PATENT SPECIFICATION

660,517

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COMPLETE SPECIFICATION.

Improvements in or relating to Rubber Powered Motors for Toys and the like

We, GEORGES GERAUD HUARD, a French citizen, of 72, rue des Archives, Paris, Seine, France, and RAYMOND JEAN ERNEST ROGER, a French citizen, of 3, Chemin du Tertre, Suresnes, Seine, 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:—

This invention relates to rubber powered motors comprising one or a plurality of rubber strands or strips which are subjected to a twisting action when the motor is being wound up, their release providing the propulsive energy for operating a toy or the like to which the motor is applied, and has for its primary object the provision of limiting means whereby the motor is prevented from being wound up, as for instance by a child, so far that the elastic or rubber element may break.

In accordance with the invention there is provided a rubber powered motor for toys and the like comprising at least one elastic member stretched between a fixed part and the end of a driving shaft, said driving shaft carrying a pinion meshing with a winding mechanism adapted to rotate said pinion for twisting the elastic member, wherein a toothed element of the winding mechanism or an additional toothed element meshing with said mechanism is formed with a toothless or other similar part engageable with a member disposed in its path of movement thereby to limit actuation of said winding mechanism in the winding direction.

The toothless or other part of the winding limiting element, in the rest position of said element, may be located diametrally opposite the co-operating member, whereby the mechanism may be wound in either direction, thus providing for reversal of the direction of movement of the propelled object.

The said toothless or other part may be provided either on a toothed winding disc meshing with the pinion on the driving shaft or on a toothed disc meshing with a pinion fixed on a shaft of the winding mechanism, which shaft carries a toothed winding disc meshing with the pinion on the driving shaft. The winding disc and driving shaft pinion may be constructed as a speed-increasing gear. A further speed-increasing gear may be provided between the driving shaft and the member to be driven thereby, and said further gear may include a freewheel arrangement enabling the driven member to be held stationary when winding up.

Further features and advantages of the invention will be gathered from the following description and from the accompanying drawings, in which the invention is illustrated by way of example. In said drawings:

Figure 1 is a perspective view of a rubber powered motor according to the invention fitted with one form of winding limiting mechanism;

Figures 2 and 3 are detail views showing two modifications of the winding limiting mechanism of Figure 1; and

Figures 4 and 5 are perspective views of a rubber powered motor according to the invention fitted with other forms of winding limiting mechanism.

Referring now to Figure 1, the form selected for purpose of illustration includes an elastic element 1, which may comprise one or several strands or strips of rubber, secured at one end to a fixed part 2 of a toy and at its other end to the rotary shaft 3 by the intermediary, say, of a hook 3*a*. The shaft 3, which in the example illustrated drives a toy aircraft propeller 4, carries a pinion 5 meshing with the winding toothed disc 6 fast on another shaft 7 having a square-shaped end 8 for receiving a winding key. The teeth 9 of the toothed disc 6 are interrupted at 10 to provide a smooth or toothless portion having a diameter corresponding to tops of said teeth and which, when the mechanism is at rest, will be adjacent to the pinion 5, for instance at 10*a*.

Thus, when shaft 7 is rotated in the direction of the arrow by means of a winding key,

disc 6 will rotate and drive pinion 5 for a predetermined number of revolutions and said pinion 5, fast with shaft 3, will impart a twisting action to the rubber element 1. When the toothless portion 10 engages the teeth of pinion 5, the disc 6 is stopped, thus preventing any further twisting of element 1. Therefore, the elastic element 1 is always subjected to the same predetermined number of turns when fully wound up, this number being calculated with a view to eliminating breakage of said element.

According to the modification shown in Fig. 2, instead of a toothless portion 10, a winding disc 6*a* is provided with a protruding finger 11 which extends radially beyond the tops of the teeth 9 and which will also engage pinion 5 to limit the rotary movement of said disc.

