PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Improvements in or relating to Endless Track Vehicles.

I, ADOLPHE KEGRESSE, a French Citizen, of 156, rue Armand Silvestre, Courbevoie, France, 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:—

It is known that in endless track vehicles, the load is distributed more or less equally over the major portion of the length of the lower part of the track which rests on the ground.

At the moment of a very sharp turn, for example, the part of the endless track under consideration scrapes laterally on the ground, in a manner tending to plough up the latter. This ploughing is all the more considerable, the greater the load on the extremities of that part of the endless track in contact with the ground.

It is to be observed that, during a turn of very small radius, it is principally the endless band on the inside which is subjected to the maximum scraping stresses, whilst the outer band, which is the driving band and describes a circle of greater radius than the inner band, will exert on the ground a friction with a turning movement less harmful than the violent scraping of the inner band.

The present invention provides a means of obviating the aforementioned serious disadvantage and consists in a device for the variable distribution of the load on an endless track vehicle actuated by the motive power of the vehicle itself, and is characterised by a control taken from the steering gear, the said device acting upon one or more of the carrying parts of the vehicle.

A variety of mechanisms known in all branches of the art may be applied to the invention, and these mechanism may be pneumatic, hydraulic, mechanical, electro-mechanical, or even electrical.

A pneumatic device and a mechanical device will be described hereinafter by way of example, and according to which devices any person versed in the art will be able to construct one of the known devices mentioned in the foregoing and capable of satisfying the conditions of the invention.

In the accompanying drawings:

Figure 1 shows in elevation an endless track vehicle, with a diagrammatical representation of the device with pneumatic mechanism.

Figure 2 is a plan view of Figure 1.

Figure 3 shows a detail of the carrying set of rollers on a larger scale and in section.

Figure 4 is a view in elevation of the device with mechanical transmission, and

Figure 5 is a plan view of Figure 4.

The device of Figures 1 to 3 will first be described.

The propelling system may comprise any desired number of rollers, and in the example which will be described hereinafter, it is driven in known manner by an engine 1 which transmits its movement to a gear box 2 and a driving axle 3.

An air compressor 4, the drive of which may be taken either from the engine or from any point of the transmission, forces compressed air by means of a pipe 5 into a reservoir 6, and to two distribution valves 7 and 8 connected to the central carrying set of rollers of the corresponding side by means of pipes 9 and 10.

The valves 7 and 8 are controlled by a small lever 11 which is mounted on the steering gear 12 of the vehicle.

The rollers 13 of the carrying set are connected in pairs by an equaliser 14, the said equaliser being pivoted at 15 to the lower portion of a guide member 16 of suitable cross-section, which guide member carries in its upper portion a piston or diaphragm 17. The said piston 17 is movable in a cylinder 18 which is fixed rigidly to the chassis of the vehicle by lugs 19.

A suspension spring 21 is disposed between the piston 17 and the cover 20 of the cylinder 18.

The device operates as follows:

When it is desired to change direction, the driver operates the steering gear 12 controlling the turning of the vehicle. The steering gear, in moving, moves the small lever 11 which, by bearing on one of the valves 7 or 8, according as to whether the vehicle is being turned to the right or to the left, sends compressed air into the central carrying set of rollers of the corresponding side.

This compressed air entering the cylinder 18 acts upon the piston 17 and consequently permits the raising of the vehicle on the desired side, on a single carrying set of rollers, by the amount of the stroke of the piston in the cylinder. It will be seen, therefore, that at this moment all the endless track mechanism on the desired side will bear on the ground over a very small area in the vicinity of the centre of gravity of the machine. The other portions of the endless track, being detached from the ground, will no longer offer any resistance to the lateral displacement of the vehicle, which in a way can pivot on the central part of the endless band situated on the inside of the turn.

For vehicles of very large dimensions, it may be of advantage to raise the ends of the two endless bands, instead of only one as described in the foregoing. In this case, it will merely be necessary to force compressed air to both sides simultaneously, which does not offer any difficulty, it being possible to employ a single valve for this purpose.

It will be appreciated, without the need of a drawing, that an inverse combination of that above described may be provided. It would in fact, be possible to obtain an identical result by forcing compressed air into the end carrying sets of rollers, and below the pistons, instead of above, in order to raise the said pistons. The result obtained would be the same, that is to say, the load at that moment would be supported entirely by the central carrying set of rollers as in the preceding case.

It will likewise be understood that the same device may be applied to sets of a larger or smaller number of rollers, and that each cylinder may act not on a pair of rollers but on a single roller or on units of three, four or more rollers without in any way departing from the scope of the invention.

