United States Patent [19]

Allsop

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[54] **ADHESIVE BLOCK**

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Jan. 4, 1973 United Kingdom 645/73

[52] **U.S. Cl.** ..... **222/146 HE**

[51] **Int. Cl.²** **B67D 5/62**

[58] **Field of Search** .. 222/389, 386.5, 325, 146 HE, 222/394; 277/212 F; 92/240, 245; 161/179; 401/1; 156/578

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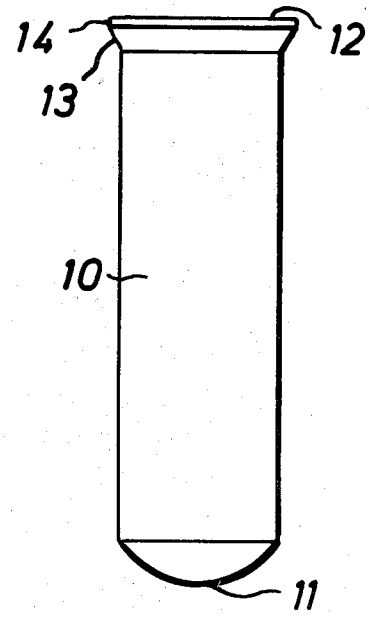
Attorney, Agent, or Firm—Harold L. Stowell

[57] **ABSTRACT**

The invention concerns an adhesive block of hot-melting material for an adhesive dispenser in which the block advances along a feed passage under the action of pressurised fluid, is melted and is dispensed as a liquid adhesive, the block having at its rear end a flange shaped and dimensioned to be capable of serving as a piston face for the direct application of pressurised fluid thereto, whereby the block can be advanced along the feed passage in sealing engagement therewith.

