No. 821,631. PATENTED MAY 29, 1906.

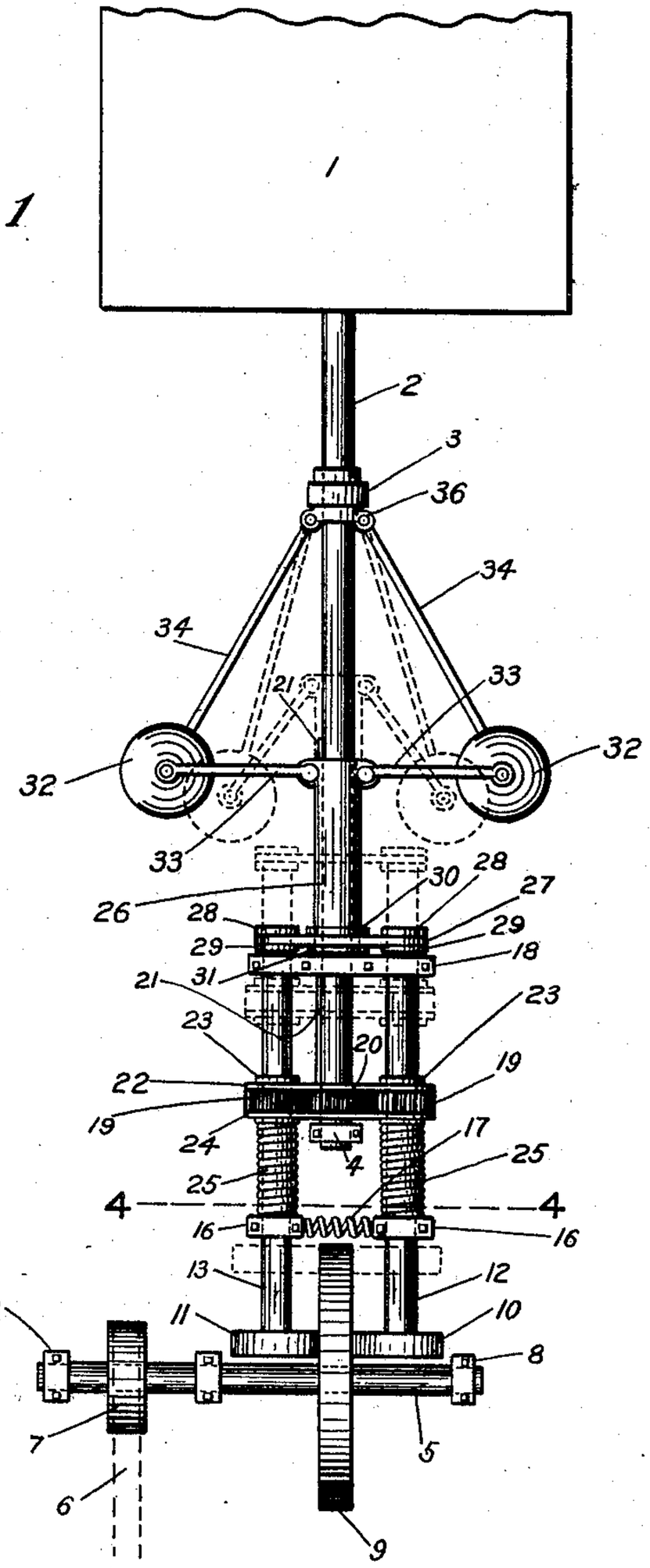
C. E. FELT.

CAR AXLE GEARING.

APPLICATION FILED MAY 15, 1902.

4 SHEETS—SHEET 1.

Fig. 1



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4 SHEETS—SHEET 2.

