W. CHRISTIE.

CLUTCH.

APPLICATION FILED DEC. 5, 1913.

1,107,588.

Patented Aug. 18, 1914.

4 SHEETS—SHEET 1.

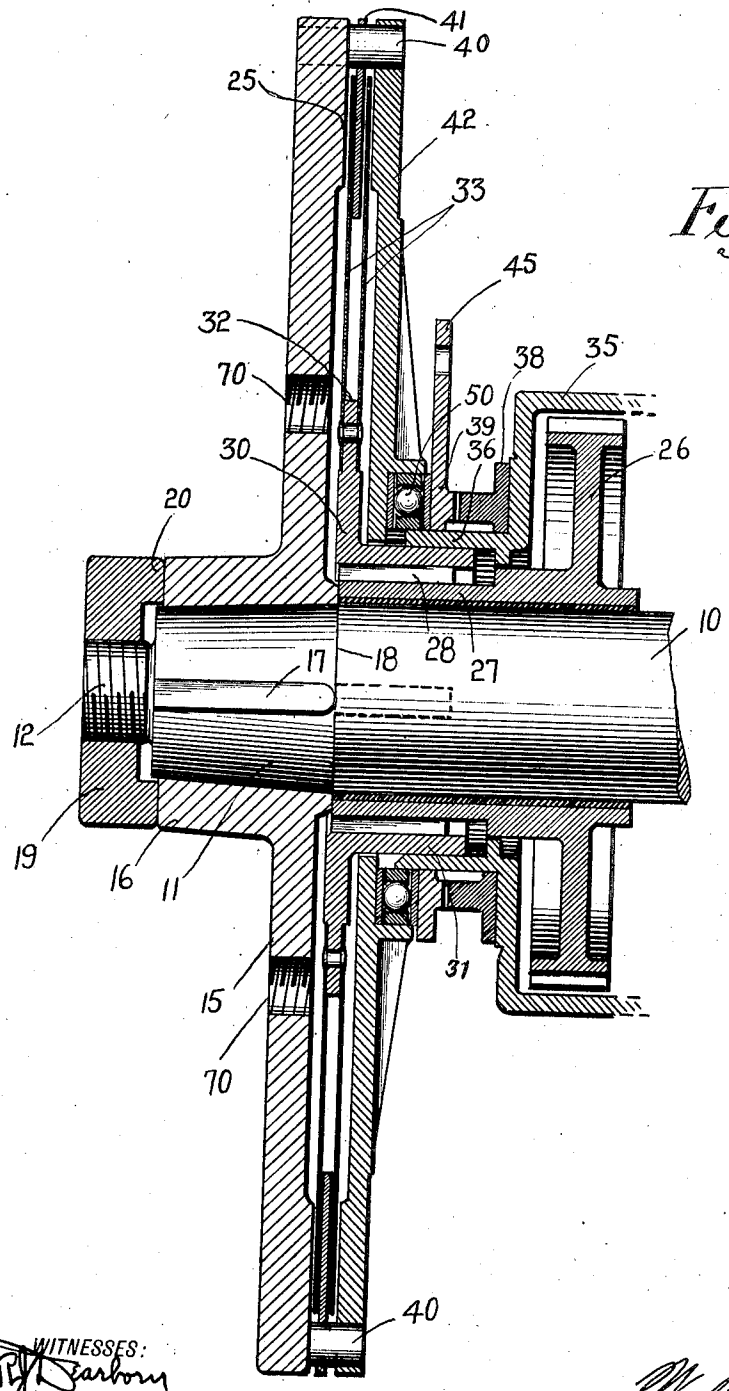


Fig. 1.

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4 SHEETS—SHEET 2.

