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(54) Friction lock.

(57) A friction lock comprises a needle having a shank (2) and a head (1), and a lock body (4) capable of receiving the shank of the needle. The lock body includes a tapered chamber (6) containing a plurality of clamping elements (5) which, in operation, in a locking position, grip the needle shank and with a special unlocking tool can be moved to a position in which they release the needle. According to the invention, the friction lock is characterized by resiliently compressible means for permitting the needle, in the position in which it is locked, to be pushed slightly further into the lock body with resilient deformation of the resiliently compressible means.

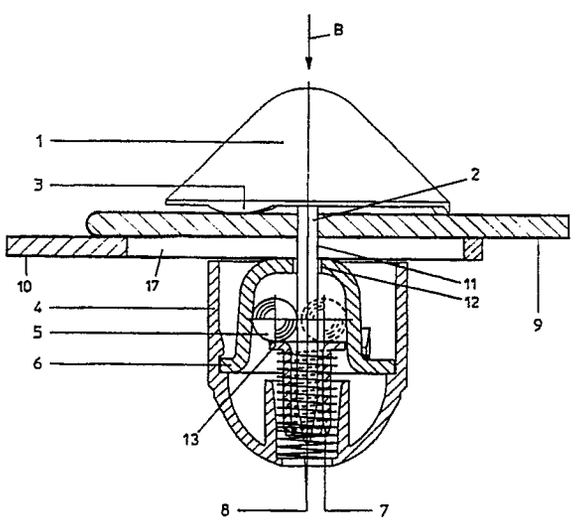

FIG.1

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Friction lock

This invention relates to a friction lock comprising a needle having a shank and a head, and a lock body capable of receiving the shank of the needle, said lock body including a tapered chamber containing a plurality of clamping elements which, in operation, in a locking position, grip the needle shank and with a special unlocking tool can be moved to a position in which they release the needle.

Such friction locks are often used for securing antishop-lifting tags to articles of merchandise, in particular clothing. A friction lock may be a separate element which is used to secure a loose detection plate or a label to a piece of clothing, but may also be an integral part of such a tag. This latter is mostly the case if the tags take the form of electronic detection plates, often referred to as wafers, which by means of an electromagnetic interrogation field can be detected in a detection zone.

A certain part of the clothing is clamped between the lock body and a relatively broad needle head. The needle is inserted through the fabric of the piece of clothing into the lock body. The wafer is safeguarded from fraudulent removal by the lock. Owing to the frictional and clamping forces between the needle shank and the clamping elements, the needle cannot be drawn out of the lock body. When the price is being paid, the wafer is removed from the piece of clothing or other article by a shop assistant. The removal of the wafer is effected at the cash desk by means of a special tool, such as an (electro) magnet which pulls the clamping elements free from the needle. If a client omits to have the wafer removed and enters the detection zone provided at the shop entrances and exits, an alarm signal is generated by a transmitter/receiver upon detection.

Friction locks of the above kind are known in various embodiments. US patent 4,286,256, US patent 3,855,280 and US patent 4,523,356 disclose friction locks having ball-shaped clamping elements disposed in a conical space. Furthermore, British patent 1,570,508 discloses a friction lock with a cylindrical clamping element.

One disadvantage of the known friction locks is that these are sometimes difficult to unlock. The clamping means may be wedged between the shank of the needle and the wall of the tapered chamber with such a large force that attempts at pulling them into a wider portion of the tapered chamber by means of the special unlocking tool, which is mostly an electromagnet, fail.

This problem can be overcome by driving the needle just slightly further into the lock body beyond its original locked position during the unlocking operation. The needle shank then pushes the clamping elements already in the direction of the wider portion of the tapered chamber, so that the clamping force is diminished. This, however, is only possible if the material of the article being safeguarded and clamped between the needle head and the lock body can be compressed further to a sufficient extent. If, however, a thin summer dress, for example, is safeguarded by the wafer, the release of the needle is apt to present problems. The fabric has too little resiliency to permit the needle to be driven further into the wafer lock. Not any material of the goods being safeguarded has sufficient resiliency for the needle to be released in a reliable manner. Another disadvantage is that the part of the needle head which contacts the material may cause damage to clothing when it is attempted to move the needle further into the wafer lock.

It is an object of the invention to overcome the disadvantages outlined above.

