No. 706,277.

Patented Aug. 5, 1902.

A. M. SWEDER.

REVERSING FRICTION CLUTCH.

(Application filed Sept. 4, 1901.)

(No Model.)

2 Sheets—Sheet 1.

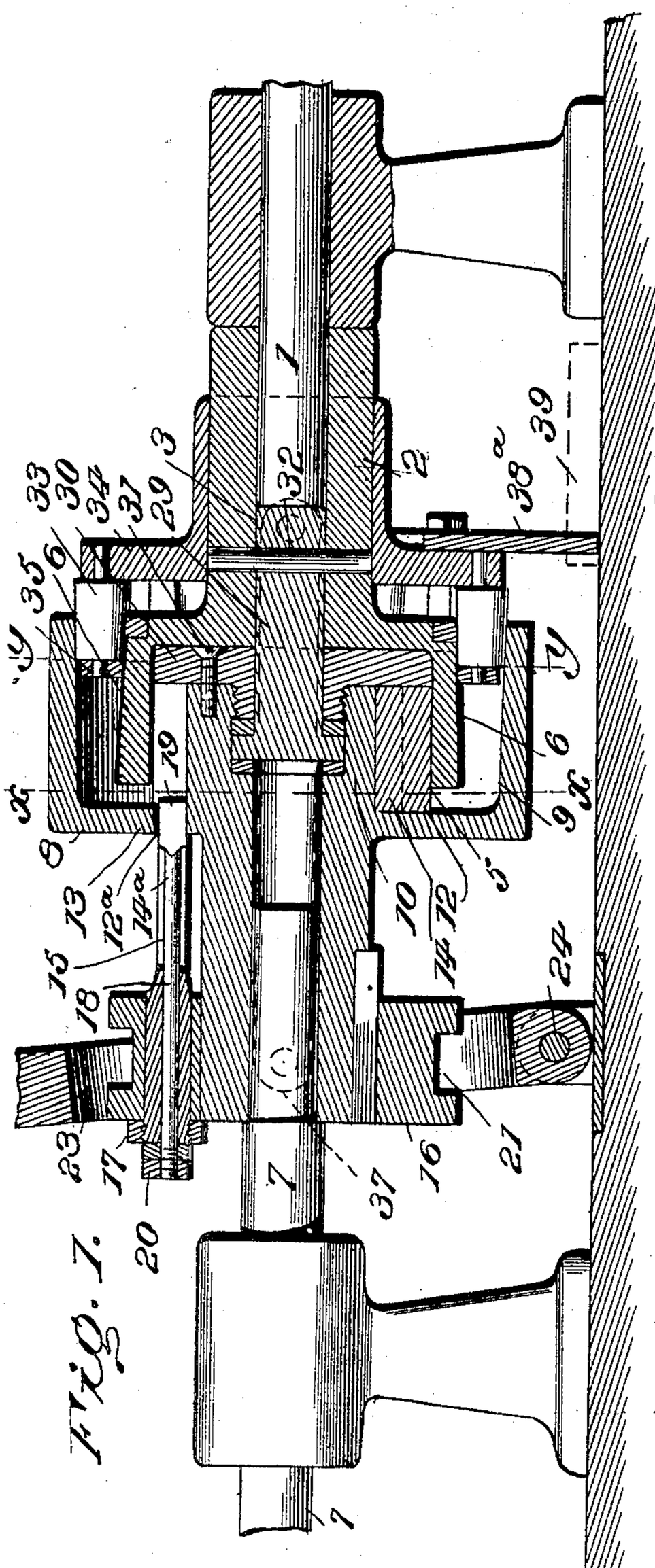

FIG. 1.

