PATENT SPECIFICATION

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153,342

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COMPLETE SPECIFICATION.

Improvements in Railway, Tramway and the like Locomotives.

We, Sir JOHN AUDLEY FREDERICK ASPINALL, of Gledhill, Sefton Park, Liverpool, Engineer, and THE ENGLISH ELECTRIC COMPANY LIMITED, of Queens House, 28, Kingsway, London, W.C., Engineers, 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:—

The present invention relates to improvements in railway, tramway or the like locomotives.

The invention will be more particularly described with reference to a locomotive driven by an electric motor but it will be obvious that the improvements are equally applicable to locomotives driven by internal combustion engines or other types of prime movers.

It has been a disadvantage of many of the existing forms of electric locomotives that the motors are mounted in a position giving a very low centre of gravity and moreover only part of the weight of the electric motor has been spring borne.

In view of these disadvantages, proposals have been made from time to time to provide for the mounting of the motor directly on the frame of a vehicle so as to be spring borne while securing the maintenance of correct distances between the centres of the toothed wheels by which rotation is transmitted from the motor shaft to the wheel axle. Included amongst these are several forms of transmission from a pinion on the motor shaft to the wheel on the driving axle through an intermediate wheel supported by a pair of radius links carried at their other ends on the motor shaft and on the wheel axle respectively. Such arrangements have generally provided that the two radius links should lie approximately at right angles to each other, one being disposed approximately vertically and other horizontally.

This generally requires that the shaft of the intermediate wheel should have considerable freedom of lateral movement to enable it to accommodate the relative displacements of the wheel axle and frame which take place during the running of the vehicle.

In accordance with the present invention a construction is adopted which does not depend for its satisfactory working upon any considerable amount of freedom for lateral movement being given to the shaft of the toothed wheel from which the running wheel axle is driven. In this construction the wheel axle is mounted so as to move in arcuate guides formed in the frame of the vehicle and struck from a centre which coincides approximately with the axis of the toothed wheel by which the axle is driven. This wheel must be so disposed that its axis is in the neighbourhood of the horizontal plane through the driving wheel axle so that the general direction of the path determined by the arcuate guides is vertical.

The invention will be more particularly described by reference to the accompanying drawings in which Figures 1 and 2 are diagrammatical views, Figure 3 is a partial side elevation of a form of construction and Figure 4 is a corresponding plan view partly in section.

Referring to the diagrammatic drawings, a motor 1, (Fig. 1) is rigidly mounted upon the frame of a rail locomotive, the drive being transmitted to the driving wheels 2, of said locomotive

through spur wheel transmission consisting of a spur wheel 3 on the motor shaft, which drives a spur wheel 4, on a countershaft 5, which spur wheel 4, in turn meshes with a spur wheel 6 on the axle of the driving wheel 2. The disposition of the axis of the shafts of the spur wheels 3, 4 and 6 is preferably substantially rectangular that is to say, the line joining the centres of the motor shaft 16 and the countershaft 5 lies approximatately vertically and the line joining the centre of the countershaft 5 with the centre of the wheel axle 21 lies approximately horizontally.

It will be understood that the wheel axle 21 carries the springs of the locomotive frame on which the motor 1 is rigidly mounted so that relative motion will take place between the shaft 16 and the axle 21.

The method of obtaining an approximately constant degree of mesh between the teeth of the wheel on the countershaft and of the driving axle is by providing arcuate guides in the sides of the framework of the locomotive as indicated in dotted lines at 7 and 8 (Fig. 2) that is the driving wheels rise and fall relatively to the locomotive frame work yet the centres of countershaft and driving wheel remain at a constant distance.

In order to relieve the load on the guides of the axle boxes the arrangement diagrammatically indicated in Figure 2 may be adopted. In this radius rods 9 are provided connecting the countershaft 5 with the driving wheel axle 21.