To this effect, according to the invention, a friction lock of the kind described is characterized by resiliently compressible means for permitting the needle, in the position in which it is locked, to be pushed slightly further into said lock body with resilient deformation of said resiliently compressible means.

Some embodiments of the invention will now be described in more detail, by way of example, with reference to the accompanying drawings. In said drawings,

Fig. 1 is a diagrammatic part-sectional elevation of one embodiment of a friction lock according to this invention;

Fig. 2 shows, in side-elevational view, an example of a needle for a friction lock according to the invention;

Fig. 3 shows the needle of Fig. 2 in bottom view;

Fig. 4 shows a cross-sectional view of a different example of a needle for a friction lock according to the invention;

Fig. 5 shows the needle of Fig. 4 in bottom view; and

Fig. 6 shows still another example of a needle for a friction lock according to this invention.

Fig. 1 shows an example of a friction lock according to the present invention, suitable for use as a lock for a wafer. The lock has a needle with a head 1 and a shank 2. Shank 2 extends, in the operative condition, through the material of an article 9, such as a piece of clothing, to be safeguarded, and into the body 4 of the wafer lock. The

wafer, which may contain á conventional electrical circuit, is shown diagrammatically at 10, and in this example can be regarded as forming part of the lock body. Provided within body 4, in this example, are a plurality of balls 5, disposed in a conical member 6. The balls are pushed into the conical member by a pad 7 and a helical spring 8, and this into the direction of the tapered end thereof. Shank 2 of the needle can be driven through a bore 11 in the wafer and a corresponding bore 12 in the tapered end of the conical member between the balls. The shank of the needle is then clamped in known manner and cannot be removed unless, and until, the balls are moved to the wider end of the conical body. For this purpose use can be made, as is also well-known, of an electromagnet which can pull the balls against the action of spring 8 to the wider part of the conical member.

The conical member is preferably formed so that the balls make linear contact with the inner wall of the conical member. Such a construction is described in applicants' US patent 4,280,256.

The contact between the clamping elements, formed as balls, and the conical member, and the shank of the needle is maintained as pad 7 drives the balls through a collar 13 into the direction of the tapered end of the conical member.

In order to provide for a reliable release of the needle, independently of the nature of the material of the article 9 being safeguarded, in the example shown, the head 1 of the needle is provided along its circumference with a plurality of supports 3, three in this example, through which the head bears on the material of article 9. Head 1 of the needle is in this example dome-shaped, but may have any other form, for example, disk-shaped.

The effect of supports 3 is that when a pushing force P is exerted on the head of the needle into the direction of shank 2, the needle head can be resiliently deformed, and the shank pushed slightly further into the lock. During this movement, the balls roll somewhat into the direction of the wider portion of the conical member, so that the clamping forces acting between the balls and the conical member and the shank of the needle are reduced.

Accordingly, if the balls are at the same time pulled into the direction of the wider part of the conical member by a special unlocking tool, such as an (electro) magnet, less force is required to overcome the clamping forces.

If a wafer has to be removed from a given thin material having insufficient resiliency, it will be possible, by pressing on the rounded supports 3, via needle head 1, to cause needle head 1 to be deformed, so as to provide the necessary resiliency to enable the needle to move further into the wafer lock.

Fig. 2, in side elevational view, and Fig. 3 in bottom view, once more illustrate the needle 2 of Fig. 1 with a needle head 1 according to the invention, provided in this case with three segments in the form of supports 3. The dome-shaped needle head is in this example further provided with interior strengthening ribs 14.

Figs. 4 and 5 show a needle with a needle head 15 which has a stepped configuration. The stepped configuration of the needle head provides a certain degree of resiliency. In this embodiment, too, the needle head can be resiliently compressed in such a manner that the needle can be moved sufficiently far into the wafer lock. The stepped needle head is preferably covered with a smooth cap 16.

Fig. 6 shows an example of a needle with a disk-shaped needle head, which is provided at the bottom with a plurality of supports 18 arranged along the circumferential edge thereof. Supports 18 make it possible for the central part of the needle head with the shank to be depressed somewhat, whereby the shank is driven more deeply into the lock body.

