Aug. 29, 1944. A. J. KOMENAK 2,356,856

DETECTION SEAL

Filed Feb. 24, 1941

Fig. 1

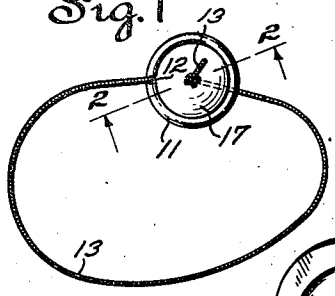


Fig. 5

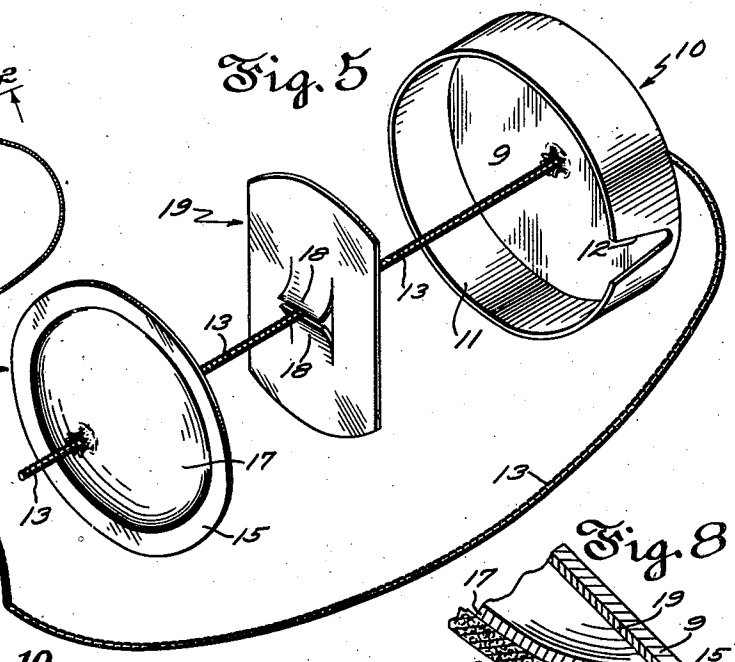


Fig. 10

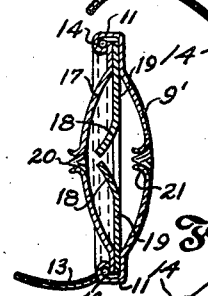


Fig. 8

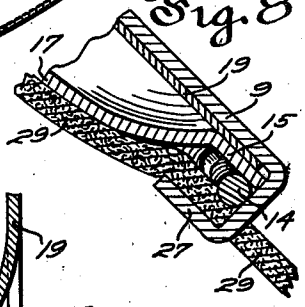


Fig. 2

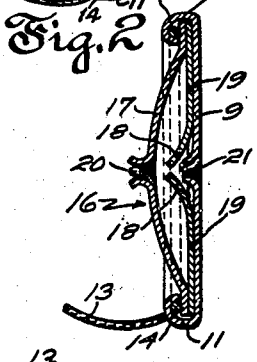


Fig. 3

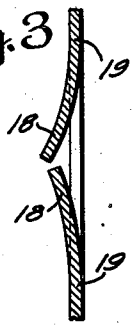


Fig. 4

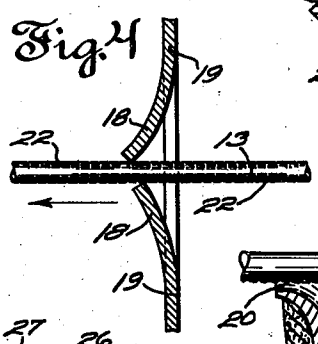




Fig. 9

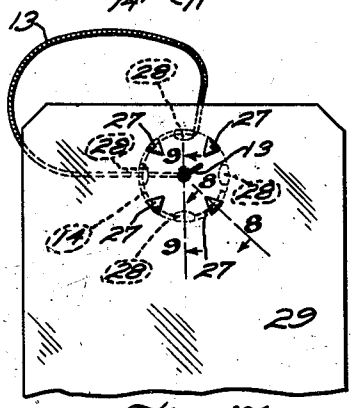


Fig. 7

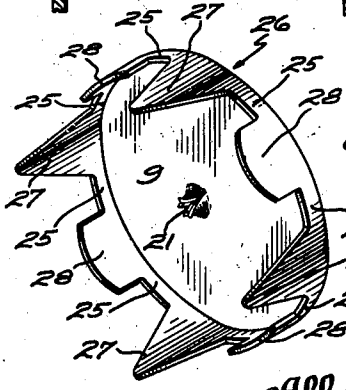


Fig. 6

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DETECTION SEAL

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Application February 24, 1941, Serial No. 380,295

6 Claims. (Cl. 292—318)

This invention relates to a detection seal of the kind which includes a loop of flexible tie wire or the like adapted to be passed through or drawn tightly around otherwise separable container parts or projections therefrom and then fastened in a way to prevent enlargement of the loop thus requiring severing of the wire in order to open the container whereby reliable evidence may be had as to whether the closure of the container, trunk, luggage, package, or the door of a freight car for instance, has been opened since it was last closed and sealed. The invention also relates to tie wire seals of this nature carrying joined to them an express tag or other identification ticket.

Prior to these improvements, it has been considered necessary to assemble as many as seven separate mechanical parts to produce a self acting wire locking unit in detection seals of the kind described. This has resulted in higher cost of manufacture and greater bulk in the finished product than is necessary or desirable for the purposes it is designed to serve.

Objects of the present improvements are to reduce the number of parts heretofore required in a detection seal for the purpose described, and to render the same smaller, lighter, more tamperproof and more agreeable to handle.

Another object is to produce a small wafer-like unit that shall be operative automatically to lock the wire of the detection seal against withdrawal in a direction to enlarge the loop of wire. Preferably the improved automatic wire locking unit will be made of light weight sheet metal parts as few as three in number.

