Apr. 3, 1923.

E. F. FOX

1,450,282

TOY

Filed Apr. 4, 1922

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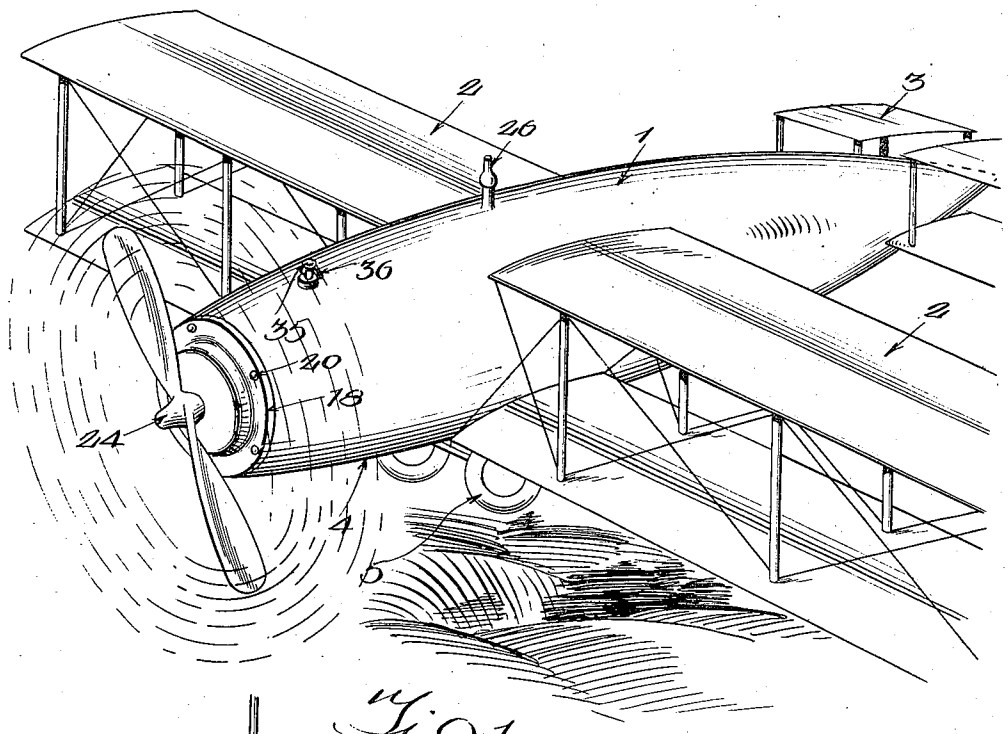


Fig. 1.

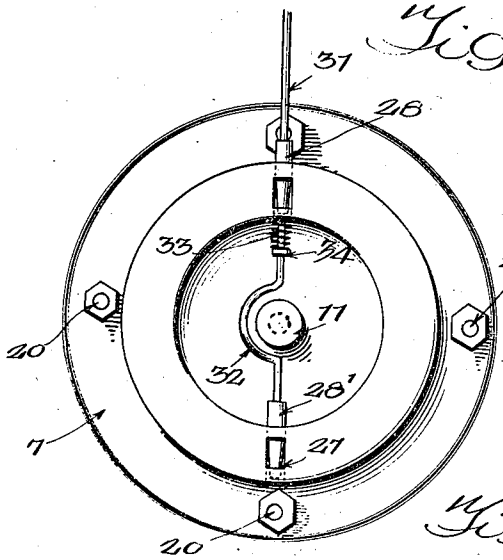


Fig. 3.

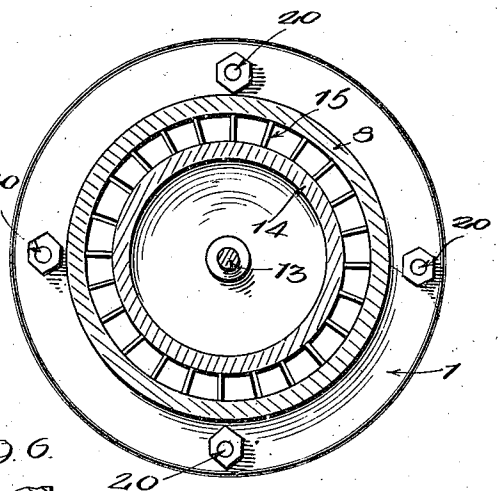


Fig. 4.

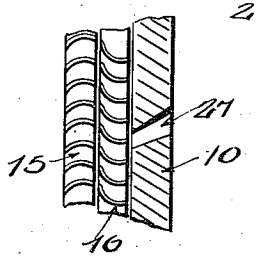


Fig. 6.

