No. 735,811. PATENTED AUG. 11, 1903.

R. M. PHILLIPS.

FRICTION CLUTCH.

APPLICATION FILED DEC. 8, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

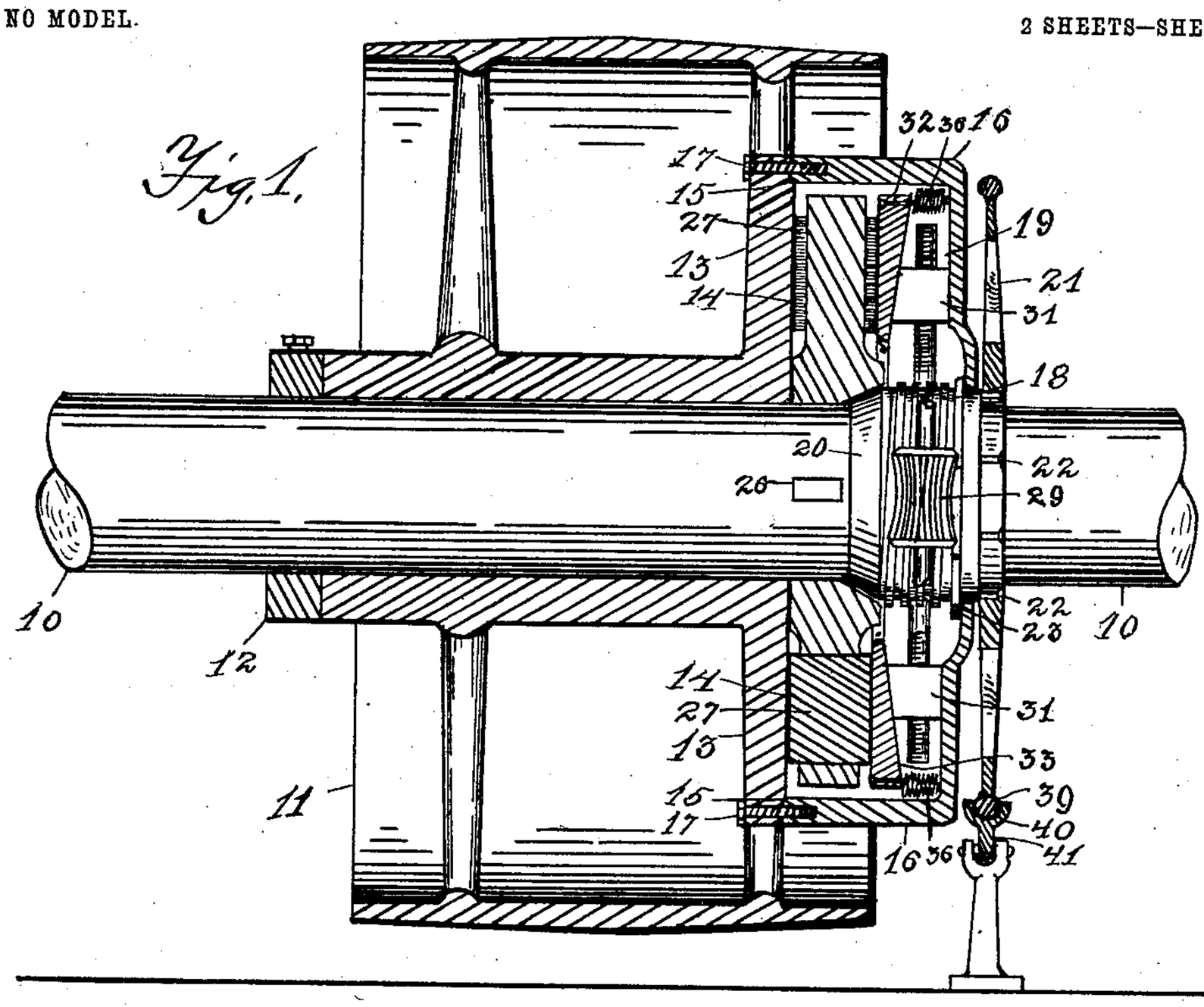
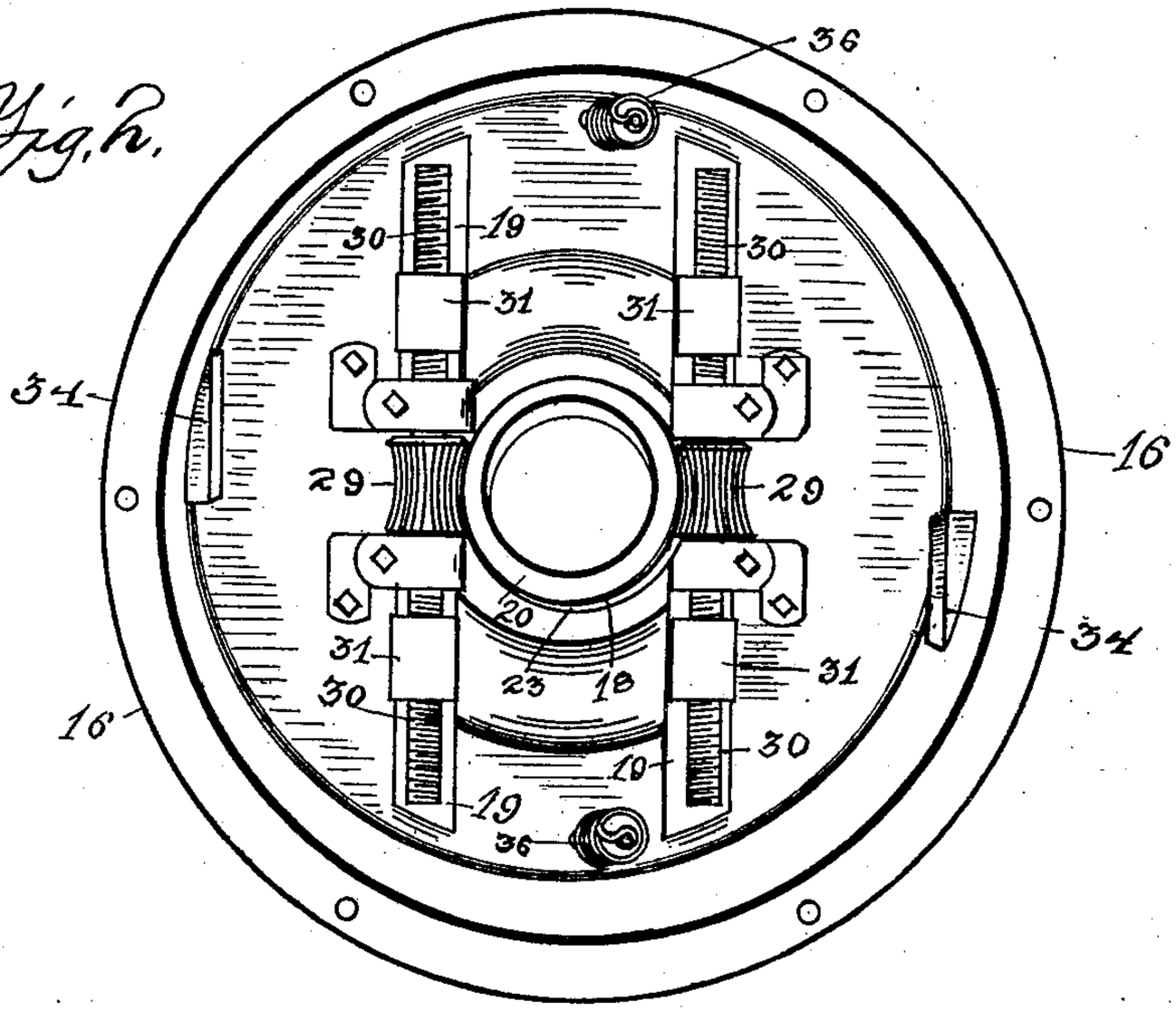