Fig. 3

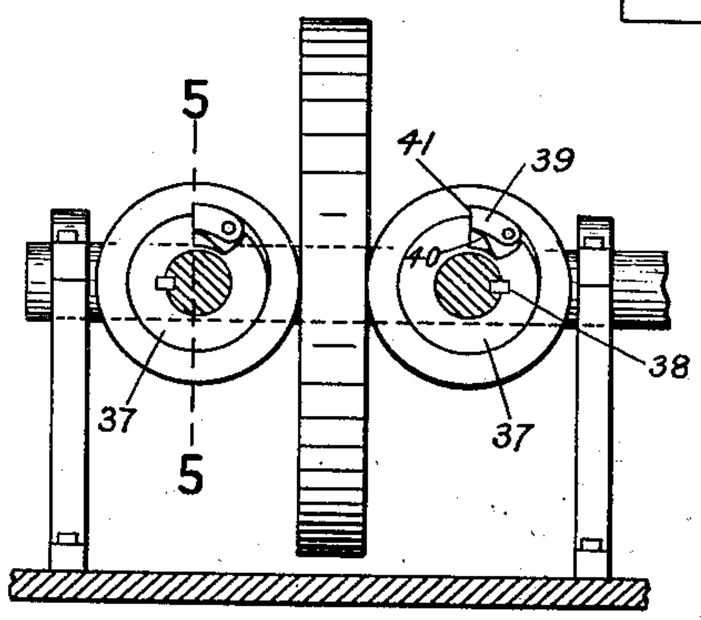


Fig. 2

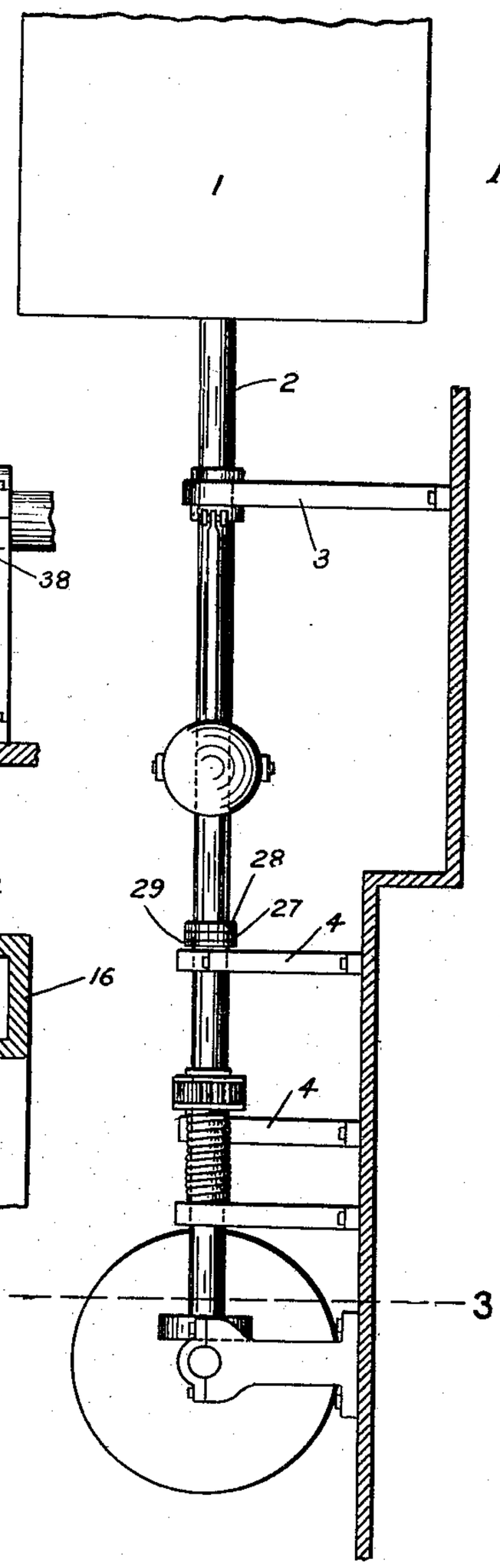


Fig. 4

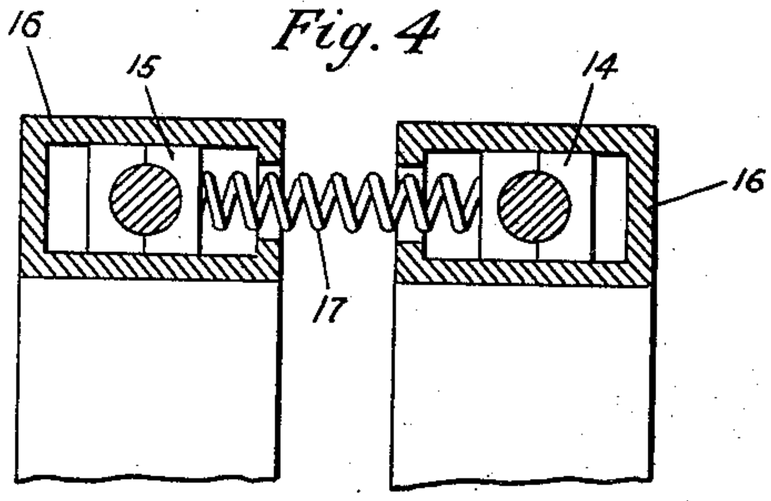
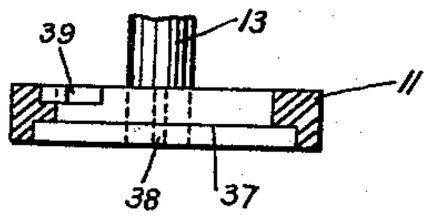