In the further embodiment illustrated in Fig. 3, a winding disc 6*b* carries a protruding finger 12 similar to finger 11 of Fig. 2 and adapted to abut a stop member 13 positioned on a fixed part of the toy, instead of abutting pinion 5. This stop member may be adjustable, for example by forming it as a pin adapted to be inserted into one of a series of holes, e.g., to position it as shown at 13*a*.

Another embodiment of the invention is exemplified in Fig. 4 wherein the motor is applied to a toy-vehicle having a set of driving wheels 14, 15 fast with an axle 16 carrying a driven pinion 17. The rubber element 18, which consists of a twisted strip, is fastened at one end to a fixed portion 19 of the toy and hooked at its other end to a hook 20 integral with the shaft 21 journalled in a suitable bearing (not shown). Fast with this shaft is a pinion 22 meshing with a toothed cup-shaped element 23 secured in turn to the winding shaft 24. The driven shaft 21 further carries a toothed cup-shaped element 25 meshing with pinion 17 of axle 16.

A pinion 26, fast on shaft 24, meshes with a toothed disc 27 integral with a spindle 28. This toothed disc is provided with a protruding part 29 adapted to engage pinion 26 for arresting the winding mechanism in the same manner as in the previous examples. In this case, the mechanism 23, 22, 21, 25, 17 forms a speed-increasing gear. When at rest, the part 29 is in a position diametrally opposite pinion 26, the arrangement thus permitting the motor to be wound up in both directions, the toy being also adapted to run in both directions.

Referring now to Fig. 5, it will be seen that a modification is provided wherein the motor as in Fig. 4, is intended for driving a set of wheels 30, 31 mounted on a power axle 32 on which a pinion 33 is fastened in meshing engagement with a toothed cup-shaped element 34 journalled for free rotation on the shaft 35 carrying the hook 36 whereto the rubber element 37 is hooked, the other end of the rubber element being secured to the usual fixed portion 38. The winding shaft 39 drives the shaft 35 through another toothed cup-shaped element 40 and a pinion 41, while a further pinion 42, fast with the winding shaft 39, meshes with a toothed disc 43 integral with the shaft 44 and having a twist-limiting protruding part 45 thereon. In this embodiment, shaft 35 is connected with toothed cup-shaped element 34 through the intermediary of a freewheel device. In the case shown, shaft 35 drives a star-shaped member 46 having four resilient arms adapted, in the driving direction, to engage the edges of lugs 47, 48, 49, 50 punched and bent out from the end wall of cup-shaped element 34. In the reverse rotational direction, the resilient arms of the member 46 will pass over the lugs without driving the element 34, thus permitting the wheels 30, 31 to remain stationary when the device is being wound up.

As will be apparent, the part 29 or 45 of Figs. 4, 5 may be replaced by a toothless portion 10, as shown in Fig. 1, or may be arranged for engagement with an adjustable abutment 13 as in Fig. 3.

Thus, in all circumstances, the rubber powered motor according to the invention ensures a positive limitation of the number of twisting turns applied thereto. With the speed-increasing gears provided in the winding device and the final drive of Figs. 4 and 5 a great number of revolutions of the axle 16 or 32 may be reached, so increasing the duration of operation and the interest in the toy. By positioning the winding-limiting part 29 or 45 in a manner whereby it will have a position at rest diametrally opposite to the meshing point of pinion 26, or 42 the motor may thus be wound up in both rotational directions and the toy may also operate in both directions of movement.

Obviously the rubber powered motor according to the invention may be used for driving not only a set of wheels or a propeller but also any other propelling member of a toy or the like.

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 rubber powered motor for toys and the like comprising at least one elastic member stretched between a fixed part and the end of a driving shaft, said driving shaft carrying a pinion meshing with a winding mechanism adapted to rotate said pinion for twisting the elastic member, wherein a toothed element of the winding mechanism or an additional toothed element meshing with said mechanism is formed with a toothless or other similar part engageable with a member disposed in its path of movement thereby to

limit actuation of said winding mechanism in the winding direction.