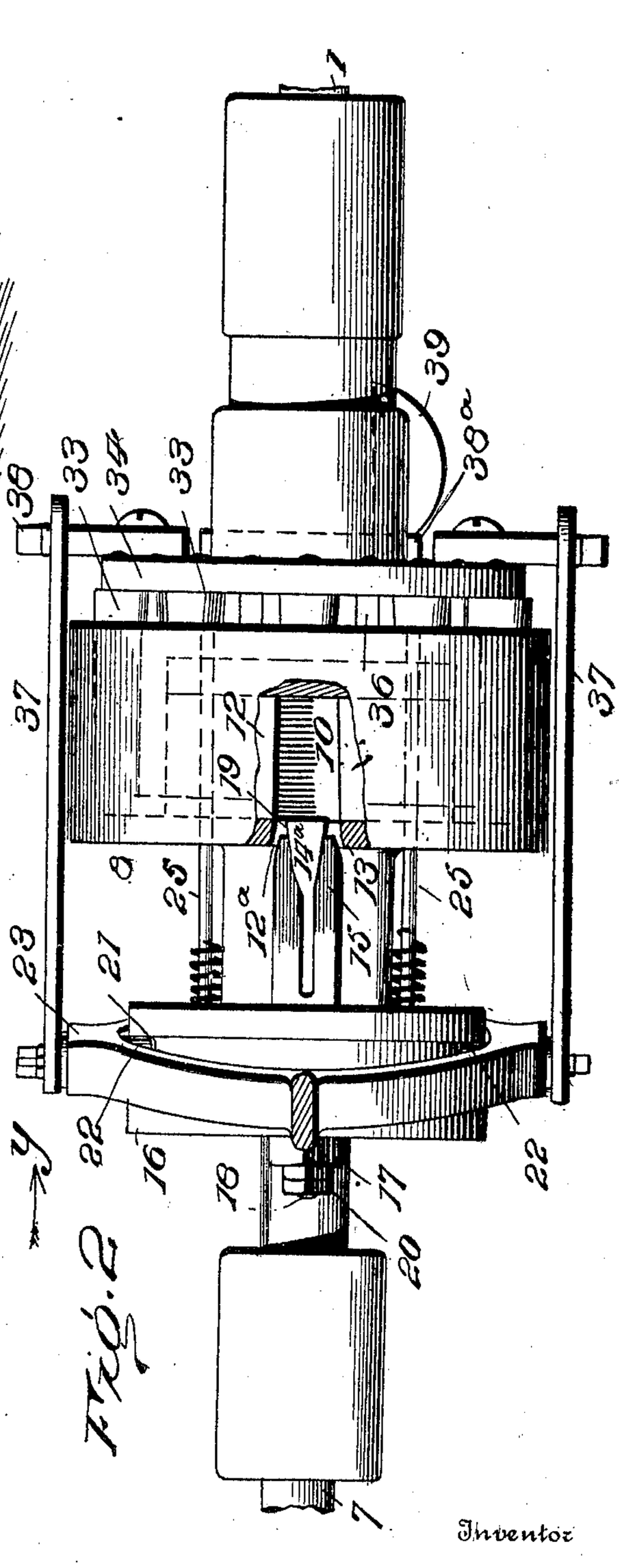

FIG. 2.

Witnesses

Inventor

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Attorney

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(No Model.) 2 Sheets—Sheet 2.

Fig. 3.

