No. 644,440. Patented Feb. 27, 1900.

J. F. McELROY.

TRUCK FOR RAILWAY CARS.

(Application filed Feb. 8, 1897.)

(No Model.) 6 Sheets—Sheet 1.

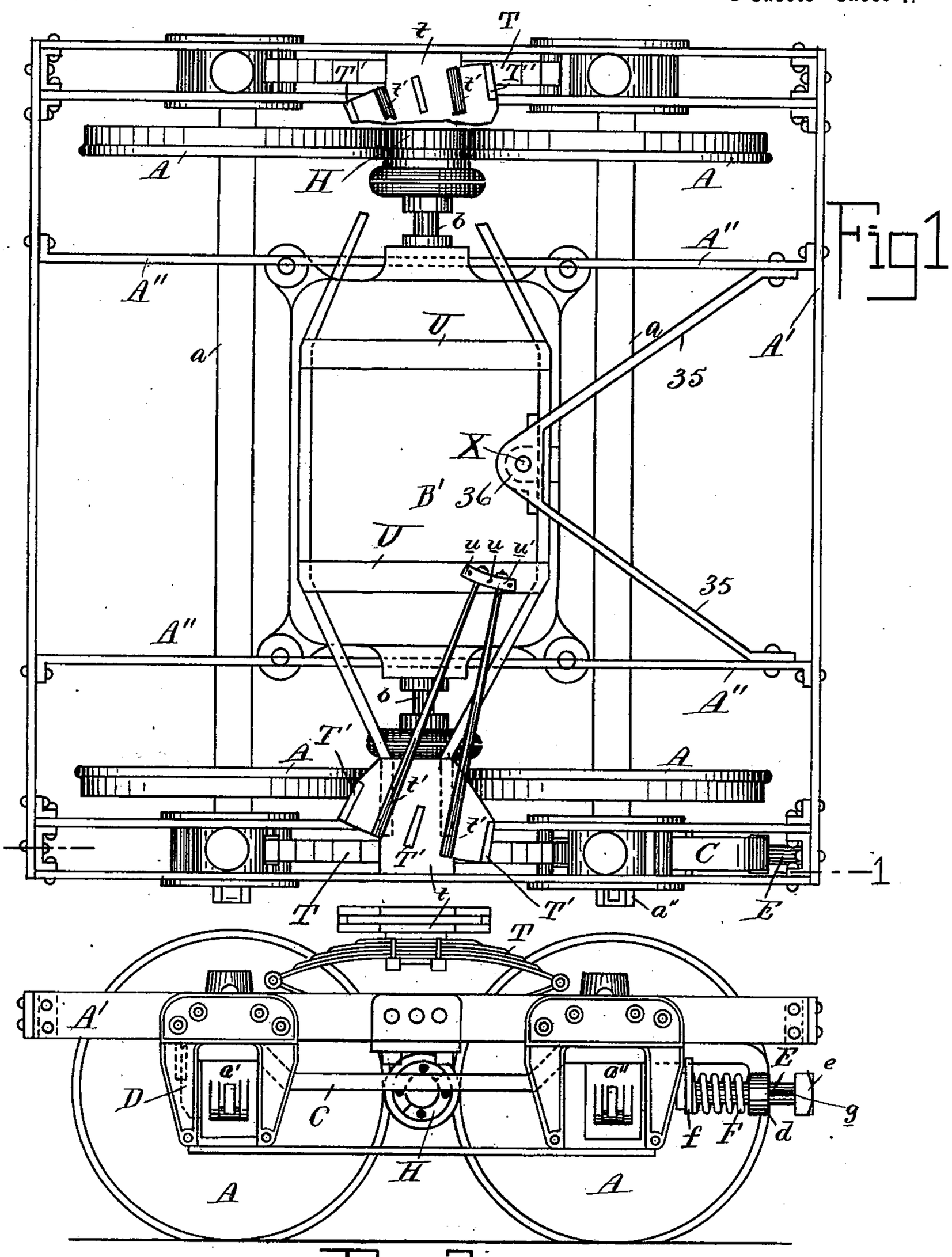

Fig 1

Fig. 2.

Witnesses=

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by, Wardt Cameron

Atty's.

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Fig. 4.

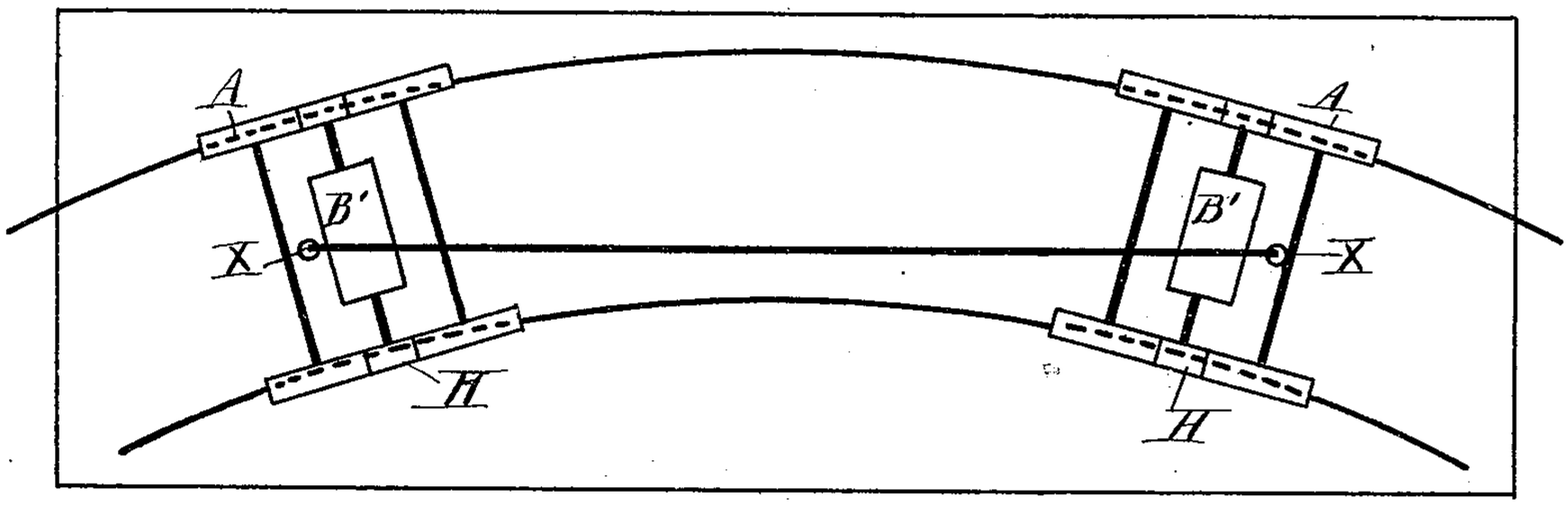


Fig. 3.

