No. 755,616. PATENTED MAR. 29, 1904.

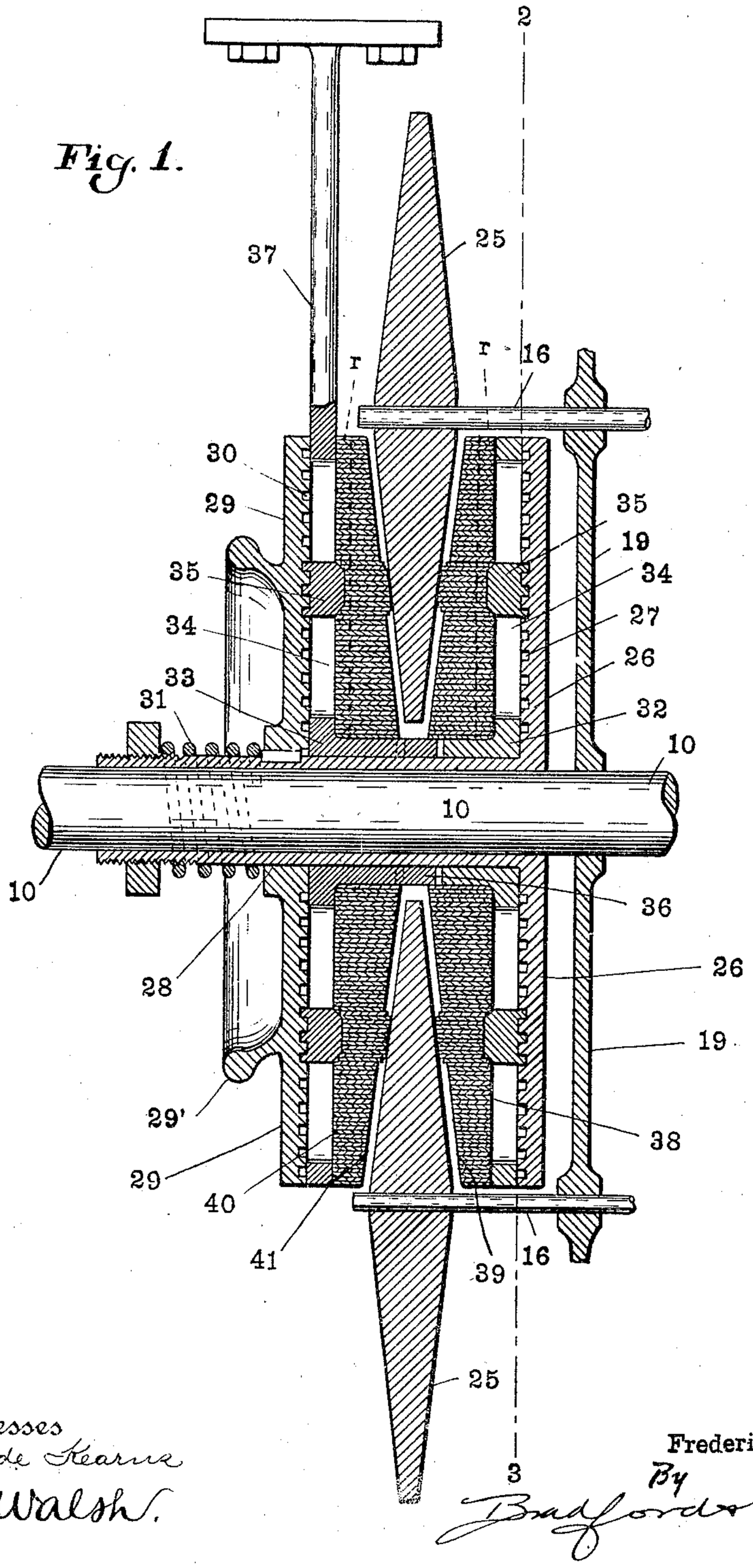
F. H. CHEYNE.

SPEED DIFFERENTIATING DEVICE.

APPLICATION FILED JUNE 25, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1.



