June 2, 1931. L. MARX 1,807,791

TOY

Filed Feb. 27, 1929

Fig. 1.

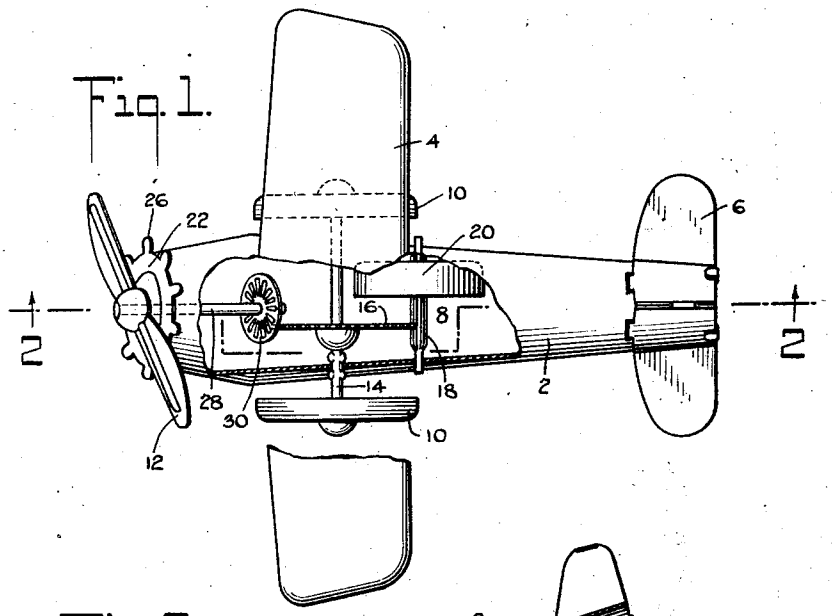


Fig. 2.

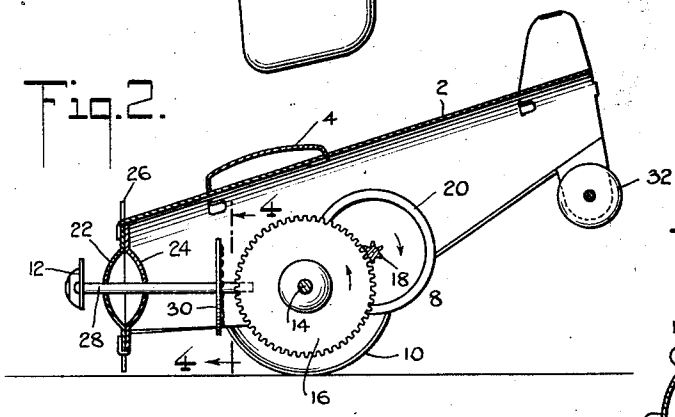


Fig. 4.

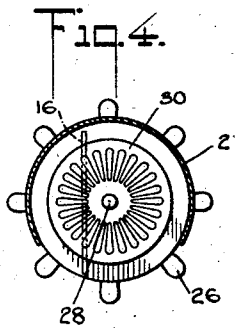
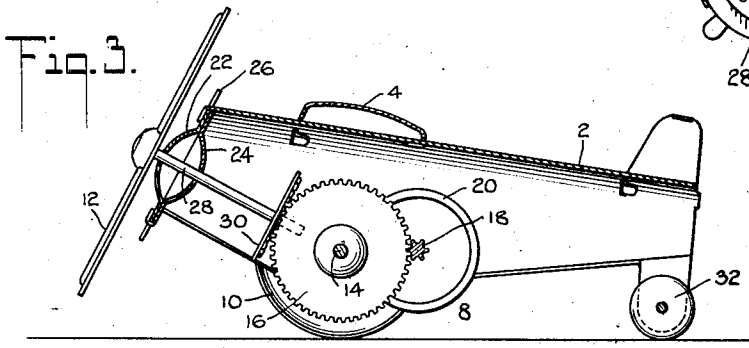


Fig. 3.



