No. 846,592. PATENTED MAR. 12, 1907.

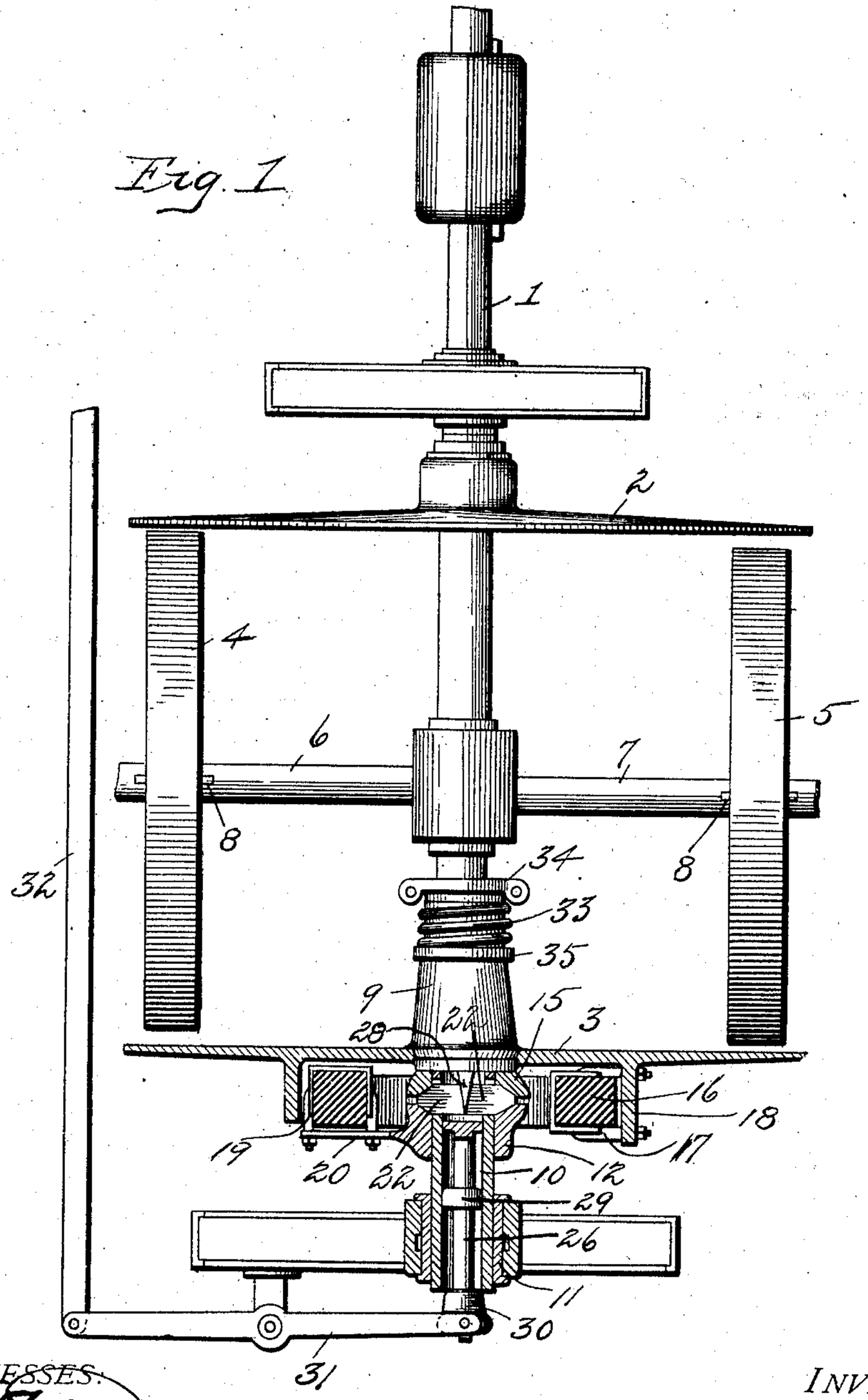
L. MAURER.