Fig. 2.



WITNESSES:

A. W. Kittle

E. T. Johnson.

INVENTOR

Ralph M. Phillips,

BY

L. Arthur Baldwin,

ATTORNEY

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APPLICATION FILED DEC. 8, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

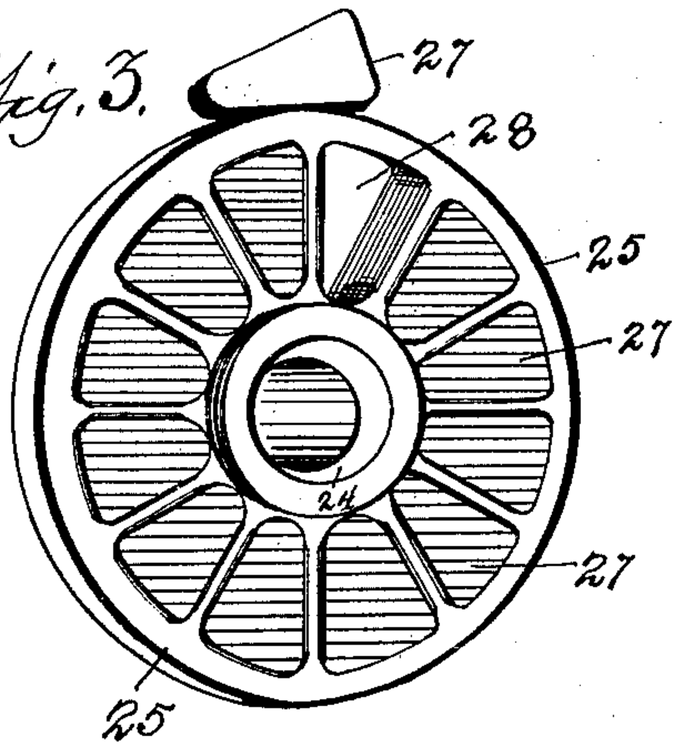

Fig. 4.

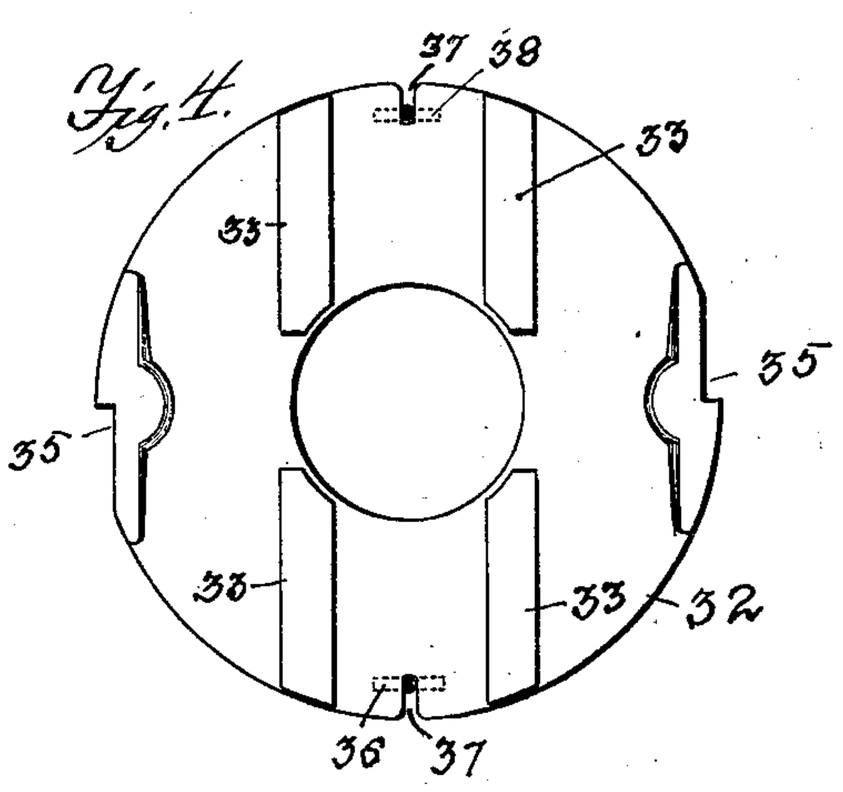

Fig. 5.