INVENTOR
Louis Marx
BY
Cravath & James
ATTORNEYS

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UNITED STATES PATENT OFFICE

LOUIS MARX, OF NEW YORK, N. Y.

TOY

Application filed February 27, 1929. Serial No. 343,030.

This invention relates to toys, and more particularly to toys provided with momentum motors.

Toys are often equipped with momentum motors which are initially energized by rapidly spinning some form of drive mechanism, for example, by frictionally engaging a drive wheel with a surface and moving it rapidly along the surface. If it is desired to run some additional driven means by the momentum motor a difficulty is encountered in that the driven means is apt to impede the energization of the motor. Accordingly, the primary object of my invention is the provision of a toy including a momentum motor and having means driven thereby which is so coupled to the momentum motor that it does not impede the energization thereof. More particularly, my invention resides in the provision between a momentum motor and means driven thereby of gearing so arranged that rapid rotation of the motor, such as occurs during its energization, causes the gearing to separate so that the driven means does not hinder the energization of the momentum motor, and yet, during normal operation of the toy, the gears are brought into contact so that the driven means is actuated by the motor.

The particular embodiment of the toy here set forth is a toy airplane having landing wheels geared to a momentum motor so that they may be used as driving wheels for energizing the motor as well as for propelling the airplane during the normal operation of the toy. In addition a propeller is provided which is driven by the momentum motor and which simulates the driving propeller of a real airplane. An object of my invention is to so gear the propeller to the momentum motor that the propeller does not rotate during, and therefore does not impede, the energization of the momentum motor. A further object of my invention is to provide safety coupling means between the momentum motor and the propeller such that the propeller may cease rotating if it encounters an obstacle, without jarring the entire motor mechanism as would be the case if no safety coupling were used.

To the accomplishment of the foregoing and such other objects as will hereinafter appear, my invention consists in the coupling mechanism, and in the toy airplane employing the mechanism, as hereinafter are more particularly described and sought to be defined in the claims; reference being had to the accompanying drawings which show the preferred embodiment of my invention, and in which:

Fig. 1 is a partially cut-away plan view of a toy airplane constructed in accordance with my invention;

Fig. 2 is an elevational section through the airplane in energizing position, taken on the line 2—2 in Fig. 1;

Fig. 3 is a similar section through the airplane in operating position; and

Fig. 4 is a section taken in the plane of line 4—4 in Fig. 2.

Referring to the drawings, it will be seen that the toy, here exemplified by an airplane comprising a sheet metal fuselage 2 and appropriate planes 4 and 6, includes a momentum motor 8, which is geared to the landing wheels 10, and also to a propeller 12. During the energization of the toy the landing wheels 10 may be considered as driving means for energizing the motor 8, and during the operation of the toy the propeller 12, as well as the landing wheels 10, become the driven means operated by the motor. Now, in accordance with my invention, the driven means, here exemplified by the propeller, is so arranged that the energization of the motor 8 is not impeded by the rapid rotation of the propeller which ordinarily would accompany the fast spin given the momentum motor during its energization, usually by rolling the airplane rapidly along a surface frictionally engaging the landing wheels 10. Furthermore, my invention permits the propeller 12 to stop rotating should it encounter some obstacle during the travel of the airplane under propulsion of the momentum motor. To this end the bevel gearing between the momentum motor and the propeller is made such that one of the gears is movable out of engagement with the other, either dur-

ing energization of the motor, or upon striking an obstacle.

Considering the toy more in detail, the landing wheels 10 are fixed to a shaft 14, on which a gear 16 is also mounted. The gear 16 meshes with a pinion 18, which rotates a momentum fly wheel 20, the gear ratio being sufficiently high to obtain the desired inertia effect. The forward end of the fuselage 2 of the airplane is closed by a pair of disks 22 and 24, which are formed with radial projections 26, and are oppositely convexed at the central portions thereof, in order to simulate an air cooled radial airplane engine. At the same time the convexity of the disks, like the crank case of the real engine, provides spaced bearings in which the propeller shaft 28 is supported and rotates. In accordance with my invention the propeller shaft is axially movable in its bearings, and has fixed to its inner end a gear 30 which is formed by stamping relatively rounded radial teeth out of the face of a metallic disk. This gear is best shown in Fig. 4, and the relation thereto of the main driving gear 16 is indicated by the broken line gear numbered 16 in that figure.

