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PATENT SPECIFICATION

Application Date, Apr. 18, 1917. No. 5471/17.

Complete Accepted, June 5, 1919.

COMPLETE SPECIFICATION.

Improvements in Mechanism Comprising Flexible Endless Supporting and Driving Bands, more particularly for Use in Motor Cars.

I, ADOLPHE KÉGRESSE, of Tsarskoïe Selo, in the Government District of Petrograd, Russia, Engineer, 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:—

This invention relates to improvements in mechanism comprising supple endless supporting and driving bands, more particularly for motor cars, of the kind described in the Specification of Application No. 5015 of A.D. 1913.

These improvements comprise mainly:

a) A simplification of the supporting apparatus which is thereby rendered independent of the driving wheels and guiding pulleys.

b) Modifications of the suspension apparatus.

c) Modifications of the supporting rollers that are free to rock in the transverse and longitudinal planes.

d) Modifications in the apparatus for driving the band, which may be driven either by means of a pulley, or directly by a suitable driving apparatus.

e) An apparatus for passing over ditches.

The accompanying drawings illustrate by way of example some constructional forms of the improvements forming the subject matter of the present invention. In these drawings which illustrate the proposed mechanical combinations:—

Fig. 1 is a side view partly in vertical section of an apparatus for propelling motor cars by means of an endless band.

Fig. 2 is a plan partly in section on the line A—B—C—D—E—F—G of Fig. 1, wherein the upper portion of the band is assumed to have been removed.

Fig. 3 is a cross section on the line M—N of Fig. 1.

Figs. 4, 5, 6 and 7 are respectively an elevation and different sections of modifications of the apparatus for driving the endless band direct.

Fig. 8 is a general view partly in elevation and partly in section of a further modification of the apparatus for driving the band by means of a driving wheel or pulley.

Fig. 9 is a horizontal section on the line A—B—C—D—E of Fig. 8.

Figs. 10 and 11 illustrate diagrammatically the position of the supporting rollers on uneven ground in the two modifications of supporting rollers shown in Figs. 8 and 9.

Fig. 12 is a development of the parts for producing the automatic adherence of a driving wheel or pulley on the endless band.

Fig. 13 is a diagrammatic view illustrating the operation of the apparatus in crossing ditches.

[*Price* 6*d*.]

In carrying the present invention into effect, the rollers are connected together by a rocking beam 1 (Figs. 1, 2 and 3), the cylindrical ends 2 of which are fitted with slight friction in the central portion of the axle 3 of the rollers 4. The rocking beams 1 are fixed at their centres to springs 5 by means of a freely movable pin 6. These springs are in their turn fixed to the axle 7 of the car by means of a jointed collar 8. They are therefore able to assume various angles relatively to the car axle.

The load supported by the springs 5 is transmitted directly and wholly to the rocking beams 1 which in their turn rest with their ends 2 on the pins 3 of the rollers 4. The joint 2 allows the rollers 4 to follow the unevennesses of the ground transversely to the direction of travel. The pin 6 of the rocking beam 1 allows the same action to take place in the longitudinal direction by allowing the rollers to move vertically relatively to one another according to the contour and the unevennesses of the road.

By this means there is obtained a supporting apparatus which is absolutely flexible and adapted to follow transversely and longitudinally the contour of the ground over which the car is travelling.

Six, eight, ten or more rollers may be combined together with this apparatus.

The large pulleys 9 (Figs. 1 and 2) serve here only as supports and guides for the band. Their relatively large diameter facilitates passing over difficult ground. These pulleys are maintained at the proper distance apart by means of stays 10 pivoted at their upper ends to the car axle 7, and being formed at their other ends with a cylindrical portion 11 fitting with slight friction in the axle 12 of the pulleys 9. By this means the large pulleys are likewise enabled to follow the transverse unevennesses of the road whilst being capable of moving vertically with relation to one another by rocking about the car axle 7.

The stays 10 may be pivoted at a point other than the axle 7, for instance at a point 13 (Fig. 1) shown diagrammatically on a part 34 (Fig. 8) which is itself fixed to the axle 7.

The driving of the endless band is effected in this case directly through the medium of an ordinary toothed wheel or roller 14 (Fig. 1) fixed on the rotating part of the axle 7; its teeth engage with the teeth 15 of the band-guiding device 16.

17 is a roller bearing upon the outer rolling track of the band 16; it maintains the latter at the proper distance from the toothed wheel 14. As the roller 17 is fixed to the chassis 18 by means of the bracket 20 and the part 19 for rendering the axle rigid, it will be understood that the action of the springs 5 will have no influence upon the proper working of this apparatus, especially in view of the flexibility and elasticity of the band.

In the case of cars of fairly high powers, the rubber teeth 15 of the band 16 may not be sufficiently strong. This defect may be remedied by providing the teeth 15 of the band with a metal plate 21 (Fig. 1) embedded in the rubber on the sides of the teeth that receive the load.

