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(54) Seal

(57) A seal 10 of the one-time padlock type comprises a plastics housing 12 having two portions joined only by a weakened portion 20, each portion having an aperture for receiving an end of a shackle 14. the weakened portion is at the bottom of a narrow elongated recess formed by adjacent housing portions. The shackle is preferably a wire having reverse bent end portions (32, 34), and the two housing portions are connected only by a centrally disposed thin web 20. Attempts to remove an end portion will cause the extreme end of the reverse bent portion to pierce through the wall of the housing and start a fracture in the thin connecting web.

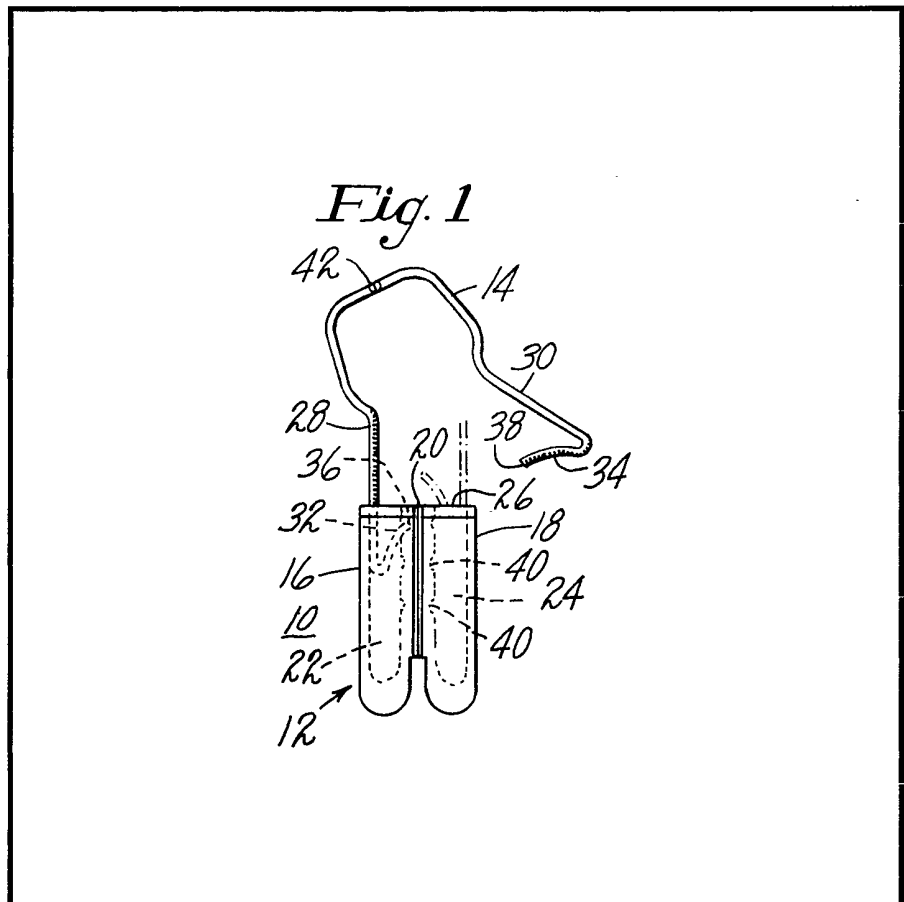


Fig. 1

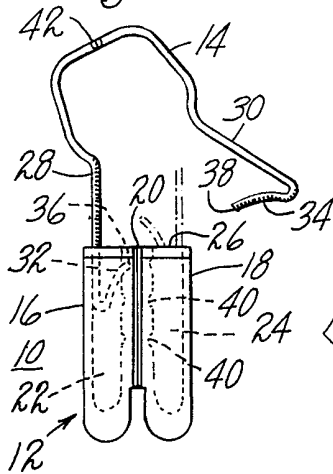


Fig. 2

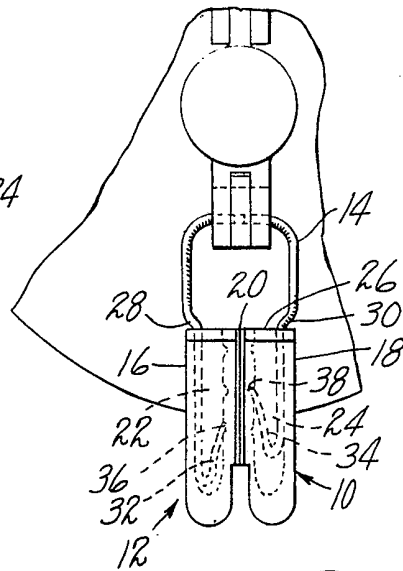


Fig. 3

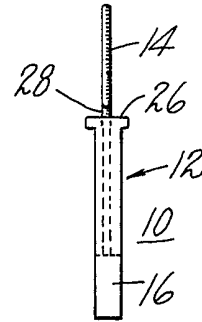


Fig. 4

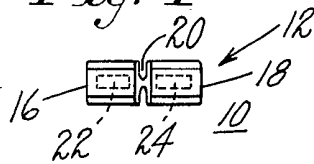


Fig. 5

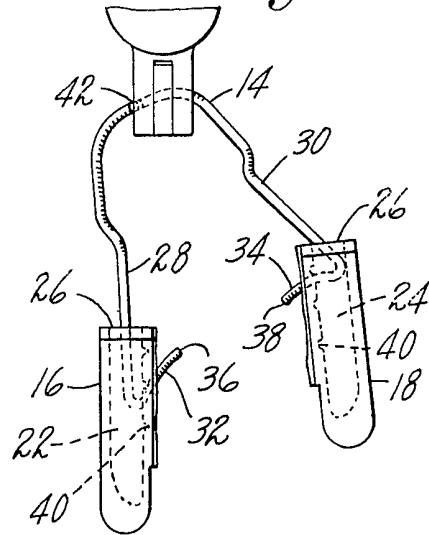
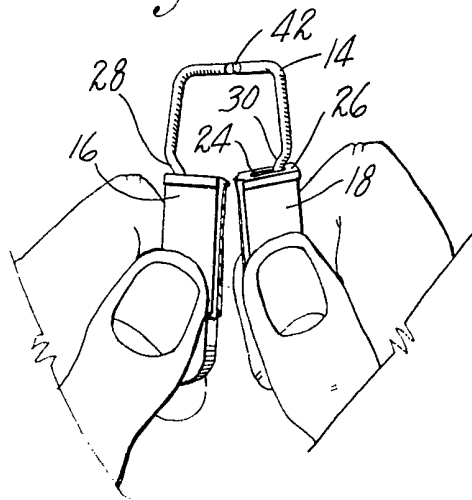


Fig. 6



SPECIFICATION

Seal

5 The invention relates to a seal.

In US Patent 3 485 521 there is illustrated a seal of the padlock type, in which the body is formed of a synthetic organic plastic material with a pair of apertures opening to one end of the body, and the shackle is formed of a U-shaped piece of wire having reverse bent end portions, which end portions, when inserted into the body openings, are locked therein by the end portion being maintained in a flexed condition so that the end of the reverse bent portion digs into the wall of the housing aperture.

Although the seal of this US Patent has achieved considerable commercial success, it has been found that in some instances it has been possible to work an end of the shackle out of its aperture to enable the seal to be removed and re-assembled without leaving evidence of tampering.

It has been proposed that if the end portions of the shackle were bent outwardly, rather than inwardly, as illustrated in the Patent, such attempts to remove a shackle end would cause the extreme end to pierce the outside wall of the housing. However, in such case, the protruding reversely bent end can be cut off, and the remainder of the leg pulled out of the housing. When, after the protected closure has been opened, the seal can be re-assembled by forming a new reverse-bent end portion on the end of the leg that has been cut off.