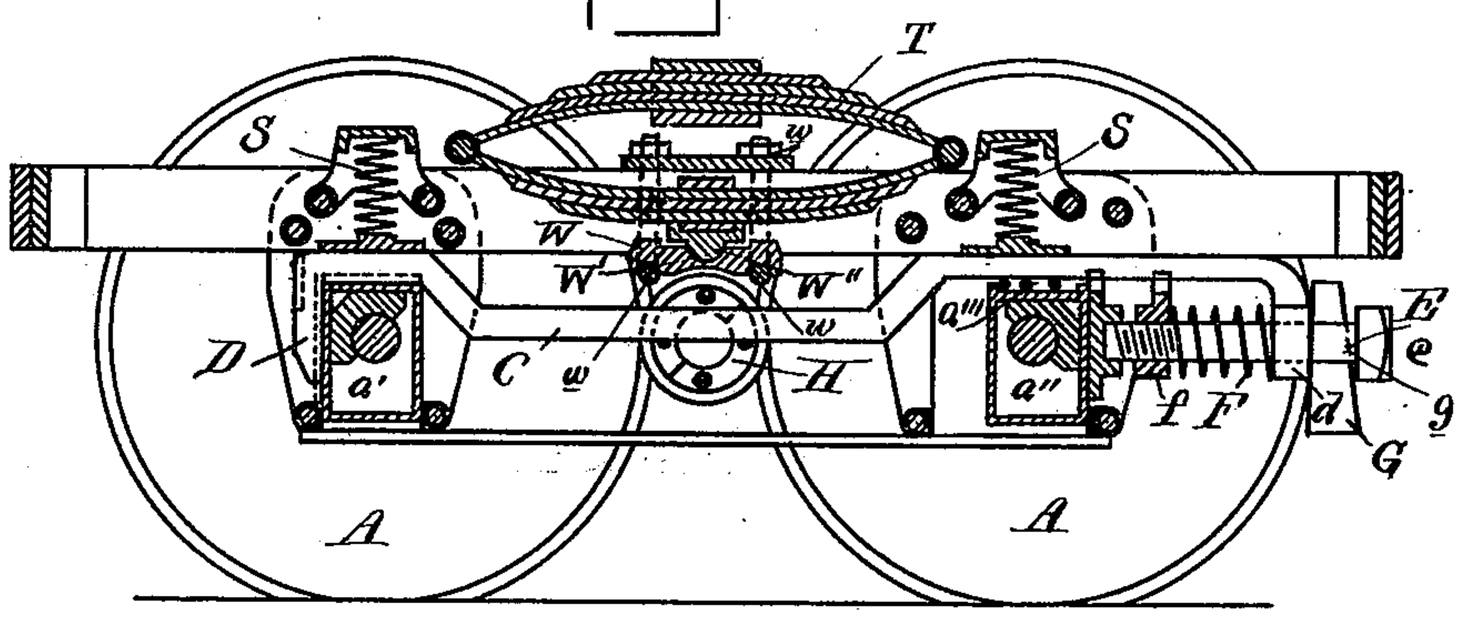


Fig. 13.

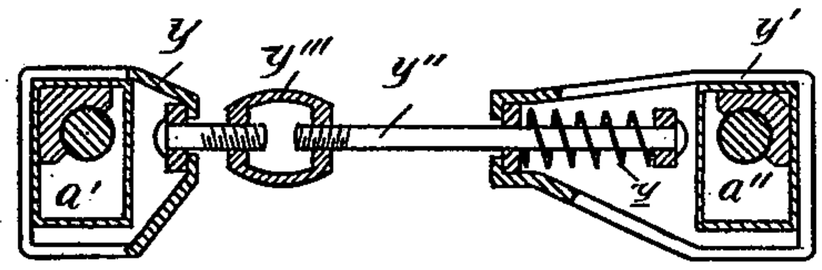
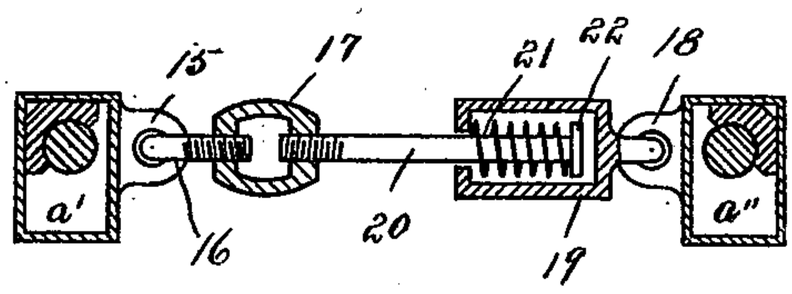


Fig. 14.



Witnesses -

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(No Model.) 6 Sheets—Sheet 3.

Fig. 5.

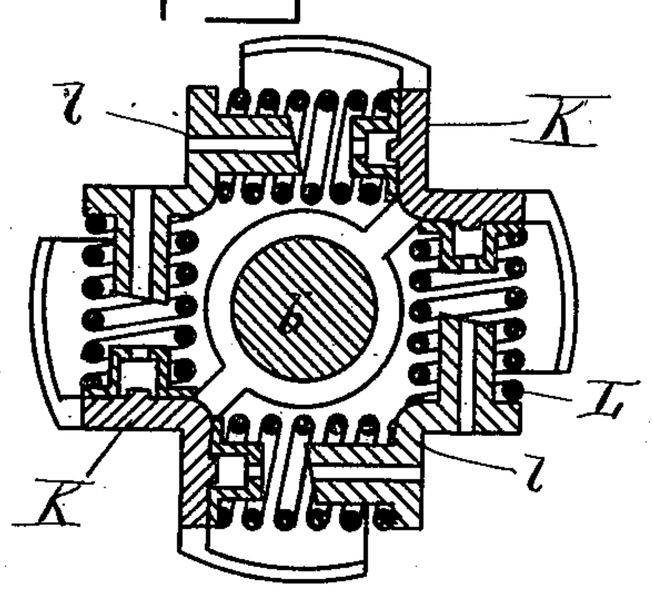


Fig. 8.

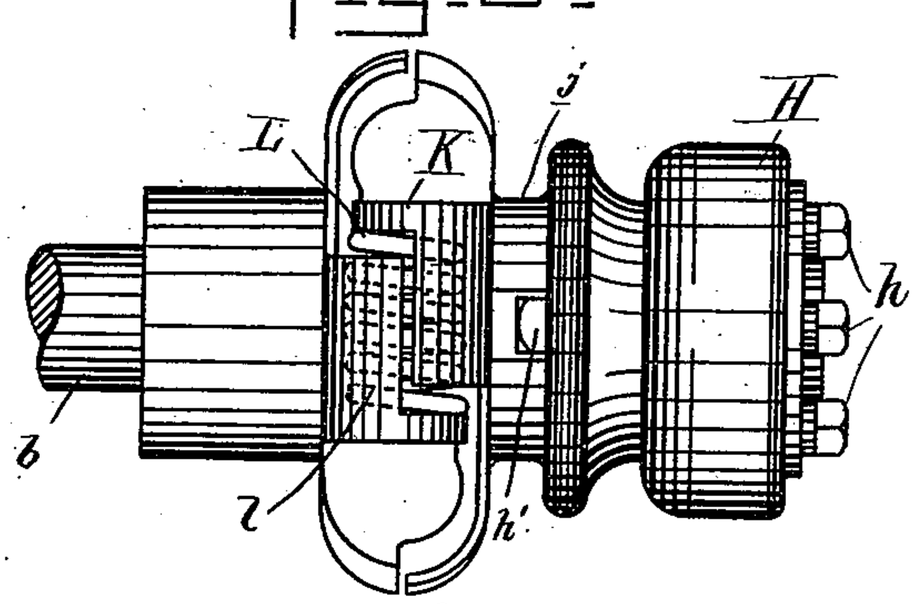


Fig. 6.