It will be obvious that varying requirements will largely determine the actual form of the locomotive structure. One arrangement is shewn in Figures 3 and 4 of the drawings. In this case, the electric motor 17, is rigidly mounted on cross beams 18, on the locomotive frame work 19, and the countershaft 20 is also rigidly mounted on this frame. The wheel axle 21, however is capable of movement in arcuate guides 22, in the locomotive frame 19, so that the degree of mesh between the wheels on the countershaft 20 and the driving shaft 21 respectively remains constant. In the arrangement shown the electric motor 17, is disposed centrally of the driving wheels 23 on the axle 21 and in this case, radius rods 24 connect the axles 20, 21, this arrangement therefore corresponding to the arrangement diagrammatically illustrated with reference to the Fig. 2, above described. On the outside of the radius rods 24, are arranged each of a pair of spur wheels 25, meshing with each of a pair of spur wheels 26 at the ends of the axle 21.

Owing to the fact that the causes of relative motion between the axis will not always equally affect both wheels 2 of an axle to the same extent, it may be desirable to provide a special shaping of the teeth of one or more of the meshing wheels. This shaping would consist in curving the faces of the teeth transversely so that sections of these faces on surfaces concentric with the pitch circle will not be straight-lines but will be slightly convex curves.

If desired, to secure further space for the motor, the radius rods 24 may be omitted, and the wheel axle be guided solely by arcuate guides as described above.

Various other modifications of drive may be effected for instance should it be so desired, the drive from the electric motor to the driving axle might be on the outside of the driving wheels.

In the construction described by way of example, above the countershaft carrying the intermediate spur wheel has been rigidly mounted. It may however be carried by radius links from the electric motor shaft or from bearings co-axial therewith.

Guards or cases such as 36 (Fig. 3) may be provided for the gears to shield these and also to serve as reservoirs for lubricant which guards can also be carried on the rigid framework supporting the electric motor and intermediate gears.

The electric motor has been shown to be rigidly mounted on cross stays, it is obvious however, that it may be mounted on spring supports depending from such cross stays or the like parts of the locomotive frame.

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 having the driving wheel axle driven through a toothed wheel on a shaft carried by the frame of the vehicle in which the said axle is mounted so as to move in arcuate guides struck from a centre approximately co-incident with the axis of the said toothed wheel which lies in the neighbourhood of the horizontal plane through the axle, substantially as described.

2. A rail locomotive as in Claim 1, in

which a radius link is arranged between the axle and the shaft carrying the toothed wheel to work in conjunction with the arcuate guides for the axle, which guides are shaped to the path taken by the end of the said link, substantially as described.

3. A rail locomotive constructed and arranged to operate substantially as described with reference to the accompanying drawings.

Dated this 20th day of December, 1919.

