July 1, 1930. W. BERRY 1,768,736

APPARATUS FOR CUTTING TEXTILE MATERIALS

Filed Oct. 31, 1925 2 Sheets-Sheet 1

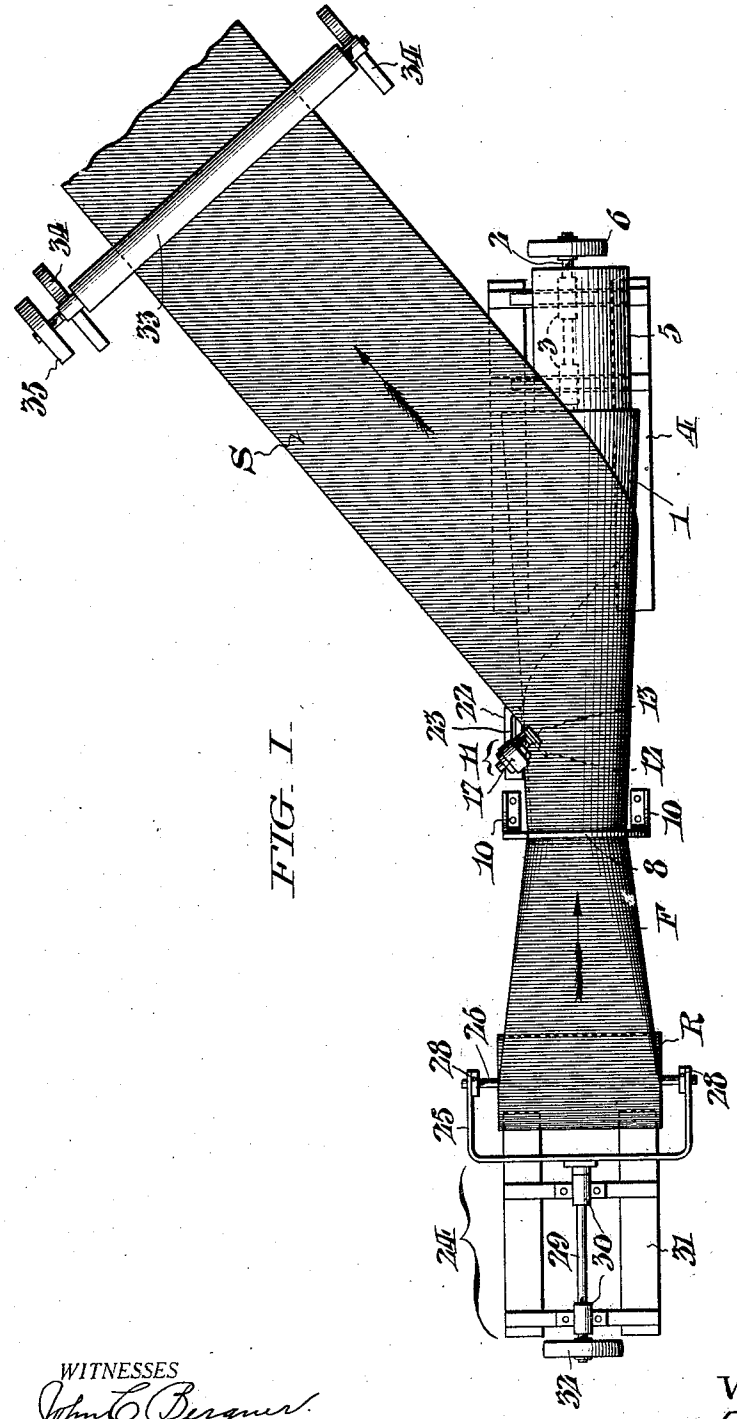


FIG. 1.

WITNESSES
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FIG. II.

