No. 673,924. Patented May 14, 1901.

R. M. PHILLIPS.

FRICTION CLUTCH.

(Application filed Mar. 17, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

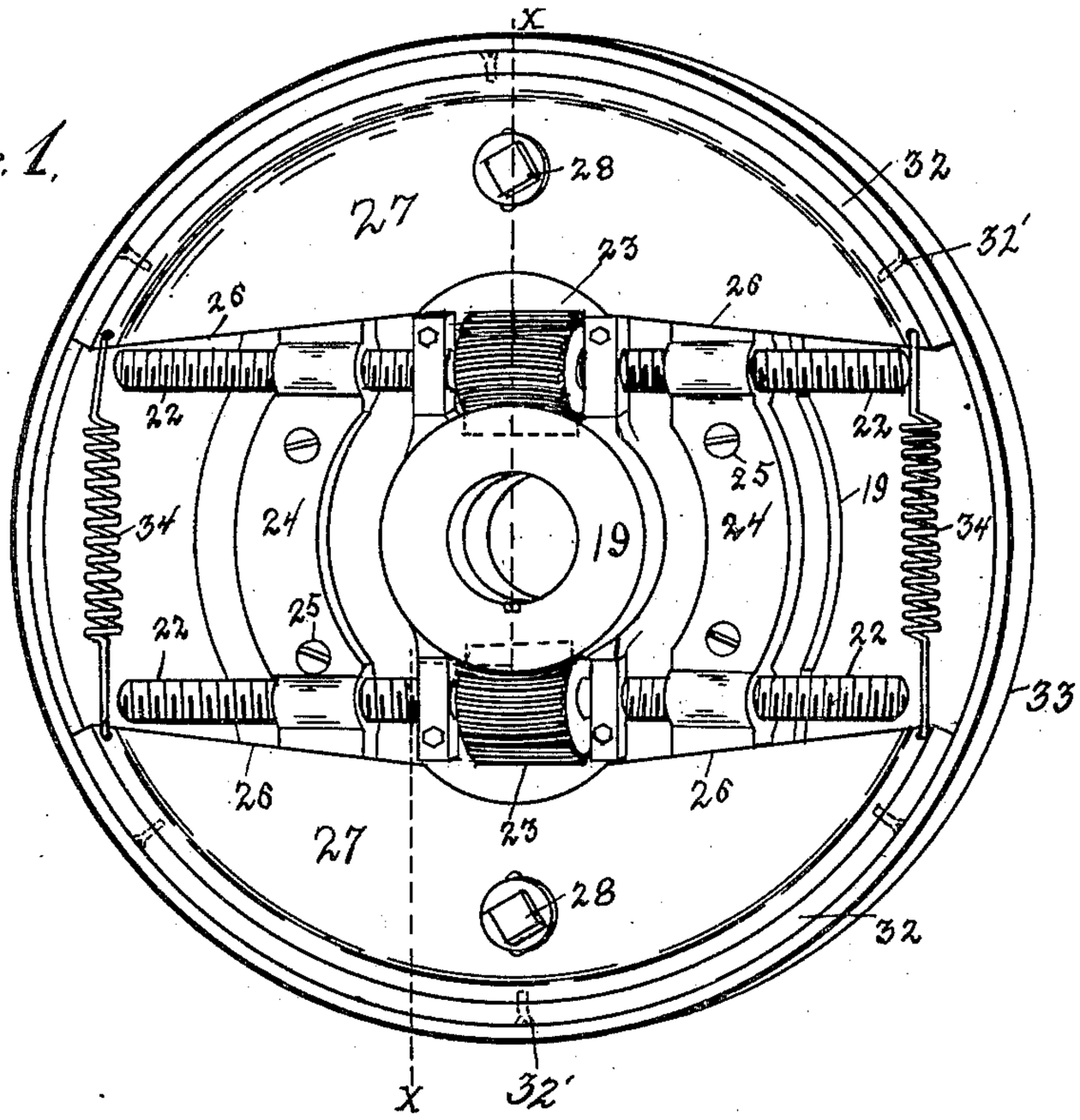


Fig. 3.