Fig. 2,

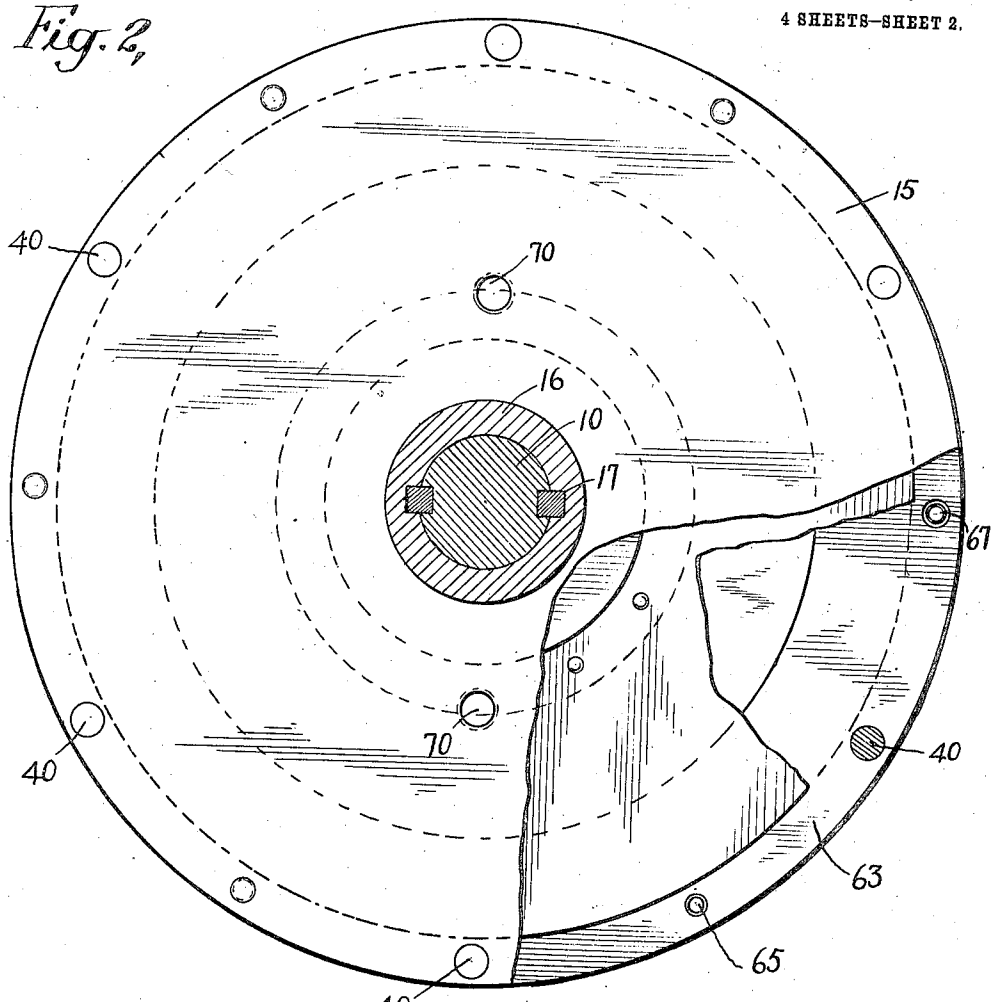
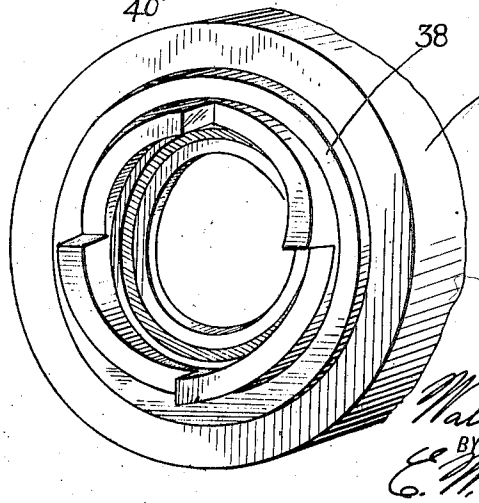


Fig. 5,



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4 SHEETS—SHEET 3.

