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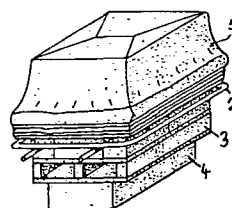
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(54) **Method and apparatus to stretch wrap an object in plastic film.**

(57) A method and an apparatus to stretch wrap an article in a tubular plastic film, the method comprising the steps of locating a length of elastically stretchable tubular plastic film 5 on a holder 2 and thereafter expanding the holder to stretch the tube to a size enabling the tube and the holder to be passed over the article to be wrapped which may be located on pallet 3 mounted on stand 4 and at the same time stripping the tube off the holder so the tube can contract and elastically embrace the object. The tube preferably has an end closed and is folded concertina fashion on the holder. The frame 2 is in sections which telescope or pivot to effect outward expansion.



**Fig.7**

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TITLE

"Method and apparatus to stretch wrap an object in plastic film."

This invention relates to a method of and apparatus for stretch wrapping.

5           Stretch wrapping is conventionally a form of packaging in which a band of stretchable plastic film is wrapped under tension about an article, a group of articles, or a pallet with an article or articles stacked thereon, to make a unitary assembly.

10       In the known art this is done by either moving a holder of stretch wrap film around the object(s) to be wrapped, at the same time dispensing film under tension from the holder, or by rotating the object(s) before a holder from which stretch film is dispensed

15       under tension.

Both of the foregoing methods have drawbacks typically the cost of equipment, difficulty with end fastening of the film band and end covering of the object(s) wrapped is difficult. There are also

20       dangers associated with mechanical equipment which rotates.

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The method of this invention does not require sophisticated or expensive equipment and is easy and safe to operate as well as providing facility for end sealing the wrapped object(s). The apparatus of this invention is versatile in that wrapping can be carried out at any location without the need for electrical power which is necessary with presently known powered equipment.

According to this invention there is provided a method of stretch wrapping comprising the step of providing a length of flexible elastically stretchable tubular plastics film having a basic unstretched internal cross-sectional dimension which is smaller than the external cross-sectional dimension of the object(s) to be wrapped and a stretch capability enabling it to be expanded to an operative internal cross-sectional dimension greater than the external cross-sectional dimension of the object(s) to be wrapped; storing at least the major part of the length of the tube as a concertina folded band around an expandable holder; expanding the holder to enlarge the cross-sectional dimension of the tube thereon to the operative internal dimension;

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passing the object(s) through the holder and the expanded tube thereon and at the same time progressively stripping the tube from the holder so it will contract and elastically embrace the object(s).

5           This invention also provides an apparatus for carrying out the method, the apparatus comprising a multi-sided frame, film tube supports on the frame to be encircled by the film tube and means to move the supports apart.

10           Several embodiments of the invention and preferred features thereof defined in the sub-claims will now be described with reference to the accompanying drawings in which:-

15           Figure 1 schematically illustrates a plastic bag and a holder therefor.

          Figure 2 schematically illustrates the plastic bag of Figure 1 being mounted as a concertina folded band on the holder.

20           Figure 3 schematically illustrates the bag fully mounted on the holder.

          Figure 4 schematically illustrates the expansion of the holder to enlarge the internal cross-section of the bag.

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Figure 5 schematically illustrates an expanded bag about to be passed over a loaded pallet on a stand.

5 Figure 6 schematically illustrates the expanded bag passing over the loaded pallet.

Figure 7 schematically illustrates the bag partly stripped from the holder and contracted onto part of the pallet load.

10 Figure 8 schematically illustrates the load pallet encased in the contracted bag.

Figure 9 illustrates one form of expandable holder.

Figure 10 illustrates a second form of expandable holder.

15 Figure 11 schematically illustrates another form of holder.

Figure 12 schematically illustrates a further form of holder.

20 Figure 13 schematically illustrates a still further form of holder.

The method will be described with reference to Figures 1 to 8 and using a bag. The expandable holder may have many forms and these are described later.

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Figure 1 shows a bag 1 having a basic substantially square cross-section and as would be used to wrap object(s) on a 46" x 46" (1170 mm x 1170 mm) pallet. The basic size of the bag side could be in the order of 40" (1016 mm) and thus the bag is initially 40" x 40". The finished size will be in the order of 46" x 46" embracing objects stacked to the perimeter of the pallet loading area. The holder 2 would have a minimum contracted side size of say 38" (965 mm) expandable to say 48" (1219 mm).