A further object is to increase the positiveness and dependability with which the wire is caught and held by the automatic detent element within the wire locking unit.

A further object is to provide a wire locking unit of the kind described having smoothly rounded peripheral contours free from sharp edges and protuberances of any kind at its edges in order to make the locking unit more comfortable to grasp and hold in the fingers of the user's hand in the normal way of handling the seal in its various applications.

A still further object is to form a cupped, sheet-metal member so that a portion of its cylindrical rim may be rolled over to effect a secure, permanent and tamperproof assemblage of the component parts of the locking unit while other portions of this same rim are left available to serve as fastening prongs for joining the wire locking unit to an express tag or other form of identification card or ticket.

The foregoing and other objectives will appear in greater detail from the following description of possible embodiments thereof, in which description reference is had to the accompanying drawing, wherein:

Fig. 1 shows in complete form a detection seal embodying the present improvements, with its loop forming fastening wire having a bare terminal portion held against retraction from the locking unit by means automatically operative within the latter.

Fig. 2 is a view drawn on an enlarged scale taken in section on the plane 2—2 in Fig. 1 looking in the direction of the arrows, the bare end of the wire being absent from the wire locking unit.

Fig. 3 is an enlarged fragmentary view showing the normal relationship of the spring lips of the grab plate within the wire locking unit.

Fig. 4 shows the wire of the seal drawn into place between the grab plate lips of Fig. 3.

Fig. 5 is an exploded perspective view of the parts shown assembled in Fig. 2.

Fig. 6 shows a modification of the casing cup of Fig. 5 designed to provide prongs for fastening thereto an express tag or the like.

Fig. 7 shows a wire locking unit incorporating the modified casing cup of Fig. 6 assembled with a cardboard or fabric tag, or the like.

Fig. 8 is a fragmentary enlarged view taken in section on the plane 8—8 in Fig. 7 looking in the direction of the arrows.