By reference to Figs. 1 and 3 it will be noticed that when the airplane is in its normal operating position, resting not only on the main landing wheels 10 but also on the tail landing wheel 32, the propeller shaft 28 is inclined and therefore tends to slide downwardly, bringing the gear 30 into mesh with the gear 16. Consequently in normal position the propeller is rotated as the airplane is running along a surface under propulsion of the momentum motor.

However, during energization of the momentum motor the airplane is normally grasped and run forcibly along a surface while resting only on the main driving wheels, in order to obtain maximum frictional engagement between the surface and the driving wheels. The airplane then assumes a position such as that shown in Fig. 2, so that the propeller shaft 28 no longer tends to slide the gear 30 into engagement with the gear 16, but, on the contrary, moves outwardly freely so that the propeller 12 does not hinder the energization of the momentum motor 8.

In this tilted position the propeller is not free to rotate, for it no longer has sufficient clearance from the surface, but this causes no injury because of the disengagement of the gears 16 and 30. Should the shaft 28 not have moved freely enough to have disengaged the gears when the energization process is begun, the contact of one end of the propeller 12 with the surface immediately causes the gear 30 to ride out from engagement with the gear 16.

This last feature explains, in anticipation, how damage is avoided should the propeller strike an obstacle while the toy is running along under its own power, for in such case, even with the airplane in the position shown in Fig. 3, the gear 16 forces the gear 30 readily out of mesh despite the slight tendency toward engagement caused by the downward inclination of the propeller shaft 28. This safety feature constitutes one of the reasons for forming the teeth of the gear 30 by rather rounded radial projections on the face of a disk, for this facilitates disengagement of the gears.

As a consequence, the disengagement takes place with such sufficient ease that should the airplane be energized while resting on all three landing wheels the propeller frees itself, and does not rotate, merely by reason of its inertia in opposition to the sudden accelerating impulse caused by the energization of the momentum motor. It thus becomes evident that a light spiral spring may be used, instead of a gravity inclination, for tending to keep the gears 30 and 16 in mesh.

It will be apparent that while I have shown and described my invention in the preferred form, many changes and modifications may be made in the structure disclosed without departing from the spirit of the invention, defined in the following claims.

What I claim is:

1. In a toy, a momentum motor, means driven thereby, contacting rotatable members for coupling the momentum motor and the driven means, said members being only lightly urged into contact, so that the driven means is automatically uncoupled during the energization of the momentum motor.

2. In a toy, a momentum motor, means driven thereby, and means for so coupling the momentum motor and the driven means that the driven means is uncoupled during the energization of the momentum motor, said coupling means comprising a pair of gears, one of which is automatically movable out of engagement with the other during the energization of the motor, said first gear being lightly urged by gravity into contact with the second gear during the operation of the toy.

3. In a toy, a momentum motor, means driven thereby, and means for so coupling the momentum motor and the driven means that the driven means is uncoupled during the energization of the momentum motor, said coupling means comprising a pair of gears mounted on relatively transversely disposed shafts, one of which is automatically axially movable under heavy load to disengage the gears, as during the energization of the motor, but which normally moves in a direction to engage said gears, as during normal operation of the toy.

4. In a toy, a momentum motor, means driven thereby, and means for coupling the momentum motor and the driven means, said coupling means comprising a pair of gears mounted on shafts whose axes intersect, one

of which is axially movable to disengage the gear carried thereby from the second gear, said movable gear having teeth in the form of relatively rounded radial projections on the face of a disk, so that it readily disengages itself from the second gear under undue load.

