No. 725,616. PATENTED APR. 14, 1903.

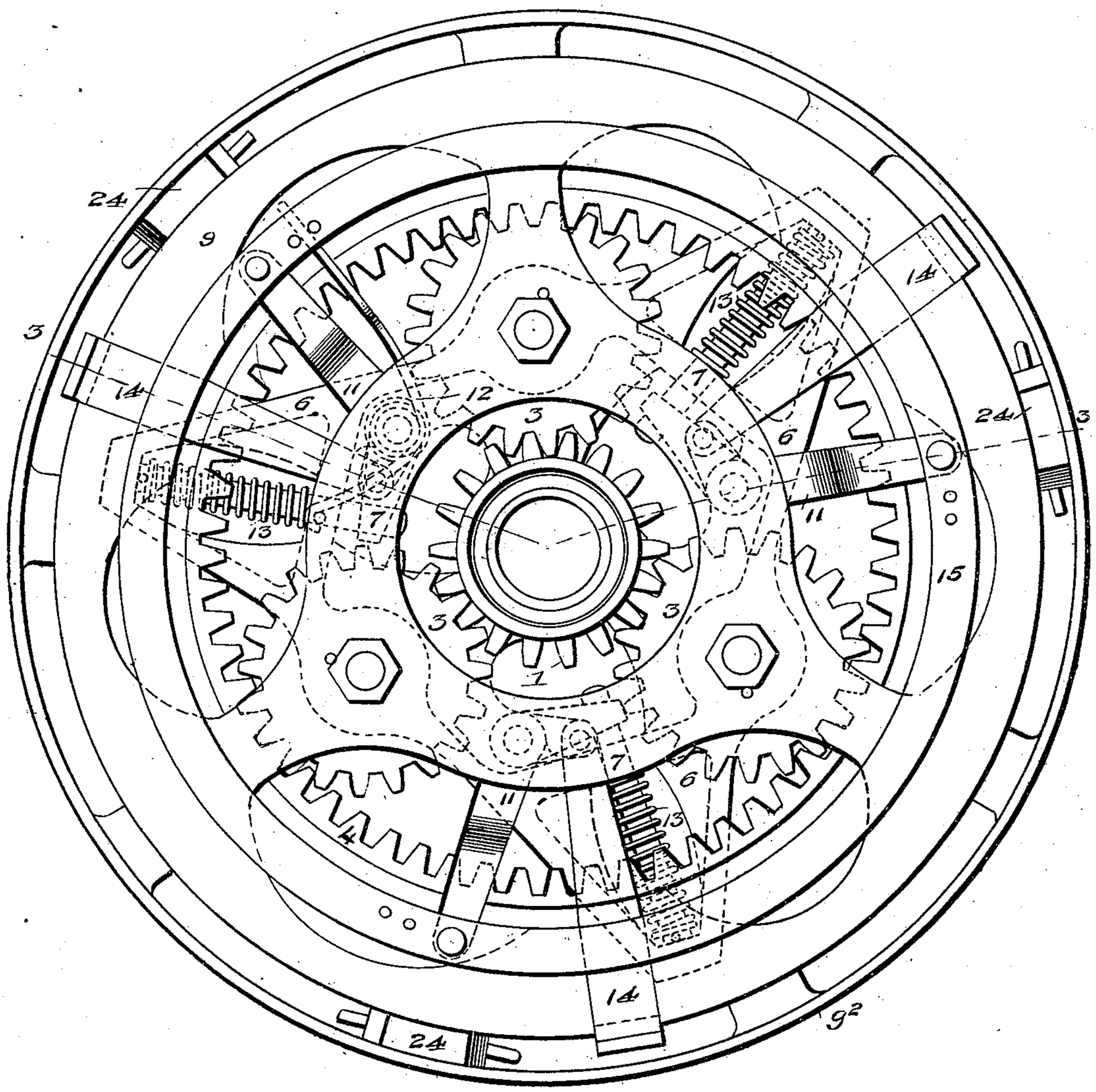
C. E. DURYEA.

POWER DRUM FOR VEHICLES.

APPLICATION FILED MAY 17, 1902.