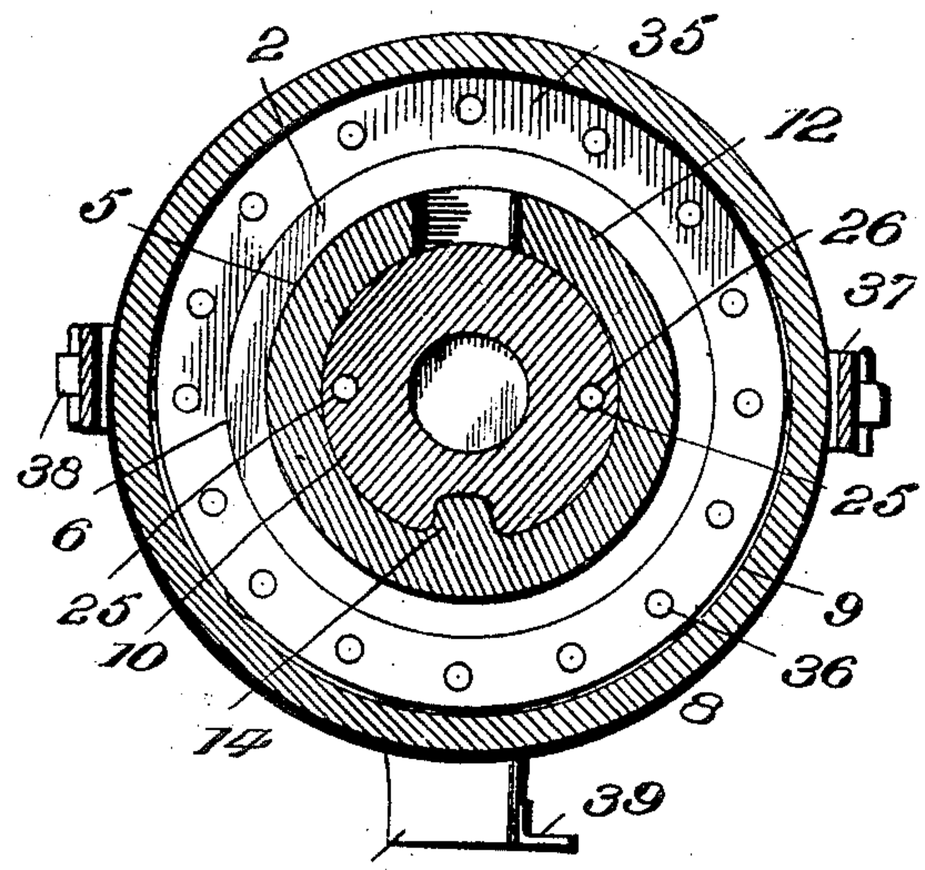


Fig. 5.

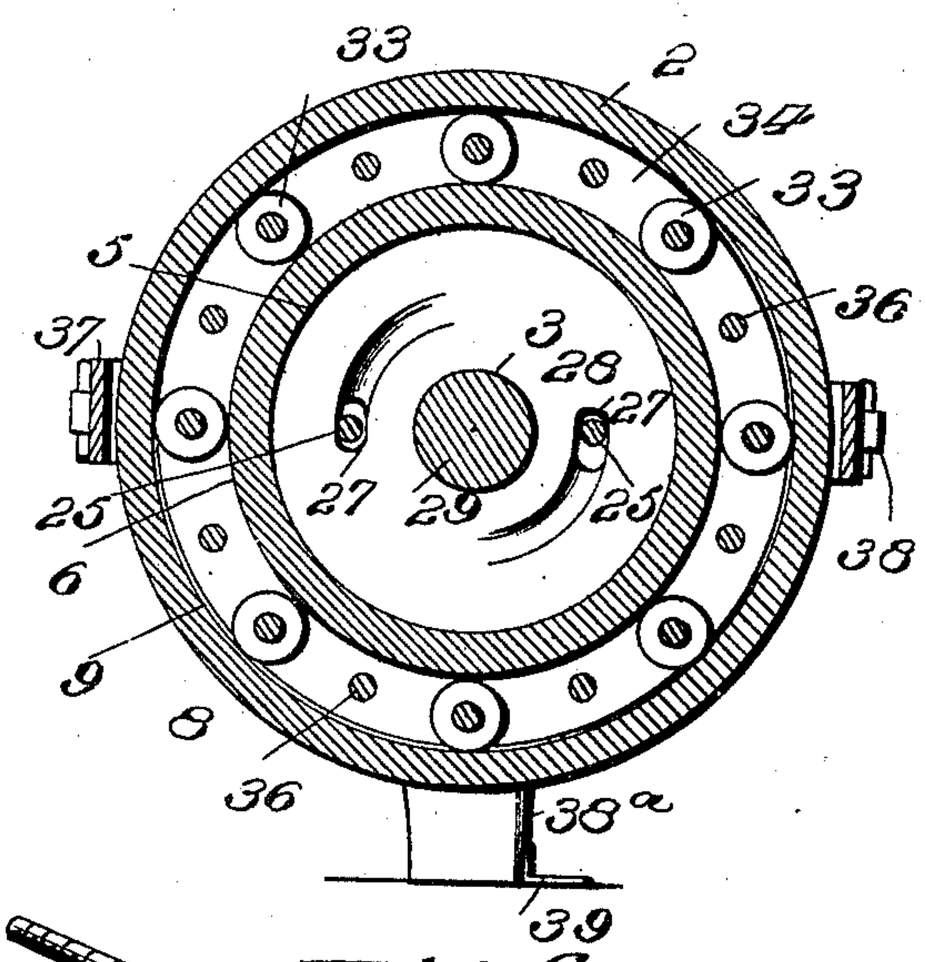


Fig. 4.

