

PATENT SPECIFICATION



Application Date: Sept. 23, 1921. No. 25,272/21.

190,261

Complete Left: June 23, 1922.

(Patent of Addition to No. 153,342: Dec. 22, 1919.)

Complete Accepted: Dec. 21, 1922.

PROVISIONAL SPECIFICATION.

Improvements in the Driving Gear of Locomotives, Tramcars and other Vehicles.

We, Sir JOHN AUDLEY FREDERICK ASPINALL, of Deerstead House, St. John's, Woking, in the County of Surrey, a British subject, and THE ENGLISH ELECTRIC COMPANY LIMITED, a company registered under British law, of Queen's House, 28, Kingsway, London, W.C., do hereby declare the nature of this invention to be as follows:—

10 In the driving of electric locomotives or tramcars and other vehicles in which tooth gearing is employed to transmit motion to the axle of the running wheels from a motor carried on the frame of the
15 vehicle, it is necessary to make provision for the relative motion of the wheel axle and the motor shaft, which takes place under the influence of irregularities of the track or other circumstances, and is
20 permitted by the fact that the springs are interposed between the frame and the wheels.

An example of a driving gear permitting this relative motion is given by the
25 Specification of our Patent No. 153,342. In that gear, up and down motion of the wheel axle relative to the frame, without material change of the distance between centres of the gearing, is provided for, and
30 the present invention has for its object to provide an improved construction which takes into account in a more satisfactory manner the condition that, in addition to rising and falling, the axle
35 may also tilt owing to the two ends rising and falling at different times. In the improved construction the gear wheel mounted on the wheel axles is not rigidly carried thereon, but is supported so that
40 it can tilt through a small angle laterally, so that its teeth faces may remain parallel with the corresponding faces on the wheel through which it is driven, regardless of the tilting of the axle. In this construction
45 a spherical seating is provided on the

axle, and the gear wheel is mounted on this seating so as to be capable of rocking thereon. The drive is transmitted from the gear wheel direct to one of the running wheels, or to a disc or frame firmly
50 mounted on the axle, this transmission being by way of members projecting from one of the wheels or discs into recesses in the other, and engaging
55 in these recesses in such a manner as to permit relative motion to take place between the members and the sides of the recesses as the gear wheel tips. Such an engagement may be made by forming the
60 members with spherical ends, which fit between a pair of blocks corresponding thereto on their inner surfaces, and being adapted on their outer surfaces to slide both radially and laterally to a small
65 extent in the recesses.

To give a certain degree of stability to the gear wheel on its spherical seating, springs are interposed between this wheel and the adjacent disc or wheel, these
70 springs being spaced apart so as to distribute their pressure around the circle, and being so designed that while they are of sufficient strength to give the necessary support to the gear wheel, they offer only
75 a small and practically inappreciable resistance to the tilting of the wheel under the influence of the driving pressure applied to its teeth.

It will be recognised that, in general, it will be necessary to make the gear
80 wheel in two or more pieces so as to permit it to be assembled on the spherical seating. A convenient form of construction seems to be one in which three pieces are employed, namely, a body divided
85 into two halves diametrically, and adapted to be bolted together and a ring encircling these two halves, and having the teeth formed on it.

In order to provide for the tilting action 90

of the gear wheel above described without sacrifice of the bearing surface of the teeth, it will be necessary to make one of the pair of wheels with a wider face than the other, so that the smaller face is always completely in engagement.

While the invention as described above

is particularly applicable to tooth gearing, it is to be understood, however, that it is not limited thereto, and may, for instance, be used as part of a chain drive.

Dated this 22nd day of September, 1921.

R. L. CLEAVER.

COMPLETE SPECIFICATION.

Improvements in the Driving Gear of Locomotives, Tramcars and other Vehicles.