NO MODEL. 5 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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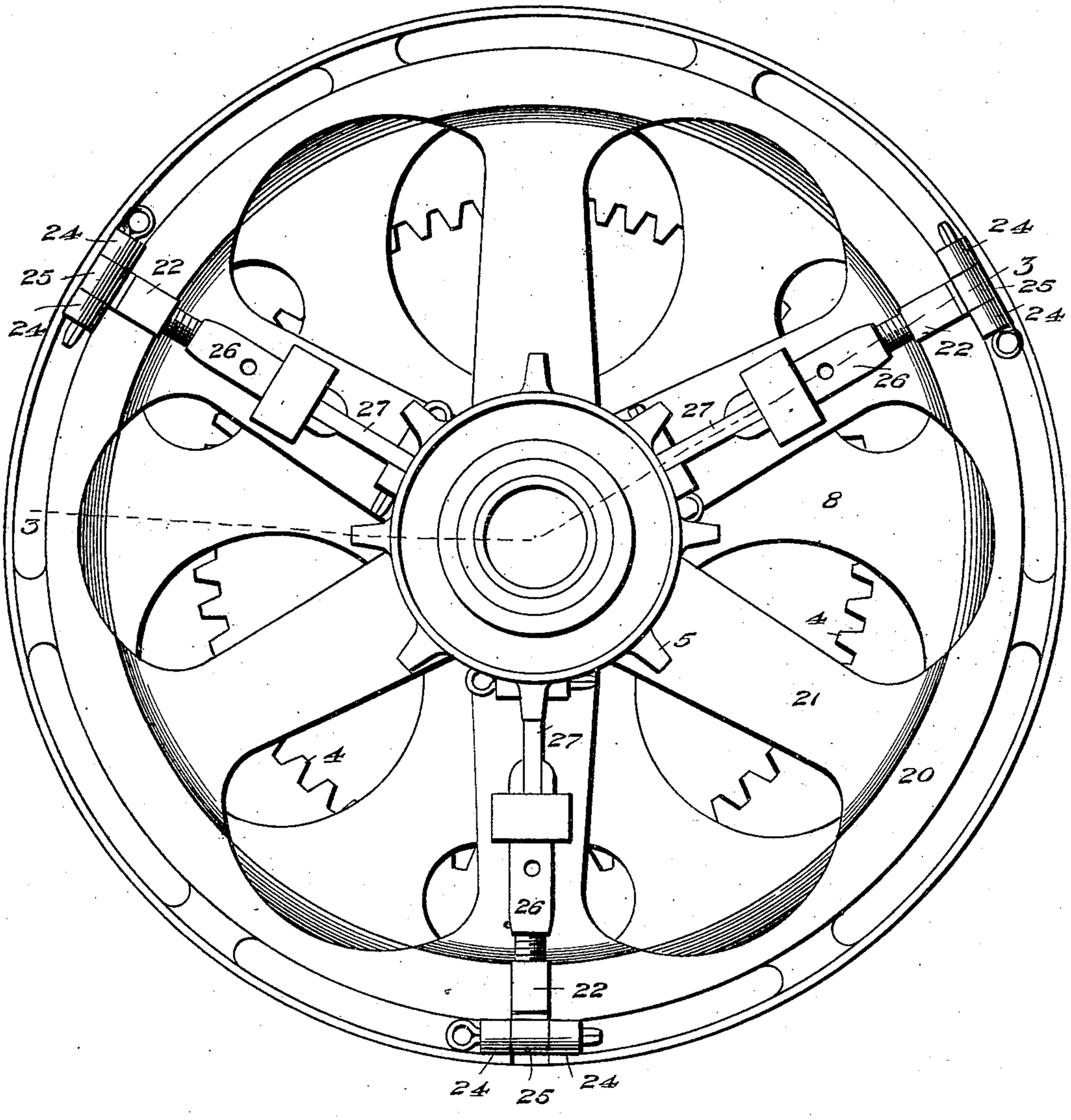
NO MODEL. 5 SHEETS—SHEET 2.

Fig. 2.



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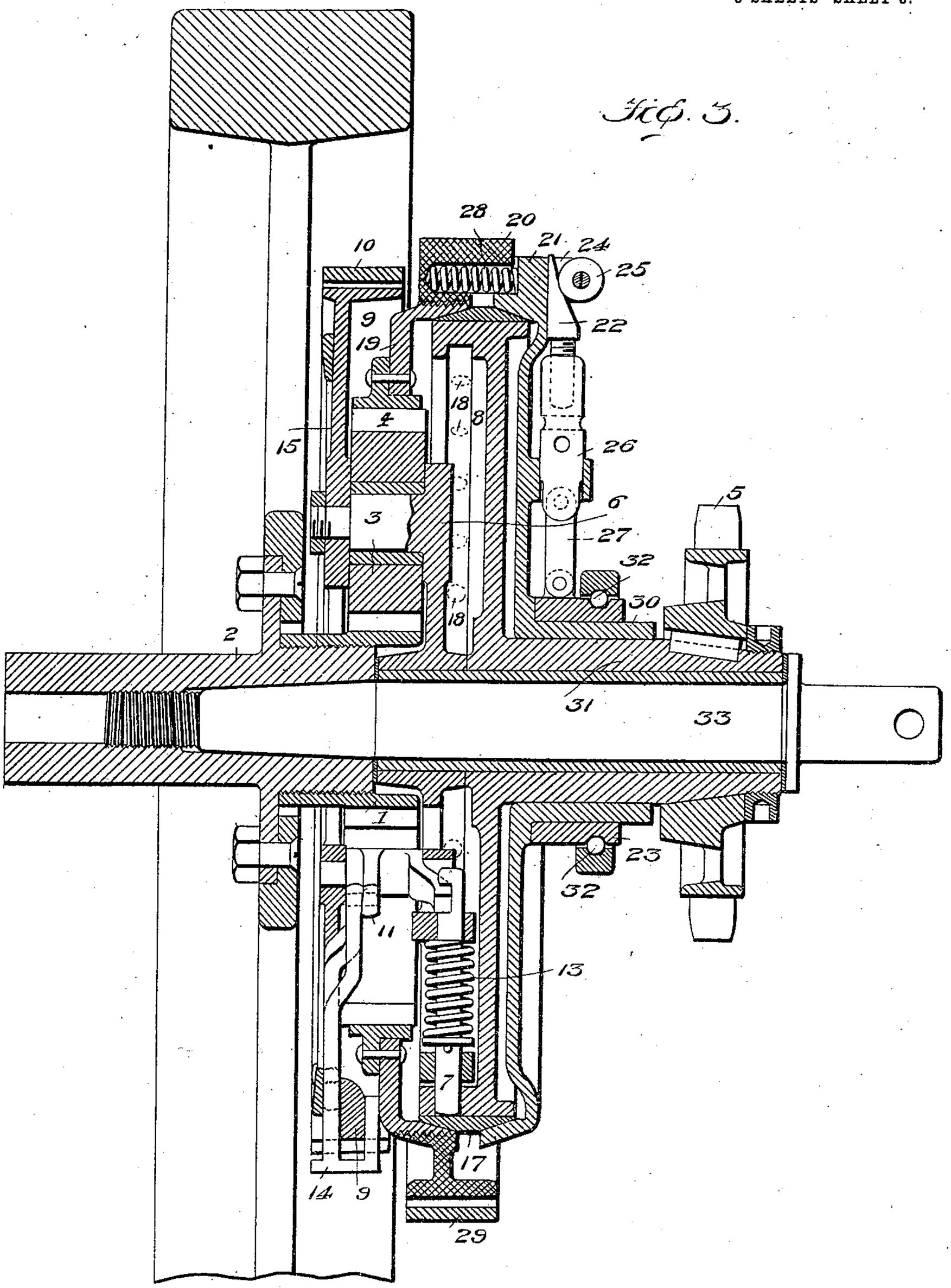
NO MODEL. 5 SHEETS—SHEET 3.

