No. 706,664. Patented Aug. 12, 1902.

S. JACKSON.

DIFFERENTIAL SPEED POWER TRANSMITTING MECHANISM.

(Application filed July 5, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

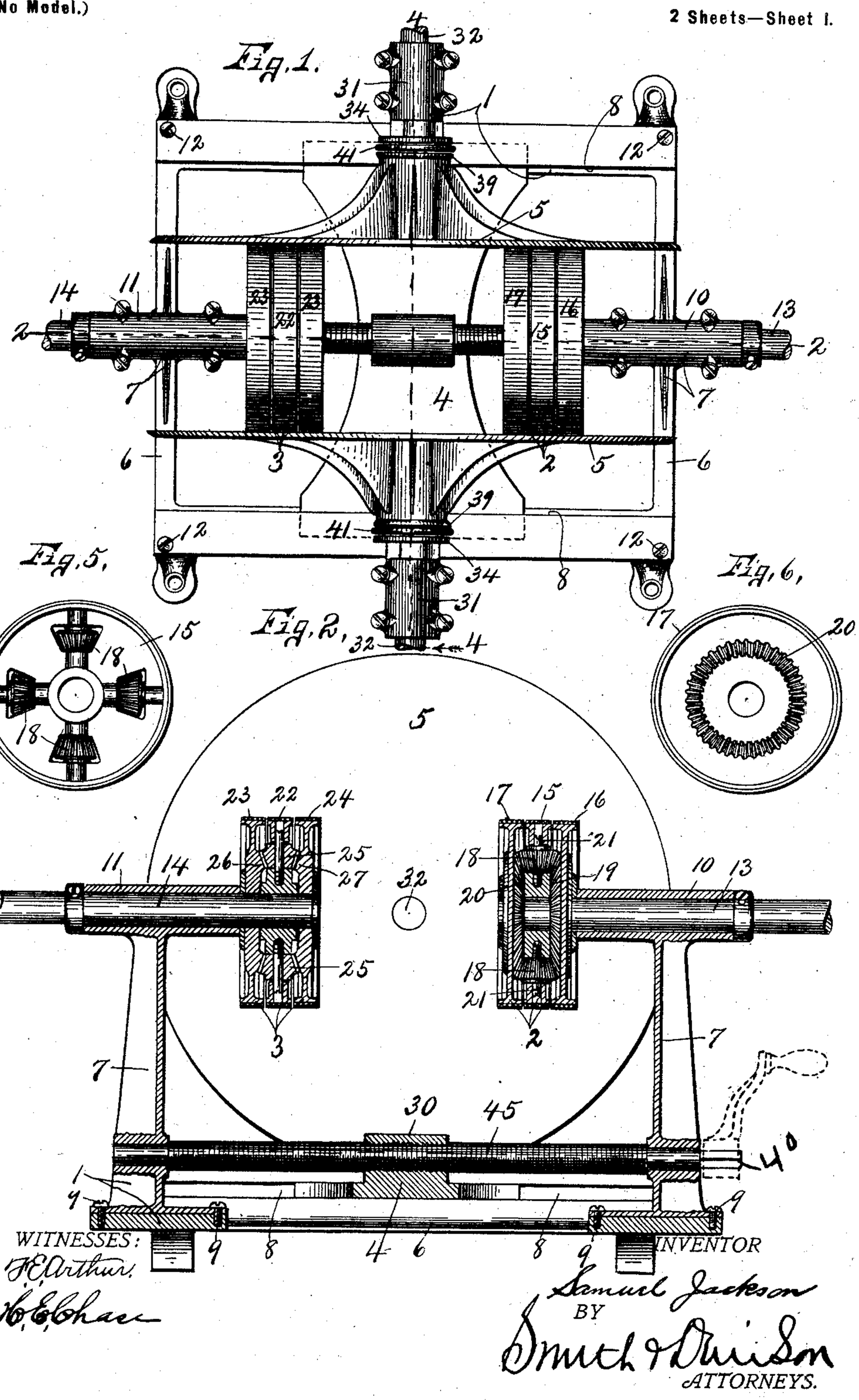

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Fig. 3.

