

June 7, 1955

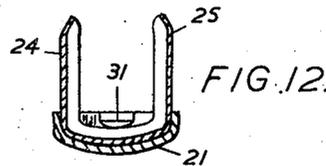
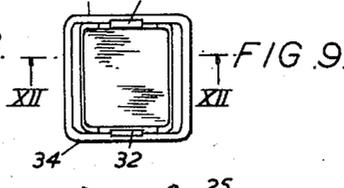
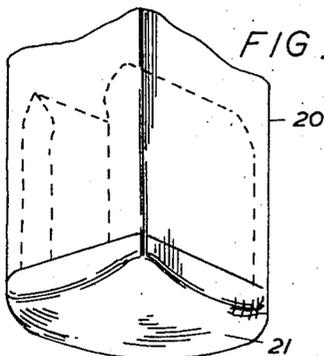
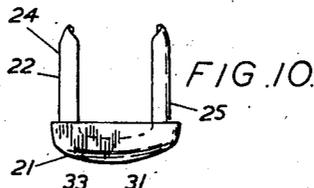
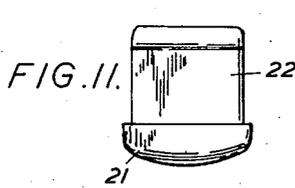
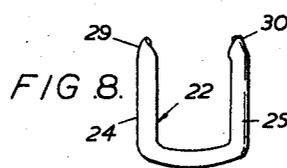
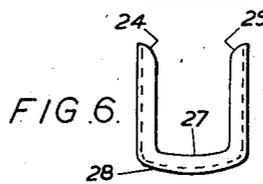
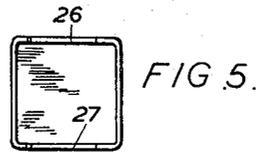
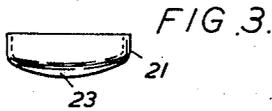
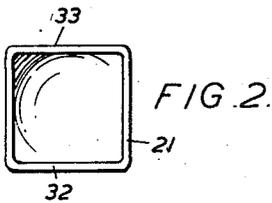
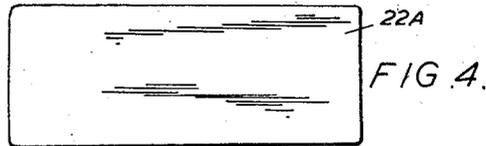
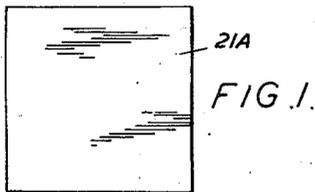
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2,710,027

TUBE CLOSURES

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2 Sheets-Sheet 1



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TUBE CLOSURES

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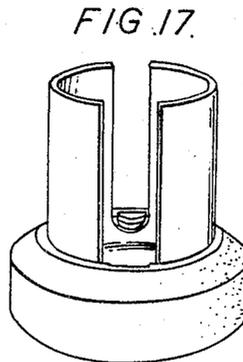
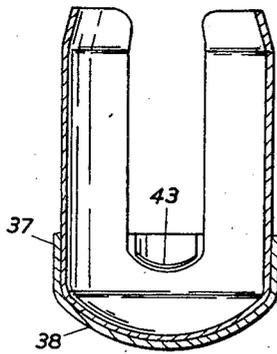
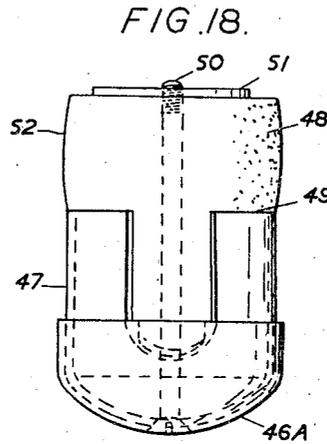
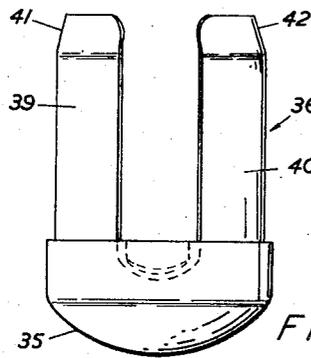
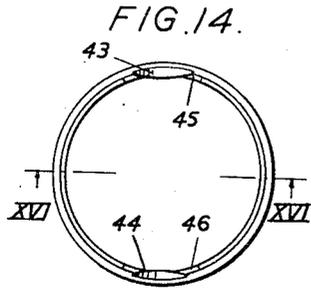