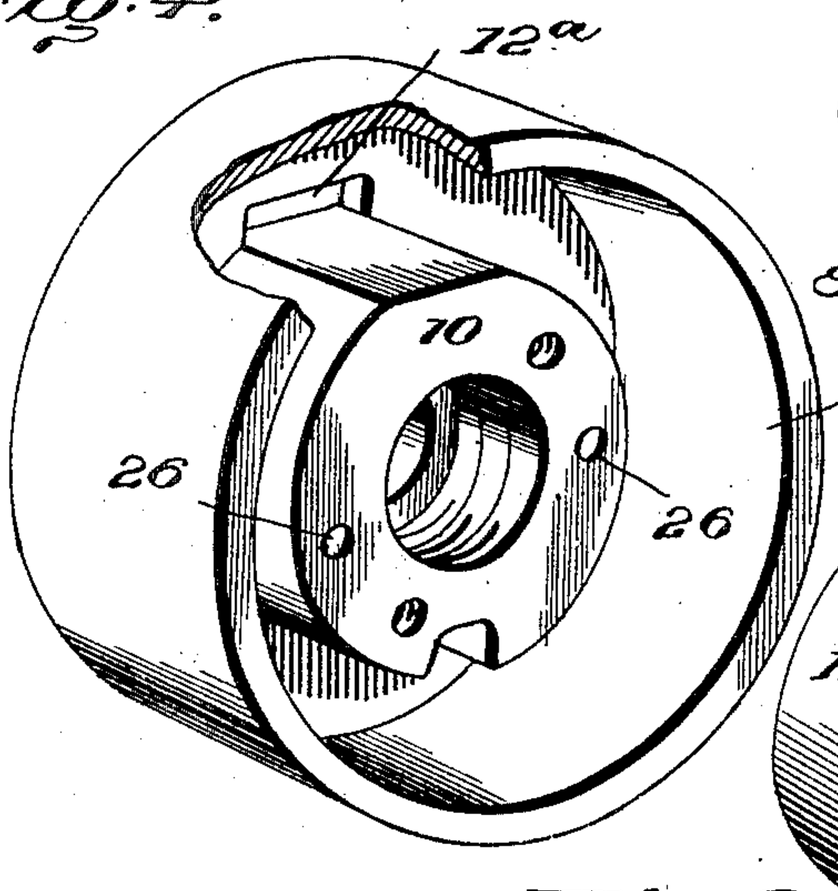


Fig. 6.

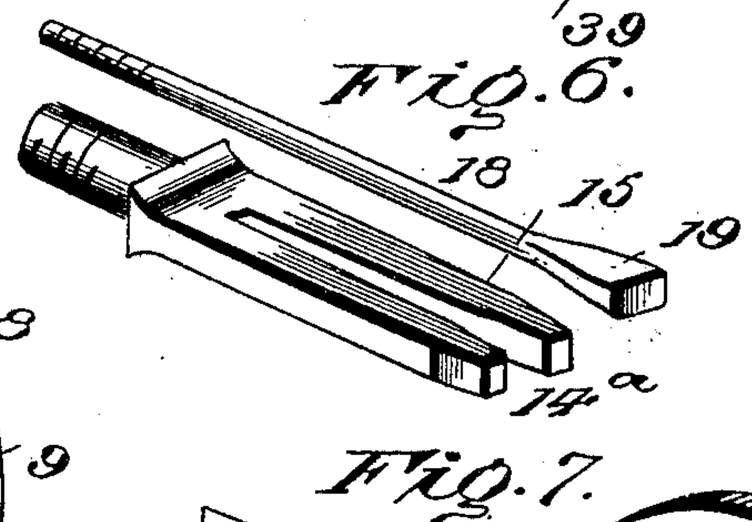


Fig. 7.

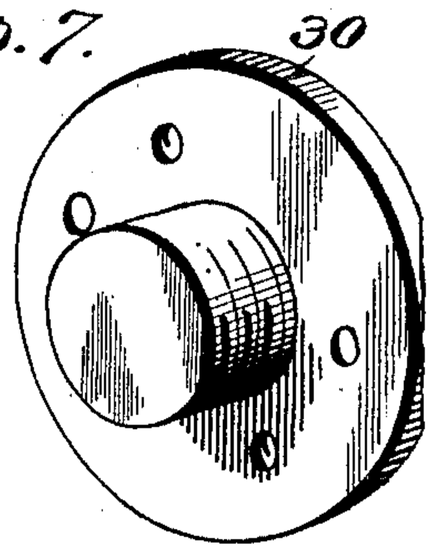


Fig. 8.

