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W. C. MAYO & J. HOULEHAN.

CAR WHEEL.

APPLICATION FILED MAY 7, 1907.

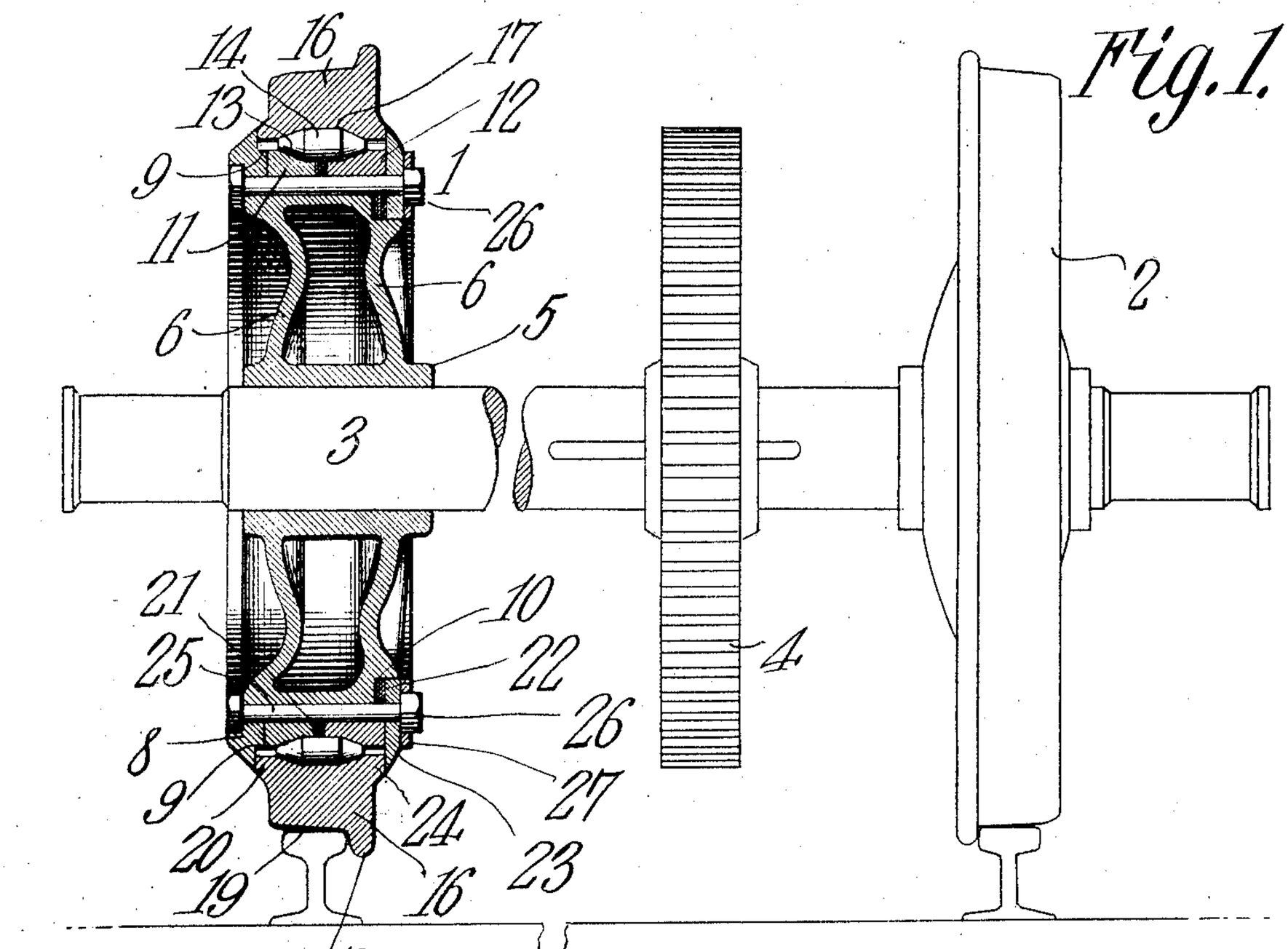

Fig. 1.

Fig. 2.