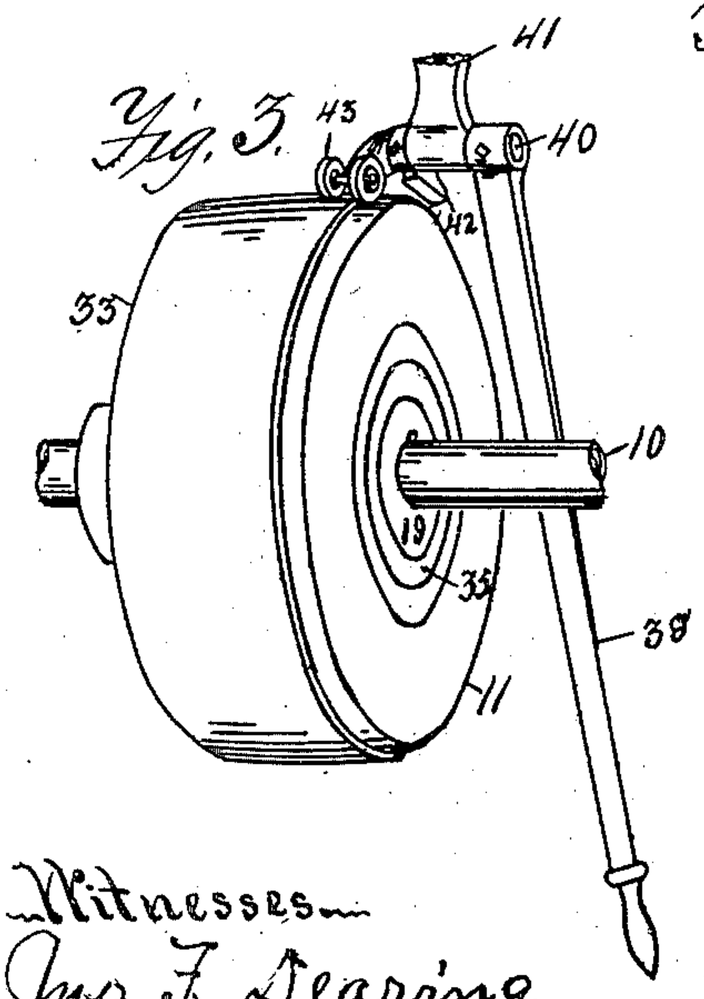
