Sept. 4, 1956 W. M. BROOKS 2,761,720

SHACKLE SEAL

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Fig. 1.

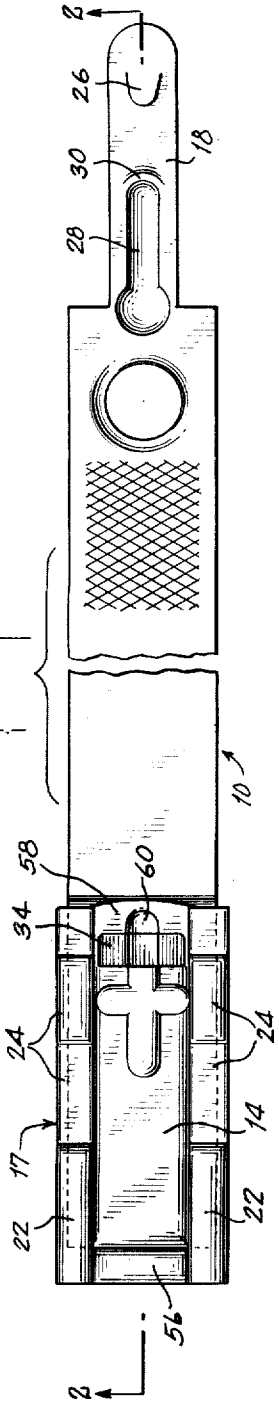


Fig. 2.

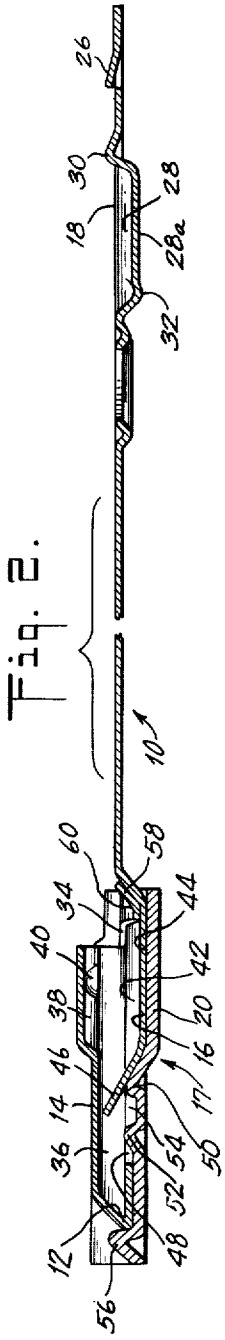
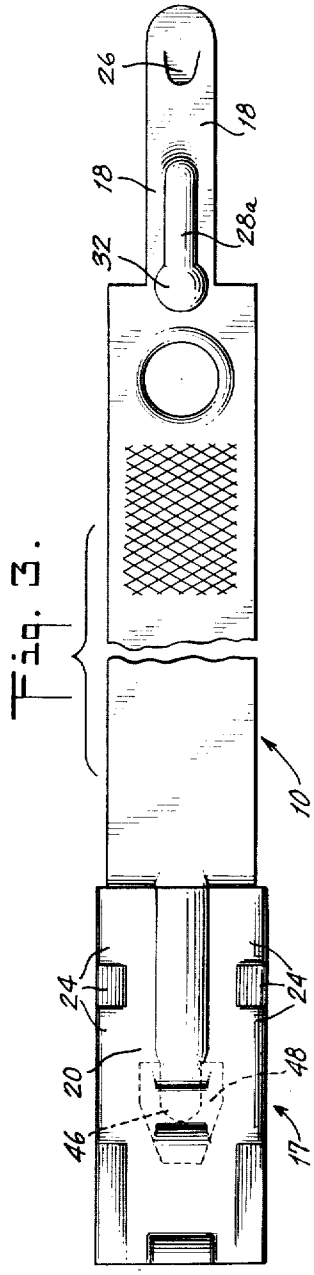


Fig. 3.