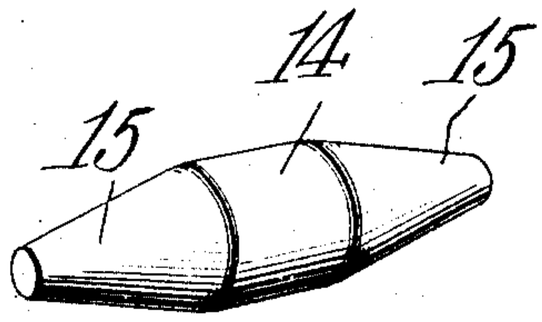

Fig. 3.

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CAR-WHEEL.

No. 879,287. Specification of Letters Patent. Patented Feb. 18, 1908.

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To all whom it may concern:

Be it known that we, WILLIAM C. MAYO and JOHN HOULEHAN, citizens of the United States, residing at El Paso, in the county of El Paso and State of Texas, have invented a new and useful Car-Wheel, of which the following is a specification.

This invention has reference to improvements in car wheels, and its object is to provide a wheel designed to prevent the slipping of car wheels on rounding curves or the slipping due to differences in the diameters of wheels mounted on the same axle.

The purposes of the present invention will be more clearly understood from a consideration of the conditions which it is proposed to meet by the improved structure.

This invention forms part of a complete system of car operation intended more particularly for urban and suburban and interstate traffic.

Consider, first, two wheels fast on the same axle so as to be immovable one with relation to the other, and also let it be considered that the two wheels are of the same diameter, though this last condition is only approximately true in practice. On a straight track, these two wheels will roll along said track without difficulty and without slipping since each will travel over the same length of track in the same time. When, however, such a pair of wheels moves on to a curve, in which, of course, the outer rail is considerably longer than the inner rail, it is evident that the outer wheel must have a greater length of travel than the inner wheel and that the latter must therefore gradually slip until this slipping has amounted to the difference in length of the inner and outer rails. This slipping occurs almost entirely on the inner rail, to the detriment of both the rail and the corresponding wheel, and also causes a very material consumption of power to drive the car around the curve as compared with the power necessary to drive the car on a straight track of corresponding length.

On steam railroads, where the curves are flat and exceedingly easy and of variable radii, this slipping may be negligible, but on street railways the curves are short with a single radius for the entire curve, and, therefore, there is an immense strain on the outer rail made up of the product of the slipping on the inner rail and the resulting reaction against the outer rail and the thrust of the train due to its deflection from a straight line. In railroad engineering the centrifugal effect is partly corrected by elevating the outer rail, but this is only partially effective and does not in any manner lessen the slipping due to the unequal length of the two rails at a curve. Under the usual conditions prevailing in city traffic the outer rail cannot be raised to a higher elevation than the inner rail, and, therefore, this corrective measure cannot, under such circumstances, be applied.

The loss of life, property and power due to the necessary construction of the tracks in city railroads and the use of car wheels both fixedly connected to the same axle, amounts to a large figure every year.

We may here state that we avoid the effect of the heavy thrust upon the outer rails, and the effect of centrifugal force due to the deflection of the train or car from a straight line of travel to travel in a curved path, by certain means which do not form the subject-matter of the present invention, and, therefore, need not be here considered, though such means do form a part of the same complete system of car operation of which the present invention is also a part. We do, however, by this invention avoid the slippage of the wheels upon the track, whether such wheels be of unequal diameters and running on a straight line of track or whether the wheels enter upon a curved section of track. For this purpose we provide one of the pair of wheels, both of which are fast on the same axle, with a rim section capable of rotating independently of the web section, which latter is fast to the axle. This two-part wheel is provided with roller bearings between the rim section and the web section, and provision is made for taking up the wear between the moving parts, so that there may never be rattling or lost motion, and provision is also made for preventing the fastening elements, by which the two parts of the wheel are held in engagement, from becoming loose or falling out so that the wheel might fall apart and thus cause disaster.

The invention will be fully understood

from the following detailed description taken in connection with the accompanying drawings forming part of this specification, in which,—

Figure 1 is a central sectional view through a car wheel constructed in accordance with our invention, with the axle and the other wheel on said axle shown in elevation; Fig. 2 is an inner face view of the improved wheel; and Fig. 3 is a detail perspective of one of the anti-friction rollers.