5. A toy airplane comprising a fuselage and wings, a momentum motor, a propeller, and means so coupling the propeller to the momentum motor that the propeller is uncoupled during the energization of the motor, said coupling means comprising a pair of gears one of which is automatically movable out of engagement with the other during the energization of the motor, said first gear being lightly urged by gravity into engagement with the second gear during the operation of the toy.

6. A toy airplane comprising a fuselage and wings, landing wheels therefor, a momentum motor geared to the landing wheels, a propeller, and means so coupling the propeller to the momentum motor and landing wheels that the propeller is uncoupled during the energization of the motor by frictional rotation of the landing wheels, said coupling means comprising a pair of gears mounted on relatively transversely disposed shafts one of which is axially movable under excess gear load to permit disengagement of the gears.

7. A toy airplane comprising a fuselage and wings, main landing wheels therefor, a tail landing wheel, a momentum motor geared to the main landing wheels, a propeller, and means including an axially movable upwardly inclined propeller shaft and a gear mounted thereon for coupling the propeller to the momentum motor and main landing wheels, said gear being uncoupled during the energization of the motor by frictional rotation of the main landing wheels, but being gravitationally urged into engagement therewith and rotated thereby when the airplane is running normally on the main and tail landing wheels under the influence of the motor.

8. A toy airplane comprising a fuselage and wings, landing wheels therefor, a momentum motor geared to the landing wheels, a propeller, an axially movable propeller shaft, a pair of disks fixed to the forward end of the fuselage and formed with radial projections in order to simulate an air cooled radial engine and oppositely convexed to form spaced bearings for supporting the propeller shaft in an axially movable manner, said propeller shaft tending normally to move in one direction, and means including a gear on the axially movable shaft for so coupling the propeller to the momentum motor and landing wheels that the gear is disengaged under excess load, as during energization of the motor by frictional rotation of the landing wheels, said disengagement being permitted by movement of the propeller shaft in the opposite direction.

9. A toy airplane comprising a fuselage and wings, landing wheels therefor, a momentum motor geared to the landing wheels, a propeller, and means including an axially movable upwardly inclined propeller shaft and bevel gears for coupling the propeller to the momentum motor and landing wheels, the gear on the propeller shaft having teeth in the form of relatively rounded radial projections on the face of a disk, so that it readily disengages itself by axial movement during energization of the momentum motor or upon the propeller striking an obstacle.

10. In a toy, a motor, means driven thereby, means for coupling the motor and the driven means comprising a pair of gears mounted on relatively transversely disposed shafts, one of which is axially movable to permit the gear carried thereby to disengage itself from the second gear under undue load.

11. In a toy, a motor, means driven thereby, means for coupling the motor and the driven means comprising a pair of gears mounted on relatively transversely disposed shafts one of which is axially movable, said movable gear having teeth in the form of relatively rounded radial projections on the face of a disc, so that it readily disengages itself from the second gear under undue load.

12. A toy airplane comprising a fuselage and wings, a motor, a propeller, and means coupling the propeller to the motor comprising a pair of gears mounted on relatively transversely disposed shafts one of which is axially movable to permit the gear carried thereby to disengage itself from the other gear, so that the propeller may stop rotating upon striking an object.

13. An airplane comprising a fuselage and wings, landing wheels therefor, a motor for rotating the landing wheels in order to propel the airplane along a supporting surface, a propeller at the forward end of the fuselage of the airplane, and means coupling the propeller to the motor comprising a pair of gears mounted on relatively transversely disposed shafts one of which is axially movable to permit the gear carried thereby to disengage itself from the other gear, so that the propeller may stop rotating upon striking an object.

14. A toy airplane comprising a fuselage and wings, landing wheels therefor, a motor geared to the landing wheels, a propeller and means including an axially movable upwardly inclined propeller shaft and bevel gears for coupling the propeller to the motor and landing wheels, the gear on the propeller shaft having teeth in the form of relatively rounded radial projections on the face of a

disc so that it readily disengages itself by axial movement to permit the propeller to stop rotating upon striking an object.

Signed at New York, in the county of New York and State of New York, this 26th day of February, A. D. 1929.

LOUIS MARX.