April 22, 1930. R. L. G. BURAUX ET AL 1,755,809

MANUFACTURE OF TUBULAR CORDS OR BRAIDS

Filed Feb. 25, 1928

Fig. 1

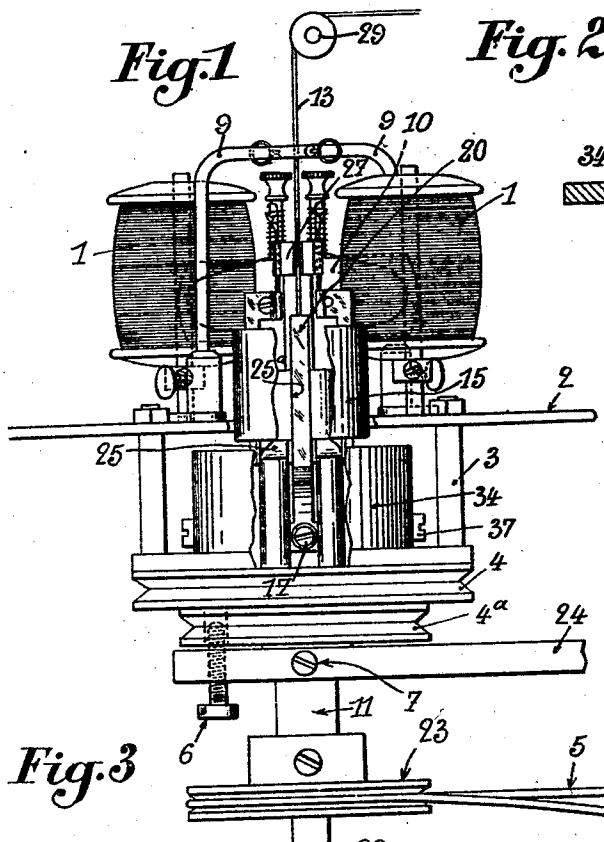

Fig. 2

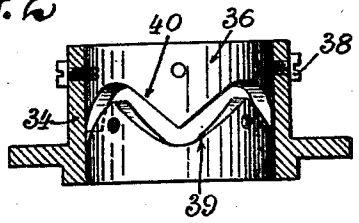

Fig. 5

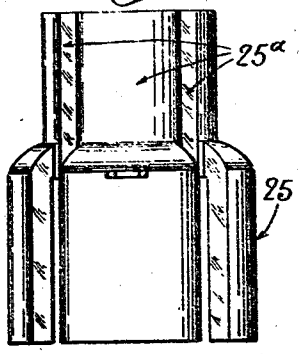

Fig. 3

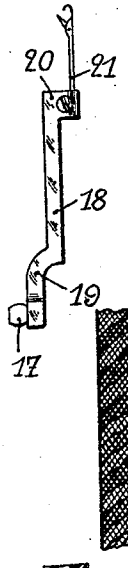

Fig. 4

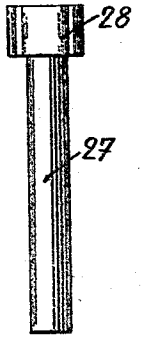

Fig. 7.

Fig. 6.

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UNITED STATES PATENT OFFICE

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MANUFACTURE OF TUBULAR CORDS OR BRAIDS

Application filed February 25, 1928, Serial No. 256,906, and in France March 15, 1927.

The present invention relates to machines for the manufacture of tubular cords or braids, and to methods for producing cords twisted in the opposite direction to the knitting.

According to current practice, the tubular kitted cord or braid issuing from the machine is a cord in which the thread forms coils having a small pitch and which will be hereinafter designated as a "cord with closed convolutions." To obtain a cord twisted in the opposite direction to the knitting (which will be hereinafter designated as a "cord with open convolutions") that is to say, in the case of yarns of various colours, a cord with a lengthwise colour disposition, it is required to twist the said cord in the contrary direction to its natural spiral turns produced by knitting, thus requiring the use of special machines with a consequent increase in the cost of the finished product.

Our invention has for its object to provide a machine for the direct obtainment of cords "with open convolutions," another object of the invention is to provide a machine which is adapted for the production of such cords "with open convolutions," but which may be readily converted into a machine for the manufacture of cords with "closed convolutions," so that a given machine will produce both classes of goods.

