June 25, 1963 R. H. BUNZL ETAL 3,094,736

MARKING DEVICE

Filed March 27, 1962 2 Sheets-Sheet 1

Fig. 1

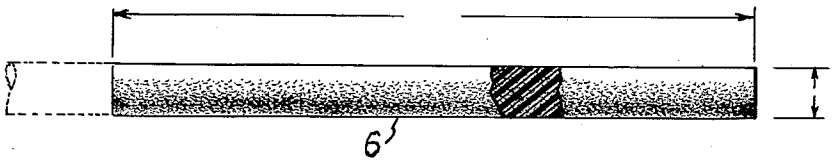


Fig. 2

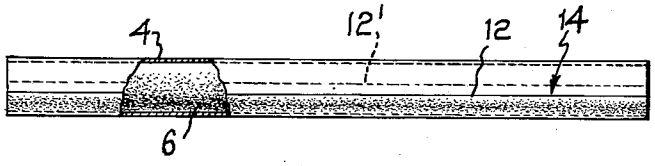


Fig. 3

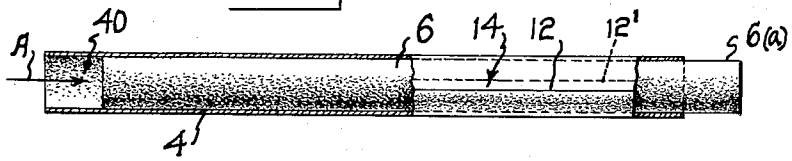


Fig. 4

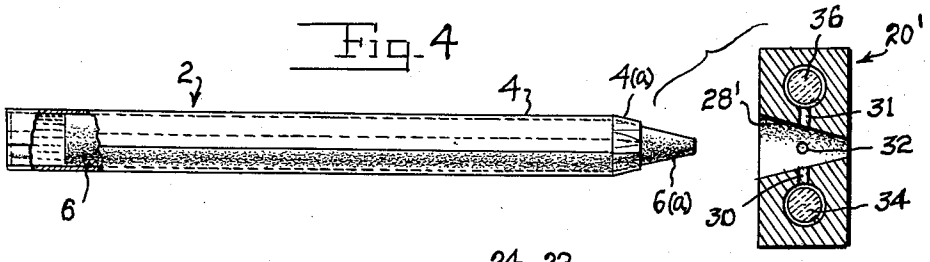


Fig. 5

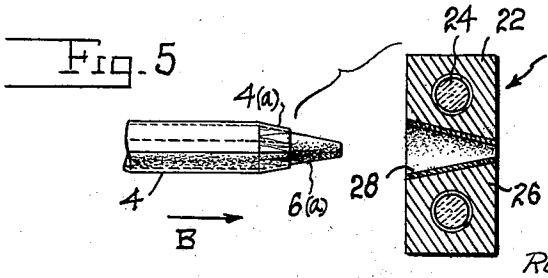
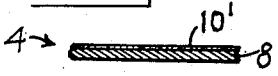