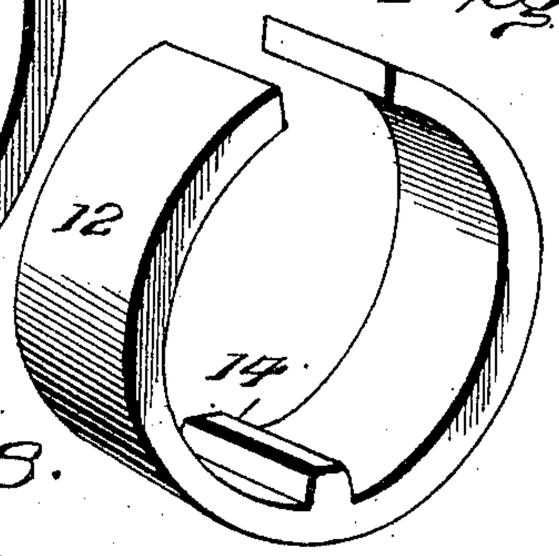
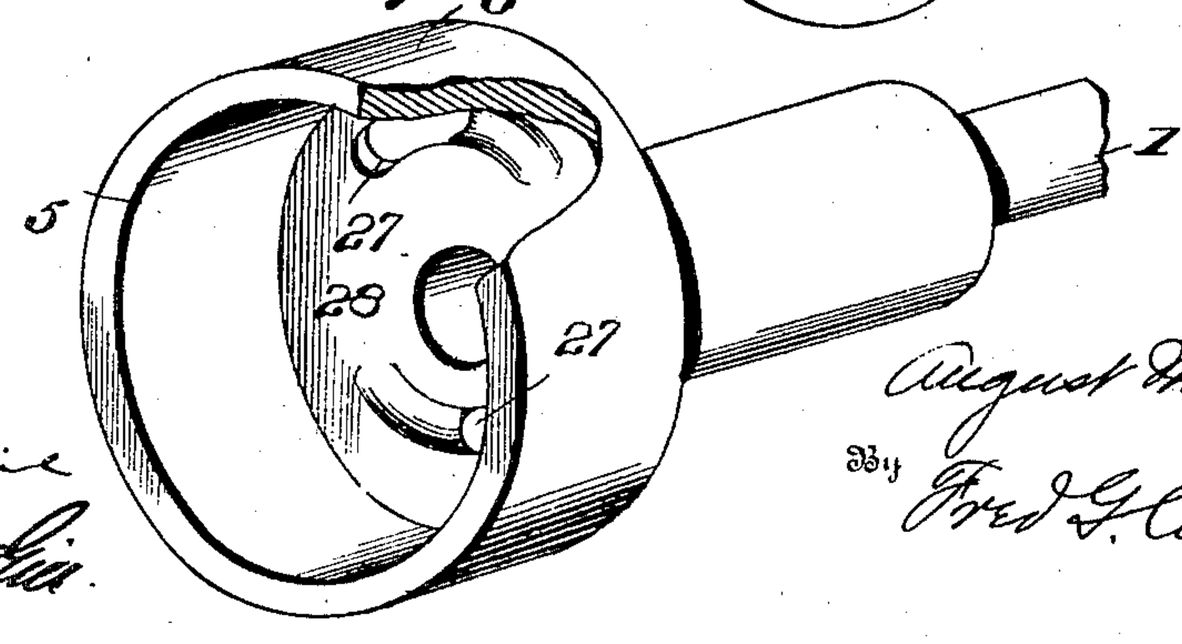


Fig. 2.



Witnesses

Inventor

August M. Sweder

By Fred G. Coldren

Attorney

UNITED STATES PATENT OFFICE.

AUGUST M. SWEDER, OF MARQUETTE, MICHIGAN.

REVERSING FRICTION-CLUTCH.

SPECIFICATION forming part of Letters Patent No. 706,277, dated August 5, 1902.

Application filed September 4, 1901. Serial No. 74,278. (No model.)

To all whom it may concern:

Be it known that I, AUGUST M. SWEDER, of Marquette, in the State of Michigan, have invented certain new and useful Improvements in Reversing Friction-Clutches; 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.