Fig. 3.



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NO MODEL. 6 SHEETS—SHEET 4.

Fig. 4.

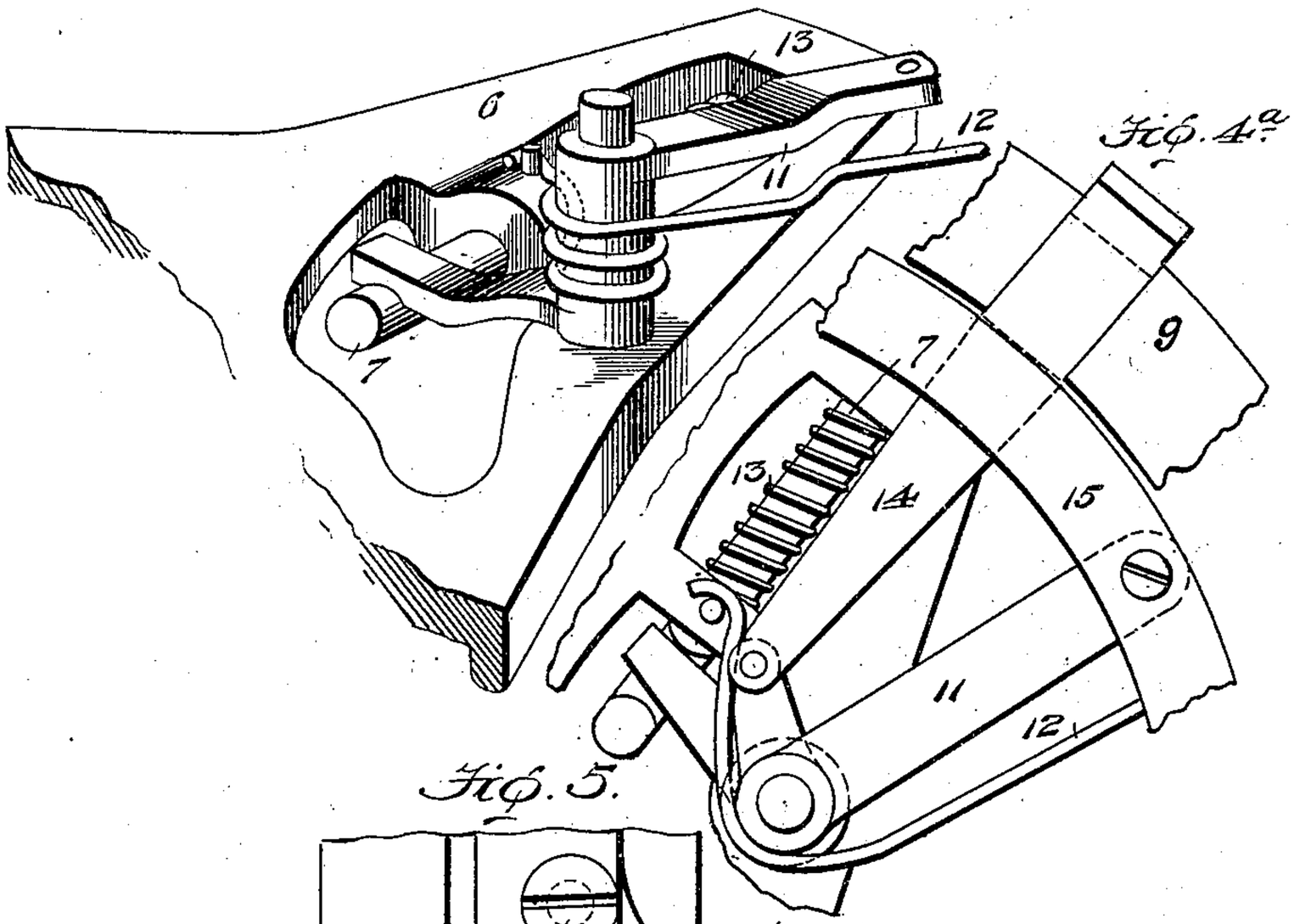


Fig. 5.