Fig. 9 is a fragmentary enlarged view taken in section on the plane 9—9 in Fig. 7 looking in the direction of the arrows.

Fig. 10 shows an assembled seal incorporating a modification of one of the chamber forming members of Fig. 2.

Referring to Figs. 2 and 5, closure member 10 may be formed by drawing or cupping a pliable sheet of metal or other formable material in a manner to produce the thin web-like or discal wall 9 and the peripheral rim portion 11 which latter remains pliable so that the whole, or desired portions, of such rim portion can be curled inward or set over as shown in Fig. 2 by an eyelet setting tool or somet equivalent bending over operation, and preferably without fracture at any point. Attention is called to the notch 12 in rim 11 which provides outlet for the tie wire 13 whose permanently anchored end 14 is bent to conform to the arcuate curvature of cup rim 11 around, say, a half of the circle. Thus in the assembled locking unit of Fig. 2, this end of wire

13 becomes permanently fastened under the turned-over cut rim 11.

In Fig. 2 wire 13 is seen to lie in planar contact with the flat annular marginal brim or border 15 of a thin, cymbal-like closure disc or cover member 16 which is dished outward in its central web-like portion 17 to make room for the flexing action of resilient lips 18 of a detent plate 19. Because the web-like portions of closure members 10 and 16 are of substantially coextensive area, their peripheries may be utilized as a means for uniting them permanently while leaving a chamber-like space therebetween.

The way in which lips 18 are formed in spur-like fashion from middle sections of detent plate 19 appears clearly in Figs. 3 and 5. Plate 19 is of proper overall length to have edgewise clearance with respect to the rim 11 by which it is surrounded. I have found it is advantageous to confine plate 19 loosely enough so that it may float or shift rotatively and diametrically of its chamber or edgewise to an extent insuring that the wire when gripped between lips 18 shall not bind in apertures 20 or 21 in case the gripping edges of said lips should in the assembly be found slightly out of line with said apertures. Said extent of edgewise shifting is limited by the overall girth of the detent plate sufficiently to so restrict departure of the wire aperture at lips 18 from alignment with holes 20 and 21 that the wire may always be threaded serially through first the hole 21, then between lips 18 and then through hole 20. The ends of plate 19 may have edges which curve correspondingly with the inside surface of cup rim 11. Plate 19 may be cut off from a running length of flat tempered steel ribbon. Preferably the temper of the steel in this ribbon and plate is sufficient to impart flexibility and good resilience to lips 18, and said lips are partially sheared out of, and offset in spur-like fashion from, the flat surrounding surface of the detent plate into an initial or normal relationship shown in Fig. 3.

The spring quality of lips 18 is such that they will resiliently flex to the position shown in Fig. 4 when a wire 13 is pushed between them by the operator's fingers. Thereafter this wire may then be drawn toward the left between lips 18. The free ends of lips 18 have sharp edge corners and are preferably much harder than the metal of wire 13 so that any attempt to withdraw wire 13 in a direction from left to right in Fig. 4 will be met by the positive resistance of lips 18. These lips will then try to flex and follow the wire toward the right but thereupon must dig into the wire and thus prevent it from slipping between the lips since the latter, themselves, can not flex back toward their position in Fig. 3 while wire 13 is present therebetween.

Preferably I employ a wire which is slightly roughened on its surface by means of a running series of close tiny crosswise indentations 22 along its length. These may conveniently be formed by passing the wire lengthwise between suitable knurling rollers. Indentations, such as 22, are not necessary where lips 18 are sufficiently sharp edged and sufficiently harder than the metal of the wire and are pressed thereagainst with sufficient spring force, but when present these indentations serve to increase the positiveness with which the wire is grabbed by lips 18 to prevent its movement toward the right. Movement toward the left is of course always freely permitted because lips 18 are free to flex in that direction only, as the wire passes therebetween.