Fig. 6



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MARKING DEVICE

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Fig. 7

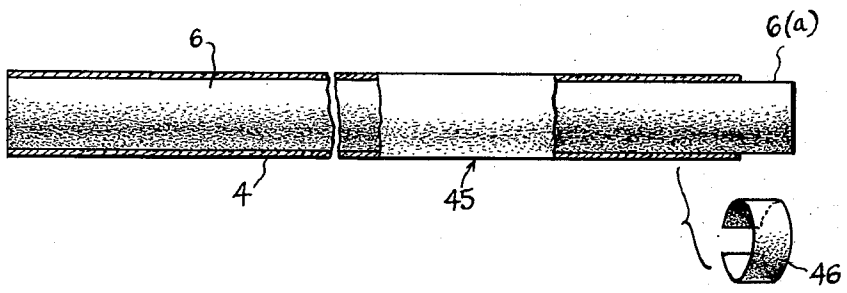


Fig. 8

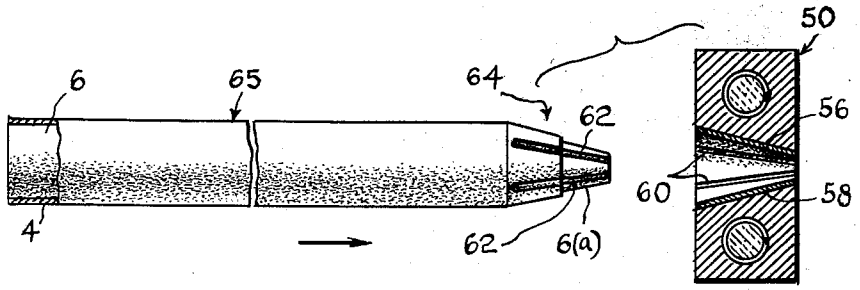
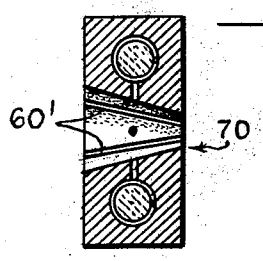


Fig. 9



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United States Patent Office 3,094,736 Patented June 25, 1963

3,094,736

MARKING DEVICE

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Filed Mar. 27, 1962, Ser. No. 183,344
15 Claims. (Cl. 15—563)

This invention relates broadly to a marking device, and is particularly concerned with the provision of an improved marking device adapted to hold marking fluid and permit selective application thereof to a surface by way of writing or the like.

Various different forms of crayon-like marking devices have heretofore been suggested. Generally, such devices comprise a container of some form having a wick projecting therefrom, whereby when the wick is impregnated with a writing fluid, as for example ordinary ink, the device can be used for purposes of writing a legend or other indicia on a given surface.

Nothwithstanding the various prior art suggestions, the industry is constantly in search of an improved marking device of the crayon-type which can not only be inexpensively manufactured, but which in addition provides improved fluid or ink dispensing properties, and the present invention has as its primary object the provision of a marking device of a crayon-type possessing such advantages.

The present application is a continuation-in-part of copending application of Rudolph H. Bunzl and Richard M. Berger for Marking Device and Methods of Making Same, filed September 28, 1961, Serial No. 141,444, now abandoned.

More particularly, the primary objects of the present invention are (1) to provide an improved marking device comprising an elongated adsorbent body adapted to controllably dispense writing fluid carried therein, and an impermeable overwrap for such body adapted to give rigidity to the body and serve as a handling casing, and (2) to provide steps in a process of fabricating a marking device, which steps yield a product conforming with the preceding object, and which steps can be carried out inexpensively and with available machinery and equipment.

In connection with the product of the invention, even further, and still more specific objects of the invention are: (*a*) to provide a marking device conforming with all of the preceding objects and having as the adsorbent body thereof a tow or tow segment comprising continuous filaments randomly oriented primarily in a longitudinal direction and bonded at a plurality of spaced locations by a plasticizer for such filaments; (*b*) to provide such a marking device wherein the adsorbent body comprises a tow or tow segment formed in accordance with the methods disclosed and explained in co-pending application Serial No. 56,189, filed September 15, 1960, and entitled, Method for Treating, Apparatus for Handling, and Products Formed From, Continuous Filamentary Tows; (*c*) to provide such a marking device wherein the overwrap comprises a metal foil preferably having one face thereof coated with a heat sealable plastic—e.g. polyethylene coated aluminum foil; (*d*) to provide such a marking device wherein the impervious overwrap surrounds the periphery of the adsorbent body and contacts the same, and wherein the impervious overwrap terminates in spaced relation to one end of the adsorbent body thereby exposing the end portion of such body for writing therewith; (*e*) to provide such a marking device wherein the longitudinal terminal edges of the overwrap are overlapped, and heat sealed to form a seam extending longitudinally of the device; (*f*) to provide such a marking device wherein the exposed end portion of the adsorbent body is frustro-conical in shape; (*g*) to provide such a marking device wherein the end portion of the overwrap adjacent to the exposed end portion of the adsorbent body is also frustro-conical in shape and effectively sealed with the adsorbent body; (*h*) to provide such a marking device which will prevent the escape of substantially all inks, regardless of their fluidity and wetting properties, from between the impervious overwrap and the adsorbent body at the terminus of the overwrap which is adjacent the exposed end portion of the adsorbent body; (*i*) to provide such a marking device wherein at least the fibres in the peripheral layer of the exposed end portion of the adsorbent body are more firmly bonded than other fibres of the body thereby to prevent fraying of the fibres during use of the device; (*j*) to provide such a marking device wherein the end portion of the overwrap remote from the writing end of the device projects beyond the end of the adsorbent body so as to provide a filling spout which aids insertion of writing fluid, and which can be collapsed easily to effectively seal one end of the device; (*k*) to provide such a marking device which is durable and trouble free in operation and use and which is adapted to controllably dispense all conventional available inks.

