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## OPTICAL TOY OF THE PERISCOPE TYPE

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This invention relates to optical toys, and more particularly to such a toy which combines ordinary periscope viewing with other indirect viewing capabilities.

The general object of the invention is to improve optical toys, especially of the periscope type.

A more particular object of the invention is to provide such a toy which can look rearward as well as forward, without using a rotating head.

Another object is to add versatility by permitting sighting to the left or to the right, without elevation of the line of sight.

To accomplish the foregoing general objects and other more specific objects which will hereinafter appear, the invention resides in the optical toy elements and their relation one to another as are hereinafter more particularly described in the following specification. The specification is accompanied by drawings in which:

FIG. 1 is a perspective view showing an optical toy embodying features of the invention;

FIG. 2 is a vertical section taken approximately in the plane of the line 2—2 of FIG. 1;

FIG. 2A is explanatory of how the bottom mirror may be changed from inclined to upright position;

FIG. 3 is a view like FIG. 2, but showing the disposition of the parts for rearward viewing;

FIG. 4 is a fragmentary view corresponding to a lower portion of FIG. 2, but showing the change in position of the bottom mirror for sideward viewing;

FIG. 5 is a horizontal section taken approximately in the plane of the line 5—5 of FIG. 4;

FIG. 6 is a fragmentary vertical section taken in the plane of the line 6—6 of FIG. 1;

FIG. 7 is a fragmentary perspective view explanatory of a detail; and

FIG. 8 is a fragmentary section taken approximately in the plane of the line 8—8 of FIG. 4.

Referring to the drawing, and more particularly to FIG. 1, the optical toy there shown comprises a generally upright housing 12 having an eye opening 14. There is a forward looking window at 16 and a rearward looking window at 18, this being somewhat lower than the forward looking window 16. There is also a rightward looking window 20, and a corresponding leftward looking window which is not visible in FIG. 1. The entire device may be supported by a hand grip 22, and its operation includes two control members, one of which is shown at 24, and the other at 26. The part 24 causes a change from forward to rearward viewing. The part 26 causes a change to sideward viewing.

Referring now to FIGS. 2 and 3 of the drawing, there is an angularly disposed top mirror 30 which receives light from the forward looking window 16. There is also an angularly disposed intermediate mirror 32 which receives light from the rearward looking window 18. There is also an angularly disposed bottom mirror 34 which is aligned with the eye opening 14. The top mirror 30 is mounted on horizontal pivots 36 which permit a change of angle to either of two positions. The position shown in FIG. 1 reflects light from the forward looking window 16 and the top mirror 30 to the bottom mirror 34 and the eye opening 14. The toy then functions as a conventional periscope.

The position shown in FIG. 3 reflects light from the rearward looking window 18 and the intermediate mir-

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ror 32 to the top mirror 30, to the bottom mirror 34 and the eye opening 14. In this case the toy acts as a rearward looking periscope.

The change in position is obtained by means of an upright rod 24 which is longitudinally movable relative to the housing, and the upper end of which is connected to the mirror 30 at a point 38 offset from the pivots 36.

Considering the arrangement in greater detail, FIG. 7 shows how the back plate or mirror support 31 has an offset pin 38 in addition to the main trunnion-like pivot 36. These parts and the mirror support 31 are all preferably molded integrally out of a suitable plastics material. One face of the support 31 is recessed to provide a rectangular seat and frame within which the mirror itself is received, the mirror being made of thin glass. The back plane of the mirror preferably passes through the axis of the pivots 36.

Referring now to FIGS. 2, 3 and 6, the upright rod 24 is enlarged at its upper end to provide a flat generally triangular portion 40. This may be slotted at 42 to receive the inner part of one of the trunnions 36, which then acts as a guide for vertical movement of rod 24. The part 40 also has an offset hole 44 which receives the control pin 38 of the mirror. From inspection and comparison of FIGS. 2 and 3, it will be seen that when rod 24 is in its down position the mirror 30 assumes the angle shown in FIG. 2, and when the rod 24 is in its up position, the mirror 30 assumes the angle shown in FIG. 3. The two positions of the mirror are preferably determined by suitable stops. In FIG. 2, the top edge of the mirror has reached the top of the housing. In addition the length of the slot 42 may be used as a motion limit. In FIG. 3 the upper edge 46 of triangular part 40 abuts a matching part of the housing, as a limit, and the slot 42 also may be used as a motion limiting stop.