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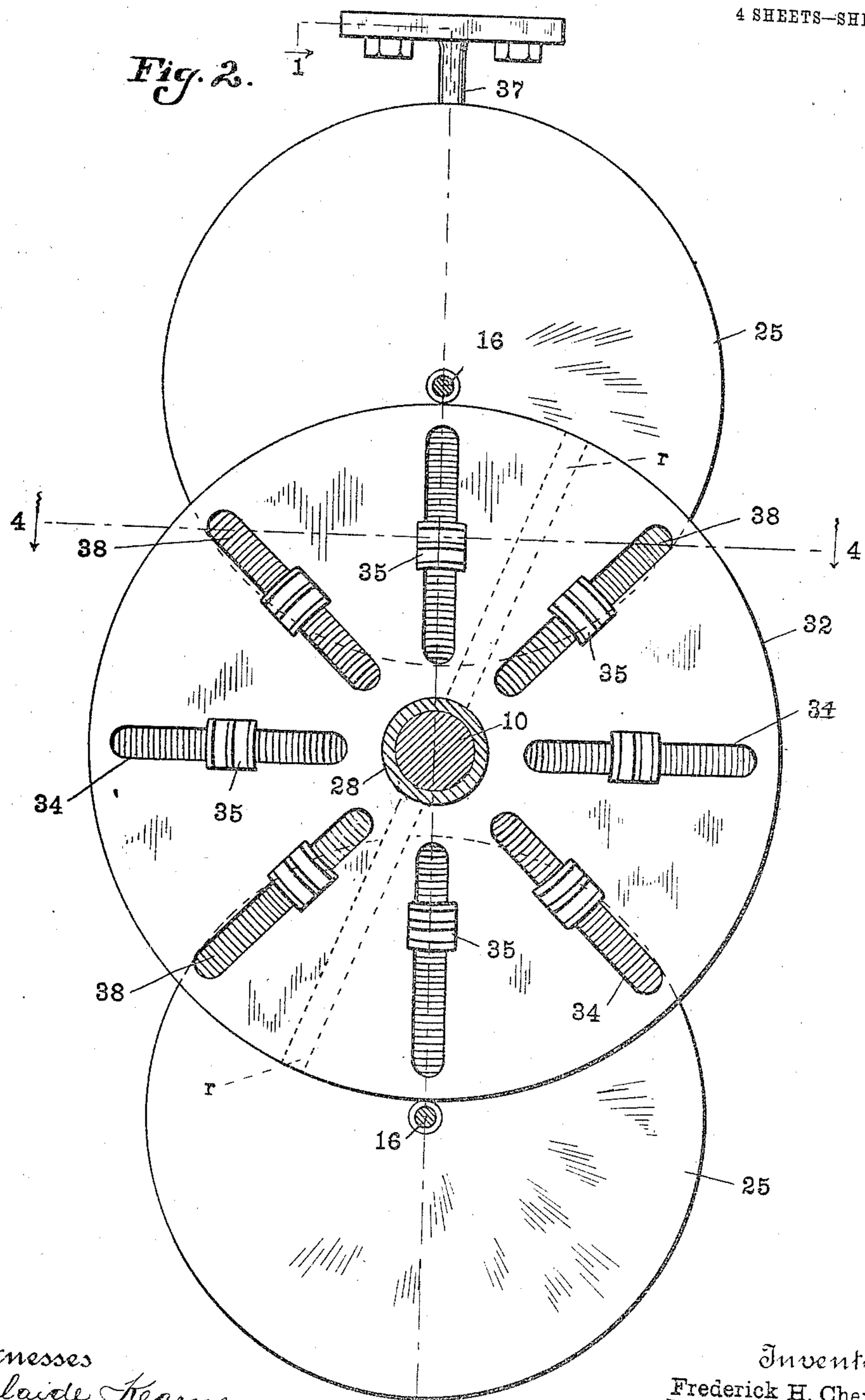
4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