We, Sir JOHN AUDLEY FREDERICK ASPINALL, of Deerstead House, St. John's, Woking, in the County of Surrey, a British subject, and THE ENGLISH ELECTRIC COMPANY LIMITED, a company registered under British law, of Queen's House, 28, Kingsway, London, W.C., do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

In the driving of electric locomotives or tramcars and other vehicles in which tooth gearing is employed to transmit motion to the axle of the running wheels from a motor carried on the frame of the vehicle, it is necessary to make provision for the relative motion of the wheel axle and the motor shaft, which takes place under the influence of irregularities of the track or other circumstances, and is permitted by the fact that the springs are interposed between the frame and the wheels.

The Specification of our Patent No. 153,342 describes a driving gear arrangement in which up and down motion of the running wheel axle relative to the frame without material change of the distance between centres of the gear is provided for. It is also recognised in that specification that owing to the causes of relative motion between the axes of the gearing acting upon the two running wheels of an axle at different times and to different extents, a tilting of the axle may take place and it is there suggested that to maintain satisfactory running under these conditions, the faces of the teeth of one or both of the gear wheels should be curved. The present invention comprises an improvement in or modification of the invention referred to above in which a more satisfactory arrangement is provided for dealing with this tilting. By this improvement or modification, the object in view is attained by an arrangement of the kind in which the gear wheel mounted on the

axle is carried on a spherical seating, the drive being transmitted between this wheel and an adjacent part by means of projections on one of them slidably engaging in recesses in the other. In accordance with the invention an arrangement of this kind is constructed so that the drive is transmitted between the gear wheel and one of the running wheels by members projecting axially between them, with or without the intermediary of a disc or frame carried by one or both of them. In constructing such an arrangement the axially projecting members are fixed at one end to one of the parts between which they transmit the drive and engage in the recesses in the other part in such a manner as to permit relative motion to take place between the members and the sides of the recesses as the gear wheel tips. Such an engagement may be made by forming the members with spherical ends, which fit between a pair of blocks corresponding thereto on their inner surfaces and adapted on their outer surfaces to slide both radially and laterally to a small extent in the recesses.

To give a certain degree of stability to the gear wheel on its spherical seating, springs are interposed between this wheel and the adjacent disc or wheel, these springs being spaced apart so as to distribute their pressure around the circle, and being so designed that while they are of sufficient strength to give the necessary support to the gear wheel, they offer only a small and practically inappreciable resistance to the tilting of the wheel under the influence of the driving pressure applied to its teeth.

It will be recognised that, in general, it will be necessary to make the gear wheel in two or more pieces so as to permit it to be assembled on the spherical seating. A convenient form of construction seems to be one in which three pieces are employed, namely, a body divided into two halves diametrically, and adapted to be bolted together and a ring encirc-

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ling these two halves, and having the teeth formed on it. Another arrangement in which two main pieces are employed will be hereafter described.

5 In order to provide for the tilting action of the gear wheel above described without sacrifice of the bearing surface of the teeth, it will be necessary to make one of the pair of wheels with a wider
10 face than the other, so that the smaller face is always completely in engagement.

The invention will by way of example be more particularly described with reference to the accompanying drawings in which Figures 1 and 2 show side elevation and plan views and Figure 3 shows an end elevation with certain parts in section of parts of a rail locomotive. Figure 4 shows a detail.

20 The motor 1 is rigidly mounted on the cross beams 2 on the locomotive frame work 3 and the countershaft 4 is also mounted on this frame work. The running wheel axle 5 is capable of movement in arcuate guides 6 in the frame 3 so that the degree of mesh between the wheels on the countershaft 4 and the running wheel axle 5 respectively remains constant as explained in the Specification of our
25 Patent No. 153,342. The motor spur pinion 7 drives the spur wheel 8 on the countershaft 4 and the teeth of wheel 8 engage the teeth of the gear wheel 9 which is mounted so that it can rock upon
30 a spherical seating 10 fixed to the wheel shaft 5, as clearly shown in Figure 3 part of which is a section on the line A B of Figure 1, and is locked in position by the ring 11 with appropriate fixing screws.