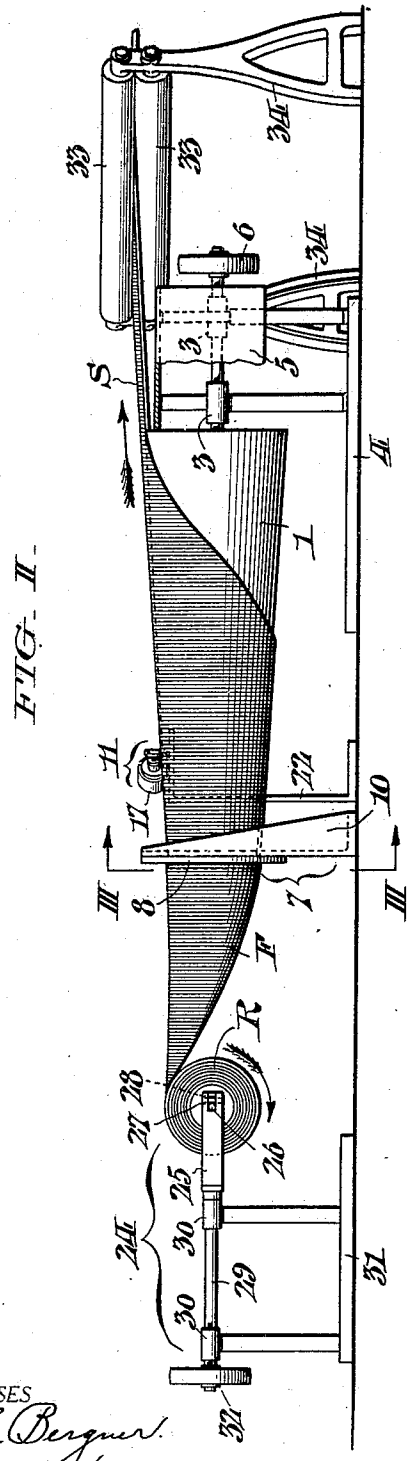


FIG. IV.

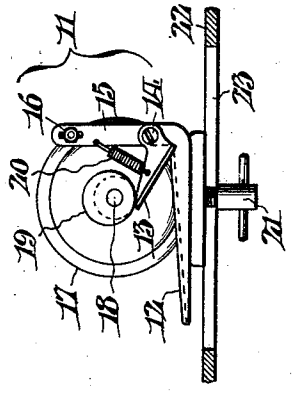
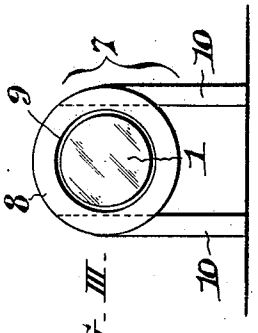


FIG. III.



WITNESSES

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UNITED STATES PATENT OFFICE

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APPARATUS FOR CUTTING TEXTILE MATERIALS

Application filed October 31, 1925. Serial No. 65,938.

This invention is concerned with continuous cutting of materials such as textile fabrics,—more specifically bias cutting—i. e., into strips wherein the warp and weft threads occupy angular positions relative to the side edges of the strips. As is well known, such strips are, as the result of bias cutting, capable of withstanding greater longitudinal and lateral strains than a corresponding width of the original fabric, and are therefore preferred in the arts where the consideration of tensile strength is highly important, e. g., in wrapping or covering wire; in securing thermo-insulating material about pipes or conduits; in the manufacture of vehicle tires; etc.

Concisely stated, the main objects of my invention are to enable fabric woven in tubular form to be cut into a continuous bias strip, and to provide a simple and efficient apparatus for this purpose.

Other objects and advantages will be readily apparent from the following detailed description of this invention.

In the drawings, Fig. I is a plan view, more or less diagrammatically represented, of a cutting apparatus conveniently typifying my invention.

Fig. II is a side elevation of the same.

Fig. III is a view taken as indicated by the arrows III—III in Fig. II; and

Fig. IV is a detail illustration of the cutting means with the mounting therefor in section.

Referring first more particularly to Figs. I and II of the drawings, it will be observed that the tubular material indicated conventionally at "F" is supplied from a bolt or roll "R" and passed over and about a mandrel 1. This mandrel 1 is slightly tapered or conical as shown so as to facilitate opening and passage thereover of the tubular fabric "F", and for another purpose to be hereinafter explained. The mandrel 1 may be made solid, although to secure the advantage of lightness, it is preferably constructed of sheet metal and secured upon an axially disposed shaft 2 that is journalled in bearings 3, beyond the larger end of said mandrel, the bearings 3 being supported by an appropriate framework 4. A guard 5 of sheet metal or the like extends about one side and over the top of the bearings 3 to prevent access of the material "F" to them. By the described arrangement, the mandrel 1 is supported entirely clear of obstruction at the forward end, and free to respond to induced rotation either in following the movement of fabric thereover, or under positive drive of a wheel 6, secured on the shaft 2, capable of being power or manually actuated at a suitable speed in accordance with the characteristics of the cloth to be cut; i. e., with regard to whether it is soft, pliable and therefore clinging, or comparatively stiff as a result of sizing;—all for the purpose of avoiding unnecessary drag and insuring a clean and accurate cut, as hereinafter more fully explained.

