

SECURITY SEALING DEVICE

This invention relates to a security sealing device and, in particular, to a security sealing device for packages containing valuable goods.

When sending a package containing valuable goods from one place to another, it is important to ensure that the package reaches its destination in the same condition that it was despatched, that is, untampered with by unauthorised persons. Moreover, it is also important that it should be possible easily to identify any attempts to interfere with the package during transit.

It is thus an object of the present invention to provide a security sealing device which is tamperproof and displays evidence of any tampering attempts.

According to the invention there is provided a sealing device comprising an elongate flexible strip having a key at one end and a socket at its other end, said socket being closed at one end and having at least two internal resilient catches which are capable of receiving the key in a locking relationship.

It is preferred that the key comprises at least one generally conical portion positioned such that the vertex of the conical portion constitutes the tip of the key, the situation where the key comprises three generally conical portions joined vertex to base with all vertices pointing towards the top of the key being particularly preferred.

It is also preferred that each internal resilient catch comprises a generally conical shell having an aperture at its vertex from which a plurality of radial slits extend, the catches being positioned so that their vertices point into the socket. The situation in which the internal resilient catches are coaxially aligned is particularly preferred.

Preferably, the elongate flexible strip includes a weakened area at which point the strip will break when tension is applied to it. It is also preferred that this weakened area is located adjacent the key.

5 It is further preferred that the sealing device is made of a flexible plastics material, such as polypropylene, which changes colour at a point to which stress is applied.

10 A preferred embodiment of the invention will now be described with reference to the accompanying drawings in which:-

Figure 1 is a perspective view of a sealing device according to the invention;

15 Figure 2 is a part sectional view of the sealing device of Figure 1 prior to use;

20 Figure 3 is a part sectional view of the sealing device of Figure 1 after the first stage of the sealing operation has been completed; and

Figure 4 is a part sectional view of the sealing device of Figure 1 in fully sealed condition.

25 Referring to the drawings, Figure 1 shows a sealing device 1 consisting of a flexible strip 2 which has a key 3 located at one of its ends and a socket 4 located at its other end.

30 Key 3 comprises three frustoconical portions 3a, 3b, 3c which are co-axially aligned and joined end to end in such a way that the base of portion 3a is attached to the vertex of portion 3b and the base of portion 3b is attached to the vertex of portion 3c thus giving key 3 a generally
35 pointed and "toothed" appearance. Key 3 is in turn attached to one end of flexible strip 2 by means of the base of portion 3c which is secured to a boss 5 of oval cross-section which lies at one end of the strip 2,

the arrangement being such that the longitudinal axis of key 3 is co-axial with the longitudinal axis of flexible strip 2.

5 Socket 4 is generally tubular with a diameter approximately equal to the width of flexible strip 2. One end of socket 4 is closed and secured to the end of flexible strip 2 opposite the end bearing key 3 in such a way that the longitudinal axis of socket 4 lies perpendicular to the longitudinal axis of flexible strip 2 (see Figure 1).
10 The other end of socket 4 is closed save for a single oval aperture 6 corresponding in size and shape to the cross-section of boss 5.

As shown in Figure 2, there are two catches 7,8 housed within socket 4. These consist of generally conical shells which are attached at their bases to socket wall 9 in such a way that their vertices point into the socket towards flexible strip 2. Each catch 7,8 is truncated so that it has an aperture, 7a,8a respectively, at its
15 vertex from which three slits, 7b,8b respectively, extend radially thus dividing each catch 7,8 into three sections, 7c,8c, respectively, at its vertex. An annular lug 10 is also provided on the base of socket 4.

25 As can be seen in Figure 1, a small rectangular aperture 11 is located in flexible strip 2 close to boss 5 but on the opposite side of boss 5 to key 3. This aperture 11 serves to weaken flexible strip 2 at this point.

30 When using a sealing device 1 to seal a package, the sealing operation must be executed in two stages. First, the flexible strip 2 is bent so that the key 3 and boss 5 are aligned with aperture 6 in socket 4, and key 3 is then pushed through aperture 6 into socket 4 by applying
35 pressure to boss 5 until portion 3a of key 3 has been forced through aperture 7a of catch 7, which situation is indicated by a single audible click. The base of portion 3a then rests against the vertex of catch 7, as shown in Figure 3,

thereby preventing withdrawal of key 3 from socket 4. To complete the sealing operation, pressure is again applied to boss 5 thus pushing key 3 further into socket 4 until portion 3a of key 3 has been forced through aperture 8a of catch 8 and portion 3b of key 3 has been forced through aperture 7a of catch 7, which situation is again indicated by a single audible click. The base of portion 3a then rests against the vertex of catch 8 and the base of portion 3b rests against the vertex of catch 7, as shown in Figure 4, thus providing a double lock against removal of the key 3 from socket 4. Portion 3c of key 3 and boss 5 at this stage are both situated within socket 4 between catch 7 and aperture 6 so that the side of boss 5 closest to aperture 11 lies flush with the top portion of the socket leaving only the flexible strip 2 outside socket 4.