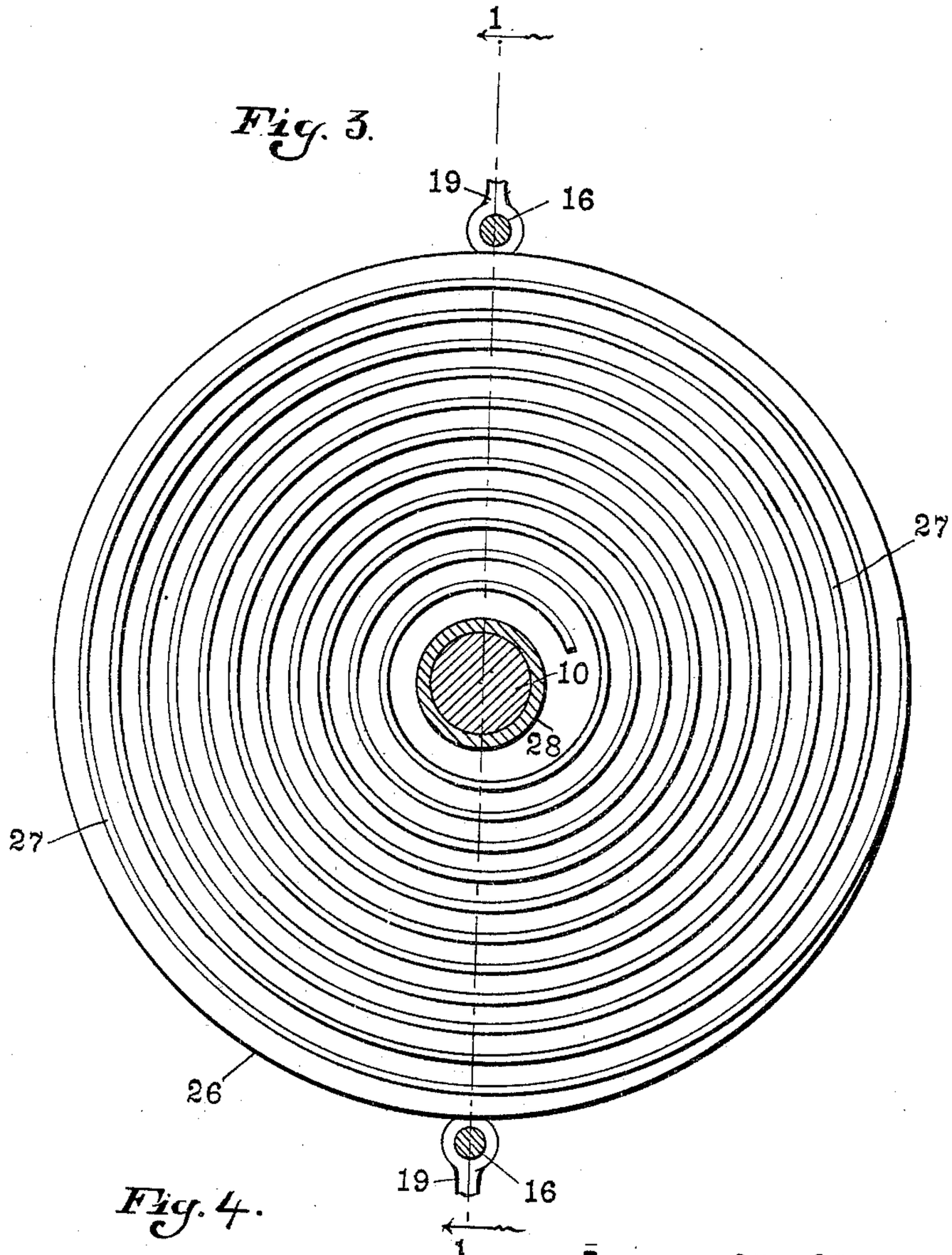