With the canvas-rubber teeth of the band there may also be combined a metal chain 22 (Figs. 4 and 5) jointed at the points 23. This chain passes inside the teeth and is fixed to the latter by rivets 24. All the teeth of the band are connected together by a rubber band in such a manner that the strain transmitted to one tooth by the driving pinion 14 will be distributed by the chain over all the other teeth of the endless band. The rollers or the teeth of the pinion 14 are adapted to allow of the passage of the chain 22.

Figs. 6 and 7 illustrate another modification of the driving apparatus. The car axle 7 carries, jointed around it on each side of the band, arms 25 on the ends of which the rollers 26 and 27 are mounted loose. Two of these latter, 26, serve to support and guide a roller chain 28 of special construction which is wide enough to allow of the passage of the teeth 15 of the band and of the teeth 29 of the driving pinion 14. The latter transmits the power directly to the rollers of the chain at two points 31, 32, diametrically opposite each other.

The chain drives in its turn the band by means of the teeth 15, and the effective length of this chain will depend on the power that is to be transmitted. The rollers 27 which may be connected together by an endless band 30 serve to assure a permanent contact between the band 16 and the chain 28.

I am aware that it has been proposed in connection with vehicle driving means to drive toothed endless belts or chains which constitute endless tracks and pass around driving pulleys and the like by means of toothed wheels, and to employ load supporting rollers on the back of the lower stretch of the endless band, which are mounted on rocking beams.

In the constructional form shown in Figures 8 and 9, the whole of the mechanism is mounted free on the tube 33 of the driving axle of an existing motor car. On each end of this tube 33 there is mounted loose a double rocking beam 34, to the ends of which are fixed the internally cylindrical spring boxes 35. The springs 36 bear at one end against the bottom of the boxes 35 and at their other end against the members 37 whose lower ends rest on the rocking beams 38 which in their turn bear upon supporting rollers 39. The members 37 whose cylindrical upper portions fit with slight friction in the boxes 35, enable the springs 36 to assure the suspension of the car. Further, the members 37 which are guided for a considerable portion of their length in the interior of the boxes 35, assure the guiding of the supporting trains formed by the rocking beams 38 and rollers 39 whilst allowing of a certain amount of lateral flexibility owing to the cylindrical fitting which also allows of an angular displacement of the members 37 with relation to the fixed boxes 35. Each rocking beam 38 is connected to the corresponding member 37 by the pin 40 around which it is capable of moving. This last arrangement is the same as that hereinbefore described with reference to Figures 1 and 2.

The two ends of the rocking beam 38 are connected to the supporting rollers 39 by the pins 41 and 42, two modifications of which are shown. The pin 41 pivoted at its centre in one of the ends of the rocking beam 38, terminates at each end in a joint.

Fig. 9 illustrates by way of example two different kinds of joint, namely:— In one kind the ends are formed by a spherical part 43 on which one of the half rollers 39 can rotate owing to the divided bearing 44. The spherical part 43 of the pin 41, as well as the bearing 44, may be replaced with advantage by a special ball-bearing of known type.

In the other kind the ends of the pin 41 may also carry a trunnion 45 on which is adapted to rock an externally cylindrical member 46 and on which the half roller 39 can rotate with slight friction.

The two combinations above described allow the supporting rollers to assume at right angles to their axes, positions similar to those shown in the diagram of Fig. 10.

Fig. 11 shows in a diagrammatic manner on the same kind of ground, the position of the supporting rollers 39 fixed with considerable friction on the pin 42 (Fig. 9). This pin 42 carries at its centre a ball-shaped member adapted to rotate inside a divided bearing 47 formed in one piece with the rocking beam 38. The ball-shaped member may be replaced by a ball bearing of known type. The combination thus obtained with the pin 42 has the advantage of simplicity and is practically sufficient in many cases.

In the construction shown in Figs. 8 and 9, the endless band is driven by means of a pulley with automatic adherence consisting of two parts, of which one is mounted on a central hub 48 and the other part is mounted on a secondary hub 49. This latter is loose on the central hub and is capable of sliding longitudinally thereon.

The central hub 48 and the corresponding part of the pulley are driven directly by a chain wheel 53 which receives its motion from the shaft 50 of the driving axle through the medium of the pinion 51 and the chain 52.

The half pulley fixed to the secondary hub 49 is driven by means of inclined

planes 54 and 55, of which one is fixed to the main hub 48 and the other to the secondary hub 49 (Figs. 9 and 12).

The automatic adhesion is effected on the cone 56 of the endless band 57. As a matter of fact, the half pulley corresponding to the secondary hub 49 is driven only through the medium of the inclined planes 54 and 55. As soon as there is any tendency to slip, this half pulley, not being fixed on the central hub 48, will follow the movement of the band which seeks to move more slowly in relation to the band of the half pulley of the central hub 48. The two hubs 48 and 49, moving through a certain angle relatively to each other, cause the inclined planes 54 and 55 to slip over each other, with the result that the two half pulleys are brought nearer to each other, thereby increasing automatically the adhesion of the cone 56 of the band 57.

The inclined planes are in this case arranged at right angles to the axis. The same effect may however be obtained by arranging them concentrically to the axis which may be done by employing a combination of right and left hand threads.

