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(54) **Press fastener**

(57) A fastener of resilient plastics material comprises a first plate (6) provided with an opening (7) and a plurality of projections (8) extending inwardly from the circumference of the opening to define a smallest diameter of the opening, and a second plate (1) connected to the first plate by a flexible band (3) and provided with a pin (9) insertable into the opening (7) when the band (3) is bent to bring the first plate over the second plate. The pin (9) consists of three spaced apart webs carrying a head larger in diameter than the smallest diameter of the opening (7) and when the pin (9) is inserted into the opening the projections (8) engage in the spaces between the webs, these spaces being formed by passages through the pin. A suspension lock may be integrally connected with the second plate.

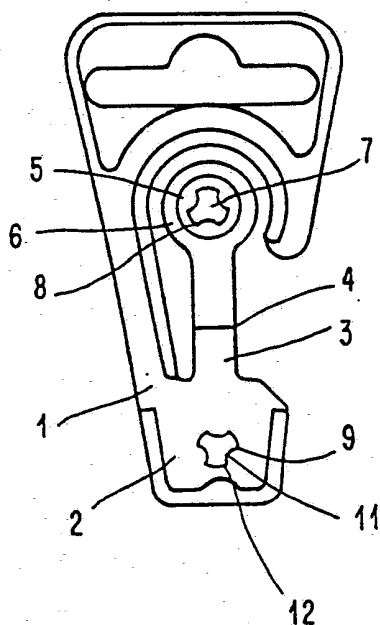


FIG. 1

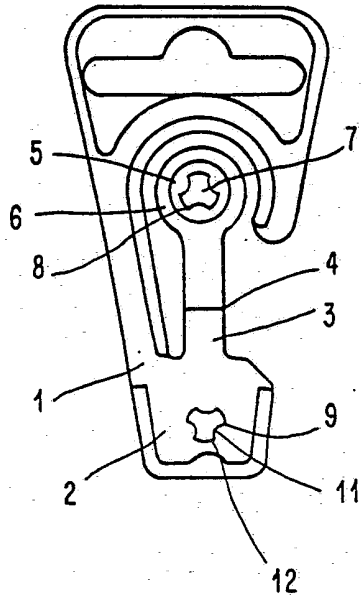


FIG. 1

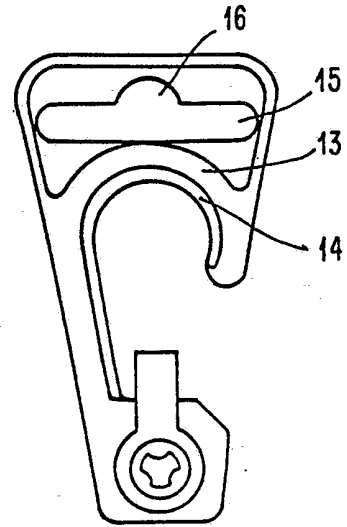


FIG. 2

FASTENER

The present invention relates to a fastener.

In DE-GM 66 04 527 and DE-PS 22 54 352 there are described press fasteners of resilient plastics material, comprising a female part  
5 in the form of a plate with an opening and a male part substantially in the form of a cylindrical pin on a further plate, the head of the pin having a somewhat greater diameter than the smallest diameter of the opening and the pin including a number of axially parallel recesses starting behind the head, into which recesses project a  
10 corresponding number of projections extending radially inwardly in the opening and defining the smallest diameter thereof.

These fasteners have the advantage of being simple to manufacture in injection moulding processes and of being durable in and convenient to use, wherein the resilient properties of a correspondingly selected  
15 plastics material in conjunction with the respective dimensions of the co-operating closure parts enables a fairly exact determination of the holding force and thus also the actuating force necessary for the proposed reopening. The use possibilities of such fasteners are manifold, for example as clamping elements for paper bundles, as  
20 fasteners for envelopes and despatch bags in postal services and as connectors of cardboard washers or similar, wherein according to requirements the parts to be connected together can be either rotatable or non-rotatable relative to each other through corresponding design of the fastener parts and an associated connecting band or  
25 the fastener can be rotatable or non-rotatable relative to the clamped-in parts.

There are, in addition, fasteners of this kind which can be closed

only once, i.e. cannot be reopened (DE-AS 16 60 801).

