May 27, 1930. D. H. MURPHY 1,760,768

BRAIDING MACHINE

Filed Nov. 16, 1928 3 Sheets-Sheet 1

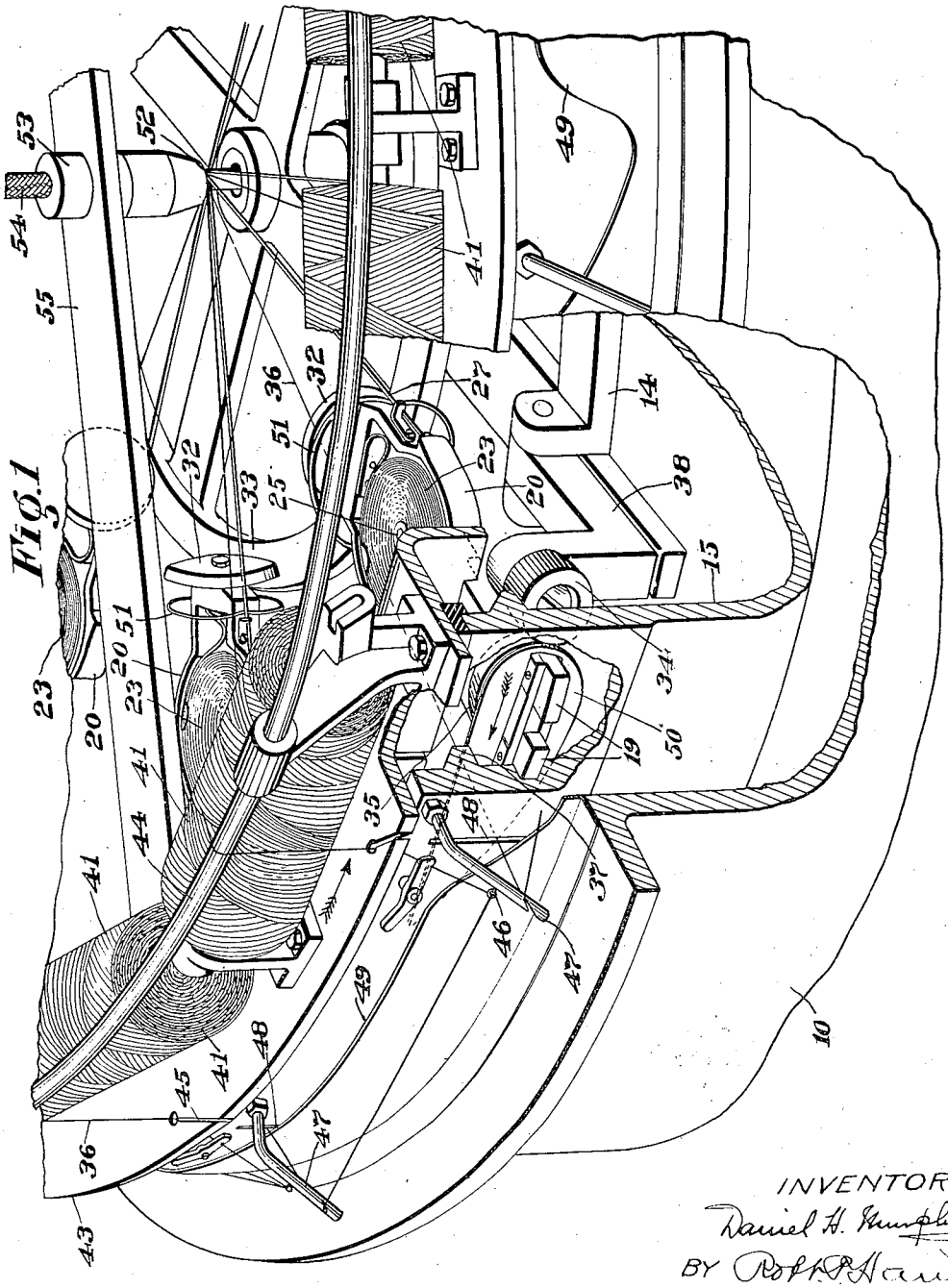


Fig. 1

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BRAIDING