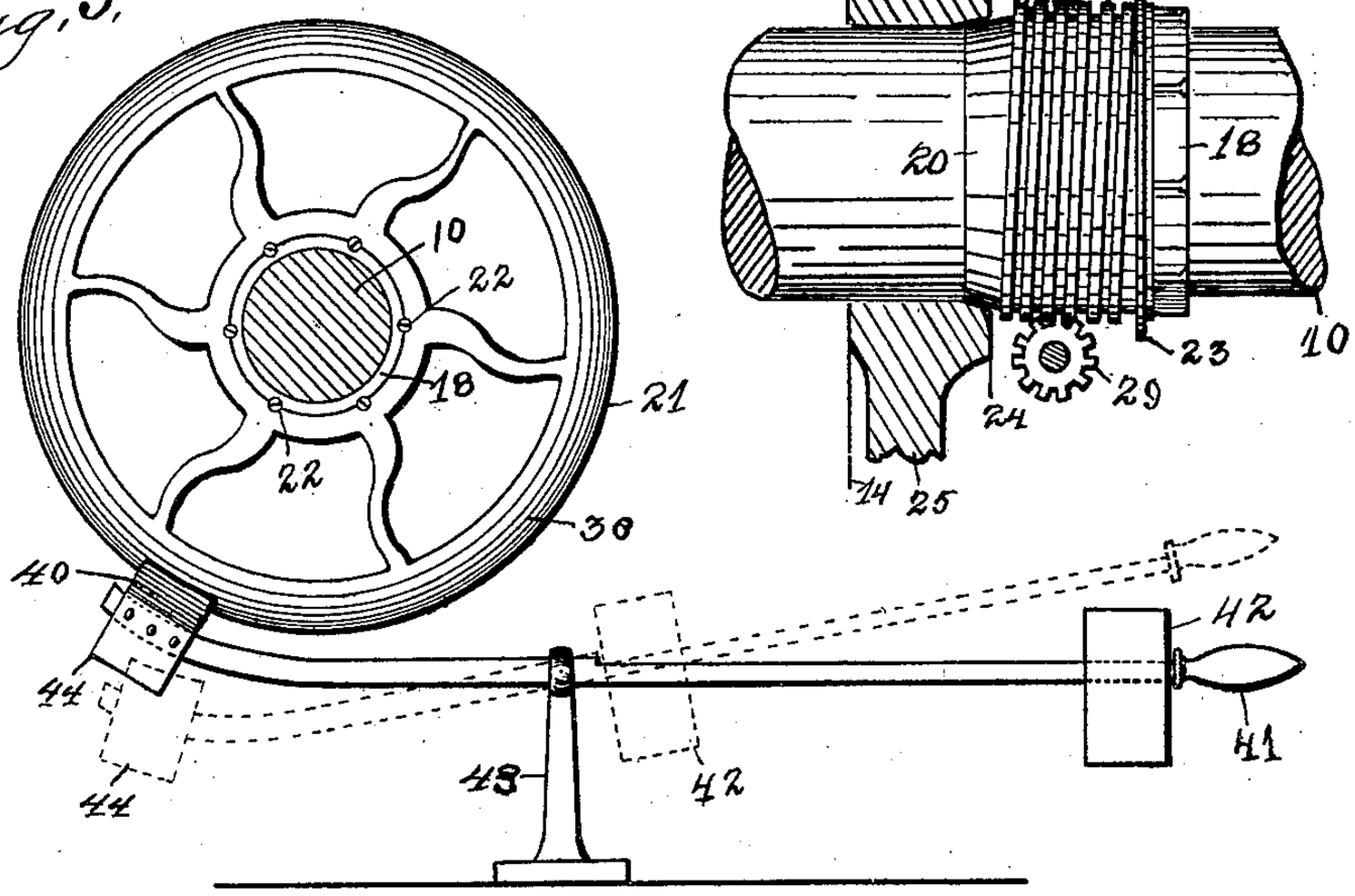

Fig. 6.

WITNESSES:

A. W. Kittle

E. T. Johnson.

INVENTOR

Ralph M. Phillips

BY

S. Arthur Baldwin.

ATTORNEY

No. 735,811. Patented August 11, 1903.