10 Claims, 6 Drawing Figures



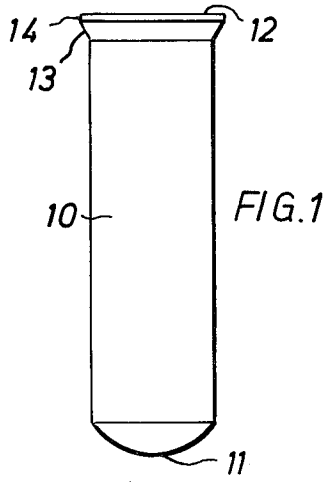


FIG. 1

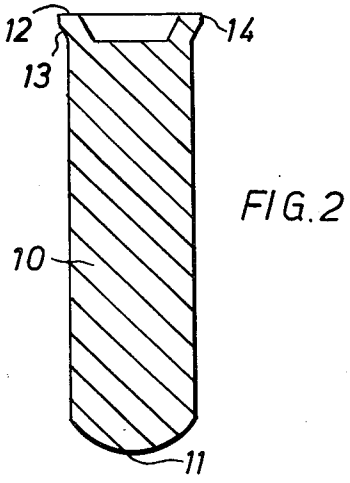


FIG. 2

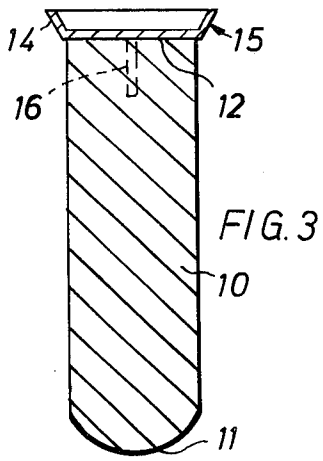


FIG. 3

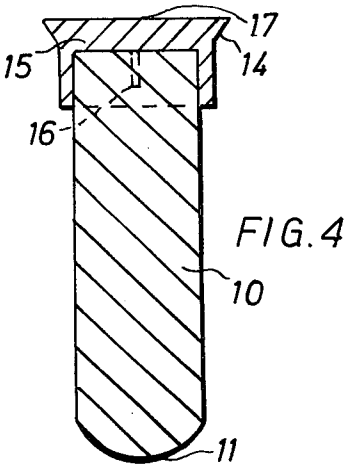


FIG. 4

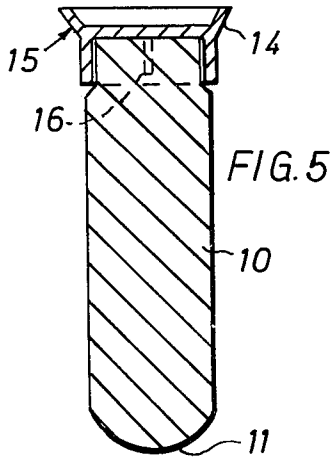


FIG. 5

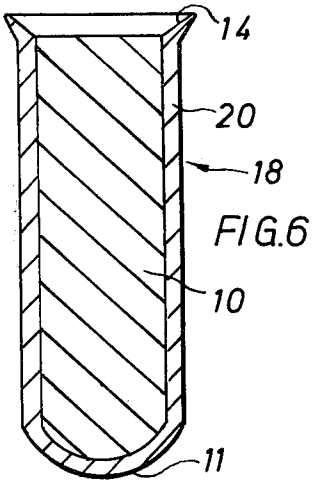


FIG. 6

ADHESIVE BLOCK

The invention relates to a solid adhesive member or cartridge for use in hot-melt adhesive dispensing devices.

It is known to apply adhesive to a workpiece by means of a dispensing device which has a feed passage charged with an elongated mass of adhesive which at room temperature is non-liquid, substantially non-tacky, and substantially shape-retaining. Known devices include means such as a pneumatically operated piston for advancing an end of the mass towards the workpiece, and furthermore the device has heating means for heating said end to liquefy the adhesive before being dispensed from a dispensing outlet.

In certain cases the adhesive selected for a particular application may have relatively poor shape-retaining qualities and may be somewhat tacky at room temperature. It has been the practice in such cases to encase the adhesive member in a sleeve or liner of stiffer and non-tacky material, the sleeve or liner with the adhesive being then referred to as a "cartridge." The liner or sleeve may itself be a hot-melt adhesive of somewhat different formulation that the adhesive member. Alternatively it may be made of a plastics material which is consumed when heat is applied to liquefy the adhesive member. The plastics material is then selected so that it substantially does not deleteriously affect the adhesive quality of the dispensed molten adhesive.

This invention aims to provide an adhesive mass of simple design particularly (although not exclusively) suitable for use in a device of the kind set forth above, the design of the adhesive mass enabling the mechanical construction of the dispensing device to be simplified by obviating the need for a piston, rendered more reliable in operation and more economical to fabricate.

Furthermore, a portable adhesive dispensing device in the form of a trigger-actuated gun is known wherein the gun has a barrel portion containing said feed passage of sufficient length to accommodate two adhesive members or cartridges placed end-to-end. Actuation of the trigger causes compressed air to be applied to the rearmost member by way of a piston.

It is also often found that on loading the barrel an air lock may form between the front end of the rear adhesive member and the rear end of the front adhesive member. Such an air lock is obviously undesirable from the view-point of continuous and uniform dispensing of adhesive. Moreover, when the adhesive is of a poor shape-retaining kind supported by a sleeve, the latter does not usually cover one end face of the adhesive. Now if the uncovered end is placed adjacent the piston, some undesired adhesion between the member and the piston may occur.

Bearing in mind that such guns are frequently operated by relatively unskilled personnel, preferred embodiments of this invention seek to eliminate the defects discussed in the preceding paragraph by a simple expedient described below.

According to one aspect of this invention, there is provided a solid adhesive member made of hot-melting material for use in an adhesive dispenser which dispenser includes a feed passage, means for melting a part of the adhesive member, a dispensing outlet for dispensing adhesive in substantially liquid form, and means for supplying pressurised fluid for advancing the adhesive member along the feed passage towards the dispensing outlet, wherein the adhesive member is characterised by being formed at or adjacent the rear end thereof, (relative to the direction of its advance in use) with a flange shaped and dimensioned so as to be capable of being advanced along the feed passage in substantially fluid-tight sealing engagement therewith, said rear end, including the flange, serving in use as a piston face for the direct application of pressurised fluid thereto.