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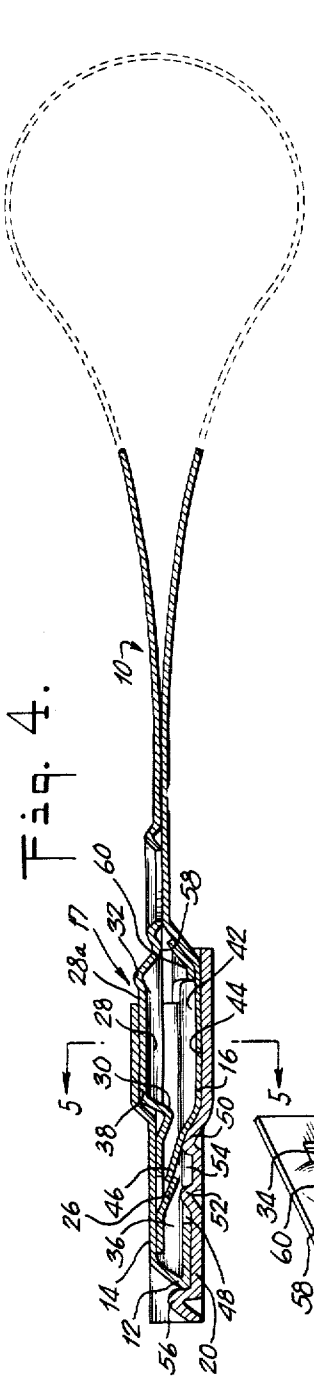


Fig. 4.

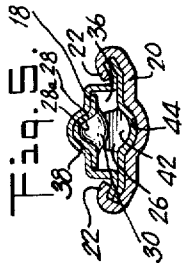


Fig. 5.

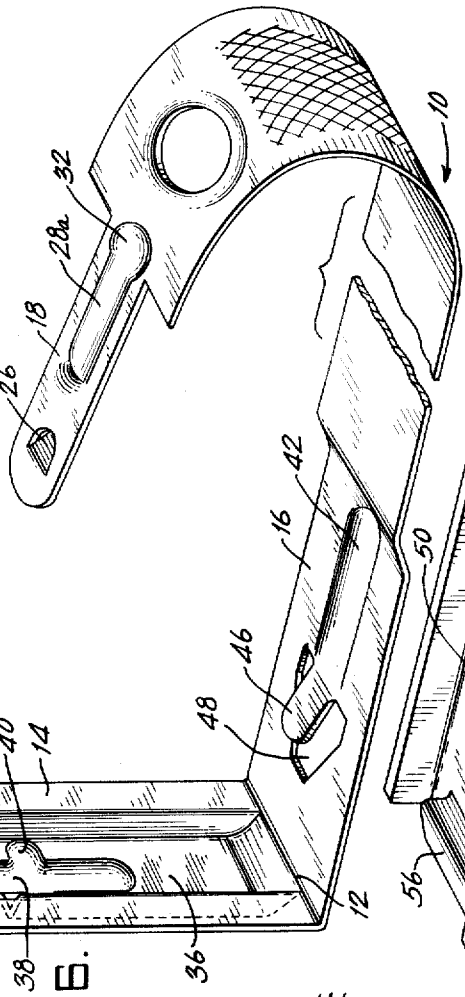


Fig. 6.

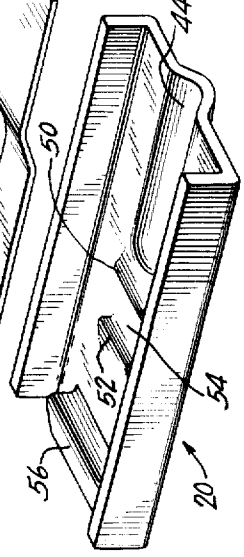


Fig. 7.

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SHACKLE SEAL

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Application March 17, 1954, Serial No. 416,775

2 Claims. (Cl. 292—317)

This invention relates to improvements in shackle seals which are useful, among other purposes, for application to a door of a railway car or other vehicle when the door is closed so that the seal if unbroken or devoid of any evidence of tampering may serve as an indication that the door has not been opened without authorization. More particularly, the present invention is an improvement upon the invention covered by my United States Patent Number 2,481,815, dated September 13, 1949.