It is observed that, after reading the above, various modification will readily occur to those skilled in the art. Thus the needle head is mostly made of synthetic plastics and the shank of steel, but alternatively the needle head may be made of metal.Also, the invention may be applied to friction locks with differently shaped clamping elements. Furthermore, it is possible for the lock body or the wafer to be made resiliently deformable in the area 17 (Fig.1) in juxtaposition to the needle head, whether or not in combination with a resiliently deformable needle head. These and similar modifications are considered to fall within the scope of the present invention.

Claims

1.A friction lock comprising a needle having a shank and a head, and a lock body capable of receiving the shank of the needle, said lock body including a tapered chamber containing a plurality of clamping elements which, in operation, in a locking position, grip the needle shank and with a special unlocking tool can be moved to a position in which they release the needle, characterized by resiliently compressible means for permitting the needle, in the position in which it is locked, to be pushed slightly further into said lock body with resilient deformation of said resiliently compressible means.

2. A friction lock as claimed in claim 1, characterized in that the resiliently compressible means include a needle head having relatively large dimensions in the transverse direction relative to the

shank of the needle, and a plurality of supports provided along the edge of the needle head, which supports, in the operative position, extend towards the lock body.

3. A friction lock as claimed in claim 2, characterized in that the needle head is dome-shaped and the supports are rounded projections provided along the edge of the dome.

4. A friction lock as claimed in claim 2, characterized in that the needle head is disk-shaped.

5. A friction lock as claimed in claim 1, characterized in that the needle head has a stepped dome shape permitting resilient depression of the top of the dome shape.

6. A friction lock as claimed in claim 5, characterized in that the needle head is covered with a smooth cap.

7. A friction lock as claimed in claim 1, characterized in that the resiliently compressible means is a resiliently depressible part of the lock body, which in the operative condition is in juxtaposition to said needle head.