WITNESSES

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2 sheets-sheet 2

Fig. 5.

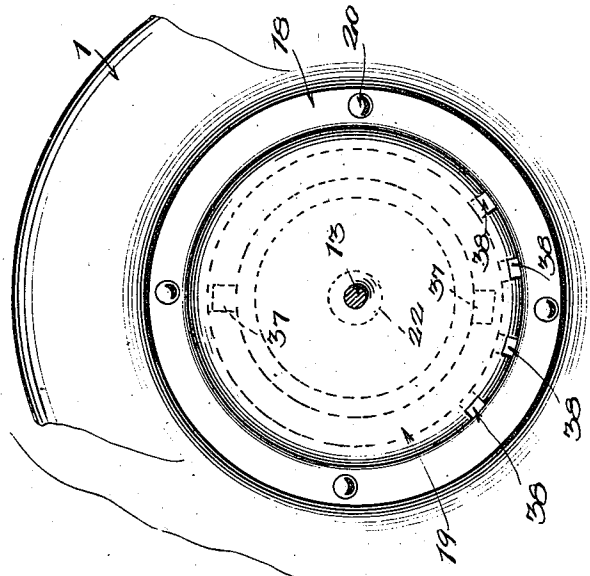
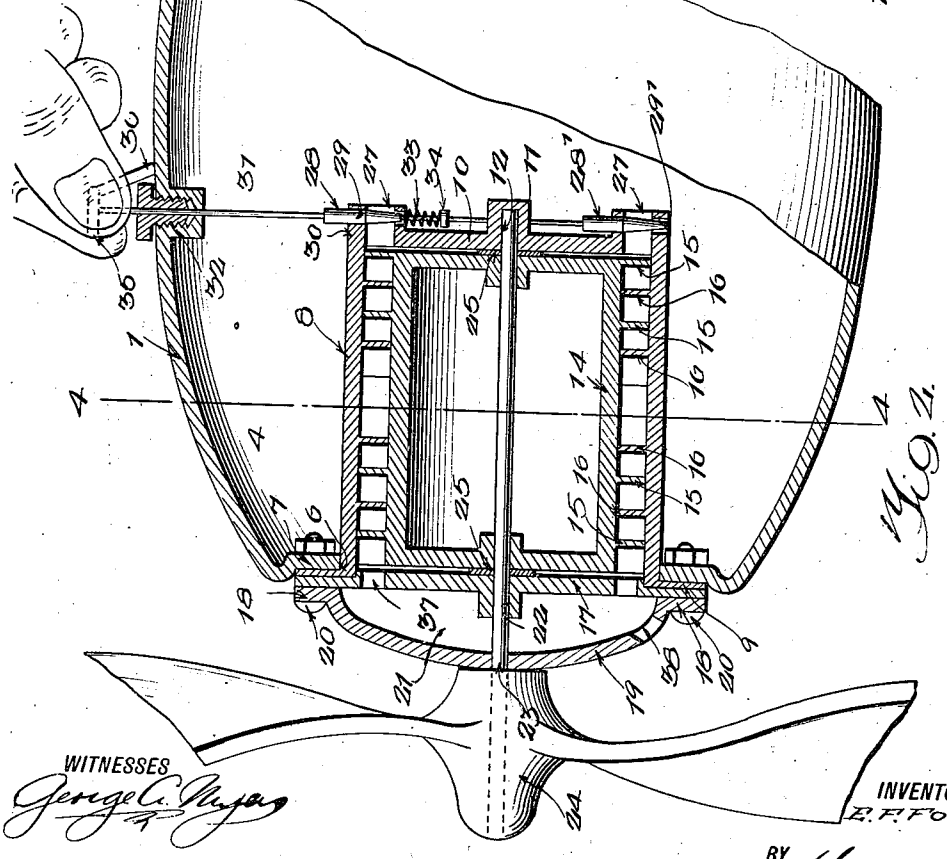


Fig. 4.



WITNESSES

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Patented Apr. 3, 1923. 1,450,282

UNITED STATES PATENT OFFICE.

ESTON F. FOX, OF WILLIAMSPORT, MARYLAND.

TOY.

Application filed April 4, 1922. Serial No. 549,384.

To all whom it may concern:

Be it known that I, ESTON F. FOX, a citizen of the United States, and resident of Williamsport, in the county of Washington and State of Maryland, have invented certain new and useful Improvements in Toys, of which the following is a specification.