MACHINE

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Fig. 2

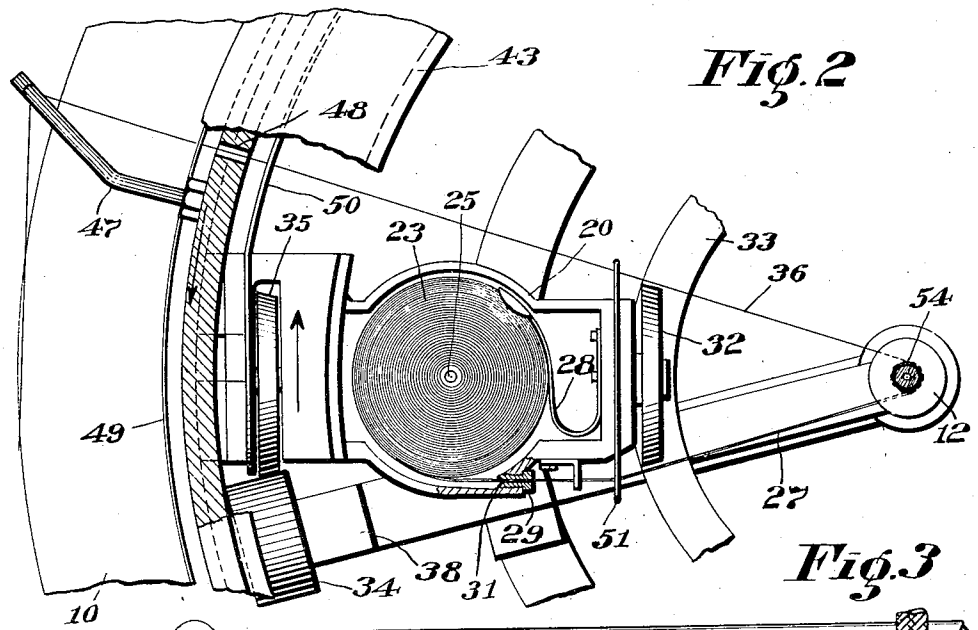
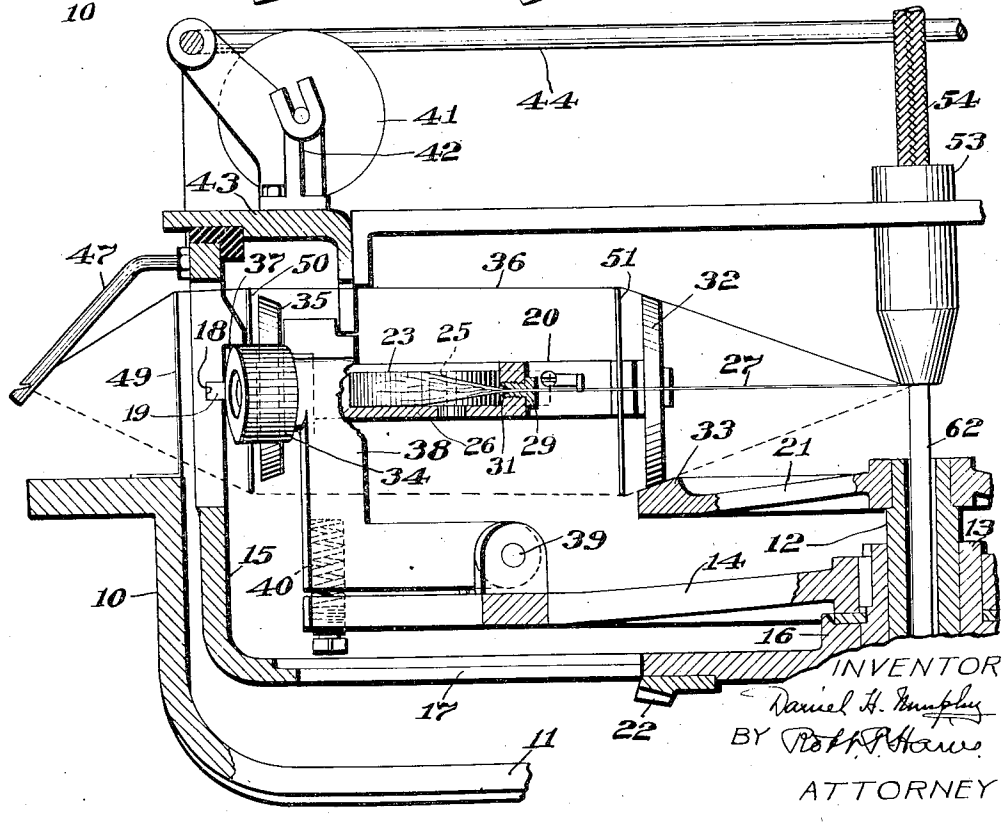