According therefore to another aspect of this invention, there is provided an adhesive cartridge for use in an adhesive dispenser which includes a feed passage, means for melting a part of the adhesive cartridge, a dispensing outlet for dispensing adhesive in substantially liquid form, and fluid-pressure operated means for advancing the adhesive cartridge along the feed passage towards the dispensing outlet, wherein the cartridge is characterized in that it includes a heat-consumable or hot-melting outer sleeve or support member engagingly supporting a member of hot-melting adhesive, the sleeve or support member being stiffer than the adhesive member and being formed at or adjacent the rear end thereof (relative to the direction of its advance in use) with a flange shaped and dimensioned so as to be capable of being advanced along the feed passage in fluid-tight sealing engagement therewith, the flange serving in use as a piston face for the direct application of pressurised fluid thereto.

It will be appreciated that in both aspects of this invention as set forth above, the need for a piston in the dispenser device is eliminated and fluid pressure, such as compressed air, may be applied directly to the rear end of the adhesive member or cartridge.

To eliminate or reduce the defects of air locks and undesired adhesion, a preferred embodiment of the invention is characterised in that the rear end and the front end of the adhesive member or cartridge are complementarily shaped, whereby two of such members or cartridges may be placed end-to-end in the feed passage and advanced together by the application of fluid pressure to the rear end of the rear member, without the possibility of air locks forming therebetween.

The special shape of the front and rear end of the adhesive member will then also enable the operator to distinguish between said ends and to load the gun correctly. It will be appreciated that even in a piston-less gun, as envisaged in this invention, it is desirable (although not essential) to distinguish between the front and rear ends of a given member or cartridge so as to ensure that adjacent ends of two adhesive members or cartridges are correctly positioned relatively to each other. However, the invention encompasses the possibility of the adhesive member or cartridge being formed with a planar front end.

Preferably, however, the rear end is concave or includes a recess, cavity or other opening. This has the advantage that application of fluid pressure to the rear end will cause pressure to be exerted not only in the axial, i.e. advancing direction, but also peripherally against the flange, whereby to help maintain the latter in satisfactory sealing relationship with the internal bore of the feeding passage.

Preferably, the support member has a rearwardly and outwardly flaring annular skirt of yieldable material.

Alternatively, however, the support member may have a sleeve portion engagingly surrounding the rear end of the adhesive member, and a skirt portion flaring

outwardly therefrom, the skirt portion having a plane rear face and being of yieldable material.

In one optional embodiment, the support member has an internal cross-section which is smaller than the external cross-section of the adhesive member. In any of these embodiments the support member may include a spike or like projection for securing it to the adhesive member.

In another preferred embodiment, the outer sleeve is a liner encasing and engaging the front and side(s) of the adhesive member but leaving the rear thereof substantially free.

The cross-sectional shape of the adhesive member or cartridge may be selected as desired. Thus, while it is customary for that shape to be circular, other shapes may readily be adopted, such as elliptical or polygonal or other, more or less intricate shapes.

The hot-melt adhesive is well-known as such and may, for example, be made of a polyamide resin or a polyester resin or an ethyl-vinyl-acetate (EVA) resin, or of any suitable mixture of these. The adhesive may incorporate wax(es), filler(s) or extender(s) and additives to influence the viscosity, melting point or other physical property of the adhesive member or core.

The invention is illustrated, by way of example only, with reference to the accompanying drawings, wherein

FIG. 1 is an elevation of an adhesive member according to a first embodiment of the invention,

FIG. 2 is a longitudinal section thereof,

FIG. 3 illustrates in section an embodiment of the invention wherein an adhesive member has a supporting flange or stiffer material,

FIG. 4 illustrates a variant of the embodiment of FIG. 3,

FIG. 5 illustrates a variant of the embodiment of FIG. 4, and

FIG. 6 is a sectional view of a further embodiment of this invention.