While the article described and claimed in aforesaid application Serial No. 141,444 was generally satisfactory and superior in performance to the prior known marking devices, it is subject to leakage between the conical end of the impervious overwrap and the adsorbent body when inks having certain qualities are used with it, such as inks of higher fluidity and/or wetting properties. The present invention provides an improved construction which substantially obviates such leakage with virtually all inks.

The invention will be better understood, and objects other than those specifically set forth above, will become apparent when consideration is given to the following detailed description. Such description refers to the annexed drawing presenting preferred and illustrative embodiments hereof, and wherein:

FIGURE 1 is a side view, partially broken away of an overwrapped tow formed in accordance with the initial steps of the invention.

FIGURE 2 is a side view, similar to FIGURE 1, but having a broken away portion exposing the tow itself.

FIGURE 3 is a side view similar to FIGURES 1 and 2, but displaying the tow in its ultimate disposition with respect to the overwrap therefor;

FIGURE 4 is a side view, partially broken away, presenting a completed marking device and a final forming die of the type adapted to be used in accordance with the forming step of the invention;

FIGURE 5 is a fragmental detail view showing the forward end of a marking device constructed in accordance with the invention, and the preferred type of final forming die used in accordance herewith;

FIGURE 6 is a fragmental detailed enlarged cross-sectional view presenting the preferred form of overwrap used in the marking device provided hereby;

FIGURE 7 is a side view similar to FIGURE 3, showing the tow and overwrap in an alternate embodiment of the invention;

FIGURE 8 is a side view, with parts broken away and in section, showing a completed marking device and final forming die of the type adapted to be used in accordance with the final forming step in the alternate embodiment of the invention; and

FIGURE 9 is a cross sectional view showing an alternate final forming die used in accordance with the invention.

In the drawings the completed marking device is best

shown in FIGURE 4, and there generally designated by the numeral **2**. Such device comprises an overwrap **4** surrounding the periphery of an elongated adsorbent body **6**. The forward end **6**(*a*) of the adsorbent body **6** is formed into a frustro-conical shape, and the forward end portion **4**(*a*) of the overwrap is formed into a corresponding frustro-conical shape.

The adsorbent body **6**, in accordance with the preferred embodiment of the invention, comprises an elongate tow or tow segment of filaments randomly oriented primarily in a longitudinal direction, and bonded at a plurality of spaced locations by a plasticizer for the filaments. The term "filamentary tow" as used in this specification and the appended claims, means a material such as that which results when filaments spun from a plurality of spinnerets are brought together and combined, preferably with filaments of other spinnerets, to form a continuous body of fibres "randomly oriented primarily in a longitudinal direction." The term "randomly oriented primarily in a longitudinal direction" as used in this specification and the appended claims, is intended to describe the condition of a body of fibres which are as a whole longitudinally aligned, and which are, in the aggregate, in a parallel orientation, but which have short portions running more or less at random in non-parallel diverging and converging directions.

Continuous filamentary tows of the type adapted to form the adsorbent body preferably used in the marking device provided hereby are made in accordance with the teaching of aforesaid patent application Serial No. 56,189 as well as in accordance with continuation-in-part application Serial No. 125,868, filed July 2, 1961 and entitled, Method for Treating, Apparatus for Handling and Products Formed From, Continuous Filamentary Tows.

Such continuous filamentary tows, as explained in such applications, have a stiffened peripheral layer, and preferably comprise at least fifty percent cellulose acetate fibres. Moreover, in such tows, the fibres are jointed together by a plasticizer preferably of the thermoplastic type. Suitable fibres and plasticizers for use in the tow used in a device in conformance herewith are described in both of such copending applications. Tow bodies so formed provide immediate rigidity, and tend to prevent wrinkles in the overwrap.

