Oct. 14, 1941. A. J. WAYMAN 2,258,941

DOUBLE SEAL CONNECTOR

Filed May 19, 1939

FIG. 1.

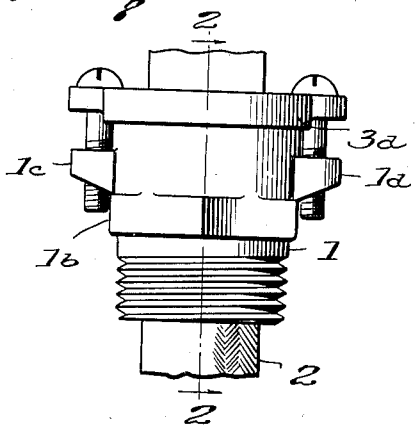


FIG. 2.

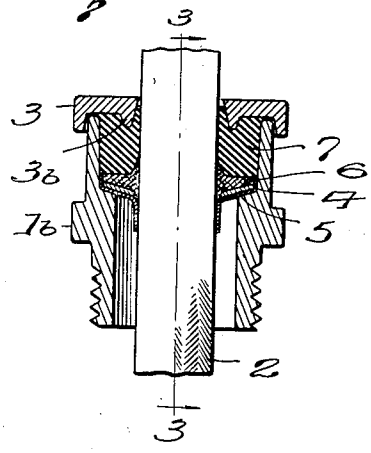


FIG. 3.

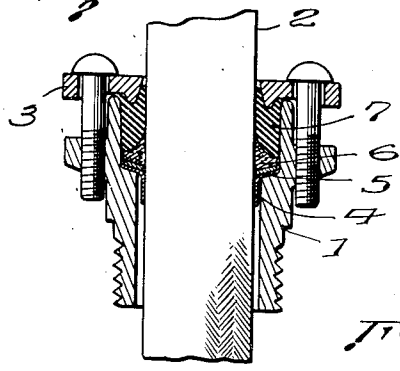


FIG. 4.

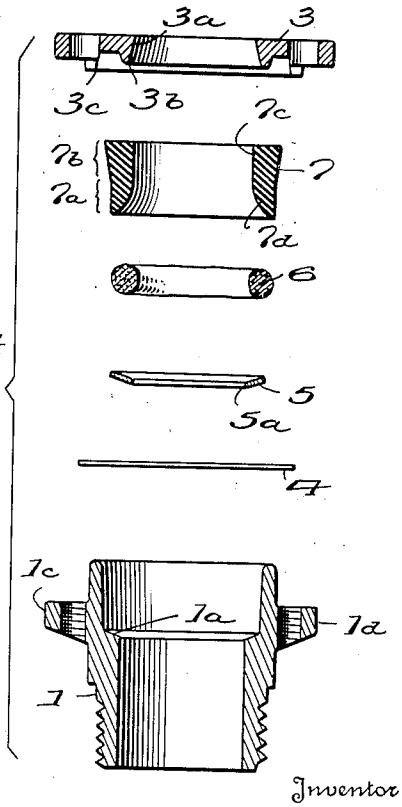


FIG. 5.

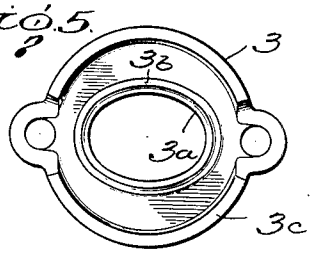
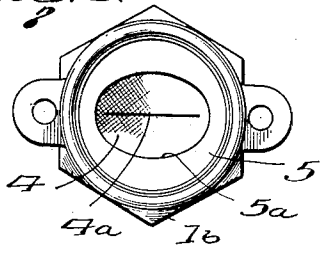


FIG. 6.



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2,258,941

UNITED STATES PATENT OFFICE

2,258,941

DOUBLE SEAL CONNECTOR

Albert J. Wayman, Youngstown, Ohio

Application May 19, 1939, Serial No. 274,648

6 Claims. (Cl. 285—6.5)

This invention relates to electric cable connectors and in particular to a connector for making a water-tight and moisture-proof joint between an electric cable and a terminal box, meter casing or other housing member. The present invention is an improvement over the connectors disclosed in my prior Patents 2,100,824 and 2,092,343.

An object of the present invention is to devise a cable connector in which there is a double seal against the admission of moisture to the terminal box, meter casing, or other housing to which the connector is secured. According to my invention, the connector is formed of a cylindrical sleeve surrounding the cable and containing an annular ring of permanently plastic adhesive material forming a seal between the inner surface of the sleeve and the outer surface of the cable, and a second seal is formed by an annular ring of rubber or other resilient material forced into contact with the ring of plastic material and compressed so as to maintain a water-tight seal between the inner surface of the sleeve and the external surface of the cable. The annular rubber ring not only serves as a seal to exclude the entrance of moisture, but it also serves to maintain the plastic material in contact with the inner surface of the sleeve and the external surface of the cable.

