Oct. 30, 1962 F. GILBERT ETAL 3,060,598

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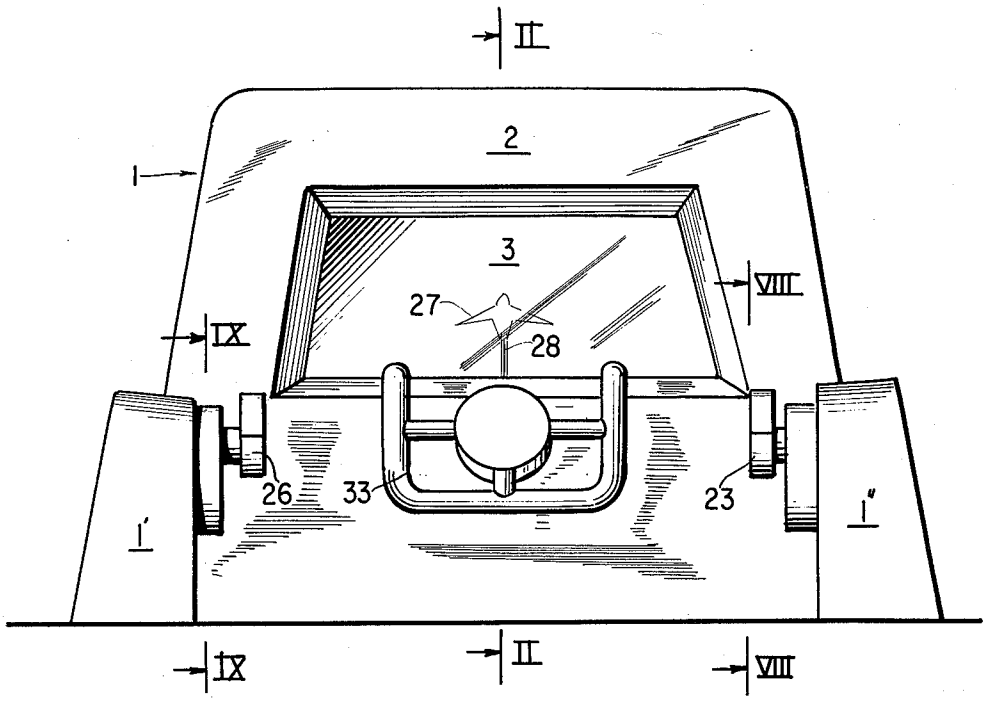