In DE-PS 22 54 352 there is disclosed a fastener with the pin of the male part constructed as a solid pin, in which three longitudinally extending axially parallel recesses of semicircular cross-section are disposed. These recesses are so arranged in the pin that three relatively thin portions of the cylindrical wall of the pin are left. For formation of these recesses the fastener can, despite the undercuts in the region of the pin, still be made with an only simply divided injection moulding tool. However, for formation of the recesses in the injection mould three very slender cylindrical moulding pins are provided, which project through the plate of the male part. This has various disadvantages.

For one thing, on manufacture of the known fastener unavoidable material residues form on the edges between the cylindrical wall of the pin and the recesses, which is detrimental to an exact engagement between female part and pin. For another thing, there is always the risk that the mould pins break off due to their very small cross-section, so that the injection mould is unusable or must be repaired. Moreover, in the case of the known fastener design the plate of the male plate is significantly weakened by the three openings for the mould pins, which is disadvantageous for the strength between plate and pin of the male part.

There is thus scope for improvement of such fasteners in the way that, for example, by means of corresponding design of a moulding tool the risk of damage thereof is substantially avoided and the pin of the male part receives a functionally secure shape without finishing treatment, in which its guide edges for the projections in the female

part can be manufactured in a functionally efficient manner.

According to the present invention there is provided a fastener of plastics material comprising a female member which comprises a first plate having an opening and a plurality of projections extending  
5 radially inwardly from the circumference of the opening to define a smallest diameter of the opening and a male member which comprises a second plate provided with a substantially cylindrical pin extending therefrom and defined by a corresponding plurality of substantially  
10 axially parallel and spaced apart webs extending from the perimeter of an opening in the second plate and forming the circumferential surface of the pin and by a head which is carried by the webs and the diameter of which is greater than said smallest diameter, the pin being insertable through the opening in the first plate for engagement of the projections in the spaces between the webs and said spaces  
15 being defined by passages through the pin.

In manufacture of a fastener embodying the invention, the shape of the pin can be formed by a two-part injection moulding tool with a single central pin of relatively large cross-section and with a number of axially parallel grooves in the pin circumferential surface,  
20 and by means of a simple cap-shaped sleeve as counter mould.

Expediently, the male part and the female part are formed integrally with and disposed at respective ends of a flexible band, so that the two parts are non-detachably connected together. This also ensures that the pin and the opening are aligned with each other before the  
25 fastener is closed. For this purpose an intended bending location is preferably arranged in the middle of the band. If the fastener and the parts to be connected together are to remain relatively

rotatable, it may be expedient to provide, in the middle region of the band between the male and female parts, two bending locations arranged at an appropriate spacing from each other, wherein the spacing is preferably selected to be somewhat larger than the intended total thickness of the parts to be connected together. The band thus has the effect of a book back.

For particular uses of the fastener this can be constructed in such a manner that a hook is formed directly on the plate of the male part, by means of which hook a packaging element or the like fixed to the fastener can be suspended, for example for presentation in a vending machine or in a storage space. The hook can be hooked into an eyelet, another hook and the like or on to a corresponding rod.

In another embodiment, a horizontally oriented elongate hole is provided in the plate above a hook. Thereby, the range of uses of the fastener is increased, in that it can be placed with others in rows on U-rails plugged into a perforated wall. This has various advantages. A customer can remove only the fastener with the article which is foremost and removal or accidental dropping of fasteners with articles placed in the row therebehind is excluded. In addition, unauthorised removal is prevented and individual articles are fastened more securely than is the case with hooks. With advantage, an enlargement is arranged upwardly in the centre of the elongate hole.

Embodiments of the present invention will now be more particularly described by way of example with reference to the accompanying drawings, in which:

- Fig. 1 is a view of a fastener, with the fastener open; and
- Fig. 2 is a view similar to Fig. 1, but with the fastener closed.

Referring now to the drawings, there is shown a plastics material fastener comprising a plate 1 incorporating a male part 2, with which a female part 5 is connected by way of a band 3 with an intended bending axis or location 4 formed by a weakened zone of the constituent material. The female part 5 consists of a round plate 6 with a central opening 7, in which three projections 8, protruding radially inwards, are moulded on and thus define the smallest diameter of the opening. Protruding out of the plate 1 surrounding the male part 2 is a pin 9 formed by three webs 11, which are parallel to the axis and which at the upper side are connected together by means of a dome. The webs 11 are moulded on at the circumference of a round opening 12 disposed in the plate 1. The shell surface of the pin 9 is therefore determined by the three webs 11.