Fig. 3



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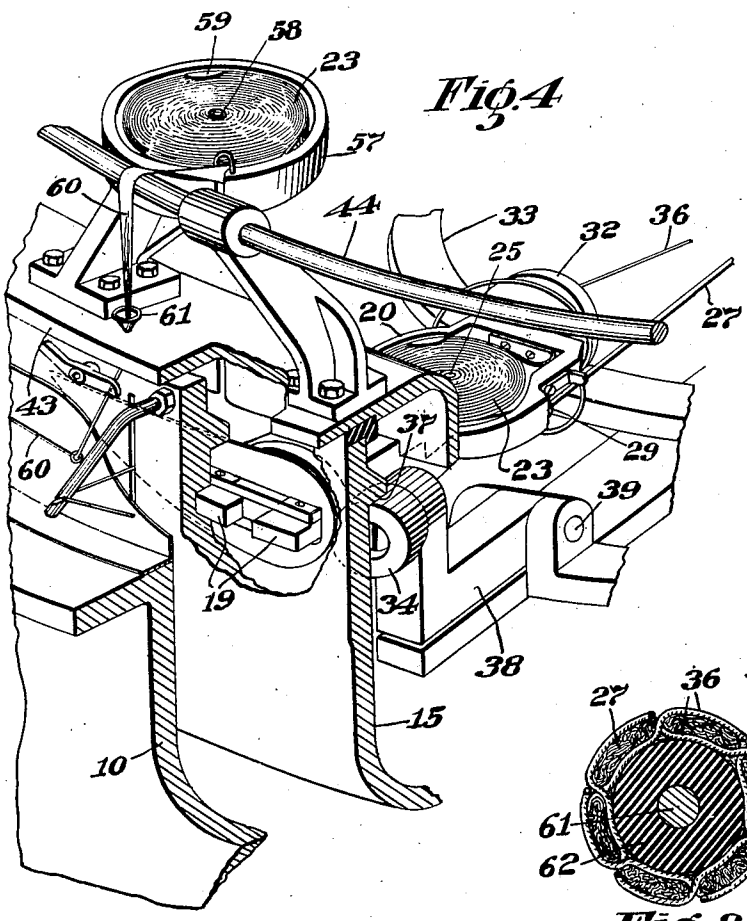


Fig. 4

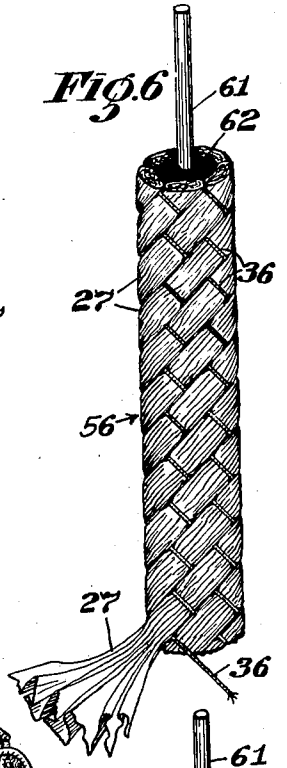


Fig. 6

Fig. 8

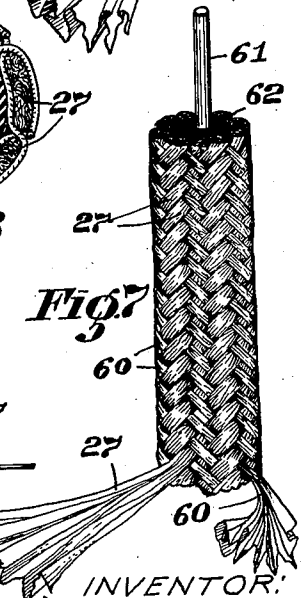


Fig. 7

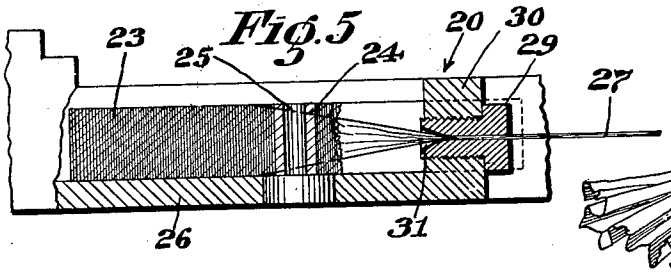


Fig. 5

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Patented May 27, 1930 1,760,768

UNITED STATES PATENT OFFICE

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BRAIDING MACHINE

Application filed November 16, 1928. Serial No. 319,884.