The appended drawing shows by way of example an embodiment of the invention.

Fig. 1 is an elevational view, with parts broken away, of a constructional form of the machine which is arranged for the manufacture of cords with open convolutions, two of the four bobbins being removed for the sake of clearness.

Fig. 2 is a partial vertical section of the cam cylinder.

Fig. 3 is an elevational view of a needle.

Fig. 4 is an elevational view of a needle guiding tube.

Fig. 5 is a like view of the needle bed.

Figs. 6 and 7 are diagrammatic views showing two colour cords with "closed convolutions" and with "open convolutions," respectively.

As shown in Fig. 1, 24 is a suitable bracket or frame in which is mounted a hollow spindle 11 to which is keyed a pulley 23. Upon said spindle are mounted two loose pulleys 4—4ª of different diameters, which support—by means of the upright spacers 3—a bobbin carrier 2; the bobbins of silk, cotton or the like, are shown at 1 and are four in number. The drawing shows only the two bobbins situated at the rear of the plane of the figure, for the sake of clearness. Upon the bobbin carrier are also mounted the brakes 10 for regulating the unwinding of the bobbins and the thread guides 9. Mounted loosely on spindle 11 is the cam cylinder 36 which is secured to and is adapted to rotate with the pulleys 4—4ª.

To the shaft 11 is keyed the needle bed 25 (Fig. 5) having vertical needle grooves 25ª adapted to receive the needle shanks 18 of the needles 21; said needles are guided in grooves of the head 28 of the needle guiding tube 27 (Fig. 4). Each needle shank 18 carries a roller 17 which protrudes between the raising and lowering cams 39—40 of the cam cylinder 36, secured to an outer ring 34.

In the bracket or frame 24 are mounted a screw 6, which may enter a hole in the pulley 4, and a set screw 7 which is adapted to hold fast the spindle 11.

If the screw 6 is completely screwed in and the screw 7 loosened, and if the driving belt 5 is passed around the pulley 23 (Fig. 1) the pulleys 4 and 4ª—and hence the bobbin carrier 2 and the cam cylinder 36—will be held stationary upon the bracket 24, whilst the spindle 11, the needle bed 25 and the needles will be rotated by the pulley 23.

If however, the screw 6 is unscrewed and the screw 7 tightened against the shaft 11, and the driving belt 5 passed around one of the pulleys 4 or 4ª, the spindle 11 and the needle bed 25 will be held stationary, whilst the bobbin carrier 2 and the cam cylinder 36 are rotated by the pulley 4 or 4ª. Herein the belt 5 is so disposed that the relative motion of the bobbins relativelv to the needle bed will be the same as in the preceding case.

In both cases, the needles will rotate with reference to the cam cylinder, (or vice-versa), and the rollers 17 thus move between

the cams 39—40 and reciprocate the needles 18 in their grooves 25a. The needles thus assume a vertical reciprocating motion, while rotating with reference to the bobbins, or inversely. The thread which is delivered by the rings of the thread guides 9 is caught by the hooks of the needles which interlace the threads and knit the tubular cord in the known manner; the cord is delivered from the machine through the tube 27 and the hollow spindle 11.

If the end of the cord 8 is left free, the cord issuing from the machine will in all cases be a cord with open convolutions, but if the cord is clamped or prevented from rotating about its axis when leaving the machine, the result will be a cord with open or with closed convolutions, according to the arrangement of the machine. It will be observed, that with the machine arranged as shown in Fig. 1, the upper end of the cord during the knitting operation, is rotated together with the needles 21, whilst the lower end, which is clamped as above stated, is held against rotation, thus producing a twist of the cord in the contrary direction to its natural twist, due to the knitting, which tends to open the convolutions of the cord, i. e. to lengthen the pitch of the spirals formed by the knitted threads. Fig. 7 shows such a cord, in the case of a two-colour cord.

When the machine is so arranged that the needles are held stationary, as above explained, the cord is not twisted, and the product will consist of a cord with closed convolutions, i. e., a cord in its natural state as formed by the knitting process. Fig. 6 shows such a cord, in the case of two-colour cord, similar to the cord of Fig. 6, obtained with the other arrangement of the machine.