W. P. THOMPSON & Co.,
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Chartered Patent Agents.

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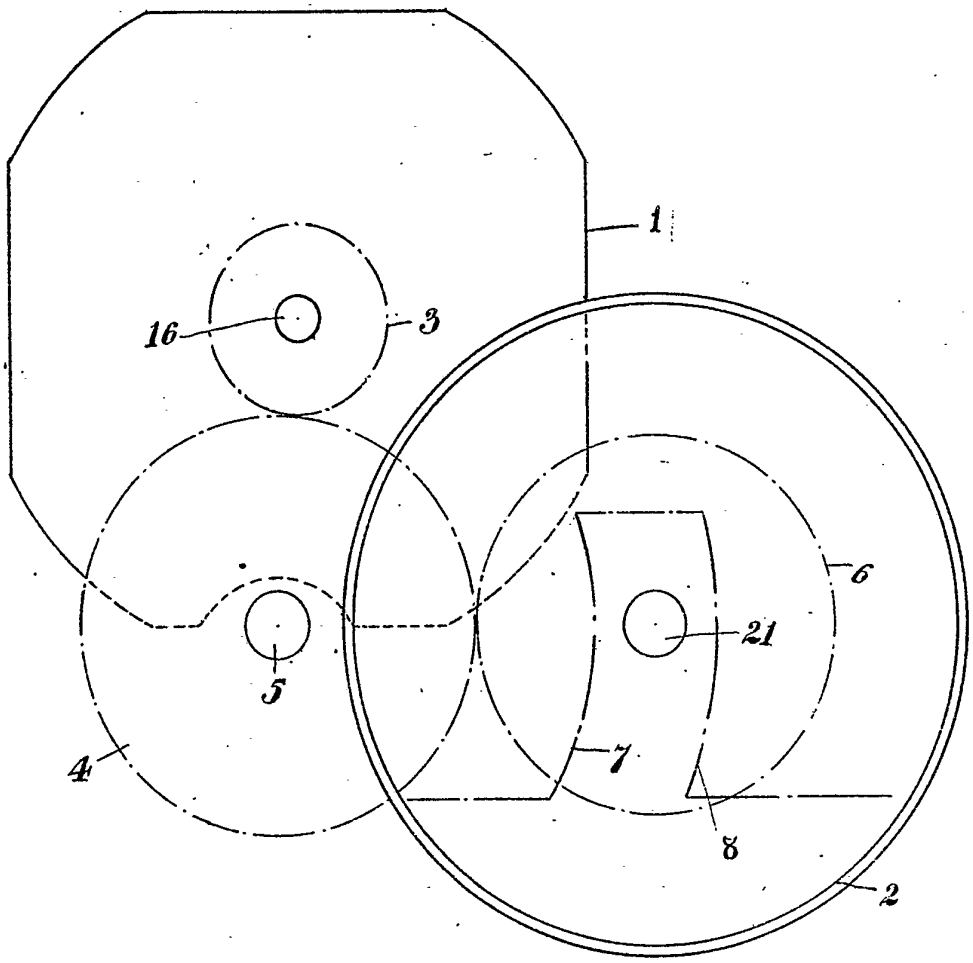

Fig. 1.

