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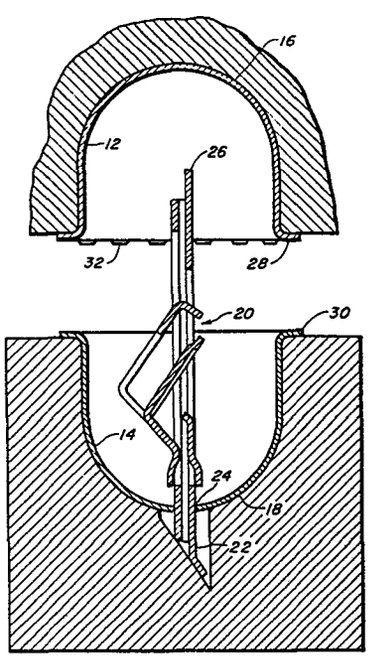
(54) Security seal housing.

(57) A seal of the ball type in which the seal body is formed of two cup-shaped body portions which retain internally a shackle locking device which is press-fitted into and projects through a suitable aperture in the bottom of one of the body portions. The body portions each have a radially extending flange at the open end thereof, which are superimposed and welded together in such a manner that there is no gap between the flanges at the outer periphery thereof.



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BACKGROUND OF THE INVENTION

In the art of security seals, a commonly used type of seal for sealing doors of cargo containers such as box cars and truck trailers is the so-called ball seal, which has a body formed of two cup-shaped portions forming an enclosure retaining a shackle locking mechanism. The two portions are held together by providing a radial flange on one of the body portions at the open end thereof, and providing a deformable flange-like portion at the open end of the other body portion; which, on assembly of the two portions, is crimped over the flange of the radial flange on said one body portion.

It has been found that if sufficient time is available, a seal body of this type can be defeated by carefully bending the crimped portion outwardly far enough that the body portions can be separated to enable release of the shackle to open the cargo door. The seal can then be re-assembled by re-inserting the shackle and then re-crimping the retaining portion over the flange of the other portion. If done carefully, it is then difficult or impossible to detect that the seal has been opened.

SUMMARY OF THE INVENTION

A seal of the type comprising two cylindrical members open at one end and closed at the other end by a hemispherical portion, said members being fastened together and containing internal locking means for receiving an apertured shackle in locking engagement. In a preferred embodiment of the invention the internal locking means has a support platform with shackle engaging means associated therewith, one end of said platform being press fitted and retained in an aperture in the hemispherical portion of one member, the other end being shaped and positioned to be centrally maintained by the inner surface of the hemispherical end portion. Each member has a radially extending flange at the open end, said flanges being superimposed and welded together in a manner such that there is no gap between the flanges at the outer periphery thereof. In a preferred embodiment of the invention at least one of the flanges is provided with a series of welding projections which are formed by embossing the material of the flange. The welding operation is so conducted that the embossments are "puddled" during welding so that they are completely flattened allowing the flanges to fit tightly together after welding.

The device may be manufactured by forming the members in progressive dies, press fitting the forward end of the platform of the internal locking member through the aperture in the hemispherical end of one of the members so that it extends on the central axis of the member.

the member. The other member is then superimposed over the projecting rear end of the locking platform, which end is curved at the same radius of curvature as that of the interior bottom surface of said other member.

While the two portions are being retained in this position, a welding electrode in the form of an annulus is placed over the assembly so that it bears against the flange. Current and pressure are then applied to the electrode to soften or "puddle" the projections and thereby allow the flanges to be welded tightly together.

In a modified form of the invention, an aperture is provided at each position on a flange that is opposite the position of a projection on the other flange, so that when the projection is "puddled" by the welding process, the projections fill the aperture.

BRIEF DESCRIPTION OF THE FIGURES OF THE DRAWING

Figure 1 is a view in section of a pair of seal body portions in position for having their flanges superimposed for welding together.

Figure 2 is an enlarged view of a portion of the superimposed flanges of the body portion, with a welding electrode positioned for welding the flanges together.

Figure 3 is a view in section, partly in elevation, of the assembled seal body.

Figure 5 is an enlarged view in section of a modified form of the flanges of the seal body.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

Referring to the drawing, there is illustrated a seal of the ball type and a method of manufacture thereof.

The seal 10 is formed of two cup-shaped body portions 12 and 14 formed of drawn sheet metal which are retained together in a manner to appear hereinafter. The body portions have a generally hemispherical bottoms 16 and 18, and retain a shackle engaging mechanism 20 in the interior thereof.

The shackle engaging mechanism 20 may be of any desired type, such as is shown in U.S. patent 4,424,995 issued January 10, 1984. One end 22 of the mechanism 20 is dimensioned to extend through a slot 24, the slot and the end 22 being so dimensioned that the shackle engaging mechanism is tightly retained in the slot. The other end 26 of the shackle engaging mechanism is rounded to approximate radius as that of the interior surface of the bottom portion 16 of the portion 12, so that said end is retained against transverse movement in any direction. (See Figure 3).

