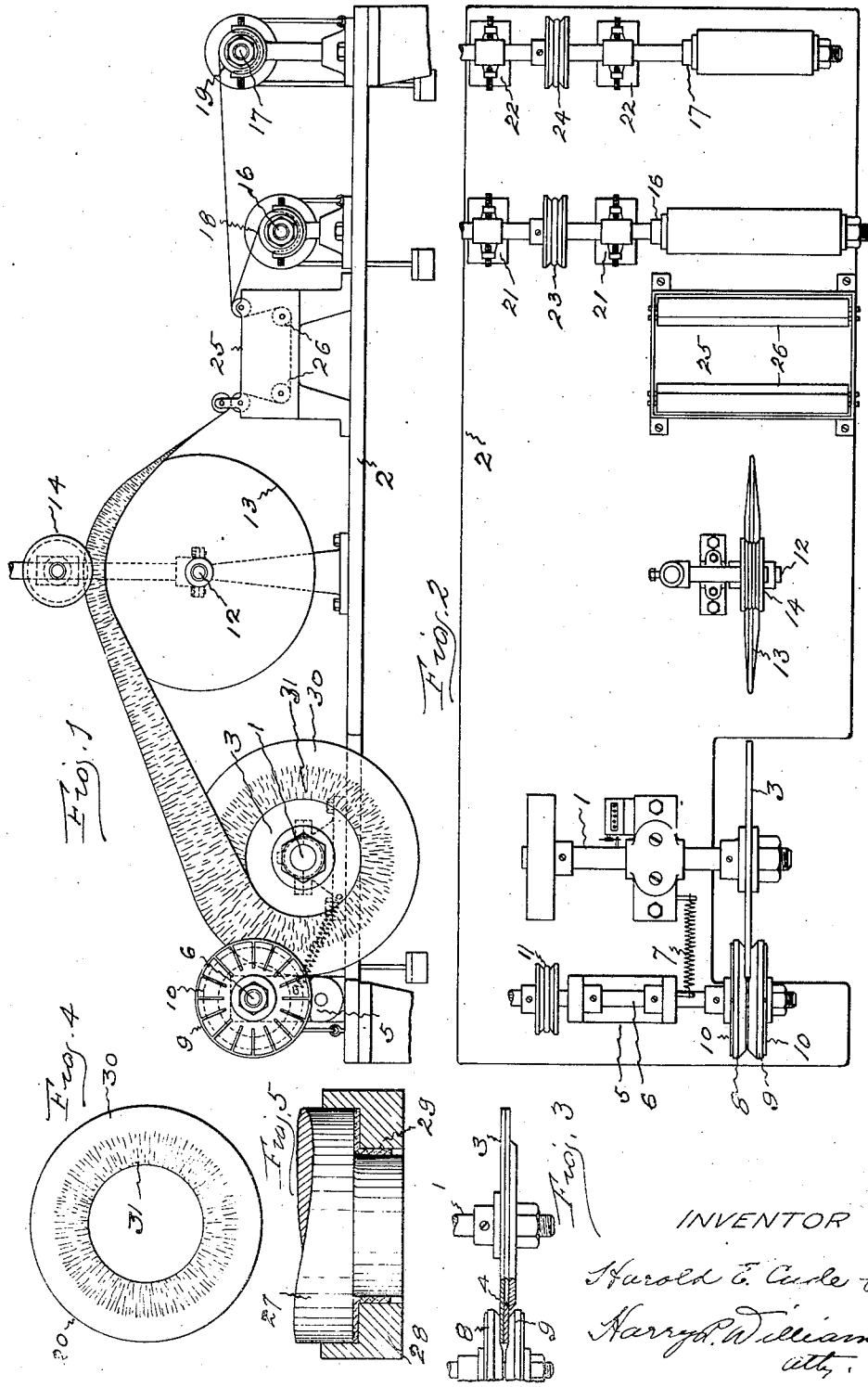
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METHOD AND MEANS FOR FORMING ARTICLES FROM PAPER

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METHOD AND MEANS FOR FORMING ARTICLES FROM PAPER

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This invention relates to a method of and apparatus for forming from sheets or strips of paper or the like fibrous material, blanks which are capable of being compressed into various commercial articles.

The object of the invention is the production of blanks from paper by a simple apparatus in a rapid manner with a minimum amount of labor and no waste of material, thereby reducing the cost of the articles previously produced for similar purposes. This object is attained by forming blanks of the desired size, thickness and approximate shape, of superimposed layers drawn from a continuous strip or strips of crepe or equivalent elastic paper treated with moisture proof binding resins, or waxes, or adhesives, and then subjecting these blanks in dies to heat and pressure for solidifying and hardening the treating compound and giving the article final shape, as more particularly hereafter described.