Such seals must often be removed by authorized service personnel, which can be done only by cutting the spring steel shackle with special type of wire cutter. Such cutting tools are expensive and often lost by the service personnel.

Attempts to remove a shackle leg by an unauthorized person which requires that the body be manually held with considerable strength, will break the thin web, which breakage may be facilitated because sufficient pulling force on the leg will cause the end thereof to pierce the wall of the body and start a fracture in the web. Further flexing of the web resulting from squeezing of the body will allow the body portions to separate, giving conclusive evidence of tampering.

However, the seal may be easily removed without the use of special tools by intentionally breaking the body so that the two portions separate, and thereafter bending or twisting the shackle so that it breaks at the centrally located weakened portion.

Since in most installations, the seal is used outdoor locations, the slot is deeper than it is wide, to minimize the effect of sunlight on the thin web at the bottom of the slot.

The invention is further described below, by

way of example, with reference to the accompanying drawing, in which:

Figure 1 is a plan view of a seal embodying the invention with a shackle thereof in the open position;

Figure 2 is a plan view of the seal of Fig. 1 assembled with a closure fastener of a device to be protected;

Figure 3 is a view of the seal of Fig. 2 as seen from the left side;

Figure 4 is a view of the seal of Fig. 2 as seen from the bottom;

Figure 5 is a plan view of the assembly of Fig. 2 in which the seal has been broken by attempts to remove the shackle ends from a body in which they are received; and

Figure 6 is a perspective view of the assembly of Fig. 2 in which the seal has been intentionally broken, illustrating the method of breaking the shackle to enable the seal to be removed from the closure fastener.