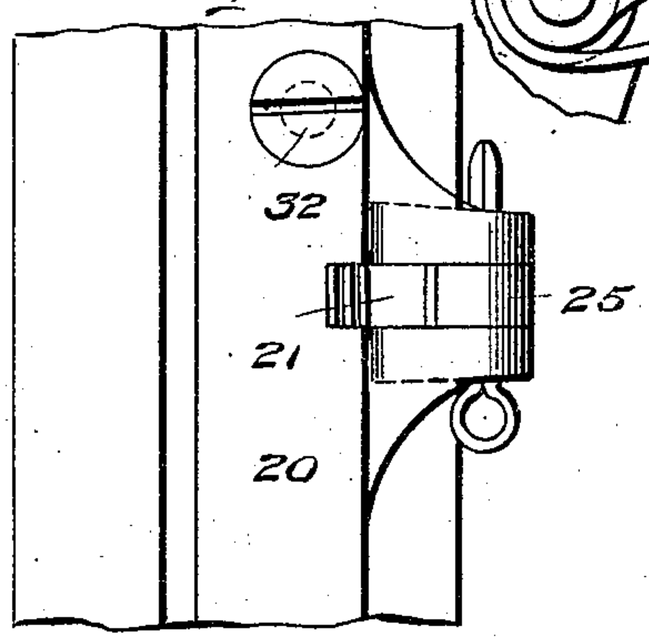
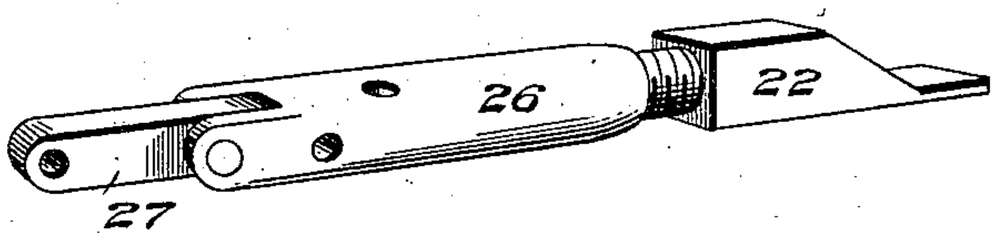


Fig. 6.



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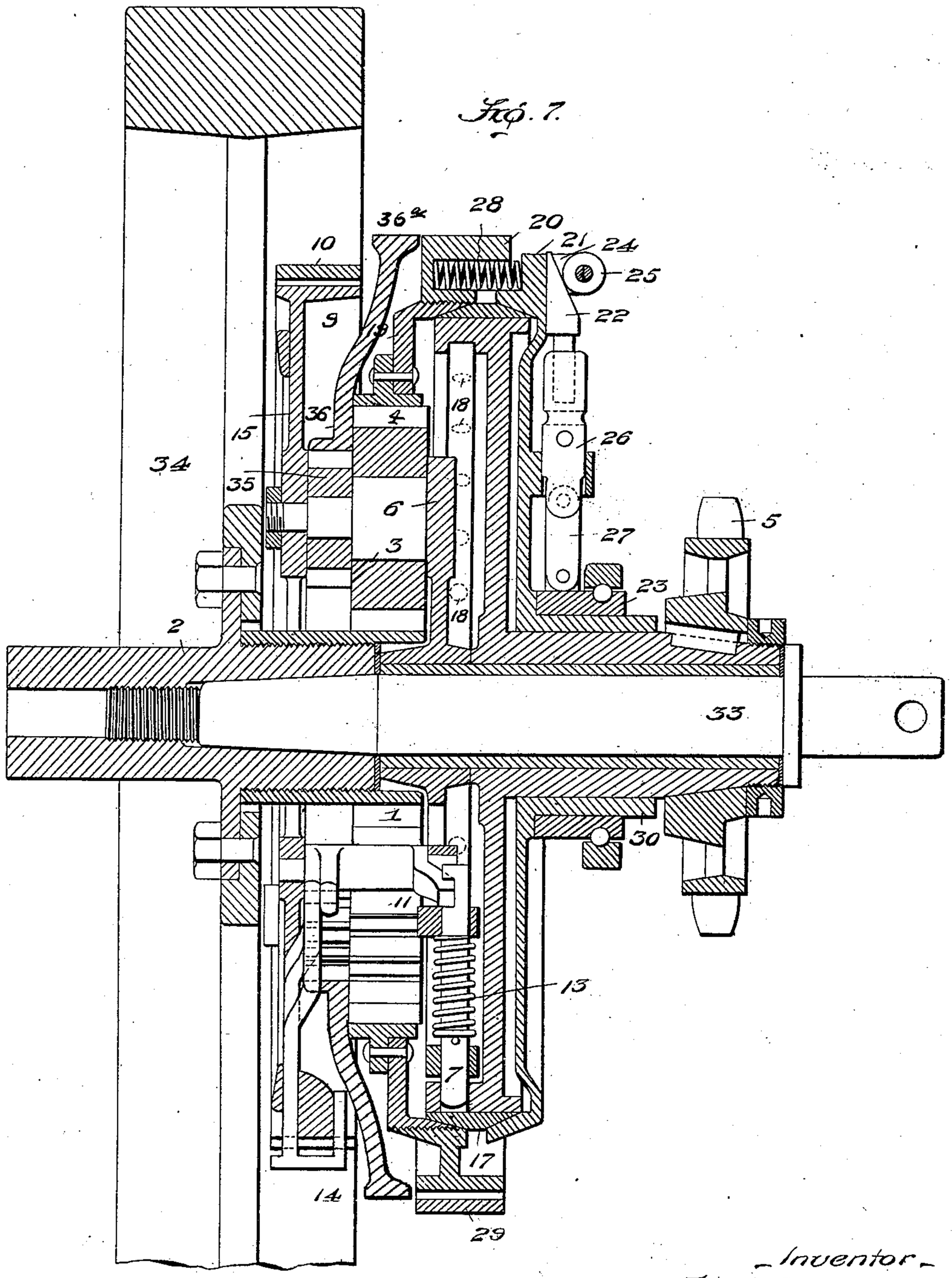
NO MODEL. 5 SHEETS—SHEET 5.