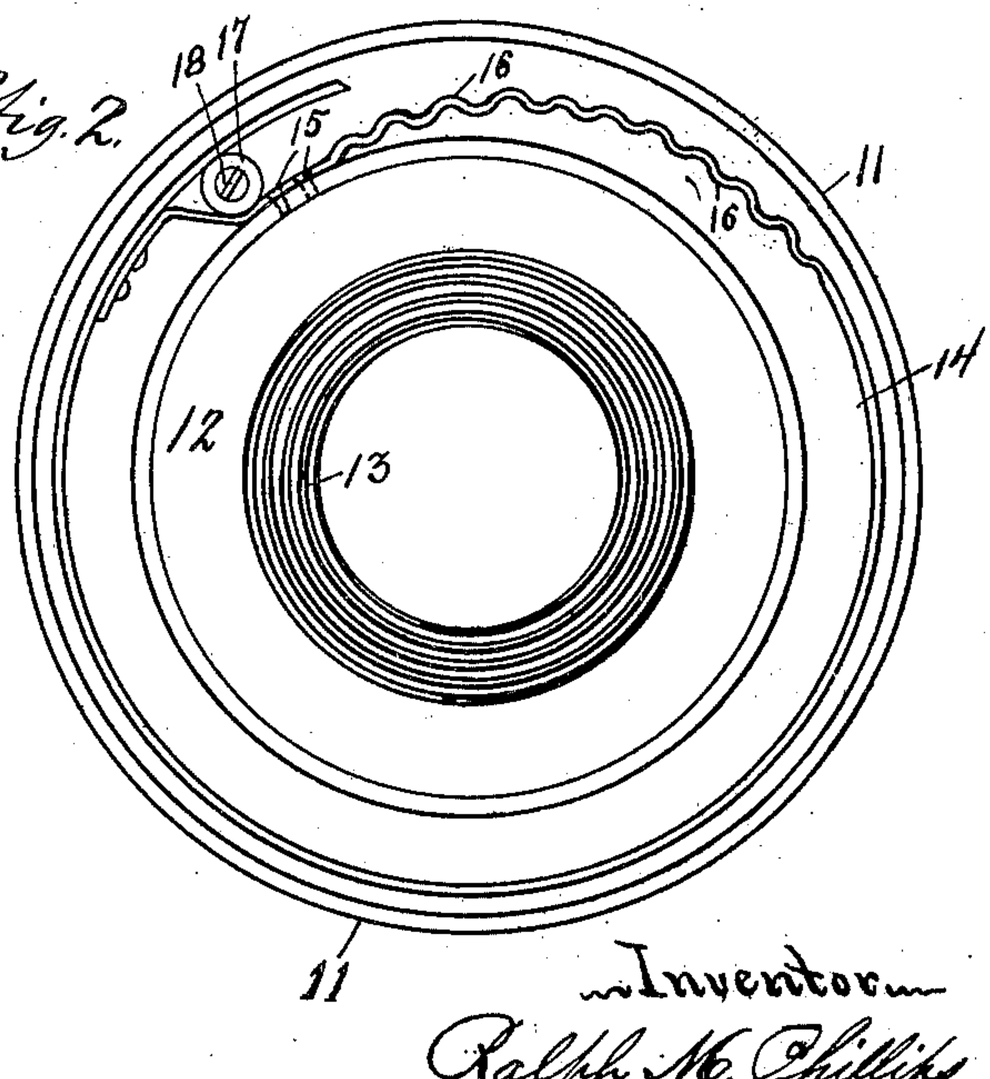


