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(54) A METHOD AND AN APPARATUS FOR FORMING
 A LAYER OF GLASS FIBRES

(71) I, GERHARD PRIEBE, a German citizen of 31 Wilhelmsaue, 1000 Berlin 31, Federal Republic of Germany, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a method and an apparatus for arranging individual glass fibres side by side. The method is a preliminary stage for further processing operations to which the glass fibres are subjected.

It is known to use glass fibres in the form of so-called "brushes" for decorative lamps or for producing light effects, light of varying colour being introduced into the ends of the fibres which have been assembled together to form a skein or bunch. The individual glass fibres of the brush element bend out of the generally vertically held bunch from a specific length onwards owing to their own dead weight, outwards and downwards, and thus assume the desired shape of their own accord. Since the diameter of the individual fibres cannot be reduced to an optionally small size this would prejudice the light conductivity and the strength of the fibres, hitherto it has not been possible to produce short brush elements of the desired shape.

It seems an obvious step to bend the fibres. But insuperable difficulties were encountered, since in that case it became necessary to change the shape of substantially every individual fibre of a bunch containing about 2,000-20,000 individual fibres. For hitherto it has not been possible to take a bunch of fibres and produce directly therefrom a brush element which has a specific spread at the brush end in such a manner that this spread is maintained by the brush element of its own accord. A further idea was to arrange the

individual glass fibres side by side and subject them to a bending operation jointly, but this idea also was not practicable since the prejudice existed that it would be impossible to arrange the about 2,000-20,000 glass fibres necessary for a brush element precisely side by side with an outlay as regards time which was economically justifiable.

The aim of the invention is to solve the aforesaid problem and to provide a suitable method and a suitable apparatus for arranging individual glass fibres side by side.

According to the present invention there is provided a method for forming a layer of individual glass fibres arranged side by side comprising the steps of placing a plurality of fibre bunches parallel and side by side, arranging transversely to the direction of the fibres a support or band provided with an adhesive substance, pressing it on to the fibre bunches and lifting it away with a layer of fibres sticking to it.

To carry out this method there is provided an apparatus comprising a base plate carrying a plurality of parallel, spaced apart narrow longitudinal ledges, the spaces between the ledges forming channels for receiving glass fibre bunches, adjustable abutments arranged longitudinally of the fibres at a distance from one end of the channels, an upwardly and downwardly movable holding means arranged in the space between the abutments and the said ends of the longitudinal ledges and two upwardly and downwardly movable supports arranged one at each side of the base plate between the said ends of the longitudinal ledges and the abutments and disposed outside the region of imaginary prolongations of the channels, said supports being for an adhesive band guided transversely relatively to the direction of the longitudinal ledges.

The advantages which are obtained with the invention consist essentially in that with a few simple method steps and using a relatively uncomplicated apparatus it is possible to arrange glass fibres side by side precisely and quickly so that it is possible to produce a preliminary product which is very well suited to further processing operations such as, for example, bending, shaping or winding.

The invention will now be described, with the help of one embodiment of an apparatus suitable for carrying out the method, with reference to the accompanying diagrammatic drawing, in which:

Fig. 1 shows a side view of the apparatus, and

Fig. 2 a plan view thereof.

The method proposed by the present invention uses as a starting material a glass fibre material which is supplied commercially in bunches of varying length or is cut *in situ* to specific lengths. These bunches are inserted into the apparatus which is shown in the drawings. The apparatus comprises a rectangular base plate 1 carrying a plurality of narrow, parallel, longitudinal ledges 2 which advantageously consist of thin rigid sheet metal. The channels 3 formed between the ledges 2 are used for receiving the glass fibre bunches (not shown). Spaced in front of one end of the channels 3 are situated longitudinally adjustable abutments 4. In the space between the abutments 4 and the longitudinal ledges 2 there is situated an upwardly and downwardly movable holding yoke 5 which extends transversely over the base plate 1 above the glass fibre bunches positioned on the latter. In the space between the ledges 2 and yoke 5, outside the region of the imaginary prolongations of the channels 3, there are situated upwardly and downwardly movable supports 6, one at each side of the base plate 1, for an adhesive band which is guided transversely relatively to the direction of the longitudinal ledges 2.

The glass fibre bunches (not shown) are pushed up to the abutments 4 after being inserted in the channels 3 of the apparatus, and are held in position by the holding yoke 5. Then an adhesive band with the adhesive side downwards is placed over the supports 6 and moved downwards jointly with the supports 6. As soon as it bears against the glass fibres, the band is pressed, by rubbing with a slight pressure, against the glass fibres, so that a layer of fibres remains sticking to the band. Then the holding yoke 5 is lifted and also the

said layer, which has the form of a mat, is lifted by means of the adhesive band and a flat bar is passed under the layer and the fibres of the layer allow themselves to be stripped out of the bunches or out of the channels 3. What is then obtained is a mat of fibres held together by the adhesive band, in which each individual fibre is arranged immediately alongside and parallel to the neighbouring fibre. In this arrangement the fibres can be fixed to one another in such a manner, for example by means of a curable glue or casting resin in the region of the adhesive band, that turning movement of the fibres relatively to one another is no longer possible. This ensures, for example, that the fibres are in a regular arrangement in glass fibre brush elements.

The invention opens up a wide field of use for glass fibres. For example it is possible to construct the ends of a fibre mat produced by the method proposed by the invention to constitute patterns, letters or characters, so that light conducted through the fibres can achieve an extremely attractive effect.

WHAT I CLAIM IS:

1. A method for forming a layer of individual glass fibres arranged side by side, comprising the steps of placing a plurality of fibre bunches parallel and side by side, arranging transversely to the direction of the fibres a support or band provided with an adhesive substance, pressing it onto the fibre bunches and lifting it away with a layer of fibres sticking to it.
2. A method for forming a layer of glass fibres substantially as herein described with reference to the accompanying drawing.
3. An apparatus for carrying out the method according to Claim 1 or 2 comprising a base plate carrying a plurality of parallel, spaced apart narrow longitudinal ledges, the spaces between the ledges forming channels for receiving glass fibre bunches, adjustable abutments arranged longitudinally of the fibres at a distance from one end of the channels, an upwardly and downwardly movable holding means arranged in the space between the abutments and the said ends of the longitudinal ledges, and two upwardly and downwardly movable supports arranged one at each side of the base plate between the said ends of the longitudinal ledges and the abutments and disposed outside the region of imaginary prolongations of the channels, said supports being for an adhesive band guided

transversely relatively to the direction of the longitudinal ledges.

4. An apparatus for forming a layer of glass fibres substantially as herein described
5 with reference to and as shown in the accompanying drawing.

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