Fig. 3,

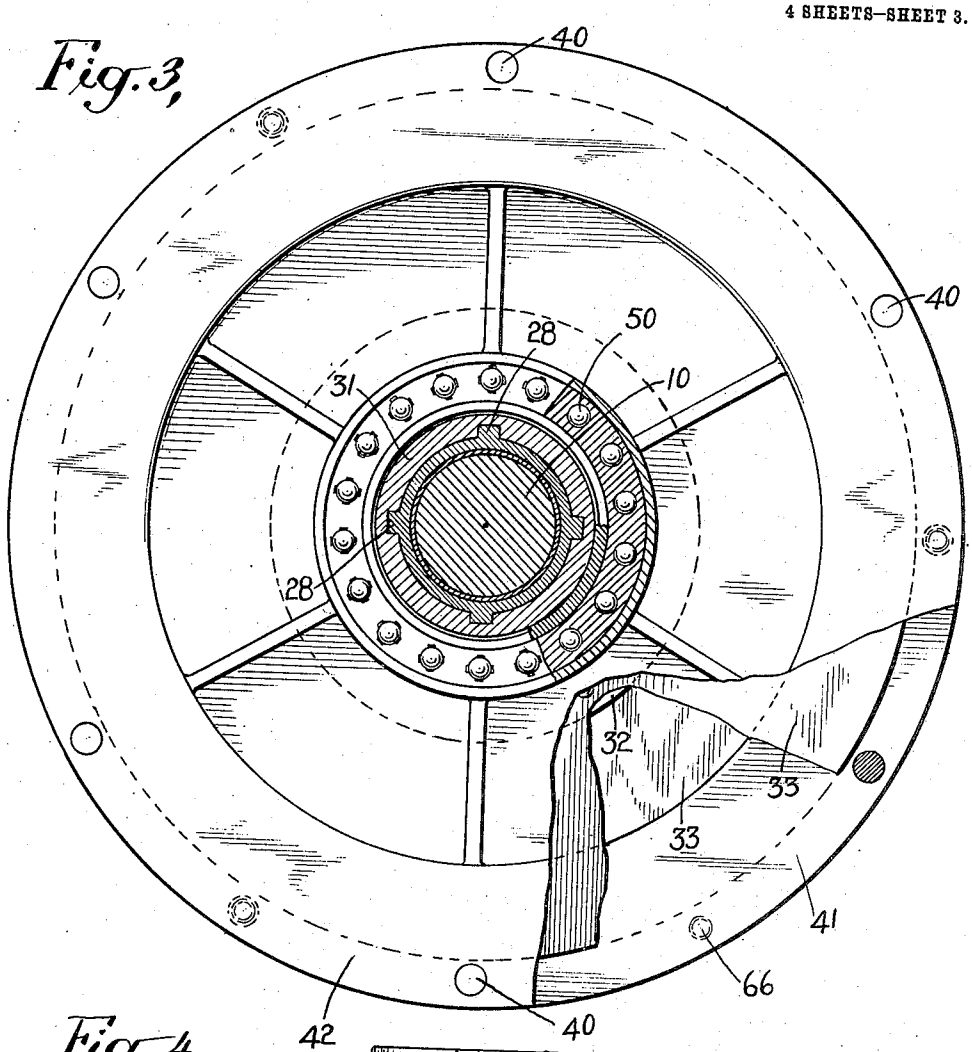
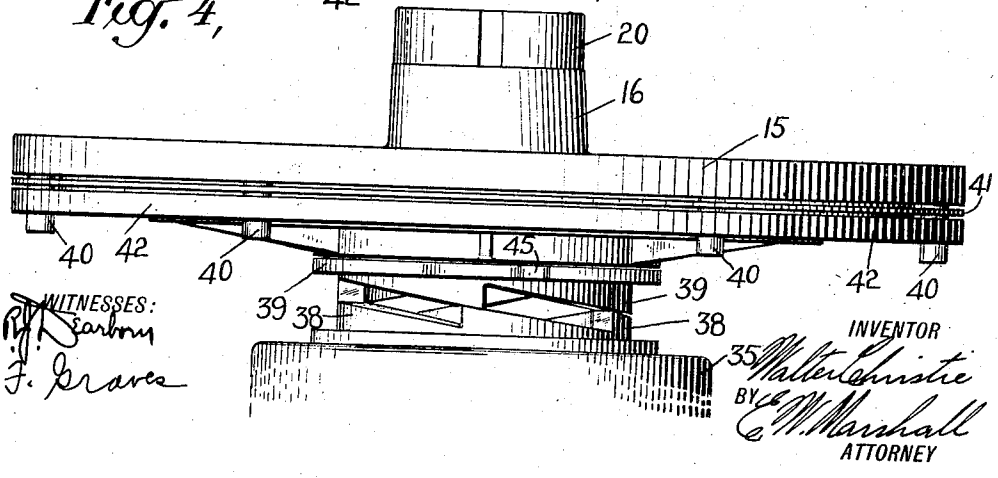


Fig. 4,



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CLUTCH.

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1,107,588.

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4 SHEETS—SHEET 4.