Fig. 1

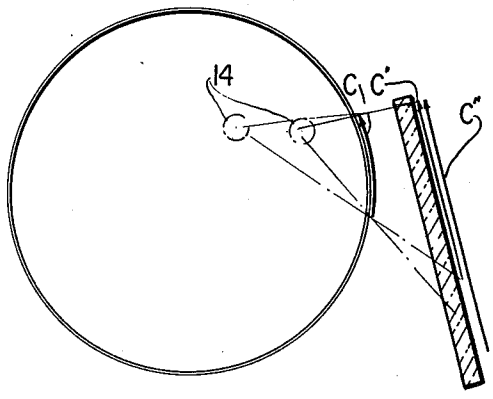


Fig. 5

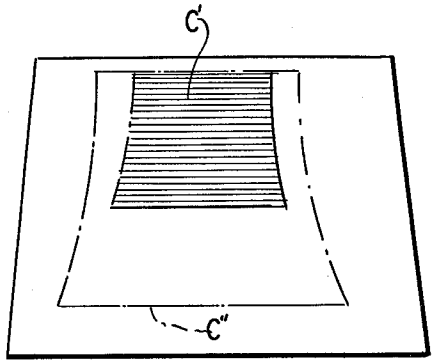


Fig. 6

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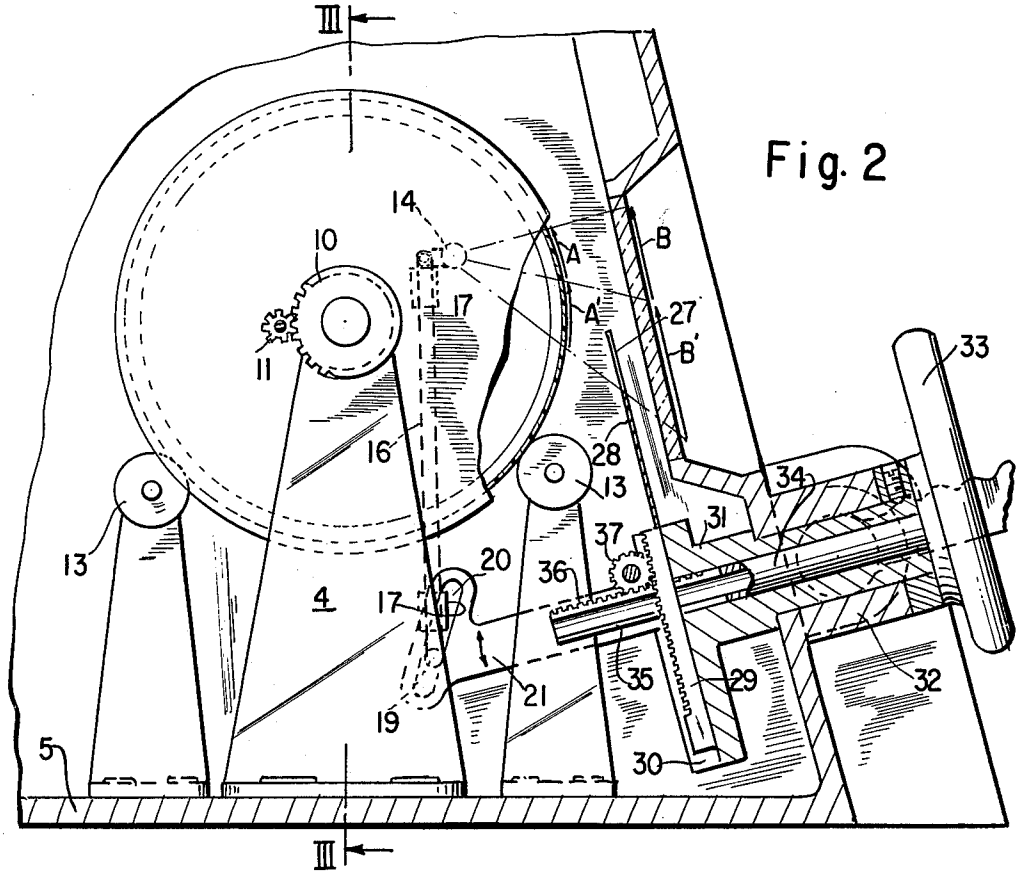