The locking mechanism utilised in sealing device 1 operates in the following manner. As can be seen in Figures 2 to 4, the internal shapes of catches 7 and 8 correspond approximately to the external shapes of portions 3a, 3b, 3c, of key 3. Thus it should not be possible to push key 3 into socket 4 any further than the point where the external surface of portion 3a lies against the internal surface of catch 7 and certainly not through aperture 7a in catch 7. However, as previously mentioned, catches 7 and 8 both have apertures, 7a and 8a respectively, at their vertices from which three slits, 7b and 8b respectively, extend radially, thus forming the catches into three sections, 7c and 8c respectively, close to their vertices. Consequently, as portion 3a of key 3 is pushed against the internal surface of catch 7, the three sections 7c are forced outwards towards the wall 9 of the socket and the size of aperture 7a gradually increases as the portion 3a is pushed further into the socket until it is large enough to allow the base of portion 3a to pass through it, such motion of sections 7c being possible due to the provision of slits 7b. However, when sections 7c are being pushed

outwards, they are in a condition of stress. Thus, as soon as the base of portion 3a has passed through aperture 7a and the outward-pushing force is therefore removed, sections 7c spring inwards back to their unstressed position as shown in Figure 2. Aperture 7a is now smaller than the base of portion 3a and portion 3a is therefore locked against withdrawal from socket 4 by pulling it through catch 7 in the reverse direction. Similarly, when further pressure is applied to key 3, portions 3a and 3b simultaneously pass through catches 8 and 7 respectively, catches 8 and 7 returning to their unstressed conditions once the bases of portions 3a and 3b have passed through apertures 8a and 7a respectively, thereby locking portions 3a and 3b against withdrawal, as described above. In practice, both stages of the sealing operation are accomplished by a "snapping" action hence the occurrence of an audible click each time a portion of key 3 passes through a catch.

To remove the sealing device 1 from a package, the device 1 must first be gripped by the user so that one hand lies each side of aperture 11. The user must then give a sharp tug to the device in a direction such that his hands move apart from each other thus breaking the flexible strip 2 at the weakened area produced by aperture 11. The sealing device 1 can then be removed giving free access to the package for the user.

Of course, if a similar tugging action is applied to the sealing device 1 during transit of the package, the sealing device 1 will break in the manner described above thus indicating to the recipient that the package has been tampered with during transit. Furthermore, the nature of the coloured plastics material from which sealing device 1 is made is such that if the sealing device is subjected to stress, for instance, by bending, during transit in an attempt to remove the device, the plastics material will turn almost white at the point to which stress has been

applied thus indicating that the package has been disturbed by an unauthorised person.

5 Sealing devices according to the present invention can be easily manufactured using conventional plastics moulding techniques. For instance, in the case of the sealing device 1 described above, the key 3, flexible strip 2 and socket 4, including catch 7 only, can be moulded in one piece. The base of the socket 4 is left open during 10 the moulding process with a round plug on which annular lug 10 is located being attached by a thin flexible web to the bottom edge of socket 4 at a position opposite to flexible strip 2. Catch 8 is moulded separately and inserted into socket 4 through the open base. The base is 15 then closed by folding the round plug bearing annular lug 10 so that it can be inserted into the open base, the base of the socket 4 left open being sealed by ultrasonic welding.

20 It will of course be understood that the present invention has been described above purely by way of example, and modifications of detail can be made within the scope and spirit of the invention.



CLAIMS

1. A sealing device comprising an elongate flexible strip having a key at one end and a socket at its other end, said socket being closed at one end and having at least two internal resilient catches which are capable of receiving the key in a locking relationship.
2. A sealing device according to claim 1 in which the key comprises at least one generally conical portion positioned such that the vertex of the conical portion constitutes the tip of the key.
3. A sealing device according to claim 1 or claim 2 in which the key comprises three generally conical portions joined vertex to base with all vertices pointing towards the tip of the key.
4. A sealing device according to claim 3 in which a boss lies adjacent the conical portions and forms a part of the key.
5. A sealing device according to claim 4 in which the boss, when the key is in locking relationship with the socket, lies flush with the surface of the socket.
6. A sealing device according to any preceding claim in which each internal resilient catch comprises a generally conical shell having an aperture at its vertex from which a plurality of radial slits extend, the catches being positioned so that their vertices point into the socket.
7. A sealing device according to any preceding claim in which the two internal resilient catches are co-axially aligned.



8. A sealing device according to any preceding claim in which the elongate flexible strip includes a weakened area at which point the strip will break when tension is applied to it.

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9. A sealing device according to claim 8 in which the weakened area lies adjacent the key.

10. A sealing device according to any preceding claim which is made of a flexible plastics material which changes colour at a point to which stress is applied.

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11. A sealing device according to claim 10 in which the plastics material is polypropylene.

12. A sealing device substantially as hereinbefore described with reference to the accompanying drawings.

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