

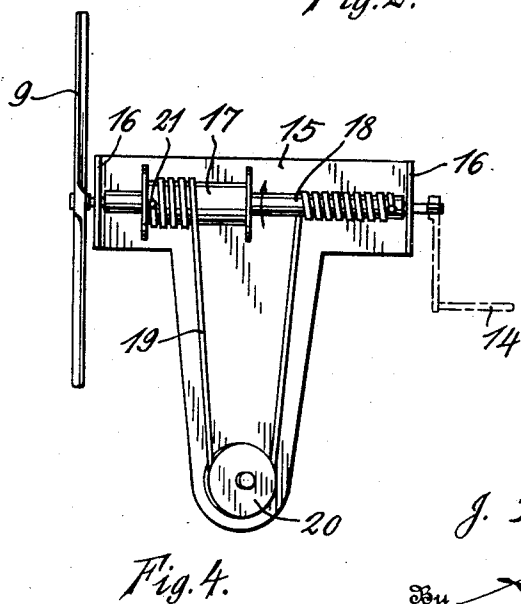
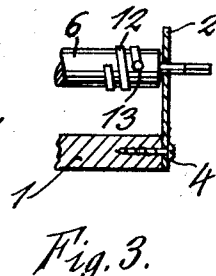
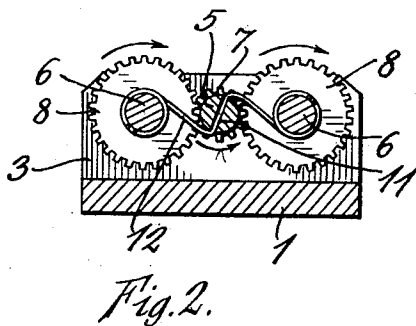
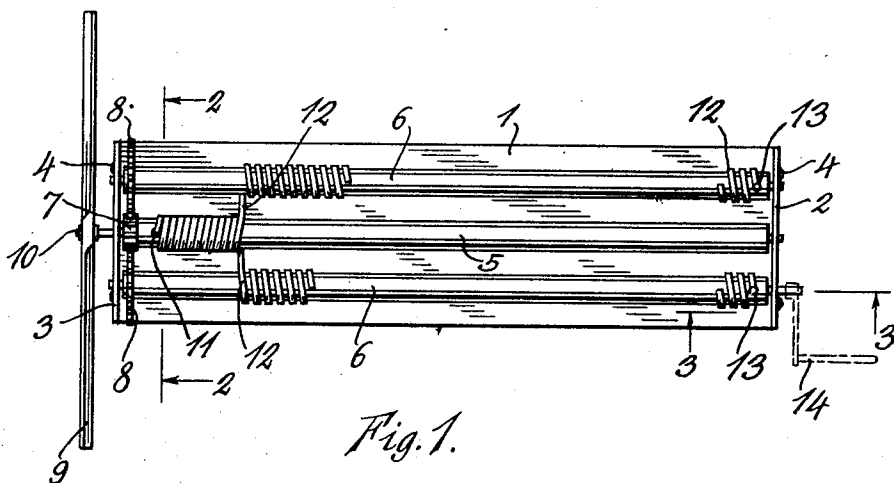
Sept. 1, 1931.

J. F. ENYEART

1,820,967

TOY MOTOR

Filed Nov. 24, 1930



Inventor

J. F. Enyeart.

By *A. O'Brien*

Attorney

## UNITED STATES PATENT OFFICE

JAMES F. ENYEART, OF DENVER, COLORADO

## TOY MOTOR

Application filed November 24, 1930. Serial No. 497,660.

This invention relates to improvements in motors and has reference more particularly to an improved motor for toys.

In the construction of toys of the mechanical type and especially of aeroplanes and toy vehicles, it is necessary for the best results to have a motor that will run as long a time as possible and to develop a substantially constant torque during its whole operation.

When spring motors are used, the spring exerts a decreasing force, as it is being unwound and towards the last it becomes very weak with the result that the mechanism stops long before the spring is fully unwound.

It is the object of this invention to produce a motor that shall be of such design that it will take up very little room and which shall be operated by elastic bands, such as india rubber bands and which shall be so constructed and designed that it will deliver substantially the same torque during its entire operation.

This invention, briefly described, consists of a rotatable driven member and a rotatable anchoring device. A rubber band has one end fastened to the driven member and the other to the anchor and is wound about the driven member in extended form and is also wound about the anchor under tension, the tension in that part of the band that is wound about the driven member being greater than the tension of that portion of the rubber band that is wound about the anchor. The anchor and the driven member are so related that when the motor operates, the peripheral velocity of the driven member is greater than that of the anchor and therefore when the rubber band is unwound from the driven member and onto the anchor, the tension will be decreased and held substantially constant during the entire operation of the motor, whereby a substantially constant torque will be delivered by the motor during its entire period of operation.

Having thus briefly described the invention, the same will now be described in detail, and for this purpose reference will be had to the accompanying drawings in which the preferred embodiment of the invention has been illustrated, and in which:

Fig. 1 is a top plan view of the preferred form of my improved motor;

Fig. 2 is a section taken on line 2—2, Fig. 1, and shows the position of the parts when the motor is in run-down condition;

Fig. 3 is a section taken on line 3—3, Fig. 1, and shows one end of one of the bands secured to the anchor; and

Fig. 4 is a top plan view of a modified form of the motor.

In the drawings reference numeral 1 designates the base which has been shown as a piece of board, to the ends of which the metal brackets 2 and 3 are secured. These brackets may be secured to the ends of the base by means of screws 4 and are each provided with three openings that form bearings for the rotatable driven member 5 and the two anchors 6. One end of the driven member is provided with a pinion 7 and the corresponding ends of the anchors are provided with gear wheels 8 that mesh with the pinion in the manner shown in Figs. 1 and 2.