Fig. 2

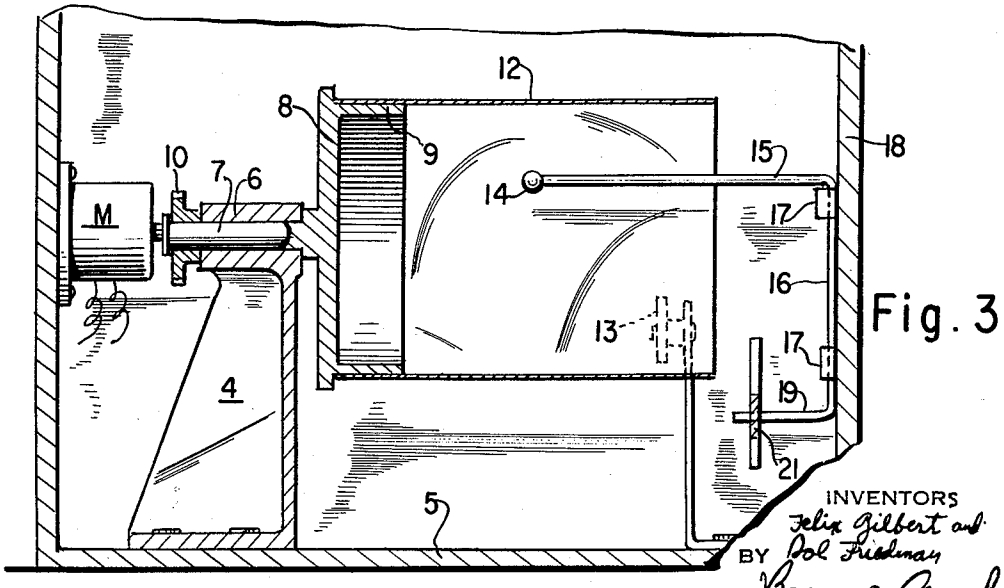


Fig. 3

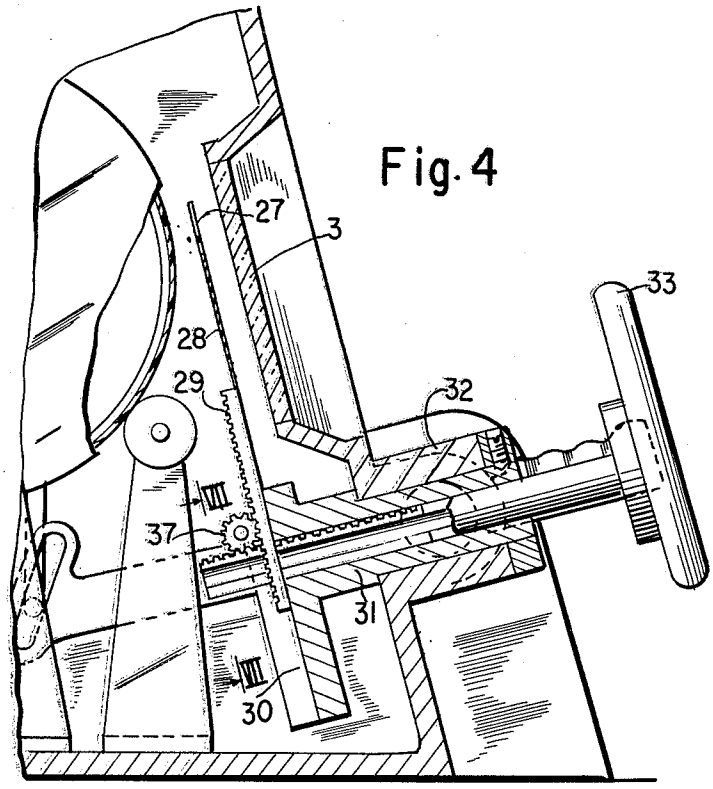
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Fig. 4



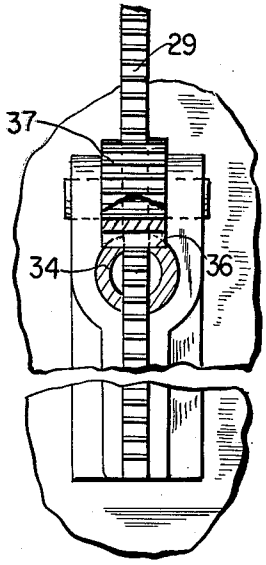


Fig. 7

Fig. 8

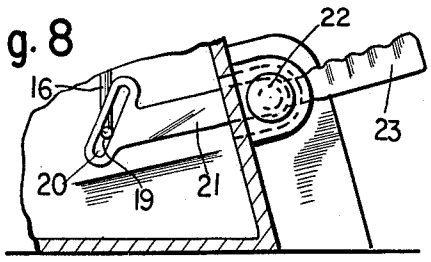
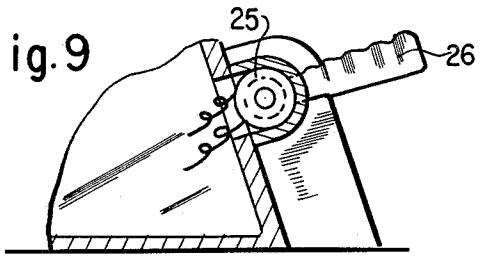


