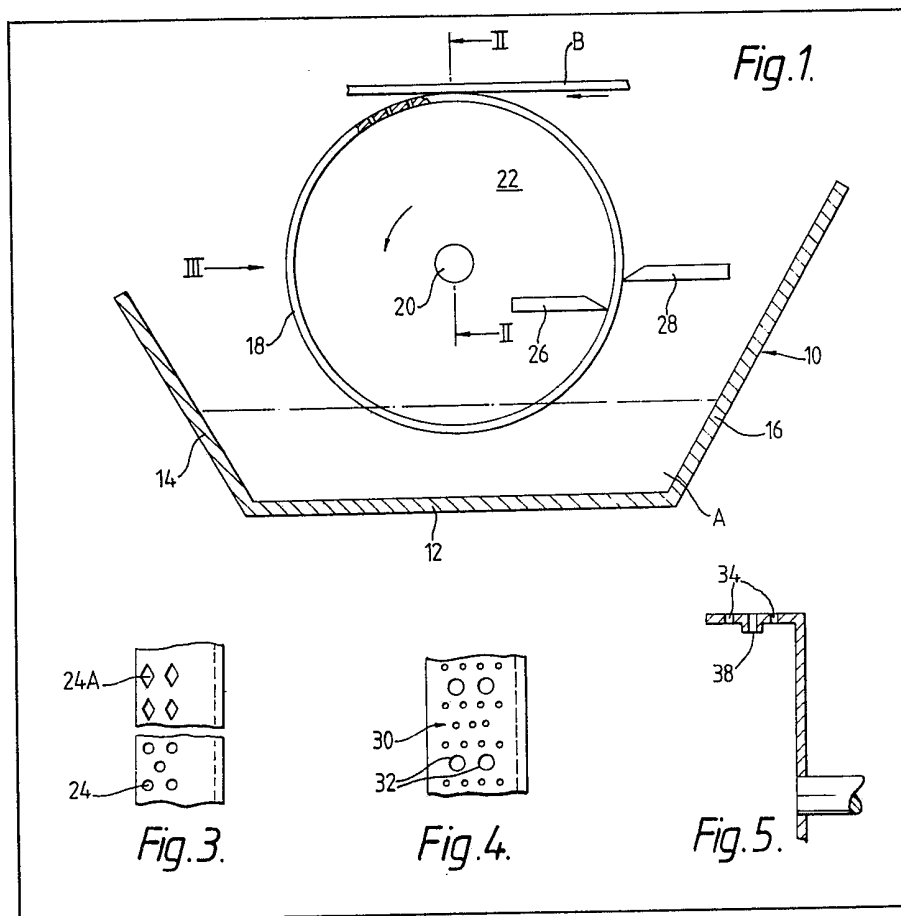


- (21) Application No 8402460
- (22) Date of filing 31 Jan 1984
- (30) Priority data
- (31) 8302663  
8332328
- (32) 1 Feb 1983  
3 Dec 1983
- (33) United Kingdom (GB)
- (43) Application published  
15 Aug 1984
- (51) INT CL<sup>3</sup>  
B05C 1/00
- (52) Domestic classification  
B2L 10X 135 136 B  
B6C 514 520 535 560 571  
EDD  
U1S 1367 1815 B2L B6C
- (56) Documents cited  
GB 1543281  
GB 1433362  
GB 1342504
- (58) Field of search  
B2L
- (71) Applicant  
Molins PLC,  
(United Kingdom),  
2 Evelyn Street,  
London SE8 5DH.
- (72) Inventor  
Dennis Hinchcliffe
- (74) Agent and/or Address for  
Service  
C. D. Benziger,  
Molins PLC,  
Group Patent  
Department,  
2 Evelyn Street,  
London SE8 5DH.

(54) Apparatus for applying adhesive

(57) A gravure-type gummer comprises a hollow cylindrical member 18 partly immersed in an adhesive container 10 and adapted to transfer a pattern of adhesive to a blank B movable in contact with the top of the member. The adhesive is held in a pattern of round bores 24 extending through the member, whose inside and outside peripheral surfaces are scraped clean of adhesive by scrapers 26 and 28. As an alternative, the bores may be diamond-shaped 24A (Figure 3). A pattern of different sized bores 30, 32 (Figure 4) can be used. Depth of bore may vary (Figure 5). A modification extends to a solid cylindrical member.