My invention is illustrated in the accompanying drawing in which:

Figure 1 is an elevational view of an assembled connector showing the cable arranged in position within the connector.

Figure 2 is a sectional view of the connector taken along the line 2—2 of Figure 1;

Figure 3 is a sectional view taken along the line 3—3 of Figure 2;

Figure 4 is an exploded view showing the various elements forming the connector in section;

Figure 5 is a view showing the inner face of the cap for the connector, and

Figure 6 is a view showing the upper end of the connector sleeve with the rubber ring removed.

Referring to the drawing, the connector is formed of a cylindrical sleeve 1 having a screw thread formed on the lower end thereof for threaded engagement with an internally threaded socket on a terminal box or meter casing or any other housing into which the cable 2 is to be introduced. The lower end of the sleeve has a smaller internal diameter than the upper end. and a shoulder 1*a* is formed inside of the sleeve as shown in Figure 4. Near the middle of the sleeve, an outer section 1*b* is formed with hexagonal shape so that a wrench may be employed to turn the connector in mounting it in its socket, see Figure 6.

At the large end of the sleeve is arranged a detachable cap 3 which is secured by means of suitable screws to lugs 1*c* and 1*d* formed on the sleeve 1. The cap 3 is provided with a cable aperture 3*a* of such form as to conform to the cross-sectional shape of the cable. In the illustrated embodiment of the invention the cable 2 is of oval cross-section and the aperture 3*a* is of corresponding oval shape as shown in Figure 5, but it will be understood that caps having different shapes of apertures may be provided and interchangeably used with the sleeve 1. Immediately surrounding the aperture 3*a* on the inner face of the cap 3 is a ring 3*b* which projects inside of the large end of the sleeve 1 when the cap is fastened tight against the sleeve. The cap 3 is also provided with an annular ring 3*c* which is arranged outside of the cylindrical wall of the sleeve 1.

For the purpose of providing an annular space within the sleeve for receiving the sealing compound around the cable, a partition structure is provided in the sleeve at the shoulder 1*a*, the partition being formed of a disc 4 of fabric material which rests directly against the shoulder 1*a* and is held in position against this shoulder by means of a washer 5. As will be seen from Figure 4, the fabric disc 4 is of larger diameter than the internal diameter of the sleeve 1, and the external diameter of the washer 5 is slightly less than the internal diameter of the large end of the sleeve 1, so that by first placing the disc over the end of the sleeve and then forcing the washer into the open end of sleeve 1, the disc 4 is clamped between the peripheral edge of the washer 5 and the inner wall of sleeve 1. As shown in Figure 4, the inner wall of the large end of the sleeve is slightly tapered to provide a larger diameter at the end than at the shoulder 1*a*. The washer 5 is provided with an aperture 5*a* of a shape which closely conforms to the outer surface of the cable. As shown in Figure 6, the fabric disc 4 is slit along the line 4*a* to permit the cable to be forced through the fabric disc. It will be understood that the purpose of providing the fabric disc 4 is to secure a close fitting partition around the outer surface of the cable 2 as shown in Figure 3, but the fabric disc 4 will not be necessary where the aperture in the washer 5 closely conforms to the surface of the cable 2.

A ring 6 of plastic adhesive sealing compound, such as the material commonly known as "Dux-

seal" is placed in the annular sealing space adjacent the washer 5, and a ring 7 of resilient material, such as rubber, is placed adjacent the ring 6. As shown in Figure 4, annular ring 7 is formed of a substantially cylindrical portion 7*a* which first enters the sleeve 1 and has an external diameter substantially equal to the larger internal diameter of the sleeve 1, and a tapered portion 7*b* of larger diameter than the largest internal diameter of sleeve 1. The aperture 7*c* of the ring 7 has a shape generally conforming to the cross-sectional shape of the cable 2 and the internal inner edge of the ring is beveled as shown at 7*d*.

In assembling the connector, the fabric disc 4 and the washer 5 are first assembled in the connector and seated against the shoulder 1*a*. The ring of plastic material 6 is then placed in the sleeve 1 against the washer 5, and the annular ring of rubber 7 is forced into the large end of sleeve 1 substantially to the extent of the section 7*a*, but not far enough to compress the ring 6. The cap 3 is then secured to the sleeve 1 by the screws having threaded engagement with the lugs 1*c* and 1*d*. The connector is now in the assembled form for distribution to the trade.