My invention relates to toys of the automatic or self-propelled type of construction, and it consists in the combinations, constructions and arrangements herein described and claimed.

An object of my invention is to provide a miniature or toy aeroplane having means operable to cause the toy aeroplane to take flight and move about in the air in a manner closely simulating the movements of a full sized aeroplane of conventional construction.

A further object of my invention is to provide a toy of the character described which is provided with a propeller and a turbine for operating the propeller, the turbine being actuated by a compressed fluid contained within the toy.

A still further object of my invention is to provide a toy of the character described having a turbine of novel and simple construction.

Other objects and advantages of the invention will be apparent from the following description and the novel features will be particularly outlined in the appended claims.

My invention is illustrated in the accompanying drawings, forming a part of this application, in which

Figure 1 is a perspective view of a toy aeroplane embodying the invention,

Figure 2 is an enlarged view mainly in side elevation and partly broken away and in section, of a fragmentary portion of the body of the aeroplane,

Figure 3 is a view of the interior of the aeroplane body at the forward end thereof, showing a turbine in applied position,

Figure 4 is a section along the line 4—4 of Figure 2,

Figure 5 is a fragmentary view showing the front or forward end of the body with the propeller omitted, and

Figure 6 is a detail fragmentary perspective view of a portion of the turbine included in the device.

In carrying out my invention, I provide a hollow body 1 which is preferably elongated and tapering toward the rear end thereof, being substantially cigar-shaped as shown. The body or shell 1 is provided with laterally extending slightly inclined elevating planes 2—2 with a rudder attachment 3 at the rear end thereof, and with a landing gear or frame 4 including ground wheels 5. The body or shell 1 is formed with a relatively large central opening 6 in its forward end or head, which opening is margined by an inwardly extending annular flange 7. The latter forms an integral part of the body or shell 1.

A turbine casing or stator 8 of substantially cylindrical conformation is of a size to be slid through the opening 6 until the outwardly extending annular flange 9 at the outer end thereof abuts the outer face of the flange 7. The stator 8 is provided with a head 10 at its inner end, which is preferably formed integrally therewith and which is formed with a central boss 11 which is bored from the inner side of the head at 12 to receive the inner end of a rotor shaft 13. The rotor 14 mounted upon the shaft 13 is revolubly mounted within the stator 8 and is provided on its periphery with spaced apart circumferentially extending series of curved vanes 15 which alternate with series of reversely curved vanes 16 extending inwardly from the inner wall of the stator 8. A head 17 at the forward end of the stator and disposed exteriorly of the shell or body 1 is clamped adjacent to its peripheral edge between a flange 18 of a convexo-concave cover plate 19 and a flange 9 of the stator. Bolts 20 are applied to secure the cover plate 19, the interposed portions of the head 17 and the flange 9 of the stator to the flange 7 of the body or shell 1, whereby the turbine will be firmly and detachably supported within the interior of the body or shell 1 at the forward end thereof and a space 21 is provided between the head 17 and the cover plate 19. The head 17 and the cover plate 19 are provided with aligned bearings 22 and 23 respectively through which the rotor shaft 13 projects. A propeller 24 is secured to the rotor shaft at the forward end of the latter.

Thrust washers 25 may be arranged upon the rotor shaft 13 between adjacent heads of rotor and stator of the turbine, if desired.

With the organization described in the foregoing the body or shell 1 is adapted to hold a fluid, such as air, which may be com-

pressed to a degree sufficient to operate the turbine in a manner which will be hereinafter described. The fluid to be compressed within the body or shell 1 or having been compressed previously may be pumped or otherwise forced through an inlet of the body or shell, which inlet is controlled by a valve 26 which may be of any suitable known type of construction that is adapted to permit of a fluid being forced therethrough into the body or shell and which is continuously actuated to prevent escape of the fluid from the interior of the shell or body therethrough. The head 10 of the turbine is provided with ports 27—27, which are relatively reduced or constricted at their inner ends and are so directed that a fluid passing therethrough will impinge against series of vanes on the rotor. The ports 27 are controlled by longitudinally aligned valves 28, 28′, respectively which are slidable in aligned bores 29, 29′ extending radially through a flange extension 30 to the head 10 and respectively intersecting the ports 27, 27. The valves 28, 28′ are tapered at their ends. The arrangement is such that when the tapered portions of the valves are seated in the bores in which disposed, the ports 27, 27 are closed by the body portions of the valves. The valve 28 is provided with a stem 31 extending through a stuffing box 32 with which the body or shell 1 is provided.