The side strains that are transmitted to the entire apparatus are taken in this arrangement by two struts 58 and 59 (Fig. 9) which are attached at one end to the inner stays 60 near the pulleys, and at their other ends are jointed to the axle tube 33. For constructional reasons the stays 59 and 60 of one of the pulleys may be jointed on pins 61 formed on the heads 62 of the opposed stays as near as possible to the car axle, and all in one and the same line parallel to the said axle. The addition of the supplementary stays 59 does not interfere in any way with the oscillations of the large pulleys since they are jointed to the same pins as the stays 60 of those pulleys.

The car is enabled to pass over ditches by means of two or more rollers 63 (Figs. 8 and 9) which are loose on their axle-pins, the ends of which are attached to springs 64 fixed on the projecting parts 65 (Fig. 8) of the struts 60 by means of collar straps 66.

This apparatus has the effect of preventing the large supporting pulleys of the endless band from descending into the ditch and of allowing them to engage the other side of the ditch at a favourable angle. The diagrammatic Figure 13 shows clearly the action of this apparatus. This apparatus is completed by the adjunction under the front axle of the car, of two large shoes terminating at both ends in large rollers, the whole being jointed around the point of attachment under the axle. These shoes assume various inclinations according to the contour of the ground.

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. A modification of the motor car propelled by an endless band with supporting rollers of the kind described in the Complete Specification No. 5015 of A.D. 1913, characterised by the feature that the system of rollers supporting the weight of the car is independent of the pulleys over which the endless band passes, the arrangement being such that these load-distributing rollers, as well as if necessary the aforesaid pulleys, are able to make rocking movements in transverse and longitudinal planes in travelling over uneven ground.

2. A constructional form of the motor car claimed in Claim 1, wherein the pulleys serve only to support and guide the endless band, whilst the propelling effort is transmitted to the band directly from the motor axle with the aid of a toothed wheel, a wheel with rollers and the like, gearing with the teeth of the inner guiding comb of the band.

3. A constructional form of the motor car claimed in Claim 1, wherein the supporting rollers are suspended from springs by rocking beams adapted to rock on the ends of the springs, the ends of these rocking beams forming trunnions on which the pins of the rollers can rock transversely, whilst the pins

of the pulleys are pivoted in a similar manner on the trunnions of stays or struts whose inner ends are jointed on the motor axle or at a point situated in the vertical plane of the said axle.

4. A constructional form of the motor car claimed in any one of the preceding claims, wherein for the purpose of reinforcing the flexible band, a metal plate is interposed in the teeth, or all the teeth are connected together by an endless chain.

5. A constructional form of the motor car claimed in Claims 1, 2 and 3, wherein the transmission of the power to the endless band is effected through the medium of another member, for instance a jointed chain gearing freely with the teeth of the band for a greater or smaller length of the latter, the said chain being driven by a toothed wheel or other member mounted on the car axle.

6. A constructional form of the motor car claimed in any one of the preceding claims, wherein pressure rollers are adapted to bear against the outer face of the band for the purpose of assuring a constant engagement of the teeth of the band with the members from which it receives its driving motion.

7. A modification of the motor car as claimed in Claim 1, wherein the driving apparatus is suspended on coiled springs arranged in boxes of the rocking beams and transmitting the weight of the car to members sliding in the said boxes, these members serving also as guides for the supporting apparatus composed of rocking beams that are jointed on the said members and of rollers, the whole of this arrangement being adapted to turn on the car axle.

8. In an apparatus as claimed in Claim 7, mounting the rollers on a pin provided with spherical journals or transverse journals by means of which the rollers are adapted to assume positions wherein their working surfaces remain parallel to the surface of the ground, as shown for instance in Fig. 10 of the accompanying drawings.

9. In an apparatus as claimed in Claim 7, mounting the rollers on a pin, the central portion of which is of spherical form, thereby enabling the rollers to assume inclined positions such as those shown in Fig. 11 of the accompanying drawings.

10. In an apparatus as claimed in Claim 7, a driving pulley with automatic adhesion acting upon a cone of the endless band by means of inclined planes, or of a combination of endless screws with right and left hand threads, which act to move the half pulleys of the hubs closer together in proportion to the effort to be generated.

11. In a motor car comprising an apparatus as claimed in Claim 7, a system of stays or struts for increasing the supporting base on the axle tube, having their joints on the same axes parallel to the axle as those of the ordinary stays or struts.

12. In a motor car, as claimed in Claim 11, an apparatus for enabling the car to travel over ditches, said apparatus being composed of springs fixed on projecting portions of the stays or struts, said springs carrying rollers at their free ends, the said apparatus being completed by the adjunction under the front axle of the car, of two large shoes terminating at both ends in large rollers, the whole being jointed around the point of attachment under the axle.

13. The improved apparatus constructed and operating substantially as hereinbefore described and also as illustrated in and by the accompanying drawings.

Dated this 2nd day of April, 1917.

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Fig. 1.