The instant invention is particularly concerned with the utilization of a tow such as formed in the aforesaid applications, and for purposes of comprehending the present invention, it is only important to understand that the adsorbent body thereof preferably comprises a body of continuous filaments randomly oriented primarily in a longitudinal direction and bonded at a plurality of spaced locations by a plasticizer for the filaments. Preferably, however, the filaments are at least fifty percent cellulose acetate filaments and the adsorbent body has a stiffened peripheral layer.

Filamentary tows, such as described above, are generally formed more or less as ropes. Such rope-like tows are adapted to be fed through the wrapping section of an ordinary cigarette-making machine for purposes of applying an overwrap thereto, and the instant invention contemplates utilization of such machinery for applying the overwrap portion of the marking device provided hereby to the adsorbent body portion thereof.

In accordance with the invention, the overwrap **4** comprises a metal foil coated with a thermoplastic material. In FIGURE 6, the overwrap foil is shown as consisting of a primary layer **8** of aluminum foil coated on one side with layer **10** of a suitable plastic, such as polyethylene. The overwrap **4** is disposed about the periphery of the tow, as shown in FIGURE 1 so as to completely encase the same. The terminal longitudinal edges **12** and **12'** of the overwrap are overlapped slightly as shown in FIGURE 2, and preferably sealed to provide longitudinal seam generally designated by the numeral **14**. Such sealing is achieved, in accordance with the preferred embodiments of the invention, by applying heat along the seam through the utilization of the standard heat sealing element available at the overwrap section of standing cigarette-making equipment.

The overwrap can be applied to the tow in lengths, and the overwrap tow can thereafter be cut into segments so as to provide an initial product such as shown in FIGURES 1 and 2—i.e., a product comprising an adsorbent filamentary tow body having an impermeable overwrap surrounding the entire periphery thereof.

After the initial formation of the product, the invention contemplates applying pressure to the adsorbent tow body to move the same forward in the direction of the arrow A (FIGURE 3) thereby exposing the forward end portion **6**(*a*) of the body **6**. After the tow **6** has been pushed forward as shown in FIGURE 3, then the product is moved in the direction of arrow B (FIGURE 5) so that the forward ends of the tow body and overwrap are pushed into a final forming die means generally designated by the numeral **20**. Such die means comprises a body **22** having a heating means **24** therein, and a frustro-conical recess **26** extending therethrough. In the embodiment of FIGURE 5, the frustro-conical recess is shown as having a frustro-conical hollow liner **28** therein. This liner is preferably formed of Teflon (polytetrafluoroethylene). The heating means **24**, as shown, comprises a steam channel within the die **20** and serves to heat the die and liner **28** thereof, so that when the forward end portion **6**(*a*) of the adsorbent body, and the forward end portion **4**(*a*) of the overwrap are moved into the liner, the same are shaped to conform with the interior shape of the liner.

The heating during the final forming steps serves to provide for a firmer bonding of at least a peripheral layer of fibres of the exposed end of the adsorbent body through the cohesive properties of the plasticizer. Moreover, by virtue of providing a thermoplastic coating on the overwrap, the overwrap, once formed frustro-conically, maintains its position upon setting-up of the thermoplastic layer once the device has been removed from the final forming die. It should be noted that additionally, the provision of the plastic coated overwrap permits a sealing of the overwrap to the peripheral layer adjacent thereto of the adsorbent body.

Die temperatures of the order of 425° have been found to be particularly satisfactory for achieving the desired forming, bonding and sealing. However, the exact temperature used is dependent on the plasticizer and moisture content of the adsorbent body, as should be readily appreciated by those skilled in the art.

While the final forming die of FIGURE 5 is preferred, a modified embodiment of the invention provides for using a final forming die such as shown in FIGURE 4. This die generally designated by the numeral **20'** generally conforms with the die shown in FIGURE 5. However, instead of using the Teflon liner **28**, steam channels **30**, **31** and **32** are provided so as to extend from primary heating channels **34** and **36**. When steam is introduced into the primary heating channels, the same passes through the auxiliary channels **30**, **31** and **32** whereby steam issues from the surface of the recess **28'**. When the device is formed, at its final step, with the die of FIGURE 4, the same results are achieved as with the die of FIGURE 5. However, in certain instances, the steam is preferable to the use of the Teflon liner, not only because of the expense of Teflon, but also because the steam tends to maintain porosity of the exposed end portion.