Fig. 9



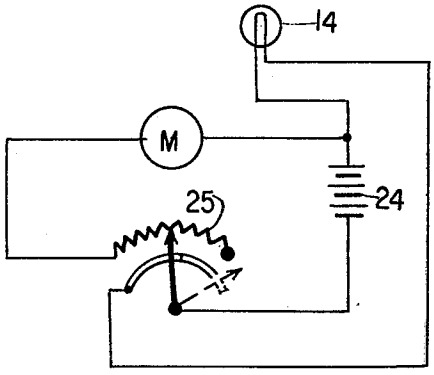


Fig. 10

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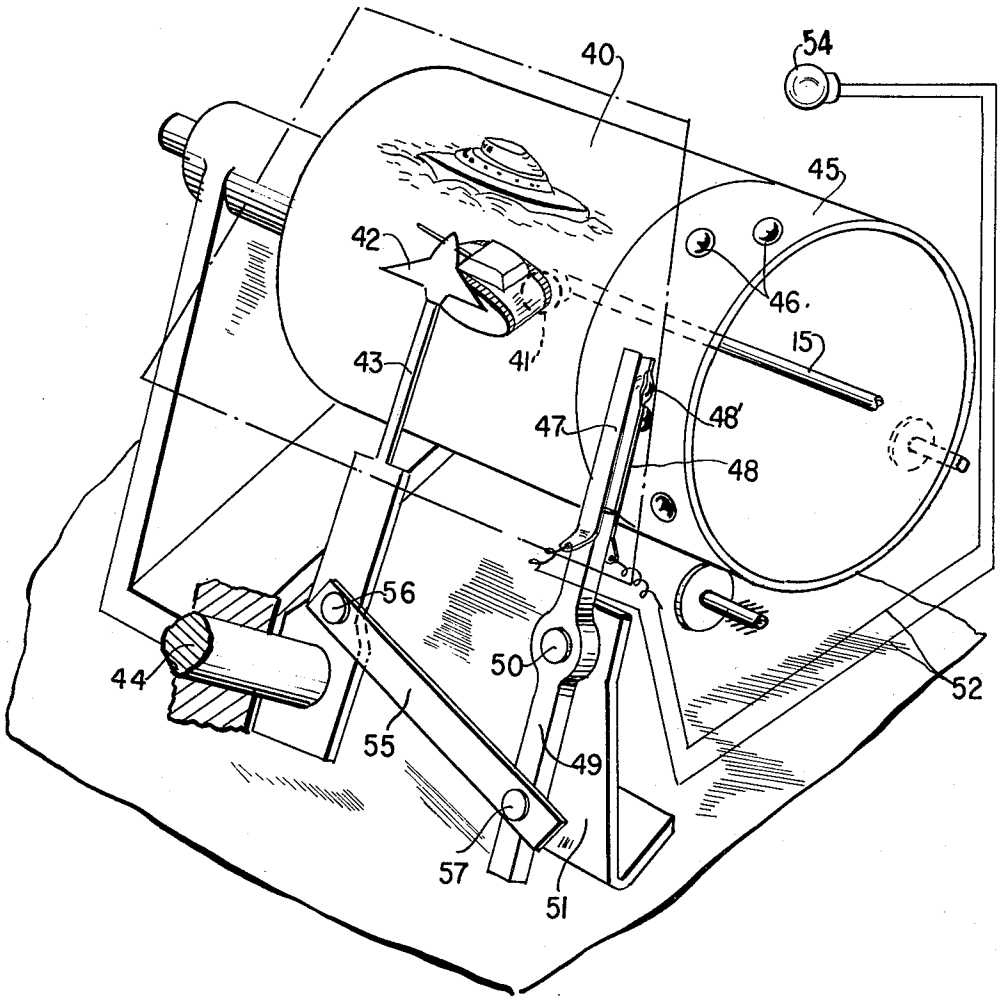


Fig. 11

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Patented Oct. 30, 1962

3,060,598

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Filed Dec. 18, 1961, Ser. No. 160,113
7 Claims. (Cl. 35—12)

This invention relates to a toy, and particularly to a toy "flight simulator" designed to give its "pilot" the illusion of being at the controls of his own jet or other airplane.

It is an object of the invention to provide simple and effective means for presenting before the "pilot" a scene corresponding generally to what might be observed in an actual flight, the scene being presented in an approximately proper perspective, expanding realistically as it is caused to move from top to bottom of a screen, in such a way that the observer may feel he is actually moving with respect to the scenery being portrayed.

It is a further object to provide a small representation of an airplane silhouette against the moving scene, with means for moving it horizontally and vertically with respect to said scene and to "bank" on left or right turns, the small silhouette representing a leader which the "pilot" is following, by appropriate manipulation of coordinated controls, or even, by a transfer which is easily made by many children, representing the airplane which the "pilot" is operating.

It is another object to provide means for changing the appearance of the scene to represent changes in altitude as by diving toward the ground or climbing away from it.

It is a further object to provide realistic appearing controls which can easily be operated even by a young child in order to obtain the above described visual effects, and appropriate sound effects also, if desired.