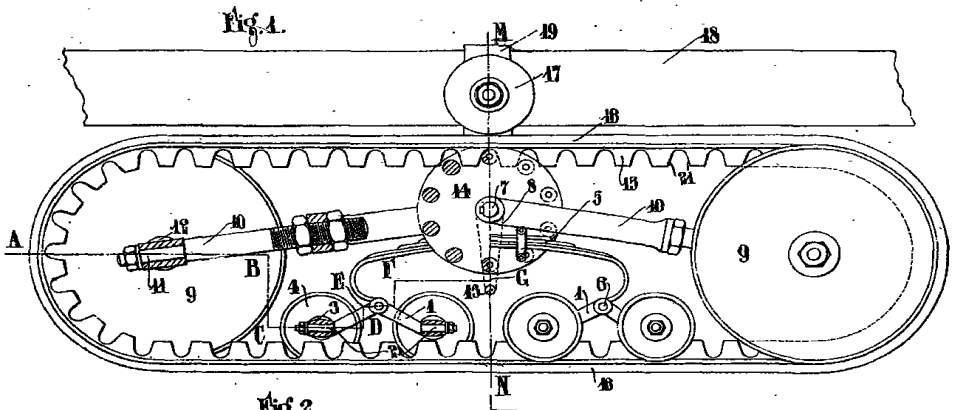
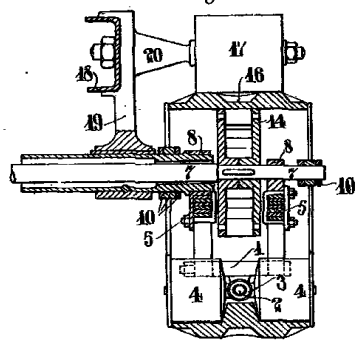


Fig. 3.



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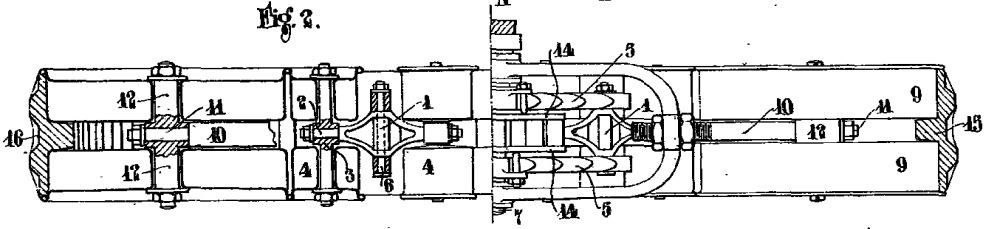


Fig. 5.

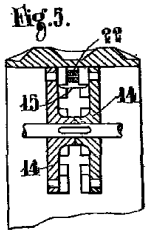
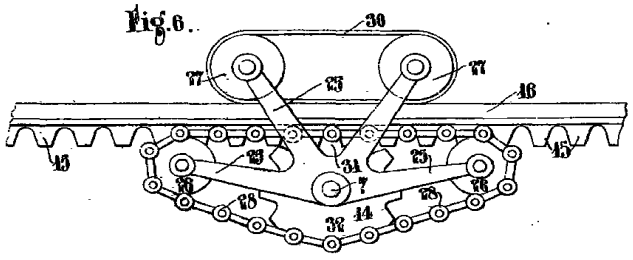


Fig. 6.



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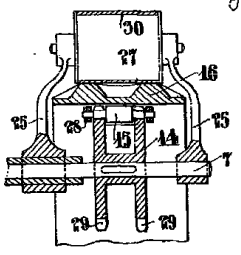

Fig. 4.

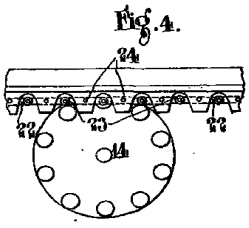

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Fig. 1.

