Nov. 29, 1938. K. HOWIE 2,138,301

TOY AIRPLANE

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Fig. 1.

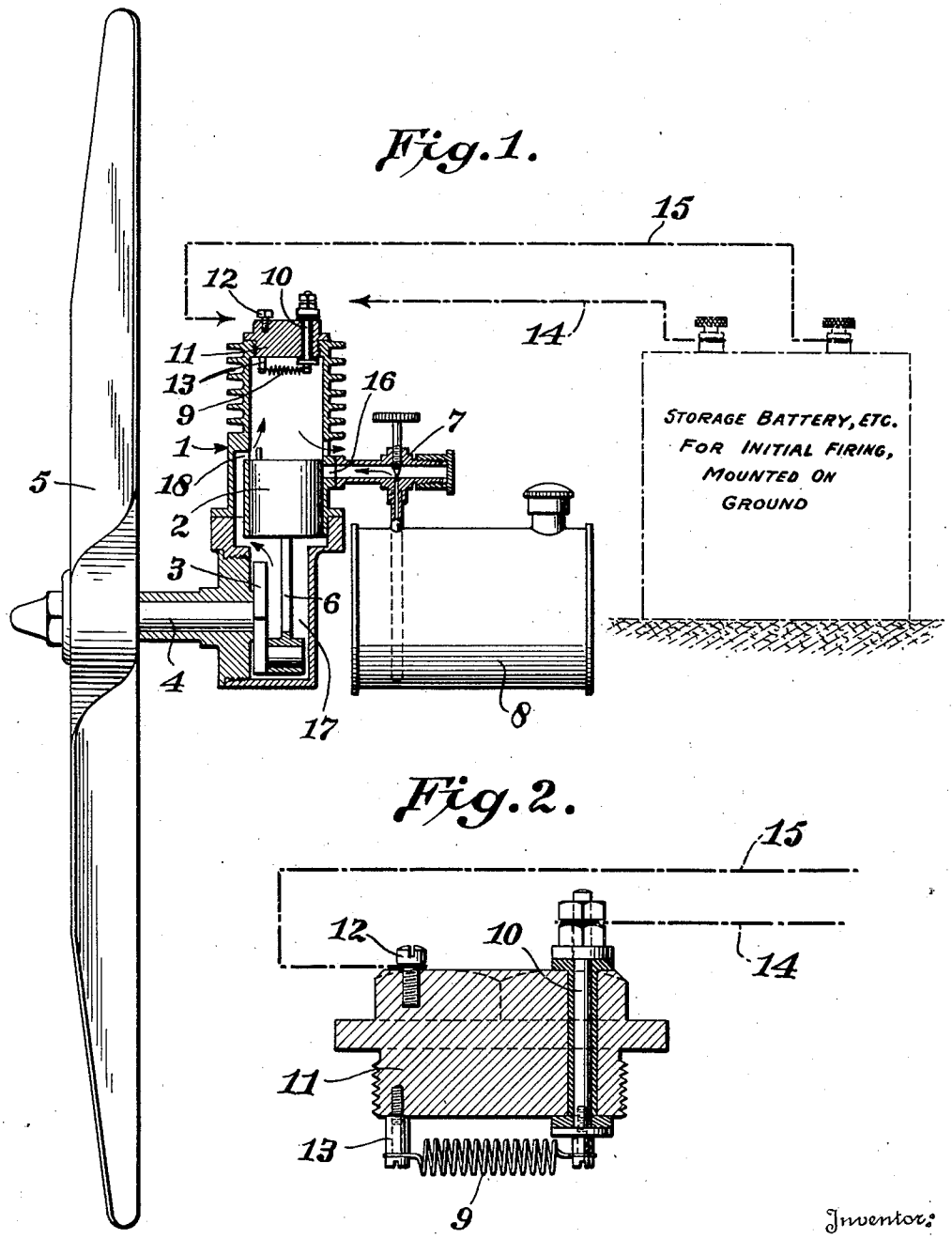



Fig. 2.




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## TOY AIRPLANE

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5 Claims. (Cl. 46—78)

One object of the invention is to provide a motor operated toy or model airplane in which the wing spread is reduced to the lowest possible limit. Toy or model airplanes at present have a wing spread of from five to thirteen feet, as compared with a desirable spread of two to three feet. The extent of the wing spread is dependent largely upon the weight of the engine, spark coil, batteries, etc. or in other words, upon the weight of the motor and ignition equipment generally. The engine must be of a size and capacity to take care of the weight due to the extensive wing spread, as well as the weight of the ignition system carried by the plane as in toy planes hitherto employed.

While it may not be difficult to reduce the size of the engine itself and thereby save weight, it is not feasible to make this reduction because the engine must be of sufficient size to take care of the weight of the present ignition system involving the spark coil, battery, spark plug, wiring system, timer condenser and suitable fittings.

My improvement concerns a toy or model airplane, devoid of the usual ignition system involving the parts above enumerated, of minimum wing spread, of light engine weight, and having ignition means which is maintained active during flight by the heat generated by the explosions in the combustion chamber of the internal combustion engine.

In carrying out the invention, an ignition member, such for instance as a coil, is located in or is in communication with the combustion chamber of the engine. This coil or member is energized initially from ignition equipment on the ground to which said coil is temporarily connected.