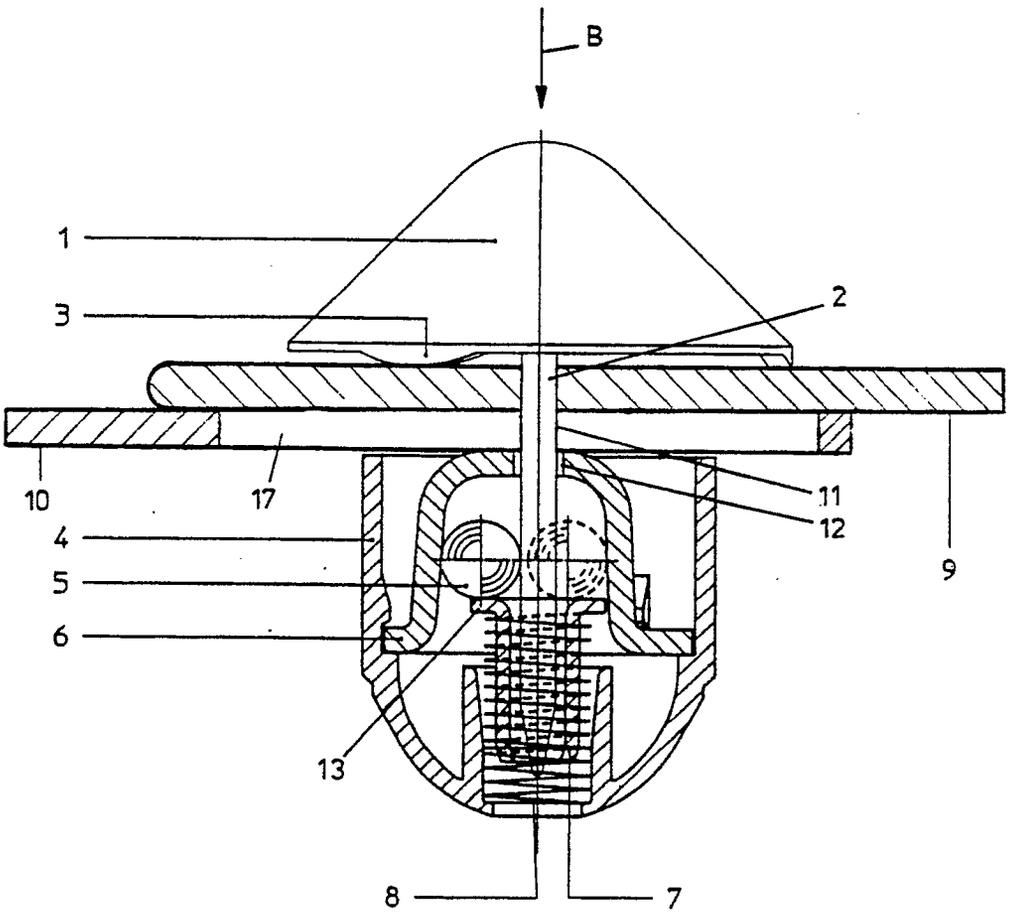

FIG.1

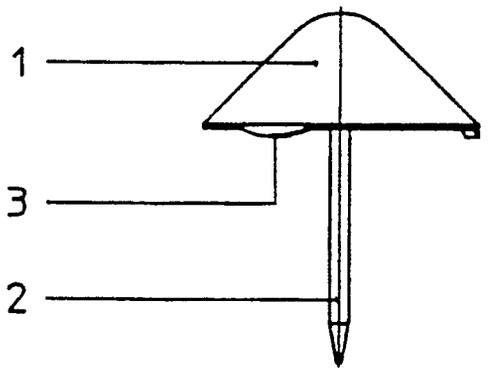

FIG. 2

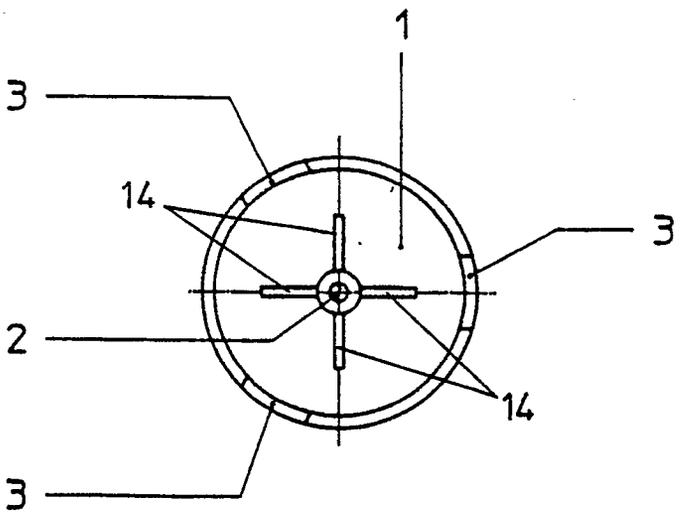

FIG. 3

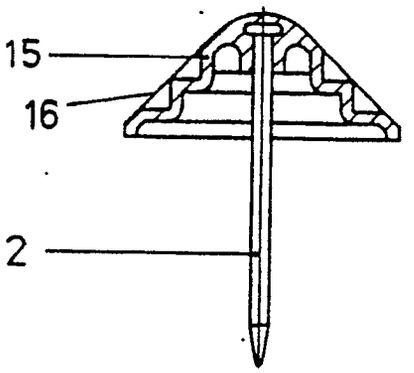

FIG.4

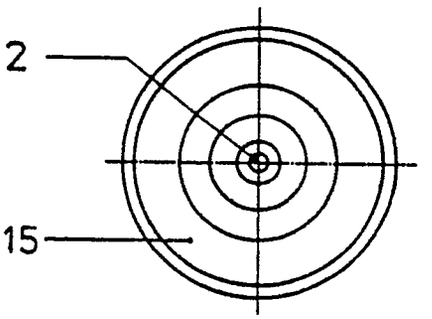

FIG.5

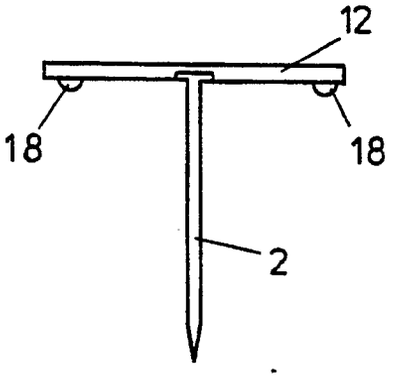

FIG.6

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EUROPEAN SEARCH REPORT

Application Number

EP 90 20 1619

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-4 523 356 (CHARLOT)		E 05 B 73/00 G 08 B 13/24
A	EP-A-0 213 375 (ALLIED CORP.)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E 05 B
E 05 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	04-10-1990	VAN BOGAERT J.A.M.M.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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