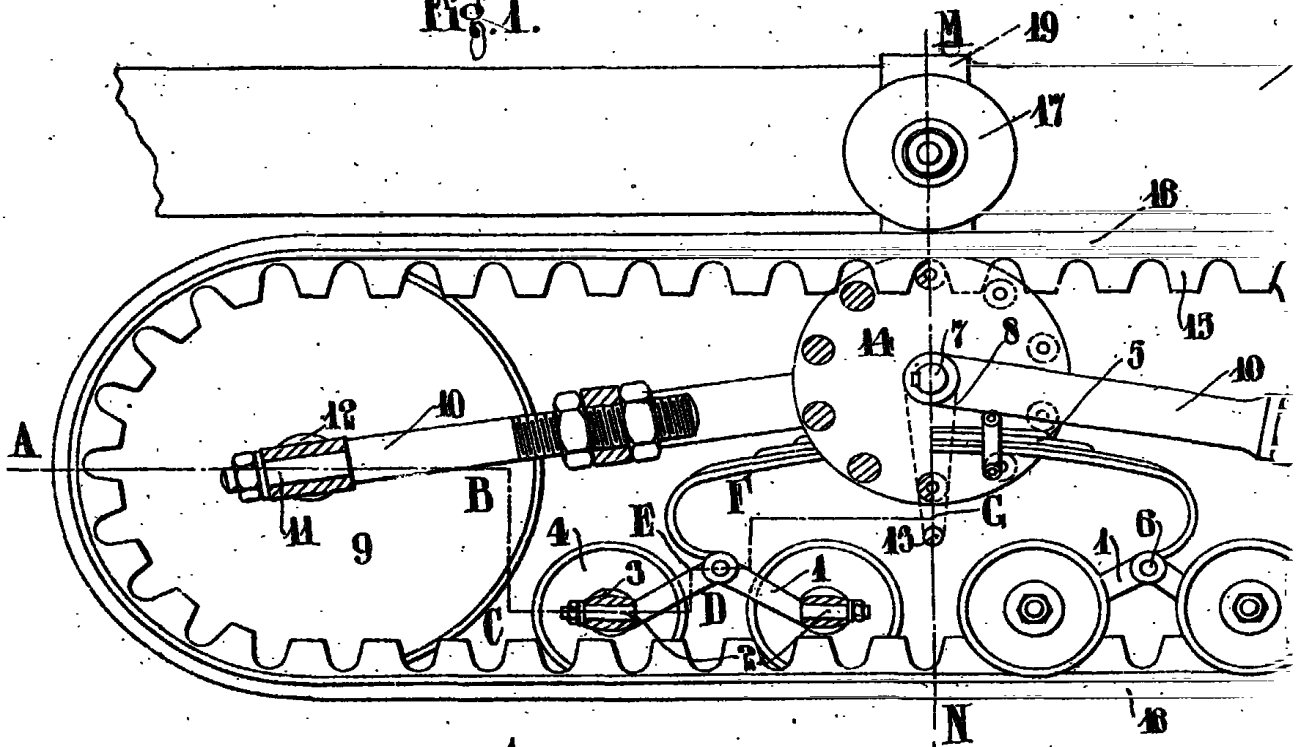


Fig. 2.

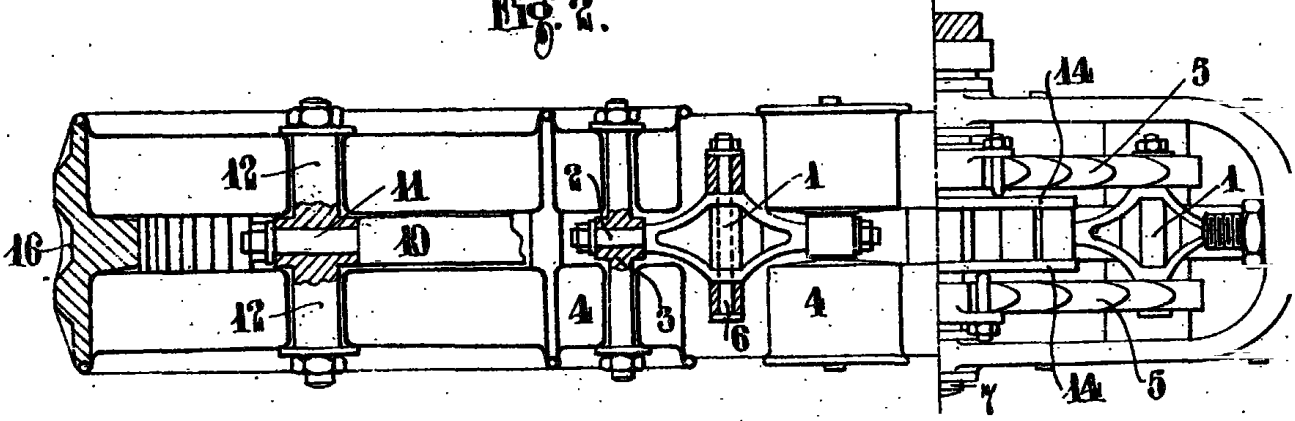
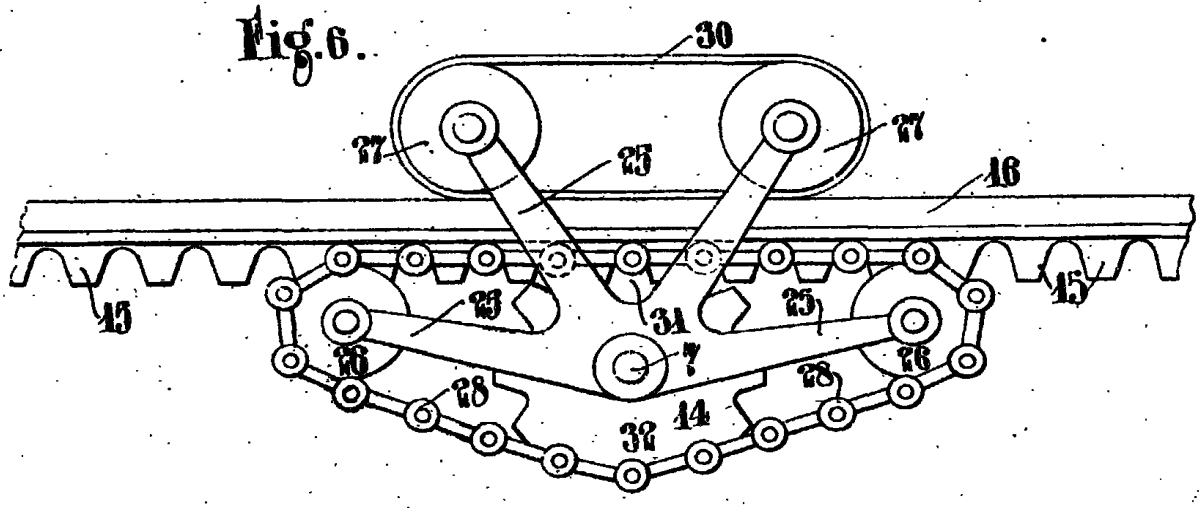


Fig. 6.