Like parts are designated by like reference numbers throughout.

Referring first to FIGS. 1 and 2, a hot-melt adhesive member according to the invention comprises an elongated, substantially cylindrical body **10** having a convex or domed front end **11** and a rear end or flange **12** of somewhat enlarged cross-sectional dimension. The flange **12** is connected integrally to the body **10** via a flared portion **13.** The flange **12** is disclike with a rim **14** shaped and dimensioned sealingly to engage the internal bore of the feed passage of a dispensing gun in which the adhesive member is to be used.

The adhesive is of a somewhat yieldable or compressible material. The flange **12** will therefore be capable of sealingly but yieldingly engaging the said internal bore, whereby the body **10** may be caused to advance along the bore on application of fluid pressure to the rear end, substantially without allowing the fluid to leak past it.

Although this is not essential, in order to improve the quality of the seal and to prevent air locks from occurring between two adjacent bodies **10** placed end-to-end, the front and rear ends of each body **10** are complementarily shaped for better interengagement. Moreover, the concavity of the rear end **12** has the effect that the fluid pressure acting on it will tend slightly to expand the flange **12** in a radial, i.e., sealing direction.

In some cases it may be sufficient for the flange **12** simply to extend rearwardly of the body **10** and the latter then has a substantially plane rear end face.

Referring now to FIG. **3,** there is shown an adhesive cartridge wherein the body **10** is secured at its rear end **12** to a supporting member in the form of a washer **15.** The washer **15** is formed with an annular skirt **14** diverging from the central part of the washer **15.** The inner surface of the skirt **14** and the face of the central part remote from the body **10** constitute a piston face for the application of pressurised fluid thereto.

The washer **15** may be made of a heat-consumable plastics material which, if becoming mixed with the molten adhesive, does not adversely influence the bond to be achieved by said adhesive. Alternatively, however, the washer **15** may be made of a hot-melt adhesive also, but of one which is stiffer at room temperature than the material of which the body **10** is formed.

Any suitable manner of securing the body **10** to the washer **15** may be selected. One possibility is to use an adhesive (which could be the material of the body **10** itself); another is to form the washer **15** with a central spike **16,** shown in dotted lines, on which the body **10** is impaled.

As already stated, the material of the washer **15** is somewhat yieldable so that, in use, application of fluid pressure to the skirt **14** will cause the latter sealingly but yieldably to engage the bore in which the adhesive cartridge is to advance.

FIG. **4** illustrates a variant of the FIG. **3** embodiment wherein the member **15** is in the form of a relatively short sleeve engagingly surrounding the rear end of the body **10.** The outer surface of the sleeve **15** flares outwardly and rearwardly and has a plane end **17** constituting a piston face. The sleeve **15** may, if desired, be provided with a central spike **16** also, for the better attachment of the body **10** to the sleeve, although this is not essential, there being, for most applications, sufficient grip between the inner surface of the sleeve and the outer surface of the body **10.**

FIG. **5** illustrates another variant of the FIG. **3** embodiment wherein the internal cross-section of the sleeve **15** is made somewhat smaller than the external cross-section of the adhesive body **10.** Then the body **10** has to be force-fitted into the sleeve **15.**

In this embodiment, the rear of the sleeve **15** is formed in a manner similar to the washer **15** of FIG. **3;** in other words, it has an annular skirt **14** diverging outwardly and rearwardly from the central, planar part of the sleeve. The inner surface of the skirt constitutes a piston face, in the manner already described.

Again, if so desired, the sleeve **15** may be provided with a central spike **16,** as indicated by dotted lines.

FIG. **6** illustrates an adhesive cartridge **18** which includes an adhesive body **10** encased at its front and side by a thermoplastic liner **20.** The rear of the body **10** is open to the direct application of fluid pressure, while the rear of the liner **20** is formed with an integral skirt **14** which diverges outwardly and rearwardly from the rear end of the body **10.** Thus the liner **20** serves the dual purpose of retaining the adhesive (which may have poor shape-retaining properties) in the desired shape and forming a seal with the internal bore, as explained above.