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

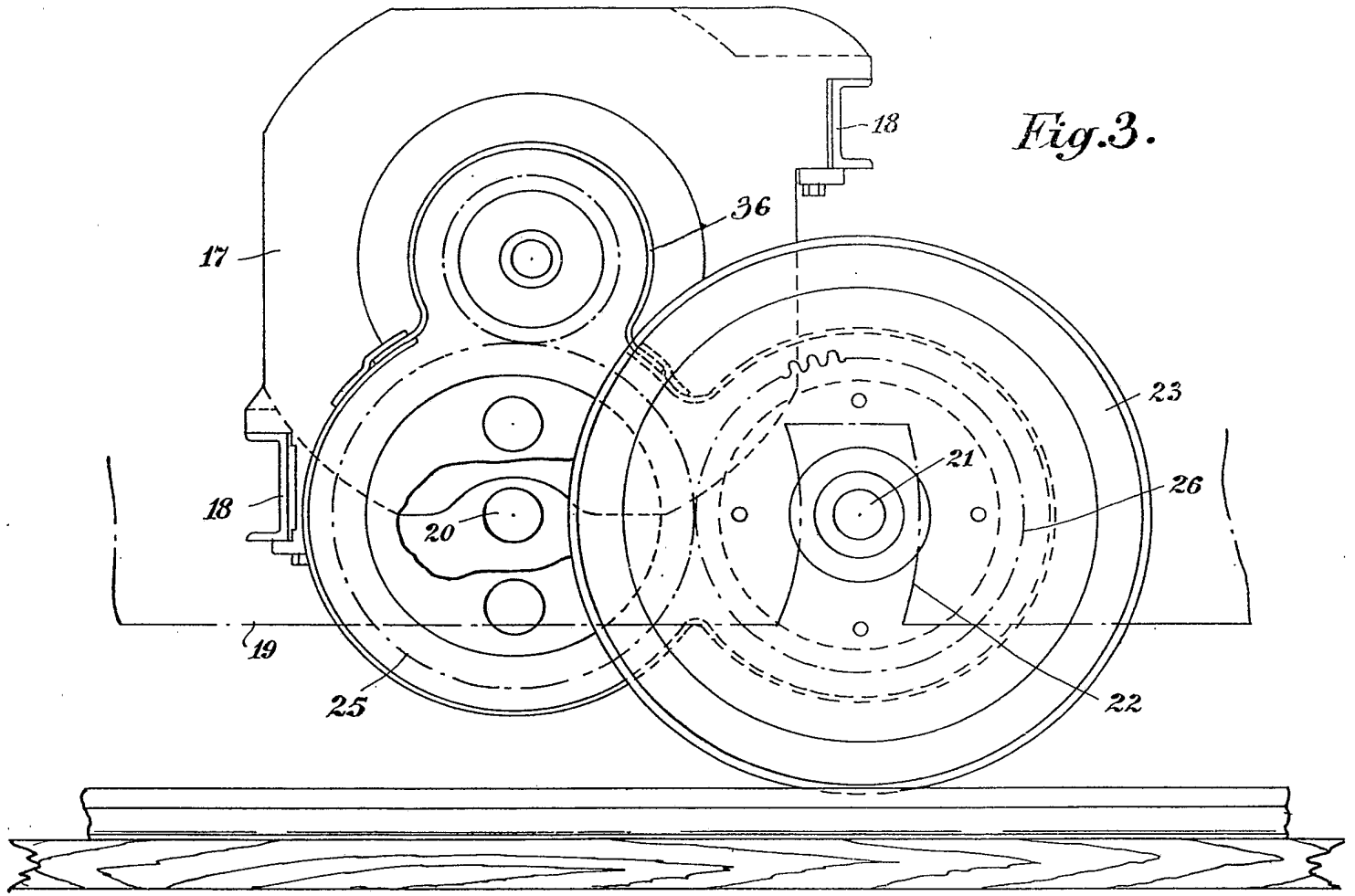

Fig.3.

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