Figs. 2 and 5 show an aperture 20 in the center of cover 16 and a similar aperture 21 in the center of casing cup 10, both of these apertures being larger than the size of the wire 13 and punched out of the sheet metal by spreading outward the border of the aperture instead of removing a blank or slug of the size of the desired aperture. In this way each of apertures 20 and 21 becomes bordered by a broken flange of appreciable axial length forming an inwardly smooth, conical slide bearing free from sharp edges so that wire 13 in passing from the right toward the left may be smoothly pulled into aperture 21 from even obliquely disposed directions. This expedient will tend to draw out kinks which may be present in the wire.

Whereas the thickness of the sheet materials of which my improved wire locking unit is composed may vary with the sizes of wire and areas of the parts, I have found it practical for use with a wire of approximately $\frac{1}{32}$'' diameter and a seal of the approximate size shown in Fig. 1, to make the members 10 and 16 out of soft steel about $\frac{1}{64}$'' thick and the plate 19 out of spring tempered hard steel about .006'' thick. Member 10 may be dished outwardly like a cymbal as well as, or in place of, so dishing member 16 as shown in Fig. 10 at 9'.

In Fig. 6 the rim 25 of a modified form of casing cup 26 is shown to be castellated to produce alternately long pointed prongs or tangs 27 and shorter blunt tabs 28. Only the latter are turned over and set down over the anchored end of tie wire 13 in the manner shown in Fig. 9, whereas the long pointed prongs 27 are left straight and are long enough to penetrate through an express tag 29 or other form of cardboard or fabric identification ticket as shown in Fig. 8. Prongs 27 may thereupon be bent over flat against the opposite surface of the express tag as shown in Fig. 7 thereby fastening such tag to the wire locking unit so that the former will serve as a permanent part of the latter.

In applying my simplified and improved detection seal to any article which has one or more engageable openings through which tie wire 13 may be passed and drawn up to a tight loop as the bare end of the wire is pulled through the automatic locking unit, the locking unit may be held by the fingers of one hand. With the fingers of the other hand the free end of the tie wire is passed around or through openings in the container parts to be sealed and is then pushed from right to left in Fig. 2 by grasping the wire a short distance from its free end. Thus said free end of the wire is pushed through aperture 21 to any desired extent. This causes it to be directed between the lips 18 and on therefrom out of the aperture 20. When sufficient length of the wire emerges from aperture 20 the balance of its length may be pulled rather than pushed through the locking unit until the loop (Fig. 1 or Fig. 7) is drawn to as small a size as is permitted by the container parts which it encompasses or the projections therefrom which it connects. After this, the excess length of the wire which has passed through the locking unit may or may not be cut off as desired.

Thus the detent plate 19 acts as a locking element or instrumentality at any point along the wire while one end of the wire remains immovably anchored to the seal. In the case of the seal locked tie wire shown in Fig. 1, it is evident that one stretch of the wire 13 is locked by the plate lips 18 while another stretch is sandwiched

between and fastened in planar contact with the flat brim surface 15 of member 17 and the bent over rim 11 of member 10.

When once sealed by my improved seal of Figs. 1 or 7, the only way in which access can be gained to the sealed closure parts, such as the cover and body of a container held tightly together by the loop of tie wire shown in either Fig. 1 or Fig. 7, is to sever or break this wire. While this, of course can be done without great difficulty, the fact of the tampering will be made known and can not be concealed since there will not remain a sufficient length of the broken wire to enable the still remaining length to reach and again be passed through the automatic locking unit. Reliable evidence is thus assured as to whether or not any container to which my improved seal has been applied has been entered since the seal was originally applied.

Fig. 8 shows that a particularly secure binding of the flexible material of the tag against the stiff bulging face of member 16 resistive to edgewise pull on the tag or ticket results from the snubbing effect in the assemblage herein illustrated since the tag is thereby warped to form a hollow and the seal in effect becomes nested therewithin. In this and other ways the exact constructions herein disclosed as examples of how the invention may be put into practice are susceptible of modifications and substitutions within the scope of the novel principles taught by this disclosure, wherefore the appended claims will be understood as directed to and intended to cover all such modifications, substitutes, and equivalents as fairly fall within their terms.