This invention relates to reversing friction-clutches, and has special reference to that class wherein both the driving and driven shafts are equipped with coupling-heads, which are thrown into direct positive engagement when the two shafts are to be operated in the same direction, and one coupling-head is operated in a reverse direction by a series of rolls in frictional engagement with oppositely-tapered surfaces of the two heads. A clutch having such characteristics is disclosed in my application for Letters Patent filed November 7, 1900, Serial No. 35,749.

The object of the present invention is to provide improved and highly-efficient means for insuring positive frictional engagement between the two coupling-heads when the two shafts are to be operated in the same direction.

A further object of the present invention is to provide auxiliary means for insuring the positive engagement between the heads in the event of any failure on the part of the primary means.

The invention will be hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical sectional view. Fig. 2 is a top plan view, parts being broken away. Fig. 3 is a section on line *x x*, Fig. 1. Fig. 4 is a detail perspective view of the head of the driven shaft. Fig. 5 is a section on line *y y*, Fig. 1. Fig. 6 is a detail view of the wedge. Fig. 7 is a detail view of the friction-ring and its retaining-plate. Fig. 8 is a detail of the head of the driving-shaft.

Referring to the drawings, 1 designates the driving-shaft, and 2 a coupling-head fast thereon, having a central bore 3 to accommodate the shaft, which latter does not extend the full length of the bore. This coupling-head has an inner true concentric surface 5 and an outer tapered concentric surface 6.

7 is the driven shaft, and 8 a coupling-head keyed thereon, which head is of considerably-greater diameter than head 2 which it incloses. The inner surface 9 of coupling-head 8 is tapered in opposite direction to the tapered surface 6 of the coupling-head 2, so as to form an intermediate approximately V-chamber between the two heads. The head 8 has an inner central boss 10, which is nearly entirely surrounded by a split friction-ring 12, the ends of which are spaced apart in line with an opening 12^a in the wall 13 of the coupling-head. A lug 14 of ring 12 fits in a corresponding groove of boss 10 to hold the ring in fixed relation to the latter and to take up the load when the ring is forced into frictional engagement with the surface 5 of head 2. When this ring is expanded by the entrance of a wedge 14^a between its ends, it will bind firmly against the inner surface of coupling-head 2, and thereby cause the driven shaft to rotate in unison with the driving-shaft. The wedge 14^a is shown in the form of a split bar 15, having a central longitudinal bore and mounted on and carried by a collar 16, keyed to the hub of head 8 in such manner that it is free to slide longitudinally thereon, the end of the wedge-bar being threaded to accommodate a nut 17. The extreme inner end of the wedge-bar is slightly beveled, and through its bore is passed a regulating-pin 18, having a beveled head 19, by which the expansion of the end of the wedge-bar is regulated by the adjustment of nuts 20 on the end of the pin. The collar 16 is formed with a circumferential groove 21, into which project the heads of lugs 22, carried by a lever 23, fulcrumed at 24, said lever having a circular portion to accommodate the collar. By throwing the lever inward the wedge will be forced between the split end of the ring and the latter will expand against the inner surface of coupling-head 2.

To provide against any possibility of failure or slipping of the friction-ring, I have equipped collar 16 with two spring-pressed pins 25, which normally extend into openings 26 in boss 10 and which will under the action of their springs be projected into openings 27 in wall 28 of coupling-head 2. The entrance

of these spring-pressed pins into openings 27 will occur when the latter are brought into alinement therewith; but if the load is taken up by the expansion of the friction-ring when such alinement does not exist the pins remain inactive, but ready for any emergency arising upon the slipping or failure of the friction-ring.

29 is a T coupling-pin, the head of which is held within a central opening of boss 10 by a cap-plate 30, having a threaded central portion screwed into such opening. This plate is firmly secured to boss 10 by screws 31 and extends outwardly sufficiently far to retain the friction-ring in position. The protruding end of T-pin 29 extends into bore 3 of coupling-head 2, to which it is locked by a cross-pin 32.