Fig. 5



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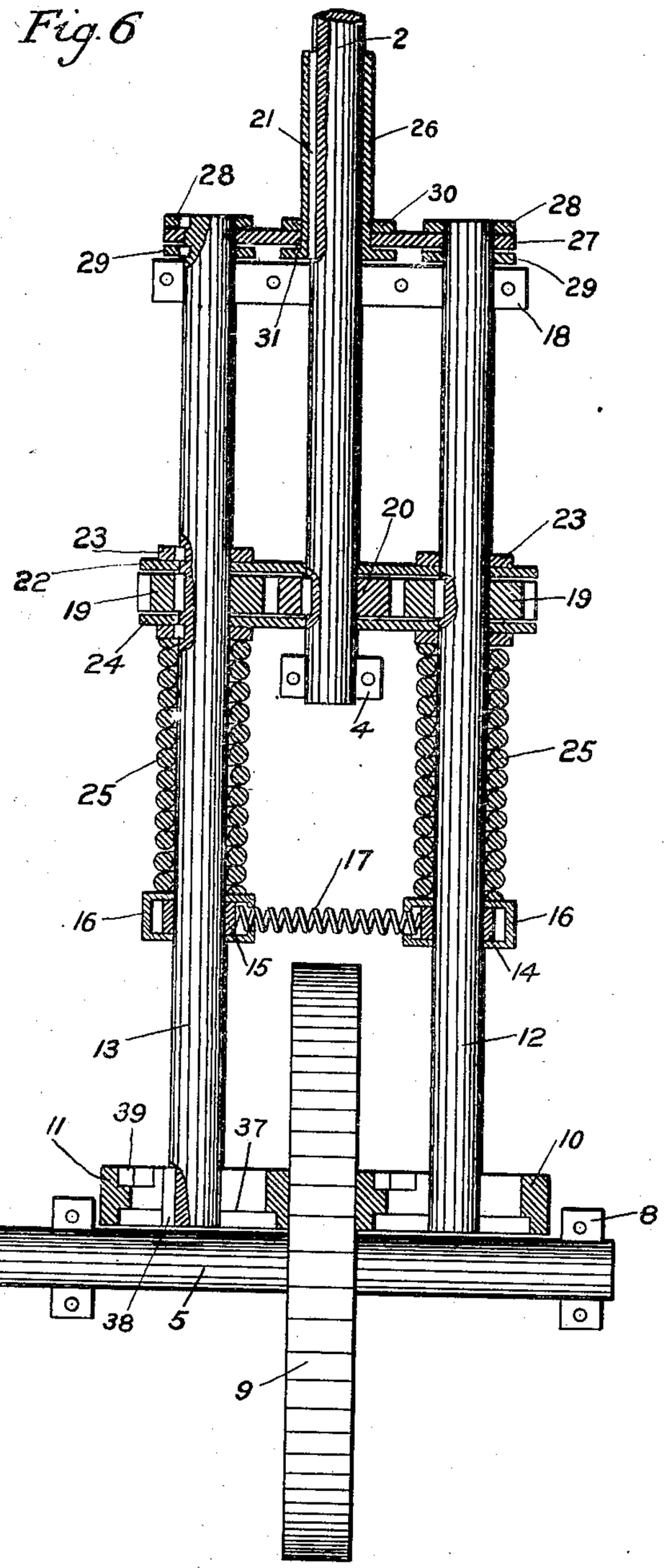
4 SHEETS—SHEET 3.

