J. H. KNIGHT.

TOY.

APPLICATION FILED DEC. 12, 1919.

1,393,544.

Patented Oct. 11, 1921.

2 SHEETS—SHEET 1.

Fig. 1.

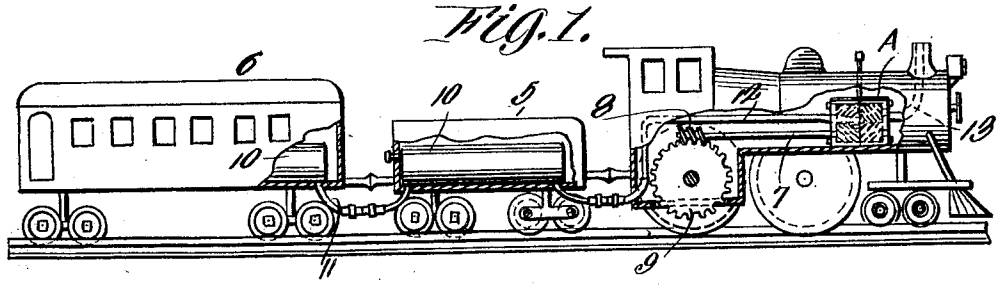

Fig. 2.

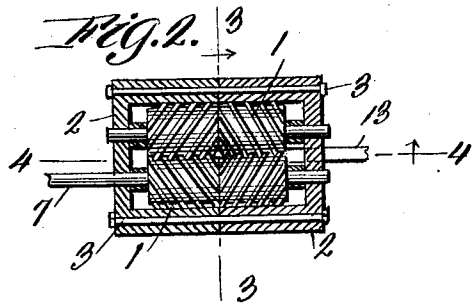

Fig. 3.

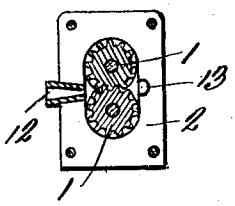

Fig. 4.

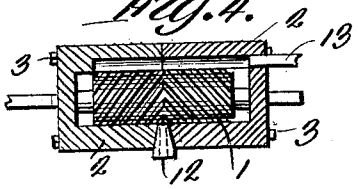

Fig. 5.

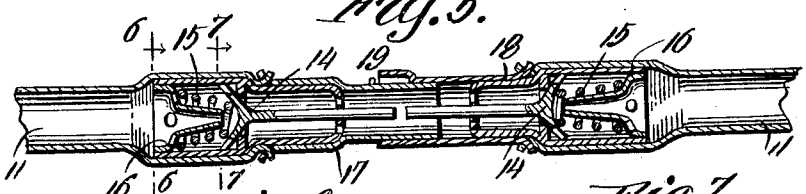

Fig. 6.

Fig. 7.

WITNESSES

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2 SHEETS—SHEET 2.

Fig. 8.

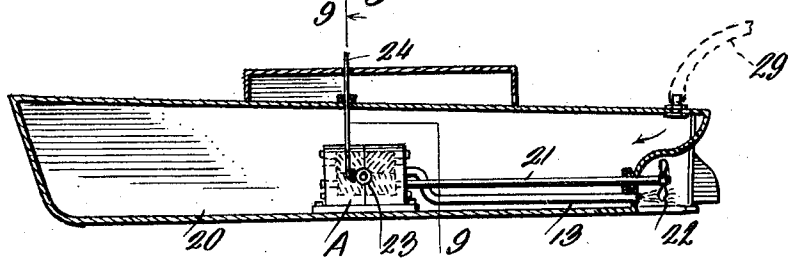


Fig. 9.

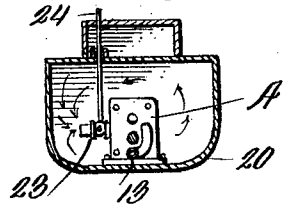


Fig. 10.