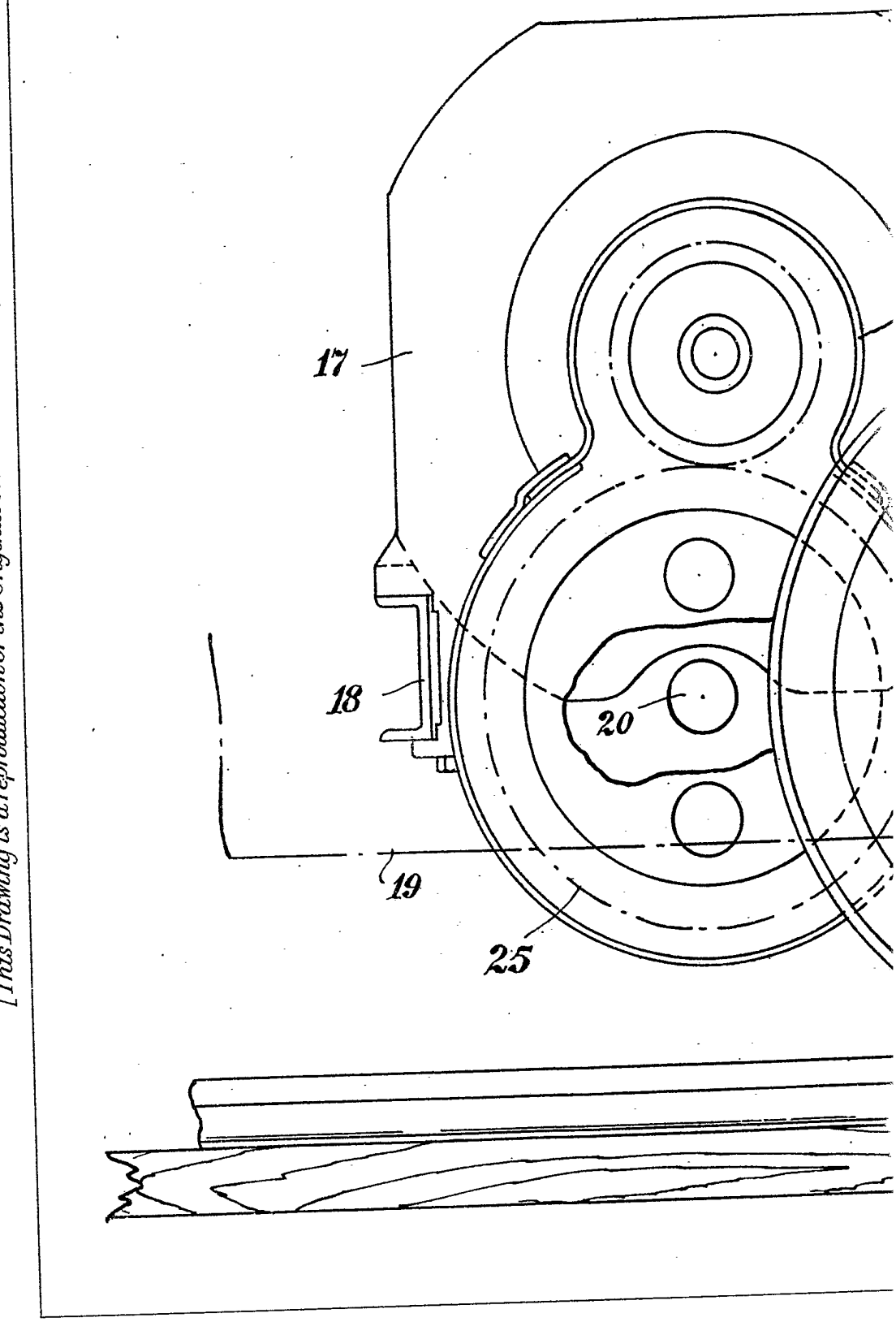
[This Drawing is a reproduction of the Original on a reduced scale.]