FRICTION GEARING.

APPLICATION FILED DEC. 19, 1906.

2 SHEETS—SHEET 1.

Fig. 1.



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His Attorney

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2 SHEETS—SHEET 2.

Fig. 2.

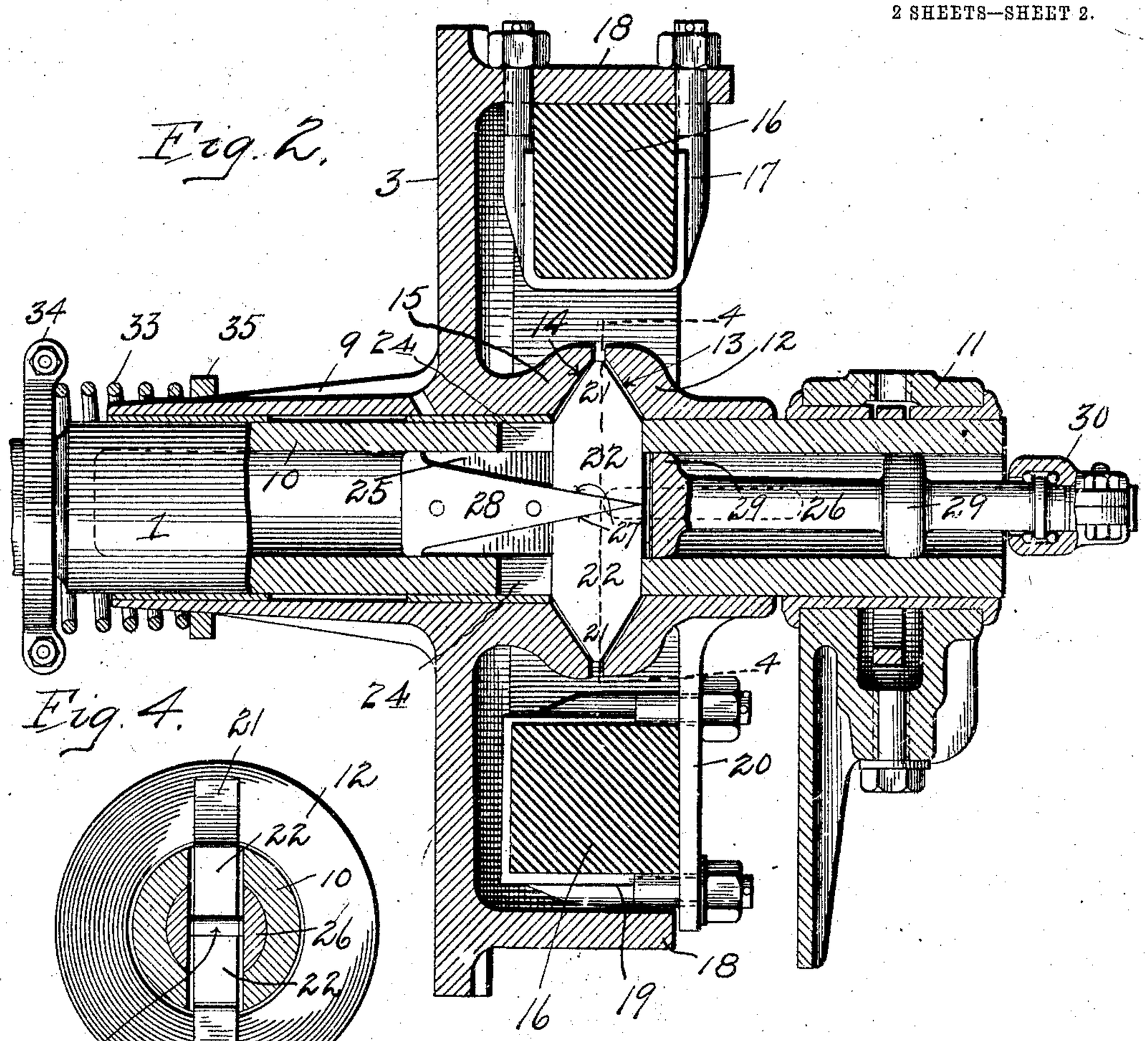
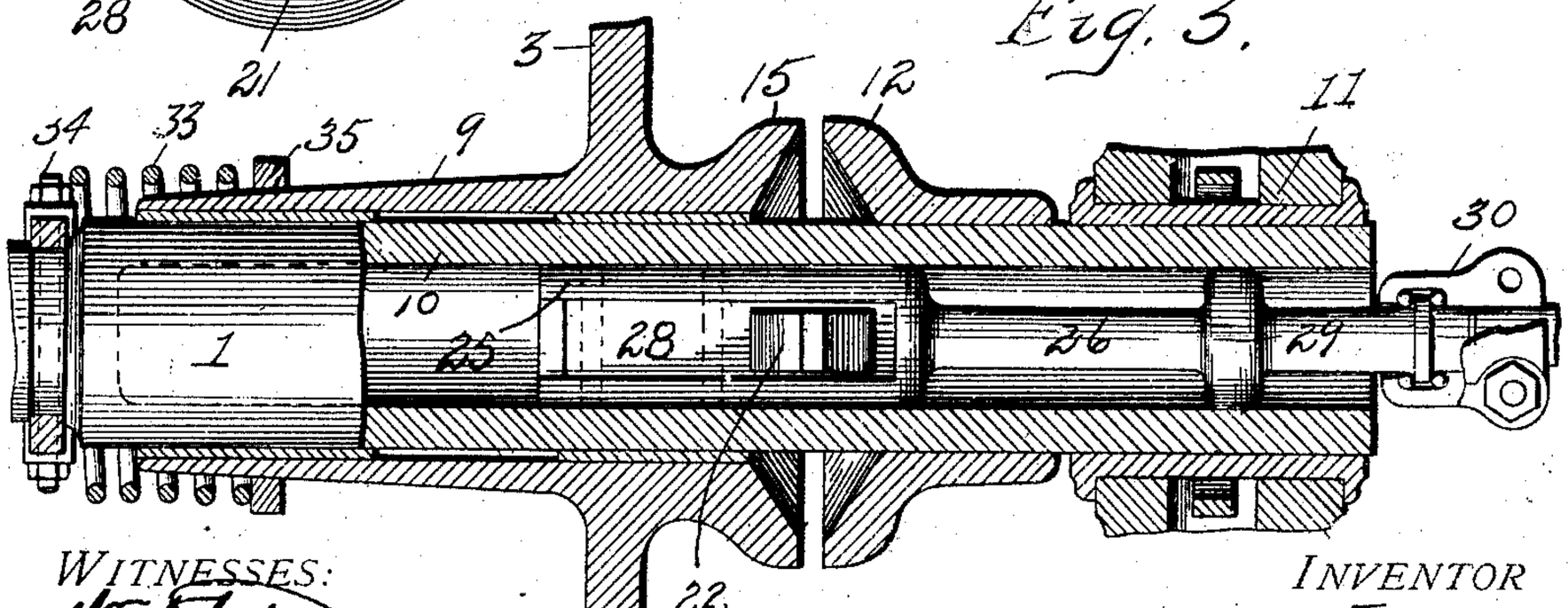