It will be readily understood that many other, functionally equivalent support-and-body and liner-and-body configurations are possible. Thus, the front end of

the body **10** (or, as in the FIG. **6** embodiment, of the liner **20**) may be completely planar. The essential point is that the adhesive body or its sleeve or support should be provided with an integral, yieldable sealing flange at or adjacent the rear ro permit the direct application thereto of fluid pressure, thereby obviating the need for a piston.

I claim as my invention:

1. A solid adhesive block made of hot-melting material for use in an adhesive dispenser which dispenser includes a feed passage, means for melting a part of the adhesive block, a dispensing outlet for dispensing adhesive in substantially liquid form, and means for supplying pressurised fluid for advancing the adhesive block along the feed passage towards the dispensing outlet; characterized in that the rear end of the adhesive block is shaped to provide a piston face for the direct application of pressurized fluid thereto and formed with a flange which is shaped and dimensioned to provide a substantially fluid-tight sliding and sealing engagement with a feed passage.

2. An adhesive block as claimed in claim **1**, wherein the said rear end and the front end of the adhesive block are complementarily shaped, whereby two of such blocks may be placed end-to-end in the feed passage and advance together by the application of fluid pressure to the rear end of the rear block.

3. An adhesive block as claimed in claim **2** wherein the rear end is recessed.

4. An adhesive block as claimed in claim **2**, further including a rearwardly and outwardly flaring annular skirt of yieldable material, said flange forming part of said skirt.

5. An adhesive block as claimed in claim **1** wherein the block is a one-piece member.

6. A block made of hot-melting adhesive material and a heat-consumable material for use in an adhesive dispenser which dispenser includes a feed passage, means for melting a part of the adhesive block, a dispensing outlet for dispensing adhesive in substantially liquid form, and means for supplying pressurised fluid for advancing the adhesive block along the feed passage towards the dispensing outlet; characterized in that the heat-consumable material comprises a support member for the adhesive material and is stiffer than the material of the adhesive material, and wherein the support member comprises a sleeve portion engagingly surrounding the rear end of the adhesive material, and a skirt portion connected to the sleeve portion and flaring outwardly from said sleeve portion, the skirt portion including a flange and having a plane rear face and being of yieldable material.

7. An adhesive block as claimed in claim **6** wherein the support member has an internal cross-section which is smaller than the external cross-section of the adhesive member.

8. An adhesive block as claimed in claim **6** wherein a spike is formed on the support member for impaling the adhesive member thereon.

9. A block made of hot-melting adhesive material and a heat-consumable material for use in an adhesive dispenser which dispenser includes a feed passage, means for melting a part of the adhesive block, a dispensing outlet for dispensing adhesive in substantially liquid form, and means for supplying pressurised fluid for advancing the adhesive block along the feed passage towards the dispensing outlet; characterized in that the heat-consumable material comprises a support member of the adhesive material and is stiffer than the material of the adhesive material, and wherein the support member comprises a disc portion attached to the rear end of the adhesive member, and a skirt portion connected to the disc portion and flaring outwardly from said disc portion, the skirt portion including a flange and having a plane rear face and being of yieldable material.

10. A solid adhesive block made of hot-melting material for use in an adhesive dispenser which dispenser includes a feed passage, means for melting a part of the adhesive block, a dispensing outlet for dispensing adhesive in substantially liquid form, and means for supplying pressurized fluid for advancing the adhesive block along the feed passage towards the dispensing outlet; characterized in that the adhesive block comprises an adhesive member, and an outer sleeve in the form of a liner encasing and engaging the front and side(s) of the adhesive member but leaving the rear end thereof substantially free, the said liner being made of a heat consumable material stiffer than the material of the adhesive member, the said liner including a flange, the rear end of the adhesive block being shaped to provide a piston face for the direct application of pressurized fluid thereto and said liner being formed with a flange at the rear end which is shaped and dimensioned to provide a substantially fluid-tight sliding and sealing engagement with a feed passage.

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