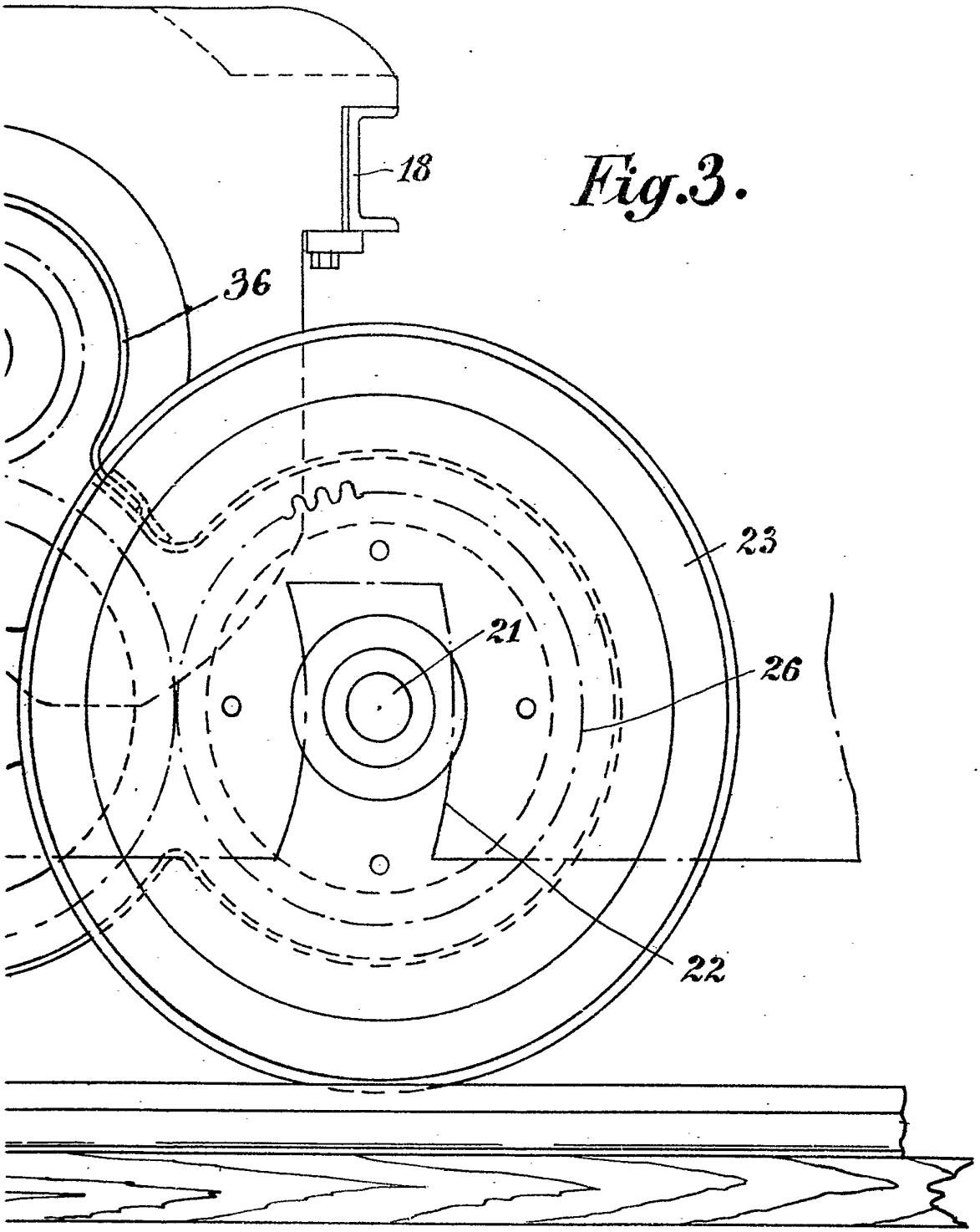


Fig.3.