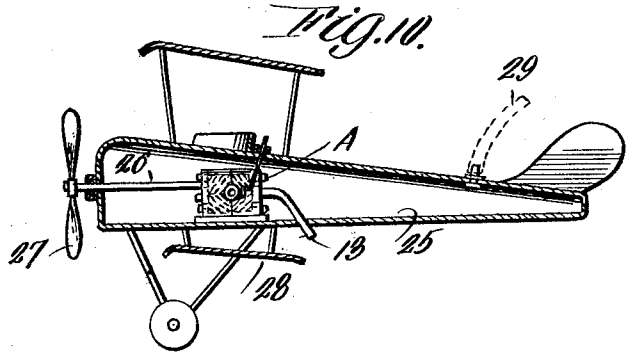
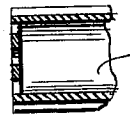


Fig. 11.

Fig. 12.



WITNESSES

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UNITED STATES PATENT OFFICE.

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To all whom it may concern:

Be it known that I, JAMES HARMER KNIGHT, a citizen of the United States, residing at Westtown, in the county of Chester and State of Pennsylvania, have invented certain new and useful Improvements in Toys, of which the following is a specification.

The invention relates to toys which are mechanically propelled by a fluid operated motor and aims to utilize a motor of the helical or herring bone type because of its simplicity and maximum development of power from a given amount of motive medium.

The drawings illustrate a preferred embodiment of the invention. However, it is to be understood that in adapting the same to meet different conditions various changes in the form proportion and minor details of construction may be resorted to without departing from the nature of the invention as claimed hereinafter.

Referring to the accompanying drawings:

Figure 1 is a side view of a miniature train of cars embodying the invention.

Fig. 2 is a detail view of a helical motor adapted for purposes of the present invention, the casing being in section and the rotors in full lines.

Fig. 3 is a sectional detail on the line 3—3 of Fig. 2.

Fig. 4 is a sectional detail on the line 4—4 of Fig. 2.

Fig. 5 is a central longitudinal section of a train pipe coupling, between two members containing tanks holding the fluid motor medium.

Fig. 6 is a sectional detail on the line 6—6 of Fig. 5.

Fig. 7 is a detail section on the line 7—7 of Fig. 5.

Fig. 8 is a central longitudinal section of a boat constructed in accordance with and embodying the invention.

Fig. 9 is a transverse section on the line 9—9 of Fig. 8.

Fig. 10 is a central longitudinal section of a toy flying machine constructed in accordance with the invention.

Fig. 11 is a transverse section of a modified form of rotor.

Fig. 12 is a sectional detail of an end portion of the modified form of rotor on the line 12—12 of Fig. 11.

Corresponding and like parts are referred to in the following description and indicated in the several views of the drawings by like reference characters.

In accordance with the present invention, the toy may have any configuration according to the machine or device of which it is representative. The toy contains within itself a motor of the helical or herringbone type and in addition holds a supply of motive medium which may be in the form of compressed air. The body of the toy is hollow and constitutes a chamber or tank of moderate strength to hold air under low pressure, sufficient to operate the motor for a reasonable period. This same space may also receive the motor. However, it is essential that the motor exhausts into the open air and that the motive medium pass from the storage chamber into the motor by way of the pipe 12 thereof.

As indicated most clearly in Fig. 2 the motor comprises a pair of rotors 1 which are provided upon their exterior with ribs or flights in spiral or herringbone form. The casing inclosing the rotors is formed of two similar or like sections 2 which may be drop forged or constructed in any economical way, and which are secured by means of bolts 3 passing therethrough. The motor is relatively small and compact and the rotors may be solid as indicated in Fig. 3 or hollow as shown in Figs. 11 and 12. The latter construction is preferred because of the small amount of effort involved and the resultant lightness of structure which is desirable.

Fig. 1 shows a train of cars embodying a locomotive, a tender 5, and a car 6. These several members may be of any cheap and light construction and are adapted to be coupled in any way. The motor designated by the letter A is disposed within the locomotive 4 and the drive shaft 7 thereof is provided with a worm 8 which is in mesh with a worm wheel 9 secured to the drive axle of the locomotive. A tank 10 is disposed within the tender 5 and car 6 and contains compressed air. A flexible tube 11 connects the tanks 10 and connects the tanks with a pipe 12 by means of which the motor medium is supplied to the motor. The exhaust from the motor passes off by way of a pipe 13. The exhaust may be utilized in a variety of ways for operating a signal or for assisting in the propulsion or control of the toy.

