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APPARATUS FOR THE TREATMENT OF TEXTILE FIBERS

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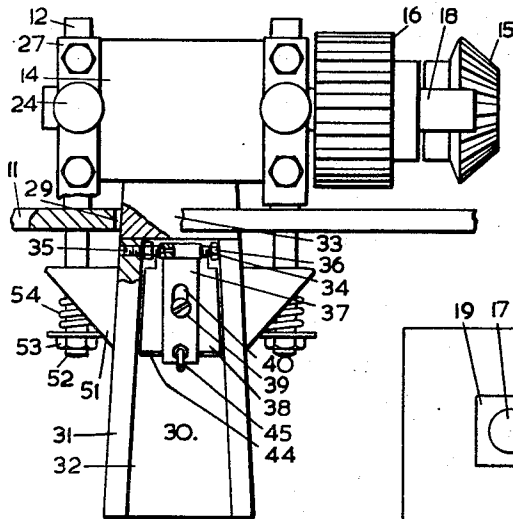


FIG. 1.

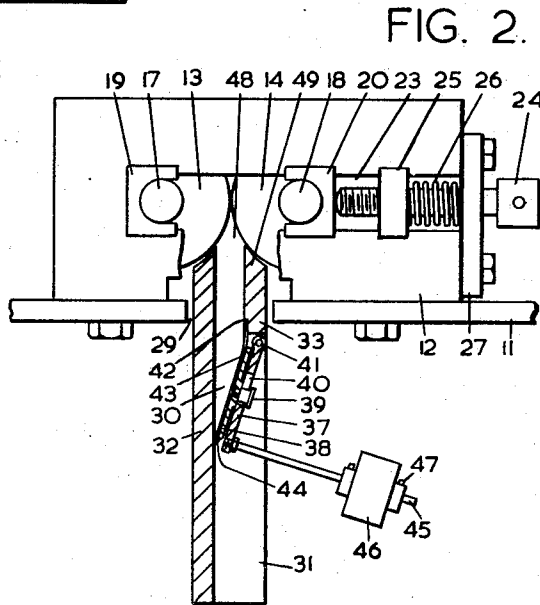


FIG. 2.

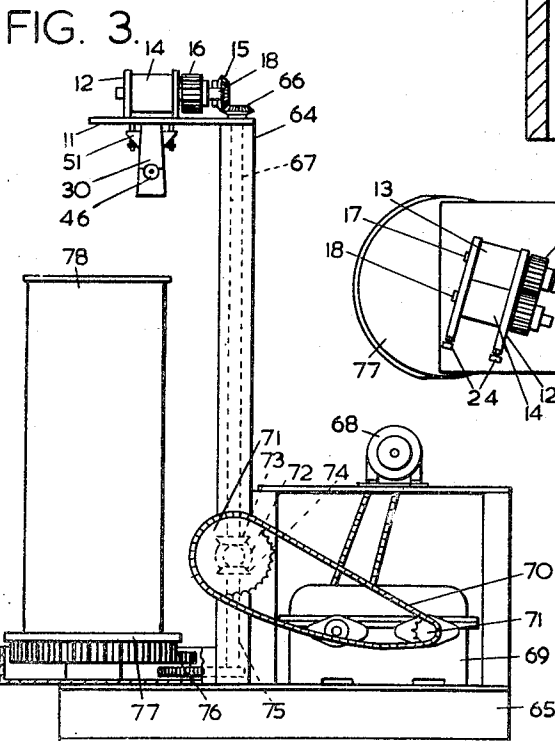


FIG. 3.

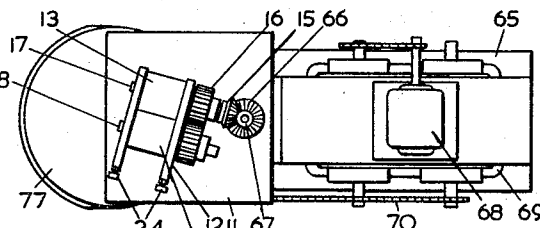


FIG. 4.

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APPARATUS FOR THE TREATMENT OF TEXTILE FIBERS

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7 Claims. (Cl. 19—66)

This invention relates to apparatus for the treatment of textile fibres and particularly to apparatus for mechanically imparting a crimp to such fibres.

In one kind of apparatus for this purpose, a continuous sliver of staple fibres or a bundle of continuous filaments is forcibly fed by a pair of nip rollers into a confined passage, one end of which fits closely to the feed rollers while the other is closed by a hinged flap forming a continuation of one wall of the passage. The flap is loaded, e. g. by springs or by a weighted lever, towards a closed position so as to require a substantial pressure in the fibres contained in the passage to force it open and to allow the fibres to emerge, which pressure fixes in the fibres, in some degree, the crimped or buckled configuration assumed by them on being forced into the passage, so that crimp is imparted to the fibres.