For preference, moulded in the upper region of the plate 1 is a hook 13, the bearing edge of which is reinforced by a rib 14. Similar rib-like reinforcements are also disposed at the upper and the lower edge of the plate 1, as Figs. 1 and 2 show.

Preferably, also, provided in the plate 1 above the hook 13 is an elongate hole 15, which in the centre has an upwardly directed enlargement 16.

As is recognisable from Fig. 1, the intended bending location 4 is disposed exactly in the centre between the centre of the male part 2 and the female part 5. Through bending over of the female part 5, the pin 9 gets exactly into the opening 7 so that the fastener can be closed in simple manner for the fastening of an article. In consequence of the resilience of the webs 11 and the radial projections 8, the male and female parts detent, with the projections engaging

in the recesses - formed as break-throughs or through passages - between the webs. Opening of the fastener correspondingly takes place through drawing off the female part 5 with the use of an appropriate opening force.

5           By means of the integral hook 13, the fastener can be hooked in usual manner onto a rod or similar. The elongate hole 15, however, offers the possibility of pushing the fastener onto a U-rail, which can be mounted in a perforated wall. This suspension makes possible the withdrawal of only the foremost fastener with the article fastened  
10 thereto. The fasteners disposed therebehind cannot drop down accidentally if a U-rail is used. The fastener is thus usable for rods and the like, as well as for pushing onto U-rails.

          In another embodiment, the male part and the female part are integrally connected together by a flexible band which is provided  
15 in the middle between the two parts with two directly adjacent intended bending locations formed by weakened zones of the fastener material, so that the band has, in the manner of a book back, two adjacent bending locations each for 90° bending. With this embodiment, when the fastener is closed a sufficient space is left between the band  
20 portions for the articles to be fastened, so that these can be rotated relative to the fastener. If only a single bending location is provided, the band exerts, in the region of its kink, a certain clamping effect on the article or articles connected to the fastener, so that the fastener is non-rotatable relative to the article or articles.

25           For manufacture of the male part there can be used a moulding tool provided with a moulding pin of relatively large cross-section having three axially parallel grooves in its circumferential surface,



the moulding pin co-operating with a cylindrical cap-shaped moulding sleeve. By means of the axially parallel grooves in the sleeve the webs can be formed, while by means of the cap-shaped sleeve lying directly on the pin circumferential surface between the grooves the  
5 through passages or break-throughs forming the undercuts, in which the projections 8 engage, will result. In use, this engagement takes place after the projections, under their natural resilience, have been pushed out by the dome.

The height of the pin 9, less the height of the dome and the  
10 thickness of the plate of the female part, determines the gap for the article or articles to be fastened. By means of appropriate dimensioning of the projections 8 at the opening of the female part, the holding force of the fastener can be correspondingly determined in relation to the respective requirements.

CLAIMS

1. A fastener of plastics material comprising a female member which comprises a first plate having an opening and a plurality of projections extending radially inwardly from the circumference of the opening  
5 to define a smallest diameter of the opening and a male member which comprises a second plate provided with a substantially cylindrical pin extending therefrom and defined by a corresponding plurality of substantially axially parallel and spaced apart webs extending from the perimeter of an opening in the second plate and forming the circum-  
10 ferential surface of the pin and by a head which is carried by the webs and the diameter of which is greater than said smallest diameter, the pin being insertable through the opening in the first plate for engagement of the projections in the spaces between the webs and said spaces being defined by passages through the pin.
  
- 15 2. A fastener as claimed in claim 1, wherein the first and second plates are integrally connected together by means of a flexible band.
  
3. A fastener as claimed in claim 2, wherein the band is provided centrally between the opening of the first plate and the pin of the second plate with a weakened zone defining an axis of bending of the  
20 band.
  
4. A fastener as claimed in claim 2, wherein the band is provided in the central region thereof between the opening of the first plate and the pin of the second plate with two adjacent weakened zones each defining a respective axis of bending of the band.

5. A fastener as claimed in any one of the preceding claims, comprising three such projections and three such webs.
6. A fastener as claimed in any one of the preceding claims, comprising a suspension hook integrally connected with the second plate.
- 5 7. A fastener as claimed in claim 6, comprising a support plate disposed at a side of the hook remote from the male and female members, the support plate being provided with an elongate suspension opening extending horizontally in the intended suspension orientation of the hook.
- 10 8. A fastener as claimed in claim 7, wherein the suspension opening is provided with an enlargement in the central portion of the side thereof furthest from the male and female members.
9. A fastener substantially as hereinbefore described with reference to the accompanying drawings.