Fig. 7.



Witnesses.

E. M. Brandt.

Inventor.

Charles E. Duryea.

By E. A. Bond

Atty.

UNITED STATES PATENT OFFICE.

CHARLES E. DURYEA, OF READING, PENNSYLVANIA.

POWER-DRUM FOR VEHICLES.

SPECIFICATION forming part of Letters Patent No. 725,616, dated April 14, 1903.

Application filed May 17, 1902. Serial No. 107,767. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. DURYEA, a citizen of the United States of America, and a resident of Reading, in the county of Berks and State of Pennsylvania, have invented certain new and useful Improvements in Power-Drums for Vehicles, of which the following is a specification.

This invention relates to certain new and useful improvements in mechanism of that class designed and adapted to vary the speed or the power delivered by a motor or other source of energy to the wheels of a carriage or similar driven device.

The present invention has for its objects, among others, to provide a simple and cheap device in the nature of a power-drum that shall be so constructed as to secure light weight, together with extreme compactness, and yet retain large working parts, such as gears and friction-clutch surfaces, together with simple and reliable means for controlling the various speed changes at will.

A further object of the invention aside from its compactness is to so arrange the parts that they shall lie closely into the fly-wheel, where they will be less likely to be accidentally damaged, as well as requiring less room in a vehicle.

Furthermore, the construction is such that all parts are balanced either by their concentric shape or by their number arranged at equal intervals around the central shaft, so that the device is adapted for high-speed work without trouble from lack of balance.

A still further advantage is that the shifting mechanism by which the shifting collar is operated can be placed in the space not occupied by the chain over and around the sprocket-wheel, whereas if the sprocket and the shifting collar were on opposite sides of the mechanism a large amount of space would be required for the shifting device.

Other objects and advantages of the invention will hereinafter appear, and the novel features thereof will be particularly pointed out in the appended claims.

The invention in its preferred form is clearly illustrated in the accompanying drawings, which, with the numerals of reference marked thereon, form a part of this specification, and in which—

Figure 1 is an end elevation of my improved device from the fly-wheel side, ready to apply to the motor-shaft just outside the fly-wheel, with the friction-band removed. Fig. 2 is an end elevation looking in the opposite direction—that is, from the sprocket side toward the fly-wheel. Fig. 3 is a section on the dotted line 3 3 of Fig. 1. Fig. 4 is a perspective view of that portion of the frame forming a mounting for the pins and their operating-levers. Fig. 4ª is a plan of the parts seen in Fig. 4, showing more clearly the general arrangement thereof. Fig. 5 is a detail in plan looking down upon the wedge and the parts operated thereby. Fig. 6 is a perspective view of the wedge, its adjusting portion, and toggle-link. Fig. 7 is a view similar to Fig. 3, showing a modified form and arrangement of parts.

Like numerals of reference indicate like parts throughout the several views.

The invention is capable of embodiment in a variety of forms, some only of which are herein shown and described; but it is evident that such forms are only illustrations of the principle of the invention and are not to be taken as the only and necessary ways by which the principle of the invention may be practically carried into effect.

My invention makes use of the well-known arrangement of gears consisting of a central pinion 1, screwed or otherwise attached to the motor-shaft 2, as seen clearly in Fig. 3, and from which it receives power, which in turn it transmits to one or more idler or planetary pinions 3 3 3, which in turn engage or mesh with an internal or ring gear 4 and provide means whereby the power received by the idler-pinions or the ring-gear, or both, may be delivered to the sprocket-wheel 5 or its equivalent in proportions determined by the relation of the various gears to each other and the action of the other parts of the mechanism. To secure these results, I employ a framework 6, on which the idler-pinions 3 3 3 are mounted, together with pins 7 7 7 for attaching this frame normally to the sprocket-carrying frame 8. The framework 6 also carries the frame and ring 9, on which bears the friction-band 10, which is used for reversing purposes. The frames 6 and 9 provide journals for the pivots of the levers 11 11 11 and