Figure 2 shows the bag in the process being mounted on the expandable holder.

Figure 3 shows the bag fully mounted on the holder.

Figure 4 shows the bag being expanded, say to 48"x 48".

Figure 5 shows the expanded bag-holder combination about to be lowered over a plurality of cartons stacked to the perimeter of a 46" x 46" pallet 3 mounted on a stand 4.

Figure 6 shows the bag in the process of being stripped from the holder as it is lowered, the stripping being due to the engagement of the bag end on the upper cartons.

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Figure 7 shows the bag stripping further advanced, and 5 indicates the contraction of the bag due to the memory of the plastic from the size on the holder to the size of the objects which is greater than the basic internal cross-section of the bag.

Figure 8 shows the bag fully elastically embracing the load and the pallet and the open end 6 of the bag contracted and curled under the pallet to lock the bag at its lower end. The holder 2 at this stage is around the stand 4 and in its expanded form can be readily removed by moving it straight upwardly over the wrapped load.

The bag is preferably of flexible elastically stretchable plastic film having a memory.

The bag may be replaced by a tube without ends. The procedure would be as above except that portion of the bag adjacent the upper end would not be expanded and only a major part of the tube length would be on the holder and expanded. The non expanded upper end of the tube would act like the bag end to assist in stripping the tube from the holder. If desired, for example on high loads, a short bag could be placed on the load and a sleeve would be used to complete the

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wrapping. In this case the whole of the tube would be on the holder and expanded. The tube could be placed on the load either before or after the bag.

Turning now to the holder, various constructions are possible.

Figure 9 shows an expandible support frame 7 of two similar right angle parts. Each part has an upper rail 8 and a lower rail 9 separated by vertical bars 10. There are two similar corner assemblies 11 each comprising an upper bend 12 and a lower bend 13 separated by vertical bars 14. The bends 12 - 13 are telescopically coupled to the rails 8 - 9 at 15. Bevel gear assemblies 16 with treaded jack screws 17 are mounted on each corner assembly and the screws 17 engage nuts on the rails 9. By means of handles the gear 16 and screws 17 are rotated and the telescopic joints 15 provide a four way expansion of the support. The bag or tube is supported on the bars 10 - 14. This form of support is preferred for use with bags, i.e. tubes with ends.

Figure 10 is another form of support having a large fixed frame 18 with first order lever arms 19 pivotally connected thereto as at 20. First (outer)



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ends 21 of the arms 19 incorporate nuts 22. A jacking screw 23 with handle interconnects the nuts 22 of a pair of arms 19. At the second (inner) ends 24 of the arms 9 there are upstanding posts with pivoted right angle corner members 25. The arrangement is such that a bag (tube) supported on the corner members 25 is caused to expand in four directions as the jack screws 23 are operated to move the arm ends 21 of each pair of arms together and the arm ends 24 apart. The corner members 25 pivot during expansion to equalise the stretch of the bag (tube). The nuts 22 are right and left handed threaded as required as is the jack screw 23 so as to obtain the operation described above. Figure 11 shows schematically the paths of travel of the corner supports 25 to increase the cross sectional dimension of the tube.

It will be understood that for manual operation handles indicated H in Figure 9 would be used as required.

It is also within the scope of the invention to substitute mechanical devices such as piston and cylinder combinations for the jacking screw arrangements described above.

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In the holders shown in Figures 12 and 13 the holder is for use with tube. The tube of plastic film is loaded over part of the rectangular frame of Figure 12 and suitable means are used to jack the frame members apart to give the expanded form of the tube. In Figure 13 only three arms are used. The two arms A are pivoted at B to the arm C and suitable means is used to jack the arms A apart. Such means could be incorporated adjacent each pivot B between arm A and C or jacking means could be used between the ends D of the arms A. The arrows show the direction of movement of the plastic of the tube as it is expanded.

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CLAIMS

1. A method of stretch wrapping an object(s) comprising the step of providing a length of flexible elastically stretchable tubular plastic film having a basic unstretched internal cross-sectional dimension which is smaller than the external cross-sectional dimension of the object(s) to be wrapped and stretch capability enabling it to be expanded to an operative internal cross-sectional dimension greater than the external cross-sectional dimension of the object(s) to be wrapped; storing at least the major part of the length of the tube as a concertina folded band around an expandable holder; expanding the holder to enlarge the cross-sectional dimension of the tube thereon to the operative internal dimension; passing the object(s) through the holder and the expanded tube thereon and at the same time progressively stripping the tube from the holder so it will contract and elastically embrace the object(s).

