Aug. 24, 1954 B. M. KIMBALL 2,687,299

DEVICE FOR FORMING PAPER YARN

Filed Nov. 18, 1952

Fig. 1.

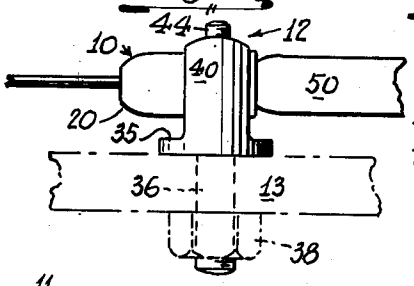


Fig. 2.

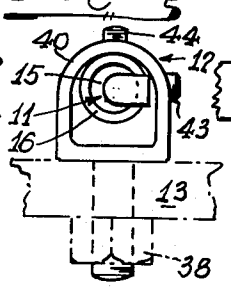
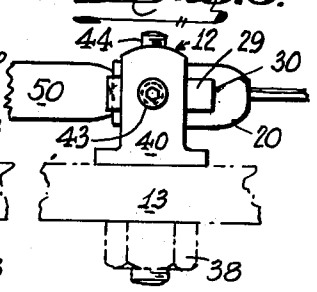


Fig. 3.



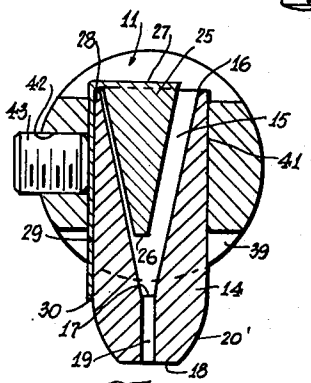


Fig. 6.

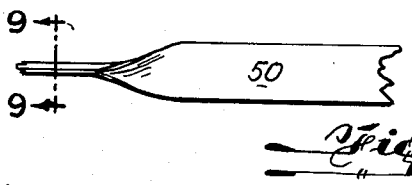


Fig. 8.

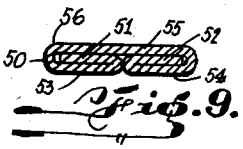


Fig. 9.

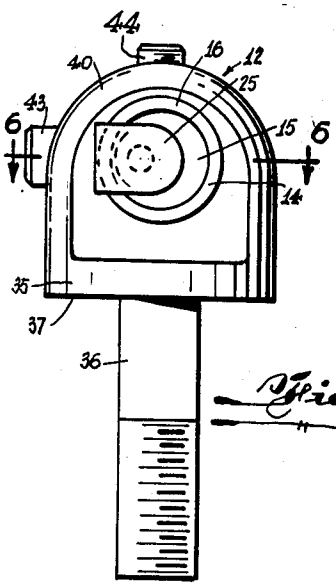


Fig. 4.

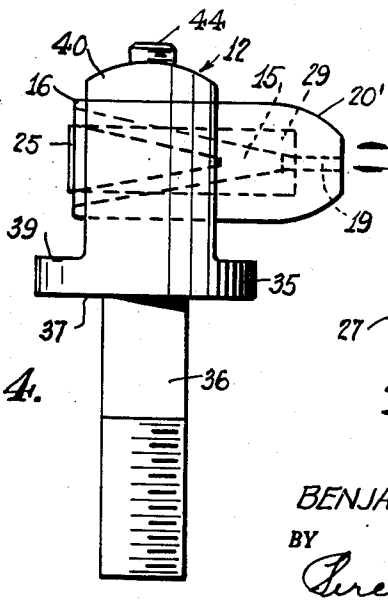


Fig. 5.

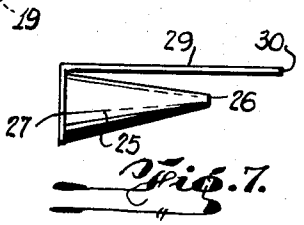


Fig. 7.

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DEVICE FOR FORMING PAPER YARN

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Application November 18, 1952, Serial No. 321,224

1 Claim. (Cl. 270—93)

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This invention relates to an improved forming device for yarn making apparatus.