Fig. 6

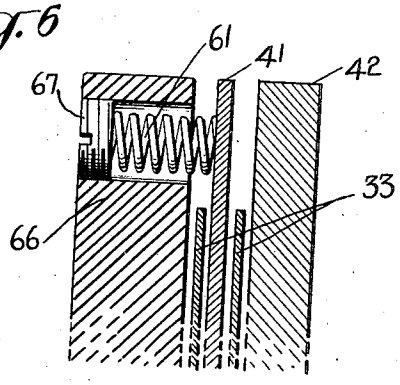


Fig. 7

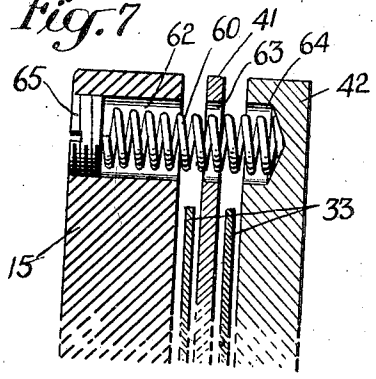


Fig. 8,

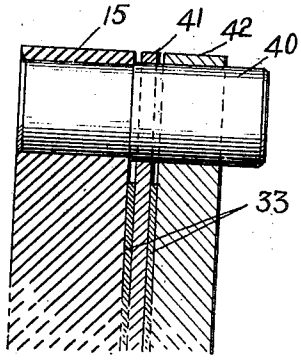


Fig. 9,

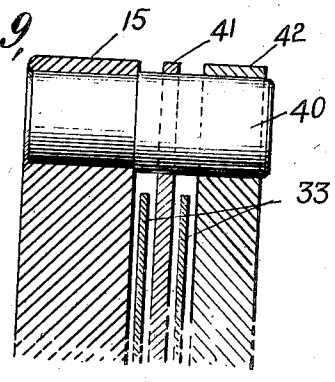
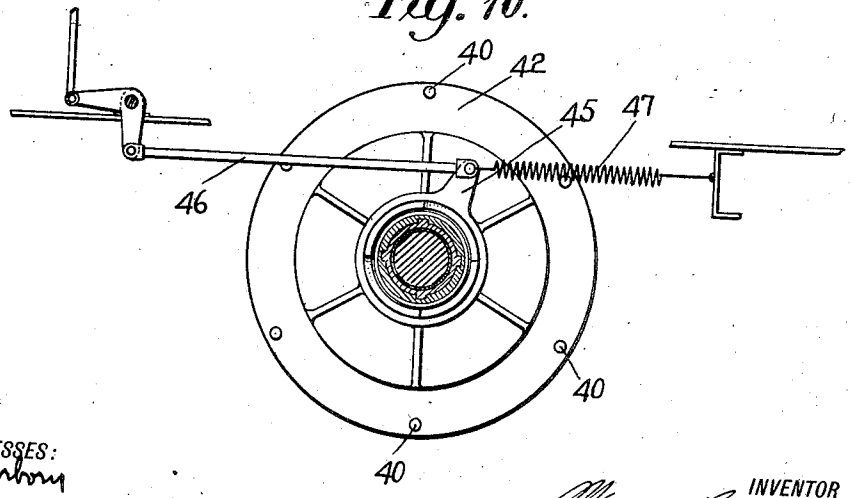


Fig. 10.



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UNITED STATES PATENT OFFICE.

WALTER CHRISTIE, OF HIGHWOOD PARK, NEW JERSEY.

CLUTCH.

1,107,588. Specification of Letters Patent. Patented Aug. 18, 1914.

Application filed December 5, 1913. Serial No. 804,806.

To all whom it may concern:

Be it known that I, WALTER CHRISTIE, a citizen of the United States, and a resident of Highwood Park, county of Hudson, State of New Jersey, have invented certain new and useful Improvements in Clutches, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to friction clutches and particularly to such as are adapted for use in the driving mechanism of motor vehicles.

One object of my invention is to provide a simple and durable clutch, susceptible of utilization as above indicated, that shall be effective in operation and extremely compact along the line of the driving shaft.

Another object is to provide a combined clutch, and flywheel that shall be particularly adapted for attachment to a transversely arranged driving shaft of a motor vehicle.

Another object of my invention is to secure the well known advantages incident to the use of multiple disk clutches without the usually attendant disadvantages.

Other objects and advantages of my invention will be set forth hereinafter.

I will describe my invention in the following specification and point out the novel features thereof in appended claims.

