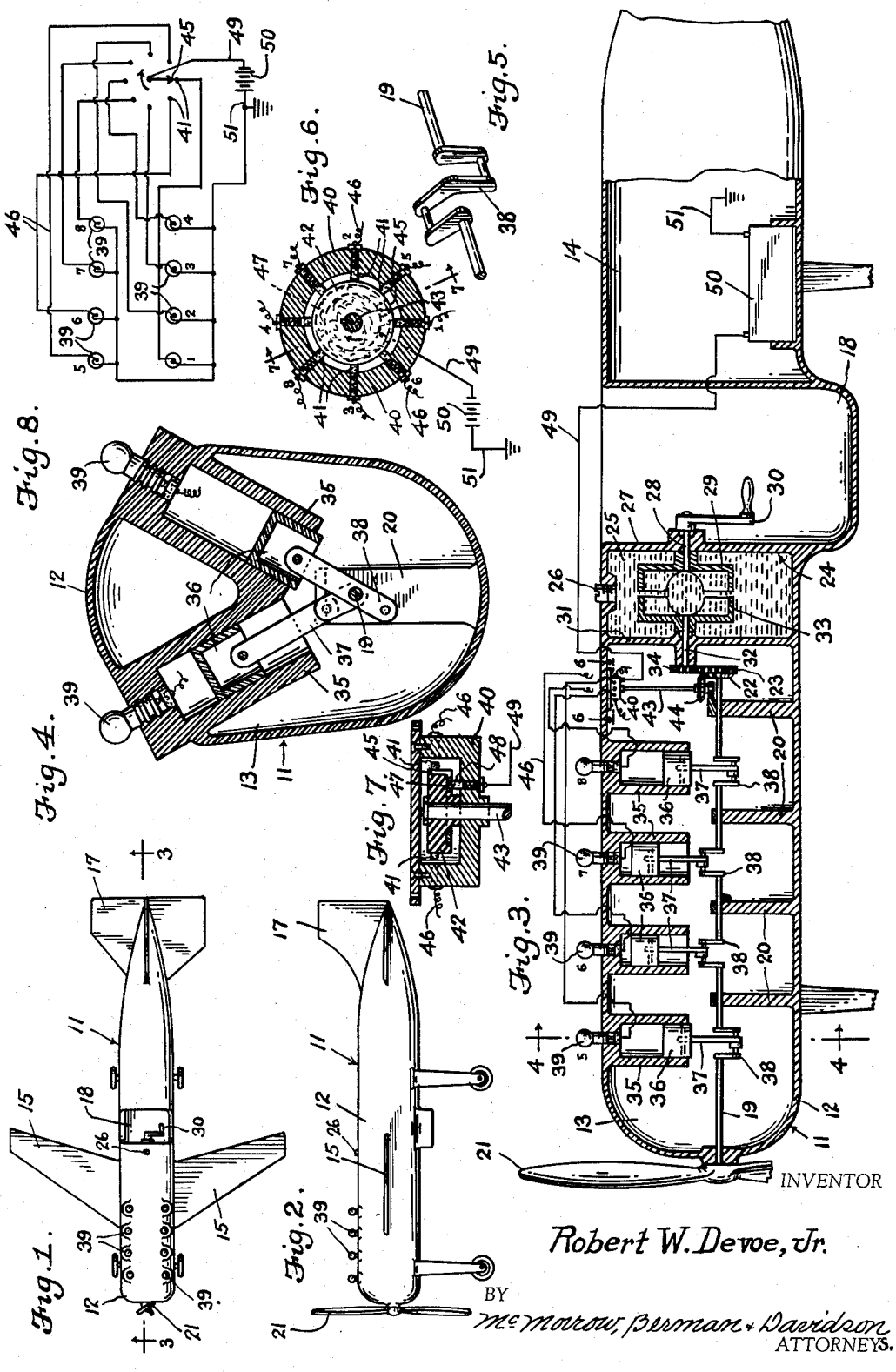
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IGNITION DEMONSTRATION DEVICE

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IGNITION DEMONSTRATION DEVICE

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2 Claims. (Cl. 35—13)

This invention relates to toy airplanes, and more particularly to an improved toy airplane provided with means illustrating the firing sequence of the cylinders in an internal combustion engine employed in aircraft.