The invention herein claimed constitutes an improvement on the apparatus shown in my Patent No. 2,505,050, issued on April 25, 1950.

The present invention enables the speed of the above-identified apparatus to be safely increased to 5000 R. P. M. On approaching such a speed with the devices of the prior art, the cord will break due to non-uniformity of cord tension and frequent turning of the cord in diverse directions. Such diverse turning of the cord, even at lower speeds, renders the prior art devices unsatisfactory for use with colored paper yarn, as such yarn has different colors on opposite sides.

Accordingly, it is a principal object of the present invention to provide a highly improved paper yarn forming device for use with cord-making apparatus, which device will allow the apparatus to operate at a substantially increased speed.

Another principal object of the present invention is to provide a paper yarn forming device for use with cord-making apparatus which will hold the yarn under constant tension and which will prevent the yarn from turning in diverse directions.

It is another object of the present invention to provide a forming device for paper yarn which folds the edge portions of the yarn under the adjacent central portions, the edge portions extending away from each other.

It is still another object of the present invention to provide a paper yarn forming device which is highly wear-resistant, and in which the elements thereof may be easily removed for repair or replacement.

It is a further object of the present invention to provide a paper yarn forming device which is simple and efficient in operation, and economical to manufacture and sell.

Other objects of the present invention will become apparent upon reading the following specification, and referring to the accompanying drawings, which form a material part of this disclosure.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts which will be exemplified in the construction hereinafter described, and of which the scope will be indicated by the appended claim.

In the drawings:

Fig. 1 is a front elevational view of a paper yarn forming device constructed in accordance

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with the present invention, showing the device mounted on a horizontal supporting member, and showing a strip of such yarn extending through and beyond the ends of the device.

Fig. 2 is an end view of the device of Fig. 1, the strip of yarn not being shown.

Fig. 3 is a rear elevational view of the device shown in Fig. 1.

Fig. 4 is an enlarged end elevational view of a slightly modified form of the device.

Fig. 5 is an enlarged front elevational view of the form shown in Fig. 4.

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 4.

Fig. 7 is a top view of the former of the present invention as removed from the device.

Fig. 8 is a fragmentary view of a strip of paper yarn partially folded.

Fig. 9 is a sectional view taken on the line 9—9 of Fig. 8.

Referring now more particularly to the drawings, the yarn forming device of the present invention comprises generally a die 10, a former 11 disposed within the die, and a holder 12 in which the die and former are removably seated and which is adapted for securement to a supporting element 13.

The die 10 embodies a generally tubular member 14 having a conical opening 15 extending inwardly from one end 16. The opening 15 converges or tapers inwardly from the end 16 to a point 17 which is adjacent to and spaced inwardly from the end 18 of the member 14. Extending inwardly from the end 18, in axial alignment with and opening into the opening 15 is a bore or opening extension 19. Thus, the member 14 is provided with a through opening constituted by conical opening 15 and bore 19, the through opening having convex surfaces. Exteriorly, the member 14 is substantially cylindrical in shape and has its sides converging at 20 adjacent the end 18. The converging portion may be conical, as shown in Fig. 1, or may be spherical as at 20' in Fig. 6. It has been found preferable to fabricate the die member 14 of plastic. However, it is appreciated that metal or other wear resistant material may be used.

Arranged within the opening 15 of the die member 14 is the former 11. The former includes a frusto-conical body 25 which is arranged within the opening 15. The body 25 has its smaller end 26 extending into the opening 15 and has its larger end 27 adjacent the end 16 of member 14. The body 25 is disposed longitudinally and eccen-

trically with respect to the member 14, as best seen in Fig. 6. An arm 28 extends transversely outwardly from the body 25 adjacent the end 27. The arm 28 may be fixedly secured to the body 25, as by welding, or integrally formed with the body 25, as shown in Fig. 6. On the free end of arm 28 is a longitudinally extending strip or plate 29 having one end fixedly secured to or integrally formed with the arm 28, and having its other end extending longitudinally of and beyond the end 26 of body 25. It is seen that strip 29 extends along and abuts the outer surface of die member 14, the arm 28 being of sufficient length to properly space the body 25 from the interior concave surface of the member 14. The convex surface of the body 25 and the concave surface of the opening 15 cooperate in a novel manner which will be more fully described hereinafter. Thus, the former 11 includes the body 25, arm 28 and strip 29.