The seal 10 illustrated in the drawing comprises the body or housing 12 formed of synthetic organic plastics material, for example polypropylene, and the shackle 14, which is formed of spring wire.

The housing 12 comprises a pair of spaced body portions 16 and 18 joined by a thin web 20 forming a slot in each face of the housing. The portions 16 and 18 have respective apertures 22 and 24 formed therein and opening only to the top 26 of the housing.

The shackle 14 is generally U-shaped to provide a pair of legs 28 and 30 of different lengths, the ends of which have reversely bent end portions 32 and 34 with extreme ends 36 and 38. The length and angle of the end portions 32 and 34 in relation to the size of the apertures 20 and 24 is such that when a shackle end is inserted into a body aperture, the bent end is maintained in a flexed condition in the aperture so that the extreme end of the end portion digs into the aperture wall to prevent removal of the shackle without leaving visible evidence of tampering. Notches 40 are optionally provided in the aperture wall to assist in allowing the ends 36 and 38 to dig into engagement with the wall.

The medial portion of the shackle 14 is provided with a weakened portion 42 for a purpose explained below.

The seal 10 is normally supplied to the user with the longer leg 28 retained in one body aperture and the reverse bend of the shorter leg 30 projecting into the other aperture. The extreme end 38 of the shorter leg end portion is not however entered into the aperture, so that the leg 30 may be readily released from the aperture for assembly with a closure fastener, for example on an electric meter. Such assembly is accomplished by inserting the free leg 30 of the shackle through the closure fastener opening, and then inserting the leg 30 into the other body aperture, and forcing both shackle legs down into the apertures, to

the position shown in Fig. 2.

The web 20 connecting the two body portions 16 and 18 is positioned mid-way between the two side faces of the portions for reasons now to be described.

Since the seal is often used on outdoor electric meter installations, it is desirable to minimize the effect of solar ultra-violet radiation on the thin web 20. For this reason the slot preferably has a greater depth than width, so that if the seal is hanging with a side of the body facing south, the web will receive direct solar radiation for only a short time.

Although the web 20 could be positioned on one face of the body, so that the slot would open only to the other face, the seal could then be inadvertently installed so that the side of the seal having the web would be exposed, so that the web would receive continuous radiation. Although such a web position would be suitable for interior installations, the illustrated positioning is preferred for exterior installations.

With either web position, it is preferred that the apertures 22 and 24 be so positioned in relation to the web 20 that the extreme ends of the shackle 14 are positioned in alignment with the web, for the following reason.

The usual steps taken by an unauthorized person to remove a shackle leg from the housing of a seal of the type shown in US Patent comprise grasping the housing with one hand and grasping the leg at the top surface of the housing with a pair of thin-nosed pliers. With manipulation of the pliers, it has been sometimes possible to work the shackle end out of the housing, or to cause the shackle end to pierce the housing so that it can be cut off.

However, when the illustrated seal is manually grasped firmly enough to resist the necessary pulling force on a shackle leg, the seal body flexed at the connecting web 20. As the wire is flexed back and forth by the pliers or other grasping instrument, flexing of the web also occurs. It has been found that the pressure that must be applied to the body by one hand to resist the pulling force that is applied to the shackle almost inevitably causes the body to break in half at the web 20. In some cases the pulling force on the shackle causes an end of a shackle leg to pierce the body wall and the adjacent portion of the web, facilitating the breaking of the web.

After the body is broken, the seal may or may not then be removed by the person attempting to open the device protected by the seal, but in either case the broken or missing seal gives clear evidence of tampering.

The seal 10 may be easily removed by authorized personnel by breaking the seal body and then separating the two body portions with a twisting motion (see Fig. 6) so that the shackle 14 breaks at the weakened

portion 42. The two portions may then be removed from the closure fastener and discarded. After the adjustment or repair to the device is completed, a new seal is applied.

Although in the illustrated embodiment of the invention, the shackle is formed of spring steel, it will be understood that in some applications a shackle of plastics material may be used. The shackle may then have locking ridges, and each aperture may have locking fingers, as shown in US Patent 3 467 427, and the body apertures may be closed at the bottom, as illustrated, or may be open, as illustrated in this US Patent, so that the shackle ends may be pulled through the body for tightening.