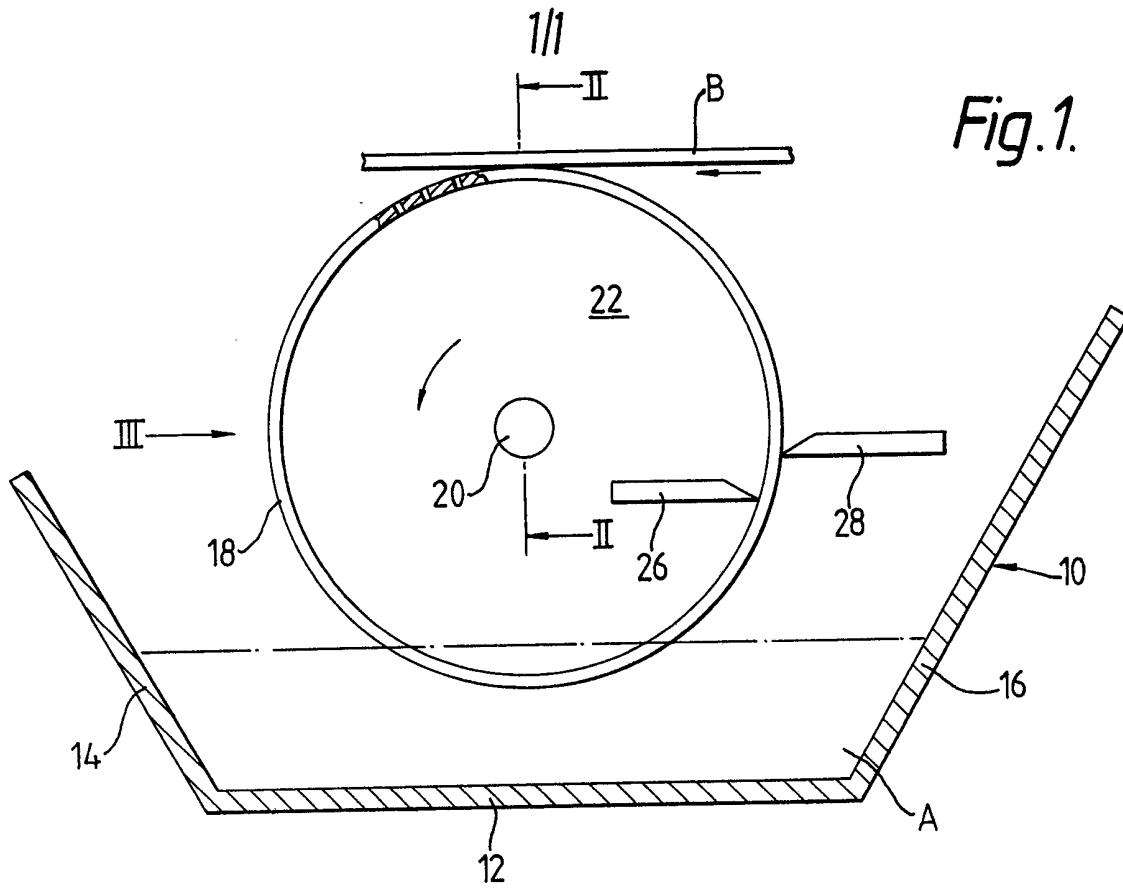


Fig. 1.

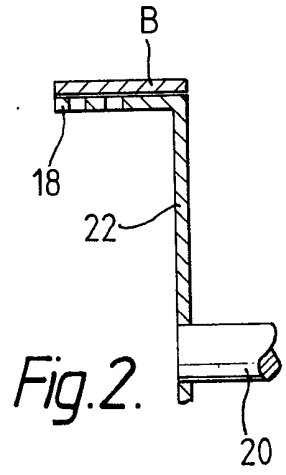


Fig. 2.