40 The drive is transmitted from the wheel 9 to the running wheel 12 by means of the projecting members 13 which are fixed to the wheel 12 and terminate in spherical ends 14 which fit between a pair of blocks
45 15 corresponding thereto on their inner surfaces and adapted on their outer surfaces to slide both radially and laterally to a small extent in the recesses 16 in the wheel 9.

50 To give stability to the gear wheel 9 on its spherical seating four sets of springs 22 are interposed between it and the wheel 12. These springs as shown in Figure 4 are threaded on to spindles 17
55 provided with flanges 18 at one end which project into recesses 19 in the wheel 9. At the other end each spindle is threaded and provided with a nut 20 and can slide loosely through a ring member 21 which
60 is screwed tightly into a hole in the disc of the wheel 12. Each spring is held compressed between the members 21 and 18 and any rocking of the wheel 9 upon its spherical seating will cause one or more
65 of the flanges 18 to come into contact with

one or more of the bottoms of the recesses 19 thus compressing the springs 22. The nuts 20 will at the same time move away from the members 21 so that the whole compressive force of the springs is communicated to the wheel 9. The position of the nut 20 on the spindle 17 is preferably adjusted so that when the wheel 9 is parallel with the wheel 12 all the force of the springs is taken between the said nuts and the members 21 and it is only when a recess 19 moves towards the wheel 12 that the force of the appropriate spring 22 is communicated to the wheel 9.

It will be noticed that the width of the gear teeth on the wheel 9 is greater than that of the teeth on the wheel 8. This is to ensure as referred to above that the whole width of the teeth of wheel 8 is always utilised.

While the invention as described above is particularly applicable to spur toothed gearing, it will be understood that it is not limited thereto and may, for instance, be used as part of a chain drive to preserve the alignment of the chain and sprocket wheels.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. A rail locomotive or the like having a gear wheel through which the main drive is transmitted mounted upon the running wheel axle of the locomotive through a spherical bearing and driving members fixed to and projecting in an axial direction either from one of the locomotive running wheels or from a disc or frame firmly mounted upon the running wheel axle into recesses in the said gear wheel or from the said gear wheel into recesses in one of the locomotive running wheels or in a disc or frame firmly mounted upon the running wheel axle in such a manner as to permit relative motion to take place between the members and the sides of the recesses as the gear wheel rocks substantially as described.

2. A rail locomotive or the like constructed as claimed in Claim 1 wherein springs are interposed between the gear wheel and the adjacent locomotive running wheel or the disc or frame mounted upon the running wheel axle substantially as described.

3. A rail locomotive or the like constructed as claimed in Claims 1 or 2 wherein the driving members where they project into the recesses have spherically shaped ends which fit between a pair of blocks corresponding thereto on their

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inner surfaces and are adapted on their outer surfaces to slide both radially and laterally to a small extent in the recesses substantially as described.

- 5 4. A rail locomotive having arrangements for transmitting the driving effort to its driving wheels substantially as

described and illustrated in the accompanying drawings.

Dated this 23rd day of June, 1922. 10

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Westminster, London, S.W. 1.

Fig.1.