UNITED STATES PATENT OFFICE.

RALPH M. PHILLIPS, OF JAMESTOWN, NEW YORK, ASSIGNOR TO THOMAS HENRY SMITH, OF JAMESTOWN, NEW YORK.

FRICTION-CLUTCH.

SPECIFICATION forming part of Letters Patent No. 735,811, dated August 11, 1903.

Application filed December 8, 1902. Serial No. 134,256. (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 certain new and useful Improvements in Friction-Clutches, of which the following is a specification.

This invention relates to clutches for starting and stopping heavy machinery in which the driving power is used to operate the clutch mechanism; and the invention relates particularly to improvements upon the clutches shown and described in the Letters Patent Nos. 673,888 and 673,924, granted to me May 19, 1901.

The object of my present improvement is to adapt the principles of my former construction by the use of end friction blocks and plates, four wedges, and a simple controlling means, whereby a clutch construction is obtained which is better adapted for use on power-shafts, crank-shafts for gas-engines, and the like.

The invention will be more readily understood by reference to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a partly-sectional view of my improved clutch, showing end friction-blocks and an annular worm having a conical end and the opening for said conical end in the friction-block disk. Fig. 2 is a perspective view of the inside of shell with the worm, worm-gears, screws, and wedges. Fig. 3 is a perspective view of the friction-block disk, showing opening for conical end of worm and one of the blocks removed and placed on top of the disk. Fig. 4 is a side elevation of plate, having inclined ways thereon for the wedges. Fig. 5 is a side elevation of the starting-wheel and my starting-lever. Fig. 6 is a detail, partly in section, of worm, worm-gears, screws, and friction-block disk.

Similar numerals refer to corresponding parts in the several views.

The numeral 10 is the shaft, which has the pulley 11 mounted thereon and held in place at one end by set-collar 12. The web 13 at one side is made solid and given a flat face 14 with a slight offset 15 to receive the edge of the shell 16, the edge of the shell being attached to web 13 by suitable screw-bolts 17, which extend through the web into the edge of shell 16. Shell 16 extends out in a rim and then in toward an annular worm 18, forming a pan-shaped shell, as shown. The inner face of shell 16 has smooth flat ways 19 thereon for a purpose hereinafter set forth.

Worm 18 has a conical or beveled extension 20 at the inner end, and a starting-wheel 21 is attached to the other end outside of shell 16 with suitable screw-bolts 22 at proper intervals in the joint between the worm and the plate, as shown in Figs. 1, 5, and 6. An annular flange 23 is provided on worm 18 to have contact with the inside of shell 16 and stop the outward progress of the worm at the proper point. Extension 20 of worm 18 fits into a conical opening 24 in a friction-block disk 25. Disk 25 is keyed to shaft 10 by a suitable key in key-seat 26 and is filled with end friction-blocks 27, (see Fig. 3,) which blocks are loosely placed in suitable openings 28 in disk 25.

Worm-gears 29 are placed on opposite sides of worm 18 and have the right-and-left screws 30 secured therein. The four small block-wedges 31 have threaded openings therein and work on screws 30. A central plate 32, as shown in Fig. 4, has the inclined ways 33 on one side for wedges 31, and the other side is left flat for contact with the ends of friction-blocks 27. Central plate 32 is kept in a fixed position in the shell by lugs 34 on the inside of the shell, which fit notches 35 on plate 32 in combination with coiled springs 36, which are attached by staples to the inside of shell 16 and are secured in openings 37 in plate 32 by key-pins 38. Springs 36 also serve to draw the plate 32 away from the friction-blocks when the clutch is released.

Starting-wheel 21 is usually made with an oval edge 39 to receive the U-shaped shoe 40 of the lever 41. A sliding weight 42 is used to stop or start the clutch by being placed out near the handle or in near support 43.