Referring to the drawings,—Figure 1 is a sectional elevation in the plane of the shaft of a clutch constructed in accordance with my invention. A partially sectional elevation of the same clutch looking toward the end of the shaft is shown in Fig. 2. In this view certain of the parts are broken away to disclose the interior construction. Fig. 3 corresponds to Fig. 2 except that this view is here taken from the opposite side of the clutch. A plan view of the clutch is shown in Fig. 4. Fig. 5 is a perspective view of an actuating member of the clutch. Details of the clutch releasing springs and their coöperating parts are shown on a larger scale in Figs. 6 and 7. Figs. 8 and 9 are sectional views of a portion of the clutch near its periphery showing the guiding projections and the relative positions of the clutch members when the clutch is set and when it is released. Figs. 6, 7, 8 and 9 correspond except that 6 and 7 are taken on different radial planes from that of Figs. 8 and 9. The arrangement of the clutch and its actuating mechanism is shown in Fig. 10, the clutch itself being drawn on a relatively small scale.

Like characters of reference designate corresponding parts in all the figures.

10 is a motor or engine shaft having a tapered section 11 near one end and a screw threaded projection 12. Affixed to the tapered section 11 of the shaft is a relatively massive clutch wheel 15 having a hub 16 provided with a tapered bore which is adapted to fit closely onto the tapered section of the shaft. The wheel 15 is prevented from rotating relative to the shaft, not only because it fits the shaft closely, but also by a key 17. It is provided with an annular contact surface 25. The wheel hub is held in position against a shoulder 18 of the shaft by a nut 19 which is screwed onto the threaded projection 12 and has an annular flange 20 which engages the opposite end of the wheel hub 16.

Rotatably supported on the shaft 10, adjacent to the member 15, is a gear wheel 26 having a relatively long hollow cylindrical projection 27 at one side. This projection is provided with a plurality of longitudinal ribs or keys 28 and a clutch member 30 is arranged to slide on it. The member 30 of the clutch consists of a cylindrical sleeve 31 having longitudinal slots in its inner surface which are engaged by the ribs 28 of the driven member and a radial flange 32 to which is affixed a pair of parallel spaced disks 33 of sheet steel or other suitable resilient material. The arrangement of parts is clearly such that the member 30 is free to slide axially on the hub 27 but is precluded from rotating relative thereto by the ribs or keys 28. Protecting the gear wheel 26 is a stationary case 35 having a sleeve projection 36 into which the sleeve 31 of the clutch member 30 extends, a running fit being provided between these two sleeves. A notched cam 38 is mounted on the stationary casing 35 and is adapted to coöperate with a similarly constructed rotatable cam 39 which is also mounted on the sleeve 36 but is beyond the stationary cam 38.

The clutch wheel 15 is provided near its periphery with a plurality of lateral pin projections 40. These projections are preferably spaced with uniformity and a ring 41 is mounted to slide on them, being substantially concentric with the member 15. Beyond the ring 41 is a relatively massive

disk 42 which is also mounted on the pins 40 and is concentric with the member 15. The arrangement of parts is such that the flange 32 is located between the clutch wheel 15 and the disk 42 while the disks 33 are spaced apart by the ring 41 and are also interposed between the members 15 and 42. The pins 40 are sufficiently large to act as guides for the members 41 and 42 which are arranged to slide axially toward and away from the member 15. It is therefore only necessary to force the members 15 and 42 toward each other to set the clutch and cause the member 30 to rotate with the members 15 and 42. This action is accomplished by a circumferential adjustment of the cam 39 which is provided with an arm 45 for attachment to an actuating rod 46 as shown in Fig. 10, a spring 47 being arranged to return the cam to its initial position when released. Since the member 42 is mounted on the pins 40, it is rotatable with the wheel 15 and with the motor shaft and consequently when the clutch is released, the disk 42 may be rotating when the cam 39 is at rest.

The members 15 and 42 which have been referred to as relatively massive, are intended to act together as a flywheel and to render a separate flywheel unnecessary. In fact the space occupied by my improved clutch is not materially greater than taken by an ordinary flywheel. I have consequently interposed a ball bearing 50 which takes the thrust existing between these relatively stationary and relatively rotatable members.

The preferred form of the cam 38 is clearly shown in a perspective view, Fig. 5. The coöperating cam 39 is similar to the cam 38 as shown in Fig. 4 but is provided with the projecting arm 45 as shown in Figs. 1 and 10.

The clutch may be set by exerting a pull on the rod 46 and thereby producing a rotative movement of the cam 39 relative to the cam 38. This movement obviously forces the cams apart and the axial thrust thus produced is transferred through the ball bearing 50 to the member 42. This member is forced toward the clutch member 15 until the relation of clutch members is as shown in Fig. 8.