This invention relates to improvements in braiding and other forms of machines adapted to produce a tubular fabric of interlocked strands, and more particularly to mechanism associated with such machines and constructed to crumple a strip of paper into a more or less rounded strand as it passes from a source of supply to the fabric forming point.

It has been proposed heretofore to form a protecting jacket or tube by interbraiding relatively large twisted strands of paper with smaller strands of cotton or other textile fibres to produce tough, durable and inexpensive tubular fabric. The present invention relates to a tubular fabric in which further advantages are secured through the employment of soft, readily compressible strands of crumpled paper in forming the braid or other tubular fabric, and more particularly to improvements in the machines employed to construct this improved tubular fabric.

An underlying feature of the present invention resides in a tubular jacket formed of soft strands of crumpled paper that are adapted to spread laterally in the fabric to increase the covering effect of the fabric, and to close the interstices in the completed fabric in constructions in which the crumpled strands are laid close together. Such tubular fabric will also yield readily to accommodate the bending and flexing of the same. As a result of this spreading tendency of the soft paper strands they will automatically close the cracks and crevices between the interlocked strands when laid close together to form a smooth tight jacket which will be free from open spaces even when the jacket is bent.

In carrying out the present invention either one or both sets of the interlocking elements may be formed of soft, crumpled paper strands which are untwisted or substantially untwisted so that they will readily spread laterally to increase their covering effect or to close the interstices between the strands, and these strands may be braided, woven or otherwise interlocked to form the desired jacket or covering.

In constructing a braided jacket formed in accordance with the present invention either the inner or the outer set of oppositely revolving carriers may be provided with the paper for the soft crumpled paper strands of the jacket, or if an all-paper braid is desired, both sets of carriers may be provided with the paper. Likewise, if the tubular fabric is woven the soft crumpled strands of paper may constitute either the warp or the weft of the woven fabric, or if desired the soft crumpled paper may be used as both warp and weft to form an all-paper, woven tubular fabric.

The paper strips may of course be crumpled into the desired rounded strands and then wound onto tubes or the like ready for use in the braiding or weaving machine, but the present invention contemplates novel mechanism associated with the braiding or other form of tube producing machine, for imparting the desired crumpled condition to the paper strands as they are advanced to the braiding or weaving point. As a result of this arrangement the paper strands may be supplied to the shuttles or yarn carriers in coils of flat strips of paper which are subjected to a crumpling operation as the strips are drawn from the sources of supply to the braiding point. This obviously eliminates the need of any preliminary crumpling operation before the packages of coiled paper are supplied to the looms or braiding machines, and reduces the cost of producing the tubular fabric.

A primary feature of the present invention therefore resides in a tubular fabric producing machine, such for example, as a braiding machine which is provided with either inner or outer carriers, or with both inner and outer carriers that are constructed to receive ribbon-like rolls of flat paper strips, and in crumpling devices or dies mounted between these rolls of paper and the braiding point and adapted to crumple the paper strips so that the paper will have the form of a soft rounded strand upon reaching the braiding point.

Other features of the invention and novel combination of parts in addition to the above will be hereinafter described in connection

with the accompanying drawings which illustrate good practical forms of the invention.

In the drawings,—

Fig. 1 is a perspective view with parts in section of a braiding machine provided with the features of the present invention;

Fig. 2 is a top plan view with parts in section of a fragmentary portion of the braiding machine of Fig. 1;

Fig. 3 is a vertical sectional view through the braiding machine of Fig. 1;

Fig. 4 is a perspective sectional view through a modified type of braiding machine in which both the inner and outer carriers are constructed to support rolls of paper.

Fig. 5 is an enlarged sectional view through a portion of an inner carrier of Fig. 1;

Fig. 6 is a perspective view of an insulated conductor provided with a paper jacket braided on the machine disclosed in Figs. 1, 2 and 3;

Fig. 7 is a similar view showing a modified type of braid constructed entirely of paper and constitutes the product of the machine shown in Fig. 4; and

Fig. 8 on an enlarged scale is a transverse sectional view through the covered conductor of Fig. 6.

