 carrying an armature ring 6 at its outer side for the purpose hereinafter described. The gear 3 is connected to a surrounding internal gear 7 by a plurality of pinions 8. These pinions are carried by a frame which straddles the gear 3 and comprises the spindles or short shafts 9 on which the pinions are mounted, the side or web 10, and the side or web 11. The hub portion of side 10 is broadened and mounted for free turning movements on the adjacent end of the gear hub 4, being prevented from having lateral movements by engagement of the gear web 3 and plate 5 with its ends, and the side 11, and has its hub 12 mounted loosely on the shaft 1 and extended in sleeve form outward from said gear.

An annular plate or collar 13 is fixed to the outer end of the hub 12 and extends radially, therefrom in flange form and carries an armature ring 14 at the inner side, in the present instance, of its outer edge portion. A magnet winding 15 is carried by a field frame 16, which is disposed at the outer side of the armature ring 14, with respect to the collar 13, and is fixedly attached to stationary frame parts 17 or in any other suitable manner, whereby the field frame and winding are permanently maintained in stationary position.

The internal gear 7 is carried at one side by a web 18, which has a hub part 19 loosely sleeved on the hub member 12, and at its other side by a rotatable field frame 20, which is provided with the magnet winding 21 and is carried by a hub sleeve 22, which is loosely mounted on the shaft 1 adjacent to the driven shaft 2. The hub sleeve 22, in the present instance, is journaled in a bearing 23 and has its outer end flanged to adapt it for attachment to a coupling flange 24 on the adjacent end of the shaft 2. The magnet winding 21 and the field frame 20 are disposed at the outer side of the armature ring 6 in position to attract said ring thereto and firmly hold it when said winding and field frame are energized. It is evident that the body of the gear 7, and the webs 18 and 20 form a housing which straddles the pinion carrying frame and the gear 3 and is loosely mounted for rotation relative to the shaft 1.

A web 25 projects inward from one edge of the gear 7 between the plate 5 and frame side 10 and forms a partition which makes a close joint with the hub portion of the side 10 and coöperates with the gear 7 and web 18 to form a chamber for containing grease for lubricating the teeth of the gears 3, 7 and pinions 8.

In the use of my invention, it will be understood that when the magnet windings 15 and 21 are dead and the shaft 1 is being driven from any suitable source of power, both the gear 3 and pinions 8 will turn freely within the gear 7 without imparting rotation thereto in either direction. To ob-

tain a direct driving of the shaft 2 from and in the same direction as the driving of the shaft 1, the operator closes the electric circuit in which the winding 21 is disposed thereby causing an energizing of said winding and the field frame 20 and a consequent attracting of the armature ring 6 to said frame. This causes a rigid coupling together of the gears 3 and 7 due to the armature ring 6 being carried by the former and the frame 20 rigidly connected to the latter thereby imparting a direct forward driving at uniform speed to one shaft by the other through the hub or side connection of said gears instead of through the gear teeth, thus relieving the gear teeth of all strain during such forward driving. To obtain a reverse driving of the shaft 2, the circuit in which the winding 15 is disposed is energized thereby attracting the armature 14 and holding it and the pinion carrying frame stationary so that a driving of the gear 3 by the shaft 1 will impart a reverse driving to the gear 7 and housing which carries the same through the medium of the pinions 8. It is evident that the winding 21, which is mounted for rotation with the field frame 20, has brush connection (not shown) with an electric supply circuit, as well understood in the art.

It is evident with my mechanism that the reverse driving only of the shaft 2 with respect to the shaft 1 is through the teeth of the interposed gears and that such gear teeth are relieved of all strain during a direct or forward driving of the shaft 2 from the shaft 1 due to the rigid connecting of the side or hub end of the gear 3 with the side portion of the housing which carries the gear 7 such connection being effected through the electromagnet 20, 21 and armature ring 6.

I wish it understood that my invention is not limited to any specific construction, arrangement or form of the parts as it is capable of numerous modifications and changes without departing from the spirit of the invention as defined in the claims.

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

1. In a mechanism of the class described, a drive shaft, a driven member, a gear fixed to the drive shaft, an armature fixed to a side of said gear, a second gear loose on the drive shaft and fixed to the driven member, a set of pinions connecting said gears, means mounted loosely on said shaft and carrying said pinions, an armature fixed to said means, and separate independently operable electromagnetic means, one being stationary and associated with said last mentioned armature to attract and hold it against turning and the other being carried by said second gear and associated with said first armature to attract it and hold the two gears against relative movements.

2. In a mechanism of the class described, a drive shaft, a driven member, a spur gear fixed to said shaft, a housing inclosing said gear and being loose on said shaft and fixed to said member, said housing forming an internal gear, pinions connecting said spur and internal gears, a frame carrying said pinions and mounted for concentric rotation relative to said gears and shaft, an armature fixed to said spur gear, an armature fixed to said frame, an electromagnet carried by said housing and operable to attract the gear armature and lock the two gears together, and a stationary electromagnet operable to attract and hold said frame armature stationary.

3. In a mechanism of the class described, a drive shaft, a driven member, a spur gear fixed to said shaft, a set of pinions in mesh with said gear, a frame carrying said pinions and straddling said gear with one side loosely journaled on the gear hub and with the other side loosely sleeved on said shaft, an armature fixed to said frame, a stationary electromagnet for attracting said armature and holding it and the frame against turning, a housing straddling said frame and having one side loosely journaled on the sleeve portion of the said frame and having its other side loosely mounted on said shaft and fixed to said member, said housing having an annular set of internal gear teeth in mesh with said pinion, an electromagnet carried by a side portion of said housing and an armature fixed to a side of said spur gear for rotation therewith and disposed in position to be attracted by and held to said housing magnet when energized.

In testimony whereof, I have hereunto signed my name to this specification.

EDWARD RATHBUN.