Reverting to FIG. 6, the lower end of rod 34 has an outwardly projecting serrated handle 48. Most of the rod 34 is supported and concealed within the housing, but the housing is slotted at 50 to expose the handle 48, which then may be raised or lowered. The side of the housing below the handle 48 may be printed to indicate that the downward position is for forward viewing, and that the upward position is for rearward viewing.

Referring now to FIGS. 2, 3 and 4 of the drawing, the bottom mirror 34 is carried by a linkage system including a spindle 52 and a handle 26, the parts of the linkage system being so mounted in the housing that the handle 26 may be used to change the mirror 34 from the angular position shown in FIGS. 2 and 3 to an upright position as shown in FIGS. 2A, 4 and 5. In the upright position the same handle 26 may be used to rotate the mirror about a vertical axis to an angle shown in solid lines in FIGS. 4 and 5 for leftward viewing, or to an opposite angle shown in broken lines in FIG. 5 for rightward viewing.

Reverting to FIGS. 2 and 3, the spindle 52 may be termed an upper spindle, in contradistinction to a spindle 54 which may be termed a lower spindle. There is also a link 56 which is rigidly connected to the lower spindle 54, the combination being pivoted in the housing by means of a ball joint indicated at 58. The link 56 is pivoted to the support 35 of mirror 34 by means of a horizontal pivot 60. The pivot 60 consists of a rod projecting on opposite sides from the link 56, with the ends of said rod received in bearings 62. The mirror support 35, like the top mirror support 31, is preferably recessed to provide a seat and frame for the thin glass mirror 34. The support 35, the upper spindle 52 and the bearings 62 are all preferably molded integrally out of a plastics material. The axis of spindle 52 preferably lies in the plane of the back of mirror 34. The link 56 is suitably offset, as explained later. The upper end

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of spindle 52 is enlarged at 63 and has flat sides slidable between the parallel walls of a chamber 64. This holds the mirror against turning. The enlargement 63 also acts as a motion limit when the mirror is in the angular position shown in FIGS. 2 and 3.

When handle 26 is moved to its upright position, as shown in FIG. 2A, the spindle 52, the mirror 34 and the spindle 54 all assume an upright position. The spindle 54 is in axial alignment with the spindle 52, and the link 56 is offset in a direction away from the mirror so that the spindle axis may coincide with the reflection plane of the mirror 34. For the purpose shown, the upper spindle is slidable as well as rotatable, and is received in the aforesaid chamber 64. The parts move into the upright position in such fashion that they remain in upright position unless intentionally changed back to the angular position.

When the parts are in upright position the mirror 34 is readily turned to one side or the other by means of the control handle 26. Its motion is limited by suitable stops indicated at 66, the action of which will be clear from inspection of FIG. 5. The stops are located at the bottom of the mirror housing. An upper part of chamber 64 is enlarged as shown at 65 in FIG. 8 to provide room for free rotation of the enlargement 63, when the mirror is upright.

The housing is preferably molded in two parts out of a suitable moldable plastics material. The housing is split on a diametrical plane running fore and aft. This facilitates the molding of the eye piece 14 and the channel 68 (FIG. 6) which receives and guides the control rod 34. Similar remark applies to the enlarged triangular part 70 of the housing (FIG. 6), which receives the triangular upper end 40 of the control rod 34.

The two halves of the housing are secured together by means of a suitable solvent, cement, or adhesive, as is well known in the plastics and toy manufacturing arts. The edges of the two parts are preferably provided with minute dowel pins and mating dowel holes, some of which are indicated at 72 in FIG. 2, to insure proper registration of the edges when the halves of the housing are put together.

The spindle 54, offset link 56, ball 58, pivot pins 60 and knob 26 are all preferably made of metal. These parts may all be die cast integrally. The remainder of the toy is preferably molded out of a plastics material, except for the three mirrors, which of course are made of glass with an appropriate coating of silver or like reflective metal. The interior of the housing, except for the mirrors, is preferably coated with a dull black coating to minimize undesired reflection of light.