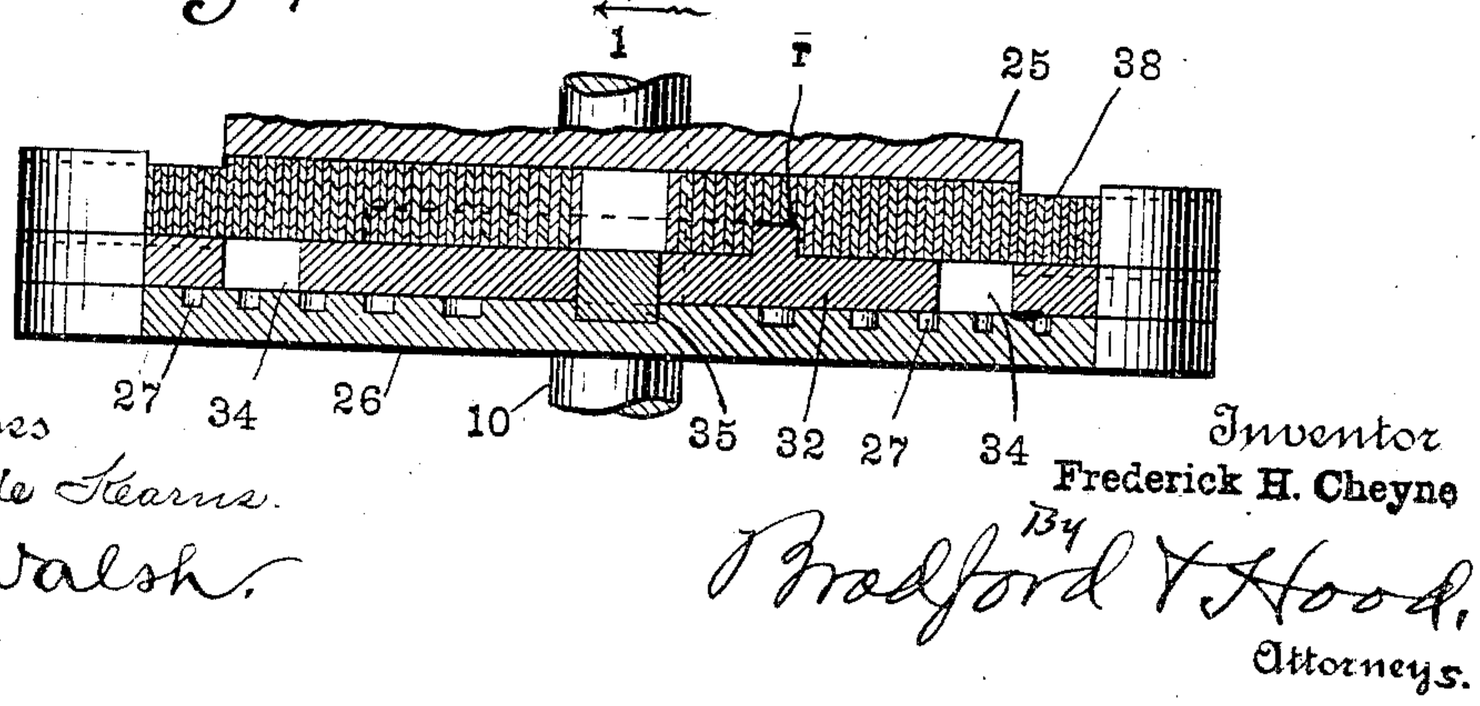