FIG. 16.

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2,710,027

TUBE CLOSURES

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Claims priority, application Great Britain June 19, 1952
2 Claims. (Cl. 138—89)

The present invention relates to an improved closure device.

The present closure is particularly suitable for stopping the ends of metal tubes such as are used for example in the manufacture of tubular furniture.

If the leg of a tubular steel chair be left open it is comparatively unsightly and can cause damage to the floor covering. In order to avoid this disadvantage it is common practice at the present time to fit a rubber cap over the open end of the tube. However, the rubber cap must be sprung very tightly over the end in order that it may not become displaced unintentionally and, consequently, the fitting of the cap on the end of the tube is a difficult and time-wasting operation.

It is also known at the present time to weld or braze a cap on to the open end of the tube and then dress the outer surface. Again, a solid cap may be turned from the solid and fitted into the end of a cylindrical tube. Such methods have the disadvantages, however, of being relatively tedious and expensive.

Objects of the present invention are to provide a closure which is easier and cheaper to make than those known hitherto whilst being effective in use and long wearing. A further object is to provide a device of this kind which is water-tight.

Preferred forms of the invention will now be described with reference to the accompanying diagrammatic drawings, in which:

Figure 1 shows a blank from which is formed a cap illustrated in plan and elevation in Figures 2 and 3,

Figure 4 shows a blank from which is formed a stud designed to fit into the cap,

Figures 5, 6 and 7 are respectively a plan, side and end elevations of the stud during the course of its manufacture,

Figure 8 is an elevation of the finished stud,

Figures 9, 10 and 11 are respectively a plan, side and end elevations of the finished closure device,

Figure 12 is a section on the line XII—XII of Figure 9,

Figure 13 is a perspective view of a closure device fitted into a tube,

Figures 14 and 15 are respectively a plan and elevation of a closure device for a cylindrical tube,

Figure 16 is a section on the line XVI—XVI of Figure 14,

Figure 17 is a perspective view of the closure device of Figures 14, 15 and 16 but having a moulded rubber head attached thereto, and

Figure 18 is an elevation of a device similar to that of Figures 15 and 16 but embodying a rubber sealing plug.

Referring now to Figures 1 to 13, a closure suitable for neatly closing the end of a tube of square section shown at 20 in Figure 13 is formed of two parts, one of which will be called a cap and is shown at 21 in Figure 18, and the other of which will be called a stud, shown at 22 in the various figures. The cap 21 is formed from a blank 21A which consists of a square sheet of mild steel. The

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blank could, however, be circular. With the aid of a suitable forming press the blank is cupped to the shape shown in Figures 2 and 3, both the internal and external shape of the cup being square and the closed end being either flat or, as shown, slightly rounded as at 23.

The stud 22 is formed from a blank 88A consisting of a rectangular strip of mild steel. With the aid of a suitable forming press the blank 22A is pressed up to the shape shown in Figures 5, 6 and 7. It will be seen that the stud 22 at this stage in its manufacture has two spring legs 24 and 25, two shallow side flanges 26 and 27, and a rounded closed head 28. In plan view (Figure 5) the external dimension of the stud is a square of side equal to the internal dimensions of the cap 21. In a subsequent operation the free ends of the legs 24, 25 are inwardly canted as shown at 29 and 30 in Figure 8.