Fig. 2.



Witnesses—
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N. E. Thomas.

Inventor—
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Fig. 4.

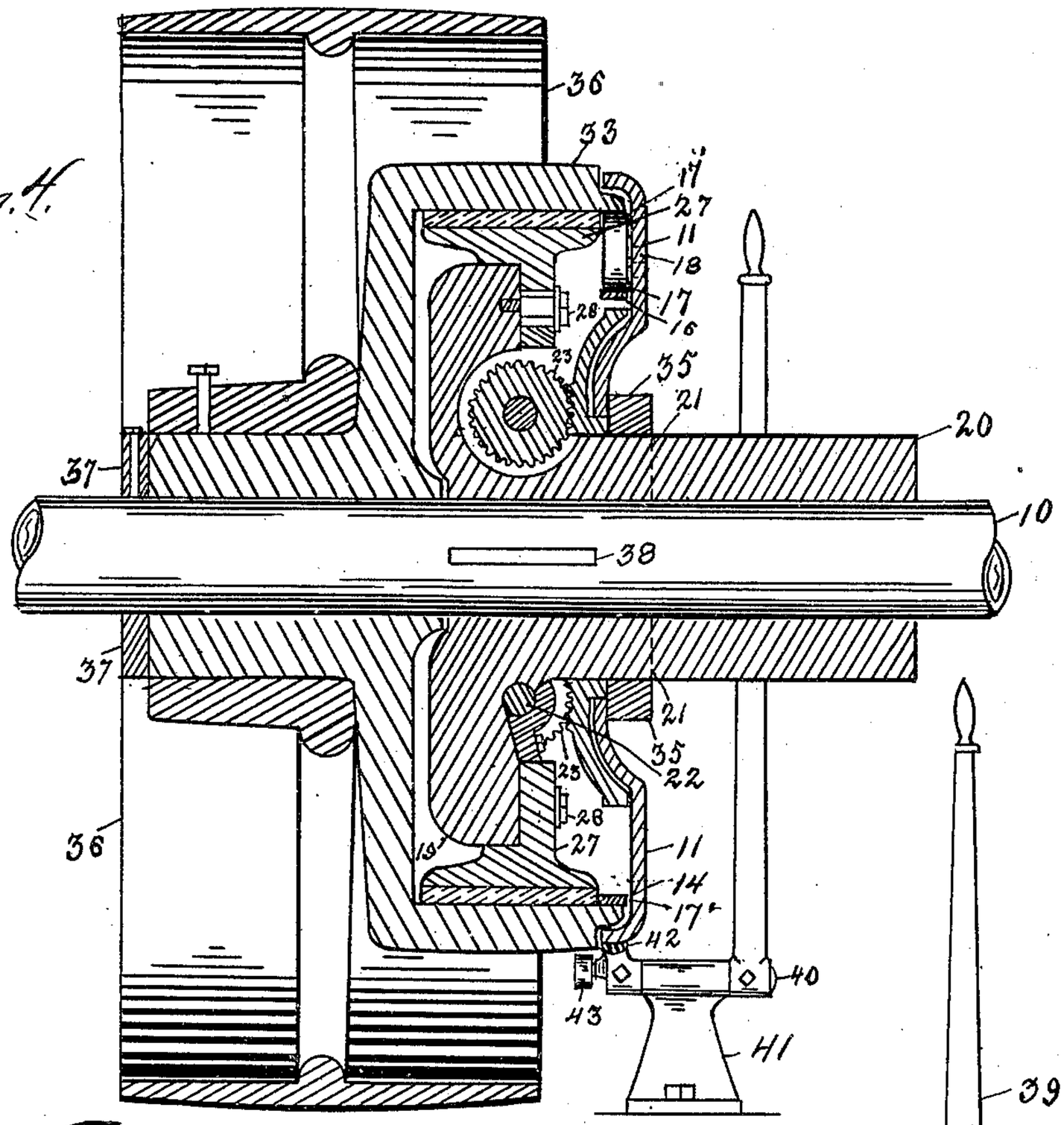


Fig. 5.

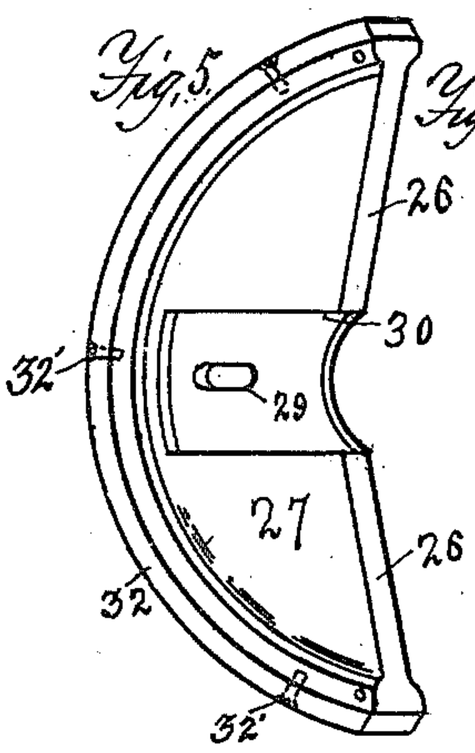


Fig. 6.

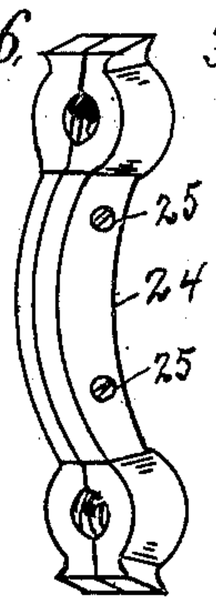


Fig. 7.