Referring to the drawings, the improved wheel is shown at 1 and an ordinary car wheel is shown at 2, and an axle, also of ordinary construction, is shown at 3, while upon the axle is shown a gear wheel 4 by which driving power may be imparted through the axle to the wheel 2 thereon by any suitable means, which need not be considered. The complete structure, as shown in Fig. 1, is designed for use as one of the driving elements of a car, particularly such a car as is used for passenger or freight traffic within city limits or within those suburban limits which utilize such traction systems. When used on steam roads the drive gear 4 may be omitted on cars drawn by locomotives, but is retained on certain cars using our system in which each car is a motor unit and a number of such units are united and operated as a train. It will be understood, of course, that the wheel constituting the subject of the present invention is not a drive wheel.

The wheel 1, as shown in Figs. 1 and 2, consists of a hub 5 carrying a hollow web 6 having strengthening ribs 7 cast on its faces. The outer edge of the web is continued radially outward to form a flange 8 having an interior shoulder 9, to be hereinafter referred to. The inner periphery of the web section is provided with an annular recess 10, the purpose of which will hereinafter appear.

The peripheral face of the web section is turned off true and receives two annuli 11—12, also turned true and with their outer faces recessed, as indicated at 13. The peripheral faces of the annuli or rings 11—12 are coincident with the shoulder 9 formed on the inner face of the flange 8 and the recesses 13, together, form seats for anti-friction rollers 14. These rollers 14 are best shown in Fig. 3, where it will be seen that their body portions are cylindrical and their ends 15 are frusto-conical. Therefore, the recesses 13 at the meeting faces of the two rings 11 and 12 are so shaped as together to form a cylindrical seat for the cylindrical portion of the rollers 14, while the rest of the recesses 13, away from the cylindrical portions, taper outwardly so as to form seats for the frusto-conical portions 15 of the rollers.

Seated on the rollers 14 is the rim section 16 of the wheel. This section is turned true on its radially inward face, which is provided with a circumferential recess 17 of suitable shape to form seats for the anti-friction rollers 14 similar to the seats 13 formed in the rings 11 and 12. The rim section 16 is provided with the usual wheel flange 18 and taper tread 19 similar to that of an ordinary car wheel, or, in this particular instance, to that of the wheel 2. The outer edge of the rim section 16 is provided with a laterally extending flange 20 turned true and seated against or in the shouldered portion of the flange 8.

The two annuli or rings 11—12 are of such width that when their meeting faces are brought into contact their outer faces will include that portion of the outer periphery of the web section which extends from the shoulder 9 to the recess 10. However, there is placed between the meeting edges of the two rings 11—12 a number of ring laminæ 21, which laminæ should be very thin and may be made of almost any substance since their only function is to occupy space, as will hereinafter appear. The introduction of the ring laminæ 21 causes the inner edge of the ring or annulus 12 to project laterally beyond the periphery of the web section for a distance over the recess 10. Within this recess there are other ring laminæ 22 equal in number to the ring laminæ 21 before referred to, and the function of the ring laminæ 22 is also to occupy space.

Applied to the inner side of the wheel is an annular cheek plate 23. This cheek plate enters the recesses 10, confining the ring laminæ 22 therein, and extends radially outward a sufficient distance to engage the edge of the annulus 12 and also to engage an annular flange 24 extending laterally from the inner side of the rim section 16. The outer end of the cheek plate 23 terminates at the same distance from the axis of the wheel as does the outer edge of the flange 8. It will be seen that the rim section is confined between the flange 8 and the cheek plate 23. Extending laterally through the web section of the wheel at the periphery thereof are a number of through bolts 25 having their heads suitably seated on the outer face of the web section of the wheel against the flange 8 and having their inner ends extending through suitable perforations in the cheek plate 23. A sufficient number of these bolts are equidistantly disposed about the web section of the wheel, and outside of the cheek plate receive nuts 26 of square or other suitable configuration. Applied to the cheek plate 23 outside thereof is a ring 27 having as many openings therethrough as there are nuts 26, and these openings conform in shape to the said nuts so as to receive the same and prevent them from turning when once the plate 27 has been applied to them. This plate 27 is held to the cheek plate 23 by means of bolts 28 to which are applied nuts 29, and these

nuts may be held in place by cotter pins or other suitable fastening devices which will prevent the nuts 29 from working loose from the bolts 28.

It is evident that after the nuts 26 have all been screwed up to the proper extent and then either slightly tightened or loosened, as the case may be, so that the ring 27 may be placed over them, these nuts cannot then by any possibility work loose, and, therefore, the wheel, while it may be readily dismantled when desired, is absolutely safe against accidental dismantling.