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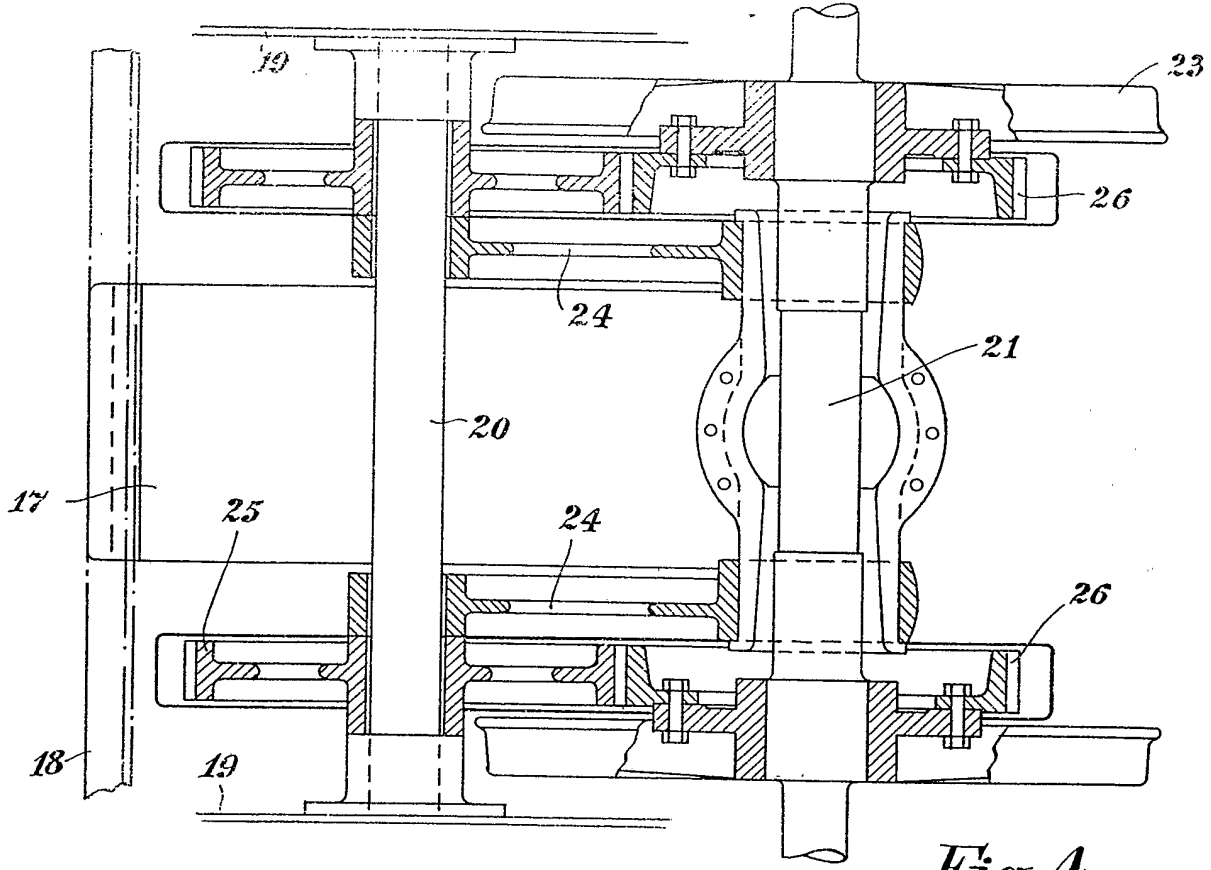