Experience proves that the cord with so-called "open-convolutions" is smooth, brilliant, silky, resilient and strong, while the other article leaves the meshes visible, is dead, has no resilience, and is easily ravelled out. When the cord is made with threads of several colors, the appearance is more agreeable with the colored bands elongated than alternated in the axial direction. Hence, in numerous applications in ladies' garment manufacture, (such as fringes or shawls) where the article with "open convolutions" constitutes a beautiful article of ornamentation, the other article cannot be used. From the point of view of utility, the first article is very strong and withstands washing, dyeing, rain, etc., while the other is readily ravelled out and cannot resist such treatments, etc.

Obviously, the cord with open convolutions, which is obtained in the arrangement of the machine shown in Fig. 1, will not remain in this form. When left to itself, it has a greater or less tendency to resume its natural shape, thus returning to the state of a cord with closed convolutions. To maintain the cord in the open state, it is necessary to provide a core consisting of cotton or like threads, and due to the adhesion to the hollow cord thereto it prevents the latter from untwisting and thus maintains it in the state of an open cord. The use of a core is not limited to this case, and the cord with closed convolutions may also comprise such a core, if this appears necessary for the external aspect which is to be obtained.

The core is preferably impregnated with a preparation of such nature as to increase the adhesion of the core to the hollow cord and to maintain this adhesion in spite of any subsequent handling or treatment of the cord such as dyeing, or hot water or steam treatment, and the like. For this purpose, the core is sized by immersion in a bath of gelatin which is softened by glycerin in order to maintain the desired flexibility of the cord, and is rendered insoluble by means of formol or the like. The means for applying adhesive to the core are not illustrated, since it does not form part of of the present invention and may be any conventional means.

The core 13 thus prepared is fed at the top of the machine, passing for instance over the pulley 29 (Fig. 1) and traversing the hollow spindle 11, the tubular cord being knitted around the said core.

When a cord of the open type is to be obtained, the tubular cord 8 with its core 13 passes through a tension regulating device, diagrammatically represented by a pulley 80 with counterweight 81, adapted to prevent the lower part of the cord from rotating about its axis and then upon a bar 82, the cord being finally wound upon the bobbin 83 which is rotatably secured to a pulley 84, movable on an axle 85, mounted on the bracket 86. The bar 82 is given a vertical reciprocating motion to provide for the proper winding of the adjacent coils of cord upon the bobbin.

It will be observed that the cam cylinder 36 shown in Fig. 2 comprises four high points and four low points, representing four separate cam portions corresponding to the four bobbins 1, so that the resulting cord may have four colours, if the said bobbins contain yarn of four different colours. If the cord is of the closed type, the four colours will be alternated along the cord, thus forming four spirals of small pitch (Fig. 6). If the cord is of the open type, the colours will form strips along the length of the cord (lengthwise colour) or at least spirals of elongated pitch (Fig. 7). When the machine has a cam with four operative portions, as shown in Fig. 2, it is thus possible to produce cords having one, two, three or four different colours according to the number of different threads, said colours being arranged as desired at the periphery.

Having now described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a machine for knitting tubular cord, a bobbin carrier, a needle actuating member, means for holding said carrier and member stationary, reciprocating needles, a needle bed, means for rotating said needle bed together with said needles, a core feeding device and means for holding against rotation the cord delivered by the machine.

2. In a machine as claimed in claim 1, the provision of means for rotating said bobbin-carrier and needle-actuating member and means for holding said needle bed stationary.

3. In a machine for knitting tubular cord, a frame, a spindle rotatably mounted in said frame, a needle bed secured to said spindle, a pulley keyed on said spindle, means for detachably securing said spindle to said frame, a bobbin carrier loose on said spindle, a pulley secured to said bobbin carrier, a cam cylinder secured to said pulley, means for detachably securing said latter pulley to said frame, means for driving either of said pulleys, a core feeding device, and means for holding against rotation the cord delivered by the machine.

In testimony whereof I have signed my name to this specification.

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PAUL JEAN MASSU.