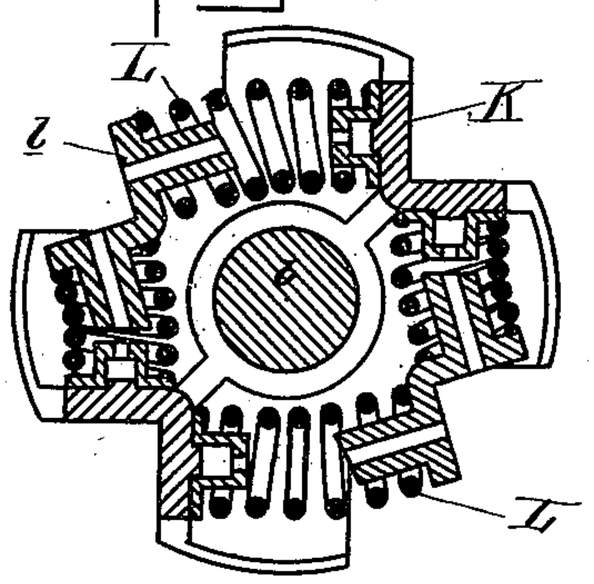


Fig. 9.

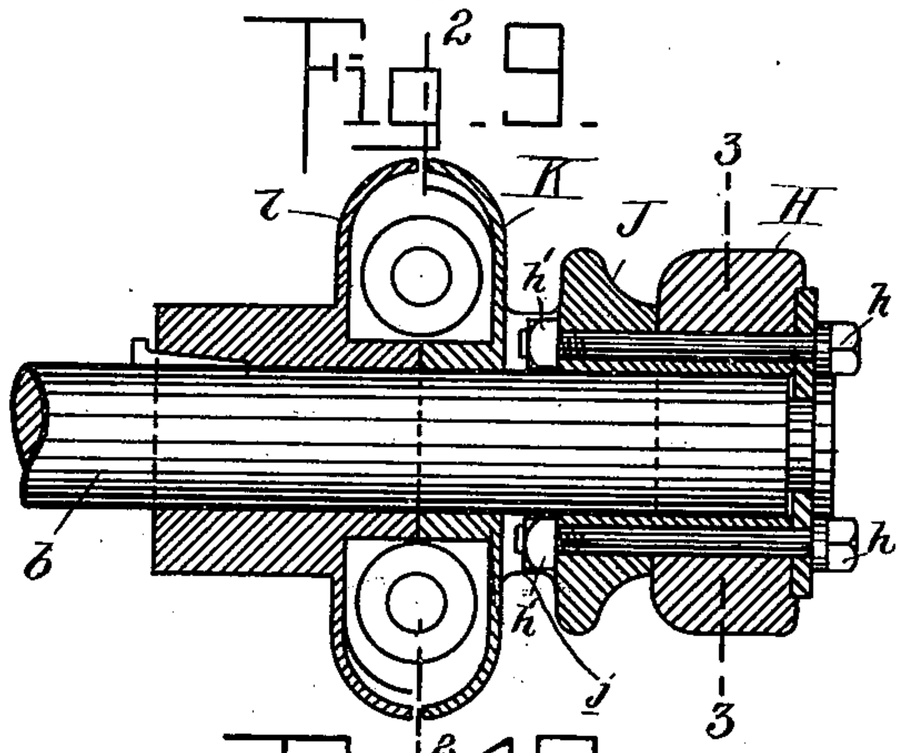


Fig. 7.

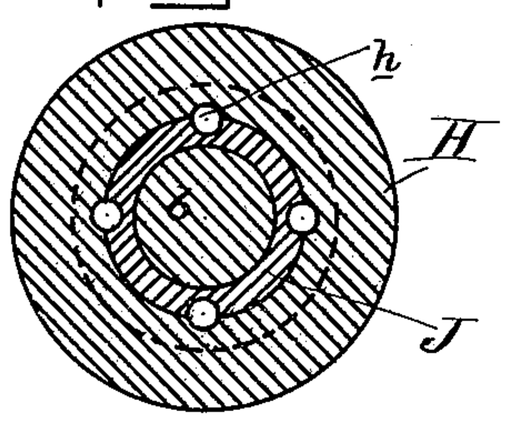
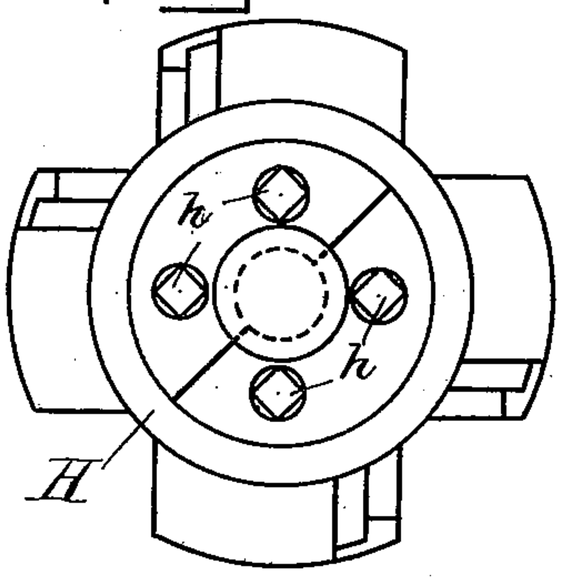


Fig. 10.



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(No Model.) 6 Sheets—Sheet 4.

Fig 11.