Fig. 6



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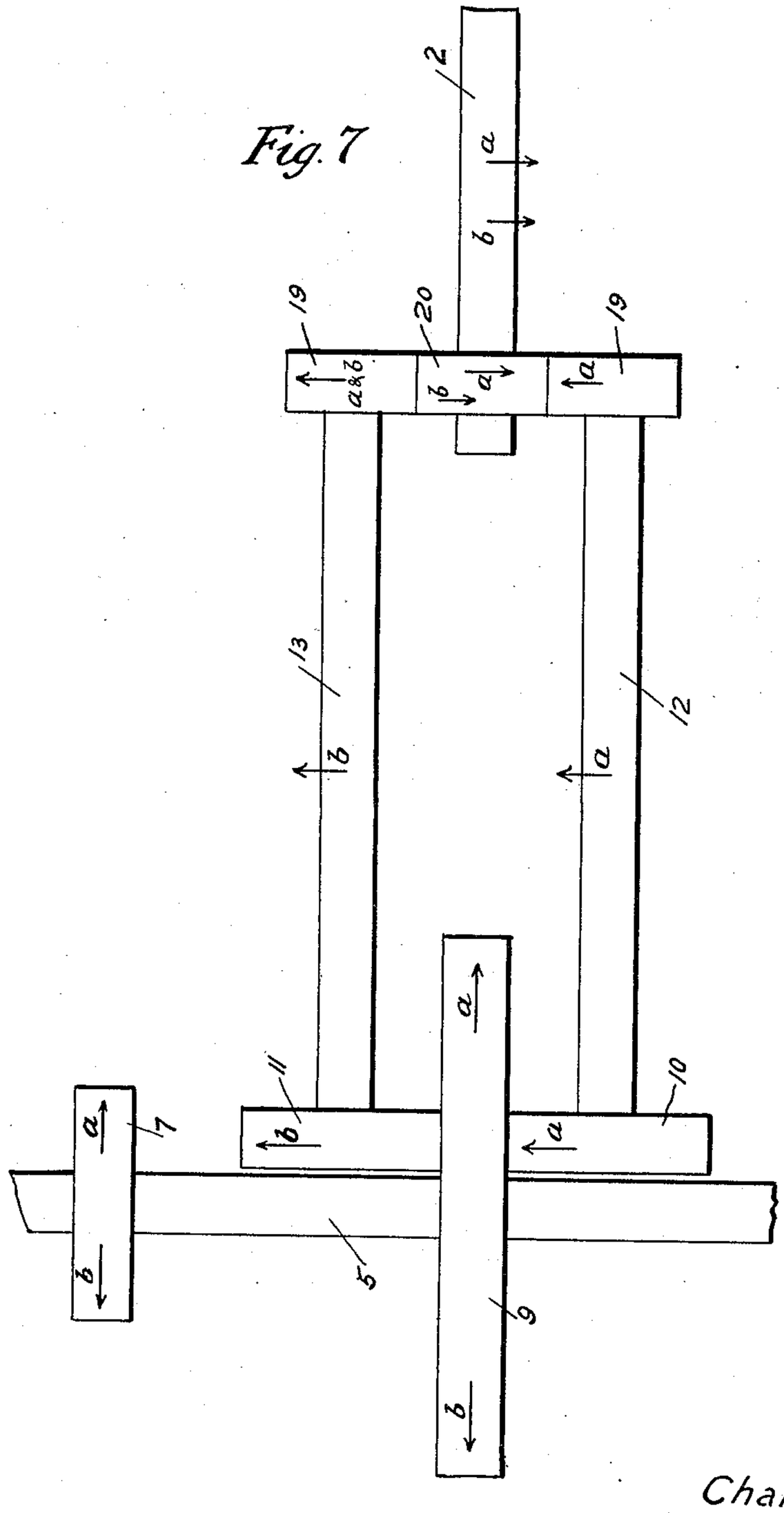
4 SHEETS—SHEET

Fig. 7



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UNITED STATES PATENT OFFICE.

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CAR-AXLE GEARING.

Specification of Letters Patent. Patented May 29, 1906.

No. 821,631. Application filed May 15, 1902. Serial No. 107,500.

To all whom it may concern:

Be it known that I, CHARLES E. FELT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Car-Axle Gearing, of which the following is a full, clear, and exact specification.

My invention relates to gearing, and more especially to means for driving that class of lighting devices or dynamos which are designed for lighting railway-cars and other vehicles and derive their power or motion from the axle of the vehicle; and my invention has for its primary object to provide improved and efficient means for driving the dynamo at a uniform rate of speed always in the same direction regardless of the rate of speed or direction of motion of the car or vehicle.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said objects and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a front elevation of my improved apparatus. Fig. 2 is a side elevation thereof. Fig. 3 is a plan section taken on the line 3 3, Fig. 2, the large disk being shown in elevation. Fig. 4 is a plan section, on an enlarged scale, taken on the line 4 4, Fig. 1. Fig. 5 is a detail section taken on the line 5 5, Fig. 3. Fig. 6 is an enlarged detailed view, partly in vertical section and partly broken away, of the power-transmitting mechanism; and Fig. 7 is a diagrammatic view illustrating the direction of rotation of the various shafts and rotary members.