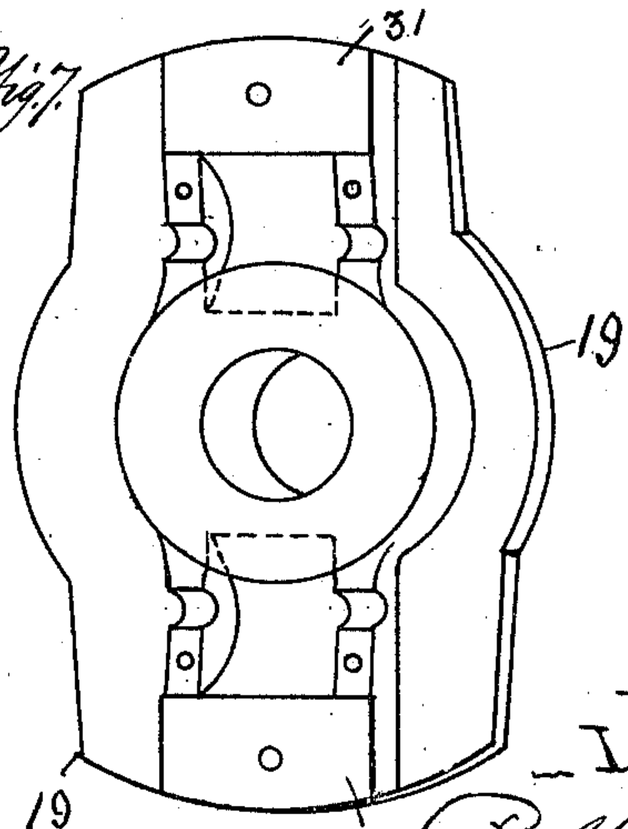
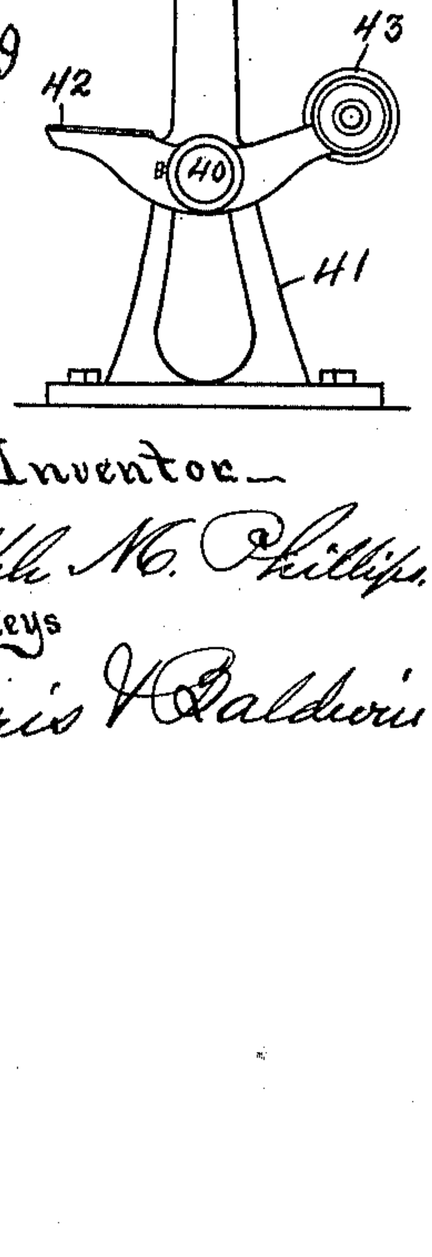


Fig. 8.



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Inventor—
Ralph M. Phillips.
By his attoneys
Harris & Baldwin

UNITED STATES PATENT OFFICE.

RALPH M. PHILLIPS, OF JAMESTOWN, NEW YORK.

FRICTION-CLUTCH.

SPECIFICATION forming part of Letters Patent No. 673,924, dated May 14, 1901.

Application filed March 17, 1900. Serial No. 9,011. (No model.)

To all whom it may concern:

Be it known that I, RALPH M. PHILLIPS, a citizen of the United States, residing at Jamestown, in the county of Chautauqua and State of New York, have invented a new and useful Friction-Clutch, of which the following is a specification.

A former application for a patent on a friction-clutch was filed by me in the United States Patent Office October 6, 1899, and given Serial No. 732,780; and the objects of my present improvement are to simplify my former device in its construction, first, as to the expanding mechanism, so that my clutch shall be more compact, occupying less space on the shaft, and of smaller diameter as to the rim in clutches of the same relative power, and, second, as to a new manner of throwing my clutch in and out of action. I attain these objects by mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side perspective view of clutch with the side and worm plates left off. Fig. 2 is an elevation of the inner side of side and worm plates. Fig. 3 is a perspective view of outside of clutch, with starting and stopping lever in position. Fig. 4 is a sectional view of clutch at line X X in Fig. 1 and shows starting and stopping lever and pulley-wheel. Fig. 5 is a perspective of the back side of friction-block. Fig. 6 is a perspective view of the wedge. Fig. 7 is a perspective view of the central plate. Fig. 8 is a side elevation of the starting and stopping lever.

Similar numerals refer to similar parts in the several views.

10 is the shaft.

11 is the face-plate of the clutch-shell.

12 is the worm-plate, which has worm 13 cut thereon.