In assembling the toy the top and bottom mirrors 30 and 34 are preliminarily secured by adhesive to their plastic backings 31 and 35. The interior of the molded halves are blackened, as by spraying with a suitable matte or non-gloss paint. The control rod 24 is placed in its mating channel, and the pins 36 and 38 (FIG. 7) of the top mirror are put into their respective holes. The intermediate mirror is slid into position, it being held by molded parts indicated at 33 in FIG. 2. The bottom mirror with its linkage is lowered into position, following which the other half of the housing is applied.

It is believed that the construction and operation of the improved optical toy, as well as the advantages thereof, will be apparent from the foregoing detailed description. It will also be apparent that while the invention has been shown in a preferred form, changes may be made in the structure shown without departing from the scope of the invention as sought to be defined in the following claims. In the claims the terms "forward," "rearward," "leftward," and "rightward" are all relative, because the periscope need not be held upright. Thus, a person lying near a roof edge may look downward; a person on an overhung slab may look rearward beneath the slab, with the periscope hanging downward instead of

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upward; a person at the corner of a building may look around the corner with the periscope held horizontally rather than vertically, and so on.

We claim:

1. An optical toy comprising a generally upright housing having an eye opening at the lower end, a forward looking window at the upper end, an angularly disposed top mirror receiving light from the forward looking window, a bottom mirror aligned with the eye opening, a leftward looking window alongside the bottom mirror, a rightward looking window alongside the bottom mirror, an upper spindle secured to said bottom mirror, a link pivotally connected to the rear of the bottom mirror, a lower spindle connected to said link, the upper spindle and lower spindle being pivoted in the housing with universal pivots such that the lower end of the lower spindle serves as a handle to change the mirror and spindles from an angular position in which the spindles are transversely related and the toy acts as a periscope, to an upright position in which the spindles are in vertical alignment at which time the lower spindle serves to turn the mirror to an angular position receiving light from the leftward looking window, or to an opposite angular position receiving light from the rightward looking window.

2. An optical toy comprising a generally upright housing having an eye opening at the lower end, a forward looking window at the upper end, an angularly disposed top mirror receiving light from the forward looking window, a bottom mirror aligned with the eye opening, a leftward looking window alongside the bottom mirror, a rightward looking window alongside the bottom mirror, an upper spindle secured to said bottom mirror, a link pivotally connected to the rear of the bottom mirror, a lower spindle connected to said link, the upper spindle and lower spindle being pivoted in the housing with universal pivots such that the lower end of the lower spindle serves as a handle to change the mirror and spindles from an angular position in which the spindles are transversely related and the toy acts as a periscope, to an upright position in which the spindles are in vertical alignment at which time the lower spindle serves to turn the mirror to an angular position receiving light from the leftward looking window, or an opposite angular position receiving light from the rightward looking window, the upper end of the upper spindle having a flat-sided enlarged head, said housing having a chamber with parallel walls receiving said enlarged head between the parallel walls to prevent rotation, the chamber at the point reached by the head when the spindle is upright being enlarged to permit rotation of the head.

3. An optical toy comprising a generally upright housing having an eye opening at the lower end, a forward looking window at the upper end, a rearward looking window at the upper end at an elevation lower than the forward looking window, an angularly disposed top mirror receiving light from the forward looking window, an angularly disposed intermediate mirror receiving light from the rearward looking window, a bottom mirror aligned with the eye opening, a leftward looking window alongside the bottom mirror, a rightward looking window alongside the bottom mirror, linkage including a spindle for the bottom mirror, said linkage being connected to said bottom mirror, said spindle being mounted in said housing by means of a ball and socket bearing, means whereby the spindle serves as a handle to change the mirror and spindle from an angular periscope position in which the toy acts as a periscope, to an upright position at which time the spindle serves to turn the mirror to an angular position receiving light from the leftward looking window or to an opposite angular position receiving light from the rightward looking window, pivot means affording change of the angle of the top mirror to either of two positions, one of said positions serving to reflect light from the forward looking window and top mirror to the bottom mirror when in angular periscope position and

thence to the eye opening, and the other of said positions serving to reflect light from the rearward looking window and intermediate mirror to the top mirror and to the bottom mirror when in angular periscope position, and thence to the eye opening.