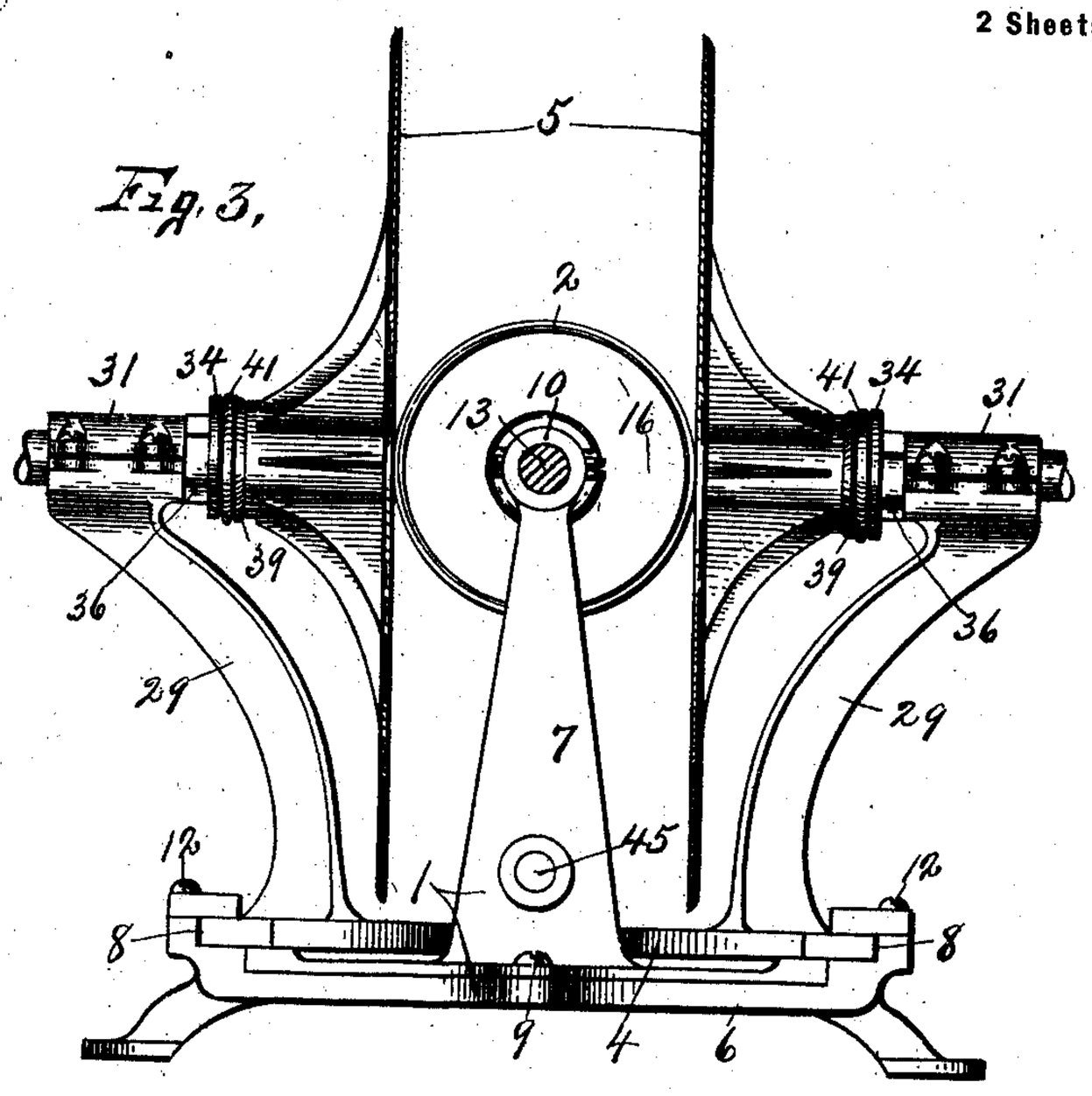
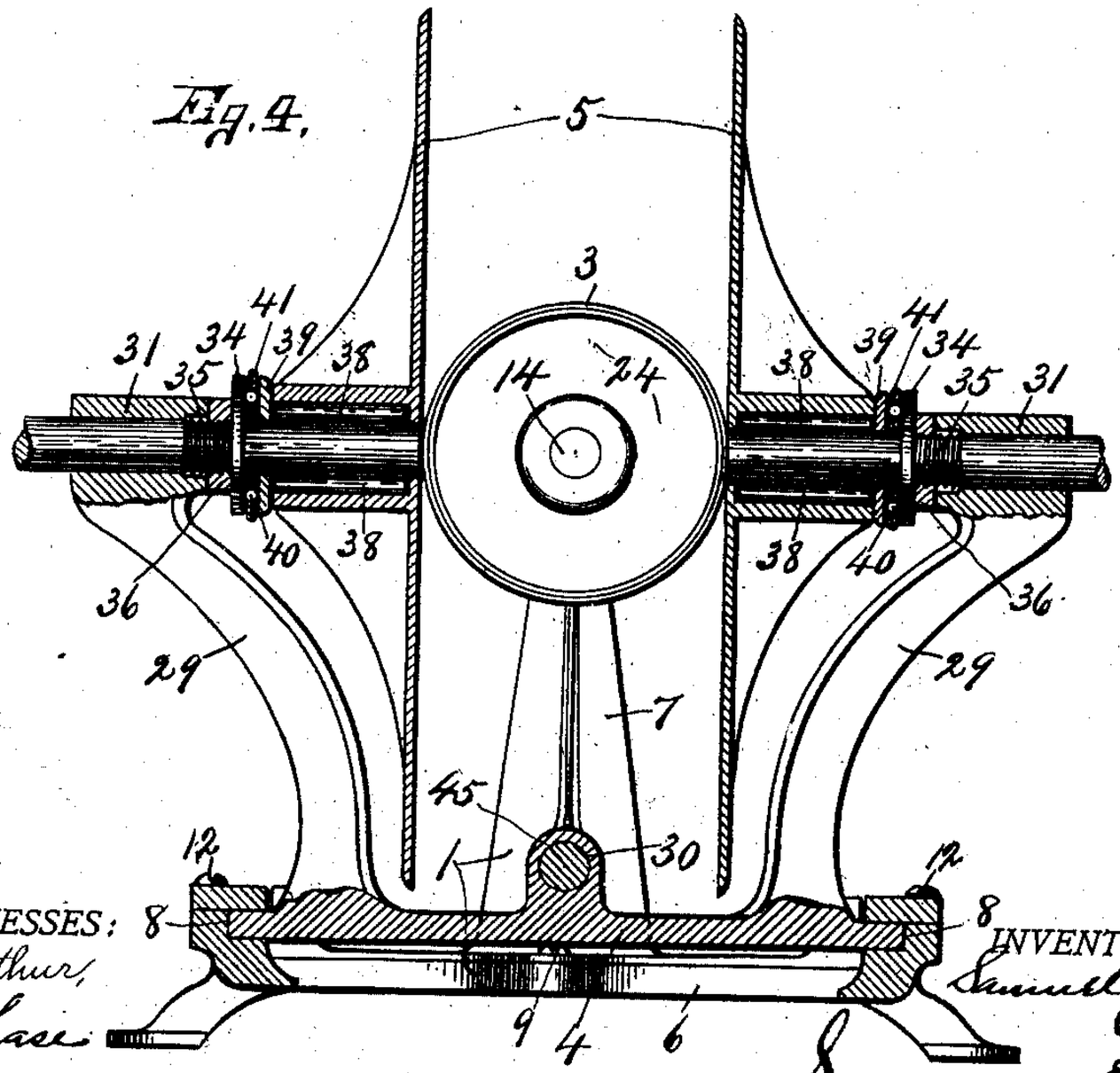