A main object of the invention is to provide a novel and improved toy airplane which is simple in construction, which is educational, and which is easy to manipulate.

A further object of the invention is to provide an improved toy airplane which may be inexpensively constructed, which is sturdy in construction, and which may be employed as an educational means for instructing children and other persons in the theory of operation of internal combustion engines, such as the internal combustion engines employed in aircraft.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is a top plan view of a toy airplane constructed in accordance with the present invention.

Figure 2 is a side elevational view of the toy airplane of Figure 1.

Figure 3 is an enlarged longitudinal cross sectional view taken on the line 3—3 of Figure 1.

Figure 4 is an enlarged transverse vertical cross sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a fragmentary perspective detail view of a portion of the crank shaft of the airplane of Figure 1 to 4.

Figure 6 is an enlarged cross sectional detail view taken on the line 6—6 of Figure 3.

Figure 7 is a cross sectional detail view taken on the line 7—7 of Figure 6.

Figure 8 is a schematic wiring diagram illustrating the electrical connections of the indicator lamps employed on the airplane of Figures 1 to 4.

Referring to the drawings, the toy airplane is designated generally at 11 and comprises a hollow fuselage 12 having the forward compartment 13 and the rear compartment 14, the fuselage being provided with the main wings 15, 15 rigidly secured to and projecting laterally from the forward compartment 13 and with the conventional tail assembly 17. The fuselage 12 is formed between the forward compartment 13 and the rear compartment 14 with the cockpit 18 which is open at its top end, as clearly shown in Figure 3.

Designated at 19 is the longitudinally extending crank shaft which is rotatably mounted on upstanding brackets 20 integrally formed in the lower wall of the forward compartment 13, said crank shaft extending rotatably through the forward end of the fuselage and having secured thereto the propeller 21. The rear end of the crank shaft 19 has secured thereto the bevel gear 22 and the pinion gear 23. The fuselage 12 is formed bewteen the forward compartment 13 and the cockpit 18 with a chamber 24 containing hydraulic fluid 25, the top wall of the compartment 24 being provided with the screw plug 26. Journaled in the transverse

partition wall 27 between the compartment 24 and the cockpit 18 is a shaft 28 having secured to its inner end the forwardly facing concave, radially vaned forward clutch element 29. Secured to its outer end in the cockpit 18 is the operating handle crank 30. Journaled in the forward wall 31 of the compartment 24 in alignment with the shaft 28 is a shaft 32 having secured to its inner end the rearwardly facing concave, radially vaned fluid clutch member 33 which faces the fluid clutch member 29, as shown in Figure 3. Secured to the forward end of shaft 32 and meshing with the gear 23 is a pinion gear 34. Rotation of the crank shaft 19 may therefore be accomplished by rotating the handle crank 30, the torque from the shaft 28 being transmitted to the shaft 32 by the hydraulic fluid 25 and being transmitted to the crank shaft 19 by the meshing gears 34 and 23.

The forward portion of the fuselage 20 is formed with a plurality of cylinders 35 which extend into the forward compartment 13 and are positioned in spaced relation along the above the crank shaft 19, each of the cylinders extending in an upwardly sloping direction with respect to the shaft 19 and in registry with the crank 38 of the shaft 19. Specifically, each of the cylinders is in the form of a V head and including a pair of cylinders with the V head being positioned in a transverse plane with respect to the crank shaft 16, as shown in Figures 3 and 4. Slidably positioned in each cylinder is a piston 36 connected by a piston rod 37 to a crank 38 of the crank shaft 19. The pistons are arranged to reciprocate in a specific timed sequence in the cylinders 35 responsive to rotation of the crank shaft 19.