4. An optical toy comprising a generally upright housing having an eye opening at the lower end, a forward looking window at the upper end, a rearward looking window at the upper end at an elevation lower than the forward looking window, an angularly disposed top mirror receiving light from the forward looking window, an angularly disposed intermediate mirror receiving light from the rearward looking window, a bottom mirror aligned with the eye opening, a leftward looking window alongside the bottom mirror, a rightward looking window alongside the bottom mirror, an upper spindle secured to the bottom mirror, a link pivotally connected to the rear of the bottom mirror, a lower spindle connected to said link, the upper spindle and lower spindle being pivoted in the housing with pivots such that the lower end of the lower spindle serves as a handle to change the mirror and spindles from an angular periscope position in which the spindles are transversely related and the toy acts as a periscope, to an upright position in which the spindles are in vertical alignment at which time the lower spindle serves to turn the mirror to an angular position receiving light from the leftward looking window or to an opposite angular position receiving light from the rightward looking window, horizontal pivots affording change of the angle of the top mirror to either of two positions, one of said positions serving to reflect light from the forward looking window and top mirror to the bottom mirror when in angular periscope position and thence to the eye opening, the other of said positions serving to reflect light from the rearward looking window and intermediate mirror to the top mirror and to the bottom mirror when in angular periscope position, and thence to the eye opening, and means to change the angle of the top mirror.

5. An optical toy comprising a generally upright housing having an eye opening at the lower end, a forward looking window at the upper end, a rearward looking window at the upper end at an elevation lower than the forward looking window, an angularly disposed top mirror receiving light from the forward looking window, an angularly disposed intermediate mirror receiving light from the rearward looking window, a bottom mirror aligned with the eye opening, a leftward looking window alongside the bottom mirror, a rightward looking window alongside the bottom mirror, an upper spindle secured to the bottom mirror, a link pivotally connected to the rear of the bottom mirror, a lower spindle connected to said link, the upper spindle and lower spindle being pivoted in the housing with pivots such that the lower end of the lower spindle serves as a handle to change the mirror and spindles from an angular periscope position in which the spindles are transversely related and the toy acts as a periscope, to an upright position in which the spindles are in vertical alignment on an axis passing through the middle of the mirror at which time the lower spindle serves to turn the mirror to an angular position receiving light from the leftward looking window or to an opposite angular position receiving light from the rightward looking window, horizontal pivots affording change of the angle of the top mirror to either of two positions, one of said positions serving to reflect light from the forward looking window and top mirror to the bottom mirror when in angular periscope position and thence to the eye opening, the other of said positions serving to reflect light from the rearward looking window and intermediate mirror to the top mirror and to the bottom mirror when in angular periscope position, and thence to the eye opening,

and an upright rod longitudinally movable relative to the housing to change the angle of the top mirror, the upper end of said rod being connected to the top mirror at a point offset from the axis of the horizontal pivots.

6. An optical toy comprising a generally upright housing having an eye opening at the lower end, a forward looking window at the upper end, a rearward looking window at the upper end at an elevation lower than the forward looking window, an angularly disposed top mirror receiving light from the forward looking window, an angularly disposed intermediate mirror receiving light from the rearward looking window, a bottom mirror aligned with the eye opening, a leftward looking window alongside the bottom mirror, a rightward looking window alongside the bottom mirror, an upper spindle secured to the bottom mirror, a link pivotally connected to the rear of the bottom mirror, a lower spindle connected to said link, the upper spindle and lower spindle being pivoted in the housing with pivots such that the lower end of the lower spindle serves as a handle to change the mirror and spindles from an angular periscope position in which the spindles are transversely related and the toy acts as a periscope, to an upright position in which the spindles are in vertical alignment at which time the lower spindle serves to turn the mirror to an angular position receiving light from the leftward looking window or to an opposite angular position receiving light from the rightward looking window, said upper spindle having a flat sided enlarged head, said housing having a chamber with parallel walls slidably receiving said enlarged head to prevent rotation, and said chamber being enlarged at the point reached by the head when the spindle is upright to permit rotation of the head, pivot means affording change of the angle of the top mirror to either of two positions, one of said positions serving to reflect light from the forward looking window and top mirror to the bottom mirror when in angular periscope position and thence to the eye opening, the other of said positions serving to reflect light from the rearward looking window and intermediate mirror to the top mirror and to the bottom mirror when in angular periscope position, and thence to the eye opening.