The features of the present invention whereby the strips of paper are crumpled into a rounded strand as they are advanced to the fabric forming point have been illustrated in the drawings as applied to a braiding machine, but it will be understood that the present invention is applicable to other types of machines employed to form a tubular fabric of interlocked strands.

The tubular jacket shown in Figs. 6 and 7 of the drawings may be braided on practically any well known type of braider provided the strips of paper employed in forming the braid are crumpled into rounded strands before such strands are supplied to the braiding machine carriers. Or if desired the crumpling of the paper may be performed simultaneously with the braiding operation, in accordance with the present invention, by providing any well known or preferred type of braiding machine with specially constructed inner or outer carriers, or both inner and outer carriers that are adapted to support rolls of ribbon-like strips of paper, and by further providing such braiding machines with crumpling devices or dies which are adapted to crumple the paper into more or less rounded strands as these strands approach the braiding point.

The features of the present invention, whereby the paper is supplied to the carriers in the form of rolls and is crumpled as it is delivered to the braiding point, is illustrated in the drawings as associated with a braiding machine having the construction disclosed in the Otto A. Frederickson application, Sr. No. 256,162, filed February 23, 1928, but, as above stated, this novel mechanism is well adapted to be associated with various types of braiding machines.

In the braiding machine illustrated in the drawing the operating parts of the machine are mounted upon a fixed frame 10 of well known construction which is supported at the desired height from the floor by legs not shown. The frame 10 is provided with a central hub, as is usual, which is connected to and supported by the laterally extending spokes or flanged portions 11 of the frame 10, and the hub just mentioned serves to support the central hollow shaft 12, as is usual. Upon the fixed hollow shaft 12 is journaled a sleeve or shaft 13 which is adapted to support and rotate the driving disk 14 in a well known manner.

Within the annular supporting frame 10 is mounted the outer revolving drum 15 the central hub 16 of which is journaled upon the sleeve 13 and this hub 16 is secured to the outer, upstanding portion of the drum 15 by the horizontally disposed spokes or flanges 17.

Within the inner face of the upstanding portion 15 of the outer revolving drum is provided a slot 18 adapted to receive the sliding shoes 19 provided at the outer ends of the inner yarn carriers 20. The inner ends of these carriers are supported by a fixed disk 21 which is rigidly secured to the upper end of the post 12. The outer revolving drum 15 and driving disk 14 are rotated in opposite directions in a well known manner by driving means including a beveled gear not shown, but the upper portion of which meshes with the ring gear 22 secured to the under face of the hub portion 16 of the outer revolving drum 15.

In carrying out the present invention each inner carrier 20 is given the construction shown so that it is adapted to receive a roll or disk 23 of paper which preferably consists of a comparatively narrow, ribbon-like sheet of thin, flexible paper, and this roll of paper, in the construction shown, is wound upon a tubular core 24 which core is mounted upon a fixed spindle or post 25 that extends upwardly from the floor or base 26 of the inner yarn carrier, the construction being such that the entire disk or roll of paper may rotate about the spindle 25 as the paper strand 27 extending from this roll to the braiding point is unwound from the roll or mass of paper 23. It may be desirable to provide tensioning means adapted to engage the outer face of the roll 23 to prevent the same from unwinding too freely and this is accomplished, in the construction shown, by the bent spring 28, one end of which is rigidly secured to an end wall of the inner carrier 20 and the opposite end portion pressed yieldingly against the outer periphery of the coil

23, as will be apparent from Fig. 2 of the drawing.

As above stated, an important feature of the present invention resides in the construction whereby the ribbon-like sheet of paper is crumpled into a rounded strand as it passes from the source of supply to the braiding point, and this is accomplished, in accordance with the present invention, by passing this strand of paper through crumpling means which may constitute a die 29 having the form of a threaded block secured to an upstanding wall 30 of the inner yarn carrier and through this block is provided a hole through which the paper strand 27 is drawn, and the entrance to this hole preferably flares outwardly, as indicated by 31, to promote the crumpling operation as the strand of paper enters the die 29. This die, in addition to crumpling the paper, will serve to tension the same as it is drawn to the braiding point.