To retain the two body portions 12 and 14 together, radially extending flanges 28 and 30 are provided at the open ends thereof. In the embodiment of Figures 1-4 one of said flanges is provided with a series of welding projections 32 which are formed by embossing the flange. In one preferred embodiment of the invention the projections 32 are spaced closely together near the outer edge of the flange and are slightly elongated in a circumferential direction for a purpose to appear hereinafter.

In a preferred method of manufacture of the seal, the two body portions are formed in separate sets of progressive dies from continuous metal strips. Thereafter the end 22 of the shackle engaging mechanism 20 is press fitted through the slot 24 from the inside of the body portion 14. The two body portions are then aligned and moved together by suitable mechanism (not shown) so that the flanges 28 and 30 are superimposed.

A welding ring 34 is then placed over the flange 28 and pressure and current is then applied to the flanges to heat the projections until they "puddle" and collapse, allowing the flanges to seat tightly against each other so that no gap remains between the flanges at the outer periphery.

The assembled seal may then be removed from the carrying or supporting structure.

The fact that the projections 32 are positioned closely together near the periphery of the flange and are elongated insures that a major portion of the periphery of the flanges is welded together to prevent any gap from occurring between the flanges at any point on the periphery thereof, yet providing the advantage of high current density at the projections required for effective welding.

It has been found impossible to open the above described seal without leaving evidence of tampering, such as a deformed flange portion, which, if bent, cannot be completely returned to the original flat condition. In most instances, attempts to open the seal will result in a torn flange, which is impossible to restore or conceal.

Although the two body portions may be formed simultaneously from two strips of metal in two sets of progressive dies and immediately assembled, it will be understood by those skilled in the art that if desired, the body portions may be manufactured and stored, and then hopper-fed into suitable assembly machinery for insertion of the shackle-engaging mechanism and for welding together.

Referring now to Figure 5, there is illustrated a modified form of seal of the type described above, in which the flange 28 has welding projections 132, and the flange 130 of the other body portion has apertures 134 positioned to receive the projections 132 when the two flanges are superimposed before welding. When the projections 132 are "puddled" during welding, they fill the apertures 134 to retain the flanges together. This structure has the advantage that the two flanges are positioned tightly together before welding, eliminating the possibility of any gap occurring between the periphery of the flanges after welding in case one of the projections does not "puddle" for any reason.

Since certain other changes apparent to one skilled in the art may be made in the herein described embodiments of the invention without departing from the scope thereof, it is intended that all matter contained herein be interpreted in an illustrative and not a limiting sense.

Claims

1. A seal of the ball type comprising a pair of cup-shaped members having open ends which are superimposed to form a cavity, shackle locking means in the cavity, one member having an aperture for receiving a shackle end, each member having a radial flange at the open end, said flanges being superimposed and welded together.

2. A seal as set out in claim 1 in which one flange, before welding, has a series of forwardly extending welding projections which have been flattened during the welding operation so that the flanges are retained tightly together with no gap between the flanges at the outer periphery.

3. A seal as set out in claim 2 in which the welding projections are spaced near the outer periphery of the flange and are spaced closely together circumferentially.

4. A seal as set out in claim 3 in which the welding projections have a dimension in a direction circumferentially of the flange which is appreciably greater than the dimension in a direction radially of the flange.

5. A seal of the ball type comprising a pair of cup-shaped members having generally hemispherical bottoms and open ends which are superimposed to form a cavity, a shackle locking mechanism in the cavity, one member having an aperture in the bottom, one end of said shackle locking mechanism being tightly retained in said aperture, the other end of said shackle locking mechanism being positioned closely adjacent the interior surface of the bottom of the other member so that it is retained against transverse movement in any direction, each of said members having a radial flange, at least one of the flanges having had forwardly projecting welding projections which are closely spaced circumferentially, said flanges being welded together in a manner such that the flanges are held tightly together with no gap therebetween at the periphery thereof.

6. A seal as set out in claim 5 in which the welded portions of the flanges occupy a major portion of the circumference of the flange.

7. A method of manufacture of a seal of the ball type, comprising forming a pair of cup-shaped members each having an open end with a radially extending flange at said open end, forming an aperture in one of said cup-shaped members in a portion thereof opposite the open end, press fitting a platform of a shackle locking device into the aperture from the open end, assembling the other cup-shaped member over the other end of the shackle locking platform so that the radial flanges of the two cup-shaped members are superimposed, and welding said flanges together.

8. A method as set out in claim 5 which includes forming a series of welding projections on the radial flange of at least one of said members, and welding the flanges together with current and pressure in a manner such as to eliminate said projections and cause said flanges to be adhered tightly together without any gap between the flanges at the periphery thereof, the welded portion existing throughout a major portion of the circumference of the flanges.

