

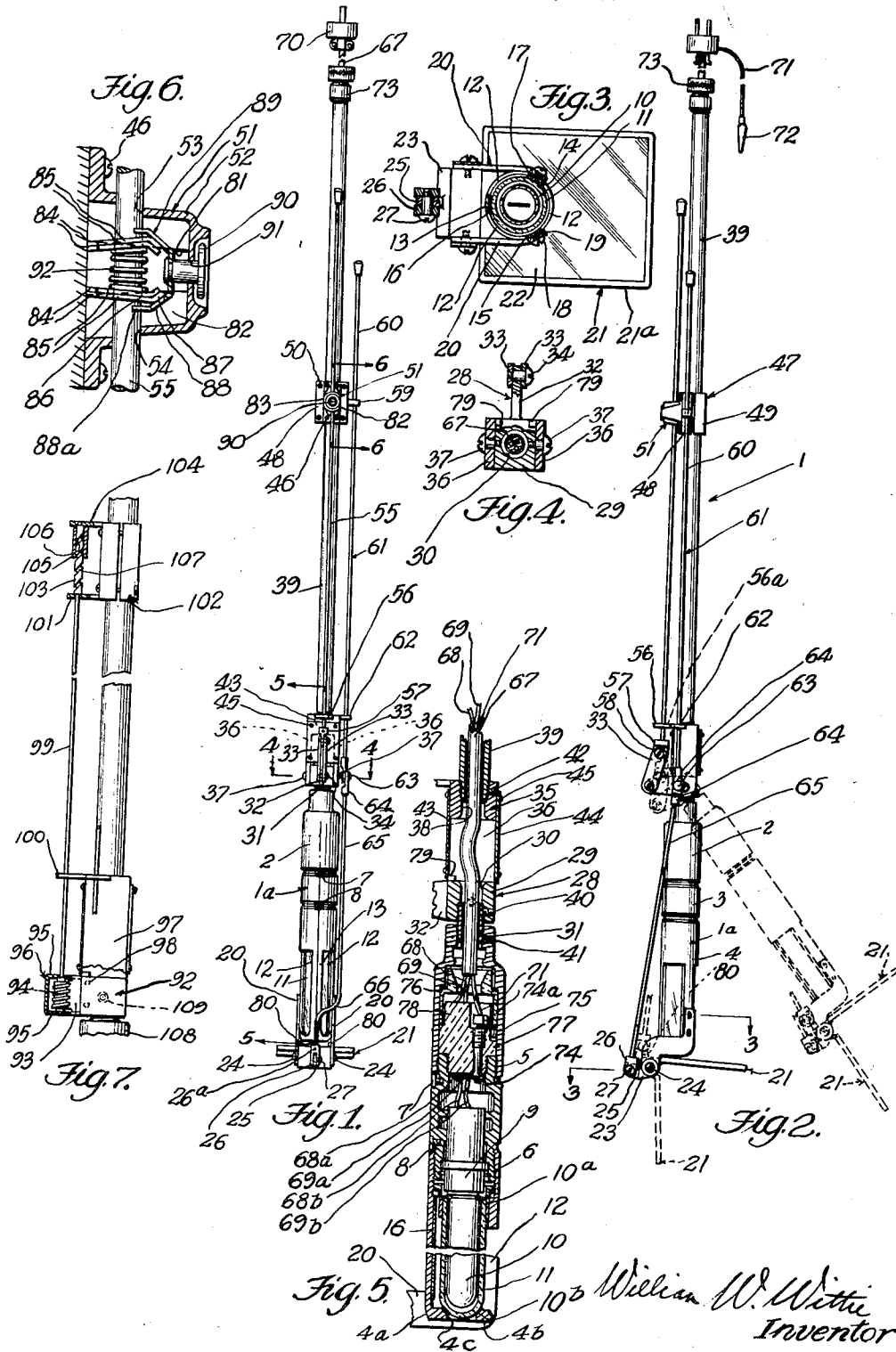
March 22, 1960

W. W. WITTIE

2,929,918

FUEL CELL INSPECTION LIGHTS

Filed Sept. 30, 1957



William W. Wittie
Inventor

1

2,929,918

FUEL CELL INSPECTION LIGHTS

William W. Wittie, Chicago, Ill.

Application September 30, 1957, Serial No. 687,149

5 Claims. (Cl. 240—2.18)

This invention relates to lights and more particularly to Fuel Cell Inspection Lights.

The fuel tank for jet planes is provided with a restricted opening to the fuel cells. The fuel cells include spaced baffles. It is required that inspection of the fuel cells be made periodically for any deterioration which may occur.

It is therefore necessary to provide means for throwing light on the various surfaces within the tank and means for reflecting this light so that visual inspection can be made.

One of the objects of the invention is to provide an elongated non-sparking unit of minimum weight, which may be readily inserted into the tank, having an explosion proof light adapted to be angularly adjusted with respect to the longitudinal axis of the unit.

Another object is to provide a mirror pivotally mounted on the lower end of the light.