It is another object to provide a scoring device, in combination with mechanism of the type described, designed to give audible and/or visible indications when the silhouette is moved to a predetermined position relative to a target or the like projected on the screen.

It is a further object to provide certain improvements in the form, construction, arrangement and materials of the several parts of the device whereby the above named and other objects may effectively be attained, this invention relating specifically to a modification of the invention set forth in the application of Felix Gilbert, Serial No. 160,112 filed contemporaneously herewith.

A practical embodiment of the invention is shown in the accompanying drawings, wherein:

FIG. 1 represents a front elevation of the flight simulator showing the relative positions of the control wheel, the control handles, the viewing screen and the silhouette;

FIG. 2 represents, on a larger scale, a vertical cross-section on the line II—II of FIG. 1;

FIG. 3 represents a detail vertical section on the line III—III of FIG. 2;

FIG. 4 represents a detail vertical section similar to FIG. 2 but with the silhouette moved to a higher position;

FG. 5 represents a diagrammatic vertical section showing how a change in position of the light source changes the appearance of the scene;

FIG. 6 represents a front view of the screen, corresponding to FIG. 5;

FIG. 7 represents a detail vertical section on the line VII—VII of FIG. 4, showing the silhouette moving mechanism;

FIG. 8 represents a detail vertical section on the line VIII—VIII of FIG. 1 showing the light source operating handle mounting and connection;

FIG. 9 represents a detail vertical section on the line

IX—IX of FIG. 1 showing the motor and light circuit operating handle;

FIG. 10 represents by way of example a suitable wiring diagram for the light and motor; and

FIG. 11 represents in perspective a modified form of scene-bearing cylinder with added provision for scoring simulated hits on designated targets.

Referring to the drawings, the housing **1** has one face **2** designed to simulate an airplane instrument panel with a translucent window **3** in the middle, the housing having forwardly projecting side parts **1'**, **1''** to form convenient supports for control levers, as described below. The window is preferably of tapering outline, narrower at the top than at the bottom, and may be of frosted glass or an equivalent translucent sheet of plastic material.

Within the housing, as shown in FIGS. 2 and 3, there is a pedestal **4**, shown as being fixed to the bottom **5** of the housing and providing at its upper end a horizontal journal **6** for the axle **7** of the cylinder head **8**. The cylinder head is circular with a diameter slightly greater than that of the cylindrical flange **9**. The axle **7** has fixed on its free end a pinion **10** which is arranged to be driven slowly by the motor M through suitable reduction gearing represented conventionally by the small pinion **11**. A belt and pulley drive could obviously be substituted if desired.

The flange **9** is adapted to receive and support one end of a cylindrical transparency **12** of self-supporting plastic and bearing on its surface a scene representing the view which the pilot is to see in the course of his simulated flights, the scene being, conventionally, an aerial view of fields, woods, water, towns, etc. Alternatively, the scene may contain only stars, planets, satellites and the like so that the pilot may imagine himself engaged in flight through outer space. The cylindrical transparency **12** is fixed securely (but removably, if desired) on the flange **9**, projecting horizontally across the interior of the housing and having its free end open and supported, for instance, by a pair of idler rollers **13**, **13** or the like to eliminate any tendency toward sagging.

Projection of the scene on the window **3** is effected by locating a strong point source of light **14** (e.g., a flashlight bulb) within the cylinder **12** in a position such that a substantial part of the scene on the cylinder can be projected onto the window **3**. It will be noted that the light **14** is nearer to the upper edge of the screen than to the lower edge, and that the course of the cylindrical transparency places it closer to the screen at the top but moving back away from the screen as it passes through the space between the light **14** and the screen surface. Thus a feature on the transparency represented by the arrow A (FIG. 2) is projected in the screen with only slight enlargement when it appears at the top of the screen as shown at B, and grows progressively larger as it moves toward the bottom, where the same sized arrow A' has grown to the size indicated at B', thus giving the viewer a feeling of approaching distant objects and flying over or past them.