It will be seen from Fig. 2 that gears 8 are of larger diameter than the pinion 7 and if the driven member and the anchors have the same diameter their peripheral velocity will be different because the driven member will rotate at a greater angular velocity than the anchors due to the gear ratios. The difference in rotation may be different for different types of motors and since this is optional, no specific ratio will be used in this description because it is sufficient for an understanding of the device to explain that the peripheral velocities of the anchors are less than that of the driven member. In order to simplify the drawings and the description, a propeller 9 has been shown as attached to one end of the axle 10 of the driven member. This propeller indicates the device to which power is transmitted and is merely illustrative as the motor can be used to turn the wheels of a toy vehicle or for any other similar purpose, as well as for rotating a propeller.

The driven member is provided near the end having the pinion with an opening 11. A rubber band 12 extends through this opening and the ends of this rubber band are secured to the anchors at points 13. Although I have

shown a single band and shown it extending through an opening 11, I want it distinctly understood that the band may be made with two parts and fastened to the driven member in any other way. In constructing the motor the rubber band is first wound about the anchors with a certain amount of tension, the exact amount of tension being immaterial with this exception, that it should not be very much under tension when the motor is first constructed. After the ends of the rubber band have been wound about the anchors and fastened to the latter at points 13, a crank like that indicated by dotted lines at 14 is applied to the shaft of one of the anchors and the motor rotated in such a direction as to unwind the rubber band from the anchors and wind them onto the driven member. Due to the fact that the driven member rotates faster than the anchors, the rubber band will be stretched to a greater extent on the driven member than it is on the anchors. The gear ratios must be so selected that this stretching does not exceed the elastic limit of the rubber band. After the band has been unwound from the anchors and wound onto the driven member, the motor will operate to transform the potential energy of the band into power for the purpose of rotating the propeller or any other mechanism to which the motor may be attached. That portion of the rubber band between the driven member and the place where it contacts with the rotatable anchors is constantly under tension and this tension is substantially constant during the entire unwinding of the rubber band from the driven member and therefore the motor has a substantially constant torque during the entire period of its operation.

In Fig. 1 the rubber bands have been shown as fastened to the anchors at the end opposite from that where the band is fastened to the driven member, but it is possible to fasten the ends of the rubber band to the anchors near the gear wheels and to wrap two turns of rubber bands about the anchors and in this way the length of rubber band can be doubled. It is also possible to have more than two layers of rubber band on the anchors when the motor is run down and therefore the length of rubber band employed can be increased to almost any extent desired without effecting the operation of the motor. For the purpose of illustration, a single layer of rubber bands on the anchors makes the operation clearer and the drawings has therefore been shown in that way.

The distinctive feature underlying the motor that forms the subject of this invention is that there is a rotatable driven member about which a rubber band can be wound under tension and an anchor to which the other end of the rubber band is secured and means operated by the rotation of the driven member for increasing the distance along the band

from the driven member to the point where it is connected with the anchor.

The desired operation can be most easily attained by means of a rotatable anchor of the type shown in Figs. 1, 2 and 3 and either one or a larger number of rotatable anchors can be employed, as the number of anchoring devices and the number of elastic bands employed is immaterial, and is controlled by the amount of power that the motor is to supply.

In Fig. 4 I have shown a somewhat different embodiment of the invention. In Fig. 4 the base has been designated by reference numeral 15 and the bearing members by reference numerals 16. Mounted for rotation in the bearing 16 is an elongated member having a cylindrical section 17 which is of a larger diameter than the cylindrical section 18. Section 17 corresponds to the driven member 5 in Fig. 1 and section 18 corresponds to the anchor 6. A rubber band 19 has one end anchored to the cylindrical portion 17 and the other to the cylindrical portion 18. This band passes about a pulley 20 located to one side of the rotating member; when the rotatable member is turned, the peripheral velocity of section 17 will be greater than that of section 18, due to the different diameters of these two sections. If a rubber band is wound about section 18 under tension and has one end secured to the section 17 at 21, then when the member is rotated by means of the crank 14 so as to unwind the band from section 18 and wind it onto section 17, the band will be under greater tension on member 17 than on member 18 and after the rubber band has been completely transferred from section 18 to section 17 and the motor is released, it will continue to rotate in such a direction as to wind the band about section 18 and unwind it from section 17. Due to the arrangement of the parts and their proportion, the tension in the band between the points where it contacts with the surfaces of sections 17 and 18 remains substantially constant during the entire operation of the motor and the latter therefore delivers a substantially constant torque through its entire operation.

From the above description it will be seen that I have produced a motor of a simple construction that employs as its motive power an elastic band which has one end secured to a rotatable driven member and the other to a rotatable anchor and which is provided with means for rotating the anchor whenever the driven member is rotated and in which the peripheral velocity of the driven member is greater than that of the anchors whereby the tension of the elastic band will be greater where it is wound about the driven member than where it is wound about the anchor, thereby producing a device in which the tension in the rubber band between the

driven member and the anchor remains substantially constant during the entire operation of the motor.

Having described the invention what is  
5 claimed as new is:

A motor comprising a single elongated rotor mounted for rotation about its longitudinal axis, said rotor having two cylindrical sections, an elastic band having its  
10 ends connected with the cylindrical sections, one end to each section, and a pulley located to one side of the rotor and mounted for rotation about an axis substantially perpendicular to the axis of the rotor, the elastic  
15 band passing over the pulley which serves to guide it from one cylindrical section to the other.

In testimony whereof I affix my signature.  
JAMES F. ENYEART.

20

25

30

35

40

45

50

55

60

65