I claim:

1. A self locking tie wire detection seal including the combination of, chamber defining members permanently secured together, one of which members comprises a shallow thin-walled cup having an inwardly bent over rim and a central opening and the other of which members comprises a discal member having a flat faced planar brim and contains a central opening a stretch of tie wire adapted to pass straight through both of said openings and said chamber, a detent plate in said chamber, at least one wire locking instrumentality carried by said detent plate operative automatically to prevent withdrawal of said stretch of wire from said chamber in the opposite direction, and a different stretch of said tie wire bowed and fastened in planar contact with the flat face of said planar brim of the discal member by said bent-over rim of said cup.

2. A self locking tie wire detection seal including the combination, with a sufficient length of wire to form a binding loop, of two closure members apertured to pass said wire freely therethrough permanently fixed together and cooperatively shaped to provide a chamber-like space between said members, a detent plate in said space containing an aperture through which a stretch of said wire may pass while occupying said space, and a flexible lip carried by said plate disposed in oblique relation to the stretch of said wire within said space and having its free edge bearing resiliently against said stretch of wire, said plate being free to be shifted edgewise by said wire in said chamber-like space within the limits of lateral movement of said wire with respect to said apertured closure members.

3. A self locking tie wire detection seal including the combination, with a sufficient length of wire to form a binding loop, of two closure members fixed permanently together and cooperatively shaped to provide a chamber-like space therebetween and having respective openings at least one of which is larger than said wire whereby said wire may pass freely through both of said members and possess lateral play in said opening, a detent plate in said space containing an aperture admitting therethrough a stretch of said wire, and at least one flexible lip bordering on said aperture in oblique relation to said wire and carried by said plate in a manner to press resiliently against said wire, the said plate being free to be shifted edgewise by lateral movement of said wire in said opening.

4. A self locking tie wire detection seal as defined in claim 3, in which the said detent plate has a peripheral edge shaped and disposed in cooperative relation to one of the said closure members in a manner sufficiently to restrict departure of the said plate aperture from the said member openings always to enable said wire to be threaded serially through one of said openings and then through said aperture and then through the other of said openings.

5. A self locking tie wire detection seal including the combination, with a sufficient length of wire to form a binding loop, of chamber inclosing members permanently fixed together, one of said member comprising a shallow thin walled cup having a central opening through which a stretch of said wire may freely pass, and the other of said members comprising a cymbal-shaped disc having a flat annular border and a central opening through which said stretch of wire may freely pass, a detent plate between said members containing an aperture through which said stretch of said wire may be drawn in one direction, and an automatic wire locking element carried by said plate to prevent withdrawal of said wire in the reverse direction, the margin of said plate being sandwiched between said border of the cymbal-shaped disc and the thin wall of said shallow cup and the rim of said cup being turned inward to overlap said border retainingly.

6. A self locking tie wire detection seal including the combination, with a sufficient length of wire to form a binding loop, of closure members permanently fixed together having apertures to pass said wire freely therethrough at least one of said apertures being oversize with respect to said wire, one of said members comprising a shallow thin walled cup, and the other of said members comprising a cymbal-shaped disc having a flat annular border, a detent plate between said members containing an aperture through which a stretch of said wire may pass, and an automatic wire locking element carried by said plate, said plate being floatingly retained between the border flange of said disc and the thin wall of said cup in a manner to be freely shiftable edgewise by lateral movement of said wire relative to said apertured closure members.

ALBERT J. KOMENAK.

CERTIFICATE OF CORRECTION.

Patent No. 2,356,856. August 29, 1944.

ALBERT J. KOMENAK.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, line 48, for "somet" read --some--; page 2, first column, line 2, for the word "cut" read --cup--; page 3, first column, line 44, claim 1, after "opening" insert a comma; and second column, line 34, claim 5, for "member comprising" read --members comprising--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of November, A. D. 1944.

(Seal)

Leslie Frazer
Acting Commissioner of Patents.