also points of bearing for the springs 12 12 12 and 13 13 13, which levers and springs operating the pins cause the engagement of said pins 7 7 7 at all times except when withdrawn for the purpose of reversing. (See Figs. 4 and 4ª.) The levers 11 11 11 are operated and caused to withdraw the pins 7 7 7 from engagement with the frame 8 by plungers 14 14 14, and in order that all the pins 7 7 7 may be withdrawn at the same and by the operation of any or all of the plungers 14 14 14 the levers 11 11 11 are connected by the ring 15 in such a manner that motion of one lever 11 transmits a similar motion to the other similar levers. The plungers 14 14 14 are supported on the ring 9 by passing astride the same, as shown in Figs. 1, 3, and 4ª, and are adapted to be operated by the encircling friction-band 10, as shown in Figs. 3 and 7. The pins 7 7 7 engage the circular frame 8 by means of holes 18 at frequent intervals in the frame 8, adapted to receive the ends of said pins. It will be observed from the description when taken in connection with the drawings, especially Fig. 3, that when the plungers 14 14 14 are pushed inward by the friction of the friction-band 10 the pins 7 7 7 are withdrawn from engagement with the circular frame 8, leaving the frame 6 disconnected, except by the frictional engagement of the ends of the plungers 14 14 14 with the friction-band 10, and it is evident that a further tightening of this band causes the band to engage the friction-surface provided for this purpose on the frame and ring 9, in which event (since the friction-band is attached to a fixed or stationary part of the framework) the frame or ring 9 will remain stationary and resist any tendency to move caused by power received from the central pinion 1. It will further be evident that if the frame 6 and its studs, which form journals for the idler-pinions 3 3 3, are stationary the said idler-pinions will turn on these studs, and motion applied by the gear or pinion 1 will move the ring-gear 4 in a reversed direction.

The ring-gear 4 is affixed to or made a part of an annular friction-surface 19, adjustably attached in any suitable manner, as by screwing together, to a second annular portion 20, which is supported on and caused to remain concentric with the other parts by the circular framework 21, journaled upon the circular frame 8. The ring-gear 4 and its supporting parts are provided with means for locking the same by friction to the frame 8 for the purpose of causing the sprocket 5 to move in unison with the ring-gear 4 when desired, and to the end that a friction-clutch having long life may be supplied an added friction-surface is provided on the circular frame 21 much resembling that of the annular friction-surface 19. Complementary surfaces 17 are likewise provided on the frame 8 and adapted to receive contact from the surfaces of the parts 19 and 21, which contact is effected at will by means of the wedges 22 22 22, operated by the shifting collar 23, which in turn is actuated by a suitable lever in a well-known manner.

The operation of these parts more specifically stated is as follows: The annular portion 20 is provided with lugs 24, on which are journaled rollers 25, while the circular frame 21 is provided with bearing portions suitably placed to receive the pressure from the wedges 22 when forced between the rollers 25 and the frame 21, as will be clearly understood from Figs. 3 and 7. It will be readily seen that this motion of the wedge causes the friction-surfaces 19 and 21 to approach each other and engage the complementary surfaces on the frame 8, forming a powerful friction-clutch of large diameter and of extended surface, and therefore one having great driving power and long life. The annular frame or bearing-surface 17, surrounding the frame 8, is preferably of some material having a higher expansion coefficient than the material forming the outer friction-surfaces—as, for example, brass for the inner friction-surface and iron for the outer one—in which event slipping would tend to heat the surfaces, and the inner one, being annular, expands with great power, tightening the contact between the surfaces, which by this means become to a limited extent self-adjusting. The wedges 22 are rendered adjustable by being screwed into guides 26, mounted in bearings on the frame 21, and are operated by means of toggle-links 27, which are pivotally connected with the shifting collar 23. It will be evident from Fig. 3 that if the shifting collar 23 is brought near to the sprocket-wheel 5 the wedge 22 will be withdrawn from its position between the roller 25 and the circular frame 21, in which event the said frame 21 will be separated from the friction-surface 19 and the annular portion 20 by the spring 28, thus releasing the ring-gear 4 from the circular frame 8, to which the sprocket 5 is attached by key and lock-nut in a well-known manner. The springs 28 are disposed in sockets in the annular portion 20 and bear against offsets in the frame 21. Since the frames 6 and 9 may be held stationary by the friction-band 10 and are in this event detached from the frame 8 by the withdrawal of the pins 7, and since a given motion of the gear 1 in this event produces a reverse motion of the ring-gear 4, and since this ring-gear may be locked by friction to the sprocket 5 through the medium of the frame 8, the frame 21, the portion 20, and the annular friction-surface 19, including the operating-wedges 22 and their attached parts, it is evident that a given motion of the gear 1 will produce a reverse motion of the sprocket 5, which motion bears a proportionate speed determined by the relative sizes of the various gears used.