The means for supporting the inner carriers and for propelling them about the braiding point may be of any usual or preferred construction and the outer end of each carrier is supported as above stated by the shoes 19 which extend into the slot or slideway 18, and the inner end of each carrier is supported by a rotating disk 32 which rests upon the runway 33 formed upon the fixed disk 21. Each inner carrier is driven forward, in the construction shown, by a push roller 34 which cooperates with a roller 35 rotatably supported at the outer portion of the inner carrier. It is desirable to rotate the cooperating rollers 34 and 35 to facilitate the passage of the outer strands of yarn 36 between them, and this is accomplished, in the construction shown, by constructing each driving roller 34 so that its outer end portion will rest against the under face of the overhanging track or annular projection 37, and each roller 34 is journaled upon a stub shaft which projects outwardly from the upstanding bracket 38, and each of these brackets is pivotally mounted at 39 upon the driving disk 14 and is urged upwardly by a spring 40. The construction is such that the driving disk 34 is yieldingly held in rolling engagement with the track 37, all of which is more fully set forth in the Frederickson application above referred to.

In the construction shown in Figs. 1, 2 and 3, the outer strands of yarn 36, which may be formed of cotton or other textile fibres, are supplied from the yarn masses 41 which are rotatably supported by the brackets 42 that extend upwardly from the overhanging ring 43 mounted upon the outer revolving drum. The outer strands of yarn 36, in the construction shown, are led from the yarn masses 41 over the guide rod 44 and then downwardly through a slot 45 in the ring 43. From this point each strand passes to a guide 46 and then to a notch near the outer end of a rod 47 that projects outwardly from the upper portion of the outer revolving drum, and each strand 36 extends inwardly from the guide notch of a rod 47 through a slot 48 in the outer revolving drum to the braiding point. In the construction shown the outer strands of yarn 36 are alternately raised and lowered so that they will pass under and over the inner yarn carriers by fixed deflector plates 49 which are secured to the upper surface of the supporting frame 10, and each inner yarn carrier 20 is provided adjacent its outer end with a deflector plate 50 which serves to direct the strands 36 that are not elevated by the fixed deflector plates 49 downward under the inner yarn carrier, as more fully set forth in the Frederickson application above referred to. Each inner yarn carrier 20 is preferably provided near its inner end with the heart-shaped guide 51 which operates in the usual manner to guide the inner strand of yarn 27 to the braiding point and serves also to hold the outer strand of yarn 36 clear of the inner carrier. The braiding point 52 is formed at the lower end of a die 53 adapted to have the braided conductor 54 drawn upwardly therethrough and this die, in the construction shown, is supported by a transversely extending bar 55 the opposite ends of which are secured to the revolving ring 43.

It will be apparent from the foregoing that the paper strands 27 supplied by the inner yarn carriers are delivered to the braiding point in a crumpled but untwisted or substantially untwisted condition and are therefore free to spread laterally under pressure to fill up the cracks or interstices between the interlocked strands of the braided sheath 56. This braided jacket, in the construction shown, is formed of the well known 1—1 type of braid, but it will be apparent that various other types of braids may be constructed of the soft, crumpled paper 27, in accordance with the present invention. Or, if desired, the paper strands may be woven or otherwise interlocked.

If desired, the paper strands employed in forming the braid 56 may be supplied from the outer yarn carriers rather than the inner carriers, as shown in Figs. 1, 2 and 3 of the drawings, or, if preferred, the conductor jacket may be formed entirely of paper as shown in Fig. 7, in which case both the inner and outer yarn carriers will be constructed to receive the paper rolls or disks above described.

In the modified construction of Fig. 4 the inner yarn carriers 20 may be the same as the inner yarn carriers above described and shown in Figs. 1, 2 and 3, but in this modified construction the outer yarn masses 41 of Figs. 1, 2 and 3 have been replaced by the cup-shaped brackets 57 adapted to support the coil of paper 23 and this bracket 57 is

preferably provided with a central post 58 about which the paper mass may unwind, and also with a tensioning device 59 similar to that above described. The crumpling of this strand of paper 60 is accomplished, in the construction shown in Fig. 4, by passing such strand through a die 61 which is conveniently mounted upon the supporting ring 43, whereupon this strand 60 is led through the various guides to the braiding point in a manner above described.

In the all-paper braid shown in Fig. 7, as the product of the braiding machine of Fig. 4, it will be noted that one set of strands 27 is larger than the other set of strands 60, but this is not an essential feature of the present invention since these two sets of strands may have the same or different size, as desired. The braided jackets just described may be employed for various purposes and are shown as constituting a covering for the conductor wire 61 which is provided with the insulated material 62.