Fig. 4.



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UNITED STATES PATENT OFFICE.

SAMUEL JACKSON, OF FAYETTEVILLE, NEW YORK.

DIFFERENTIAL-SPEED POWER-TRANSMITTING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 706,664, dated August 12, 1902.

Application filed July 5, 1901. Serial No. 67,184. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL JACKSON, of Fayetteville, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Differential-Speed Power-Transmitting Mechanism, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to improvements in variable-speed power-transmitting devices in which one rotary member is actuated by frictional engagement with another rotating member.

The object of this invention is to increase the number of points of contact between the rotary members without liability of counter-friction or drag of one member upon the other, this being accomplished by providing one of the revoluble members with a plurality of rotary contact-faces movable at different rates of speed corresponding to the speed of movement of the portion of the other member in contact therewith.

Another object is to produce a frictional power-transmitting device whereby two rotary members may be rotated at the same or at variable speeds in the same or in reverse directions.

A still further object is to provide a simple and efficient means for shifting the position of one of the friction members relative to the other for controlling the speed and direction of movement of the driven member.

To this end the invention consists in the construction, combination, and arrangement of the parts of a power-transmitting mechanism, as hereinafter fully described, and pointed out in the claims.

Referring to the drawings, Figures 1 and 3 are respectively top plan and end views of a device embodying my invention. Figs. 2 and 4 are sectional views taken, respectively, on lines 2 2 and 4 4, Fig. 1. Figs. 5 and 6 are face views, respectively, of the intermediate and one of the end friction-disks of one of the compensating-gear heads.

Similar reference characters indicate corresponding parts in all the views.

To illustrate the principle of my invention, I have shown the frame 1, revoluble friction-heads 2 and 3, a sliding bracket or cross-head 4, and friction-disks 5, carried by the cross-head.