It is particularly significant to note that the invention contemplates the provision of a frustro-conical end portion on the marking device. The circular tip which is obtained by virtue of such formation of the writing end portion of the device facilitates application of ink to a surface, and moreover, permits by variation in slope, a variation in the marking width. This construction lends itself to easier application of curved lines than, for example, a square or rectangular end.

Although not specifically set forth above, it should be apparent from a review of the drawings, that the final marking device provided by the instant invention has an inlet spout generally designated by the numeral **40** at the rear end thereof. This spout permits easy filling of the absorbent body with the writing fluid or ink. Moreover, since the overwrap comprises a foil, once the device has been filled with ink, the end can be collapsed by a mere crushing operation with the hand, and the rear end of the device can accordingly be effectively sealed.

Although it has been stated herein above that the marking device provided hereby can be formed initially with available cigarette-making machinery, it is to be understood that other equipment can be used in the formation without departing from the scope and spirit of the invention, and that other modifications can be made in the product and methods provided hereby without departing from the principles hereof. While tows as described above are preferred for the adsorbent body, in some instances other fibrous bodies of rod-like shape can be used. Regardless of the type tow, however, with use of a die such as that shown in FIGURE 5, as well as with use of a die such as shown in FIGURE 4, the right (small) end of the recesses **26** and **28'**, respectively, should be open, and the tip of the tow being formed should be passed at least to the right edge of the die as shown, whereby to prevent undesired bonding of the exposed tip fibers.

Referring now to FIGURE 7, there is shown a product **45** which is generally similar to the product shown in FIGURE 2, and comprising an adsorbent filamentary tow body **6** and an overwrap **4**. Instead of applying pressure to the adsorbent tow body **6** to move the same forward as is shown in FIGURE 3, an end portion **46** of the overwrap **4** is cut away by any suitable means and discarded to thereby expose the forward end portion **6**(*a*) of the body **6**. The product of FIGURE 7 is therefore similar to the product shown in FIGURE 3, except that there is not present an inlet spout **40** as in the FIGURE 3 construction.

After formation of the product of FIGURE 7, it is moved in the direction of the arrow B (FIGURE 8) so that the forward ends of the tow body and overwrap are pushed into a final forming die means generally designated **50**. Die means **50** is generally similar in construction and operation to die means **20** shown in FIGURE 5, except that the frustro-conical recess **56** thereof is provided with flutes **60** which extend along the walls of the frustro-conical recess and in planes through the axis thereof. Die means **50** has a matching hollow liner **58**, preferably formed of Teflon (polytetrafluoroethylene).

The marking device **65** shown in FIGURE 8 is similar to the marking device **2** of FIGURE 4, but not having an inlet spout **40**, and having indentations **62** in the forward end portion **64** thereof, which indentations **62** were caused by the flutes **60** and extend in both the exposed forward end portion **6**(*a*) of the adsorbent tow body **6** and in the forward end of the overwrap **4**.

The marking device **65** is characterized by having a seal between the conical end portion of the adsorbent tow body **6** and the conical end of the impervious overwrap **4**, and is proof against substantially all inks, including those inks having higher fluidity and/or wetting properties.

There is shown in FIGURE 9 an alternate embodiment of a final forming die, generally designated **70**, die **70** being of generally the same construction as die **20'** shown in FIGURE 4, except that it is provided with flutes **60'** generally similar to the flutes **60** shown in the die means **50** of FIGURE 8.

The operation of the die **70** will be understood from the operation discussed above in connection with the die means **50** and die **20'**.

From the foregoing description, it should be apparent that the objects set forth at the outset of this specification have been successfully achieved, and accordingly,

What is claimed is:

1. A marking device adapted to hold marking fluid and permit selective application thereof to a surface, said device comprising an elongate adsorbent body of continuous filaments randomly oriented primarily in a longitudinal direction and bonded at a plurality of spaced locations by a plasticizer for said filaments, and a liquid impervious overwrap surrounding at least substantially the entire periphery of said adsorbent body but terminating in spaced relation to one end thereof to expose said one end of said body for writing therewith, the terminal edges of said overwrap being overlapped and heat sealed to form a seam.