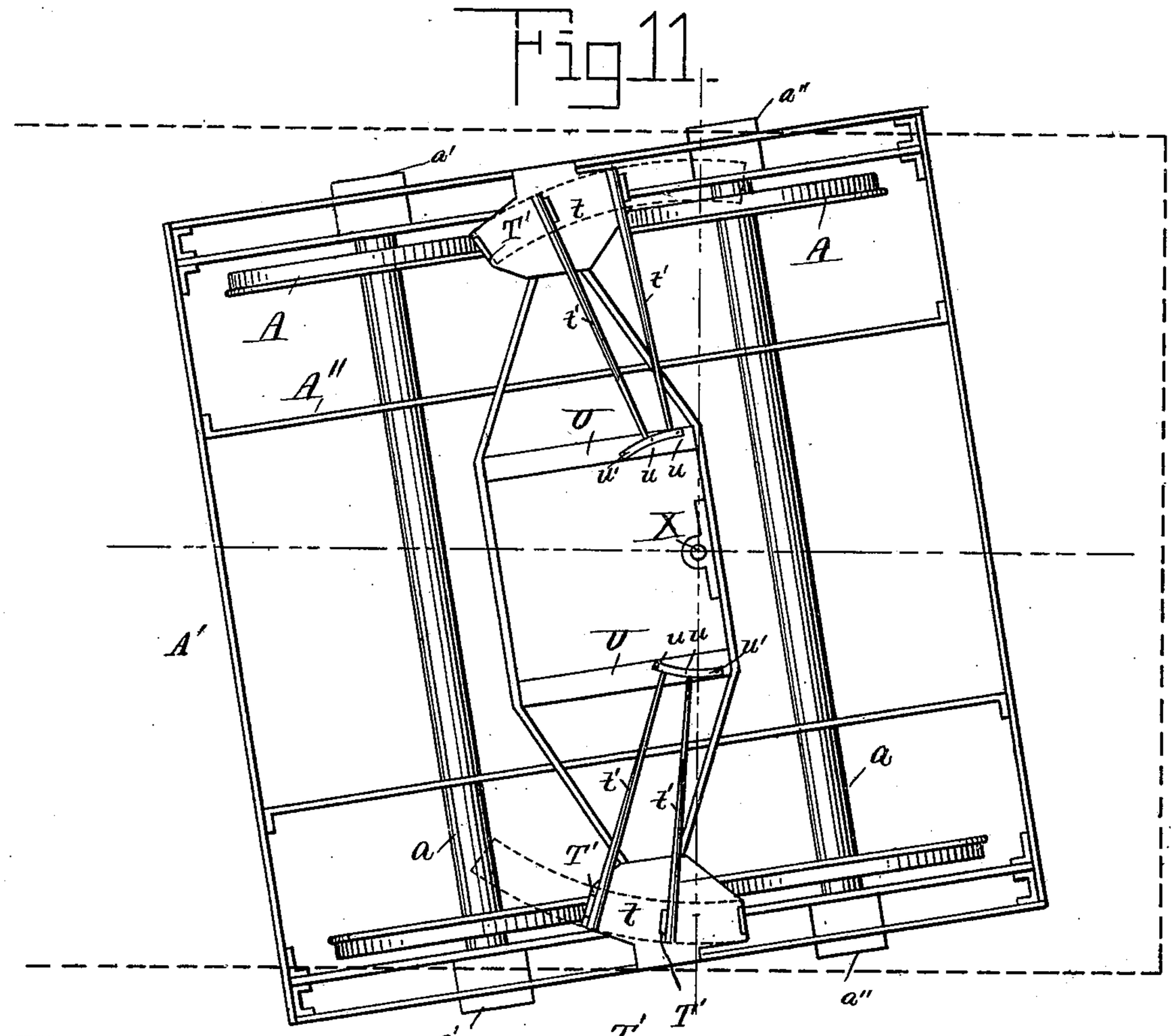

Fig 12.

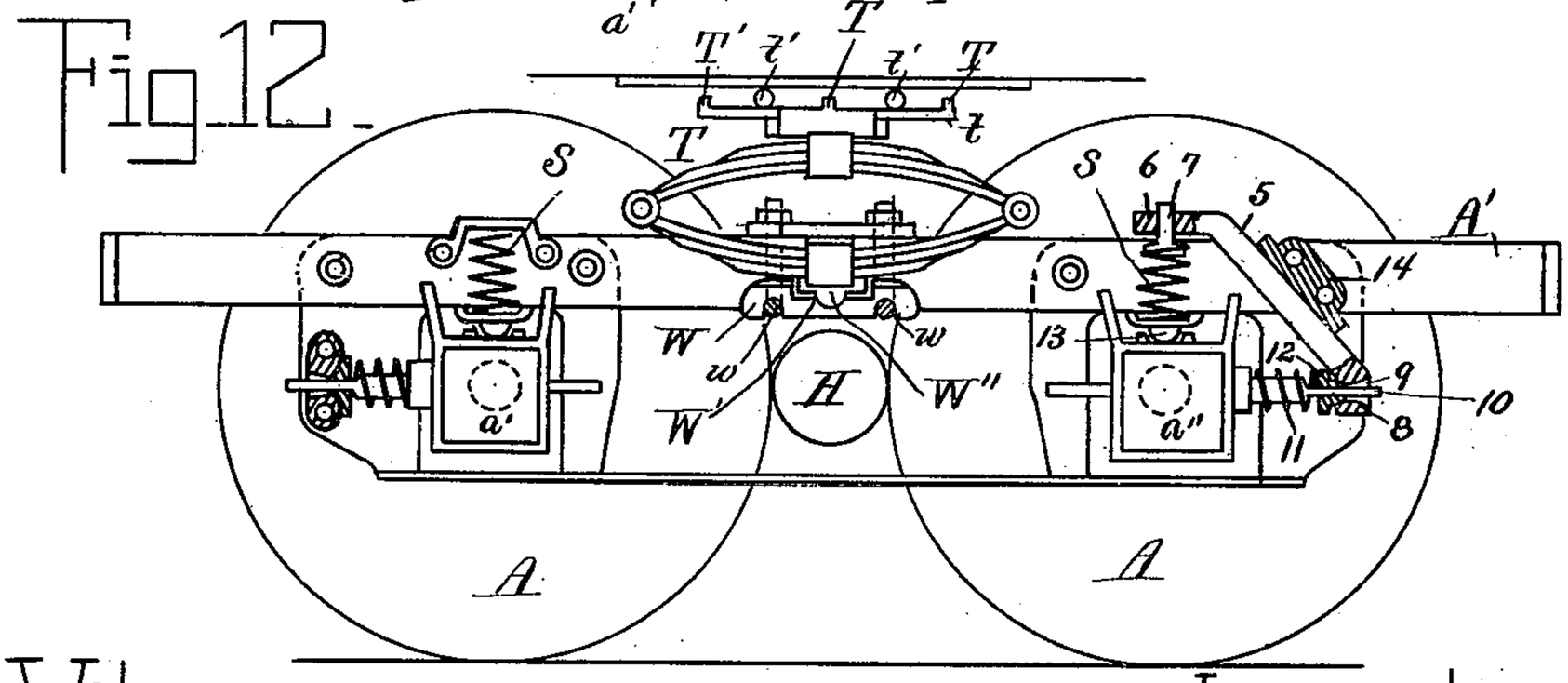

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Fig. 16.

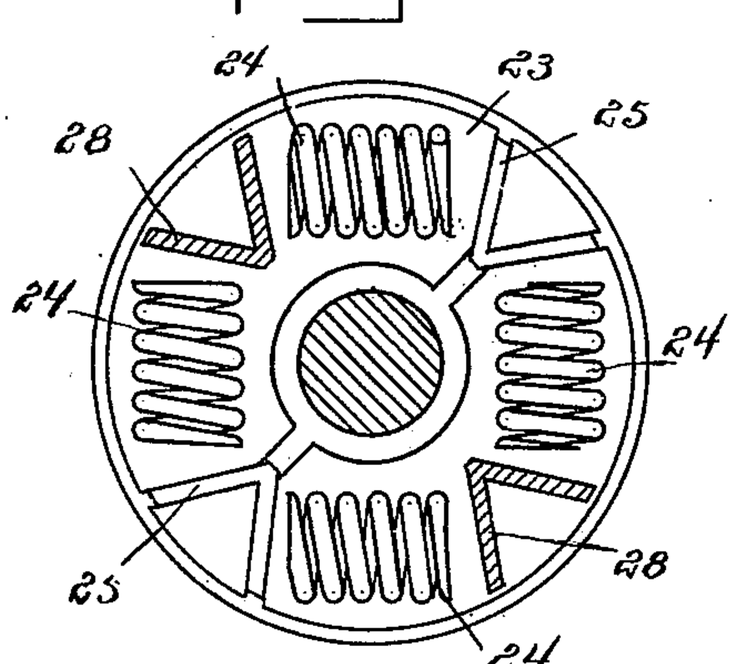

Fig. 18.