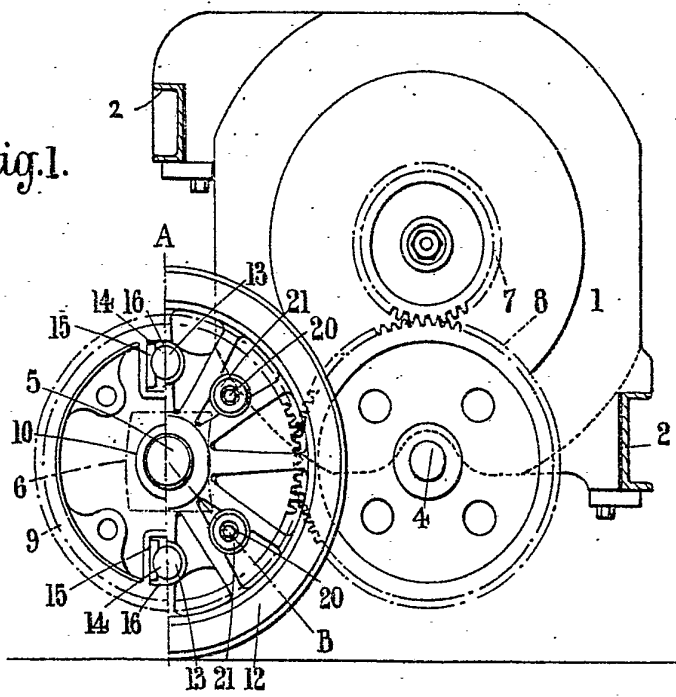
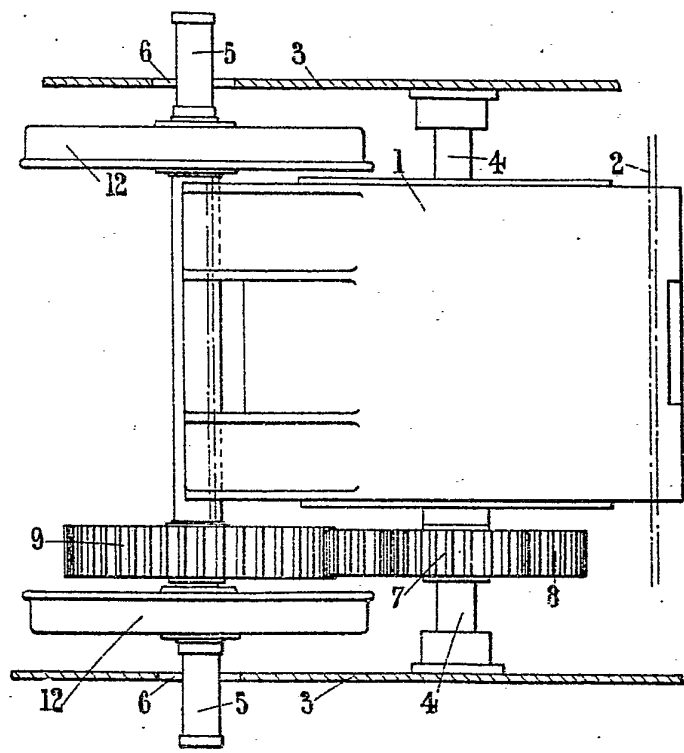


Fig.2.



[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 3.

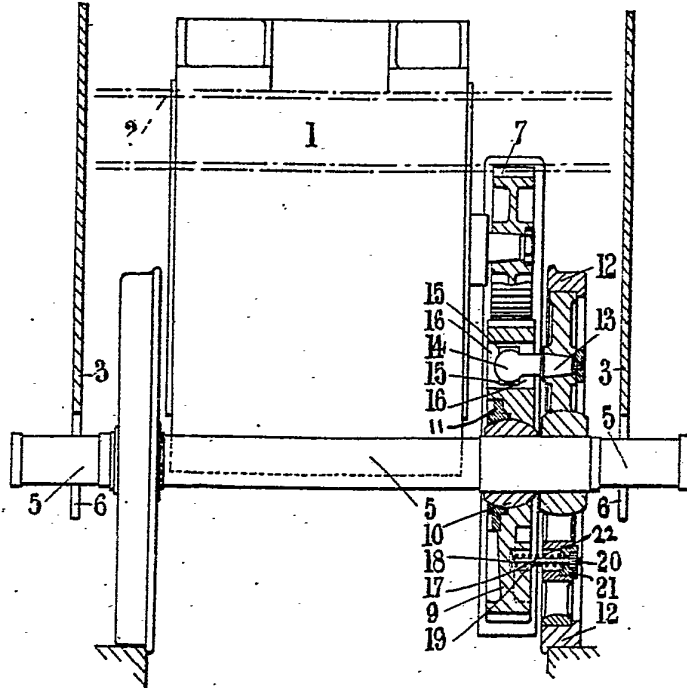
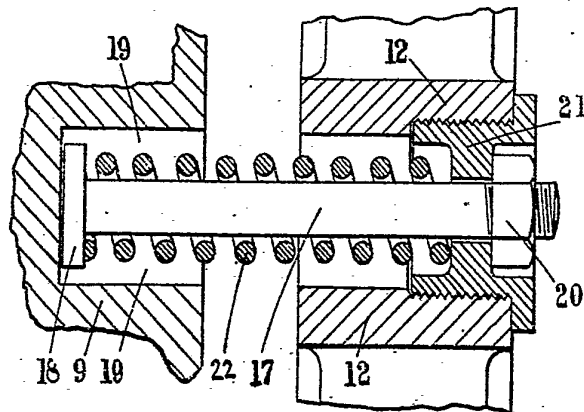