Another object is to provide a unit whereby the light may be adjusted to various angular positions and means for holding the light in said positions.

Another object is to provide a unit having a mirror adapted to be adjusted to various angles with respect to the light.

With these and other objects in view the invention will be better understood by reference to the accompanying specification and drawings wherein:

Fig. 1 is a rear view of the light.

Fig. 2 is a side view.

Fig. 3 is an enlarged section taken on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged section taken on the line 4—4 of Fig. 1.

Fig. 5 is an enlarged section taken on the line 5—5 of Fig. 1.

Fig. 6 is an enlarged section taken on the line 6—6 of Fig. 1, and

Fig. 7 is a view of a modified form of light operating mechanism.

Referring to the drawings 1 is an elongated unit which in the present instance is constructed of non-sparking material, and has an explosion proof light 1a. The light 1a consists of an upper section 2, a mid section 3 and a lower section 4. The sections 2 and 4 are threaded onto 3 as shown at 5 and 6 respectively, and locked in place by screws 7 and 8 respectively.

Mounted within the section 3 is a socket 9 into which is attached an elongated lamp 10. An elongated protective globe 11 is mounted over the lamp 10 and held between a ring 10a and gasket 10b. The section 4 is provided with elongated slots 12 intermediate the ends thereof. The lower end of section 4 is rounded as at 4a and has a cut off 4b to provide an axial opening 4c.

Ribs 13, 14 and 15 are formed by the slots 12.

Rib 13 has attached thereto, in any suitable manner, a reflector 16. Ribs 14 and 15 are provided with tapped holes 17 into which screws 18 are threaded through openings 19 in Z shaped brackets 20.

2

A mirror is shown at 21 and consists of a frame 21a and a mirror 22 which may be attached in any suitable manner as by adhesive. A reduced portion 23 of the frame 21a is pivotally connected to the outer ends of brackets 20 by means of shoulder bolts 24. Centrally located at the outer end of section 23 is an ear 25 pivotally connected to a clevis 26 by means of a shoulder bolt 27.

A rocker arm is shown at 28 having a rectangular section 29 provided with a central opening 30. A close nipple 31 is threaded into the lower end of section 29 and the upper end of section 2. An arm 32 extends outwardly from section 29 and is pivotally connected between a pair of links 33 at one end by a shoulder bolt 34.

A clevis 35 is provided with spaced parallel arms 36 pivotally connected at their outer ends to section 29 by means of shoulder bolts 37. The upper end of the clevis 35 is provided with an axial opening 38 into which is threaded a handle 39 in the form of a tube.

Arm 28 and section 2 are locked in place by set screws 40 and 41 respectively.

Handle 39 is locked in place by set screw 42.

The open sides of clevis 35 are closed by plates 43 and 44 attached thereto by drive screws 45.

Mounted intermediate the ends of handle 39 is a split support 47 comprising sections 48 and 49 clamped to handle 39 by screws 50. Attached to support 47 is a latch 51 by means of screws 46. The latch 51 comprises a housing 52 having aligned openings 53 and 54 in which is mounted a vertical light adjusting rod 55. One end of rod 55 extends above the latch and the other end extends downwardly through a perforated ear 56 which is slotted as at 56a and attached to a clevis 57 pivotally connected between links 33 at their other ends by shoulder bolt 58.

A perforated ear 59 extends forwardly of section 48. The vertical upper section 60 of a mirror adjusting rod 61 has its upper end extending through ear 59 and its lower end extending through a forwardly extending ear 62 formed on clevis 36, and pivotally connected as at 63 by lugs 64 to a lower rod section 65 of the rod 61. The lower end of rod section 65 is offset at 66 and attached to the upper end of clevis 26 by a drive pin 26a.

An electric three wire cord 67 is connected with two leads 68 and 69 to a plug 70. The other lead 71 is a ground lead which extends through plug 70 and has a ground clamp 72 attached to its outer end. The cord 67 is fixed to the upper end of the handle 39 by a retainer 73, and extends downwardly through handle 39, clevis 36, nipple 31 and section 2, a slack being provided between rocker arm 29 and the upper portion of clevis 36. The inner ends of leads 68, 69 and 71 extend downwardly through the upper section 76 of a split insulating block 77. Lead 71 is attached to a terminal 74 having a wire clamp 74a and contact clip 75 at its upper end, the clip 75 being normally in abutment with the inner wall of section 2. The leads 68 and 69 are fixed to the upper ends of terminals 68a and 69a respectively. Leads 68b and 69b are connected to the lower ends of terminals 68a and 69a respectively and have their lower ends connected to socket 9.

Stop lugs 79 are formed on the inner faces of arms 36. Stop lugs 80 are formed on the inner faces of the pivot ends of brackets 20.