The invention is particularly adapted for producing elements, for example washers, sleeves and flanged collars, which are to be used in electrical apparatus for insulating live conductors from conducting bodies, although, of course, the product may be shaped for use in connection with other classes of apparatus, and for many other purposes. In order to simplify the disclosure the invention is illustrated and described as adapted to the production of insulating flanged collars, such as are provided for electrical transformers, although, as stated, the invention is practicable for forming other articles.

In the production of such electrical insulating pieces one or more strips of crepe paper are drawn from a supply roll or rolls and passed between a disk and roll which impart an initial scoring, and then passed about a collapsible mandrel disk over the periphery and on to the sides of which the paper is stretched by a pair of friction disks. The paper may be pre-treated or may be treated as it passes from the supply to the scoring means, with moisture-proof and insulating compound, such for example as bakelite. When the required number of layers of paper have been wound to give the desired thickness the mandrel is removed, leaving a blank which has a stretched and somewhat hardened rim section and a gathered softer center section. The soft center section is pushed out and this blank is placed in a female die and subjected to the action of a male die, preferably under heat and pressure, for solidifying and hardening the treating compound and giving final shape to the article.

In the accompanying drawing Fig. 1 shows a side view of an apparatus by means of which the novel method may be practiced.

Fig. 2 shows a top view of the same.

Fig. 3 shows a top view of the mandrel disk and friction disks that stretch and fold the paper, with the mandrel reinforced by a paper collar.

Fig. 4 on larger scale shows the blank which is formed on the mandrel.

Fig. 5 shows this blank placed in a female die and complementary male die.

In the apparatus illustrated the drive shaft 1 is supported by suitable brackets on a bed 2. This shaft may be driven by any convenient variable-speed source of power. At the outer end of this shaft and rotatable therewith is a collapsible disk 3 that is designed to be employed as a mandrel upon which the paper is to be wound to form the blanks. This mandrel may be made of thin metal, press board or composition, and has sufficient resilience to permit it to be withdrawn from the paper that is wound upon it. If it is desired to increase the thickness and stiffness of the blank a collar 4 of relatively stiff paper may be detachably applied to the outer face of the mandrel and left within the paper windings when the mandrel is removed.

Mounted in a bracket 5 hinged to the bed so it may be swung up toward or down away from the drive shaft 1 is a shaft 6. A spring 7 may be arranged to normally hold the shaft up. At the outer end of the shaft 6 are two separable disks 8 and 9 which when the shaft 6 is turned up contact with and rotate against opposite faces of the periphery of the mandrel disk 3. The inner faces of the disks 8 and 9 may have their faces lined with sponge rubber or leather, preferably the former, and they are yieldingly pressed together by spring washers 10. The shaft 6 may be provided with a common friction brake 11 to control the rotation of the disks 8 and 9.

On the bed and parallel with the shafts 1 and 6 is a shaft 12 at the outer end of which is a scoring disk 13. Rotatable in contact with the periphery of this disk is a grooved scoring wheel 14, the bottom of which is preferably covered with soft rubber. This wheel presses with a slight tension down upon the periphery of the disk 13.

One or more continuous strips of paper may be used in forming the articles to be produced by the apparatus described. Spindles 16 and 17 for receiving rolls of the paper 18 and 19 which is to be wound into the blanks 20, may be arranged on the bed with their axes parallel with

the axes of the shafts 1, 6, and 12. These spindles are free to rotate in bearings 21 and 22 except as they are controlled by common friction brakes 23 and 24. Located on the bed between the spindles and the scoring means there may be a receptacle 25 for containing material for treating the paper as it passes from the supply to the forming apparatus. Rolls 26 are arranged in this receptacle for guiding the paper through the treating material. The treating material may be in a liquid or semi-liquid or pulverized or granular condition, and its composition will depend upon the density, hardness, insulating and moisture-proof qualities that it is desired the finished product shall possess.

Located convenient to this forming apparatus may be a male die 27 and a female die 28, the cavity between which dies has the shape of the finished article 29 to be produced. The dies may be heated, and are capable of being forced together under considerable pressure in any suitable press.

In practicing this method and using the apparatus described the end of a continuous strip of paper is drawn from a supply roll and passed through the treating material, then between the scoring disk and wheel, and partly around the mandrel. The end of this strip is preferably temporarily attached by quick drying adhesive, to the face of the mandrel. The rotation of the mandrel winds the paper around its periphery in superimposed layers. The coaction of the scoring disk and grooved scoring wheel initially doubles the paper and partially stretches and curves the strip along the middle of its length. The strip is further folded, stretched and smoothed and curved over the edge of the mandrel by the friction disks. After a sufficient number of layers of paper have been wound upon the mandrel the strip is cut, the friction disks swung away, and the mandrel detached and removed from within the blank of coiled paper. The blank then has an annular shape with a more or less smoothed and hardened rim 30 and a soft crinkled center 31. If it is desired to add thickness and rigidity to the edge of the blank the collar mentioned may be attached to the face of the mandrel before the paper is coiled. This collar preferably is of a size of the flange to be formed on the finished article, and is left in the blank when the mandrel is removed. If the stiffening collar is not employed a narrower strip from the second roll of paper may be fed with the first strip. This second strip preferably need be only sufficiently wide to form the flanges, the width of the first strip being wide enough to form both the flanges and collar of the blank.