It will also be appreciated that it is possible to construct a hydraulic device on the same principle. For this purpose, it is merely necessary to replace the compressed air apparatus by hydraulic apparatus using oil or any other liquid commonly employed in the art.

It is also possible to provide an electro-mechanical device in which an electric servo-motor controls the appropriate raising devices.

An electrical device may also be employed, for example, in the form of a generator dynamo, driven by the engine and adapted to energize electro-magnets disposed in the supporting boxes of the carrying set of rollers, the current being distributed by contactors controlled by the steering gear.

As stated hereinbefore, it is also possible to vary the distribution of the load by means of the mechanical device shown in Figures 4 and 5.

As in the case of Figures 1 to 3, a small proportion of the motive power is employed for varying the distribution of the load on the endless band, in order to facilitate turning, while permitting at the same time an improvement in the suspension.

Whereas in the preceding case, fluid under pressure is employed, in the present instance a drive 1^1 derived from the transmission of the vehicle actuates a clutch 2^1 or the like, which is controlled by a hand lever or pedal 3^1 situated in the vicinity of the steering gear 17^1. The said clutch drives a transverse shaft 4^1 which by means of an appropriate step-down gear 5^1 actuates a lever 6^1 connected by a rod 7^1 to a toggle joint 8^1, one arm 9^1 of which is pivoted by its end 10^1 to a fixed point 11^1 on the vehicle chassis itself. The end of the other arm 12^1 of the toggle joint is mounted on the equaliser 13^1 of the central carrying set of rollers.

The device operates as follows:

When negotiating a turn, the hand-lever 3^1 is actuated to throw in the clutch 2^1 of the drive 1^1. This clutch actuates the shaft 4^1, on each end of which the pinion 14^1 moves the crown gear 15^1, to which is fixed the lever 6^1. The latter is moved through a certain angle, at the same time straightening the arms of the toggle joint 8^1. The angle of displacement of the lever 6^1 being limited by the stop 16^1, the opening of the toggle joint is also limited by reason of that fact. The length of movement is predetermined so that the toggle joint can never be brought completely into a straight line. The toggle joint, on opening, moves its fixed point away from the carrying set of rollers, thus raising the vehicle, while bearing only on the central carrying set.

It will be seen that, at this moment, all or most of the load of the vehicle is transferred to the central carrying set of rollers, thus facilitating the turning. This also permits, in the provision of the

distribution of the load over the lower portion of the endless band during normal operation, the said load to be transferred almost entirely to the extreme carrying sets of rollers, the central portion merely serving, so to speak, as a guide for the endless band. The suspension of the vehicle is thus improved, due to the distance apart of the points of support on the ground.

In order to render the device entirely automatic, the handle 3^1 for controlling the clutch 2^1 is actuated by the steering gear 17^1 for example by means of a small lever forming a cam 18^1. In this way, to each movement imparted to the steering gear, there will correspond a raising of the vehicle.

It will be understood from this description and the drawings, that this device is reversible, that is to say, as soon as the pull on the rod 7^1 ceases the vehicle will reassume its original position under the action of its weight.

The device is shown as applied to a central carrying set of two rollers, but it is to be understood that the number of the rollers of this set may vary more or less, according to the size of the vehicle.

Furthermore, it will be observed that a similar device may be applied in a different way, for example, instead of acting on the central set of rollers and raising the vehicle, it is possible to provide a mechanism acting on the extreme carrying sets of rollers. In this case, the effect of the mechanism will be to raise the carrying sets of rollers relatively to the chassis, instead of lowering them as in the example described hereinbefore.

It will be seen that the final result will be of the same order since, by raising the carrying sets of rollers, the load will be automatically transferred to the central carrying set of rollers.

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

1. In an endless track vehicle, a device for the variable distribution of the load actuated by the motive power of the vehicle itself, characterised by a control taken from the steering gear, the said device acting upon one or more of the carrying parts of the vehicle.

2. A device as claimed in Claim 1, characterised by a pneumatic or hydraulic unit, comprising a pump or compressor, actuated by the engine or its transmission gear, conduits and valves operated by the steering gear and forcing the compressed air or liquid into one or more selected parts of the carrying system of the vehicle.

3. A constructional form of the device as claimed in Claim 1, characterised by mechanical operating means deriving its motion from the engine or its transmission gear and acting on the carrying system of the vehicle by any appropriate and known mechanical means.

4. In the device as claimed in Claims 1 and 3, the use of a combination of an electric servo-motor with known mechanical operating means for acting on one or more selected parts of the carrying system of the vehicle.