The seal disclosed in the mentioned patent embodies certain features tending to discourage tampering with the seal by unauthorized persons. While the mentioned patented seal is very effective for its intended purpose it is possible nevertheless for an authorized person, who may have learned the details of the structure of the seal, to release it and thereafter refasten it without leaving very clearly obvious signs of tampering.

An important object of the present invention, therefore, is to provide an improved seal of the mentioned character embodying additional means rendering it practically impossible to open the device without damaging it to such an extent that it could not be refastened or reused without showing very clear signs of the tampering that had taken place.

The foregoing and other more or less obvious objects are accomplished according to the present invention, of which a single embodiment is disclosed herein for illustrative purposes, without, however, limiting this invention to the particular disclosed embodiment. The mentioned illustrative embodiment is shown in the accompanying drawings in which:

Figure 1 is an elevational view of one side of a shackle seal according to a preferred embodiment of this invention; the seal being shown in its open position. For convenience, the illustrated side is sometimes hereinafter referred to as the top of the device.

Fig. 2 is a longitudinal sectional view of the device substantially on the line 2—2 of Fig. 1.

Fig. 3 is an elevational view of the opposite side of the device, this side being sometimes hereinafter referred to for convenience as the bottom of the device.

Fig. 4 is a longitudinal sectional view of the device corresponding to the section shown in Fig. 2; the device in this figure, however, being shown in its fully closed position.

Fig. 5 is a cross-sectional view of the closed device substantially on the line 5—5 of Fig. 4.

Fig. 6 is a perspective view of a formed band which constitutes the principal member of the device; one end of the band being bent at a sharp angle preliminary to being folded into close association with an adjacent part of the band to form a locking head and the other end of the band being bent in a curve so that its locking association with the locking head may be better understood.

Fig. 7 is a perspective view of a clamping channel member which is employed to hold the locking head closed in a fully-folded position.

A finished sealing device, according to the illustrative embodiment shown in the drawings, appears in its open form as shown in Figs. 1, 2 and 3 as a band **10** formed of thin sheet metal which preferably is quite pliant so that it may be bent to some extent without breaking or becoming weakened but which nevertheless possesses a limited degree of resiliency. At one end, the band **10** is bent sharply at transverse line **12** (Fig. 4) to define an end or top locking portion **14** and an adjacent bottom locking portion **16**. In manufacturing the device, the two locking portions **14** and **16** are brought together from their Fig. 6 relationship to their relationship as shown in Figs. 1–5 inclusive. The other end of the band **10** is formed with a tongue **18** of reduced width.

The locking portions **14** and **16** are held intimately together by a channel clamping member **20**, the main portion of which underlies the bottom locking portion **16** and opposite side walls of which are folded in over side edges of top locking portion **14** as best shown at **22** at Fig. 5, and these folded-in walls **22** are preferably crimped as at **24** which crimping of course extends through the adjacent side edge margins of locking portions **14** and **16**. This crimping, however, is omitted toward the free end of the locking head, thereby maintaining the strength of said walls against deformation which could facilitate insertion of a prying blade at said end by unauthorized persons as hereinafter explained.

While the band **10** is flat, or i. e. before the locking portions **14** and **16** have been folded together as just described, the two said locking portions and the tongue **18** are formed by suitable pressing and cutting dies to provide interlocking portions of the locking head and of said tongue. Thus, the tongue **18** is formed with a struckup inwardly-facing prong **26** toward the tongue's end and inwardly of said prong the tongue is formed with a longitudinally extending downwardly depressed groove **28** terminating at its outer end in an upwardly extending bump **30** and terminating at its inner end in a downwardly extending bump **32**.

