March 19, 1940. J. KRAMS 2,194,122

METHOD OF MANUFACTURING BRUSHES

Filed Feb. 4, 1939

Fig. 1

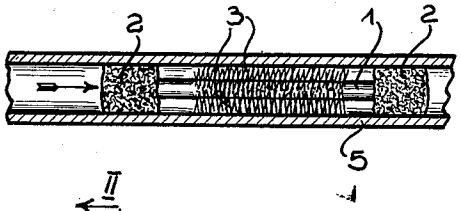


Fig. 2

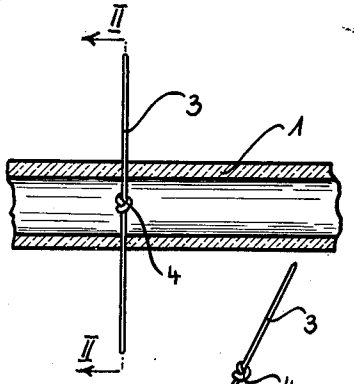


Fig. 3

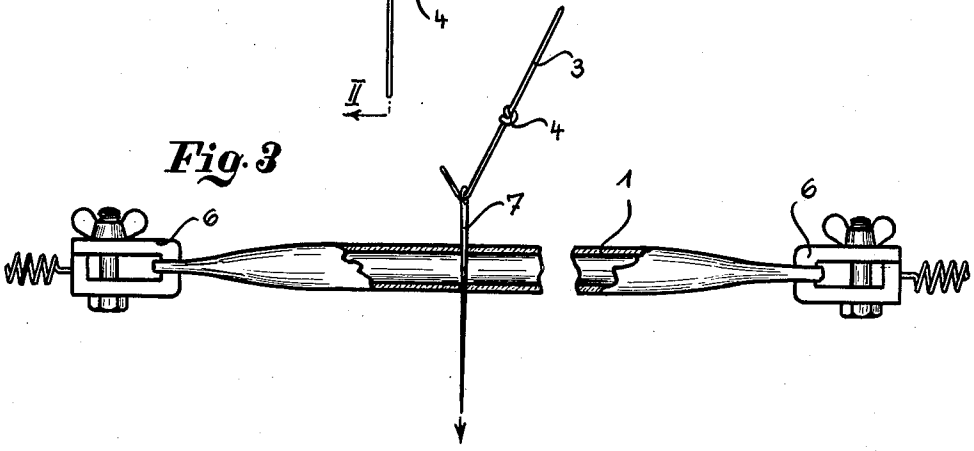
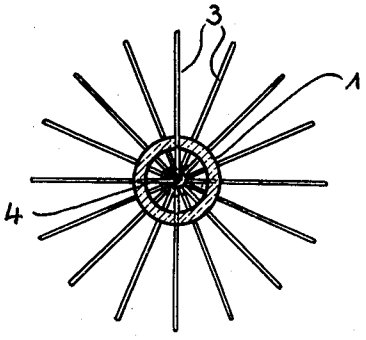


Fig. 4



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METHOD OF MANUFACTURING BRUSHES

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5 Claims. (Cl. 300—21)

The invention relates to the manufacture of brushes or cleaners and is more particularly concerned with the manufacture of brushes having a flexible tube of rubber or like carrier for accommodating bristles. These brushes, which have a relatively small diameter, may serve the purpose of cleaning narrow pipelines, more particularly beer pipelines, and are provided at both ends with stoppers adapted to the internal diameter of the pipelines, so that after being inserted in the pipeline they can be forced through said pipeline by means of a compressed medium acting against one of the stoppers of said brush. In view of the fact that the pipeline to be cleaned may contain bends throughout its length, the brush body parts must be pliable. It has therefore been proposed to use a length of rubber tubing as the brush body. This however presents the difficulty of attaching the bristles to the thin rubber tube in a durable manner and with the requisite closeness to ensure a perfect cleansing action.

The present invention solves the problem of manufacturing these brushes having a flexible tube of rubber or like carrier for accommodating the bristles by first stretching the tube axially, then providing the wall with a number of fine perforations in which the bristles are arranged, the size of a knot made in the middle of each bristle exceeding the diameter of the perforation (when unstretched), whereupon each individual bristle is pulled through diametrically opposite perforations in such a manner that the knots remain encased by the rubber tube. The tension on the rubber tube is then released and finished by providing both ends with a stopper made of an elastic or yielding material. It is advisable to thread each bristle through the eye of a needle after the knot has been tied so as to facilitate threading them through the perforations by means of said needle. In this manner the forming of the perforations and the insertion of the appertaining bristle can be effected in one working operation. The perforations are arranged on two helically extending lines on opposite sides of the tube.