2. A motor according to claim 1, wherein the said toothless or other part is provided on a toothed winding disc meshing with the pinion on the driving shaft.

3. A motor according to claim 1, wherein the said toothless or other part is provided on a toothed disc meshing with a pinion fixed on a shaft of the winding mechanism, which shaft carries a toothed winding disc meshing with the pinion on the driving shaft.

4. A motor according to claim 1, wherein the limit of the winding motion is determined by the engagement of a protruding tooth or finger on a toothed disc meshing with a toothed element of said winding mechanism with a stop member on a fixed portion of the toy or other object.

5. A motor according to claim 4, wherein the stop member comprises a pin which is adjustable in position by inserting in into one of a series of holes in said fixed portion of the toy or other object.

6. A motor according to any of claims 1 to 5, wherein the driving shaft is connected to the driven member of the toy or the like, for example, a wheel axle, through the intermediary of a speed-increasing gear.

7. A motor according to claim 6, wherein the speed-increasing gear comprises a toothed cup-shaped element mounted on the driving shaft and meshing with a pinion on the driven member.

8. A motor according to claim 7, wherein a freewheel device is interposed in the speed-increasing gear.

9. A motor according to claim 8, wherein the freewheel device comprises a star-shaped member formed with resilient arms and connected to the driving shaft, the said arms, in the driving directions, abutting lugs punched and bent out from the end wall of the cup-shaped element of the speed-increasing gear.

10. A motor according to claim 2 or 3, wherein the winding disc and the pinion on the driving shaft are formed as a speed-increasing gear.

11. A motor according to claim 1, wherein the toothless or other part of the toothed winding limiting element is located, in the rest position of said element, diametrally opposite the co-operating member.

12. Rubber powered motors for toys and the like substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 22nd day of August, 1949.

For the Applicants:
S. E. MATTHEWS,
Chartered Patent Agent.
14-18 Holborn, London, E.C.1.

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FIG.1.

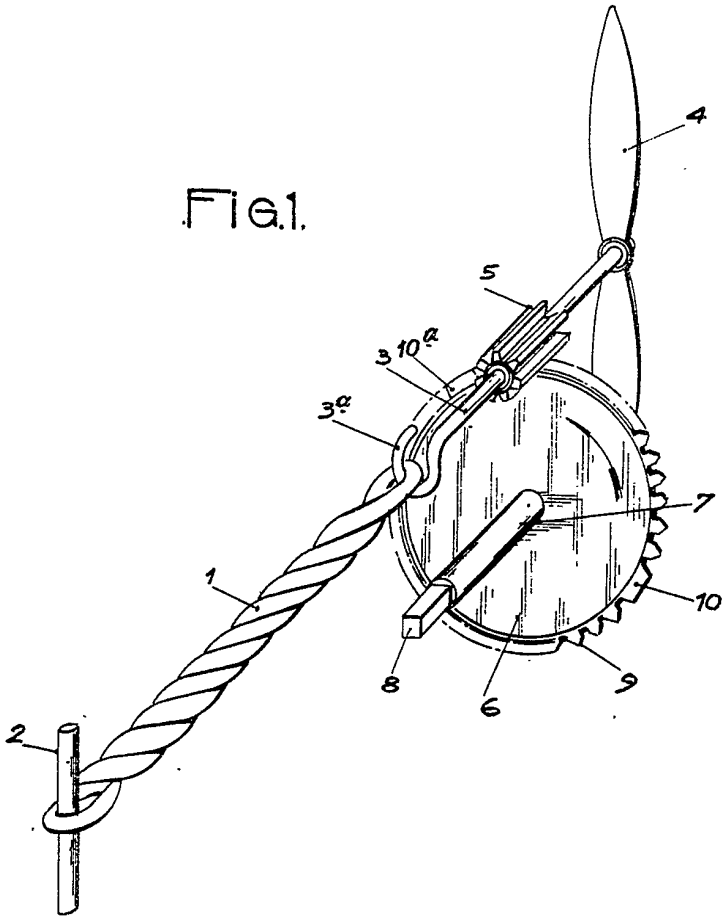

FIG.2.