Once the engine is started, and is heated up, the connection between said coil and ignition equipment is broken and then the toy plane is ready to start on its flight, leaving the weighty ignition equipment behind. The coil is kept hot for firing the charges by the heat derived from the explosions, in the combustion chamber, of the fuel supplied to the engine from a suitable source carried by the toy, so that during flight all that the toy plane carries for ignition purposes is the hot coil.

As a result of employing the hot coil or member as the sole means of firing the charges during the flight of the toy, the weight of the usual ignition system is eliminated, the size of the engine is reduced, thus further eliminating weight, and therefore the spread of the wings can be reduced to a minimum, and this again eliminates weight and contributes to the use of a lighter engine.

The possibility of weight reduction consequent upon the use of the coil as the sole means of ignition during flight of the toy is cumulative in the sense that the elimination from the plane of the weight of the usual ignition system enables a lighter engine to be employed, this in turn enables a minimum wing spread to be used, and this again permits a further reduction in the size of the engine.

In the drawing

Figure 1 is a diagram of an internal combustion engine, the propeller, fuel tank and mixing valve of a toy or model airplane according to my invention.

Fig. 2 is a detail view of the head of the engine having a heating coil carried thereby.

The engine 1 may be of the two cycle type. Its piston 2 is connected with the crank 3 of the shaft 4 of the propeller 5 by a piston rod 6. At 7 is shown an ordinary mixing valve and at 8 a tank for holding the gasoline.

The parts mentioned above constitute the motor organization for driving the propeller. There is no ignition system on the toy, i. e. no battery, spark coil, spark plug, and features necessarily employed in such systems. The sole means of ignition on the toy is the coil 9, adapted to be initially heated from an ignition system on the ground. The coil is energized from the ground plant by current obtained from a battery, or other source of electricity, located on the ground through suitable circuit wires, involving a wire connected to the binding post 10 carried by the head 11 of the engine, which may be screw threaded into connection with the engine cylinder, and a wire connected with a binding screw 12 also mounted on the head block. The coil 9 is connected at one end to the binding post 10 and at the other end it connects by means of a screw 13, with the head 11, so that the circuit is completed through the head between the binding screw 12 and 13.

I have shown in dotted lines a storage battery with circuit wires 14, 15 connected to the battery and adapted to connect with the binding members 10 and 12. These connections are shown in dotted lines unattached, indicating that the motor unit when working ready for flight is disconnected from the ignition system mounted on the ground.

The ground plant is used only for starting the engine, after which it is detached from the engine, as shown, whereupon the coil 9 is kept

sufficiently hot by the fire of the explosions to serve as the sole ignition means during flight of the toy plane.

The engine works on the two cycle principle. The heat of the explosions keeps the coil 9 hot enough to fire the charge.

When the piston is at the top of its stroke it uncovers the port 16 to which the mixing valve is attached and the mixture of gasoline and air is drawn into the crank case. On the down stroke of the piston the mixture is compressed in the crank case 17. When the piston reaches the bottom of its stroke it uncovers the port 18 in the left hand side of the cylinder and the gas compressed in the crank case rushes into the cylinder as in the two cycle type of engine. Just before the new charge enters the cylinder the burnt gases escape through the exhaust port on the right hand side of the cylinder which is uncovered by the piston just a little before the inlet port is opened. On the up stroke of the piston the new charge is compressed and explodes by coming in contact with the hot coil.

The hot coil is made of platinum wire or any of the heat resisting wires now on the market which are used for electric furnaces etc.

It will be observed that with my improvement I provide a cycle of weight reductions. The elimination of the usual ignition system from the plane reduces its overall weight, so such an extent that a smaller engine can be employed, and these weight reductions enable me to employ wings having a minimum spread.

A toy airplane having a reduced wing spread is an important advance in the art because of the convenience with which it may be carried or transported to and from the flying field. Wings of considerable spread render a toy plane cumbersome and inconvenient to handle and carry, especially by automobile, it not being possible to carry the larger models within the car in going to and from the point where a meet is held, because of the aggregate lengths of the wings.

An instance of the weights involved in previous model or toy planes and the saving in weights by my invention may be stated as follows:

| | Ounces |
|---|---|
| Engine, propeller and tank | 4.48 |
| Dry cells | 6.09 |
| Spark coil | 2.53 |
| Spark plug and wires | .359 |
| Timer | .242 |
| Condenser | .556 |

By my invention all of the above weights but the engine, propeller and tank are eliminated, so that the weight saved by use of the hot coil is 9.777 oz. or 68%.

I claim:

1. A toy airplane having an internal combustion engine for driving the propeller, and ignition means kept active during flight solely by the heat of the explosions.

2. A toy airplane according to claim 1 which is devoid of electric ignition equipment.

3. A toy airplane according to claim 1 in which said ignition means is a member rendered active initially by an electric current and adapted to be kept active by the heat of the explosions, after the said member and airplane are disconnected from the source of current for flight.

4. A toy airplane of light weight and comparatively small wing spread having an internal combustion engine for driving the propeller and provided with a member for firing the charges, said member being adapted to be rendered active initially by extraneous means and maintained active by the heat of the explosions and constituting the sole means of ignition on the engine during the flight of the toy.

5. A model or toy airplane having an internal combustion engine for driving the propeller, said engine taking an explosive mixture into the cylinder before the compression stroke and having ignition means kept active during flight solely by the heat of the explosions.

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