1 represents the dynamo, and 2 the armature-shaft thereof, which is mounted in any suitable bearings 3 4, and 5 is a countershaft which may be driven from the axle of the car or vehicle (not shown) by belt 6 and pulley 7 or by any other suitable means, and, indeed, so far as the purposes of this invention are concerned the shaft 5 may be regarded as the axle itself. In the example of the invention shown in the drawings the shaft 5 is supported by suitable bearings 8, and upon this shaft is secured a friction-disk 9, against opposite sides of which engage friction-wheels 10 11, arranged with their peripheries against the flat sides of the disk and secured to substantially parallel shafts or spindles 12 13, which are arranged radial with respect to the disk. The lower ends of these shafts 12 13 are mounted in boxes 14 15, respectively, sliding in suitable guides 16 and connected together by a spring 17 or any other suitable means capable of drawing the wheels 10 11 against opposite sides of disk 9 with a uniform and yielding pressure of sufficient force to enable the wheels 10 11 to receive the motion of the disk. The upper ends of these shafts 12 13 are journaled in a suitable bearing 18, secured to the bearing arm or bracket 4, and are capable of sliding vertically therein, while at a point intermediate of the bearing 18 and the guides 16 the shafts are provided with pinions 19, and the lower end of the armature-shaft 2, which is arranged between the shafts 12 13 and in line therewith, is provided with a pinion or gear 20, engaging with pinions 19 and connected with the shaft 2 by means of a spline 21, so as to be capable of sliding longitudinally of the shaft 2 while turning it. All three of the shafts 2, 12, and 13 pass through a cross-bar 22, arranged just above the pinions 19 20 and held from moving longitudinally on the shafts by collars or flanges 23, secured to shafts 12 13, while just below the pinions 19 20 is a similar cross-bar 24, through which the three shafts pass, and sleeved on the shafts 12 13 below the cross-bar 24 are coiled springs 25, which take their bearing between the bar 24 and the supports 16, whereby they exert a tendency to push the shafts 12 13, with their pinions 19 and other connected parts and the pinion 20, outwardly away from the center of the disk 9, thereby increasing the speed of rotation of the armature-shaft.

The extremities of the shafts 12 13 opposite those carrying the wheels 10 11 are rotatably attached to a sleeve 26, which slides loosely upon the shaft 2. This attachment may be conveniently effected by means of a cross-bar 27, through the ends of which the shafts 12 13 pass and are provided on opposite sides of the cross-bar with collars 28 29, the sleeve 26 being similarly passed through the cross-bar 27 and provided on opposite sides thereof with collars 30 31, so that the sleeve 26 will move longitudinally of the

shaft 2 during the reciprocating motion of the shafts 12 13 while turning with relation to the shafts 12 13. This sleeve is keyed to shaft 2 by spline 21 and operatively connected to a centrifugal governor, preferably comprising a pair of balls 32, connected by links 33 with the sleeve 26 and by links 34 with a collar 36, rigidly fixed to the shaft 2, so that as the speed of the friction-disk 9 increases the balls 32 will swing outwardly and compress the springs 25 in the manner shown in Fig. 1, thereby forcing the friction-wheels 10 11 nearer to the center of disk 9 and decreasing the speed of shaft 2, and as the speed of disk 9 decreases, releasing the centrifugal force on the balls 32, the latter will be drawn inwardly, as shown in dotted lines in Fig. 1, and the wheels 10 11 will be forced outwardly toward the perimeter of disk 9, thereby increasing or maintaining the speed of shaft 2, it being understood that the sleeve 26 imparts its motion longitudinally to the shafts 12 13 through the intermediary of the cross-bar 27 and collars 28 29, while the springs 25 impart their motion to the sleeve 26 and to said shafts through the intermediary of the aforesaid cross-bar and collars and the cross-bar 24 and collars 23.

In order that rotation of the disk 9 in either direction will cause rotation of the shaft 2 always in the same direction, the friction-wheels are so connected to their shafts that one will revolve its shaft when the disk 9 rotates in one direction and the other will revolve its shaft when said disk rotates in the opposite direction. This may be conveniently effected by making the wheels 10 11 loose on their shafts and providing them with pawl-and-ratchet connection with the shafts. For example, to each of the shafts 12 13 is secured a hub 37 by means of a key 38 or any other suitable device, which is provided on one side with a pawl 39, normally pressed outwardly by a spring 40 into engagement with a tooth 41, formed on each of the wheels 10 11. As shown in the drawings, the hub 37 is let into the face of the wheel, so as to be substantially flush therewith, and the tooth 41 is formed in the inner edge of the wheel adjacent to the hub, so as to engage with the pawl 39 when the wheel revolves in one direction, but to slip past the pawl without revolving the hub 37 when the wheel revolves in the opposite direction. These wheels 10 11 being arranged on opposite sides of the disk 9, it will be seen that they will rotate the shaft 2 always in the same direction, no matter which way the car or vehicle may be running.