After the blanks have been removed from the mandrel the soft center is pushed out to one side, and the blanks subjected to heat and pressure in the dies, which smooth out the crinkles and compact the folds in the paper, and cause the treating material to penetrate and bind the superimposed layers of the paper into rigid, water-proof insulating pieces that are of the exact size required for subsequent use in the appliances for which they are designed. By the employment of this method there is practically no waste of material, and there is a saving in time and labor which insures a greatly reduced cost in their production over the cost of the articles previously made for the same purposes.

The invention claimed is:

1. An apparatus for forming articles from a continuous strip of material which comprises means for supplying said strip of material, a rotatable mandrel about which the strip is to be wound, means for rotating said mandrel, disks rotatable in frictional contact with opposite faces of the mandrel for in cooperation therewith drawing the strip and folding it over the periphery of the mandrel, means for initially scoring the strip as it passes to the mandrel, and means for treating the strip with a binding compound as it feeds.

2. An apparatus for forming articles from a continuous strip of material which comprises means for supplying said strip of material, a rotatable mandrel about which the strip is to be wound, means for rotating said mandrel, disks rotatable in frictional contact with opposite faces of the mandrel for in cooperation therewith drawing the strip and folding it over the periphery of the mandrel, and means for initially scoring the strip as it passes to the mandrel.

3. An apparatus for forming articles from a continuous strip of material which comprises means for supplying said strip of material, a rotatable disk-shaped mandrel about which the strip is to be wound, means for rotating said mandrel, and disks rotatable on axes parallel with the axis of the mandrel and having portions of their faces in frictional contact with opposite faces of the mandrel for in cooperation therewith drawing the strip and folding it over the periphery of the mandrel.

4. An apparatus for forming articles from a continuous strip of material which comprises means for supplying said strip of material, a rotatable mandrel about which the strip is to be wound, means for rotating said mandrel, and disks rotatable on axes parallel with the axis of the mandrel and having portions of their faces in contact with opposite faces of the mandrel for folding and stretching the strip over the periphery of the mandrel.

5. An apparatus for forming articles from a continuous strip of material which comprises a rotatable mandrel about which the strip is to be wound, means for rotating said mandrel, disks rotatable on axes parallel with the axis of the mandrel and having their faces in contact with opposite faces of the mandrel and yielding means for closing said disks with their faces bearing against the faces of the mandrel.

6. An apparatus for forming articles from a continuous strip of material which comprises a rotatable mandrel about which the strip is to be wound, means for rotating said mandrel, a pair of disks having elastic opposing faces rotatable on axes parallel with the axis of the mandrel and having said faces in frictional contact with the faces of the mandrel near the periphery of the mandrel, and means for pressing the friction disks toward each other.

7. An apparatus for forming articles from a continuous strip of material which comprises a rotatable mandrel about which the strip is to be wound, a pair of disks having elastic opposing faces rotatable on axes parallel with the axis of the mandrel and having portions of said faces in frictional contact with the faces of the mandrel near the periphery of the mandrel, and yielding means for pressing the friction disks toward each other.

8. The method of forming articles from a continuous strip of material which comprises, feeding the strip lengthwise, treating the strip as it is fed with binding compound, scoring the strip lengthwise as it is fed, stretching, smoothing and

folding the strip along the scored section and winding the folded strip into a coil of superimposed layers, and subjecting said coil to heat and pressure.

9. The method of forming an article from a continuous strip of fibrous material which comprises, feeding the strip lengthwise, scoring the strip lengthwise as it is fed, stretching, smoothing and folding the strip along the scored section, and winding a continuous length of the folded strip convolutely with layers one over the other and the fold at the circumference, into a disk-shaped article of superimposed layers having a folded, compacted and smoothed rim and a soft crinkled center.

10. The method of forming an article from a continuous strip of fibrous material which comprises scoring the strip lengthwise, stretching, smoothing and folding the strip along the scored section, and winding a continuous length of the folded strip convolutely with layers one over the other and the fold at the circumference, into a disk-shaped article of superimposed layers having a folded, compacted and smoothed rim and a soft crinkled center.

11. The method of forming an article from a continuous strip of fibrous material which comprises, stretching, smoothing and folding the strip along its length and winding a continuous length of the folded strip convolutely with layers one over the other, into a disk-shaped article of superimposed layers having a folded, compacted and smoothed rim and a soft crinkled center.

12. The method of forming an article from a continuous strip of fibrous material which comprises, feeding the strip lengthwise, treating the strip as it is fed with binding compound, scoring the strip lengthwise as it is fed, stretching, smoothing and folding the strip along the scored section, and winding a continuous length of the folded strip convolutely with layers one over the other into a disk-shaped article of superimposed layers having a folded, compacted and smoothed rim and a soft crinkled center.

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