Fig. 4.



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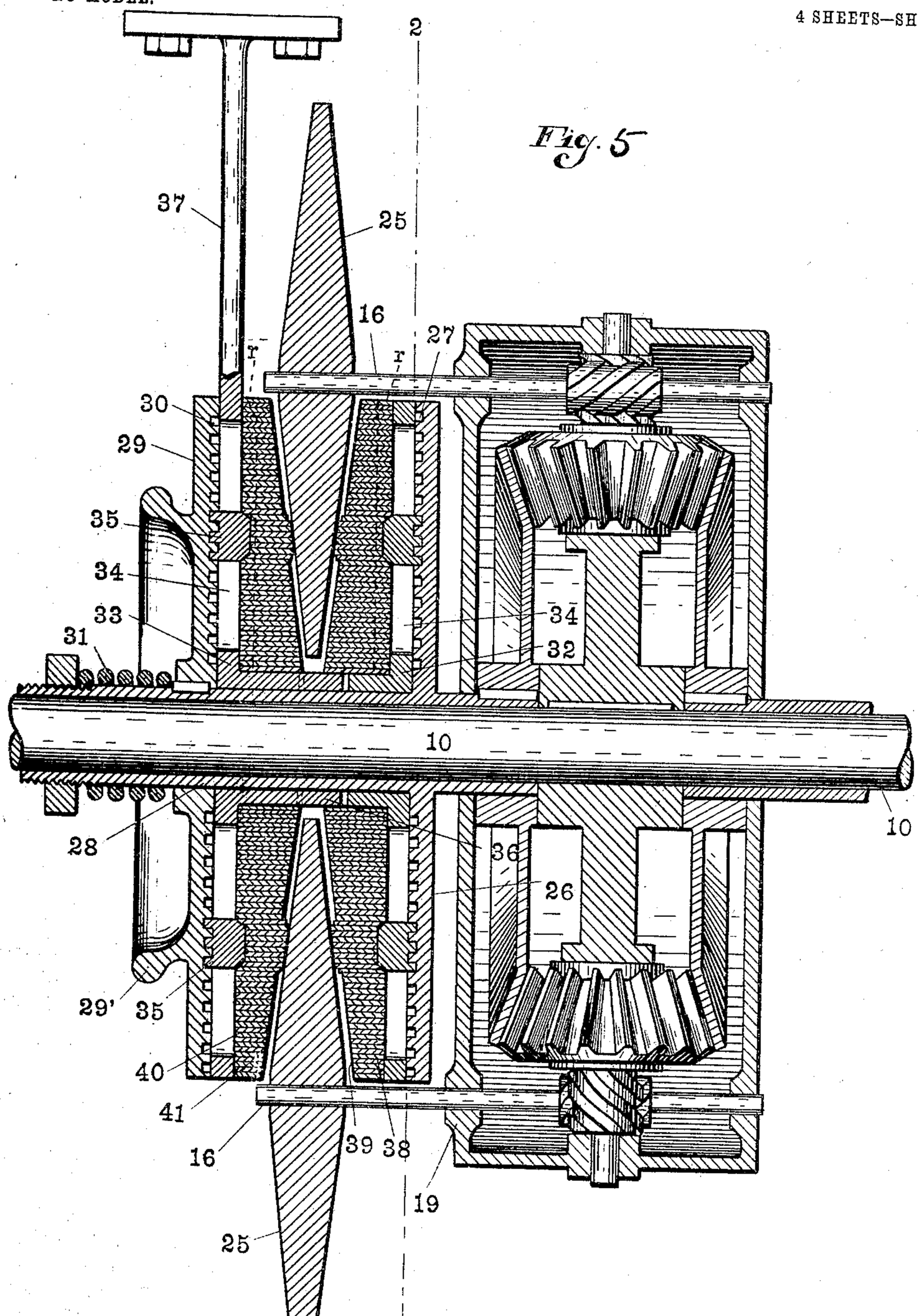
NO MODEL. 4 SHEETS—SHEET 4.

Fig. 5



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UNITED STATES PATENT OFFICE.

FREDERICK H. CHEYNE, OF INDIANAPOLIS, INDIANA.

SPEED-DIFFERENTIATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 755,616, dated March 29, 1904.

Application filed June 25, 1903. Serial No. 163,007. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK H. CHEYNE, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Speed-Differentiating Devices, of which the following is a specification.

The object of my invention is to produce an improved form of speed-differentiating mechanism.

The accompanying drawings illustrate my invention.