33 designates a series of tapered rolls, the journals of which are supported by a disk 34 and an inner ring 35, said ring being held in fixed relation to the disk by spindles 36. These rolls are tapered throughout their length and are preferably equipped with ball-bearings. When thrown into frictional engagement with the tapered surface 6 of head 2 and the inner tapered surface 9 of head 8, the rolls will cause the latter to revolve in opposite direction to the rotation of the driving-shaft. The disk 34 is connected to lever 23 by links 37 engaging lugs 22 of the lever and lugs 38, projecting outwardly from the disk. A downwardly-projecting plate 38^a (shown in the form of a Y) by engagement with a stop-plate 39 prevents disk 34 from rotating when the rolls are in action, said plate allowing, however, of the free shifting of the disk 34.

From what has been said it will be seen that to cause the driven shaft to rotate in the same direction with the driving-shaft lever 23 is thrown in the direction of arrow Y, thereby throwing the roll-carrying disk outwardly and forcing the wedge between the ends of the friction-ring, causing the latter to expand into frictional engagement with the inner surface of coupling-head 2. As before stated, if for any reason the friction-ring should fail to take hold upon coupling 2 sufficiently to take up the load and effect the revolution of the driven shaft the spring-pressed pins 25 will positively engage such head when openings 27 come into line therewith. To secure a reversal in the direction of rotation of the driven shaft, the operator throws lever 23 in an opposite direction, thereby withdrawing the wedge from between the ends of the friction-ring and throwing the friction-rolls 33 into engagement with the outer tapered surface of head 2 and the inner tapered surface of head 8, the rotation of which rolls will reverse the direction of rotation of the driven shaft. When it is desired that no motion be imparted to the driven shaft, it is obvious that such result will be obtained by holding lever 23 at an intermediate point. The T-pin constitutes a connection between the two coupling-heads to hold them in certain relation to each other and prevent either head from being thrown out in the actuation of the lever.

It is obvious that my improvements are applicable for use in connection with a single shaft, as that of lathes, planers, shaper-drills, sawmills, &c., in which event the coupling-pin may be omitted and the shaft equipped with a collar to bear against cap-plate 30 when under reversal.

The advantages of my present improvement are apparent. It will be noted that by providing the friction-ring and the wedge for positively expanding the latter positive engagement between the two coupling-heads is insured; also, that if the ring should for any reason fail of its purpose, either when the parts are first operated or while in operation, the auxiliary means will effect the positive connection—that is, the spring-pressed pins will positively engage the coupling-head 2 when the openings thereof are brought into line therewith. The means employed for these purposes have been found highly advantageous and far superior in operation to anything heretofore known or used. The form of wedge has also proven most desirable, since by the longitudinal adjustment of the regulating-pin the spread of the wedging-bar may be quickly and easily adjusted.

I claim as my invention—

1. A reversing-gearing comprising, in combination, a driving-shaft, a driven shaft, a coupling-head on each shaft, one head having a true concentric surface and a tapered surface, the other head having an inner tapered surface opposite the tapered surface of the former head, an expansion-ring carried by one head for engaging the true concentric surface of the other head, means for acting on such ring to effect its engagement with the said concentric surface, a series of friction-rolls designed to be thrown into frictional engagement with the tapered surfaces of the two heads when the expansion-ring is out of engagement, and means for actuating such rolls, substantially as set forth.

2. A reversing-gearing comprising, in combination, a driving-shaft, a driven shaft, a coupling-head on each shaft, one head having an inner true concentric surface and an outer tapered surface, the other head having an inner tapered surface opposite the tapered surface of the former head, an expansion-ring carried by one head for engaging the true concentric surface of the other head, means for expanding such ring, a series of friction-rolls designed to be thrown into frictional engagement with the tapered surfaces of the two heads when the expansion-ring is out of engagement, and means for actuating such rolls, substantially as set forth.

3. A reversing-gearing comprising, in combination, a driving-shaft, a driven shaft, a coupling-head on each shaft, one head having an inner true concentric surface and an outer tapered surface, the other head having an in-

ner tapered surface opposite the tapered surface of the former head, an expansion-ring carried by one of the heads for engaging the inner true concentric surface of the other head, means for expanding such ring, auxiliary means for positively coupling such heads supplemental or in addition to the coupling effected by the expansion-ring, a series of friction-rolls designed to be thrown into frictional engagement with the tapered surfaces of said heads when the friction-ring and auxiliary means are out of engagement, and means for actuating such rolls, substantially as set forth.