An additional illusion can be effected by changing the horizontal position of the light, as indicated in FIGS. 2, 3 and 5. The light **14** is shown as being supported on the end of a bracket arm **15** which projects in horizontally from a vertical rod **16** rotatably held in bearings **17**, **17** on a side wall **18** of the housing **1**. The lower end **19** of the rod **16** projects horizontally inward to engage in a slanting slot **20** in the inner end of a control lever **21**, pivoted at **22** on the projecting part **1''** of the housing. The exposed end **23** of the control lever may have any suitable configuration adapting it to be grasped by the "pilot's" right hand and moved up or down. When the handle is moved up the end **19** is drawn toward the front of the housing and the light **14** is correspondingly moved

forward, the effect being illustrated diagrammatically in FIGS. 5 and 6. In its rearmost position the light will project a given feature on the cylinder (represented conventionally by the arrow C) on the screen so as to have only slightly enlarged dimensions as indicated at C' in FIGS. 5 and 6. When the light is moved forward toward the top of the screen, the same arrow (C in FIG. 5) is projected to a much larger size, as shown at C'' in FIGS. 5 and 6, the enlargement of all objects on the cylindrical transparency being on the same scale. The "flying progress" illusion resulting from the normal movement of the cylinder is transformed, during forward movement of the light, into an illusion of losing altitude, as in a dive. When the light is moved rearward the projected scene grows smaller, as if receding, giving the pilot a feeling of climbing or regaining altitude.

The motor M may receive its power from a battery **23** (FIG. 10) the power being turned off and on by a switch or rheostat **25** actuated by a control handle **26** on the projecting part **1'** of the housing, within easy reach of the pilot's left hand. The circuit for the light **14** may conveniently be combined with the motor circuit as shown in FIG. 10 so that movement of the handle will first turn on the light and further movement will actuate the motor at varying speeds.

An important feature of the invention is the small airplane silhouette **27** positioned near the inner surface of the screen **3** so that its shadow will fall sharply on the screen in any position of the light **14**. The silhouette is designed to be movable horizontally and vertically, one form of supporting and moving mechanism being the rack and pinion arrangement shown in FIGS. 2, 4 and 7.

The opaque silhouette **27** is mounted on a transparent clear stem **28** projecting upward from a rack **29** which is slidably guided in an open track **30**. The track may be formed integral with a sleeve **31** journaled in a steering post **32** which projects from the front of the housing below the middle of the window **3**. An airplane-type control wheel **33** is fixed on the outer end of a control shaft **34** passing slidably through the sleeve **31**. The inner portion of the shaft **34** is bifurcated by the provision of a slot **35** wide enough to accommodate the rack **29**, and the upper surface of the shaft is serrated to form a split rack **36** along the bifurcated portion. The racks **29** and **36** should be similar so that both can mesh accurately with the teeth of the wide pinion **37** which is journaled in inward extensions of the sleeve **31**.

The silhouette may be regarded as being in neutral position when it is centered in the screen, approximately as shown in FIG. 1. It can be moved to the right or left by turning the control wheel accordingly, rocking the sleeve **31** about its axis and swinging all the parts carried thereby to a distance which should be limited by suitably placed stops, not shown, so that the silhouette will not leave the screen. Alternatively or simultaneously the silhouette may be moved up or down suitably limited distances by pulling out or pushing in the control wheel; as the control shaft **34** is moved out the rack **36** will rotate the pinion **37** in a direction to drive upward the rack **29**, raising the silhouette, and as the control shaft is pushed in the pinion **37** is rotated oppositely to lower the rack **29** and the silhouette mounted thereon. Since lateral motion of the silhouette is around the axis of the sleeve **31**, the shadow of the silhouette will be seen as "banking" properly whenever it is moved off center. Light springs tending to return the silhouette to neutral position can be provided if desired.

Additional interest can be provided by enabling the "pilot" to maneuver his aircraft over specified targets, as if on a bombing run, and to have successful accomplishment of such missions recorded or visibly and/or audibly indicated. In FIG. 11 is shown a modified form of the device designed to attain these ends.

In this form the scenic transparency cylinder **40** is mounted and moved in the same way as the cylinder **12** of FIGS. 1 to 10 and the light **41** may also be mounted and moved in the same manner as the light **14**. The silhouette moving arrangement is simplified by elimination of the racks and pinion, the silhouette **42** being supported on the upper end of a transparent stem **43** which is fixed to the inner end of the control shaft **44** (corresponding to shaft **35**, but not slidable). This mounting permits the silhouette to be moved from side to side but not up and down.