The valve 28′ has a stem 32 arranged with the end thereof in the bore 29 and in connected relation to the tapered end of the valve 28. A spring 33 disposed upon the stem 32 to react against a collar 34 secured thereto tends to hold the valves in position to close the ports controlled thereby. The stem 31 carries a cap 35 at its outer end, which may be conveniently grasped to manipulate the same in order to close or open the ports controlled by the valves, as desired. An arm 36 hingedly attached to the cap 35 to depend therefrom may be swung substantially into upright position so that the valve stem 31 is releasably maintained in raised position and the ports controlled by the valves 28—28′ thus kept open.

The head 17 is provided with a port 37 communicating with the space or compartment 21. The latter is provided with ports 38 opening through the lower part of the cover plate 19 adjacent to the lower edge of the latter, as best seen in Figure 5. I prefer to provide four of the ports 38 and to arrange these ports in spaced apart relation, as illustrated.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood. A suitable operating fluid, such as air is forced through the valve 26 into the shell or body 1 until the fluid therewithin is compressed to a desired degree. It will be understood that the ports 27, 27 are closed while the body 1 is being charged.

When the valves 28 and 28′ are raised, the pressure fluid will pass through the ports 27, 27 to impinge against the end series of vanes 15 and will then be guided by the succeeding series of vanes 16 to impinge against the adjacent series of vanes to occasion the rotation of the rotor 14 at a relatively high speed. After traveling the length of the stator, the pressure fluid is forced through the ports 37 into the space or compartment 21 and is exhausted downwardly from the latter through the ports 38, thereby exerting a lifting force upon the body 1. It will of course be understood that the rotation of the rotor occasions the rotation of the propeller 24, thereby imparting a forward and upward motion to the body, the upward motion being occasioned by the lifting action resulting from the movement of the inclined planes 2—2 through the horizontal currents of air generated by the propeller. When the pressure fluid is exhausted through the port 38, the body will be lifted and the device will take flight in the manner of an aeroplane of conventional construction and will move about in the air under the control of the rudder 3 and the influence of the elevating planes 2—2 as long as the turbine is in operation.

It will thus be apparent that my invention provides a toy of simplified and economical construction which is adapted to operate in a manner resembling the operation of a conventional aeroplane and to thus afford entertainment and instruction to children and other observers.

Obviously, my invention is susceptible of embodiment in forms other than that in which illustrated in the accompanying drawings and I therefore consider as my own all modifications and adaptations of the form of the device disclosed herein which fairly fall within the scope of the appended claims.

Having thus described the invention, what is claimed is:—

1. In a device of the character described, an elongated hollow body provided with an inlet and with an opening at one end thereof, a normally closed valve controlling the inlet, a turbine closing the opening at the end of the body and partially received within the latter, said turbine being provided with an inlet port at the end thereof received within the body and being provided with an outlet port at its opposite end, whereby said turbine is adapted to be actuated by a pressure fluid introduced into said body through said inlet of the body, a propeller operatively connected with the turbine and arranged to be driven by the latter, and a cover plate for the portion of the body provided with the outlet port, said cover plate

being provided with an exhaust opening through the lower part thereof whereby a lifting force is applied to the body as the exhaust pressure fluid passes through the exhaust opening.

2. In a device of the character described, an elongated hollow body provided with an inlet and with an opening at one end thereof, a normally closed valve controlling the inlet, a turbine closing the opening at the end of the body and partially received within the latter, said turbine being provided with an inlet port at the end thereof received within the body and being provided with an outlet port at its opposite end, whereby said turbine is adapted to be actuated by a pressure fluid introduced into said body through said inlet of the body, a propeller operatively connected with the turbine and arranged to be driven by the latter, a cover plate for the portion of the body provided with the outlet port, said cover plate being provided with an exhaust opening through the lower part thereof whereby a lifting force is applied to the body as the exhaust pressure fluid passes through the exhaust opening, and a valve operable exteriorly of the body for controlling the inlet port of said turbine.

3. In a device of the character described, an elongated hollow body provided with an opening at one end thereof, a turbine closing the opening at the end of the body and partially received within the latter, said turbine being provided with an inlet at the end thereof received within the body and with an exhaust port at its opposite end, whereby said turbine is adapted to be actuated by a pressure fluid, means carried by the body and adapted to be operated by said turbine to propel the body, and means arranged adjacent to the exhaust port of the turbine and cooperating with the latter to utilize the exhaust pressure fluid in exerting a lifting force against the body.

ESTON F. FOX.