2. A marking device as defined in claim 1 wherein said filaments are at least 50% cellulose acetate filaments, wherein said adsorbent body has a stiffened peripheral layer in contact with said overwrap and a softer inner portion within the confines of said layer, wherein said overwrap comprises a metal foil having at least one face thereof coated wtih a heat sealable plastic, and wherein said plastic is heat sealed to said adsorbent body adjacent said one end of said adsorbent body.

3. A marking device as defined in claim 2 wherein the end portion of said body adjacent said one exposed end is at least generally frusto-conical in shape, and at least the fibres of the peripheral layer of said end portion are more firmly bonded together than the fibers of the remainder of said body.

4. A marking device as defined in claim 3 wherein said overwrap projects beyond the end of said body opposite said one end, and wherein a portion of said overwrap overlies a portion of said end portion of said body and is conformingly frusto-conical in shape therewith.

5. A marking device as defined in claim 4 wherein said overwrap is polyethylene coated aluminum foil.

6. A marking device as defined in claim 1 wherein said body has a stiffened peripheral layer in contact with said overwrap, and wherein the end portion of said body adjacent said one exposed end is frusto-conical in shape, and at least the fibers of the peripheral layer of said end portion are more firmly bonded together than the fibres of the remainder of said body.

7. A marking device as defined in claim 1 wherein the end portion of said body adjacent said one exposed end is frusto-conical in shape, and wherein a portion of said overwrap overlies a portion of said end portion and is conformingly frusto-conical in shape therewith.

8. A marking device adapted to hold marking fluid and permit selective application thereof to a surface, said device comprising an elongate adsorbent body formed of a plurality of fibres, at least some of which are synthetic, joined at a multiplicity of spaced locations and providing a rod-like unitary structure, and an impervious overwrap surrounding the periphery of said structure and terminating in spaced relation to one end thereof to expose one end portion of said body for writing therewith, said overwrap being sealed to the periphery of said adsorbent body at least adjacent said one end portion.

9. A marking device adapted to hold marking fluid and permit selective application thereof to a surface, said device comprising an elongate adsorbent body formed of a plurality of fibres joined at a multiplicity of spaced locations and providing a rod-like unitary structure, and an impervious overwrap surrounding the periphery of said structure and terminating in spaced relation to one end thereof to expose one end portion of said body for writing therewith, said overwrap comprising a metal foil coated on one face thereof with a thermo-plastic material.

10. A marking device adapted to hold marking fluid and permit selective application thereof to a surface, said device comprising an elongate adsorbent body formed of a plurality of fibres, at least some of which are synthetic, joined at a multiplicity of spaced locations and providing a rod-like unitary structure, and an impervious overwrap surrounding the periphery of said structure

and terminating in spaced relation to one end thereof to expose one end portion of said body for writing therewith, the portion of said overwrap, and the underlying portion of said body, adjacent said one end portion having coincident indentions therein, said portion of said overwrap being sealed to the periphery of said underlying portion of said adsorbent body.

11. A marking device as defined in claim 10 wherein said one end portion of said body, at least part of said portion of said overwrap and at least part of said underlying portion of said adsorbent body are conformingly and continuously at least generally frusto-conical in shape.

12. A marking device as defined in claim 11 wherein the terminal edges of said overwrap are overlapped and heat sealed to form a seam.

13. A marking device as defined in claim 12 wherein said indentations lie in planes extending through the axis of said marking device, and said overwrap is polyethylene coated aluminum foil.

14. A marking device adapted to hold marking fluid and permit selective application thereof to a surface, said device comprising an elongate adsorbent body formed of a plurality of fibres joined at a multiplicity of spaced locations and providing a rod-like unitary structure, and an impervious overwrap surrounding the periphery of

said structure and terminating in spaced relation to one end thereof to expose one end portion of said body for writing therewith, said overwrap comprising a metal foil coated on at least one face thereof with a thermoplastic material, the portion of said overwrap, and the underlying portion of said body adjacent said one end portion having coincident indentations therein, said indentations lying in planes extending through the axis of said marking device, said portion of said overwrap being sealed to the periphery of said underlying portion of said adsorbent body.

15. A marking device as defined in claim 14 wherein said portions of said overwrap and said body having said indentations therein are generally frusto-conical in shape.

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