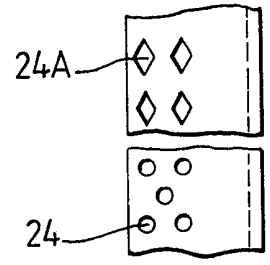


Fig. 3.

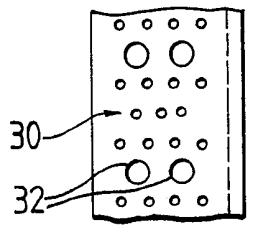


Fig. 4.

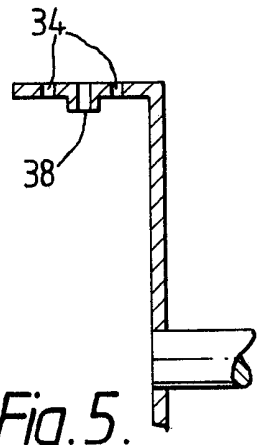


Fig. 5.

## SPECIFICATION

**Apparatus for applying adhesive**

5 This invention relates to apparatus for applying adhesive to sheet-like material, for example blanks of wrapping materials, partly formed packages and webs of material generally.

A well known manner of applying adhesive to a web, or to a discontinuous sheet, is to use a cylindrical member formed with recesses of the corresponding pattern, the member being partly immersed in a receptacle or trough of adhesive and the remainder of the periphery of the cylindrical member being scraped clean so that adhesive is applied by contacting the surface of the cylinder with the web or the sheet. This type of adhesive application is sometimes known as gravure gumming, and a typical example of such apparatus is described in U.S. Patent No. 1,793,082 to H.J. Goss. There the pattern of adhesive is formed by groups of small recesses or pockets. Such recesses may be more suitable for gravure printing, in which the ink fluid to be transferred is of a far lower viscosity than adhesive, and where the ink material is transferred by the application of high pressures onto material to which the ink is to be printed. But with adhesive there is a danger of the recesses becoming gradually clogged or blocked up, so that no new fresh adhesive can be received in those recesses, with the result that there is a failure to transfer the pattern of adhesive.

It has been proposed to overcome this difficulty by widening the recesses to form transverse grooves extending from one side of the cylindrical member to the other. However this is only satisfactory when the width of the cylindrical member is small in relation to the depth of the grooves, otherwise the same clogging problem arises, though more slowly than with recesses.

According to one aspect of the present invention there is provided apparatus for applying adhesive to a sheet-like material, comprising a hollow cylindrical member having a relatively thin peripheral wall with internal and external surfaces and supported for rotation about a horizontal axis, a pattern of perforations extending through said wall, means for supplying adhesive to a portion of the member, and scraper means directed against said internal and external surfaces for removal of excess adhesive, whereby the perforations are filled with adhesive for direct application to the sheet-like material.

The scraper means may comprise inner and outer scrapers of which the inner scraper is positioned upstream relative to the outer scraper, as considered in the direction of rotation of the member.

The inner scraper may be made of plastics or rubber-like material, and may be slightly spaced from said internal surface, since the inner scraper only requires to remove general excess glue from the internal periphery. The outer scraper, on the other hand, is in contact with the external surface of the peripheral wall so as to scrape that surface very clean, in particular those areas where there are no perforations, i.e. where no adhesive is to be applied

to the sheet-like material.

An adhesive applying apparatus according to another aspect of the invention comprises a cylindrical gravure gumming member having a pattern of apertures formed in its peripheral surface, some of which apertures are larger than others, so that such larger apertures apply adhesive in a thicker or denser layer than that applied by the other apertures.

Said larger apertures may be deeper than other apertures, and may take the form of axial grooves where the cylindrical member is solid. Alternatively where the cylindrical member is hollow, said larger apertures may comprise larger holes through the peripheral wall of the hollow member.