Assuming that the gear wheel 26 is connected by suitable gearing to a vehicle axle which is to be driven, the clutch member 30, together with the disks 33 are adapted to operate independently of the motor shaft when the clutch is released and when the clutch is set, the operative connection from the shaft to the gear wheel (and, in the case assumed, to the axle) is complete.

In order to avoid wear and tear and to insure that the clutch parts will operate independently of each other without friction when the clutch is released, I provide three or more releasing springs 60 as shown in Fig. 7 which tend to separate the clutch disk 42 from the wheel 15, and three or more springs 61 which tend to hold the members 15 and 41 at a predetermined distance apart.

In order to provide pockets for the spring 60, the clutch members 15 and 41 are provided with holes 62 and 63 and the member 42 is provided with correspondingly located recesses 64. When the springs are inserted, screw plugs 65 or other suitable means are utilized to close the outer ends of the holes 62. The wheel 15 is further provided with holes 66 to receive the springs 61, the springs in this case abutting directly against the member 41 and the outer ends of the holes 66 being closed by plugs 67 which correspond to the plugs 65.

In order to facilitate disassembling the device, the clutch member 15 is preferably provided with tapped holes 70 to receive eye bolts or hooks. (Not shown.)

The fact that the axial dimension of the clutch is relatively small, renders the device particularly well adapted for use on a motor vehicle having a transverse motor or engine shaft. In fact, in many instances, a motor vehicle of ordinary size may be equipped with an engine having a transversely disposed shaft if the clutch of my invention is employed where it would be impossible to employ such an arrangement with any suitable clutches hitherto proposed. Another advantage incident in the use of my invention arises from the fact that the axis of the driving gear wheel is coincident with the axis of the driving motor which as above indicated may be transversely arranged. The axis of the driven gear wheel may consequently be in parallelism with the axle of the vehicle thereby avoiding the necessity for bevel gears or other well known means for driving shafts at an angle to each other.

Variations in size and arrangement of parts may be effected within the spirit and scope of my invention and I intend that only such limitations be imposed as are indicated in the appended claims.

What I claim is:

1. A clutch comprising a wheel adapted to be affixed to a driving shaft, a driven gear wheel having a hollow cylindrical hub projection adjacent to the wheel and rotatably mounted on the driving shaft, a clutch member having a resilient disk adjacent to the wheel, operatively connected to the gear wheel and slidable on said hollow cylindrical hub projection, a rigid disk operatively connected to the wheel and axially movable relatively thereto and means for forcing the rigid disk toward the wheel to clamp the resilient clutch disk between the two.

2. A clutch comprising a wheel adapted

to be affixed to a driving shaft and having an annular contact surface near its periphery, a driven gear wheel having a hollow cylindrical hub projection adjacent to the wheel and rotatably mounted on the driving shaft, a clutch member having a resilient disk adjacent to the annular contact surface of the wheel, operatively connected to the gear wheel, operatively conected to the gear wheel and slidable on said hollow cylindrical hub projection, a rigid disk operatively connected to the wheel and axially movable relatively thereto and circumferentially movable means for forcing the rigid disk toward the wheel to clamp the resilient clutch disk between the two.

3. A clutch comprising a driven shaft having a tapered end portion and a screw-threaded projection, a relatively massive wheel affixed to the tapered portion of the shaft having a plurality of laterally extending pins near its periphery parallel to the axis of the shaft, a driven gear wheel having a hollow cylindrical hub projection adjacent to the wheel and rotatably mounted on the shaft, a stationary casing for the gear wheel having a sleeve projection concentric with the hub of the gear wheel, a clutch member operatively connected to the gear wheel hub rotatably and axially movable within the casing sleeve, a radial flange and a resilient clutch disk secured thereto adjacent to the contact surface of the clutch wheel, a rigid disk concentric with the shaft and slidably mounted on the laterally extending pins of the wheel beyond the resilient clutch disk, an annular cam secured to the stationary gear casing, a coöperating rotatably movable cam on the sleeve projection of the casing and a thrust bearing interposed between the rotatively movable cam and the rigid clutch disk whereby a rotative movement of the cam forces the ratchet clutch disk between the contact surface of the wheel and clamps the resilient clutch disk between them.

In witness whereof, I have hereunto set my hand this 28 day of November, 1913.

WALTER CHRISTIE.

Witnesses:
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F. B. GRAVES.