

PATENT SPECIFICATION

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(54) ENGAGEMENT LOCK

(71) I, PREBEN MICHAEL REMARK, of Danish nationality, of Tjørnevej 10, DK — 2800 Lyngby, Denmark, do hereby declare the invention for which I pray that a patent may be granted to me and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to engagement locks. A known type of engagement lock comprises two members adapted for automatic interlocking engagement on the introduction of one member into the cavity of the other member, the said first member being a rod-shaped body with a tapered insertion end and with an abruptly restricted cross-section area slightly inward of the tapered section so as to form a shoulder, and the said second member being a block with a bore in which is provided a tubular sleeve of limited or no mobility in the axial direction. The said sleeve is slit at the end located innermost in the block and its sectional opening at that end is adapted to permit the shoulder of the rod-shaped body to be passed through the tubular sleeve only as a result of the elasticity provided by the slits in that end of the sleeve.

Engagement locks of this type are known from the specifications of US Patents Nos. 3,730,578 and 1,553,188. In the engagement lock disclosed by U.S. Patent No. 3,730,578 the second member is a block with through-going openings the diameter of which is smaller at the end where the rod-shaped body is introduced than at the opposite end, which is closed by an inserted sleeve provided with a bore facing the interior of the block and of the same diameter as the smallest diameter of the throughgoing opening. The sleeve extends so far into the block as to form within the block an annular groove for a lock ring which will be expanded on the introduction of the rod-shaped body into the block until the rod-shaped body has got so far that the shoulder thereof has passed the lock ring, which then

prevents the rod-shaped body being withdrawn.

Such a single engagement lock is used partly as a padlock but specifically as a seal, for instance on containers for the transport of goods. The opening of the lock requires the use of violence and the fact that the lock looks intact would indicate that no unauthorized person has had access to the interior of the container.

However, it was found that a lock of the said known type could be opened and relocked without leaving any direct signs of the use of violence, and thus the security that the contents on receipt were the same as despatched would be lost. Besides, the interlocking of the two members was not very secure because the known lock could be opened by a blow or by means of a crowbar.

In the engagement lock disclosed by US Patent No. 1,553,188 the aforesaid lock ring has been replaced by a tubular sleeve open at both ends. Theoretically this resulted in an improved interlocking connection between the two members of the lock, but this lock too can be broken by a relatively simple operation, in that the block consists of porcelain or plastics material, though it could probably not be relocked without leaving signs of the opening.

According to the invention there is provided an engagement lock for a container and comprising first and second members adapted for automatic interlocking engagement after the first member has been introduced into a cavity provided in the second member, said first member comprising a rod-shaped body having a head at one end and a tapered insertion end at the other end, said tapered end having an abruptly reduced cross-section area disposed rearwards of the tapered section so as to form a shoulder, said second member including a casing with a bore closed by a wall of the casing, a tubular sleeve open at both ends disposed in said bore with sub-

stantially no mobility in the axial direction, said sleeve being slit at the end located innermost within said casing and having a sectional opening at that end permitting the shoulder of the rod-shaped body to pass through the tubular sleeve only as a result of the elasticity of the slit end of the sleeve, wherein the rod-shaped body has a second tapered section extending from said shoulder, and wherein, in the locked position, when the shoulder has been carried only just through the sleeve, there is a spacing between the insertion end of the rod-shaped body and the wall of the casing, which spacing is reduced on retractable advancement of the rod-shaped body into the casing so that the rod-shaped body after locking and against resistance from and expansion of the slit sleeve can be further advanced into the casing by sliding contact of the further tapered section in said sleeve until the rod-shaped body engages the wall of the casing.

The engagement lock may be provided in combination with a container having locking rings wherein when the first member has been passed through the locking rings and when the shoulder has passed through the sleeve to cause interlocking engagement of said first and second members, the head is spaced from the second member by a first distance, said first distance enabling a clearance to be provided between the casing or head and a respective one of the locking rings sufficient to permit the insertion of a cutting tool, at least an equal clearance being provided between the insertion end of the rod and said wall of the casing. Here the rod-shaped body can be carried so far past the locking position that the part of the rod-shaped body extending outside the second member of the lock will be concealed by the locking rings of the container. Thus unauthorized persons without knowledge of the construction will be unable to break the seal. The opening has to be effected by means of a strong pair of shears or scissors inserted between the head of the rod-shaped body of the casing and the adjacent locking rings. In the first stage of the cutting operation the rod-shaped body is withdrawn until its shoulder strikes the inner end of the sleeve and in the last stage the rod-shaped body is severed.

Suitably, the head of the rod-shaped body and/or the block have substantially frusto-conical faces at the ends facing each other. This facilitates the drawing apart of the two members by means of the shears sufficiently to make the part of the rod-shaped body which is concealed by the container locking rings accessible for cutting simply by inserting the shears between the head of the rod or the block and the adjacent locking ring.