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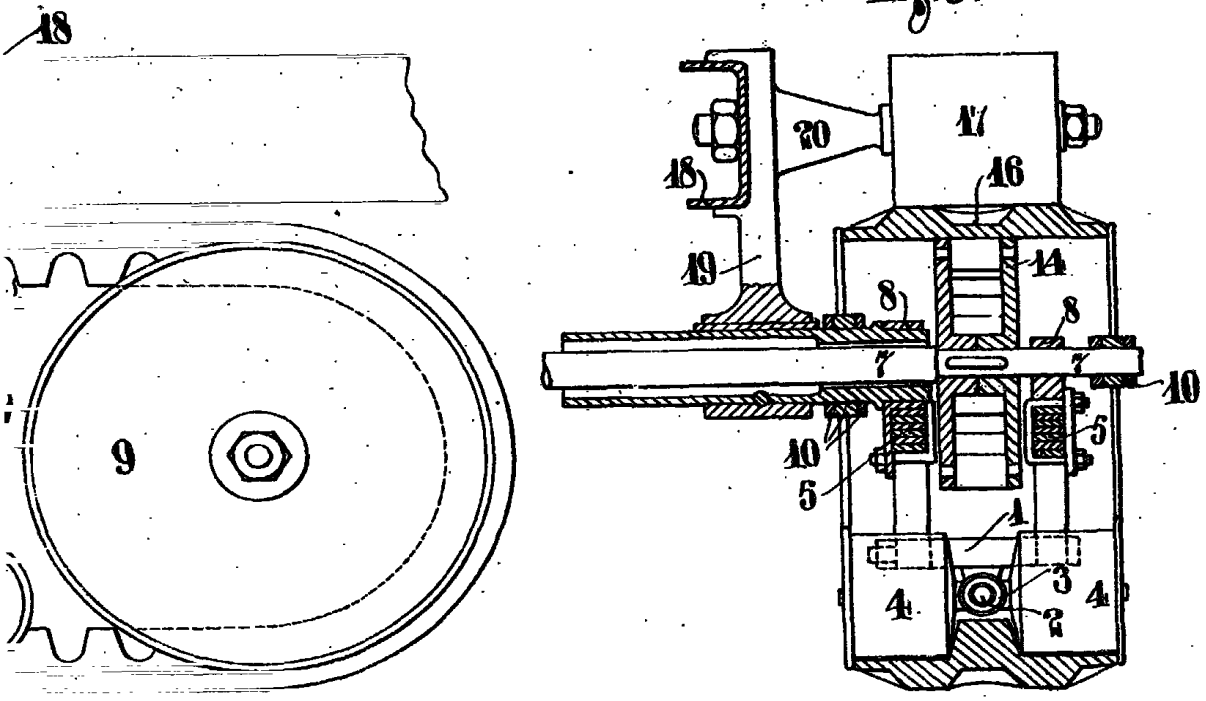

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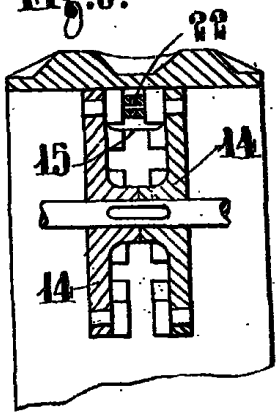

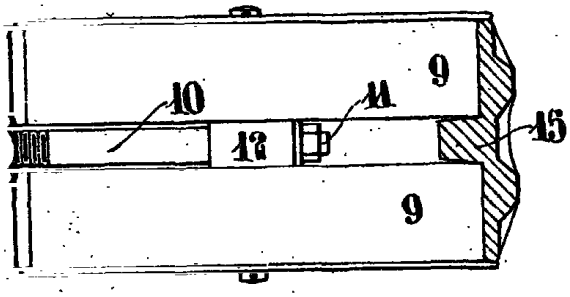

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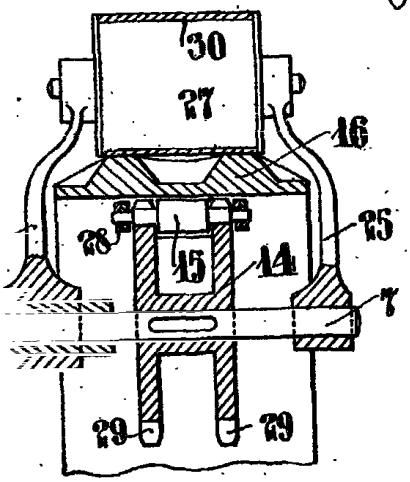

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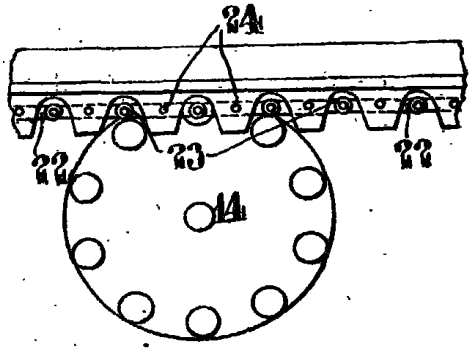

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Fig.8.