As normally the pins 7 engage the circular frame 8, which carries the sprocket 5, and as the friction-surfaces 19, 21, and 8 may be separated at will, it is evident that holding

the ring-gear 4 by means of a friction-band or otherwise will cause the idler-pinions 3 to roll around inside the ring-gear 4 in the same direction as the pinion 1 is moved, and it is further evident that this rolling motion will carry the frame 6 around in the same direction as the pinion 1 moves, but at a slower rate proportionate to the relative sizes of the various gears in conjunction with their arrangement, thus imparting to the sprocket 5 a slow movement in the same direction as the pinion 1. As hereinbefore stated, the ring-gear 4 is carried by or made a part of the annular portion 19, which is screwed or adjustably attached to the annular portion 20, on the outside of which is a friction-surface adapted to receive a friction-band 29, as seen clearly in Fig. 3, which band is affixed so as to be stationary, and I hold the ring-gear 4 from moving, when desired, by tightening this friction-band on the surface of the portion 20 by any suitable means, this clamping being the only operation necessary to secure a slow movement of the sprocket 5 relative to the pinion 1 when the band 10 and the shifting collar 23 are in off positions.

It is to be understood that the collar 23 is mounted to slide lengthwise of the hub portion 30 of the frame 21, which hub portion is sleeved upon the hub portion 31 of the frame 8, as seen clearly in Fig. 3.

Since the friction-surfaces of the members 19, 21, and 8 are liable to wear, I provide an adjustment whereby the surface 19 may be brought nearer to the frame 21, and this means of adjustment consists of the screw-threads uniting the two annular parts 19 and 20 together, with a locking device, such as a set-screw 32, (seen best in Fig. 5,) passing through the frame 20 against or into the surface 19. A further adjustment is provided by screwing the wedge 22 into its guide 26, so that the same may be unscrewed therefrom when desired, as will be apparent.

Since the frame 6, carrying the idler-pinions 3, is normally attached to the frame 8, carrying the sprocket 5, it will be readily evident that locking the ring-gear 4 to the said frame 8 in any manner will prevent motion of the various gears and cause the driving-gear 1 to rotate the nest of gears solidly together without relative motion, thus carrying the sprocket 5 at the same speed and in the same direction as the gear 4 is driven. This locking of the ring-gear 4 to the circular frame 8, to which the frame 6 is normally attached, is accomplished by means of the shifting collar 23, which, as above stated, is slidably mounted upon the hub 30 of the frame 8 and designed to be operated in any well-known manner and acting upon the friction-surfaces provided for this purpose through the operating-wedges 22. From the description thus far given it will be evident that this mechanism secures a slow reverse movement of the sprocket 5 as compared with the motor-shaft 2, a forward movement at a slower speed, and a forward movement at the same speed, a total of two speeds forward and one in the reverse direction.

The sprocket-wheel 5 may be of any well-known or approved form of construction and of the desired diameter.

Since the pins 7 normally engage the frame 8, they cause the frames 6 and 8 to move in unison at all times except when reversing, and it is therefore evident that this mechanism may be used to give two speeds forward without a reverse speed by making the frames 6 and 8 integral and omitting from the device the parts at present used for reversing—such as the friction-band 10, the ring 9, the ring 15, the levers 11, the springs 12, the pins 7, and the springs 13, with the plungers 14—thus effecting a great simplification of the construction where the reverse movement is not necessary or desirable. I have shown the shifting collar 23 as composed of two parts connected by a row of balls 32, forming a common ball-bearing, (see Fig. 3;) but instead of the balls and ball-race a common groove, as is generally used for shifting collars, may be substituted. Since the power is transmitted from the crank-shaft 2 of the motor to the gear 1 and thence through the mechanism to the sprocket 5, I provide the said crank-shaft 2 with a removable extension 33, as seen in Figs. 3 and 7, which may be detached for the purpose of removing the speed-changing mechanism from its position at the end of the motor-shaft in a manner which will be readily understood from the construction shown in Fig. 3.

The wedges 22 may be straight-lined or their operating-surfaces which pass under the rollers 25 may be curved or otherwise shaped, so as to vary their action in bringing the friction-surfaces together with greater or less power. Since the sprocket 5 transmits power by means of a chain, I provide the end of the extension 33 with a proper bearing to receive the strains, and one of the advantages of my construction and arrangement of parts is that the sprocket 5 lies close to the bearing on the end of said extension 33.

It is not deemed necessary to herein show or describe all of the different forms of styles of clutches that may be used or the different methods of operating such clutches. In Fig. 7, however, I have shown a modification to which attention is now directed. Since holding the ring-gear 4 gives the slow speed, it is evident that a slight change, such as setting the fly-wheels 34 and the ring 9 sufficiently far away from the other mechanism hereinbefore described, to provide room for the insertion of a smaller idler by the side of the idler 3 and attach the same permanently thereto. This increased space provided room for the said idler and the additional small ring-gear and its friction-surface. Fig. 7 shows such relative disposition of the parts. In this view, 35 designates the smaller additional idler, and 36 the additional small ring-gear. The fric-

tion-surface 36ª by the side of the friction-surface 21, holding this smaller ring-gear, would give a slower speed through the means hereinbefore described by transmitting the power through the idler-pinion 3 and thence from the pinion 35, attached to it, to the smaller ring-gear 36, as will be readily understood.

From the foregoing it will be seen that I have devised a simple, cheap, novel, and efficient form of power drum or mechanism for the purpose described, and while the structural embodiment of my invention as herein disclosed is what I at the present time consider preferable it is evident that the same is subject to changes, variations, and modifications other than those herein shown and described without departing from the spirit of the invention or sacrificing any of its advantanges, and I therefore do not intend to restrict myself to the details of construction herein disclosed, but reserve the right to make such changes, variations, and modifications as come properly within the scope of the protection prayed.