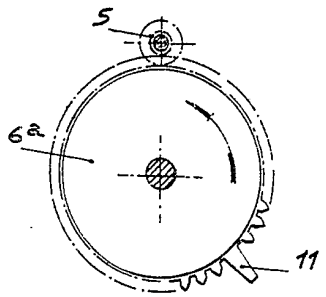

FIG.3.

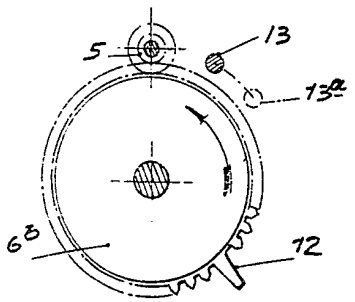

Fig. 4.

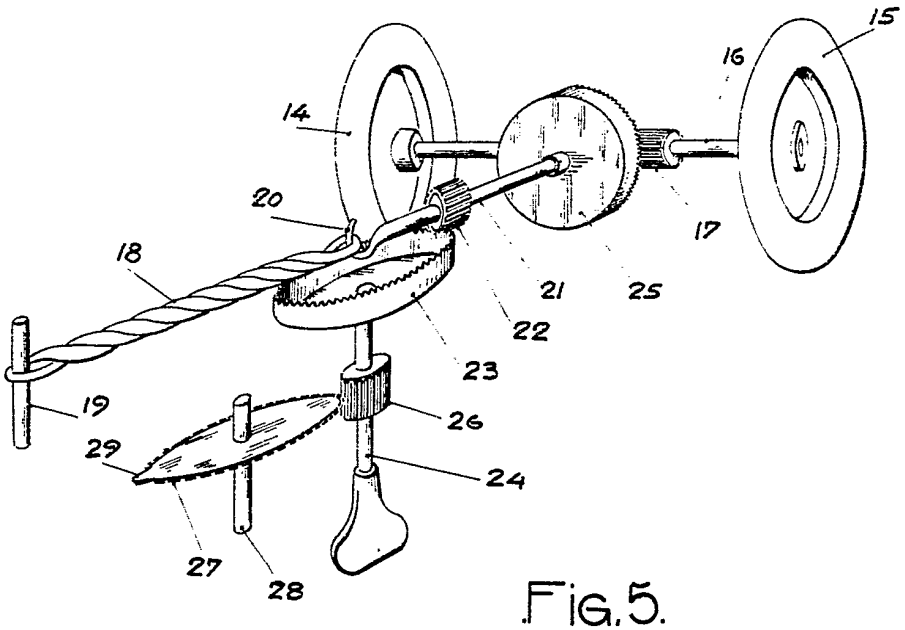
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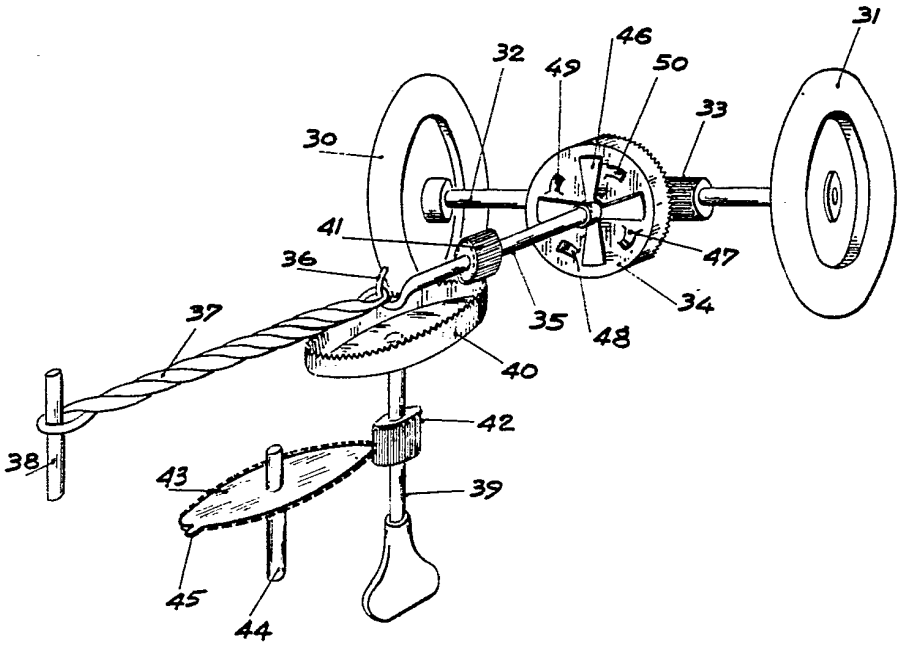
Fig. 5.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SHEET 1