Figure 1 is an axial sectional view of my device as seen from the dotted lines 1 1 of Figs. 2 and 3; Fig. 2, a transverse sectional view as seen when looking toward the left from the dotted line 2 3 in Fig. 1; Fig. 3, a view looking toward the right from said dotted line 2 3; Fig. 4, a sectional view as seen when looking in the direction indicated by the arrows from the dotted line 4 4 in Fig. 2, and Fig. 5 is an axial section showing my device applied to the gearing shown in my Patent No. 714,780.

Said drawings show a mechanism designed to take the place of friction members 40 40 and 43 shown in my Patent No. 714,780, issued December 2, 1902, and 10 indicates a main shaft corresponding to the shaft 10 in said patent. 16 16 indicate the planetary shafts corresponding to the shafts 36 36, and 19 indicates a casing corresponding to the casing 37 of said patent.

Secured to the outer end of each shaft 10 is a disk 26, having ormed upon one face a spiral groove 27, and said disk 26 is provided with an axial sleeve 28, sleeved upon shaft 10. Mounted upon sleeve 28 is a disk 29, similar to disk 26 and provided on its inner face with a spiral groove 30, mating with groove 27. Disk 29 is splined upon sleeve 28, so as to prevent revolution in respect thereto, but is capable of axial movement thereon, and the two disks are urged toward each other by means of a spring 31. Mounted between the two disks 26 and 29 are two plates 32 and 33, one adjacent to each of the disks and each provided with a plurality of radial grooves 34, in each of which is mounted a sliding block 35, which is provided on its bottom with teeth adapted to engage the adjacent spiral groove 27 or 30, while the other end of each of said blocks projects through plate 34 and is provided with beveled ends, as clearly shown in Fig. 1. The two plates 32 and 33 are locked together by suitable clutch members 36, which prevent relative angular movement, but permit relative axial movement, and the plate 33 in the construction shown is held against angular movement by a bracket 37. It is to be understood that this is only a means of holding the parts 32 and 33 and 26 and 29 from revolving together and that other means may and in many cases will be employed for the purpose without departing from my invention.

Wound about the hub of plate 32 is a compact volute spring 38, each end of which is attached to plate 32, thus forming a series of substantially concentric laminæ, which form a contact member, the inner face of which is beveled, as at 39, to conform to the angle of the adjacent face of wheel 25 and the inner edges of which laminæ are arranged to be engaged by the sliding blocks 35. Similarly there is wound about the hub of plate 33 a compact volute spring 40, the inner face 41 of which is similarly beveled.

Disk 29 is provided with a suitable handwheel 29′, by means of which it, and consequently disk 26, may be rotated with relation to plates 32 and 33.

It is desirable that the laminæ of the structures 38 and 40 shall be kept from movement relatively to each other, or, in other words, that in the "clock-spring" form shown they shall not be permitted to wind up tightly enough to prevent their free sidewise movement when operated by the blocks 35. I therefore form transverse cuts therein, one or more, (two being shown,) and form upon the adjacent surfaces of the plates corresponding ribs *r*, which will enter the grooves formed by said cuts, thus holding the laminæ against any possible circumferential relative movement. These ribs are indicated by dotted lines in Fig. 2, and one of them is shown in section in Fig. 4.

The operation is as follows: The two volutes 38 and 40 need to be kept from revolving with the disks 26 and 29 and in the construction

shown are held stationary by means of bracket 37, so that a rotation of casing 19 about shaft 10 causes a planetary movement of the wheels 25 25, and these wheels are engaged between opposite rings which are formed by projected laminæ of the volutes 38 and 40, said laminæ being projected by blocks 35. By turning disks 29 and 26 upon shaft 10 the blocks 35 may be shifted radially, and thus change the diameter of the laminated rings, and thereby change the ratio between the diameter of said rings and the diameters of wheels 25 and cause a differentiation in the speeds of the connected parts in the manner already described.

A series of concentric laminæ suitably connected together might be substituted for the volutes; but I am of the opinion that the form described is both more economical and efficient.

I claim as my invention—

1. A speed-differentiating device consisting of a stationary member and a planetary member, a volute member forming the operating-face of one of said members, and means for projecting portions of said volute member into operative engagement with the other member.