In the use of the connector, it will be understood that the connector is first screwed into its threaded socket, after suitable "dope" is applied to the threads of the sleeve to secure a watertight seal. The end of the cable is then passed through the aperture 3*a* in the cap 3, the aperture 7*c* in ring 7, through aperture 5*a* in ring 5 and is forced through the slit 4*a* in the fabric disc 4, the fabric disc being distorted to form a sleeve around the cable 2 as shown in Figures 2 and 3. After the cable is pushed through to provide the necessary length of cable inside of the housing or terminal box, the screws securing the cap 3 to the sleeve 1 may be tightened up to force the rubber ring 7 into contact with the plastic ring 6. This causes the plastic ring to be compressed into intimate contact with the outer surface of the cable 1, and the inner surface of the sleeve 2, as well as into contact with all exposed surfaces of the washer 5 and the ring 7, as shown in Figures 2 and 3, thus providing a water-tight and moisture-proof seal around the cable. As the cap 3 is forced into engagement with the rubber ring 7, the annular ring 3*b* formed on the inner face of the cap 3 engages the outer face of the ring 7 and expands the material of the ring to cause intimate contact between the ring 7 and the outer surface of the cable 2. Simultaneously, the ring 7 is being forced into the end of the sleeve 1, and since the section 7*b* of the ring 7 is of larger diameter than the internal diameter of the sleeve 1, the material of the ring is being compressed inwardly by the sleeve 1 into contact with the cable. This action is also aided by the taper of the inner wall of the sleeve 1. Thus, the rubber ring 7 provides another water-tight and moisture-proof seal around the cable.

Experience has shown that in the course of time rubber rings lose their resiliency and become hardened and are not in themselves entirely reliable to provide a water-tight seal. In my present construction, even though the ring 7 may in time deteriorate and be ineffective to provide a water-tight seal, the necessary seal will be provided by the plastic ring 6, and even though the ring 7 should become lifeless, it will still form the function of a packing ring so that by tightening up the screws securing the cap 3 to the sleeve 1, the plastic ring 6 may be maintained in the proper contact with the cable and the sleeve.

The resilient ring 7 may be termed a "stopper" ring, since it cooperates with the sleeve 1 in the same manner that a stopper cooperates with the mouth of a bottle. As the ring 7 is forced into the end of sleeve 1, the material of the ring is compressed into contact with the inner wall of the sleeve and the outer surface of the cable and thus forms a water-tight joint between the cable and the sleeve.

It is obvious that various changes may be made in certain details of construction. For example, other forms of partition structures may be employed than the elements 4 and 5 to provide a partition with an aperture which maintains close contact with the outer surface of cable 2. Where the electric cable is manufactured so that its external dimensions fall within a certain tolerance, it is possible to dispense with the separate partition structure and to form the wall of the sleeve 1 below the shoulder 1*a* so that it fits closely around the surface of the cable and will prevent any substantial leakage of the plastic compound from the sleeve.

What I claim is:

1. A connector for an electric cable comprising a sleeve surrounding said cable and providing an annular space therein surrounding said cable, a ring of adhesive plastic sealing compound surrounding said cable in said annular space, a stopper ring of resilient water-impervious material surrounding said cable adjacent said ring of plastic material, and means for compressing said ring of resilient material against said ring of plastic material, whereby said ring of plastic compound forms a water-tight seal between said cable and said sleeve, and said stopper ring forms a second water-tight seal between said cable and said sleeve.

2. A connector for an electric cable comprising a sleeve surrounding said cable and providing an annular space therein surrounding said cable, a ring of adhesive plastic sealing compound surrounding said cable at the bottom of said annular space, a stopper ring of resilient water-impervious material surrounding said cable in the open end of said space, a cap for the open end of said connector, and means for adjustably securing said cap to said sleeve whereby said cap forces said stopper ring into said sleeve and into engagement with said ring of plastic material, whereby said ring of plastic compound forms a water-tight seal between said cable and said sleeve, and said stopper ring forms a second water-tight seal between said cable and said sleeve.

3. A connector for an electric cable comprising, a sleeve for surrounding said cable and having a larger internal diameter than the external diameter of said cable, a partition structure within said sleeve and provided with a cable aperture adapted to receive said cable, a ring of adhesive plastic sealing compound arranged within said sleeve adjacent said partition, a stopper ring of resilient water-impervious material positioned in the open end of said sleeve adjacent said ring of plastic material, and means mounted on said sleeve for forcing said stopper ring into said sleeve.

4. In a cable connector, the combination of

a sleeve having a larger internal diameter at one end than at the other and having an internal shoulder intermediate the ends thereof, a partition structure mounted within the large end of said sleeve adjacent said shoulder and comprising a fabric disc seated against said shoulder, and an apertured disc of resilient material positioned entirely within the large end of said sleeve and cooperating with the inner wall of said sleeve for maintaining said fabric disc in position in contact with said shoulder.

5. A combination according to claim 4 in which said fabric disc is slit along a diametrical line of said disc.

6. A connector for an electric cable comprising a sleeve surrounding said cable and providing an annular space therein surrounding said cable, a ring of adhesive plastic sealing compound surrounding said cable in said annular space, a stopper ring of resilient water-impervious material surrounding said cable adjacent said ring of plastic material, said stopper ring being tapered on the outside and having a portion thereof of greater diameter than said annular space, and means for forcing said stopper ring into said sleeve and against said ring of plastic material, whereby said ring of plastic compound forms a water-tight seal between said cable and said sleeve, and said stopper ring is pressed inwardly against said cable.

ALBERT J. WAYMAN.