Fig.1.

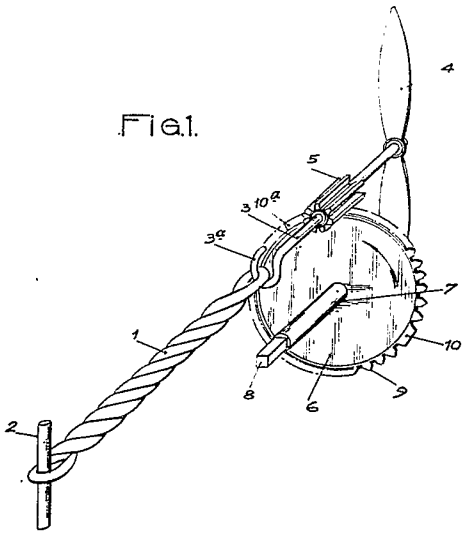


Fig.2.

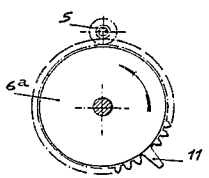
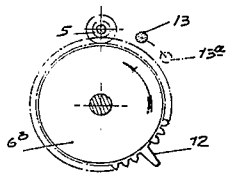


Fig.3.



SHEET 2

Fig.4.

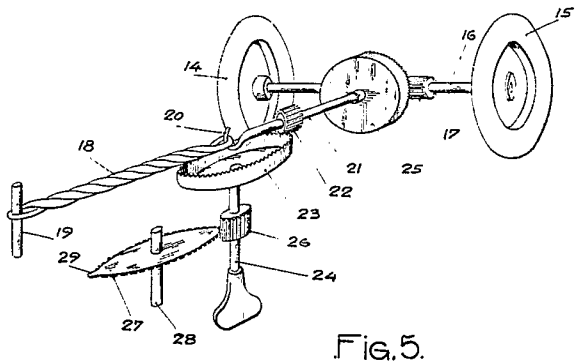
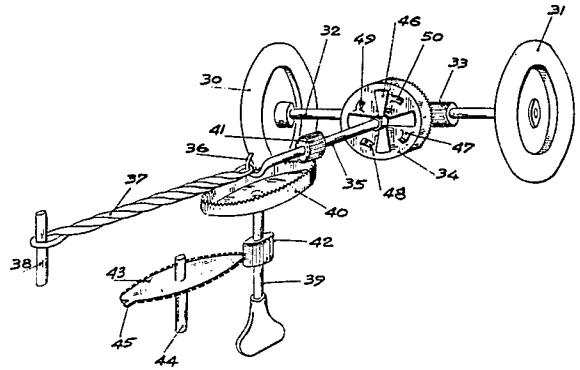


Fig.5.



H.M.S.O. (M.F.P.)