Fig. 4.

Fig. 3.



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UNITED STATES PATENT OFFICE.

LUDWIG MAURER, OF NUREMBERG, GERMANY.

FRICTION-GEARING.

No. 846,592. Specification of Letters Patent. Patented March 12, 1907.

Application filed December 19, 1906. Serial No. 348,648.

To all whom it may concern:

Be it known that I, LUDWIG MAURER, a subject of the German Emperor, residing at Nuremberg, Bavaria, Germany, have invented a new and useful Improvement in Friction-Gearing, of which the following is a specification.

This invention relates to friction-gearing, and has special reference to gearing of this type possessing special utility as a transmission-gearing for motor-vehicles and like machines.

In certain forms of friction-gearing—such, for instance, as those disclosed in my former United States applications, bearing Serial Nos. 312,761 and 315,538, and filed, respectively, April 20, 1906, and May 7, 1906—there is a tendency to the development of one-sided or uneven strains and also a lack of certainty that the friction-wheels will be pressed with the same or equal pressure against their respective friction-disks.

The present invention contemplates a construction intended to obviate the foregoing objections by providing a centrical arrangement of the gear-shifting mechanism for throwing the gearing into and out of action and which mechanism provides for simultaneously moving the friction-disks in opposite directions toward and from the friction-wheels without changing the positions of the axes of the friction-wheels.

While the invention is necessarily susceptible to structural modification without departing from the scope thereof, a preferred practical embodiment of the same is shown in the accompanying drawings, in which—

Figure 1 is a plan view, partly in section, showing the general arrangement of the improved friction-gearing with the parts thereof assembled in the relation which they preferably occupy for transmission purposes in motor-vehicles and like machines. Fig. 2 is an enlarged longitudinal sectional view through the end of the shiftable driving-shaft carrying the movable friction-disk and the shifting mechanism directly associated therewith. Fig. 3 is a longitudinal sectional view through the hollow end portion of the driving-shaft at right angles to the line of section of Fig. 2. Fig. 4 is a detail cross-section view on the line 4 4 of Fig. 2.

Like reference characters designate corresponding parts in the several figures of the drawings.

In carrying the invention into effect there is associated with a longitudinally-shiftable driving-shaft 1 a pair of oppositely-located friction-disks 2 and 3, which coöperate, respectively with the oppositely-located friction-wheels 4 and 5, mounted on the transmission-shaft sections 6 and 7. The shaft-sections 6 and 7 are arranged, respectively, at opposite sides of the shaft 1 and are supported in any suitable bearings or bearing-supports provided therefor; but in the present invention it is intended that the axes 6 and 7 for the opposite friction-wheels 4 and 5 shall remain in fixed positions, while the throwing of the gearing in and out of action is accomplished solely through the shifting of the friction-disks 2 and 3. The said friction-wheels 4 and 5 are preferably splined or feathered upon their respective shaft-sections, as indicated at 8, so that the same may be adjusted axially to provide for alterations or adjustment in the transmission ratio.

The friction-disk 2 is fast on the driving-shaft 1, so as to be shiftable therewith, while the directly-opposite friction-disk 3 is loose on the shaft and has an independent shifting movement, while also capable of relative rotation. However, it is preferable in carrying out the invention to construct the loose disk 3 with what may be termed a "bearing-hub" extension 9 at one side to loosely receive therein the hollow end portion 10 of the shaft 1. The outer extremity of said hollow end portion of the driving -shaft is supported in an outer bearing-box 11, and at an intermediate point said shaft portion 10 has secured fast thereon an abutment-collar 12, provided with an inclined bearing-face 13, opposing a corresponding reversely-inclined bearing-face 14, formed upon a presser-head 15, projected centrally from one side of the friction-disk 3. An elastic or flexible coupling is provided between the disk 3 and the shaft 1 through the employment of a flexible coupling-ring 16, secured to the disk 3 by means of one or more U-shaped clip-bolts 17, embracing the ring and bolted to a holding-flange 18, projected from one side of the disk 3 as an integral or rigid part thereof. At a point opposite its fastened connection with the flange 18 the said elastic coupling-ring 16 has a clip-bolt connection 19 with a connecting-arm 20, having a rigid connection with the fast abutment-collar 12 on the hollow end portion 10 of the shaft 1.