In describing the operation of my clutch let it first be noted that the shaft 10 is always revolving, whether it is a power-shaft or the crank-shaft of a gas-engine, and that disk 25 is keyed to the revolving shaft and turns with it. Let it also be noted that worm 18 is

around and rests on revolving shaft 10. It is apparent that worm 18 will revolve with the shaft unless said worm is held stationary and that as soon as the worm revolves it is turned by its thread meshing in gears 29 into contact with disk 25, and hence throws the clutch into action. It is therefore necessary to have a constant brake, as shown, on starting-plate 21 when the clutch is out of action, and then as soon as the brake is removed the worm will be turned by the revolving shaft and drawn in by the worm-gears, and thus the clutch will start itself.

Accordingly when it is desired to start my clutch sliding weight 42 is moved in near support 43, as shown in dotted outline in Fig. 5, and brake-shoe 40 falls away from edge 39 of the starting-wheel 21, being balanced down by the weight 44 on shoe 40. Worm 18 is then drawn in, and conical end 20 is forced into contact with conical opening 24 in disk 25, which contact revolves worm 18. Then worm 18 turns the worm-gears 29 and screws 30, forcing out wedges 31 between ways 33 on plate 32 and 19 on the inner side of shell 16, as shown in Fig. 2. The pressure of wedges 31 on plate 32 forces said plate against the end of friction-blocks 27 in revolving disk 25, compressing said blocks between plate 32 and face 14 of the web 13 of pulley 11, thus starting pulley 11 to revolving.

A peculiar point in the action of worm 18, with its conical extension 20 and gears 29, is that when worm 18 and revolving disk 25 are once in contact the draw of the gears on the worm automatically forces beveled end 20 into sufficiently strong contact with conical opening 24 to carry the load, and when additions are made to the load whereby the clutch would naturally be made to slip this contact causes it to wind up automatically and carry the load, the strength of the contact increasing with the load.

To release the clutch, weight 42 is slid out to the outer end of lever 41. This weight and leverage are sufficient to stop the starting-wheel 21 and hold worm 18 stationary, and the revolution of the parts about the stationary worm will quickly unwind the gears and screws and draw in the wedges, thus effecting a complete release. Weight 42 will continue to hold worm 18 stationary until it is desired to start the clutch again. The ease with which my clutch may be thrown in and out of action will be readily appreciated. It is the simple act of sliding weight 42 back and forth on lever 41, and the driving power does the rest, except when the clutch is stopped with the clutch in action, in which case the expanding mechanism may be quickly released by turning starting-wheel 21 by hand.

I claim as new—

1. In a friction-clutch, the driving-train consisting of a frictional means secured on the power-shaft to revolve therewith, the driven train composed of a worm directly on said power-shaft having means of contact with said frictional means, mechanism acted upon by said worm to grip said frictional means, and a brake which holds said worm stationary when out of action.

2. In a friction-clutch, the driving-train consisting of a frictional means secured on the power-shaft to revolve therewith, the driven train composed of a worm on said shaft having means of frictional contact with said frictional means to turn said worm, expanding mechanism acted upon by said worm to grip said frictional means, a brake-wheel on said worm, and a brake to engage said wheel having a sliding weight to operate the same.

3. In a friction-clutch, the driving-train consisting of a frictional means secured to the power-shaft to revolve therewith, the driven train composed of an annular worm around said shaft having means of contact with said frictional means to turn said worm, worm-gears working in said worm, screws turned by said gears, wedges working on said screws, a plate having inclined ways thereon for said wedges, a suitable shell, and a releasable brake which holds said worm stationary when the clutch is out of action.

4. In a friction-clutch, the driving-train consisting of a friction-block disk keyed to the power-shaft, and a conical opening in said disk, the driven train composed of a worm on said shaft, a conical end to said worm to fit said conical opening, worm-gears working in said worm, screws turned by said gears, wedges working on said screws, a plate having inclined ways thereon for said wedges, a suitable shell, and a releasable means for holding said worm stationary.

5. A friction-clutch comprising a friction-block disk secured on the power-shaft, a conical opening in said disk, a worm on said shaft, a conical extension on said worm to fit said conical opening, worm-gears working in said worm, right-and-left screws secured in said gears, wedges working on said screws, a plate having inclined ways thereon for said wedges, a clutch-shell, and means for throwing the clutch in and out of action.

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

RALPH M. PHILLIPS.

Witnesses:
A. W. KETTLE,
S. A. BALDWIN.