The housing 51 is provided with recesses 81 in side walls 82 and 83 in which are arranged the ear portions 84 at one end of pivot plates 85. The other ends of plates 85 are angled as at 87. The plates 85 are perforated as at 86. The plates 85 are arranged in pairs and are held in spaced relation on rod 55 by a spring 92. Ends 87 of the outer pivot plates abut angled arms 88

3

of a U-shaped push plate 89 riveted to a push pin 90 which extends through an opening 91 in housing 51. Forked parallel legs 88a formed on the outer ends of plate 88 are adapted to straddle rod 55 whereby to guide plate 88 inwardly when pin 90 is depressed.

In Fig. 7 is shown a modified form of light adjusting mechanism wherein rocker arm 92 is provided with a gear segment 93 meshing with worm 94. The worm 94 is rotatably mounted in side walls 95 of a bracket 96 mounted on a clevis 97 by bolts 98. An operating rod 99 is fixed to worm 94 by a drive pin or the like and extends upwardly through a guide ear 100 and the lower ear 101 of a split support 102. The upper end of rod 99 is fixed to a driving screw 103 rotatably mounted at its upper end to the upper ear 104 of support 102. A sleeve 105 is slidably mounted on screw 103 and is provided with a follower pin 106 arranged in groove 107 of screw 103. With this arrangement sliding movement exerted on sleeve 105 will act to turn screw 103, rod 99 and worm 94. Worm 94 in turn will act to move gear segment 93 thereby rocking arm 92 and light 103 on pivot 109.

Referring to Figs. 1 to 6 inclusive, the operation of the device is as follows:

After connecting the cord plug into an electric circuit, the handle 39 is grasped in the left hand with the thumb in a position to depress button 90; the clamp 72 being attached to a suitable ground. The unit 1 is then inserted through the opening in the fuel tank to the desired position, with the light 1a in axial alignment with handle 1 as shown in full lines in Fig. 2, mirror 21 in position shown in dotted lines in Fig. 2. The mirror 21 may now be moved to any position between these dotted lines and the full lines in Fig. 2. By grasping the rod 60 in the right hand and exerting downward pressure, the rod 65 acts to pivot the mirror 21 on the shoulder bolts 24. With this arrangement light rays projecting downward and outward from the light may be reflected at various angles from the mirror, permitting visual inspection from outside the tank.

Areas of the fuel cells are difficult to inspect with the light in axial alignment with the handle. To facilitate more difficult inspection, button 90 is depressed, the push plate 89 acting to move the pairs of pivot plates 85 toward each other in parallel relation against the action of spring 92 and permitting rod 55 to be moved downwardly with the right hand. Downward movement of rod 55 moves links 33, rocker arm 29 and light 1a being pivoted on shoulder bolts 37 to various angular positions with respect to the longitudinal axis of the handle. One of these positions is shown in dotted lines in Fig. 2. After light 1a is moved to the desired position, the thumb is released. The spring 92 then expands moving plates 85 to the position shown in Fig. 6, the

4

peripheries of the openings 53 and 54 acting to lock the rod 55 against movement. The mirror 21 may now be manipulated similarly as previously described whereby the various additional surfaces may be inspected.

After inspection, the button 92 is again depressed and the rod 55 pulled upwardly, the light 1a in turn moving to axial alignment with the handle, and the unit 1 removed from the tank.

From the above it will be seen that I have provided a compact device which may be easily manipulated for the purpose intended, and it is to be understood that various changes in the detail of construction may be made without departing from the spirit of the invention.

What I claim is:

1. An inspection light comprising a lamp, a mirror, a pair of brackets mounted on the outer end of said lamp in spaced relation to each other for pivotally supporting said mirror therebetween, an ear extending from said mirror, a rod connected to said ear for pivoting said mirror transversely to the plane of said lamp, a rocker arm attached to the inner end of said lamp, a clevis for pivotally supporting said rocker arm at one end, a handle attached to the other end of said clevis, a second ear extending from said rocker arm, a second rod for moving said lamp and mirror pivotally connected to said second ear transversely to the plane of said handle, and a latch for slidably supporting said second named rod mounted on said handle, said latch adapted to releasably hold said second rod in adjusted positions.
2. An inspection light as in claim 1 wherein lugs are formed on the inner faces of said brackets for limiting movement of said mirror.
3. An inspection light as in claim 2 wherein a second set of lugs are formed on the inner faces of said clevis for limiting movement of said rocker arm.
4. An inspection light as in claim 3 wherein the lamp is provided with longitudinal openings to permit rays from said lamp to be reflected by said mirror.
5. An inspection light as in claim 4 wherein the lamp is further provided with an opening at its outer end to further permit rays from said lamp to be reflected by said mirror.

References Cited in the file of this patent

UNITED STATES PATENTS

1,036,000	Pease	Aug. 20, 1912
1,493,709	Schwabacher	May 13, 1924
1,874,571	Mitchell	Aug. 30, 1932
2,079,233	Wappler	May 4, 1937
2,226,616	Kraus	Dec. 31, 1940
2,289,226	Foregger	July 7, 1942
2,677,751	Marchand	May 4, 1954
2,740,882	Soucy	Apr. 3, 1956