The frame 1 may be of any desired size or construction and is here shown as consisting of a base 6 and opposite upright standards 7, the base 6 being provided with opposite substantial parallel ways or guides 8 for receiving and guiding the cross-heads 4, and the standards 7 are usually secured to the base by suitable fastening members, as screws 9, and are provided at their upper ends with alined bearings 10 and 11. The upper walls of the guides or ways 8 are preferably removable for permitting the insertion or removal of the cross-head 4 and are secured in position by suitable fastening means, as screws 12.

The friction-heads 2 and 3 are substantially identical in construction, one of which, as 2, may be regarded as the driving member and the other, 3, as the driven member, the head 2 being mounted upon a revoluble shaft 13, journaled in the bearing 10, and the head 3 is mounted upon a shaft or spindle 14, journaled in the bearing 11, and rotary motion is transmitted from one to the other by means of the disks 5. Although I have described the heads 2 and 3 as being respectively driven and driving members, it is obvious that the head 3 or one of the disks 5 may be used as a driving member for transmitting rotary motion to the head 2 and shaft 13.

As seen in Fig. 2, the head 2 preferably consists of intermediate and opposite end friction-wheels 15, 16, and 17, all of which are supported upon the inner ends of the shaft 13, the intermediate friction-wheel 15 being preferably secured to the shaft and is provided with two or more revoluble pinions 18, meshing with gears 19 and 20 for forming compensating-gear connections between the revoluble walls 16 and 17. The pinions 18 are mounted in suitable openings in the web of the intermediate friction-wheel 15 at opposite sides of the axis of the shaft 13, being journaled on suitable spindles 21, which are secured to the wheels 15, and the gears 19 and 20 are secured, respectively, to the friction-wheels 16 and 17 and, together with said friction-wheels, are loosely mounted upon the shaft 13 and are adapted to rotate simultaneously at different speeds when the head 2 is engaged with the friction-disks 5 at one

side of their axis. The opposite head 3 is identical in construction with the head 2, and consists of intermediate and outer end friction-wheels 22, 23, and 24, pinions 25, and compensating gears 26 and 27, the pinions 25 being revolubly supported by the web of the intermediate wheel 22, and the compensating gears 26 and 27 are secured, respectively, to the outer end wheels 23 and 24, all of which parts operate in substantially the same manner as those described for the head 2, and it is thought to be unnecessary to further describe the same.

The cross-head 4 is mounted in the guides 8, is movable in a plane substantially parallel with the axes of the shafts 13 and 14, and is provided with opposite upwardly-extending arms 29 and an intermediate screw-threaded lug 30. The opposite ends of the arms 29 are provided with bearings 31 for receiving oppositely-arranged spindles 32, which are secured in said bearings and extend inwardly toward each other therefrom for receiving and supporting the friction-disks 5. These friction-disks 5 are revolubly mounted upon the inner ends of the spindles 32 and are arranged to engage diametrically opposite faces of the heads 2 and 3, and in order to permit these disks 5 to be adjusted toward and away from the adjacent faces of the heads 2 and 3 I provide the spindles 32 with fixed collars or annular shoulders 34 and threaded portions 35, the shoulders 34 being arranged at the outer ends of the hubs of the disks 5, and the threaded portions 35 are engaged by suitable nuts 36, which are interposed between the shoulders 34 and the adjacent faces of the bearings 31.

The disks 5 are preferably mounted on roller-bearings 38, and in order to reduce the end-thrust friction between the shoulders 34 and the adjacent faces of the hubs of the disks 35 I preferably provide hardened washers 39 and ball-bearings 40, the washers 39 being arranged adjacent to the end faces of the hubs of the disks 5, and the ball-bearings 40 are interposed between the said washers and the shoulders 34, said ball-bearings being held in position by a suitable retainer-frame, as 41.

It is apparent from the foregoing description that when desired to adjust the friction-disks 5 toward and away from the peripheries of the friction-heads 2 and 3 it is simply necessary to rotate the adjusting-nuts 36, which being interposed between the shoulders 34 and the adjacent end faces of the bearings 31 engage said end faces of the bearings 31 and move the spindles and their shoulders 34 endwise, thereby impinging the adjacent faces of the disks 5 against the opposite faces of the rotary heads 2 and 3.

As seen in the drawings, Fig. 2, the heads 2 and 3 are shown substantially equidistant from the axis of the disks 5, and therefore would rotate at substantially the same rate of speed, but in reverse directions, and if desired to rotate one of said heads at greater speed than the other the cross-head 4, carrying the disks 5, is moved along the guides until the desired speed for the heads 2 and 3 is obtained.