14 is the starting and stopping spring, which is bent up at one end and is fastened to the outer edge of worm-plate 12, near said bend, by screws 15, and after encircling the plate 12 is riveted to said bent-up end, forming a pocket, as shown in Fig. 2, to stop and hold friction-roller 17 when stopping or retarding the clutch. This leaves spring 14 free to be pushed to one side in starting the clutch. 16 is that portion of spring 14 near said pocket, and part 16 is so shaped that spring 14 is gradually pressed by roller 17 against the opposite inner side of revolving rim 33, as at 17′ in Fig. 4, for about one-half the circumference of spring 14. Part 16 is usually given an uneven or undulating surface that the undulations may hold friction-roller 17 from working back when the clutch is bearing the load, though the bend of part 16 may be made so gradual that the undulations are unnecessary.

17 is a small friction-roller so loosely mounted on screw-stud 18 in plate 11 that the rollers may be pressed out against the rim when run out on spring 14.

19 is the central plate, which may extend out in sleeve 20 around shaft 10, but is usually cut off at dotted line 21, as shown in Fig. 4 or Fig. 3.

22 22 are right-and-left screws mounted in central plate 19 in suitable boxes.

23 23 are worm-gears secured on screws 22 and made straight-sided and having curved cogs which mesh in worm 13.

24 24 are the wedges, which are operated by screws 22 and are usually made in two pieces and united by screws 25 25.

26 26 are the converging inner edges of the friction-blocks or expansive segments 27 27, which converging ways are made to give a broad smooth bearing and of the same angle as the ends of wedges 24 24, that the ends of wedges 24 may work back and forth thereon. Edges 26 converge toward their outer ends to make the expansion when wedges 24 are forced out between them.

Friction-blocks 27 27 are fastened to central plate 19 by bolts 28 28, which work in slots 29 29, and the broad opening 30 on the back side of the blocks is to receive the broad projection 31 of the central plate and hold the blocks in line when working the clutch.

32 32 are friction-shoes, preferably made of fiber or wood and attached to the outer edges of the blocks by screws 32′ 32′ to press against the inside of rim 33, which rim part must always be keyed to the driving power that it may run free therewith. Connecting-springs 34 34 draw in blocks 27 when the clutch is released and prevent all rattling.

35 is a set-collar to hold plates 11 12 in place on the central plate 19, allowing them to revolve freely.

36 is a pulley-wheel which may be keyed to

rim part 33, as shown, or to sleeve 20 when desired. 37 is a set-collar to hold rim part 33 on the shaft.

38 is a key-slot for fastening central plate 19 to the shaft.

39 is the starting and stopping lever, which is keyed on shaft 40 in standard 41 and has a yoke, composed of brake-arm 42 and starting-wheels 43, keyed to the other end of the shaft 40. Wheels 43 are keyed to their axle and mounted to revolve in the end of the yoke-arm when pressed against the revolving rim 33.

The pressure of starting-wheels 43 on rim 33 and plate 11 starts plate 11 to revolving, running roller 17 out on part 16 of spring 14 until the shape of the spring presses the roller against the revolving rim 33. Rim 33 then turns the roller in onto spring 14, and the roller presses spring 14 against the opposite inner side of rim 33, as at 17′ in Fig. 4, until the friction of the spring on the revolving rim is sufficient to turn worm-plate 12 and work the clutch, the pressure of the spring against the revolving rim turning the worm, gears, and screws and forcing out the wedges between the converging ways of the friction-blocks until a complete contact is made and the load carried.

To stop the clutch, brake 42 is pressed on the edge of plate 11, which causes roller 17 to run back to the starting point or pocket and gradually stop, stopping worm-plate 12, and the pressure of brake 42 is continued until the stationary worm pulls in the wedges and stops the clutch.

To govern the clutch so that it will stand at a desired point in its clutching power, brake 42 is pressed only for a moment on plate 11 when the clutch has reached the desired point. Plate 11 is retarded and roller 17 slips back into its pocket on spring 14 and out of contact with revolving rim 33. The clutch will therefore stand at that point in its gripping power and slip under extra strain. The application of the starting-wheels will cause plate 11 to instantly catch up again.