Mounted in the top end of each cylinder 35 is an electric lamp 39, the outer shell of the lamp base being grounded to the fuselage. Mounted in the rear portion of the forward compartment 13 of the fuselage is an annular housing 40 secured to the top wall of compartment 13, as shown in Figure 7, said housing being provided in its peripheral wall with a plurality of inwardly directed spring biased brush elements 41 which slidably engage the periphery of a circular rotor member 42. The rotor member 42 is secured on a vertical shaft 43 which is journaled axially in the housing 40 and which has secured to its lower end a bevel gear 44 meshing with the bevel gear 22. The rotor 42 has secured to its periphery a brush element 45 which successively engages the respective brush elements 41 responsive to rotation of the rotor 42. Each of the brush elements 41 is connected by a wire 46 to a center contact of a respective electric lamp 39. The brush element 45 on the rotor 42 is connected to an annular metal ring 47 secured in the bottom of the rotor 42, said ring being engaged by a spring pressed brush element 48 provided in the bottom wall of the housing 40. The brush element 48 is connected by a wire 49 to the positive terminal of a battery 50 mounted in the rear compartment 14 of the fuselage, the other terminal of the battery being grounded by a wire 51, as shown in Figure 3.

It will therefore be apparent that when the crank shaft 19 rotates, the shaft 43 rotates synchronously therewith, causing the brush element 45 on the rotor 42 to sequentially engage the respective contacts 41 and therefore the lamps 39 are sequentially energized as their respective circuits are closed. The connections of the center contacts of the lamp sockets to the respective brush elements 41 are arranged to provide sequential energization of the electric lamps 39 corresponding to the firing sequence of an internal combustion engine having the relative arrangement of the pistons 36 in the cylinders 35 corresponding to that in an actual aircraft internal combustion engine. The wiring arrangement is such as to provide energization of each lamp as its associated

piston reaches the uppermost portion of the cylinder, simulating the ignition in a cylinder of an actual internal combustion engine. Therefore, the theory of operation of an aircraft internal combustion engine may be readily demonstrated by rotating the handle crank 30 and observing the sequential energization of the electric lamps 39. The device therefore provides instructive information as well as amusement and may be employed not only for entertainment of children but the instruction of adults in the theory of operation of aircraft internal combustion engines.

While a specific embodiment of an improved toy airplane has been disclosed in the foregoing description, it will be understood that various modification within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. In a toy airplane, a hollow fuselage comprising a forward compartment, a rear compartment, and an open cockpit between said compartments, a crank shaft having a plurality of cranks rotatably mounted longitudinally in said forward compartment, a plurality of cylinders positioned within said forward compartment and in spaced relation along and above said shaft, each of said cylinders extending in an upwardly sloping direction with respect to said shaft and in registry with the crank of said shaft, a piston slidably mounted in each cylinder and connected to the adjacent crank of said shaft, said crank shaft, cylinders and pistons being visible through said fuselage, a rotor journaled in said forward compartment and coupled to said shaft, an electric lamp mounted in said fuselage over each of said cylinders, a contact on said rotor, a plurality of stationary contacts adjacent the periphery of said rotor and engageable by the first-named contact responsive to rotation of the rotor, a battery carried in said rear compartment, means connecting said battery to said first-named contact, and means connecting the respective last-named contacts to the electric lamps, whereby said lamps are sequentially connected to the battery responsive to rotation of said crank shaft.

2. In a toy airplane, a hollow fuselage comprising a forward compartment, a rear compartment and an open cockpit between said compartments, a crank shaft having a plurality of cranks rotatably mounted longitudinally in said forward compartment, a plurality of cylinders positioned within said forward compartment and in spaced relation along and above said shaft, each of said cylinders extending in an upwardly sloping direction with respect to said crank shaft and in registry with a crank of said shaft, a piston slidably mounted in each cylinder and connected to the adjacent crank of said shaft, said crank shaft, cylinders and pistons being visible through said fuselage, a rotor journaled in said forward compartment and coupled to said shaft, an electric lamp mounted in said fuselage over each of said cylinders, a contact on said rotor, a plurality of stationary contacts adjacent the periphery of said rotor and engageable by the first-named contact responsive to rotation of the rotor, a battery carried in said rear compartment, means connecting said battery to said first-named contact, means connecting the respective last-named contacts to the electric lamps, whereby said lamps are sequentially connected to the battery responsive to rotation of said crank shaft, a handle journaled on said fuselage and arranged in said cockpit, and fluid-coupling means between said handle and said crank shaft.

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