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(54) SURFACE-STRUCTURED BODIES MANUFACTURED BY PHOTOPOLYMERIZATION, DISTRIBUTING SUCTION OR PRESSURE OVER AN AREA

(71) We, BASF AKTIENGESELLSCHAFT, a German Joint Stock Company of 6700 Ludwigshafen, Federal Republic of Germany, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following Statement:-

The present invention relates to a further use of photopolymerizable plastics, such as are already used, for example, as plane or curved relief printing plates in the printing industry, for the manufacture of suction-clamping and suction-fixing bodies of large area, and for transport devices which provide adjustable or variable friction by means of a flowing pressure medium distributed over a large area.

The irradiation of plates of photopolymerizable plastics with actinic light through a transparent image has been disclosed; this hardens the irradiated areas by polymerization, so that after subsequent washing to remove the unexposed soft areas, a surface structure of peaks and valleys is produced, which corresponds to the transparent image placed over the plate during exposure. Bodies having a surface structure, which can be produced relatively rapidly by this method, are employed successfully as plane or cylindrically curved plates, for example as relief printing plates in the printing industry.

Furthermore, suction-clamping systems have been disclosed, for example in industrial photographic equipment and copying equipment, in which a thin flexible sheet is temporarily fixed, during an exposure, onto a plane support of large area, possessing a fine structure of recesses and ridges, by applying suction from the back of the support. Following a similar principle, suction rollers for transporting webs have been disclosed, in which the required adhesion over a predetermined wrap-round angle of the cylinder surface is exerted onto the moving, or movable, elastic and flexible material web by means of suction, distributed from the interior of the roller by means of a system of channels provided in the surface of the roller. The deliberate release of adhesion to the cylindrical surfaces of transport rollers by exerting a certain pneumatic pressure from the interior of the roller also employs a more or less fine network of recesses in the roller surface.

Machining processes, etching processes and grinding processes - depending on the material in question, which is mostly a metal or glass - have been disclosed for the manufacture of such ridged, network-like air channels on static clamping devices and rotating transport rollers. The machining processes are relatively expensive and present particularly great problems if channels less than one millimeter deep are to be produced. The production of channels etched in glass is also expensive and troublesome. Very fine channels are required for the manufacture of clamping plates and suction-transport rollers, for example for processing photographic films, and to this extent require particularly long processing times, using expensive equipment.

We have found that clamping and fixing devices, as well as transport rollers, with adjustable and variable static friction can be manufactured at substantially lower cost, without such troublesome and expensive

process steps, by using a plastics body according to the invention, especially a plate or cylinder, which has been manufactured and treated by photopolymerization processes for their functionally active surface which is covered with a network-like system of intercommunicating fine channels.

The conventional photopolymerization processes for the manufacture of printing plates make it possible, for the purposes of the invention, to manufacture plane plates and arc shaped segments or cylinders having any configuration, with both relatively coarse and extremely fine ridges and grooves or recesses in the surface, and these bodies can all be manufactured with virtually the same cost and the same amount of work per unit area.

The accompanying drawing shows, firstly, systematically patterned networks of grooves or recesses in the surface of a photopolymerizable plastics plate and, secondly, on a greatly magnified scale, the manner in which the suction connections are made from the back of the plate. Figure 1 shows a particularly fine network of grooves, the finest branches of which have, for example, a depth of less than 0.1 mm. The points at which a suction connection is made from the back are marked V1 and V2 in Figure 1. As regards the adhesion and clamping forces of, in particular, very thin films to plane surfaces or cylinders, it is not necessary to provide the entire surface of the particular body with the network; instead it suffices, for example, to provide the network in the edge zone, as shown in Figure 1.

Figure 2 shows a coarser grid of grooves R of constant depth. In the region of the rear suction connection V3, further parallel and diagonal recesses are provided in the relevant square of the grid, so that, for example, pressure changes and pressure alternations for clamping and releasing the film can be induced with minimum delay into the network of recesses.