To adapt the locking head to receive the tongue **18** therewithin, a portion **34** of top locking portion **14** is cut away and a central part of the top locking portion **14** is pressed outwardly so that, in the finished seal, there is an elongate central cavity **36** in the locking head **17**. The part of the top locking portion which partially defines said cavity is formed with an inner longitudinal groove **38** which extends completely to the inner end of said cavity and which is adapted to accommodate therewithin a rib **28A** of the tongue **18** which is derived from the formation of the groove **28**. The rib **28A** is a close fit within the groove **38** and the bump **32**, when the tongue is inserted in the locking head, abuts the metal edge at the inner end of said groove to limit the insertion of the tongue **18** into the locking head **17**. Optionally, a short transverse groove **40** may extend across and intersect the groove **38** to give additional rigidity to the metal in that area. As may best be seen in Fig. 4, bump **30** protrudes considerably into the cavity **36** for anti-tampering purposes hereinafter more fully explained.

The bottom locking portion **16** of the hand **10** is formed with a strengthening groove **42** and the channel clamping member **20** is complementally grooved as at **44** to form a seat for the external rib which is derived from the formation of groove **42** and also to afford additional strength to said clamping member.

The bottom locking portion **16** is also formed with an upwardly or inwardly extending prong **46** surrounded on three sides by a cut-away portion **48**. The channel-clamping member **20** is formed with a pair of transversely extending inner ribs **50** and **52**, the latter rib preferably extending inwardly to a slightly greater extent than the former rib. As best understood from Fig. 2, the rib **50** underlies and supports the prong **46** at its heel and the

rib 52 extends into cut-away portion 48 somewhat beyond the free end of the prong 46 thus leaving a recess 54 underneath the free end of the prong 46. The channel-clamping member 20 also is struck upwardly towards its outer end to form an upwardly extending transverse rib 56 abutting the outside of the transverse bend line 12 at the juncture of the top locking portion 14 and the bottom locking portion 16. The rib 56 is provided for additional anti-tampering purposes which will be hereinafter more fully described. In partial furtherance of this objective, the rib 56 terminates inwardly of the inturned walls 22 of the clamping member. A transverse end strip 58 of the top locking portion 14 which partially bounds the cut-away portion 34 is formed with a depression 60 which, when the device is assembled, seats into the inner end of the groove 42. Thus, the cut-away portion 34 constitutes an opening of sufficient width to accommodate therewithin the tongue 18 to close or lock the seal.

It may be seen from Fig. 4 that when the seal is fully closed or locked the prong 26 extends partly underneath prong 46 or at least is in end-to-end abutting relationship to the latter prong so that once the device has been closed or sealed it cannot normally be separated. It may also be observed from Fig. 4 that prong 46 as compared to its condition in Fig. 2 has been bent downwardly slightly, this having occurred when the prong 26 passed over it in locking or closing the device.

Although the foregoing description may have afforded sufficient understanding of the device, nevertheless, it is thought best to reiterate to some extent its operation in order to give a better understanding of the reasons why this device is substantially tamper-proof.

The completed device, before usage, is substantially as it appears in Fig. 2. To utilize the seal, it is bent as indicated in broken lines in Fig. 4 and in full lines in Fig. 6 so that the loop thus formed will encircle or pass through a hasp or other structure or structures to be sealed against unauthorized opening. After the loop has been formed, the tongue 18 is inserted over the strip portion 58 and into the cavity 36. In thus inserting the tongue, it is pushed toward the end of the locking head 17 in which movement the prong 26 rides over the prong 46. This inter-engagement of the two prongs causes them both to flex only slightly and, as this slight flexing is distributed throughout the entire lengths of said prongs, it does not give them a permanent set or bend. The dimensions of the related parts are such that this inserting movement may continue sufficiently to enable the end of the one prong to pass over the end of the other prong whereafter the slight resiliency present in the metal of which the band is formed causes the prong 26 to drop downwardly into abutment with the end of the prong 46 or in some instances the prong 26 may drop sufficiently so that it will actually underlie the prong 46. In this condition, it may readily be understood that the tongue 18 may not thereafter be withdrawn in any normal operation of the device.