Spreading and smoothing of the tubular material "F" in its passage to the mandrel 1 is accomplished by what may be conveniently termed a spreader, indicated at 7 in the drawings. This spreader 7 comprises a plate or board 8 with a circular opening 9 through which the smaller or receiving end of the mandrel 1 projects with allowance of a slight amount of circumferential clearance thereabout, as shown in Fig. III. The edge of the circular opening 9 is preferably rounded to facilitate passage of the material "F" therethrough. A pair of uprights 10 rising from the floor serve to support the member 8 in fixed relation to the mandrel 1.

As a result of combined longitudinal and rotational progression induced in a manner to be presently described, the tubular fabric "F" is moved spirally of the drum 1 past a cutting means shown at 11. This cutting means 11 is located at the surface of the drum 1, and comprises a fixed horizontal shear blade 12, and a cooperating movable shear blade 13 which is pivoted at 14 to an integral upright extension or arm 15 of the fixed blade 12. This arm 15 is secured by one or more bolts 16 to the frame of an electric motor 17 provided, in the present instance as a convenient means for actuating the movable blade 13. To the shaft 18 of

the motor 17 is affixed an eccentric cam 19 wherewith the movable shear blade 13 is maintained in operative contact by a contractile spring 20 in tension between said movable shear blade 13 and the arm 15 of the fixed blade 12. Thus, by operation of the motor 17, the movable shear blade 13 is constantly vibrated toward and away from the fixed blade 12. In order to permit adjustment of the shear blades 12, 13 relative to the mandrel 1 for the purpose of varying the angles of the bias cut, a swivel clamp screw 21 is employed to fasten the motor 17 to a bracket 22 provided for its support. The clamp screw 21 passes through an elongated slot 23 in the bracket 22 so that the cutting means 11, in addition to capacity for angular adjustment, as above explained, can be bodily shifted longitudinally of the mandrel 1 to properly position the shears 12, 13 at the region where the tubular material "F" is substantially fully expanded on the drum 1, or as required for tubular material of different diameters.

Rotative movement of the fabric "F", while passing over the rotating mandrel 1, may be imparted for example, through bodily rotation of the bolt or roll "R" from which the fabric is supplied. To this end, I provide a rotating holder device for the fabric bolt or roll "R" which holder device 24, as shown in Figs. I and II of the drawings, is located closely adjacent to the forward end of the mandrel 1. This holder 24 comprises a yoke 25 between the extremities of which an axle shaft 26 for the bolt or roll "R" is removably mounted to permit substitution of a new bolt or roll for one previously exhausted. A simple arrangement enabling such substitution is by recessing the extremities of the yoke 25, as shown at 27, to receive and support the ends of the axle shaft 26, and by employing removable pins 28 to retain said shaft ends in place in the recesses 27. The yoke 25 is fixed to the end of a shaft 29 which is substantially axially aligned relative to the drum 1; and it is journalled in bearings 30 on the frame 31 of the holder device 24. If desired, the holder may be positively driven by a pulley 32 on the shaft 29 to facilitate and assist in rotation of the tubular material in passing to the mandrel 1. As a consequence of the rotative movement imparted to the tubular material "F" in the manner suggested, said material yields readily to being opened enroute to the mandrel 1, such opening being greatly eased by the spreading and smoothing action of the spreader 7. Attention is also directed to the fact that the roll or bolt "R", by reason of its free mounting in the yoke 25 of the holder device 24, will respond readily to turning in satisfying the longitudinal progression of the material induced as already stated, concurrently with rotation, to determine spiral travel relative to the mandrel 1; and, if desired or required, said mandrel 1 may be positively driven, as previously stated, through power applied to the wheel 6.