2. The method claimed in Claim 1 including the step of having one end of tube closed to form the tube into a bag.

3. The method claimed in Claim 1 or Claim 2 including the step of making the tube length in excess of the height of the object(s) to be wrapped.

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4. Apparatus to carry out the method of any one of Claims 1 to 3, comprising a multi-sided frame, film tube supports on the frame to be encircled by the film tube and means to move the supports apart.

5. Apparatus as claimed in Claim 4 having three sides, two sides being pivoted at corresponding first ends to respective ends of the third side with means to move the second ends of the said two sides apart.

6. Apparatus as claimed in Claim 4 having four sides two of which are of fixed length and the other two of adjustable length and means to adjust the length of the said other sides.

7. Apparatus as claimed in Claim 4 comprising a generally rectangular frame with two similar right angle sub-frames oppositely disposed and two corner assemblies between adjacent ends of the two sub-frames, and extensible means coupling the corner assemblies to the sub assemblies to move the corner assemblies and sub-frames apart to increase the size of the frame.

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8. Apparatus as claimed in Claim 4  
including a four sided support frame, a pair of  
first order lever pivot arms on each of two  
opposed sides of the frame, jacking means to move  
5 first ends of each arm pair apart and together and  
tube supports pivotally mounted on second ends of  
the arms.