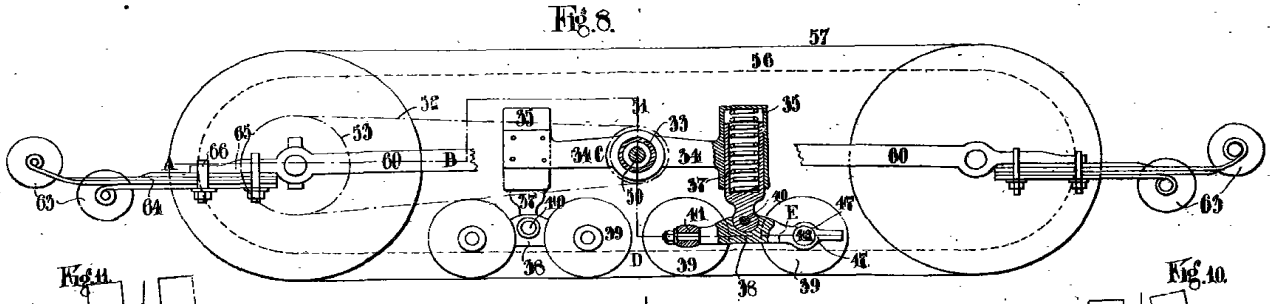

Fig.11.

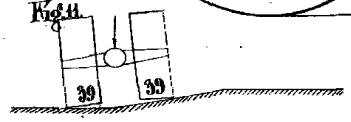

Fig.9.

Fig.10.

Fig.12.

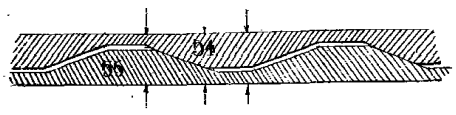

Fig.13.

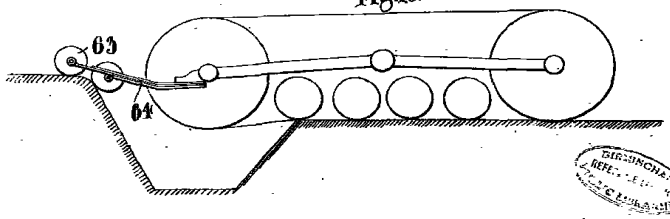

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Fig.8.

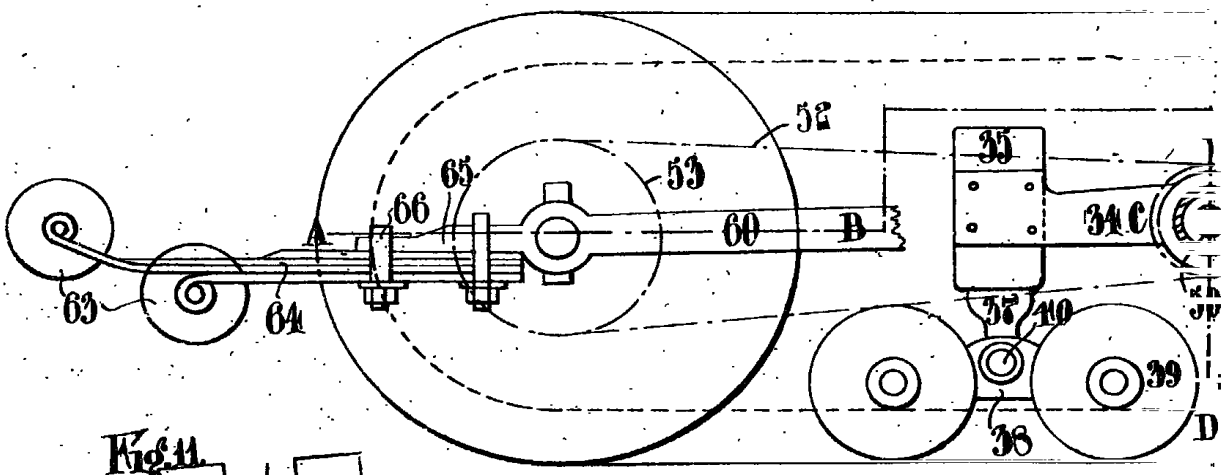


Fig.11.