Fig. 4.



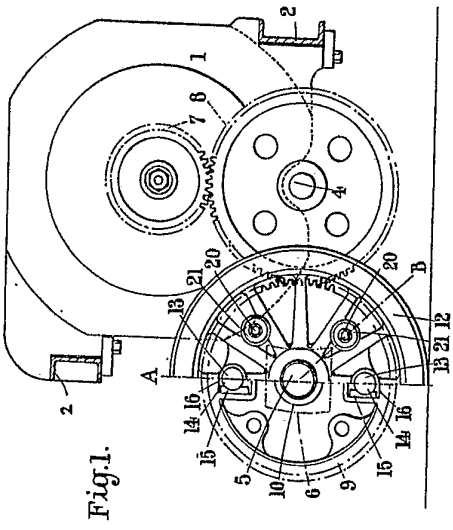


Fig. 1.

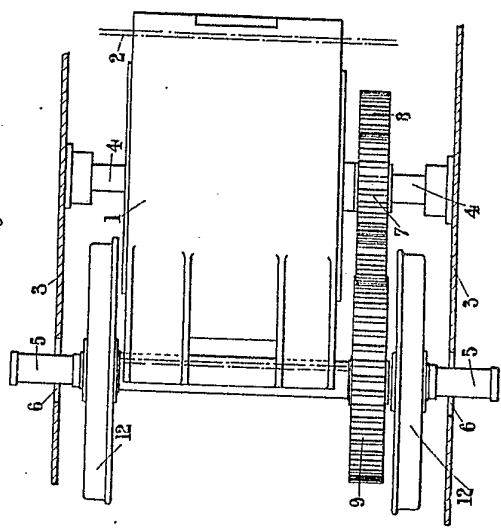


Fig. 2.

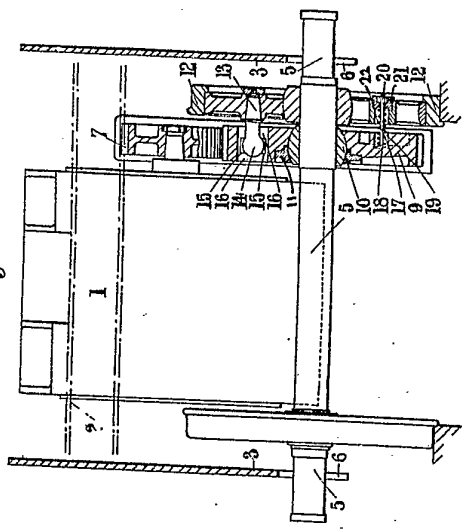


Fig. 3.

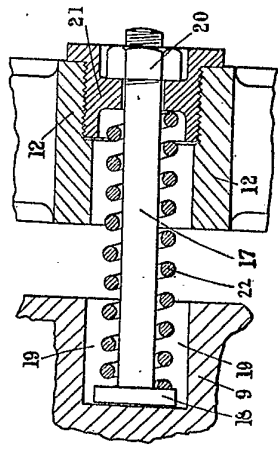


Fig. 4.

[This Drawing is a reproduction of the Original on a reduced scale.]