The reversely-inclined bearing-faces 13 and 14 of the collar 12 and head 15 are adapt-

ed to be engaged by the double-beveled ends 21 of a pair of oppositely-arranged wedge-blocks 22, arranged crosswise of the hollow shaft portion 10 and operating through guide-slots 24, formed in diametrically opposite sides of said shaft portion 10. The inner end portions of the blocks 22 are held within the carrying-fork 25 of an operating-plunger 26 and are formed with inclined faces 27, engaged by the inclined sides of an actuating-wedge 28. This wedge 28 is secured fast within the fork 25 of the plunger 26 and is disposed longitudinally thereof, as plainly shown in Fig. 2 of the drawings. The blocks 22 are loosely mounted.

The operating-plunger 26 slides longitudinally within the hollow portion 10 and is provided thereon with guiding and holding collars 29, which steady and support the plunger within the shaft. The outer end of the plunger has a rotatable swivel connection 30 with one end of a rocking lever 31, which in turn has a suitable controlling-rod connection 32 therewith.

Referring to the action of the mechanism, it will be observed that upon the retraction of the plunger 26 the blocks 22 are carried against one end of the slots 24 and against the collar 12, and simultaneously the wedge 28 is moved between the camming-blocks. The consequent result is to simultaneously draw upon the shaft 1 in one direction and thrust the blocks 22 outward, causing the loose friction-disk 3 to be moved in an opposite direction. Hence the two friction-disks 2 and 3 are simultaneously moved against their respective friction-wheels 4 and 5 simultaneously and with even pressure. The disengagement of the friction-disks is effected automatically upon release of pressure from the plunger 26 by means of a release-spring 33, interposed between a fast collar 34 on the shaft 1 and a collar or shoulder 35 on the hub portion 9 of the loose disk 3. It will therefore be observed that the construction described allows a simultaneous and uniform engagement of the friction-disks, while the steadiness of the torque transmitted is insured by the insertion of the elastic coupling.

I claim—

1. In a friction-gearing, the combination with a pair of friction-wheels, of a longitudinally-shiftable driving-shaft, a fast and a loose friction-disk mounted on said shaft, and a gear-shifting mechanism comprising means for simultaneously moving the loose friction-disk and the shaft with the fast disk in opposite directions without moving the axes of the friction-wheels.

2. In a friction-gearing, the combination with a pair of friction-wheels, of a longitudinally-shiftable driving-shaft, fast and loose friction-disks mounted on said shaft, a release-spring arranged to normally move the friction-disks away from the friction-wheels, an elastic coupling between the loose disk and the shaft, and a shifting mechanism comprising means for simultaneously moving the shaft and the loose disk in opposite directions.

3. In a friction-gearing, the combination with the friction-wheels, of a longitudinally-shiftable driving-shaft having a hollow end portion, fast and loose friction-disks mounted on the shaft, an elastic coupling between the loose disk and the shaft, and a shifting mechanism centrically arranged within the hollow shaft portion and having wedge devices for simultaneously moving the shaft and the loose disk in opposite directions.

4. In a friction-gearing, the combination with the friction-wheels, of a longitudinally-shiftable driving-shaft having a hollow end portion provided with side guide-slots, fast and loose friction-disks mounted on the shaft, the loose disk having a presser-head, a fast abutment-collar on the driving-shaft, a reciprocal operating-plunger working in said hollow shaft portion and provided with a carrying-fork, a pair of opposite wedge-blocks carried in the said fork and projecting through said guide-slots for engagement between and against said abutment-collar and presser-head, an actuating-wedge also carried by the fork of the plunger and operating between said blocks, and a release-spring interposed between the driving-shaft and the loose disk for moving said elements in opposite directions.

In testimony whereof the said LUDWIG MAURER has signed his name to this specification, in the presence of two subscribing witnesses, this 28th day of November, 1906.

LUDWIG MAURER.

Witnesses:
JOHANN STELZER,
HEINRICH DYNNEBIER.