June 18, 1957 J. O. ROESER 2,795,959

HERMETIC SEAL FOR A SWITCH

Filed Aug. 12, 1955

Fig. 1

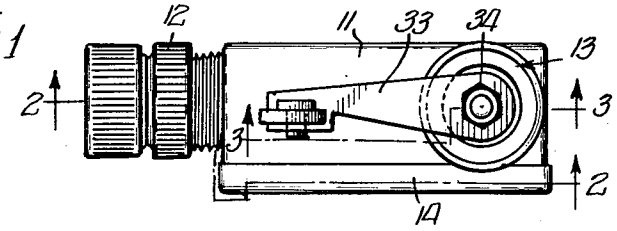


Fig. 2

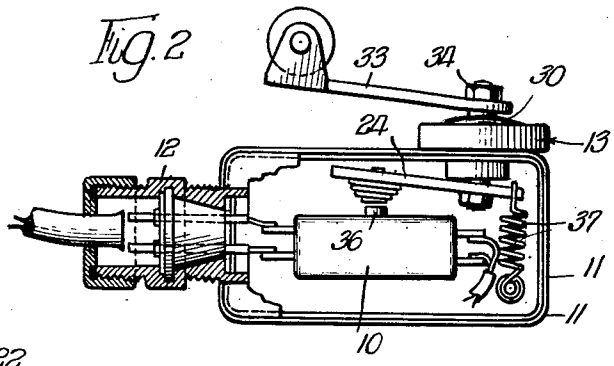


Fig. 5

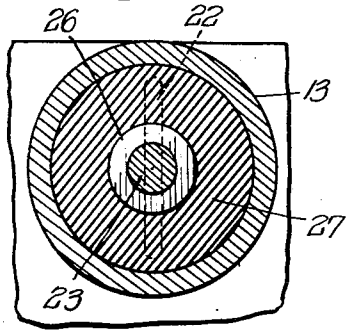


Fig. 3

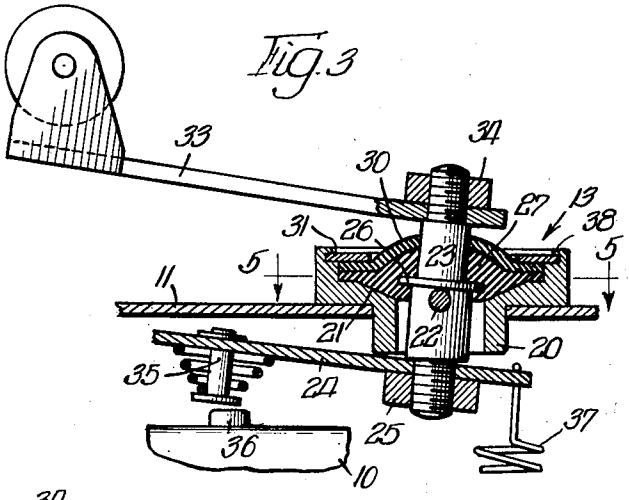
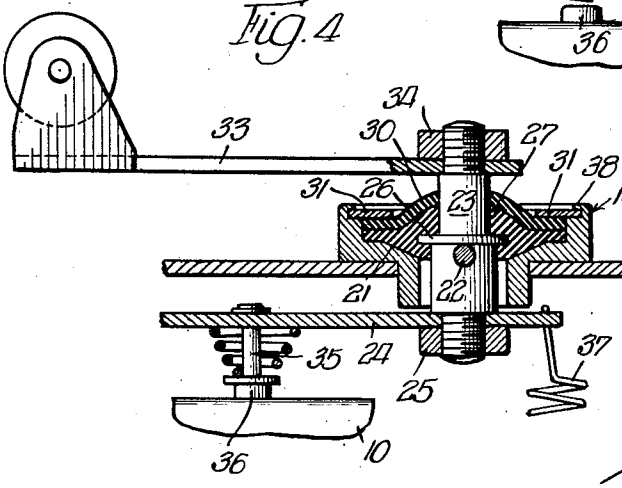


Fig. 4



INVENTOR.
John O. Roeser,
BY George H. Simmons
attg.

United States Patent Office 2,795,959
Patented June 18, 1957

2,795,959

HERMETIC SEAL FOR A SWITCH

John O. Roeser, Chicago, Ill., assignor to Electro-Snap Switch & Mfg. Co., Chicago, Ill., a corporation of Illinois

Application August 12, 1955, Serial No. 528,081

5 Claims. (Cl. 74—18.1)

This application is a continuation-in-part of my co-pending application Serial No. 243,697, filed August 25, 1951.

It is a main object of the invention to provide a hermetic seal for an electric switch of the snap action type, which is encased in a hermetically sealed casing.

Another object of the invention is to provide a hermetic seal for a pivoted operating stud that projects out of a hermetically sealed casing in which a snap action switch is enclosed.

Another object of the invention is to provide a hermetic seal of the above type, which will maintain seal under widely varying conditions of temperature and pressure.

Another object of the invention is to provide a hermetic seal of the class described, which can be manufactured at low cost without sacrificing quality and is capable of maintaining seal over a long period of time without maintenance.

Further objects of the invention not specifically mentioned here will be apparent from the detailed description and claims which follow, reference being had to the accompanying drawings in which a preferred embodiment of the invention is shown by way of example and in which:

Fig. 1 is a plan view of a hermetically encased seal involving the invention;

Fig. 2 is an elevational view, partly in section, along the line 2—2 of Fig. 1, looking in the direction of the arrows;

Fig. 3 is an enlarged fragmentary sectional view taken substantially along the line 3—3 of Fig. 1, looking in the direction of the arrows;

Fig. 4 is a view similar to Fig. 3, showing the apparatus in operated position; and

Fig. 5 is a fragmentary cross sectional view taken substantially along the line 5—5 of Fig. 3, looking in the direction of the arrows.