This brings us to the features of the device which render it substantially tamper-proof. Tampering of the device usually is attempted if at all only by persons who know something of the mechanism thereof, and the attempt to open the device without showing evidence of tampering would take two forms. First, one might attempt to insert a rather thin blade leftwardly, as viewed in the drawings, between the two adjacent ends of the band 10 and into the cavity 36 in order to push or pry the prong 46 downwardly so that the prong 26 would no longer abut therewith thus enabling the tongue 18 to be withdrawn from the locking head without any material mutilation of the latter. Such a tampering operation would be considered successful by the unauthorized person only if it accomplished two things; one, the opening of the device without showing evidence of the tampering, and, two, leaving the device in such condition that it could be reclosed and locked. One feature of the present invention is that if the

unauthorized person thus succeeds in pushing the prong 46 downwardly to release the tongue 18 he would thereby render the prong 46 useless as a means for thereafter functioning as a part of the locking mechanism of the device. That this is so may be understood by noting that if such a prying blade is introduced leftwardly as viewed in Fig. 4 the blade would push the prong 46 downwardly into the recess 54 and as the sheet metal of which the band is formed is only slightly resilient such bending of the prong 46 localized at a very short bending radius immediately above rib 50 would have the effect of causing the prong 46 to thereafter become set as thus bent, and remain down within the recess 54 with the rib 52 functioning as a protective barrier at the end of the prong 46. In that condition, it should be obvious that if the one tampering with the device thereafter inserts the tongue 18 it will nevertheless be impossible for the prong 26 to engage the prong 46 in any manner which would permit the two to lock the device in a reclosed position.

Another way in which an unauthorized person might attempt to pry the seal open would be to insert a prying blade into the locking head from the free end of the device, i. e., rightwardly from the left end, as viewed in Fig. 4, to push prong 26 upwardly clear of prong 46. However, in order to do this the person would have to first pry or otherwise bend the rib 56 downwardly thereby considerably mutilating the device. Then the blade would be pushed rightwardly between the channel-clamping member 20 and the outer surface of the bottom locking portion 16. The rib 52, however, again comes into play inasmuch as it is in position to form an abutment against the complete insertion of such a prying instrument thereby substantially opposing any effort to open the device improperly in the manner just described.

It should be understood that the width of the cavity 36 and the clearances between the parts as shown in the several figures are not exactly as they occur in an actual device. In an actual device the cavity 36 is considerably narrower and the clearances between the various parts when the tongue 18 is inserted into locking position are less than those shown in the drawings. These conditions were tolerated in the drawings in order to avoid confusion of the various parts so that one referring to the drawings might better understand the manner in which the parts coact with each other. It should be clear from the foregoing that although the shackle seal disclosed in my mentioned Patent No. 2,481,815 is quite effective against tampering, nevertheless, the several additional features embodied in the disclosed structure according to the present invention render tampering much less likely and also give further assurance that if tampering is attempted the seal will almost certainly be so mutilated that it could not be reused without authorized persons discovering the tampering that had occurred.

It should also be understood that the present inventive concept may be utilized in other structures varying to some extent from the structure disclosed and described herein without however departing from the spirit of the invention as set forth in the following claims.

I claim as my invention:

1. A shackle seal comprising an elongate band of bendable material having a tongue at one end and a locking head at the other end formed by the folding of a portion at the latter end on a transverse folding line over and upon an adjoining opposed portion of the band, and a channel-clamping member partially encircling said locking head and clamping the thus-folded portions together; the locking head being substantially hollow and open at its inner end to receive said tongue therewithin, said tongue and said locking head having inwardly extending prongs adapted to oppose and lap each other in the locking head in order to lock the seal, and the channel-clamping member having an inwardly extending portion underlying and supporting the heel of the prong of the locking head, leav-

ing the free end of the latter prong unsupported and thereby capable of being permanently bent substantially downwardly out of possible locking association with the prong on said tongue when the prong of the locking head is pushed down by a prying instrument in an attempt to open the device; said seal being further characterized in that said clamping member has an additional inwardly extending portion spaced from the first-mentioned inwardly extending portion to form therebetween a recess to receive the bent-down prong of the locking head, which bent-down prong remains in said recess to render the latter prong inaccessible to the prong of the tongue for relocking the seal.

2. A shackle seal according to claim 1, further characterized in that the two said inwardly extending portions forming said recess are transverse ribs, the said additional rib extending inwardly to a greater extent that the other of the said two ribs.

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