In Fig. 7 I have shown diagrammatically the direction of rotation of the shafts and other rotary members resulting from either direction of rotation on the car-axle. In this figure the arrows *a* indicate the direction of rotation resulting from the rotation of the axis 5 and driving-disk 9 in a direction toward the right, and the arrows *b* illustrate the opposite direction of rotation.

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

1. In a device for the purpose described the combination with the shaft to be driven and a rotary driving-disk, of rotary motion-transmitting members engaging opposite faces of said driving-disk for deriving motion therefrom, means for imparting the rotation of one of said motion-transmitting members to said shaft to be driven when the driving-disk rotates in one direction, and means for imparting the rotation of the other one of said transmitting members to said shaft when the driving-disk moves in the opposite direction, substantially as set forth.

2. In a device for the purpose described the combination with the shaft to be driven and a rotary driving member, of rotary motion-transmitting members engaging opposite sides of said driving member and movable toward and from the center of said driving member, means for imparting the rotation of one of said transmitting members to the shaft to be driven when the driving member rotates in one direction and means for imparting the rotation of the other one of said transmitting members to said shaft when the driving member moves in the opposite direction, substantially as set forth.

3. In a device for the purpose described the combination with a shaft to be driven and rotary driving members, of rotary motion-transmitting members engaging opposite sides of said driving member and movable toward and from the center of said driving member, a governor operatively connected with said transmitting members for moving them lengthwise of the diameter of said driving member, means for imparting the rotation of one of said transmitting members to the shaft to be driven when said driving member rotates in one direction and means for imparting the rotation of the other one of said transmitting members to said shaft when the driving member moves in the opposite direction, substantially as set forth.

4. In a device for the purpose described the combination with a shaft to be driven and a driving member rotatable in opposite directions, of two driving-shafts movable longitudinally of said first shaft and operatively connected therewith, means impinging said driving member for imparting the two rotary motions thereof to said driving-shafts respectively and means for moving said driving-shafts lengthwise of the diameter of said driving member, substantially as set forth.

5. In a device for the purpose described the combination with a shaft to be driven and a driving member rotatable in opposite directions, of two driving-shafts, two rotary

motion-transmitting members for said driving-shafts respectively impinging opposite sides of said driving member, means for each of said driving-shafts for imparting the rotation of its said motion-transmitting member thereto when revolving in one direction and permitting said member to run free thereon when revolving in the opposite direction and means operatively connecting both of said driving-shafts with the said shaft to be driven, substantially as set forth.

6. In a device for the purpose described the combination with a shaft to be driven and a driving member rotatable in opposite directions, of two driving-shafts, rotary motion-transmitting members on said shafts respectively impinging opposite sides of said driving member and each being free to revolve in one direction without rotating its shaft, a centrifugal governor secured to revolve with said shaft to be driven and means securing said governor to said driving-shafts for moving the latter lengthwise of the diameter of said driving member, substantially as set forth.

7. In a device for the purpose described the combination with a shaft to be driven and a driving member rotatable in opposite directions, of two driving-shafts operatively connected with said driving member for respectively receiving rotation therefrom as it rotates in opposite directions, pinions on said shafts intermeshing with one another for imparting the rotation of the driving-shafts to said shaft to be driven, the pinion on the shaft to be driven being movable independently longitudinally thereof, springs for forcing said driving-shafts in one direction, a sleeve on the shaft to be driven movable longitudinally thereof, swivel connection between said sleeve and driving-shafts, governor-balls, links connecting said balls with said sleeve and links for limiting the movement of said balls longitudinally on the shaft to be driven, substantially as set forth.

8. In a device for the purpose described, the combination with a shaft to be driven and a driving member rotatable in opposite directions, of two power-transmitting members operatively connected with said shaft to be driven and impinging said driving member and movable thereon lengthwise of the diameter thereof, the power-transmitting movements of said power-transmitting members being effective on said shaft to be driven, in opposite directions, and means for moving said power-transmitting members lengthwise of the diameter of said driving member.

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