5. A constructional form of the device as claimed in Claim I, characterised by purely electric operating means composed of a generator dynamo, driven by the engine, sending current into electro-magnets disposed in the supporting boxes of the carrying set of rollers, the said current being distributed by contactors controlled by the steering gear.

6. A device for the variable distribution of the load on an endless track vehicle, characterised by a drive acting upon a clutch or like member, controlled by the steering gear, which clutch sets in motion an appropriate transmission acting on the system which connects the chassis and the set or sets of rollers for varying the distance between the said set or sets of roller and the chassis.

7. A device as claimed in Claim 6, in which the mechanism acts upon the central carrying set of rollers by raising the body relatively to the said set of rollers.

8. A device as claimed in Claim 6, in which the mechanism acts on the extreme carrying sets of rollers, by raising them relatively to the body.

9. An endless track vehicle, substantially as described or substantially as shown in the accompanying drawings.

Dated this 16th day of November, 1933.

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Fig.1.

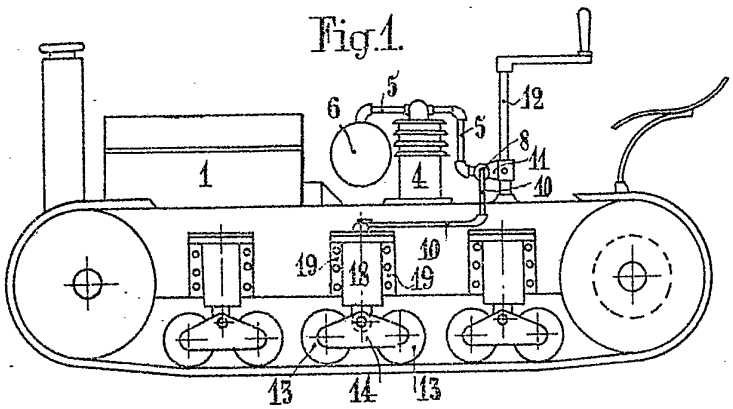


Fig.2.

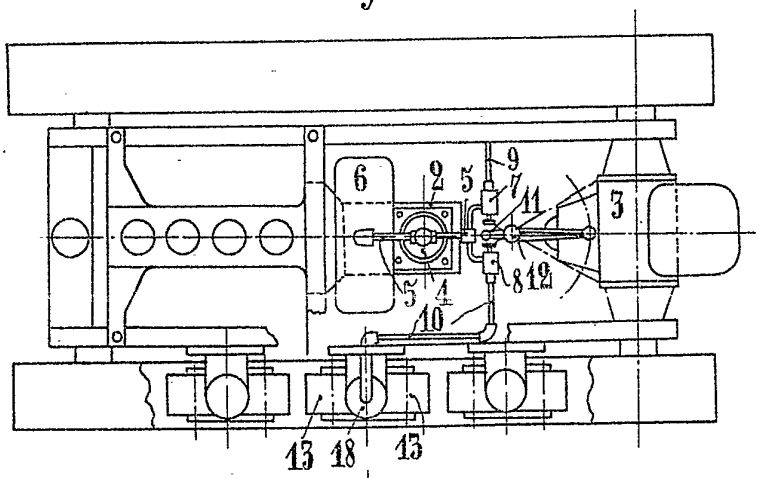
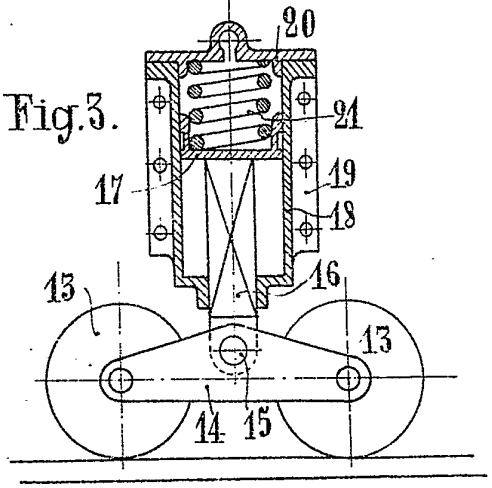
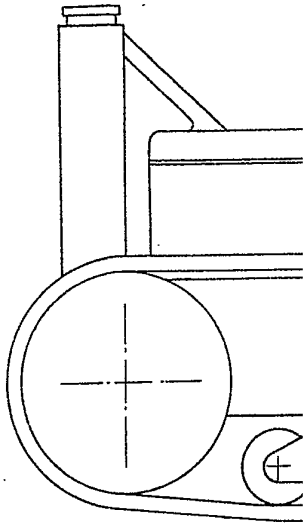


Fig.3.