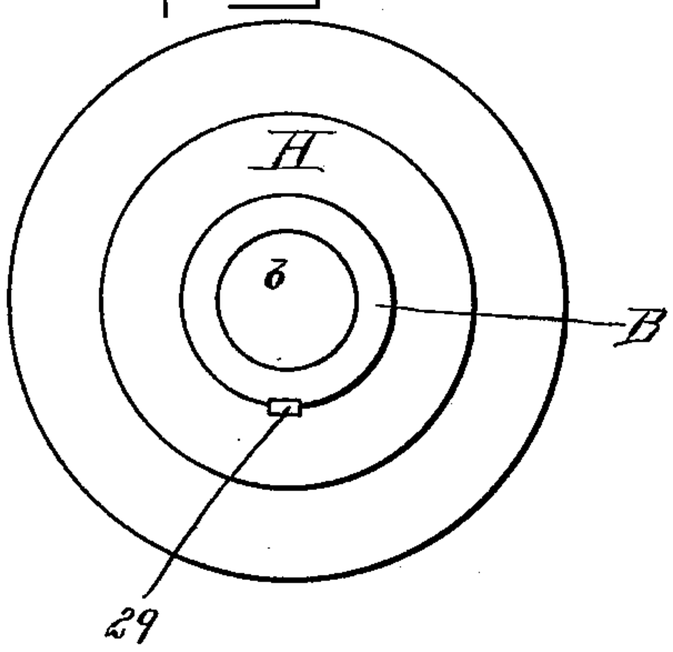

Fig. 15.

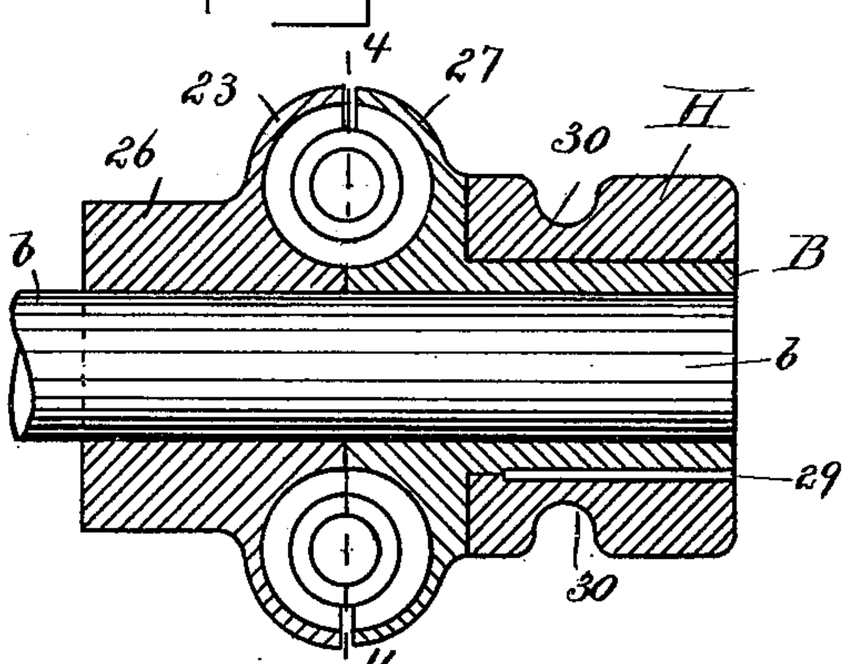

Fig. 17.

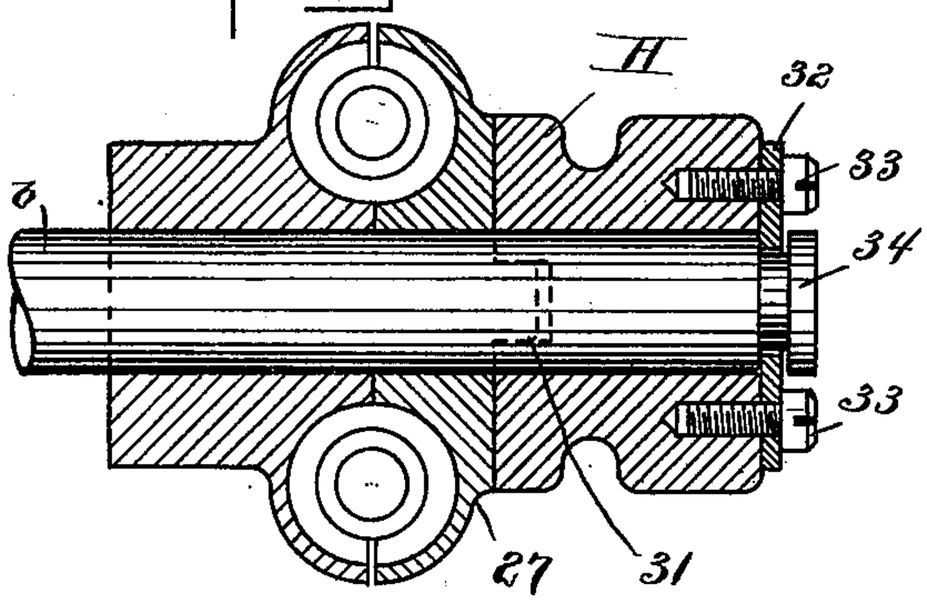

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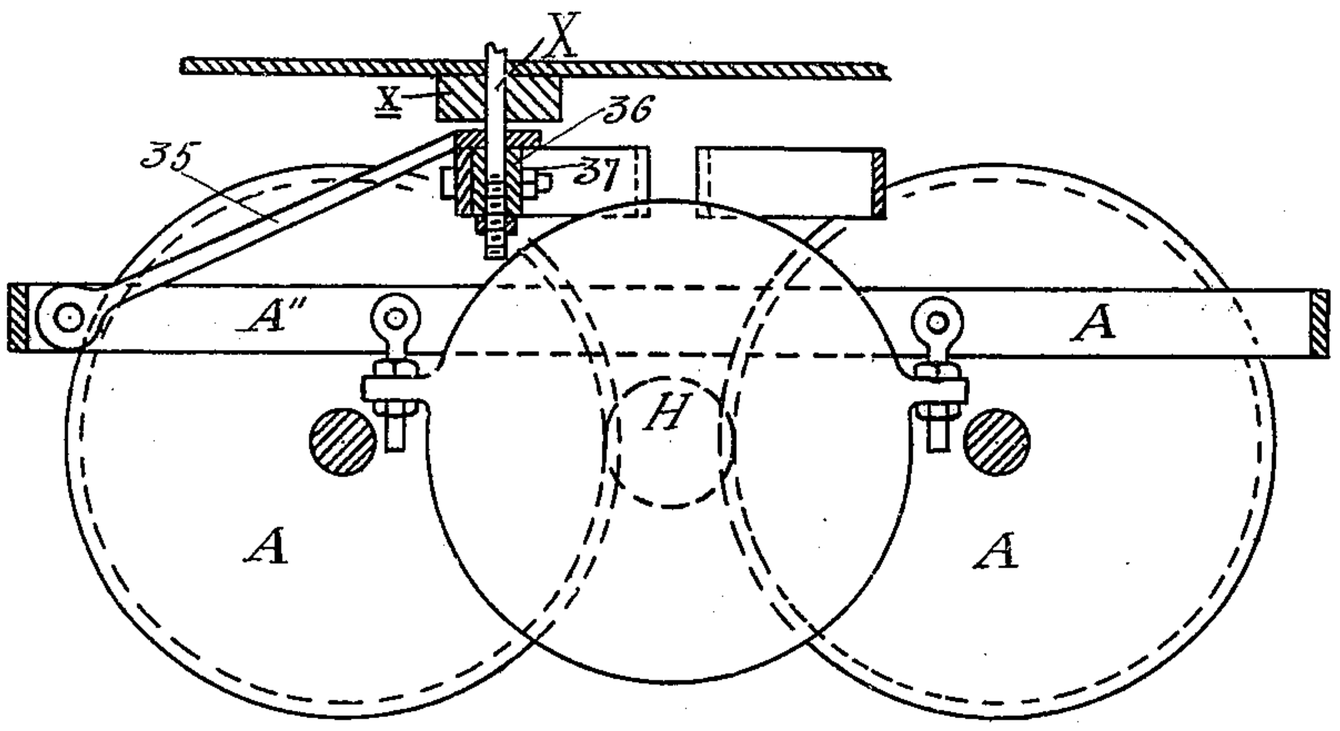
Fig 19



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UNITED STATES PATENT OFFICE.