4. The combination with the driving-shaft, its coupling-head having an inner true concentric surface and an outer tapered surface, of the driven shaft, the coupling-head thereon having a central boss and an inner tapered surface opposite the before-mentioned tapered surface, a friction-ring fixed on said boss within the concentric surface of the coupling-head of the driving-shaft, a sliding collar carried by the coupling-head of the driven shaft, means carried by said collar for expanding said ring, a lever for shifting said collar, a series of rolls between said tapered surfaces, a disk supporting said rolls, and connections between said disk and said lever, substantially as set forth.

5. The combination with the driving-shaft having a coupling-head with an inner true concentric surface and an outer tapered surface, of the driven shaft, the coupling-head thereon having a central boss and an inner tapered surface opposite the before-mentioned tapered surface, a friction-ring fixed on said boss within the concentric surface of the coupling-head of the driving-shaft, a sliding collar carried by the coupling-head of the driven shaft, a wedging-bar carried by said collar and designed to be forced between the ends of said ring, a lever for shifting said collar, a series of rolls between said tapered surfaces, a disk supporting said rolls, and connections between said disk and said lever, substantially as set forth.

6. The combination with the driving-shaft having a coupling-head with an inner true concentric surface, and an outer tapered surface, of the driven shaft, the coupling-head thereon having a central boss and an inner tapered surface opposite the before-mentioned tapered surface, a friction-ring fixed on said boss within the concentric surface of the coupling-head, of the driving-shaft, a sliding collar carried by the coupling-head of the driven shaft, a wedging-bar carried by said collar and designed to be forced between the ends of said ring, said bar being split longitudinally and having a central bore, a regulating-pin extended through said bore and having a tapered head for engaging the bar at its end, means for adjusting said pin, a lever for shifting said collar, a series of rolls between said tapered surfaces, a disk supporting said rolls, and connections between said disk and said lever, substantially as set forth.

7. The combination with the driving-shaft and its coupling-head having an inner true concentric surface and formed with openings in its wall, of the driven shaft, the coupling-head thereon having a central boss, reversing-gearing between said heads, an expansion-ring on said boss, a sliding collar, spring-pressed pins carried by said collar and extended through openings in the coupling-head of the driven shaft for entering said openings of the other coupling-head, and means for actuating said collar, substantially as set forth.

8. The combination with the driving-shaft and its coupling-head having an inner true concentric surface, of the driven shaft, the coupling-head thereon having a central boss formed with a groove, reversing-gearing between said heads, a split ring on such boss having a lug fitted in said groove, a wedging-bar for expanding said ring, a sliding collar carrying said wedging-bar, a lever for actuating the collar, two spring-pressed pins mounted on the collar and extended through the head of the driven shaft and designed to extend into the openings in the coupling-head of the driving-shaft.

9. The combination with the driving-shaft and its coupling-head having a central bore, of the driven shaft, the coupling-head thereon having a central boss, reversing-gearing between said heads, a coupling-pin fitted in said boss and extended into the bore of the driving-shaft coupling-head, a locking-pin engaging said coupling-pin, a split ring on said boss, a cap-plate holding said ring and coupling-pin, a wedging-bar for expanding the ring, a sliding collar, and means for actuating the same, substantially as set forth.

10. The combination with the driving-shaft, and its coupling-head, of the driven shaft, the coupling-head thereon, means for effecting a positive engagement between said heads for causing both shafts to rotate in the same direction, a lever for controlling such means, a series of friction-rolls between said heads for reversing the rotation of the driven shaft, a disk on which such rolls are mounted, connections between such disk and lever, a plate extending from such disk, and a stop with which such plate is designed to engage when the rolls are in action, substantially as set forth.

11. The combination with a coupling-head and a shaft, said head having an inner true concentric surface and an outer tapered surface, of a second coupling-head having a tapered surface and an expansible friction-ring for engaging said inner concentric surface, a wedge for expanding said ring, shiftable means for moving said wedge into and out of engagement with said ring, a series of tapered rolls for engaging both concentric surfaces, a disk supporting such rolls, a connection be-

tween such disk and shiftable means, and a plate having a bore through which the shaft is passed, both coupling-heads being concentric with the shaft, which latter is limited in its longitudinal movement in coupling and uncoupling, substantially as set forth.

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

AUGUST M. SWEDER.

Witnesses:
GRAFTON L. MCGILL,
FRANK S. MAGUIRE.