It is an object of the present invention, in an apparatus of this kind, to make provision for preventing the fibres treated in the apparatus from lodging and jamming, under the heavy pressures involved, in the crevices and interstices of the apparatus, a phenomenon which is apt to necessitate frequent stoppage of the crimping operation in order to clear the apparatus.

According to the present invention, an apparatus for the crimping of textile fibres comprises a pair of nip rollers, a confined passage one end of which fits closely to said feed rollers, a hinged flap forming a continuation of one wall of said passage, said flap being loaded towards a position in which it closes said passage, and a sheet of flexible material anchored at one end within said passage and covering the hinge and the surface of the wall and of the flap on each side of said hinge so as to prevent fibres in the passage from coming into contact with the hinge. By these means, without hindering the opening and closing of the flap under the loading thereof and under the pressure of the fibres within the passage, lodgment of the fibres in the interstices of the hinge is prevented so that the jamming of the hinge and the frequent necessity of interrupting the crimping operation for cleaning the hinge are overcome.

The sheet of flexible material is preferably of a springy metal such as mild steel or brass. It can be anchored by being brazed, welded or screwed to the short section of wall between the nip rollers and the hinge of the flap, the wall being suitably stepped or recessed to receive the end of the flexible sheet without forming a ledge against which the fibres would be liable to catch.

According to a further feature of the invention, in order to prevent lodgment of the fibres between the nip rollers and the mouth of the passage, the passage is resiliently mounted with reference to the bearings of the nip rollers so as to be urged constantly against the curved surfaces of the rollers. In this way, as the rollers move relatively to one another, e. g. by reason of small inequalities in the thickness of the fibrous product supplied to them, contact is maintained between the mouth of the passage and the surfaces of the rollers, and the forcing of the fibres between the said mouth and the rollers is prevented. The mouth of the passage may engage the surfaces of the rollers over substantially the whole of its periphery, the side walls of the passage being shaped to conform to the nip of the rollers, or it may engage only over those edges which are parallel to the roller axes, the side walls in this case extending past and in contact with the ends of the rollers, or fitting into circumferential grooves in the rollers, provided to

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receive the edges. In either case the resilient mounting of the passage is advantageous.

By way of example one form of apparatus according to the invention will now be described in greater detail with reference to the accompanying drawings in which,

Figure 1 is a front elevation, and Figure 2 a side elevation, both partly in section, of the crimping apparatus, and

Figure 3 is a side elevation and Figure 4 a plan of an apparatus in which the crimping apparatus of Figures 1 and 2 can be employed.

Referring to Figures 1 and 2 the apparatus shown therein is mounted on a square base plate 11 on which are two upstanding side brackets 12 carrying between them a pair of nip rollers 13, 14 each of $1\frac{1}{4}$ " radius. The rollers 13, 14 are driven, in a manner to be described hereafter, through a bevel gear 15 and are geared to one another by spur gears 16 mounted on the spindle 17, 18 of the rollers 13, 14. The bevel gear 15 is mounted on the spindle 17. The spindles 17, 18 are carried in half-bearings 19, 20 sliding in horizontal slots 23 in the side brackets 12. The half-bearings 19 are lodged in the ends of the slots while the half-bearings 20 are urged towards the half-bearings 19 by means of screws 24 threaded into blocks 25 slidable in the slots 23, the blocks 25 being acted upon by springs 26 which abut against end plates 27 on the brackets 12. The pressure exerted by the springs 26 can be adjusted by turning the screws 24.

Beneath the rollers 13, 14 a rectangular hole 29 is formed in the base plate 11 through which extends the crimping passage, indicated generally at 30. The passage 30 is formed by side walls 31, a rear wall 32, and a short front wall 33 let into suitably shaped recesses in the front edges of the side walls 31. The sidewalls 31 diverge slightly, as shown in Figure 1, to avoid jamming of the fibrous mass within the passage 30. Screwed through the side walls 31 just below the lower edge of the front wall 33 are two pins 34 slotted at their outer ends as at 35 to receive a tool for the adjustment of their position, and secured in place by lock nuts 36. The inner ends of the pins 34 are conically pointed and enter into conical enlargements at each end of a bore 41 near the top edge of the portion 37 of a two-part flap 37, 38 which is thus pivoted on a hinge constituted by the pins 34 and bore 41. The other portion 38 of the flap is in the form of a plate, loosely mounted beneath the hinged portion 37 shaped to conform to the side walls 31 and secured to the hinged portion 37 by means of a screw 39 passing through a slot 40 in the hinged portion 37. The threaded portion of the screw 39 screws into a slightly raised boss on the face of the plate 38 and is of reduced diameter so that the screw 39 does not nip the portion 37. At 42 on the inner face of the front wall 33 is brazed the upper edge of a sheet 43 of flexible brass, the front wall 33 being relieved below 42 so that the wall above 42 leads smoothly into the surface of the sheet 43. The lower edge of the sheet 43 is rolled so as to form a bead 44 just below the lower edge of the plate 38 and serving to support the plate. Screwed into the hinged portion 37 near the lower edge thereof is a rod 45 extending at right-angles to the flap and carrying a cylindrical lead weight 46 adjustable along the length of the rod 45 and secured in position by means of set screws 47. The upper ends of the side walls 31 of the crimping passage are shaped at 48 to conform to the nip of the rollers 13, 14 while the upper edges of the rear and front walls 32, 33 are bevelled at 49.