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TRUCK FOR RAILWAY-CARS.

SPECIFICATION forming part of Letters Patent No. 644,440, dated February 27, 1900.

Application filed February 8, 1897. Serial No. 622,469. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. McELROY, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented a new and useful Improvement in Trucks for Railway-Cars, of which the following is a specification.

My invention relates to improvements in car-trucks; and the objects of my invention are, first, to provide a car-truck in which the power is applied to the drive-wheels by means of friction-rollers and in which there is maintained between the drive-wheels and the friction-rollers a constant elastic pressure; second, to provide a rotary flexible connection between the friction-roller and the shaft upon which it is mounted; third, to provide a means for renewing the frictional surface of the friction-roller when desired, and, fourth, to provide a means for interlocking the flanges of the wheels and to attain such other objects as are specified and claimed herein. I attain these objects by means of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a plan. Fig. 2 is an elevation. Fig. 3 is a cross-section along the lines 1 1 on Fig. 1. Fig. 4 is a diagram showing the position of the car when taking a curve. Fig. 5 is a cross-section along the lines 2 2 on Fig. 9. Fig. 6 is a cross-section along the lines 2 2 on Fig. 9, showing two of the springs contracted and two elongated. Fig. 7 is a section along the lines 3 3 on Fig. 9. Fig. 8 is a plan of the friction-roller, shaft, and flexible rotary connection. Fig. 9 is a section through the friction-roller, shaft, and flexible rotary connection. Fig. 10 is an end elevation of the friction-roller. Fig. 11 is a plan of the truck, showing the position of parts when taking a curve. Fig. 12 is a section similar to Fig. 3, but of a modified form. Fig. 13 is a detail view of a modified form of the device for holding the wheels in connection with the roller. Fig. 14 is a modified form of the device for holding the wheels in connection with the friction-roller. Fig. 15 is a longitudinal section of a modified form of the friction-roller, shaft, and flexible rotary connection. Fig. 16 is a cross-section along the lines 4 4 on Fig. 15. Fig. 17 is a longitudinal section of a modified form of the friction-roller, shaft, and flexible rotary connection. Fig. 18 is an end elevation of the device illustrated in Fig. 15. Fig. 19 is a longitudinal section through the truck, showing in section the means of connecting the truck to the car-body.

Similar letters and figures refer to similar parts throughout the several views.

One of the objectionable features of street-railway cars, particularly noticeable to residents along the lines of the roads and by the occupants of the cars, is the distracting noise occasioned by the pounding of the heavy motor-trucks upon the rails and also by the gear mechanism connecting the armature of the motor with the axle. To the railway company these objections are increased by the great injury and damage which ensue by the destruction of the track and road-bed caused by the pounding and by the wearing out and stripping of the gears.

Ordinarily it has been necessary to have a motor with each pair of drive-wheels on the car, making two motors on each car, each motor operating one pair of wheels. The trucks have been placed in relation to the ends of the cars in such a position that a very slight raising of the wheels occasions a very marked elevation of the platform at the end of the car, and consequently in passing swiftly over tracks more or less irregular there is a constant raising and lowering of the wheels as well as of the car-body, which accounts for the pounding and much of the noise of the operation of the car. I propose to avoid or reduce to a minimum the objectionable noise and expense attendant thereon heretofore occasioned by the moving of a street-car. To accomplish this, I place two trucks under a car, nearer to the ends of the car than has heretofore been the common practice, which will do away with the pounding of the wheels on the track and the oscillation and galloping of the car-body to a very great extent. I also eliminate the gearing heretofore commonly used for the purpose of connecting the armature of the motor to the axle. I connect the armature to a friction-roller adapted to engage with each pair of drive-wheels on each side of the car, thus having two friction-rollers connected with each motor, each friction-roller being between adjacent drive-wheels in each truck. In

order to attain the best results, the rapidly-revolving friction-roller should be entirely free from any weight or pressure except that which is applied by contact with the drive-wheels. The force applied to the apparatus for the purpose of insuring contact should, therefore, be applied to the drive-wheels rather than to the friction-roller. The drive-wheels must be operated upon to make contact with the friction-roller, which friction-roller must be untrammeled except by contact with the drive-wheels, and the contact between the friction-roller and the drive-wheels must be constant and elastic. When the friction-roller is in contact with the drive-wheels and one of the drive-wheels in the pair is raised by some irregularity in the track or by some other cause, there would be exerted upon the shaft carrying the friction-roller a torsional action, which would tend to cause a partial twisting of the shaft, or there would be a slipping between the friction-roller and the drive-wheels, and in order to take up such twisting motion and prevent injury and slipping I have arranged a flexible rotary device in connection with the friction-shaft.

In order to more clearly illustrate my invention, I refer to the drawings herein, in which drive-wheels are represented by A A, mounted on axles *a a* in a car-truck A′, thus making four wheels in each truck, two on each side thereof. Hereinafter in referring to the wheels I designate them as consisting of two pairs in each truck, meaning thereby that two wheels on the same side of the truck shall be considered as a pair.

A friction-roller H is mounted on a shaft *b*, which is connected with the armature of the motor B′. I preferably have a friction-roller on each side of the truck. I also preferably construct the friction-roller with a groove in its periphery, in which the flanges of the two drive-wheels which bear against it engage. I preferably make this construction such that the bearing against the flange will come in the line of the face of the drive-wheel itself. Since the flanges of the forward and rear wheels both run in the same groove in the friction-roller, they will be locked together in such a way that when the forward wheel strikes a curve, causing a pressure parallel to its axis, the strain is not thrown upon the truck-frame, but is communicated through the interlocking of the flanges of the forward and rear wheels to cause a reshifting of the truck as a whole to meet the new direction of motion of the truck.

The motor B′ is supported beneath the car in any suitable manner.

Above one of the journal-boxes *a′* on each of the pairs of drive-wheels I place a hook D, which hook is formed on the end of the link C, which link is provided at its opposite end with a collar *d*, adapted to receive the bolt E. The journal-box *a″* is capable of a longitudinal movement, while the journal-box *a′*, being the one supporting the axle of the adjacent drive-wheel, is preferably stationary. Upon the bolt E, I place a spring F, preferably spiral in form, which has a seat against the collar *d* and against a threaded plate *f*, which engages with threads in the bolt E. The end of the bolt E presses against the side of the journal-box *a″*. As thus arranged it is apparent that the resilience of the spring will press the journal-box *a″*, and therefore the drive-wheel attached to the axle in said journal-box, toward the adjacent drive-wheel, and therefore in contact with the friction-roller placed between them. I place, preferably, rollers *a‴* between the link C and the journal-box *a″*, reducing the friction. (See Fig. 3.) I thus provide a constant elastic contact between the friction-roller and the drive-wheels, and by providing a sufficiently-strong spring on the bolt E the pressure upon the friction-roller may be made to equal or exceed the pressure of the wheels A A upon the track, which will insure the movement of the wheels when the friction-roller is made to revolve.