Fig. 4.

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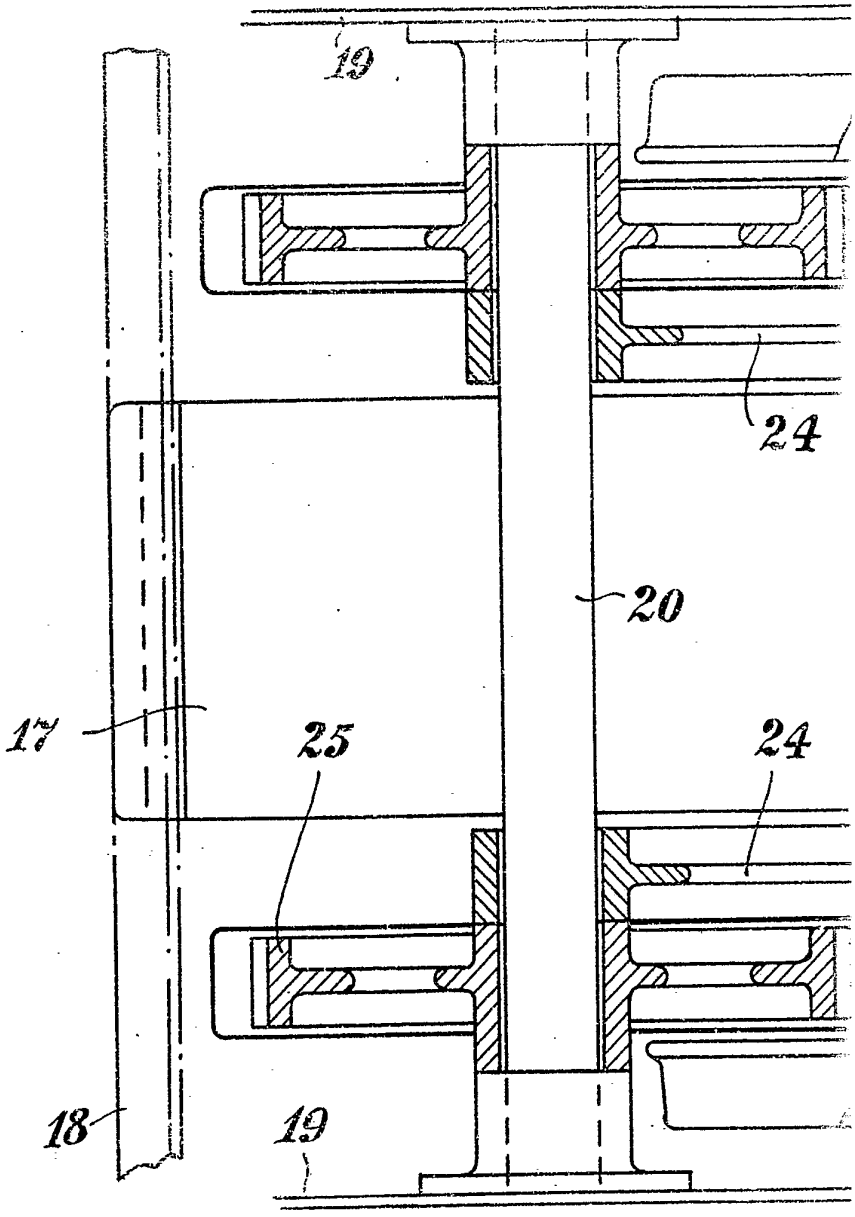
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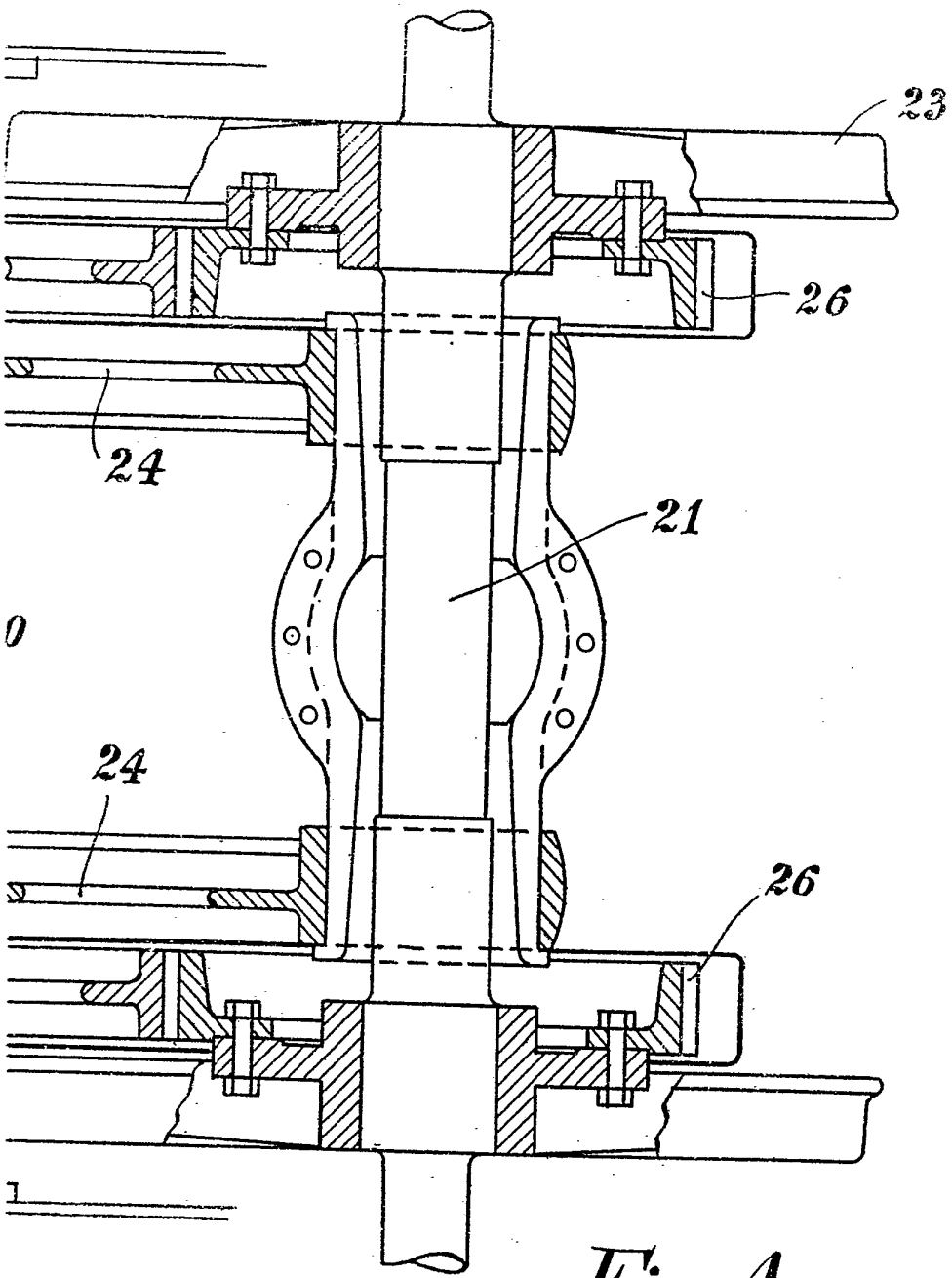

Fig. 4.

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