It will be apparent from the foregoing that the paper braid shown in Figs. 6 and 7 of the drawings may be rapidly produced at low cost and that, due to the soft condition of the paper strands whereby they will readily spread laterally under pressure, the braid may be given a smooth, tightly closed construction that forms an excellent protecting jacket for electric conductors and for other purposes. It will also be understood that since the paper strips are crumpled as they are advanced to the braiding point, the paper may be supplied to the carriers in the form of the rolls 23 which can be manufactured at low cost.

The tubular fabric herein shown and described as formed of crumpled paper is claimed in my copending application Serial No. 319,885, filed Nov. 6, 1928.

What is claimed is:—

1. In a braiding machine, in combination, a carrier for a braiding element adapted to support a roll formed of a narrow sheet of paper, and means mounted between said roll and the braiding point in position to act upon the strip of paper as it is advanced by the braiding mechanism and constructed to crumple the strip of paper into a more or less rounded strand that is delivered to the braiding point.

2. In a braiding machine, in combination, a carrier for a braiding element adapted to support a ribbon-like mass of sheet paper, and a die mounted between said mass and the braiding point to act upon the strip of paper as it is pulled in the direction of its length by the braiding mechanism and adapted to crumple the strip of a paper into a more or less rounded strand that is delivered to the braiding point.

3. In a machine for forming a tubular fabric of interlocked strands, in combination, a carrier for supplying one of said strands to the fabric forming point and adapted to support a ribbon-like mass of paper, and means mounted between said mass and the fabric forming point to act upon the paper as it is advanced by the fabric forming mechanism and adapted to crumple the strip of paper into a more or less rounded strand that is delivered to the fabric forming point.

4. In a braiding machine, in combination, an inner carrier adapted to support a ribbon-like roll of paper, means for advancing the inner carrier about a braiding point, and a die mounted upon the inner carrier to act upon the paper as it is advanced by the braiding mechanism and adapted to crumple the strip of paper into a more or less rounded strand that is delivered to the braiding point.

5. In a braiding machine, in combination, a carrier for a braiding element adapted to support a mass of thin, flexible, sheet-like strip paper, and means supported between said mass of paper and the braiding point to act upon the paper as it is advanced in the direction of its length by the braiding mechanism and adapted to crumple the strip of paper into a more or less rounded strand that is delivered to the braiding point.

6. In a machine for forming a tubular conductor covering of interlocked strands, in combination, a carrier for supplying one of said strands to the cover forming points and adapted to support a mass formed of a narrow sheet of paper, mechanism for advancing said carrier about the cover forming point, and means mounted between said mass and the cover forming point to travel with the carrier and adapted to crumple the strip of paper into a more or less rounded strand that is delivered to said point.

7. In a machine for forming a tubular fabric of interlocked strands, in combination, means for supporting a ribbon-like mass of paper so that the strand of paper may be drawn from the supported mass to the fabric forming point, means mounted between said mass and the fabric forming point to act on the paper as it is advanced by the fabric forming mechanism and constructed to crumple the strip of paper into a soft readily compressible strand that is delivered to the fabric forming point, and mechanism for interlocking said crumpled strand of paper with other strands to form a tubular fabric.

8. In a braiding machine, in combination, inner yarn carriers, outer yarn carriers constructed to support ribbon-like rolls of paper for delivery of the paper to the braiding point, means for advancing the carriers about the braiding point, and crumpling devices mounted adjacent the outer yarn carriers and constructed to crumple the strips of paper into a soft, rounded strand and to tension the paper as it is drawn from said rolls to the braiding point.

9. In a braiding machine, in combination, inner and outer yarn carriers constructed to support a ribbon-like mass of flat paper, means for revolving the carriers about the braiding point, and crumpling devices associated with the inner and outer yarn carriers to act upon the strips of paper as they are advanced by the braiding mechanism and adapted to crumple the strips of paper into soft readily compressible strands as they pass from the masses to the braiding point.

10. In a braiding machine, in combination, outer yarn carriers, inner yarn carriers constructed to support ribbon-like rolls of paper for delivery of the paper to the braiding point, means for advancing the carriers about the braiding point, and crumpling devices mounted upon the inner yarn carriers and constructed to crumple the strips of paper into soft, rounded strands as the paper is drawn from said rolls to the braiding point.

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

DANIEL H. MURPHY.