Embodiments of the invention will now be described with reference to the drawing, in which:

Fig. 1 shows an engagement lock immediately before the interlocking of the two members is completed,

Fig. 2 shows the same as Fig. 1 but after completion of the interlocking operation, and

Fig. 3 shows the sleeve of Figs. 1 and 2 on a larger scale.

The drawing shows a rod-shaped body 1, preferably of circular cross-section. The body 1 is provided at one end with a head 2 of substantially greater diameter than the rod-shaped body 1, so that the latter, but not the head, can be carried through a pair of locking rings 20, 21 on a container. At the opposite end the rod 1 has a tapered insert section 3 and slightly spaced forwardly of the taper an abruptly reduced cross-section area so as to produce a shoulder 4. From the shoulder 4 the cross-section is again increased in the direction of the head so that a second tapered section 5 is provided.

The rod-shaped body 1 forms one member of an engagement lock, the other member of which is a block 10 with a bore 11 into which a sleeve 12 has been introduced and secured, preferably by welding. The sleeve 12, which is shown on a larger scale in Fig. 3, is slit at the end located innermost in the block 10. The illustrated embodiment is provided with four slits 13 distributed evenly in the periphery. The sleeve 12 has a bore in which the rod-shaped body 1 fits and at the slit end it is provided with a collar 14 facing inwardly towards the said bore. The opposite end 15 of the sleeve 12 has a head which is pressed into the block 10 and welded in that position. Between the bore 11 of the block and the slit end of the casing is sufficient clearance to enable the sleeve to expand during the interlocking of the two members.

When the shoulder 4 of the rod-shaped body 1 has been pressed into the tubular sleeve 12 and has passed the innermost end thereof, the sleeve will resume its non-deformed state, and if it is attempted to withdraw or beat back the rod-shaped body 1 the shoulder 4 will abut on the end of the tubular sleeve 12 and thus be retained effectively. If a greater force is applied the tubular sleeve 12 may be deformed so that the webs formed by the slits 13 abut on the walls of the bore 11 in the block 10. This produces additional resistance to the withdrawal and separation of the members. The single engagement lock is opened by cutting the rod-shaped body 1, a small portion of which will be left in the cavity of the other member, and this portion prevents interlocking with a new rod-shaped body. The number of the container or of an invoice

may be stamped on one or on both members to provide proof that the original engagement lock has not been broken and replaced by a new lock of the same type.

After the actual interlocking of the two members has been effected the rod-shaped body may be inserted still further into the sleeve, whereby the tapered section 5 will again expand the sleeve, and the rod-shaped body 1, which has been passed through the locking rings 20, 21 of the container, will be almost concealed by the rings so that it will be difficult for persons without knowledge of the construction to break open the lock.

The unlocking is effected by means of a strong pair of shears inserted between the head 2 or the block 10 and one of the locking rings. In the first stage of the cutting operation the rod-shaped body is withdrawn until its shoulder 4 hits the inner end of the sleeve and in the final stage of the cutting operation the rod-shaped body 1 is severed.

WHAT I CLAIM IS:—

1. An engagement lock for a container and comprising first and second members adapted for automatic interlocking engagement after the first member has been introduced into a cavity provided in the second member, said first member comprising a rod-shaped body having a head at one end and a tapered insertion end at the other end, said tapered end having an abruptly reduced cross-section area disposed rearwards of the tapered section so as to form a shoulder, said second member including a casing with a bore closed by a wall of the casing, a tubular sleeve open at both ends disposed in said bore with substantially no mobility in the axial direction, said sleeve being slit at the end located innermost within said casing and having a sectional opening at that end permitting the shoulder of the rod-shaped body to pass through the tubular sleeve only as a result of the elasticity of the slit end of the sleeve,

wherein the rod-shaped body has a second tapered section extending from said shoulder, and wherein, in the locked position, when the shoulder has been carried only just through the sleeve, there is a spacing between the insertion end of the rod-shaped body and the wall of the casing, which spacing is reduced on retractable advancement of the rod-shaped body into the casing so that the rod-shaped body after the locking and against resistance from and expansion of the slit sleeve can be further advanced into the casing by sliding contact of the further tapered section in said sleeve until the rod-shaped body engages the wall of the casing.

2. An engagement lock as claimed in Claim 1, wherein the head of the rod-shaped body and/or the casing at the ends facing each other in the locked position have substantially frusto-conical faces.

3. An engagement lock substantially as herein described with reference to and as shown in the accompanying drawings.

4. An engagement lock as claimed in any preceding Claim, in combination with a container having locking rings wherein when the first member has been passed through the locking rings and when the shoulder has passed through the sleeve to cause interlocking engagement of said first and second members, the head is spaced from the second member by a first distance, said first distance enabling a clearance to be provided between the casing or head and a respective one of the locking rings sufficient to permit the insertion of a cutting tool, at least an equal clearance being provided between the insertion end of the rod and said wall of the casing.

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