What is claimed as new is—

1. A power-transmitting device comprising a motor-shaft, a gear on said shaft, revoluble power-transmitting means operatively connected therewith, a sprocket-wheel operatively connected with the revoluble means, a brake adapted to coöperate with said revoluble means to produce a certain speed, and pivoted means interposed between said sprocket-wheel and said means and engaging the latter for varying the speed, substantially as described.

2. A power-transmitting device comprising a driven gear, revoluble power-transmitting means operatively connected therewith, a sprocket-wheel, a brake adapted to coöperate with said revoluble means to produce a certain speed, a shifting collar interposed between the revoluble means and sprocket-wheel, and means carried by said collar for engaging said revoluble means to vary the speed.

3. The combination with a driven gear and idlers, of a ring-gear meshing with said idlers, annular concentric frames, a brake coöperating with one of said frames to produce a certain speed, shifting means, devices carried by the shifting means, and means on one of said annular frames coöperating with said devices, to vary the speed, as set forth.

4. A power-transmitting device comprising a driven gear, idlers meshing therewith, a ring-gear meshing with the idlers, annular rings, and radially-operated means mounted on pivoted supports to engage one of said rings to vary its frictional engagement with the other and a brake, as set forth.

5. A power-transmitting mechanism comprising a driven gear, idlers, a ring-gear, a second set of idlers, means for restraining said idlers from rotation about the shaft, a smaller ring-gear, a shifting collar, annular frames, and radially-disposed means coöperating with said frames for varying the speed, and pivoted supports for said means, as set forth.

6. A power-transmitting mechanism comprising a driven gear, idlers, a ring-gear, a second set of idlers, means for restraining said idlers from rotation about the shaft, a smaller ring-gear, a shifting collar, annular frames, and radially-disposed means for coöperation with said frames for varying the speed, and pivoted supports for said means, said parts being disposed so as to be balanced, as set forth.

7. The combination with the driven gear, and the concentric frames and a brake, of a shifting collar, means by which the driven gear operates said frames, wedges pivotally connected with said collar and means on one of said frames for coöperation with said wedges, as set forth.

8. The combination with the driven gear, and the concentric frames, of a shifting collar, wedges pivotally connected with said collar and means on one of said frames for cooperation with said wedges, and means for adjusting said wedges, as and for the purpose set forth.

9. The combination with the motor-shaft and its gear, of the idlers meshing with said gear, the ring-gear meshing with the idlers, the frame carrying said idlers, the frame concentric therewith having openings, pins carried by the first-mentioned frame to engage said openings, and means for actuating said pins, as set forth.

10. The combination with the motor-shaft and its gear, of the idlers meshing with said gear, the ring-gear meshing with the idlers, the frame carrying said idlers, the frame concentric therewith having openings, pins carried by the first-mentioned frame to engage said openings, means for actuating said pins, and springs acting on said pins in opposition to their operating means, as set forth.

11. The combination with the motor-shaft, the gear on the motor-shaft, the idlers, the annular frame carrying the same, the frame concentric therewith, the ring-gear meshing with the idlers, means for connecting the two frames to cause them to move in unison, annular friction means coöperating with said frame, and means for bringing the friction means together with greater or less power, as set forth.

12. The combination with the shaft, the concentric annular frames and the parts carried thereby, and annular friction means coöperating therewith, of means for bringing said means together with greater or less power, the driven gear, connections between said gear and frame for operating the latter and means for securing a slow reverse movement of the shaft, as set forth.

13. A power-drum having its parts disposed to balance, the sprocket, the fly-wheel, means including radially-disposed wedges for giving varied diminished speed in one direction or reverse slow movement, said parts being com-

pactly arranged and disposed between the sprocket and fly-wheel, as set forth.

14. The combination with the ring-gear, the idlers, and the gear on the motor-shaft, of the annular frame, the sprocket-wheel attached thereto, and radially-disposed wedges for connecting or disconnecting said annular frame and ring-gear, as set forth.

15. The combination with the circular frame, the pins movably mounted to engage the same, the ring-gear, the idler-pinions, the pinion meshing therewith, the frame carrying the idler-pinions, the levers pivotally mounted thereon and disposed to actuate said pins, and means for actuating said levers, as set forth.

16. The combination with the annular frame, the idler-pinions thereon, the ring-gear, a driving-gear, the sprocket-carrying frame, the spring-actuated pin, the pivotally-mounted levers, springs acting on said levers and pins, and the plungers for actuating said levers substantially as described.

17. In a device of the character described, the combination with a driven gear, idlers and a ring-gear meshing with said idlers, of a friction-clutch having an inner friction-surface of higher expansion coefficiency than the outer surface thereof, and means to hold the idler-pinion frame against rotation, as set forth.

18. In a device of the character described, the combination with a driven gear, idlers and a ring-gear meshing with said idlers, of a friction-clutch having its inner surface of brass whereby it will more readily expand under heat to form practically a self-adjusting friction-surface, and means to hold the idler-pinion frame against rotation, as set forth.

Signed by me at Reading, Pennsylvania, this 16th day of May, 1902.

CHARLES E. DURYEA.

Witnesses:
H. DE HART,
CHARLES R. WERNER.