CLAIMS

1. A seal comprising a shackle, a body having two portions each with an aperture for receiving therein in a non-releasable manner a respective end of the shackle, the shackle having a weakened part between its ends, and the body having a weakened part between the portions.

2. A seal claimed in claim 1 wherein the weakened part of the body comprises a thin web between the two portions.

3. A seal as claimed in claim 1 or 2 wherein each body has a thin wall adjacent the web, and the shackle is a wire shackle, each shackle end being bent so disposed relative to the associated wall, and the wall being of such thickness and material that the free end of the shackle penetrates through the wall in response to an attempt to pull the shackle end out of the aperture.

4. A seal having a body comprising two portions joined together by a thin web, each portion having an aperture for receiving a respective bent end of a wire shackle and a wall adjacent the thin web, the bent end being so disposed relative to the wall and the wall being of such thickness and material that the free end of the shackle penetrates through the wall in response to an attempt to pull the shackle end out of the aperture.

5. A seal as claimed in claim 2, 3 or 4 wherein the web and the body portions adjacent thereto from a slot having a depth greater than its width at the surface of the body with the web at the bottom of the slot.

6. A seal having a body comprising two portions joined by a thin web so as to be readily separable, each portion having an aperture for receiving therein in a non-releasable manner a respective end of a shackle, the web and the body portions adjacent thereto forming a slot having a depth greater than its width at the surface of the body with the web at the bottom of the slot.

7. A seal as claimed in claim 6 wherein each body portion has a thin wall adjacent the web, and the shackle is a wire shackle, each shackle end being bent and so disposed rela-

tive to the associated wall, and the wall being of such thickness and material, that the free end of the shackle penetrates through the wall in response to an attempt to pull the shackle end out of the aperture.

5 8. A seal as claimed in claim 4, 6 or 7 wherein the shackle has a weakened part between its ends.

10 A seal as claimed in claim 5, 6 or 7 having a like slot in a surface of the body opposite the said surface, with the web between the slots.

15 9. A seal as claimed in any preceding claim wherein the apertures extend in parallel directions into the body from an end thereof.

10. A seal as claimed in any preceding claim wherein the body is of plastics material.

20 11. A seal substantially as herein described with reference to the accompanying drawings.

CLAIMS (28 Jan 1980)

25 1. A seal comprising a shackle, a body having two portions each with an aperture for receiving therein in a non-releasable manner a respective end of the shackle, the shackle having a weakened part between its ends, and the body having a weakened part between the portions.

30 2. A seal as claimed in claim 1 wherein the weakened part of the body comprises a thin web between the two portions.

35 3. A seal as claimed in claim 1 or 2 wherein each body portion has a thin wall adjacent the web, and the shackle is a wire shackle, each shackle end being bent and so disposed relative to the associated wall, and the wall being of such thickness and material, that the free end of the shackle penetrates through the wall in response to an attempt to pull the shackle end out of the aperture.

40 4. A seal having a body comprising two portions joined together by a thin web, each portion having an aperture for receiving a respective bent end of a wire shackle and a wall adjacent the thin web, the bent end being so disposed relative to the wall and the wall being of such thickness and material that the free end of the shackle penetrates through the wall in response to an attempt to pull the shackle end out of the aperture

45 5. A seal as claimed in claim 2, 3 or 4 wherein the web and the body portions adjacent thereto form a slot having a depth greater than its width at the surface of the body with the web at the bottom of the slot.

50 6. A seal having a body comprising two portions joined by a thin web so as to be readily separable, each portion having an aperture for receiving therein in a non-releasable manner a respective end of a shackle, the web and the body portions adjacent thereto forming a slot having a depth greater than its width at the surface of the body with the web at the bottom of the slot.

7. A seal as claimed in claim 6 wherein each body portion has a thin wall adjacent the web, and the shackle is a wire shackle, each shackle end being bent and so disposed relative to the associated wall, and the wall being of such thickness and material, that the free end of the shackle penetrates through the wall in response to an attempt to pull the shackle end out of the aperture.

70 8. A seal as claimed in claim 4, 6 or 7 wherein the shackle has a weakened part between its ends.

75 9. A seal as claimed in claim 5, 6 or 7 having a like slot in a surface of the body opposite the said surface, with the web between the slots.

80 10. A seal as claimed in any preceding claim wherein the apertures extend in parallel directions into the body from an end thereof.

85 11. A seal as claimed in any preceding claim wherein the body is of plastics material.

12. A seal substantially as herein described with reference to the accompanying drawings.

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