To illustrate, suppose it is desired to rotate the head 3 at a greater rate of speed than the head 2. The cross-head 4, carrying the disks 5, would then be moved to change the position of the axes of the disks 5 nearer to the head 2 than to the head 3, and if desired to stop the head 2 entirely the axes of the disks 5 would be moved into alinement with the intermediate friction-wheel 15, and in like manner the head 3 may be stopped from rotation by moving the axes of the disks 5 in alinement with the intermediate friction-wheel 22. On the other hand, if it is desired to rotate the shafts 13 and 14 in the same direction it is simply necessary to move the disks so that both heads 2 and 3 are at the same side of the axis of the disks 5.

By constructing the heads 2 and 3 in the manner previously described it is apparent that a broad contact-surface is presented to the disks 5 and that by affording a series of rotary contact-surfaces connected by compensating gears there is no liability of counter-friction or drag between the contact-faces of the friction heads and disks.

The means for moving the cross-head and the disks carried thereby consists of a screw 45, having its opposite ends journaled in the brackets 7 and its intermediate portion screw-threaded and engaged with the threaded portion 30 of the cross-head, one end of the spindle 40 being extended beyond the adjacent bracket 7 and is adapted to be engaged by a suitable crank or other means for rotating the screw.

The operation of my invention will now be readily understood upon reference to the foregoing description and the accompanying drawings, and it will be noted that the essential feature of this invention is to construct a friction-head of a plurality of separate friction-rings connected to each other by compensating gears, whereby the rings move at different rates of speed when in contact with the friction-disks and afford a broad contact-surface with said friction-disk.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A plurality of friction rings or wheels having a common axis, in combination with a friction member in contact with the rings or wheels and having a different axis, and means connecting the rings or wheels whereby the rotation of the contacting parts causes the rings or wheels to travel in the same direction at different rates of speed.

2. The combination with a rotary disk, of a rotating shaft, a plurality of friction wheels or rings in contact with the disk, and compensating gears connecting said wheels for permitting their rotation at variable speeds.

3. A revolving shaft, a plurality of friction rings or wheels mounted thereon, one being secured to the shaft, compensating gears connecting the other rings or wheels in combination with a friction-disk contacting with the peripheries of the rings or wheels.

4. The combination of two revoluble shafts or spindles having their axes arranged at an angle with each other, a friction-disk secured to one of the shafts, and a plurality of friction-rings mounted on the other shaft and having peripheral contact with the end face of the disk, one of said rings being secured to the latter shaft, and the other rings being loose thereon, and compensating gears connecting the loose rings or wheels for the purpose set forth.

5. The combination of two rotary members having contacting friction-faces one being driven by the other, one of the members consisting of intermediate and opposite end friction rings or wheels of substantially the same diameter, a revoluble pinion carried by the intermediate wheel and a gear secured to each of the other wheels or rings and meshing with said pinion for the purpose described.

6. In a power-transmitting device, the combination of a rotary shaft or spindle, a plurality of friction rings or wheels mounted thereon, one of said wheels or rings being secured to the shaft and the others being loose thereon, compensating gears connecting the loose rings or wheels, and friction-disks contacting with different points in the peripheries of said rings or wheels for the purpose set forth.

7. The combination with a rotary friction-disk, of a rotating shaft, a plurality of friction wheels or rings in contact with the disk, compensating gears connecting said wheels or rings for permitting their rotation at variable speeds, and means for moving one of the friction members across the face of the other for varying the speed of the driven member.

8. The combination of two revoluble shafts or spindles, a plurality of friction rings or wheels mounted on each of the shafts or spindles, one of said rings or wheels of each shaft being secured to the shaft and the others being loose thereon, and compensating gears connecting the loose rings or wheels of their respective shafts, for the purpose described, and a friction-disk in contact with the peripheries of the rings or wheels of each shaft.

9. A revolving shaft, a plurality of friction rings or wheels mounted thereon, one being secured to the shaft and the others being loose thereon and compensating gears connecting the loose rings or wheels, in combination with a friction-disk contacting with the peripheries of the rings or wheels and movable lengthwise of the axis of said shaft.

10. The combination of two revoluble shafts or spindles, a plurality of friction rings or wheels mounted on each of the shafts or spindles, one of said rings or wheels being secured to the shaft and the others being loose thereon, compensating gears connecting the loose rings or wheels of their respective shafts for the purpose described, and a friction-disk in contact with the peripheries of the rings or wheels of each shaft and means for moving the disks lengthwise of the axes of said shafts for the purpose specified.

In witness whereof I have hereunto set my hand this 11th day of June, 1901.

SAMUEL JACKSON.

Witnesses:
H. E. CHASE,
MILDRED M. NOTT.