An example of apparatus according to the invention will now be described with reference to the accompanying drawings, in which:

*Figure 1* is a side view of the apparatus,  
*Figure 2* is a section of a drum taken on the line II-II of *Figure 1*,

*Figure 3* is a scrap view of the periphery of the drum taken in the direction of arrow III in *Figure 1*,

*Figure 4* is a modification of *Figure 3*, and

*Figure 5* is a further modification of the drum in a sectional view similar to *Figure 2*.

Referring first to *Figure 1* of the drawings, there is shown a receptacle or container 10 for adhesive A, comprising a base 12 and two inclined sides 14 and 16 of which the right hand side 16 as viewed in *Figure 1* is higher than the left-hand side 14. The front and back of the container are enclosed by vertical walls (not shown).

Dipping into the container 10 is a hollow cylindrical gravure drum 18 mounted on a shaft 20 for rotation in an anti-clockwise direction, the drum being supported from the shaft by a circular disc 22 integral with the drum (see also *Figure 2*).

Formed in the relatively thin peripheral wall of the drum 18 is a pattern of perforations. As best seen in *Figure 3*, these are preferably in the shape of circular apertures 24 (or alternatively of diamond shaped apertures 24A). The diameter of the apertures 24 is about the same as the depth of the apertures, so that they are approximately square in the section as seen in *Figure 2*. The actual diameter and depth of the apertures chosen will depend on various factors, in particular on the viscosity of the adhesive to be used (for example, whether a PVA or a hot melt adhesive). However, a typically suitable diameter of the apertures may be about 1mm.

Mounted to the right of the drum 18 are a pair of inner and outer scrapers 26 and 28 having chisel-edged or pointed ends engagable respectively with the internal and external peripheries of the drum. The outer scraper 28 is at a position below the centre line of the shaft 20 and is made of a pointed metallic material mounted close to the drum 18, the drum itself being made of a material such as stainless steel to resist corrosion by the adhesive.

The inner scraper 26 is at the level below the outer scraper 28 so that it is at a position upstream of the drum as considered in the direction of its rotation. The inner scraper 26 may be made of a softer material than the outer scraper and may be made of a

rubbery or plastics material, for example nylon.

There is a small clearance or spacing of the pointed end of the inner scraper from the internal periphery of the drum, in contrast to that of the outer scraper 5 28 which is preferably in close contact with the external periphery.

The outer annular position of the supporting disc 22, which in use will also be wetted by the adhesive A, is similarly scraped clean by internal and external 10 wipers (not shown) which may form part of the scrapers 26 and 28.

A sheet blank B is fed horizontally and tangentially across the top of the drum 18. The sheet B is fed on guides (not shown) over the drum 18 and is brought 15 into contact with the drum by a backing roller or fixed deflector (not shown).

The operation of the adhesive applicator described is fairly self-evident. The container 10 is filled with an adhesive A to a level just above the inside peripheral 20 surface of the drum 18 so that the apertures 24 are properly filled with adhesive. On rotation of the drum 18 the inside periphery of the drum is scraped generally clean by the scraper 26 followed by a very clean scraping by the outer scraper 28. The resulting 25 "slug" or measure of adhesive in each aperture then rotates to the top, where a part of it is deposited against the undersurface of the sheet B while a residue remains in the aperture.

Due to the relatively small cylindrical area of each 30 aperture in contact with the adhesive and the fact that the aperture is also open at the inside, it is believed that there is a gradual replacement of said residue of adhesive in each aperture, particularly from inside, so that there is a radially outward 35 scavenging action with the result that the formation of dried adhesive in the aperture is prevented. Furthermore the deposition of adhesive on to the sheet B can be accomplished using only a light pressure on the sheet from said backing roller or 40 fixed deflector, which reduces the risk of adhesive contamination therewith when a sheet is missing.

Figure 4 shows a modification of the pattern of perforations in the drum. Indicated at 30 are three 45 axial rows of circular apertures or holes which are of small diameter. These small holes 30 are followed by an axial row of two larger diameter holes 32, and the pattern is then repeated.