The wear on the rollers when the wheel is running on a straight track is practically negligible since the only wear that would occur would be due to the unequal diameters of the wheels 1 and 2, and the rim section 16 would move sufficiently with relation to the web section to make up the difference in the rotation of the two wheels due to their slight difference in diameter. Since the amount of travel of the rim section 16 with relation to the web section under these circumstances would be very slight, it need not really be considered. However, when the wheels are upon a curve the rim section will move relatively to the web section to a considerable extent and ultimately, from this cause, there will be some wear on the rollers even when the wearing parts are all made of hardened steel. Now, by dismantling the wheel and taking out one or more of the laminæ 21 and 22 the wear may be taken up so that when the parts are again assembled the wearing parts will run perfectly tight. It may be noted that the conical ends of the rollers wear faster than the cylindrical portions, and, therefore, by making the wearing surfaces of the conical ends greater than that of the cylindrical portions and by properly proportioning these surfaces, the wear may be so regulated that the cylindrical portions will wear somewhat faster than the end portions and thus all side lash will be prevented and a perfectly stiff wheel will result.

The improved wheel can be applied to cars already in service by forcing off one of the wheels on an axle and replacing it with the wheel forming the subject-matter of the present invention. It is desirable, however, upon motor cars, to place the idle wheel upon one side on one truck and upon the other side on the other truck so as to equalize the weight of the car for tractive purposes, for otherwise, the entire driving effect being on one side of the car might cause the trucks to slue and cause the car to jump the track. Since the wear on the wheels when used on a motor car will be mainly on the wheel fixed to the axle and used as a driving wheel, this fixed wheel will ultimately be reduced in diameter, but this will in no wise interfere with the operation of the structure as any difference in the rotative speed of the two wheels will be taken up by the rim 16.

While in the foregoing description stress has been laid upon the use of the improved wheel in connection with the sharp curves in tracks used in city traction systems, the improved wheel may advantageously be used in other connections, since the saving in power and in wear and tear on the running gear and track more than compensate for the initial cost and maintenance of the wheels constructed in accordance with our invention.

We claim:—

1. In a car wheel, a body portion, a rim portion rotatable circumferentially around the body portion, the contiguous faces of the body and rim portions being provided with circumferential seats having central portions concentric with the axis of the wheel and tapered edges of greater area than the concentric portion, rollers interposed between the rim and body portions, each roller having a cylindrical center bearing portion and conical end bearing portions of greater area than the cylindrical portion, and means for adjusting the seats for the rollers in the direction of the axis of the latter to take up wear.

2. A car wheel composed of a body portion, removable wearing rings applied thereto and having their outer faces formed with grooves coacting to constitute a circumferential seat having a cylindrical center portion and tapered side portions, rollers seated in the wearing rings, each roller having a cylindrical central bearing face and conical end bearing faces of greater area than the cylindrical face, a rim section applied to the rollers and having an interior circumferential seat for the rollers, said seat having a cylindrical center portion and tapered side portions of greater area than the center portion, and a cheek plate removably secured to the body portion of the wheel for holding the wearing rings and rim section thereto.

3. A car wheel comprising a body portion, wearing rings seated on the periphery thereof, thin, removable washers interposed between the meeting faces of the wearing rings, a removable cheek plate for holding the wearing rings in place, thin, removable washers interposed between the cheek plate and the body portion, a rim portion circumferentially movable about the body portion and held thereto by the cheek plate, and rollers interposed between the rim portion and the wearing plates on the body portion.

4. A car wheel comprising a body portion, wearing rings seated on the periphery of the body portion, thin, removable washers between the meeting faces of the wearing rings, rollers on said wearing rings, a rim section carried by said rollers, a cheek plate applied

to the body portion and retaining the wearing rings and rim section in place, other thin, removable washers between the cheek plate and the body portion, bolts extending through the body portion and the cheek plate, a locking ring engaging the nuts of all the bolts, and means for securing said locking ring to the body portion of the wheel.

In testimony that we claim the foregoing as our own, we have hereto affixed our signatures in the presence of two witnesses.

WILLIAM C. MAYO.
JOHN HOULEHAN.

Witnesses:
W. A. WARNOCK,
WM. W. GILLEN.