Fig. 5 and the detail views thereof show the means for coupling the parts of the train pipe 11, said coupling embodying similar members, each containing a valve 14, a spring 15 in coöperative relation with the valve for normally holding it seated and a stop 16 for limiting the movement of the springs and the valve in one direction. The stop 16 is of conical formation and hollow and forms a support for the spring 15 which is of helical formation and tapering to correspond with the tapering end of the stop 16. Each member of the coupling comprises a shell 17 and an inner hollow member 18. The two members are adapted to be connected by means of a bayonet joint 19, each member being provided with an element constituting the joint.

Referring now in particular to Fig. 5 it will be observed that the stop 16 serves not only as a support for spring 15 whose function is to insure the closing of the valve but the nozzle-like projection forms a stop for the valve allowing it to open just enough for the free passage of the air. Now, when the outer male sleeve of the coupling is inserted into the female sleeve until its edge just passes the bottom of the locking slot, there is established a continuous, non-leakable passage between the two adjoining air fluid compartments. The valves 14 are not yet open but their stems are in contact. The further telescoping movement of the outer sleeve to the point of locking is divided equally between the two valves by adjusting the length of the forward end of the stop first mentioned. This prevents either valve taking up all of the movement in case the other valve should stick, and also insures the positive and equal opening of both valves.

Fig. 8 illustrates a toy boat 20 the hull of which constitutes a chamber to receive air under compression. A motor A of the type herein described is located within the hull of the boat, and the drive shaft 21 is provided at its rear end with a propeller 22. The exhaust pipe 13 from the motor is arranged to discharge the spent motive medium in the rear of the boat so as to act upon the propeller and materially assist in the operation thereof so as to propel the boat. In this case both the motive medium and the motor are contained within the hull of the boat, and the motive medium is admitted to the motor by means of a valve 23 which is controlled from the outside by means of a stem 24.

Fig. 10 illustrates the invention applied to a flying machine the body of which is indicated at 25 and is hollow to receive both the motor A and the motive medium. The drive shaft 26 of the motor is provided with a propeller 27. The exhaust is discharged downwardly and rearwardly by means of the pipe 13 and back of plane 28 so as to assist materially in lifting the machine from its support, or in supporting the machine while in flight. The dotted lines 29 in Figs. 8 and 10 represent a tube from an air compressor such as the ordinary hand pump whereby the body of the toy may be charged with air under pressure for operating the motor. The body of the toy is provided with an air valve to which the tube and air pump such as used for inflating tires may be coupled when it is required to supply the tank or body of the toy with compressed air for operating the motor.

Having thus fully described my invention what I claim as new and desire to secure by Letters Patent, is:—

1. A toy comprising a hollow body adapted to contain fluid motive medium and a motor located within the body of the toy and adapted to be driven by the fluid motive medium, the drive shaft of the motor being provided with a propelling element and the exhaust from the motor being utilized for operating a signal.

2. A toy embodying a hollow body adapted to contain fluid motive medium, a motor disposed within a body of the toy and operable by the fluid motive medium derived from the body of the toy, the drive shaft of the motor extending beyond the body of the toy and provided with a propelling element and the exhaust from the motor discharging without the body of the toy.

3. A toy comprising units coupled in train, a helical motor mounted on one of the units, a tank containing fluid motive medium, a pipe connecting said tank with the motor and a coupling in the length of the pipe and between units and comprising complemental members each containing a valve, a hollow stop of conical form, a conical helical spring, and connecting means for securing the members when properly assembled.

4. A toy comprising units coupled in train, a motor mounted upon one of said units, a tank containing fluid motive medium, a pipe connecting said tank with the motor; and a coupling in the length of the pipe and located between the unit and comprising a plurality of sections, each containing a valve, a stop, yieldable means associated with said stop, and means for connecting and securing the members together when properly assembled.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES HARMER KNIGHT.

Witnesses:
PERCY MCGEORGE,
HAROLD E. BIRD.