In the embodiment of the invention shown by way of example, a switch **10** is mounted in a metallic casing **11**, from one end of which is a hermetically sealed connector **12** and in one wall of which is a bushing **13** to which the present invention particularly relates. The switch **10** may be of any desired type, such as for example that shown in my prior Patent 2,518,255, issued August 8, 1950; and the connector **12** may be of the type shown in my prior Patent 2,684,401, issued July 20, 1954. The casing **11** is closed by a cover **14** sealed thereon to hermetically enclose the casing.

The bushing **13** contains an inner cylindrical portion **20** that projects through the wall of casing **11** and is sealed therein in any convenient manner such as brazing. The cylindrical portion **20** is tubular in form and the cavity in the bushing flares outwardly at **21** forming a larger diameter cavity exteriorly of the casing **11**. Mounted upon pivot rod **22** is an operating stud **23** which projects through the bushing **13** and into the casing **11**, there being an operating lever **24** fixed on the inner end of the stud **23** in a convenient manner as by a nut **25**.

Fixed upon the stud **23** above the pivot rod **22** is a washerlike collar **26**.

Disposed within the cavity in the bushing **13** is a mass of gum **27**, preferably silicone gum because of its ability to withstand widely varying conditions of temperature without deterioration. The mass of gum is bonded to the tapered wall section **21** of the bushing to the surface of the stud **23** and completely encompasses the washer **26**, which washer thus affords an added area of bonding between the gum and stud.

Overlying the gum **27** is a rubber diaphragm **30** which encircles the stud **23** and is held in the bushing by a suitable washer **31**. The diaphragm **30** is preferably composed of silicone rubber because of its temperature resisting characteristics and serves as a mechanical protection for the gum.

Fixed upon the outer end of the stud **23** is an operating lever **33** held thereon in suitable manner as by a nut **34**.

In operation of the device, when the operating lever **33** is moved from the position in which it is shown in Fig. 3 to the position in which it is shown in Fig. 4, the mass of gum **27** and the diaphragm **30** flex to maintain seal with the bushing and stud during this movement. Operating lever **24** is thus moved downwardly and the spring pressed pin **35** carried thereby operates the plunger **36** of the switch **10** thereby to operate the switch. When the force moving the operating lever **33** is removed, spring **37** restores the mechanism to the position shown in Fig. 3.

In the manufacture of this seal the stud **23** is placed within the bushing and a mass of raw gum **27** placed therein around the stud. The assembly is then put in a suitable mold and heat pressure applied to cure the gum and to bond the gum to the walls of the bushing, to the stud **23**, and to the washer **26**. The diaphragm **30** is then placed over the stud and secured in the bushing by a washer **31** and the walls of the bushing turned over the washer **31** in the manner shown at **38** in Fig. 4.

The casing **11** thus hermetically sealed may be evacuated or filled with an inert gas, if desired. The switch thus formed maintains seal under widely varying conditions of temperature and pressure, such as are encountered by an airplane taking off from the ground at high temperature and climbing rapidly to altitudes where low temperatures are encountered. While silicone is preferred as a gum and material for the diaphragm because of its temperature characteristics, the use of other suitable materials is contemplated within the teachings of the invention.

While I have chosen to illustrate my invention by showing and describing a preferred embodiment of it, I have done so by way of example only as there are many modifications and adaptations which can be made by one skilled in the art within the teachings of the invention.

Having thus complied with the statutes and shown and described a preferred embodiment of my invention, what I consider new and desire to have protected by Letters Patent is pointed out in the appended claims.

What I claim is:

1. A seal for a hermetically encased plunger operated snap switch, comprising: a metallic housing in which the switch is mounted and into which switch connecting wires are led through a hermetically sealed bushing; a hollow bushing sealed in said housing opposite said switch, a stud pivotally mounted in said bushing and extending therethrough; a lever fixed on the inner end of said stud and extending into juxtaposition to said switch plunger; a mass of gum in said bushing surrounding said stud and bonded to the stud and bushing to hermetically seal the housing and to maintain that seal during movement of the stud around its pivot; a rubber

diaphragm fixed in said bushing externally of said gum and having an opening through which said stud projects; and an operating lever fixed on said stud exteriorly of said diaphragm for moving the stud around its pivot thereby to operate the switch.

2. A hermetic seal as specified in claim 1, in which the gum is silicone and is cured in the bushing to bond it to the stud and bushing.

3. A hermetic seal as specified in claim 1, in which a disk surrounds the stud within the bushing and is embedded in the gum to provide additional area of bonding of the gum to the stud.

4. A hermetic seal as specified in claim 1, in which the diaphragm is composed of silicone rubber, is clamped in the bushing over the gum, and affords mechanical protection to the gum.

5. A seal for a hermetically sealed electric switch having a reciprocal plunger, comprising a housing in which the switch is mounted, a wall of said housing

opposite the plunger containing an opening, a hollow bushing sealed in said opening, a stud pivotally mounted in said bushing and projecting therefrom into said housing, means fixed on said stud for operating said plunger, a mass of silicone gum in said bushing surrounding said stud and bonded to the stud and bushing to hermetically seal the housing, a rubber diaphragm fixed in said bushing externally of said gum and having an opening through which said stud projects, and an operating lever fixed on said stud exteriorly of said diaphragm.

References Cited in the file of this patent

UNITED STATES PATENTS

2,365,649	Shaw	Dec. 19, 1944
2,430,064	Lawson	Nov. 4, 1947
2,439,760	Thomas	Apr. 13, 1948
2,468,512	Riche	Apr. 26, 1949