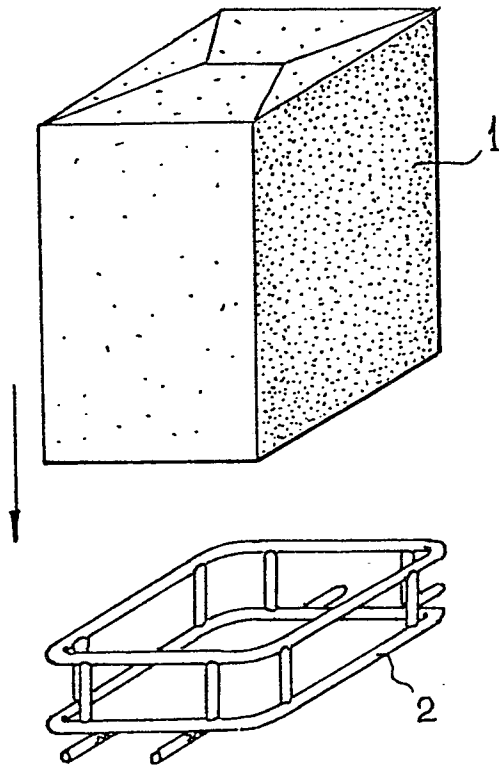


Fig. 1

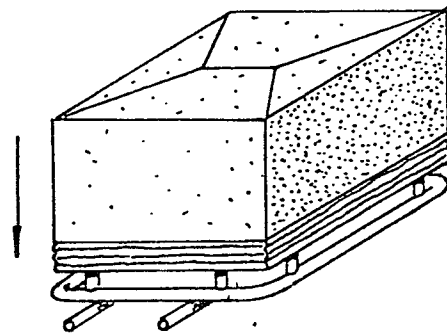


Fig. 2

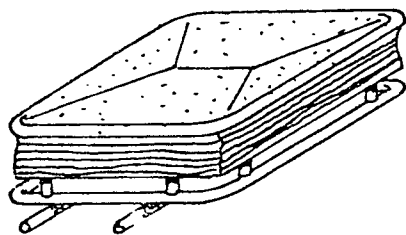


Fig. 3

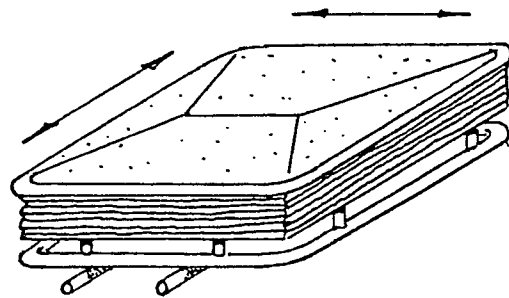


Fig. 4

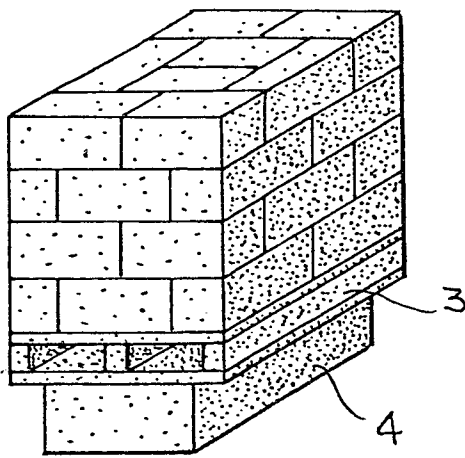
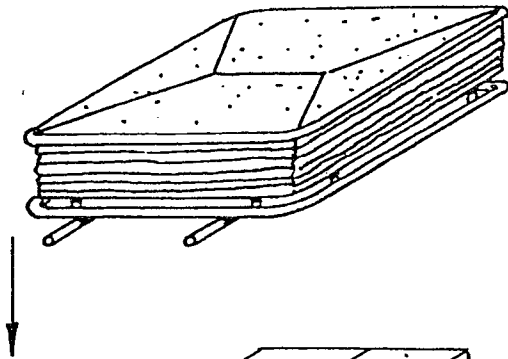