In order properly to support and position the die 10 and former 11, the holder 12 is provided, which includes a disc 35 having a bolt 36 on one face 37. The bolt 36 has its free end threaded and is adapted to extend through the supporting element 13 and receive a nut 38 for securing the holder to the supporting element. On the other surface 39 of disc 35 is an upstanding ear 40 which is provided with a transversely extending through aperture 41 for receiving the die member 14 and former 11. Extending inwardly through one side of the ear 40 is a threaded aperture 42 which opens into the opening 41. The aperture 42 threadedly receives a fastener or set screw 43, which engages the strip 29 and holds the former 11 and die 10 in position. Another fastener or set screw 44 may extend downwardly through ear 40 and engage with the die member 14 to hold the latter in any selected position. Preferably the through opening 41 is formed to conformably receive the die 10 and former 11. Under certain circumstances, it has been found desirable to taper the external surface of die member 14 and the internal surface of through aperture 41, the taper extending from end 16 of die member toward end 18 thereof. Thus, if the set screws 43 and 44 were jarred loose during operation, the die 10 would be wedged into the holder 12, for a reason to become apparent hereinafter.

In operation, the yarn, which may be a paper strip, extends and is drawn through the die member 14 into end 16 and out of end 18. The concave surface of opening 15 urges the paper strip or tape to curl around the concave surface of body 25 and as the opening 15 converges, the longitudinal edge portions 51 and 52 are folded over upon the adjacent portions 53 and 54 which are in turn folded over upon the central portion 55. Thus it is seen that the edge portions 51 and 52 extend outwardly or away from each other. It is also seen that only one surface 56 of the paper yarn is exposed after the folding operation. This is essential when using colored yarn, as the color is different on opposite sides. This manner of folding will also increase the strength of the yarn, as it is three-ply thick at all points.

If it becomes necessary to remove the former 11 or die 10, this may quickly and easily be done by loosening the set screws 43 and 44, and sliding the former and die out of the ear 40. The former and die are separate and held together by the engagement of set screw 43 with the strip 29. If the set screws come loose during operation, and the die member 14 and opening 41 are tapered from end 16 of die member 14 toward end 18, it is seen that the force of the paper 50 moving inwardly through end 16 would retain the die member 14 and former 11 in their proper positions.

From the foregoing, it is seen that the present invention enables a cord-making machine to operate at substantially higher speed by always folding the yarn in one direction, and holding the yarn under constant tension.

Although the present invention has been described in some detail by way of illustration and example for the purposes of clarity of understanding, it is understood that certain changes and modifications may be made within the spirit of the invention and the scope of the appended claim.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

In a paper yarn twisting device having a paper tape supply reel and a rotatable drum for receiving tape from the supply reel and twisting the same, a forming device interposed between said supply reel and said drum, said forming device comprising a die having an opening through which the tape may be drawn, said opening converging toward its outlet end and having a cylindrical bore communicating with the smaller end of said opening, a conical former disposed eccentrically of and within said conical opening and tapering toward the outlet end thereof and cooperating with the die to fold said tape, said conical former terminating short of the line of juncture between the said opening and the cylindrical bore; an arm secured on the base of the conical former and extending radially outwardly thereof and having a right-angled extension on said arm extending along and abutting the outer surface of the die member parallel to the longitudinal axis thereof, a holder having on one end a threaded stem for engagement with a supporting element and on its opposite end an ear or thimble which has a transverse hole extending at right angles to the longitudinal axis of the stem, said ear embracing the die member, a set screw extending through the ear from the outside for removably positioning the die member in said ear and for impingement against said extension of the arm of the former.

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