As the material "F" is passed edge-wise between the shears 12, 13 it follows, in view of the spiral movement imparted thereto, that it is cut at an angle with resulting production of a single continuous bias strip "S". This strip "S" is drawn tangentially at an angle from the surface of the mandrel 1 by superposed nip or draft rolls 33, whose axes are inclined to that of said mandrel, as shown in Fig. I, to determine the desired angular travel of the cut strip "S". The draft rolls 33 are journalled at opposite ends in bearings of appropriate upright frames 34, and may be driven by power applicable to a pulley 35 provided for the purpose. By this arrangement, it will be obvious that the pull upon the cut strip "S" causes the material to be drawn between the shear blades 12, 13; and, concurrently, to be advanced longitudinally along the mandrel 1. Also, the strip "S" tends to cause the mandrel 1 to revolve and in this way assists in inducing rotation of the material. By use of my improved apparatus, the material may be easily cut or split by a very light pull on the strip "S" to the avoidance of any injurious straining, the cutting means 11 being in practice adjusted to prevent any such contingency, to a point in advance of the region of full expansion of the tube "F" on the mandrel 1, so that said tube "F" can never be stretched to the extent of resisting its progress on said mandrel. Therefore by use of a mandrel 1 of the proper taper, I am able to insure delivery of the material to the cutting means 11 with the minimum amount of tension and without necessitating aid of drawing devices other than the nip rolls 33. With comparatively stiff or sized material, it is quite possible to cut without motion of the shear blades 12, 13, the pull on the strip "S" sufficing without additional aid. In the case of materials of a softer texture, motion of the shear blades 12, 13 is desirable so that stretching or distortion may be avoided.

Having thus described my invention, I claim:

1. In apparatus for cutting bias strips from tubular material comprising a rotating taper mandrel adapted to occupy the tubular material and to rotate co-axially therewith, means to cut the material into a continuous strip, and means to draw upon the cut strip to cause longitudinal advance of the tubular material on the mandrel.

2. In apparatus for cutting bias strips from tubular material comprising a rotating frusto-conical mandrel adapted to occu-

py the tubular material and to rotate coaxially therewith, means to cut the material into a continuous strip, and take up means arranged at an angle to the mandrel to draw upon the cut strip, thereby to cause longitudinal advance of the tubular material on said mandrel.

3. In apparatus for cutting bias strips from tubular material comprising a mandrel rotatably secured at one end, a yoke with means for holding a roll of the tubular material, said yoke being contiguous to the free end of the mandrel and axially aligned for rotation in unison with the latter, and means to cut the fabric as it is rotated on the mandrel.

4. In apparatus for cutting bias strips from continuous tubular material comprising a rotating frusto-conical mandrel over and about which the tubular material is passed, associated cutting means, and means for drawing the cut strip tangentially at an angle from the rotating mandrel to determine longitudinal advance of the material thereon past the cutting means.

5. In apparatus for cutting bias strips from continuous tubular material, comprising a rotating frusto-conical mandrel over and about which the tubular material is passed, means whereby said mandrel may be positively driven, associated cutting means, and means for drawing the cut strip tangentially at an angle from the rotating mandrel to determine longitudinal advance of the tubular material thereon past the cutting means.

6. A machine for cutting bias strips from continuous tubular material comprising a rotating frusto-conical mandrel over and about which the tubular fabric is passed, a wheel on the axis of said mandrel whereby it may be positively driven, means for cutting the material into a strip, and means for drawing the cut strip tangentially at an angle from the rotating mandrel to determine longitudinal advance of the tubular material thereon past the cutting means.

7. A machine for cutting bias strips comprising a rotatable frusto-conical mandrel fixed against longitudinal movement and adapted to occupy and rotate with it a sleeve of fabric, a knife to cut said fabric to form a strip, and take-up means for pulling on the strip as it comes from the knife and to cause the sleeve to move longitudinally on the mandrel.

8. A machine for cutting bias strips comprising a rotatable frusto-conical mandrel fixed against longitudinal movement and adapted to occupy and rotate with it a sleeve of fabric, a knife to cut the fabric and a take-up means arranged at an angle to the mandrel to pull the cut strip and to cause the sleeve to move longitudinally on the mandrel.

9. A machine for making bias strips comprising a mandrel rotatably secured at one end, a yoke with means for holding a roll of fabric, the yoke being rotatable with its centre of rotation substantially in line with the centre of rotation of the mandrel, the free end of the mandrel being contiguous with the yoke so that when the fabric from the roll is passed over the mandrel and the mandrel is rotated, the yoke is rotated with it, and a knife for cutting the fabric as it is rotated on the mandrel.

10. A machine for cutting bias strips comprising a rotatable mandrel fixed against longitudinal movement and adapted to occupy and rotate with a sleeve of fabric, means for cutting said fabric to form a strip, and take-up means for pulling on the cut strip at an oblique angle to the mandrel and thereby causing the sleeve to move longitudinally on the mandrel, as well as to turn.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this 30th day of October, 1925.

WILLIAM BERRY.