Figure 3 shows, on a larger scale, a cross-section through a pneumatic connection point at the back of the plate. The plate P, manufactured by photopolymerization in such a way as to possess a network of recesses, is pressed onto a carrier plate T. In the region of the pressure or suction connection V, the carrier plate T is provided with a bore, onto which, for example, a hose-connector nipple N is butt-welded from the back. Depending on the use of the clamping device, the hose connections S are permanently fixed to, or detachable from, the nipple N. In the region of the pressure or suction distribution points V within the network of grooves and recesses, the grooves of normal dimensions, produced by photopolymerization, can additionally be made somewhat deeper by slight machining, so that at these points they extend down to the carrier plate T, as shown schematically in Figure 3.

If plastics bodies provided with a surface structure in the manner described above are required as cylinders rather than as plane plates, for example for roller-type transport devices with adjustable static friction, it is possible either to produce this cylinder by curving a plane plate and welding a seam, or by producing a thin-walled, seamless cylinder with a predetermined surface structure by photopolymerization and then to shrink it onto a thicker-walled roller. Using the last-mentioned method of manufacture, a cylindrical surface having a network free from interruptions in the circumferential direction is obtained.

WHAT WE CLAIM IS:-

1. A plastics body having at least a portion of a surface thereof provided with a network-like system of intercommunicating channels produced by photopolymerisation, which channels communicate with connections in the body for a suction line or pressure line, the said body being useful for the distribution of suction or pressure over an area on static clamping and fixing devices and on rotating transport devices with adjustable and variable static friction.

2. A plastics body as claimed in claim 1, in which the plastics body is produced as a film, by photopolymerization, and is then fastened on a solid or rigid support of a clamping or transport device.

3. A plastics body as claimed in claim 1 or 2 for the cylindrical surface of a roller-type transport device, which is a thin-walled, seamless cylinder with a predetermined surface structure produced by photopolymerization, the cylinder being shrunk onto a thicker-walled roller.

4. A plastics body as claimed in claim 1 and substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

5. A static clamping and fixing device or a rotating transport device with adjustable and variable static friction which is provided with a plastics body as claimed in any of claims 1 to 4 for the distribution of suction or pressure.

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1584969 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

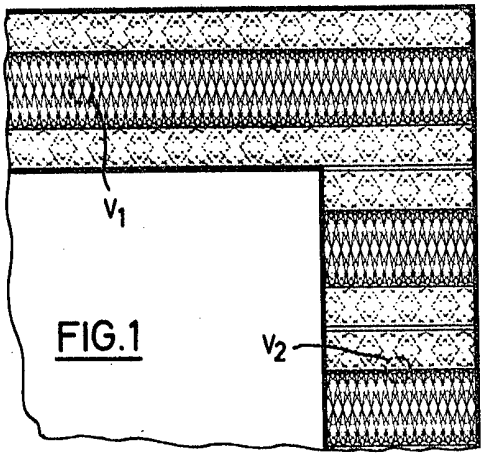
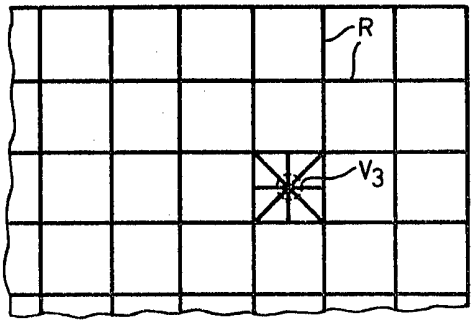


FIG.1

FIG.2



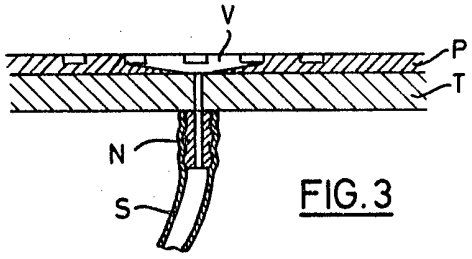


FIG.3