7. An optical toy comprising a generally upright housing having an eye opening at the lower end, a forward looking window at the upper end, an angularly disposed top mirror receiving light from the forward looking window, a bottom mirror aligned with the eye opening, a leftward looking window alongside the bottom mirror, a rightward looking window alongside the bottom mirror, a linkage system including a lower spindle and a handle for said bottom mirror, and an upper spindle, said lower spindle and upper spindle and handle being connected to said bottom mirror, a ball and socket bearing mounting said lower spindle in said housing for universal movement, and said upper spindle being movably mounted in the housing, whereby said handle may be used to change the mirror and lower spindle from an angular position in which the toy acts as a periscope, to an upright position in which the handle and lower spindle together with the upper spindle serve to rotate the mirror about a vertical axis to an angular position receiving light from the leftward looking window, or to an opposite angular position receiving light from the rightward looking window.

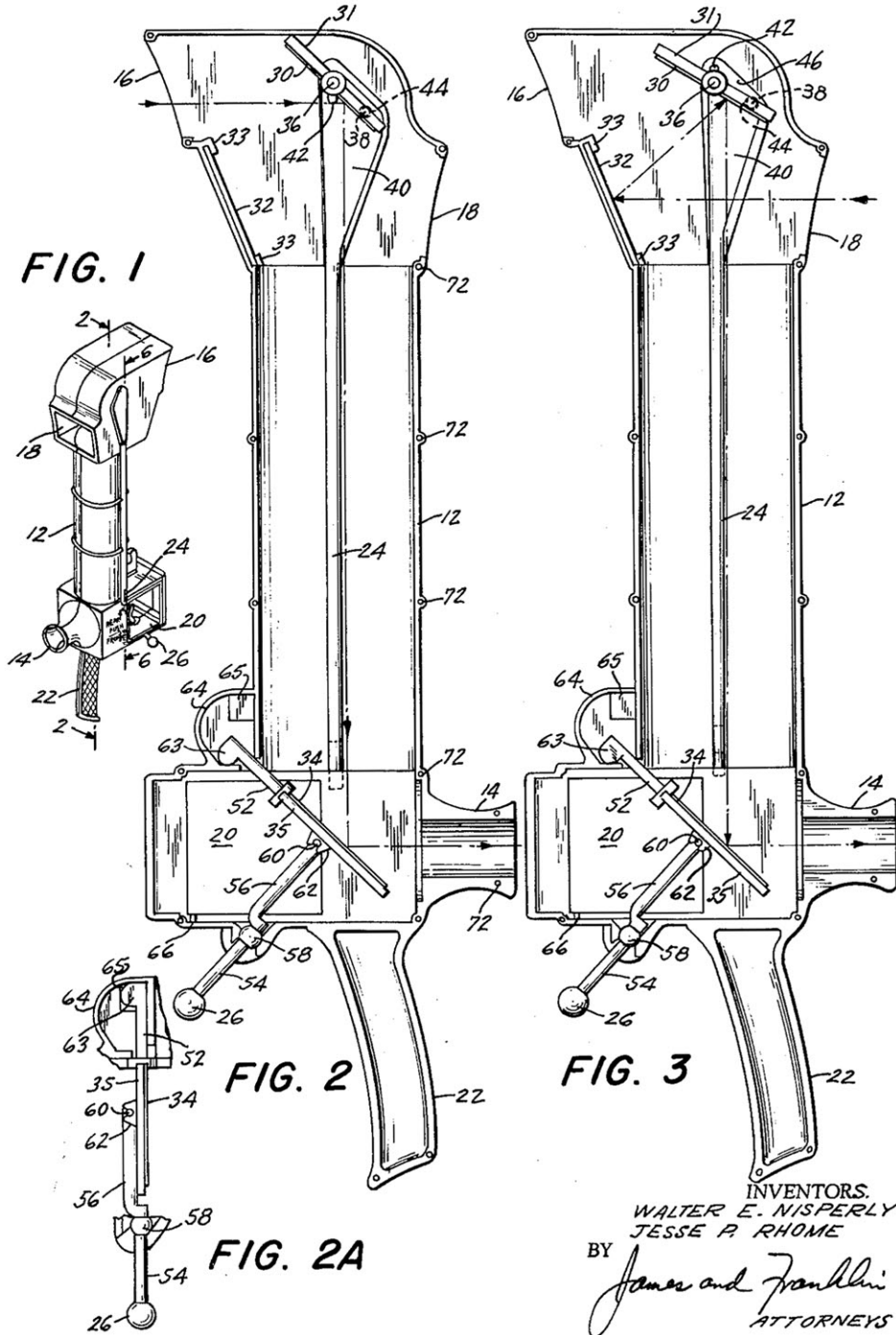
#### References Cited in the file of this patent