When the tension on the tube has been released after being stretched the bristles are held firmly in the perforations due to the diminishing in size of the perforations, the knots located inside the tube preventing the bristles from falling out. The protruding ends of the bristles are then cropped so as to form a cylindrical body.

The method and product derived therefrom will now be further explained with reference to the accompanying drawing in which

Figure 1 illustrates in full size a finished brush made in accordance with the invention, shown in working position within a portion of a pipeline, the latter being shown in section.

Figure 2 illustrates on a larger scale a portion of the tube in section provided with a bristle threaded through the tube wall,

Figure 3 illustrates the tube under tension with the needle applied thereto for the purpose of pulling through a bristle, the needle and bristle being both drawn to a larger scale than that of the tube, and

Figure 4 illustrates a cross section along line II—II of Figure 2 with several bristles in position.

The finished brush (Figure 1) consists of a tubular body 1, carrying at each end a stopper 2 made preferably of sponge rubber or the like. Bristles 3 are pulled through the tubular body 1 in a spiral-like arrangement, each bristle being tied in a knot 4 encased within the tubular body 1. The bristles 3 form together with the two end stoppers 2 a cylindrical body which is adapted to be driven through the pipeline 5 (Fig. 1), as by means of hydraulic pressure. The diameter of the stoppers 2 and of the brush body 1 is conformable by virtue of their resiliency and flexibility to the internal diameter of the pipeline 5.

For the purpose of manufacturing the brush body the tubing 1 is tensioned lengthwisely for example between two clamps 6 (Figure 3) and in this manner said tubing is stretched axially. The bristle 3 to be inserted is looped once or twice for the purpose of forming a knot 4 thereon and then threaded through the eye of a needle 7 (Fig. 3). The needle 7 is then drawn through the tensioned tube 1 in a radial direction so that the end of the bristle 3 is drawn into the wall of the tube 1 until the knot 4 is inside the tube, and then out through the wall on the opposite side thus leaving said knot within said tube. The needle is then released from the bristle and the next bristle is attached to the tube 1 in the same manner. In this way the individual bristles will be arranged in staggered formation, extending around the tubular body in the form of a spiral (Figure 4). When all the bristles have been inserted within the tube 1, the latter is released from the clamps 6 and owing to the resultant contraction of the perforations (caused by said needle) the said bristles are firmly held both by the walls surrounding said perforations and by the knots located inside the tube 1. The ends of the tube 1 beyond said bristles are then provided with stoppers 2 as by cementing the same to said tube ends, respectively.

The protruding ends of the bristles are then cropped so as to form a cylindrical body substantially corresponding to the diameter of the stoppers 2.

For the purpose of manufacturing the brushes the tensioned length of rubber tube can also first be provided with all the requisite perforations, whereupon the bristles are inserted as a second operation. Furthermore, a long piece of rubber tubing may be clamped in position and several brush bodies formed thereon having appropriate intervals, whereupon the tube may be cut up into several brush lengths after release from the clamps.

What is claimed and desired to be secured by Letters Patent is:

1. A method of manufacturing a brush having a tube made of elastic material accommodating bristles, consisting in axially stretching the tube, arranging fine bore perforations in the wall of the tube, drawing bristles having a knot tied in the middle thereof through two diametrically opposite perforations in such a manner that the knots remain encased inside the tube, and finally releasing the tube from tension.

2. A method of manufacturing a brush having a tube made of elastic material accommodating bristles, consisting in axially stretching the tube, threading the bristles having a knot tied in the middle thereof through the eye of a needle, drawing the bristles through the tube by means of said needle in such a manner that the knots remain encased inside the tube, and finally releasing the tube from tension.

3. A method of manufacturing a brush having a tube made of elastic material accommodating bristles, consisting in axially stretching the tube, drawing the bristles each having a knot tied therein through the tube in such a manner that the knots remain encased inside the tube, the ends of the tube being left free, releasing the tube from tension, and attaching stoppers made of elastic material to said free ends of the tube.

4. A method of manufacturing a brush having a tube made of elastic material accommodating bristles, consisting in axially stretching the tube, drawing the bristles each having a knot tied therein through the tube in such a manner that the knots remain encased inside the tube, the ends of the tube being left free, releasing the tube from tension, attaching stoppers made of elastic material to said free ends of the tube, cropping the protruding ends of the inserted bristles at a distance from said tube for the purpose of forming a cylindrical body the diameter of which substantially corresponds to the diameter of said stoppers.

5. A method of manufacturing brushes having a tube made of elastic material for accommodating bristles, consisting in placing a length of rubber tubing under axial tension, forming several brush bodies thereon leaving in spaced apart relation, the appropriate spaces between said brush bodies releasing the tube from tension, severing the tube into several brush body sections, and attaching stoppers to the ends of said brush sections.

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