Welded to the side walls 31 are horizontally extending brackets 51 of inverted U or channel section through which pass studs 52, screwed into the underside of the base plate 11. Nuts 53 are screwed on the ends of the studs 52 and act through springs 54 located partly within the channel section of the brackets 51 so as to urge the crimping passage 30 upwards into engagement with the nip rollers 13, 14. By these means the mouth 48, 49 of the passage 30 is held in constant engagement with the rollers 13, 14, notwithstanding that the rollers may move apart as the fibres fed thereby pass between them.

The crimping device described above is employed in conjunction with a conventional coiler mechanism as

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shown in Figures 3 and 4. The base plate 11 of the crimping device is mounted at the top of a cylindrical column 64 rising from the base of the coiler mechanism 65. A bevel gear 66 for engagement with bevel gear 15, described above, is mounted on the upper end of a shaft 67 extending up the column 64. The shaft 67 is driven from an electric motor 68 through an infinitely variable gear unit 69 which is connected by means of a chain 70 and sprockets 71 to a bevel gear 72. The bevel gear 72 drives two bevel gears 73, 74, the gear 73 being mounted on the lower end of the shaft 67 while the gear 74 is mounted on the upper end of a further shaft 75. From the shaft 75 the drive is transmitted through gears 76 to a rotatable platform 77 on which is placed a coiler can 78 lying below the mouth of the crimping passage.

In the operation of the device a thick sliver of staple fibres or tow of continuous filaments is fed by the nip rollers 13, 14 into the passage 30, in which they are retained by the weight-loaded flap 37, 38 and subjected to crimping pressure. When sufficient pressure is built up, the flap 37, 38 is forced open and the crimped product emerges continuously into the coiler can 78 which is rotated to distribute the crimped filaments or fibres in the can. The springy sheet 43 is supported over substantially its whole area by the lower part of the front wall 33 and by the plate 38, the freedom of the plate 38 to rock slightly about the boss on its face enabling it to accommodate itself to the sheet without forming a step behind the sheet at the junction of the hinge at the upper edge of the flap 37, 38. The lower edge of the plate 38 is supported by the rolled edge 44 of the thin sheet 43, and its upper edge is in close, but slightly variable proximity to the lower edge of the front wall 33. Notwithstanding the high pressure to which the fibres are subjected while in the passage 30, the close fitting of the mouth of the passage constituted by the portions 48, 49 prevents the fibres being forced out between the rollers 13, 14 and the mouth of the passage 30, while the flexible sheet 43 covering the hinge of the flap 37, 38 guides the fibres past the hinge so that they do not enter the hinge and cause it to jam.

Having described our invention, what we desire to secure by Letters Patent is:

1. Apparatus for the crimping of textile fibres said apparatus comprising a pair on nip rollers, means de-

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fining a confined passage one end of which fits closely to said nip rollers, a flap pivoted on a hinge and forming a continuation of one wall of said passage, said flap being loaded towards a position in which it closes said passage, and a sheet of flexible material anchored at one end within said passage and covering said hinge and the surface of the wall and of said flap on each side of said hinge.

2. Apparatus according to claim 1 in which the sheet of flexible material is of springy metal.

3. Apparatus according to claim 2 wherein the sheet is anchored to the wall of the passage of which the flap forms a continuation, said wall being recessed to receive the anchored end of said sheet.

4. Apparatus according to claim 1 wherein the free edge of the flexible sheet extends just beyond the edge of the flap and is turned over to form a bead.

5. Apparatus according to claim 1 in which the flap comprises a hinged portion and a plate loosely connected to said hinged portion and disposed between said hinged portion and the flexible sheet.

6. Apparatus according to claim 1, wherein the means defining the confined passage is resiliently mounted in relation to the nip rollers so as to urge the mouth of the passage into engagement with the nip rollers, the walls of said passage at the mouth thereof being shaped to conform to the surfaces of the nip rollers.

7. Apparatus according to claim 1 in which the flap comprises a hinged portion and a plate loosely connected to said hinged portion and disposed between said hinged portion and the flexible sheet, and wherein the free edge of the flexible sheet extends just beyond the edge of said plate and is turned over to form a bead so as to support said plate.

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