The stud is reversed and placed in a compression and staking tool, the cap is placed over it and the press operated first to force the cap over the closed end of the stud and then to form stakes 31 and 32 in the lips of the side walls 33 and 34 of the cap 21. The stakes 31 and 32 are formed on the inside of the walls 33 and 34 so that they protrude inwardly over the lips of the flanges 26 and 27 to secure the stud 22 in the cap 21.

In order to use the device to close the end of a square section tube 20 (Figure 13), the spring legs 24 and 25 are pushed into the end of the tube, the sloping portions 29 and 30 serving as a lead-in for this purpose, whereupon the cap is hammered lightly into the end of the tube, one blow usually being sufficient for this purpose.

In Figures 14, 15 and 16 is illustrated a device suitable for closing the end of a tube of circular section. As before, the device is in two parts, comprising a cap 35 and a stud 36. The cap is formed from a circular blank sheet of mild steel and is formed in a press to the shape of a cup having cylindrical walls 37 and either a flat or a rounded closed end 38.

The stud is formed from a rectangular sheet of mild steel and is pressed to the U-shape shown in the figures. It comprises two spring legs 39 and 40 each of which is part-cylindrical over its major portion and is bent inwardly a little as at 41 or 42 at its free ends. Although shown parallel, the legs are preferably splayed outwardly a little. As before, the stud and cap are placed in the tool of a press which serves to force the stud into the cap and produces two diametrically opposite stakes 43 and 44 in the lips of the cylindrical walls of the cap 35. The stakes are situated at the bottom of the two slots 45 and 46 formed between the legs 39 and 40 and serve to hold the stud in the cap.

This device is used in a manner similar to the last, being placed legs first into the end of a circular cylindrical tube and hammered therein.

It will be appreciated that such closure devices can be easily and cheaply manufactured, can be applied very quickly and provide a neat finish without many of the disadvantages of existing closures.

If desired the device may have a rubber or synthetic plastic head moulded, bonded or otherwise secured to the outside of the cap and in this case the closed end of the cap may have holes formed in it to serve as keying means for the rubber, plastic or like heading material. An illustration of such a headed closure device is shown in Figure 17.

The gauge of the metal from which the cap is formed is preferably equal to that of the tube into which it is to be fitted so as to provide a flush outer surface.

If desired the cap may have dimples formed in its side walls, or other deformities extending inwardly, to engage the stud.

Alternatively the cap and stud may be secured together by spot-welding or brazing.

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The device illustrated in Figure 18 comprises a cap 46A similar to that of Figures 15 and 16 and a stud 47 which is also similar to that of Figures 15 and 16 except that the legs are shorter and have no chamfered lead-in at the free ends. The stud and cap are secured together in any of the ways mentioned above.

Fitting tightly within the stud is a rubber or similar resilient plug 48 shouldered as at 49 to fit within the legs of the stud and bored axially to receive a screw 50. The cap is also centrally bored and countersunk to receive the screw and the plug is secured within the cap and stud with the aid of a circular nut 51 which, when tightened, causes the plug to bulge slightly as at 52.

When such a closure device is fitted into a tube end it serves to provide a dust- and water-tight closure.

What we claim is:

1. A closure device, suitable for stopping the end of a tube, comprising a U-shaped stud having spring legs bridged by a head of cup shape, an open-ended cap of similar cup-shape fitting over the head so that the flanges of the head and cap are in contact, the flange of the cap

being substantially higher than that of the head of the stud, and deformities in the free edge of the flange of the cap which protrude inwardly to lie over the edge of the flange of the head, in the gaps between the legs, so as to secure the cap and stud together.

2. A device as claimed in claim 1, provided with a resilient plug secured under compression within the stud so as to protrude therefrom, the transverse section of the protruding portion being of similar shape but slightly larger than the internal transverse section of the cap.

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