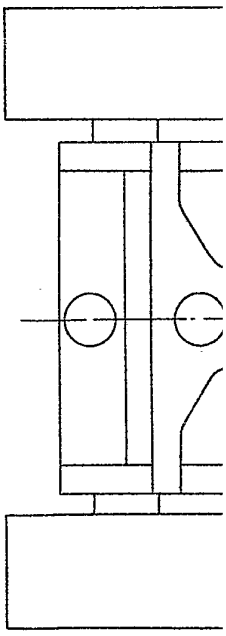


Fig.4.

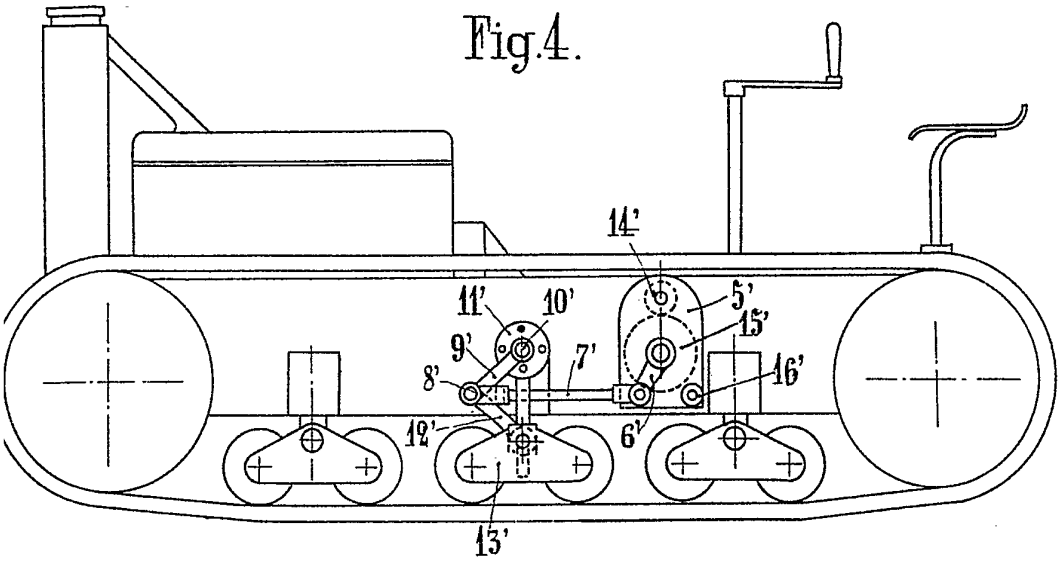


Fig.5.

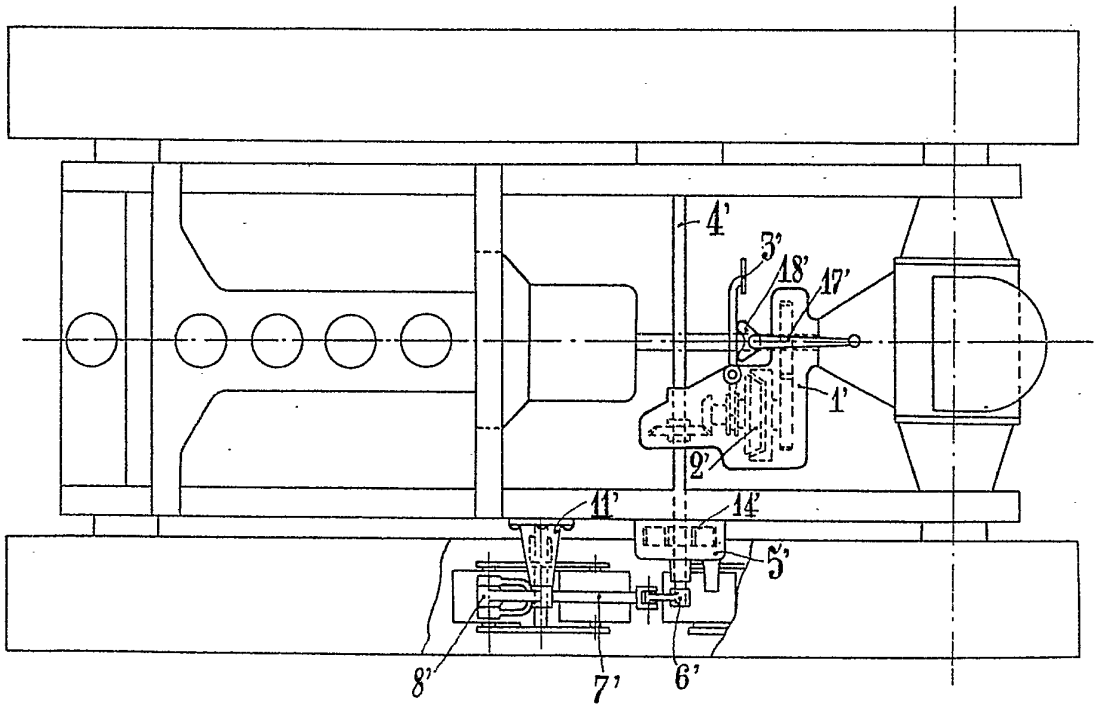


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Fig.1.