Fig. 12 illustrates another means for holding the friction-roller in contact with the drive-wheels, in which the link extending from one journal-box to the other is eliminated and in its place is a short link 5, provided with a substantially-horizontal portion 6, adapted to engage with a bolt 7, at the top of the frame of the truck, and also provided with a projection 8, with an opening 9 therein, adapted to engage with a rod 10, secured to the journal-box *a″*, about which rod is a spring 11, having its seat against a nut 12, which engages with the link 5. This journal-box *a″* is operated on with the spring 11, acts upon the end of the link 5, and is held in contact with the friction-roller H. If this modification is used, it is advisable to have a tongue 13, secured to the truck-frame, engage with the top of the journal-boxes and forming a tilting joint to allow for the movement of the journal-boxes. I arrange a bracket 14 on the side of the truck-frame, against which the link 5 rests and which by said bracket is held securely in position.

Fig. 13 illustrates a method for drawing the wheels in contact with the friction-roller differing somewhat from those already described. I place a band Y around one of the journal-boxes *a′* and a similar band Y′ around one of the journal-boxes *a″*. A rod Y″ is provided with a turnbuckle Y‴ and has a spring *y*, arranged at one end thereof in such a position that the spring shall have a seat within the band Y′ and against the nut on the rod Y″. Thus by the operation of the spring the box *a″* will be moved toward the box *a′*, which will insure engagement with the friction-roller.

In Fig. 14 I show another modified form of connecting the journal-boxes in such a manner that they may be drawn toward each other, and thus bring the drive-wheels in contact with the friction-roller. To the journal-

box a' I arrange an eye-lug 15, within the eye of which may be placed a hook 16, engaging with a turnbuckle 17. The journal-box a'' is also provided with an eye-lug 18, to which is hooked a casing 19, within which a rod 20 is inserted, and also within which the spring 21 on said rod is inclosed, said spring having a seat against the nut 22 on the end of said rod and also against the end of the casing farthest from the journal-box a''. The opposite end of the rod 20 engages with the turnbuckle 17. The operation of the device shown in Fig. 14 is similar to that illustrated in Fig. 13.

I do not limit myself to any of the means shown for keeping the contact between the drive-wheels and the friction-roller constant. It is obvious that by placing the friction-roller above the center line of the drive-wheels the drive-wheels may be made to support the friction-roller, and thus carry part of the weight of the armature, and the force of gravity will tend to assist in keeping the connection between the drive-wheels and the friction-roller constant.

Above the journal-boxes and resting thereon or upon the link C, I arrange the springs S S, which provide for a slight vertical movement of the wheels, the weight of the car acting upon the large spring T on each side of the truck, and which is supported by the truck-frame. The springs T, being thus arranged on each side of the truck and carrying the weight of the car, are preferably provided with a bearing which allows them to have a tilting motion, thus making them more easily adjustable and preventing injury and straining. I therefore provide a plate W, held in position by the bolts w, as shown in Fig. 3, or in any suitable manner, which plate is provided with a groove W', which forms a seat for the tongue W'' on the bottom of the spring T. It will be noticed that by this arrangement when the wheels are raised slightly the movement may be taken up without affecting materially the spring T, the plate W being capable of movement upon the tongue W'', thus causing the car to ride more smoothly.

When the wheels have become worn, by screwing the bolt E into the nut f the wear may be taken up and contact be maintained with the friction-roller. When it is necessary to remove a wheel, a wedge-shaped strip G may be driven into the slot g in the end of the bolt E between the head e of said bolt and the collar d, as shown in Fig. 3. The insertion of the wedge G forces the head e and therefore the bolt E (the slot being long enough to admit of such action) away from the collar d, which will withdraw the plate f from contact with the journal-box, and after jacking up the truck the wheel may be readily removed.

As thus arranged I am enabled to obtain a positive equal pressure upon both pairs of wheels on each side of the motor-truck, and doing away with the gearing there is absolutely no opportunity for the breaking of teeth or stripping, as sometimes occurs where the gear mechanism is used, and I thus obviate many of the objectionable features which are usually present in the operation of a car.

For the purpose of providing a new wearing-surface when the friction-roller has become worn I may make the friction-roller of two parts, as shown in Fig. 9, in which the ring H may be removed and a new one substituted. In order to arrange for this removal and substitution, I preferably place a series of bolts h h, which pass through the steel ring and through the block J, as shown in Fig. 9. Said block J forms part of the friction-roller and is integral with or attached to the casting j, and said bolts are held in contact with the block J by nuts h' h'. In this way I provide a very efficient and rapid means for replacing the worn friction-surface.

In order to provide a flexible rotary connection upon the shaft b, I secure to the casting j of the friction-roller or make integral therewith a bracket K, extending on opposite sides of the shaft, said bracket K adapted to receive a spring L and form a seat therefor. On the shaft b I arrange on each side brackets l, corresponding to the brackets K and arranged to partially envelop said spring L and provide a seat for one end of the spring. Thus the spring L is held within brackets, one of which is secured to the friction-roller and the other to the shaft, the spring being placed within said brackets and having a seat against each of said brackets in such a position that a movement on the part of either of the brackets will tend to compress the spring between them or cause it to be elongated. Thus when the friction-roller is in its normal condition the position of the springs will be that shown in Fig. 5, and when one of the wheels has been raised, causing a twisting of the friction-roller, the position of the springs in the brackets will be substantially that shown in Fig. 6, in which two of the springs are compressed and the other two are elongated. The shock which would otherwise be transmitted to the motor is thus taken up and prevented or reduced to a minimum. I do not limit myself to the number of springs or the peculiar construction of the spring mechanism.

Figs. 15, 16, 17, and 18 show a modified form of my flexible rotary connection. Within the plate 23 I place springs 24, adapted to engage with webs 25 within the plate, forming a seat for one end of the springs, said plate secured to or formed integral with the casting 26 attached to the shaft b. A corresponding plate 27 is secured to or formed integral with the casting B and is also provided with webs 28, adapted to fit into the plate 23 in contact with the springs 24, engaging with the end of said springs opposite to the ends with which the webs 25 engage. The springs are affected in the same way by the raising of the wheels against the friction-roller, and

the armature is relieved from torsional motion in the same manner as in the flexible rotary device illustrated in Figs. 5 and 6.

Figs. 15 and 17 illustrate a method of constructing and securing the friction-roller H in a manner different from that illustrated in Fig. 9. The friction-roller is maintained upon the shaft by means of a key 29, inserted in a groove within the casting B, Fig. 15, partially and partially within a groove within the friction-roller H and held from lateral motion by the interlocking of the flanges of the drive-wheels within the groove 30. In Fig. 17 I arrange on the casting 27 a locking-lug 31, engaging with a depression corresponding to said lug within the friction-roller H, and secure to the end of the friction-roller a cap 32 by means of suitable bolts 33, said cap being prevented from lateral motion by the nut 34 on the end of the shaft *b*.

In a line midway between the sides of the truck, but preferably nearer one end thereof than the other, I arrange a king-bolt X, thus making the connection between the car-truck and the car eccentric in reference to the length of the truck. By locating the king-bolt in this position I avoid any interference with the motor, which must necessarily be in the center of the truck. By thus locating the king-bolt the car will make a curve with less binding, and therefore less friction, than if the king-bolt were in the center. The weight of the car will incline toward the center of the curve. In order that the truck may move freely beneath the car, I arrange a plate *t* on the spring T, suitably supported, upon which one or more rollers *t'* are placed, said rollers also being supported upon the plate U above the motor and arranged to keep a position substantially coinciding with radial lines drawn from the king-bolt to the plate *t*, thus being farther apart at the plate *t* than at the plate U. I arrange on the plate *t* suitable stops T' to limit the movement of the rollers *t'*, and I also on the plate U arrange a series of stops *u u*, showing bolts passing through a covering *u'*, or which may be done in any suitable manner. The bottom of the car rests upon the rollers *t' t'*, and it is apparent that in taking a curve the truck may be moved easily beneath the car to a certain extent, thus relieving the strain which would otherwise be made upon the car.