In use such perforations will apply adhesive to an article, such as the sheet B, in a pattern of three rows 50 of small dots of adhesive which will be thin or shallow (as the cylindrical area of each hole 30 for retaining adhesive is relatively large compared with its peripheral area), followed by a row of two relatively thick blobs of adhesive. When the sheet is 55 applied to another surface to be adhered to it, the rows of shallow adhesive will dry more quickly than the row of two thick blobs, which however will spread out more densely and tend finally to provide a stronger bond between the surfaces to be joined. 60 Furthermore the thick blob will adhere the two surfaces together even if they are not brought into close enough contact for the rows of shallow adhesive to form an adhesive bond. This may be particularly important in forming packages such as 65 hinged lid cigarette packets, for example, where it

cannot always be ensured that the outer side flaps are maintained in flat intimate contact with the underlying inner side flaps during drying of the adhesive.

70 The same principle as described with reference to Figure 4 may be adopted in other gravure gumming applicators where the cylindrical member is solid and its periphery has a pattern of blind recesses or grooves, i.e. not open to the interior. For example, 75 the grooves may be transverse and consist of a repeating pattern of three shallow grooves of about 0.1mm depth followed by a deeper groove of about 0.3mm depth.

In the further modification shown in Figure 5 the 80 internal peripheral surface of the drum is annularly ridged and provided with perforations 38 deeper than than the perforations 34 at each side of the ridge. The inner scraper will, of course, need to have a notch corresponding to the ridged section at the 85 inside of the perforations 38.

The perforations 34 and 38 may be cylindrical or oval, or may even extend circumferentially in the interrupted grooves around the periphery of the drum. In all cases the effect is similar to that 90 described in relation to Figure 4, in that the dots or stripes of adhesive applied by the perforations 34 will provide a quick adhesive bond whereas that applied by the deeper perforations 38 will tend to provide a stronger bond and/or will bridge any 95 surfaces to be adhered which are not in close contact.

#### CLAIMS

100 1. Apparatus for applying adhesive to a sheet-like material, comprising a hollow cylindrical member having a relatively thin peripheral wall with internal and external surfaces and supported for rotation about a horizontal axis, a pattern of perfora- 105 tions extending through said wall, means for supplying adhesive to a portion of the member, and scraper means directed against said internal and external surfaces for the removal of excess adhesive, whereby the perforations are filled with adhesive for 110 direct application to the sheet-like material.

2. Apparatus as claimed in claim 1 in which said means for supplying adhesive comprises a receptacle for containing adhesive into which said peripheral wall is arranged to dip.

115 3. Apparatus as claimed in claim 1 or in claim 2 in which the scraper means comprises inner and outer scrapers, of which the inner scraper is positioned upstream relative to the outer scraper, as considered in the direction of rotation of the member.

120 4. Apparatus as claimed in claim 3 in which the inner scraper is made of a plastics or rubber-like material.

5. Apparatus as claimed in claim 3 or claim 4 in which the inner scraper is slightly spaced from the 125 internal surface of said peripheral wall.

6. Apparatus as claimed in any preceding claims in which said pattern of perforations in the peripheral wall comprises alternate large and small perfora- 130 tions.

7. Apparatus as claimed in claim 6 in which said

large and small perforations are circular holes arranged in alternate axial rows.

8. Apparatus as claimed in claim 6 and further comprising an annular ridge formed in the internal surface of said peripheral wall in which ridge are provided some of said perforations, whereby the perforations in said ridge are larger than the perforations adjacent thereto by reason of their greater depth.

9. Apparatus for applying adhesive to a sheet-like material comprising a cylindrical gravure gumming member having a pattern of apertures formed in its peripheral surface, some of which apertures are larger than others, so that such larger apertures apply adhesive in a thicker or denser layer than that applied by the other apertures.

10. Apparatus as claimed in claim 9 in which the cylindrical member is hollow and is provided with a relatively thin peripheral wall, and in which said pattern of apertures is provided by alternate axial rows of large and small holes extending through said peripheral wall.

11. Apparatus as claimed in claim 9 or claim 10 in which said larger apertures are deeper than the other apertures.

12. Apparatus for applying adhesive to a sheet-like material substantially as herein described with reference to, and as illustrated in, Figures 1 to 3, Figure 4 or Figure 5 of the accompanying drawings.