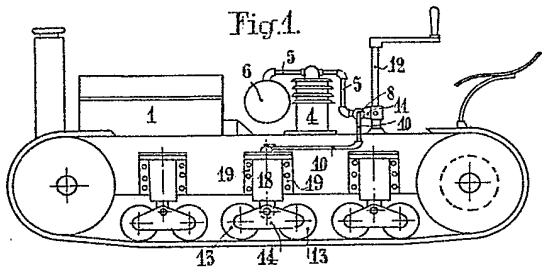


Fig.2.

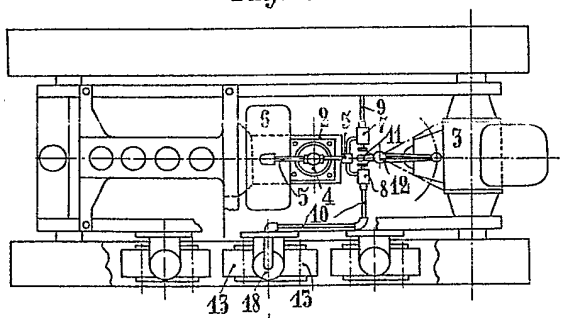


Fig.3.

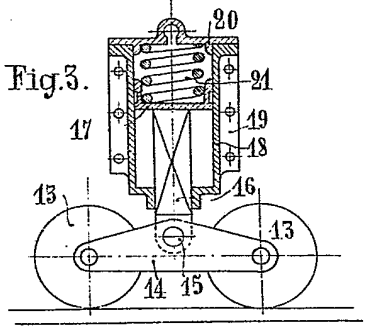


Fig.4.

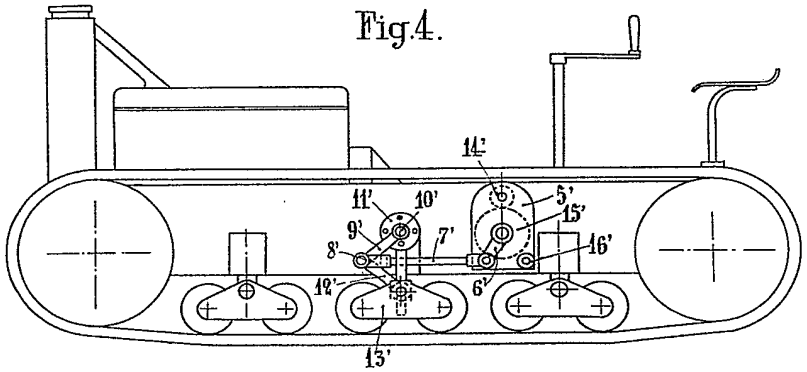
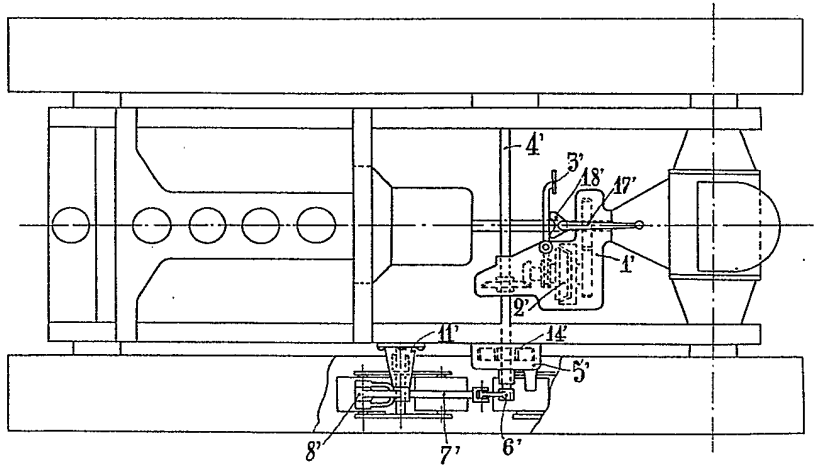


Fig.5.



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