Parts 11 33 of the shell might be made equal in diameter, and starting-wheels 43 might be made of equal size and start the clutch all right when not in motion, since plate 11 has only to turn far enough for roller 17 to engage spring 14 and rim 33 to start worm-plate 12 and the clutch; but when the clutch is standing at some desired point in its clutching power, as above stated, and consequently all the plates are revolving at about the same rate of speed, then the application of equal-sized starting-wheels on an even shell could not make plate 11 to catch up, as stated, and therefore would not serve my purpose. I therefore make sufficient difference either in the size of wheels 43 or in shell parts 11 33 that face-plate 11 shall be run enough faster than worm-plate 12 to quickly catch up therewith and place roller 17 in contact between the spring and rim again. I prefer to make the difference in the size of the wheels in most cases.

By the use of a vertical worm-plate mounted at right angles to the shaft I do away with the horizontal motion of my former worm, and the worm-gears have nothing between them and the shaft but the beginning of the sleeve of the central plate, which I cut away for the gears without specially weakening the same. Sleeve 20, as shown in Fig. 4, is unnecessary, except for the one form of clutch which transmits the power from the shaft to the pulley.

It will be noticed that longitudinal vibration of the shafts in a cut-off coupling cannot affect my improved clutch, since spring 14 holds the clutch in action, and I do not depend upon the friction of the two parts of the clutch-shell to work the clutch. The two parts of my improved clutch-shell overlap each other and make the shell practically dust-proof.

I claim as new—

1. In a friction-clutch, a plate having a worm cut on its side, a spring-hoop larger than said worm-plate secured to the edge thereof, said spring encircling said plate and bent to form a pocket and means for coöperating with said worm and spring, as shown and for the purpose specified.

2. In a friction-clutch, a plate revolubly mounted upon and at right angles to the shaft having a worm cut on its side, a spring-hoop larger than said plate and secured to the same, said spring having undulations for some distance upon its surface and means for cooperating with said worm and spring, as shown and for the purpose specified.

3. A friction-clutch having a shell in two parts, the face-plate revolubly mounted and having a friction-roller loosely mounted on its inner side, a worm-plate having a spring-hoop attached to the same, a portion of said spring-hoop bent to engage said friction-roller, as shown and described.

4. A friction-clutch having a shell composed of a face-plate and a running-rim, a worm-plate having a spring-hoop secured thereto, a roller loosely mounted on a stud on said face-plate to engage said spring and rim, a yoke having starting-wheels mounted therein each wheel coöperating with one of the two shell parts and a brake-shoe to engage said face-plate, as shown and described.

5. A friction-clutch having a shell in two parts, a friction-roller loosely mounted on the inner side of the shell face-plate, a worm-plate having a spring-hoop attached to the outer edge thereof and bent to form a pocket for said roller as shown, a yoke having a brake-arm to engage said face-plate and an arm having starting-wheels of unequal size mounted therein to engage said shell parts, a lever to operate said yoke, as shown and for the purpose specified.

6. A friction-clutch having a running-rim and a central plate, a worm-plate a face-plate

and gears and screws to connect said rim and central plate, said worm-plate having a spring-hoop secured thereto and bent to form a pocket, a roller loosely mounted on said face-plate to engage said spring and running-rim, as shown and described.

7. A friction-clutch having a shell in two parts, the rim part secured to the driving power, the face-plate made less in diameter than the rim part and having a roller mounted on its inner side, a worm-plate having a spring-hoop secured to the same and bent to form a pocket for said roller, a yoke having starting-wheels mounted in one arm and a brake-shoe on the other arm, a lever to operate said yoke, a central plate having screws mounted thereon, worm-gears and wedges on said screws, friction-blocks having converging ways on their inner edges, as shown and described.

8. A friction-clutch having a shell in the two parts 11 33, face-plate 11 having roller 17 loosely mounted on its inner side, revoluble plate 12 having worm 13 cut thereon and spring 14 attached thereto, central plate 19 having projections 31 and sleeve 20, right-and-left screws 22 mounted on plate 19 in suitable boxes, worm-gears 33 secured on screws 22 to work in worm 13, friction-blocks 27 having openings 30 to receive projections 31 and provided with converging ways 26 and connecting-springs 34, shoes 32 on blocks 27, wedges 24 operated by screws 22 between converging ways 26, substantially as shown and for the purpose specified.

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

RALPH M. PHILLIPS.

In presence of—
N. E. THOMAS,
L. T. BALDWIN.