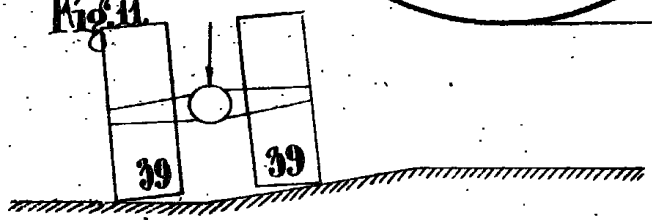
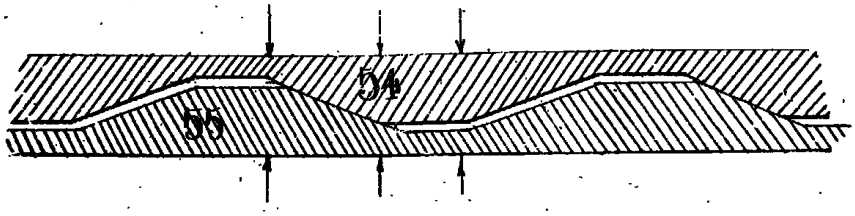


Fig.9.

Fig.12.



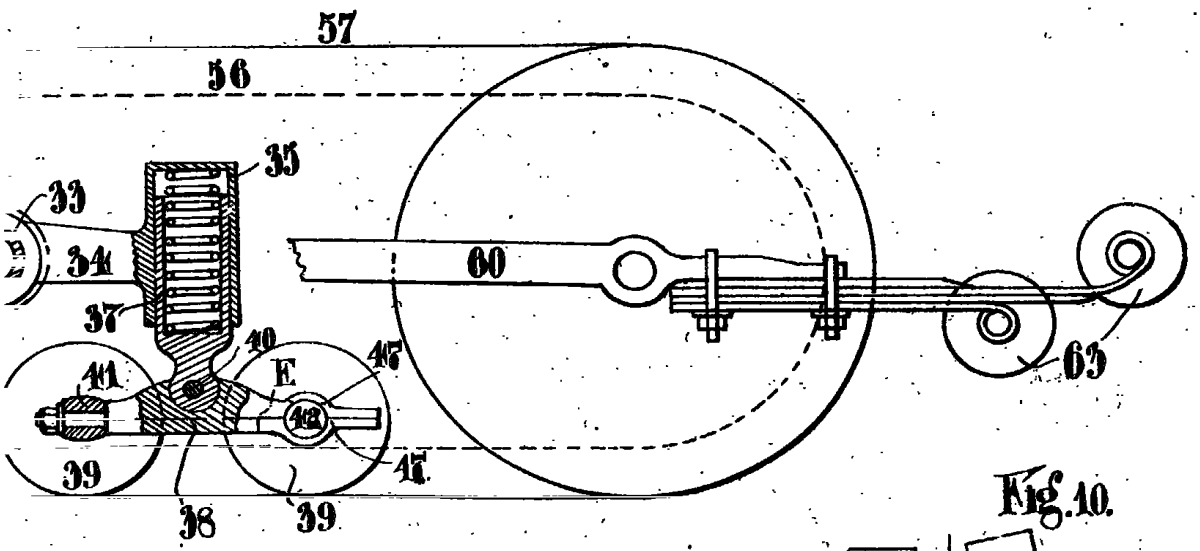
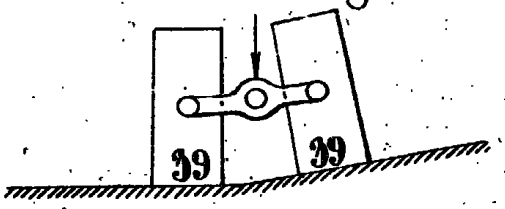


Fig. 10.



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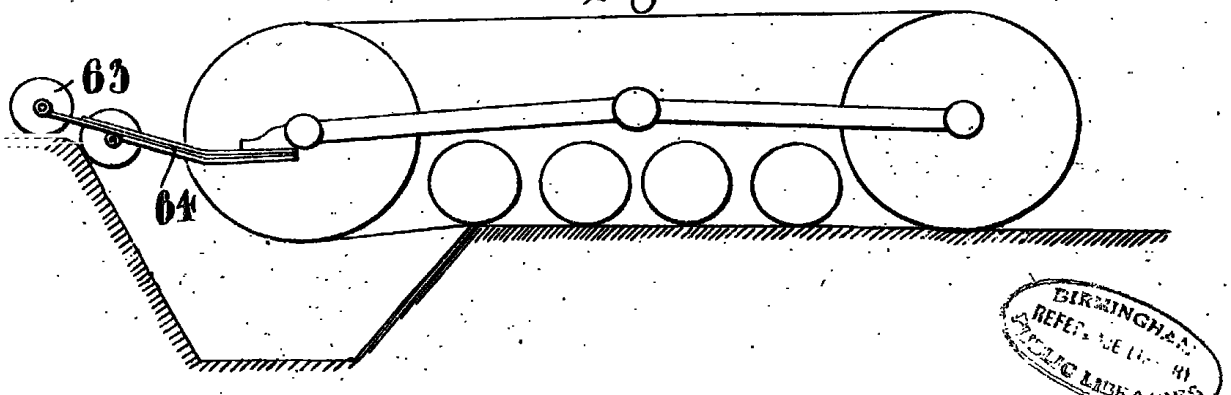

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