Near the forward end of the frame of the truck I pivotally secure for vertical movement the braces 35 35, connected with a plate 36, said plate provided with an opening therethrough adapted to allow for the insertion of the king-bolt X. The braces 35 and the plate 36 are beneath the car, the plate 36 being attached to the truck-frame, preferably by bolts 37, in a position for the king-bolt which passes through the bolster-beam *x'* of the car to pass through it, and thus so arranged that any thrust which may be made on the car shall be taken up directly by the truck-frame and preventing the springs T T being affected materially by said thrust. The pivotal connection of the braces allows for the up-and-down movement.

I designate as the line of support of the car-body a line connecting the points of the support of the car-body on the truck, which points of support are on each side of said truck and car-body, respectively.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a railway-car truck, four drive-wheels, two on each side thereof, a friction-roller placed between adjacent wheels on each side of the truck, one wheel on each side of the truck mounted in a movable journal-box, an adjustable device for maintaining contact between the friction-roller and the drive-wheels, substantially as described.

2. In a railway-truck, a pair of drive-wheels, a friction-roller placed between them and in contact with each, a means for imparting motion to said friction-roller, the journal-box of one of said drive-wheels movable longitudinally, a link connecting with said movable journal-box, a means for operating said link, thereby moving said journal-box and maintaining a constant, elastic contact between the friction-roller and the drive-wheels, substantially as described.

3. In a railway-truck, two pairs of drive-wheels, a friction-roller placed between each pair, a flexible rotary connection between the shaft upon which the friction-roller is mounted and the friction-roller, with a means for maintaining a constant, elastic contact between the drive-wheels and the friction-roller, substantially as described.

4. In a railway-truck, two pairs of drive-wheels suitably mounted, a friction-roller placed between each pair of drive-wheels, said friction-roller consisting of a hub with a removable ring forming a friction-surface, with a flexible rotary connection between said roller and the shaft upon which it is mounted, substantially as described.

5. In a railway-car truck, a friction-roller, a shaft upon which it is mounted connected with a motor, one or more brackets secured to or connected with the hub of said roller, one or more brackets keyed to said shaft, a spring housed within each pair of brackets, forming a flexible rotary connection between the friction-roller and the shaft upon which it is mounted, one or more drive-wheels adapted to engage with said friction-roller, substantially as described.

6. In a railway-car truck, the combination of a pair of drive-wheels suitably mounted, with a friction-roller mounted on a shaft connected with a motor, one of the journal-boxes of said drive-wheels movable longitudinally, a link engaging with said movable journal-box, a collar at one end of said link, a bolt adapted to pass through said collar and engage with the side of the other journal-box of said pair, a spring mounted on said bolt seat-

ed against said collar and operating to draw the drive-wheels in contact with the friction-roller, substantially as described.

7. In a railway-car truck, two pairs of drive-wheels suitably mounted, a friction-roller mounted on a shaft operated by a motor, a removable ring forming the periphery of said friction-roller, a flexible rotary connection between the friction-roller and the shaft upon which it is mounted, with a means for holding the drive-wheels in constant, elastic contact with said friction-roller, substantially as described.

8. In a railway-car truck, a pair of drive-wheels, a friction-roller mounted between them, a means for maintaining a constant, elastic contact between the drive-wheels and the friction-roller by the operation of a spring acting upon the journal-box of one of said drive-wheels, substantially as described.

9. In a railway-car truck, a pair of drive-wheels, a friction-roller mounted between them, the journal-box of one of said drive-wheels movable horizontally, said journal-boxes united by an adjustable resilient coupling, so arranged that the drive-wheels shall be held in contact with the friction-roller by means of the resiliency of said coupling, substantially as described.

10. In a railway-car truck, a pair of drive-wheels on each side thereof, a friction-roller between said drive-wheels, a link secured to one of the journal-boxes, a bolt passing through said link engaging with the opposite journal-box, a spring on said bolt, the resiliency of which tends to force the bolt in contact with the journal-box, a wedge adapted to be driven between the end of said bolt and the end of said link, causing a tension of said spring and providing a means for relieving the drive-wheels from the action of said spring, substantially as described and for the purpose set forth.

11. In a railway-car truck, two wheels on each side, a friction-roller, a means for driving the wheels by imparting motion to said friction-roller, a means for making a constant elastic contact between said drive-wheels and said friction-roller, the flanges of the drive-wheels interlocking with the groove in the friction-roller, substantially as described and for the purpose set forth.

12. In a railway-car truck, two pairs of drive-wheels, a friction-roller between each pair, a motor operating a shaft upon which said friction-roller is mounted, said friction-roller placed slightly above the center of said drive-wheels, whereby the weight of the friction-roller and the armature may be partially supported by the drive-wheels, substantially as described and for the purpose set forth.

13. In a railway-car truck, four drive-wheels, two on each side thereof, a friction-roller placed between adjacent wheels on each side of the truck, one wheel on each side of the truck mounted in a movable journal-box, and an adjustable elastic contact maintained between the friction-roller and said drive-wheels, substantially as described.

14. In a railway-car truck, four drive-wheels, two on each side thereof, a friction-roller placed between adjacent wheels on one side of said truck, one of said wheels in contact with said friction-roller mounted in a movable journal-box, and means for maintaining contact between the friction-roller and the drive-wheels by means of a spring acting upon said movable journal-box, substantially as described.

15. In a railway-car truck, a friction-roller connected to the armature of a motor adapted to rotate in connection with one of the drive-wheels, a key arranged to hold the bearing portion of said friction-roller in connection with the castings, the bearing portion of said friction-roller adapted to be held on the casting by the flange of the drive-wheel engaging with the groove in the periphery of said friction-roller, substantially as described and for the purpose set forth.

16. In a railway-car truck, a friction-roller adapted to rotate in connection with one of the drive-wheels, a lug on the casting adapted to engage with an aperture in the end of said friction-roller, with a cap on the end of the shaft upon which the friction-roller is mounted, suitably secured to the end of said friction-roller, substantially as described and for the purpose set forth.

17. In a car-truck, drive-wheels arranged on each side of said truck, a brace pivoted to the frame of the truck near one end thereof, a plate attached to or formed integral with said brace, a car resting upon said truck, a king-bolt passing through said car and through said plate into said truck, substantially as described and for the purpose set forth.

18. A railway-car, consisting of a truck having drive-wheels on each side thereof carrying equal weights, a car-body supported by said truck, a king-bolt passing through said car-body into said truck at a point eccentric to said truck and which point is also without the line of support of said car-body, substantially as described.

19. In a railway-car truck, a rotating shaft, a friction-roller in contact with one or more truck-wheels and driven by said shaft, and a flexible rotary connection between said shaft and said roller, whereby the roller may have a certain amount of rotary motion independent of the shaft, substantially as described.

20. In a railway-car truck, a friction-roller placed between adjacent wheels on one side of a truck, one or both of said wheels being so mounted as to be capable of horizontal adjustment, and a spring or equivalent means for maintaining contact between the friction-roller and said wheels, substantially as described.

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Witnesses:
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