##### UNITED STATES PATENTS

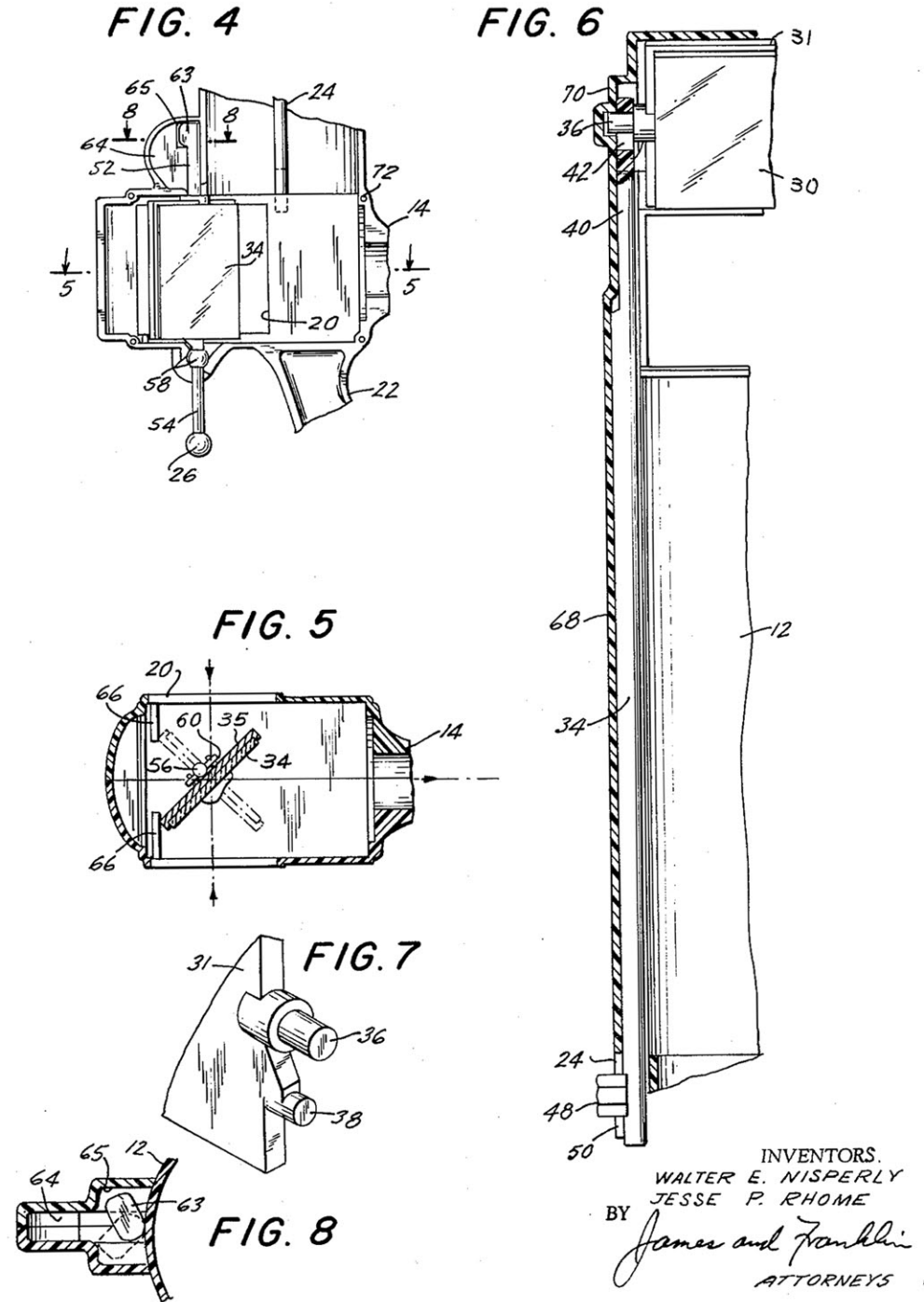
2,167,657 Karnes ----- Aug. 1, 1939  
3,031,913 Janeska ----- May 1, 1962

##### FOREIGN PATENTS

56,823 France ----- July 30, 1952



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