2. A speed-differentiating device comprising disk-like friction members, a volute member forming the operating-face of one of said members, and means for projecting portions of said volute member into operative engagement with the other member.

3. In a speed-differentiating device, a stationary member and a planetary member, a series of laminæ arranged about the axis of one of said members, and means for projecting one or more of said laminæ into operative engagement with the other member.

4. In a speed-differentiating device, disk-like friction members, a series of laminæ arranged about the axis of one of said members, and means for projecting one or more of said laminæ into operative engagement with the other member.

5. In a speed-differentiating device, a stationary member and a planetary member, and a series of laminæ arranged about the axis of one of said members and forming its operating-face, a series of radially-movable blocks arranged behind said laminæ, and means for shifting said blocks radially whereby successive substantially concentric sets of laminæ may be projected into operative engagement with the other member.

6. In a speed-differentiating device, disk-like friction members, and a series of laminæ arranged about the axis of one of said members and forming its operative face, a series of radially-movable blocks arranged behind said laminæ, and means for shifting said blocks radially whereby successive substantially concentric sets of laminæ may be projected into operative engagement with the other member.

7. In a speed-differentiating device, a stationary member and a planetary member, a volute spring forming the operative face of one of said members, a series of blocks arranged behind said spring, and means for adjusting said blocks radially with relation to said spring, whereby successive portions of said spring at different distances from the axis thereof may be projected into operative engagement with the other member.

8. In a speed-differentiating device, disk-like friction members, a volute spring forming the operative face of one of said members, a series of blocks arranged behind said spring, and means for adjusting said blocks radially with relation to said spring, whereby successive portions of said spring at different distances from the axis thereof may be projected into operative engagement with the other member.

9. In a speed-differentiating device, a member consisting of a slotted plate, blocks radially movable within said slots, a plurality of laminæ arranged about the axis of said plate and engaged by said blocks, a volute-grooved plate engaging said blocks, and an element adapted to be engaged by projected portions of said laminæ.

10. In a speed-differentiating device, a stationary member consisting of a slotted plate, blocks radially movable within said slots, a plurality of laminæ arranged about the axis of said plate and engaged by said blocks, a volute-grooved plate engaging said blocks, and a planetary element adapted to be engaged by projected portions of said laminæ.

11. In a speed-differentiating device, a pair of plates provided on their adjacent faces with mating volute grooves, a pair of radially-slotted plates mounted between said disks, blocks mounted in said radial slots and engaged by said volute grooves, a volute spring wound about the axis of each plate and attached to said plate, the inner edges of each of said volute springs being engaged by one set of blocks, and a planetary member mounted between said volute springs and adapted to be engaged by projecting portions thereof.

12. The combination, in a speed-differentiating device, of a shaft, a pair of friction-disks mounted thereon and capable of movement toward and from each other but secured against independent rotation, other friction members extending between said disks, contact members interposed between said disks and said other friction members, and means operated by said disks for shifting the point of contact between said contact members and said other friction members.

13. The combination, in a speed-differentiating device, of disks, as 25, contact members for operatively engaging with said disks composed of laminæ, and means for engaging successive portions of said laminæ with said disks.

14. The combination, in a speed differentiat

ing device, of two disk-like friction members, contact members operatively engaging therewith composed of laminæ and having transverse grooves cut through said laminæ, ribs on the adjacent parts entering said grooves, and means for engaging successive portions of said laminæ with said disks.

15. The combination, in a speed-differentiating device, of a member consisting of a slotted plate provided also with ribs, blocks radially movable within the slots in said plate, a plurality of laminæ arranged about the axis of said plate and engaged by said blocks and having grooves formed by transverse cuts therein engaging with said ribs, a volute-grooved plate engaging with said blocks, and a friction member adapted to be engaged by projected portions of said laminæ.

In witness whereof I have hereunto set my hand and seal at Indianapolis, Indiana.

FREDERICK H. CHEYNE. [L. s.]

Witnesses:

ARTHUR M. HOOD

JAMES A. WALSH.