9. A seal body which has been manufactured by the method of claim 7.

10. A seal body which has been manufactured by the method of claim 8.

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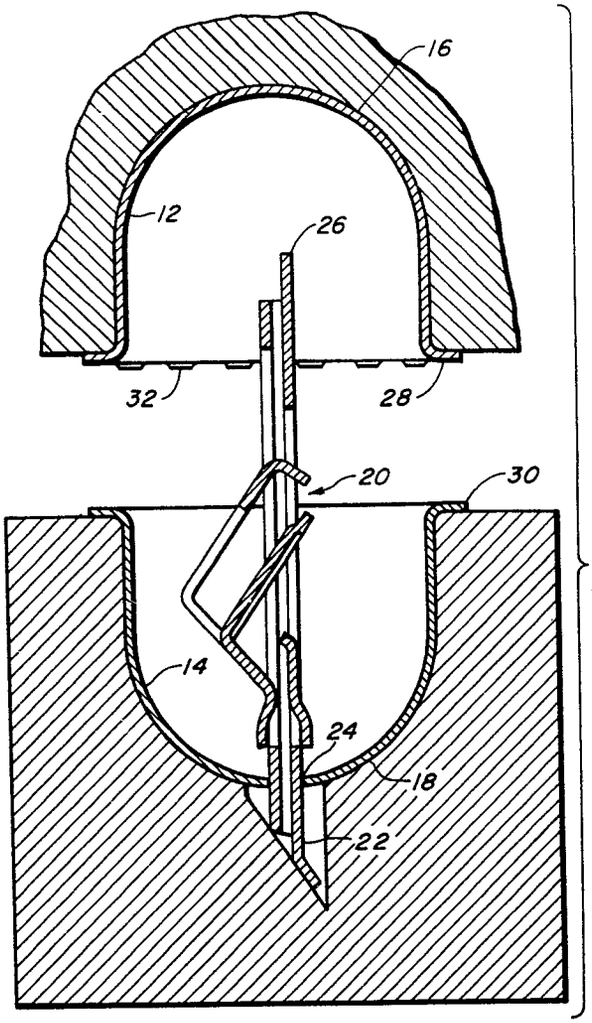

FIG. 1

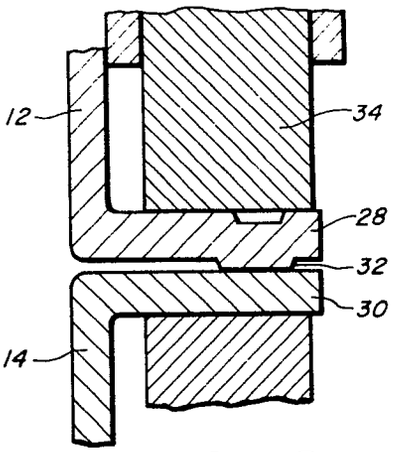

FIG. 2

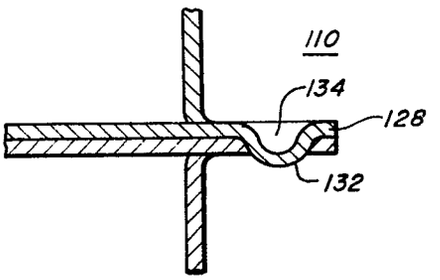

FIG. 5

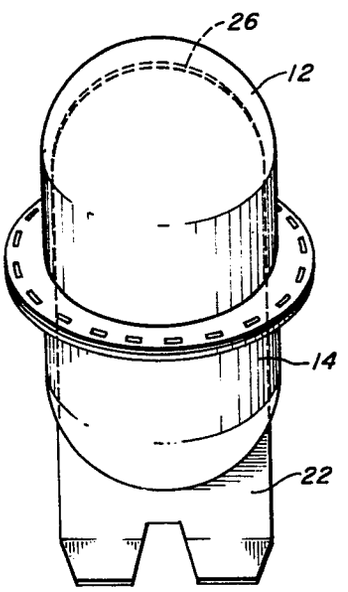

FIG. 4

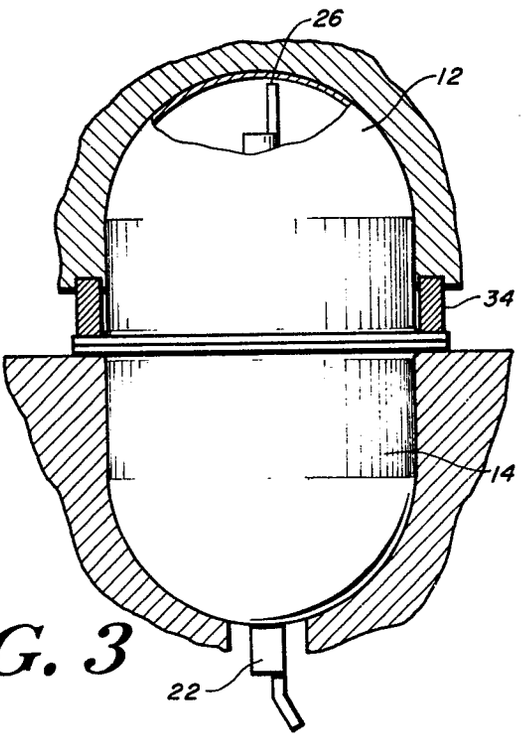

FIG. 3