Fig. 5

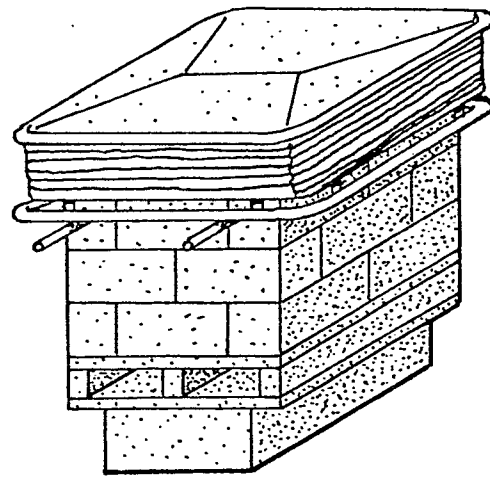


Fig. 6

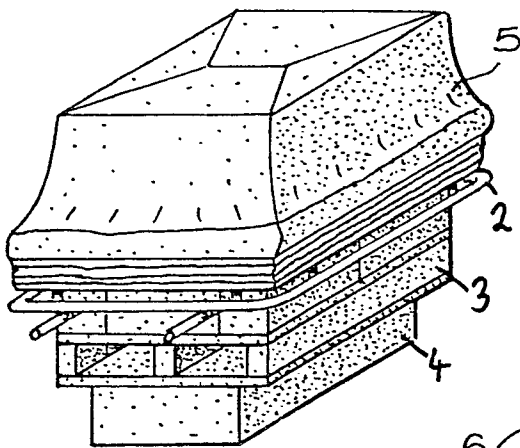


Fig. 7

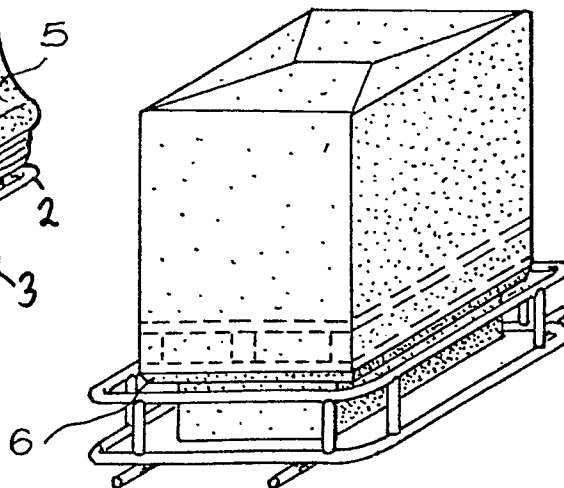
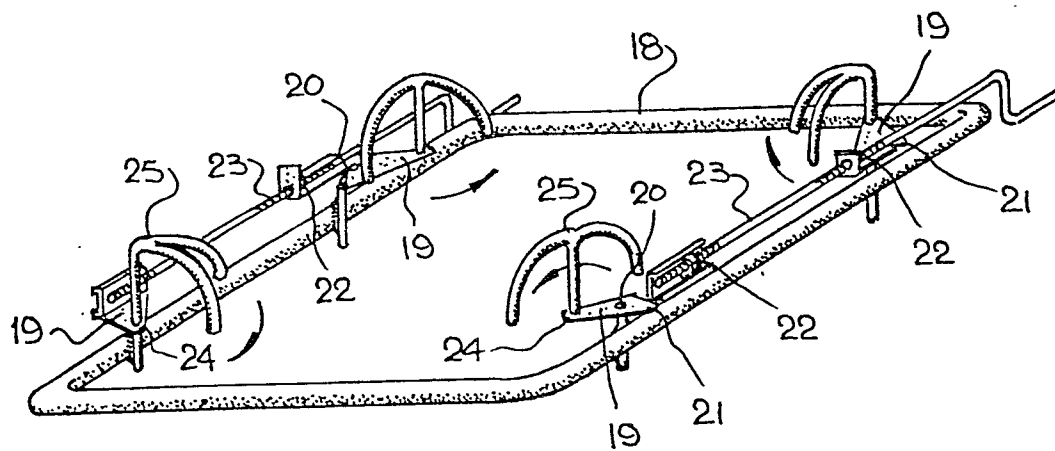
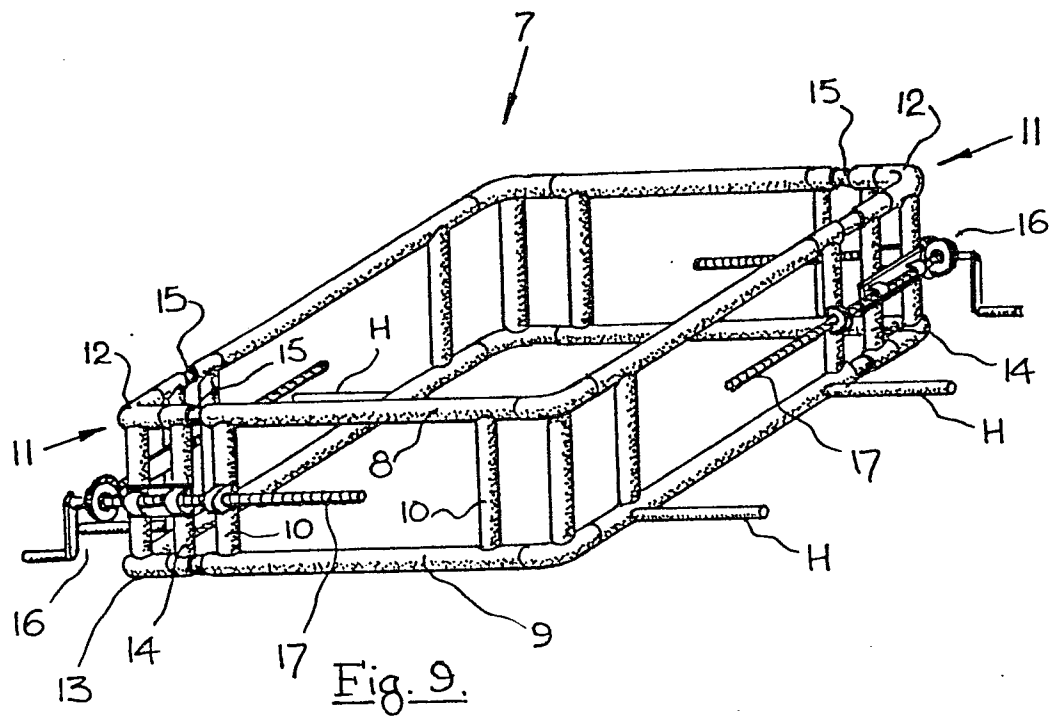