Attached to the free end of the cylinder **40** is an additional narrower cylindrical collar **45** having raised knobs or buttons **46** projecting above its surface at selected points. Since each knob or button **46** corresponds to a "target" represented on the cylinder **40** the collar **45** may be made integrally with the cylinder or must at least be firmly fixed and keyed thereto. A switch comprising the contacts **47, 48** is carried on the upper end of a lever **49**, pivoted at **50** on a bracket **51** fixed to the housing, the lever **49** preferably being rotatable in the same plane as the silhouette-supporting stem **43**. The contact **48** is a flexible resilient blade having a rounded projection **48'** near its outer end in a position to be engaged by the knobs **46** if the lever **49** is rotated to the proper position at a moment when the rotation of collar **45** is bringing a certain knob opposite the projection **48'** on the contact blade **48**. When the latter is thus engaged, it closes a circuit with the contact **47**, through wires **52**, battery **53** (which may be the same as battery **24**) and a signal light **54**, visible to the operator at any desired location on the front of the housing. A bell or other sounding device, or a counter, can be used in addition to, or in place of, the light **54**, if desired. The lever **49** is rotated to its selected proper position through the link **55**, pivotally secured at **56** to the stem **43** and at **57** to the lever **49**, its point of engagement **56** with the stem **43** being closer to the axis of shaft **44** than its point of engagement **57** with lever **49** is to the pivot **50** so as to scale down the amplitude of movement. As shown, movement of the silhouette to the left will cause a shorter movement of the switch **47—48** to the right, and vice versa, but the switch can be made to move in the same sense as the silhouette by connecting the link **55** above the pivot point **50**, if desired. In this arrangement the transparency cylinder and its attached collar need not carry any electrical wiring or contacts; the knobs or buttons **46** act as simple cams to close the adjacent switch **47—48** under predetermined conditions, and since the knobs or buttons are rounded they can never cause any jamming or injury to the switch contacts no matter how the rounded projection **48'** may be moved.

The knobs or buttons **46** may, if desired, be replaced by conductive material, such as small areas of metal foil, designed to close a circuit between a pair of fixed contacts (similar to contacts **47—48** but both brushing the surface of collar **45**) or to close a circuit between one such contact and a circuit element carried by the collar.

It will be understood that various changes may be made in the form, construction and arrangement of the several parts without departing from the spirit and scope of the invention, and hence we do not intend to be limited to the details herein shown or described except as the same are included in the claims or may be required by disclosures of the prior art.

What we claim is:

1. A toy flight simulator comprising a housing, a translucent viewing screen in one side of said housing, a point source of light within the housing and spaced from said screen, a cylinder bearing pictorial material in the form of a transparency, and means for turning said cylinder on its axis in order to pass said pictorial material downward through the space between the light and the screen, the light source being located within the cylinder and the surface of the cylinder lying closest to the screen in the vicinity of the upper edge of the screen.

2. A toy flight simulator according to claim 1 in which the ratio of the light-to-cylinder distances to the cylinder-

to-screen distances is greatest on a line from the light to the upper part of the screen and decreases progressively on lines from the light to lower points of the screen down to the bottom thereof.

3. A toy flight simulator according to claim 1 in which the means for turning the cylinder is a motor, and which includes means for driving the motor optionally at different speeds.

4. A toy flight simulator according to claim 1 which includes an airplane silhouette, means for supporting the silhouette between the screen and the cylinder, and means for moving the silhouette to points adjacent selected different parts of the screen.

5. A toy flight simulator according to claim 4 in which the silhouette moving means includes means for moving the silhouette laterally about an axis below the center line of the screen.

6. A toy flight simulator according to claim 5 which includes relatively movable contact means for causing a perceptible indication of the juxtaposition of the silhouette with the projection of a predetermined pictorial feature on the screen to be given.

7. A toy flight simulator according to claim 6 in which said contact means is in an electric circuit and constituting a switch adapted to open and close as a function of the relative positions of the silhouette and the cylinder.

References Cited in the file of this patent

UNITED STATES PATENTS

2,265,598	Firestone et al.	Dec. 9, 1941
2,943,855	Javna et al.	July 5, 1960
3,012,779	Friedman	Dec. 12, 1961

FOREIGN PATENTS

714,921	Great Britain	Sept. 8, 1954