Fig. 8





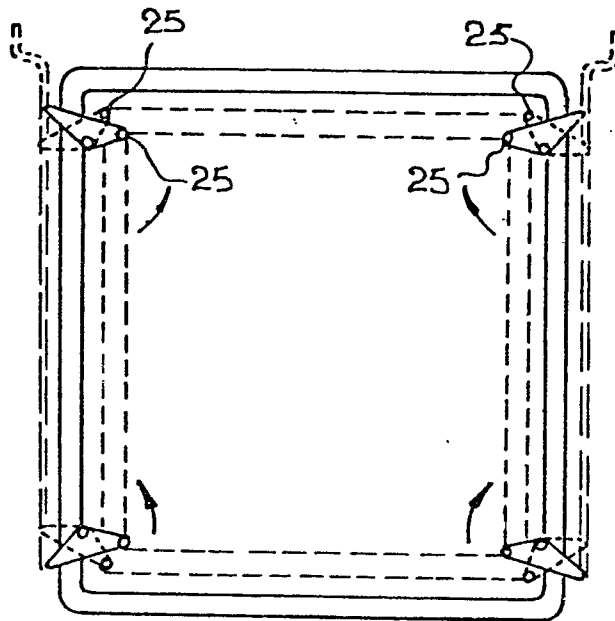


Fig. 11

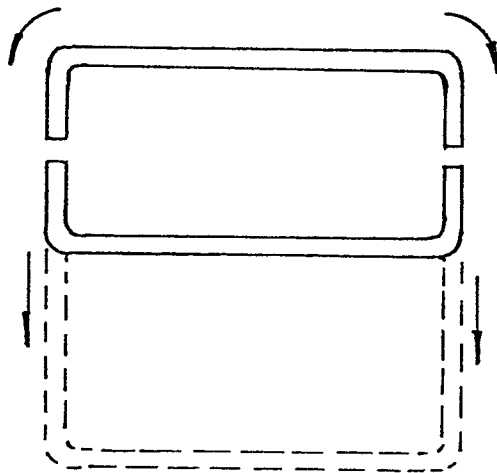


Fig. 12

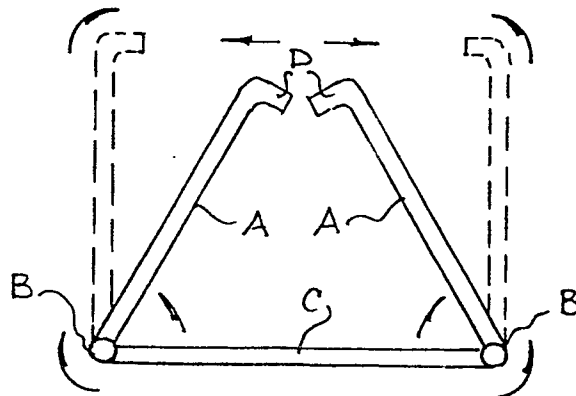


Fig. 13



European Patent  
Office

# EUROPEAN SEARCH REPORT

0035612

Application number

EP 80300641.0

| DOCUMENTS CONSIDERED TO BE RELEVANT |                                                                               |                                                | CLASSIFICATION OF THE APPLICATION (Int. Cl. 1)                                                                                                                                                                                                                             |
|-------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Category                            | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim                              |                                                                                                                                                                                                                                                                            |
| A                                   | DE - A1 - 2 524 185 (NORDENIA-KUNSTSTOFFE)<br><br>+ Totality +<br>--          |                                                | B 65 B 45/00<br>B 65 D 65/02                                                                                                                                                                                                                                               |
| A                                   | DE - A - 1 938 960 (C.KELLER & CO)<br><br>+ Totality +<br>--                  | 1                                              |                                                                                                                                                                                                                                                                            |
| A                                   | DE - B2 - 1 923 672 (NÜTRO HIRSCH & CO)<br><br>+ Totality +<br>----           | 1                                              |                                                                                                                                                                                                                                                                            |
|                                     |                                                                               |                                                | TECHNICAL FIELDS SEARCHED (Int.Cl. 3)                                                                                                                                                                                                                                      |
|                                     |                                                                               |                                                | B 65 B 5/00<br>B 65 B 9/00<br>B 65 B 27/00<br>B 65 B 33/00<br>B 65 B 45/00<br>B 65 B 53/00<br>B 65 B 67/00<br>B 65 D 19/00<br>B 65 D 65/00<br>B 65 D 75/00<br>B 65 D 85/00                                                                                                 |
|                                     |                                                                               |                                                | CATEGORY OF CITED DOCUMENTS                                                                                                                                                                                                                                                |
|                                     |                                                                               |                                                | X: particularly relevant<br>A: technological background<br>O: non-written disclosure<br>P: intermediate document<br>T: theory or principle underlying the invention<br>E: conflicting application<br>D: document cited in the application<br>L: citation for other reasons |
| X                                   | The present search report has been drawn up for all claims                    |                                                | &: member of the same patent family, corresponding document                                                                                                                                                                                                                |
| Place of search<br>VIENNA           |                                                                               | Date of completion of the search<br>07-10-1980 | Examiner<br>MELZER                                                                                                                                                                                                                                                         |