June 24, 1930. E. TONELLI 1,765,779

SHEET WINDING MACHINE

Filed Aug. 8, 1928 3 Sheets-Sheet 1

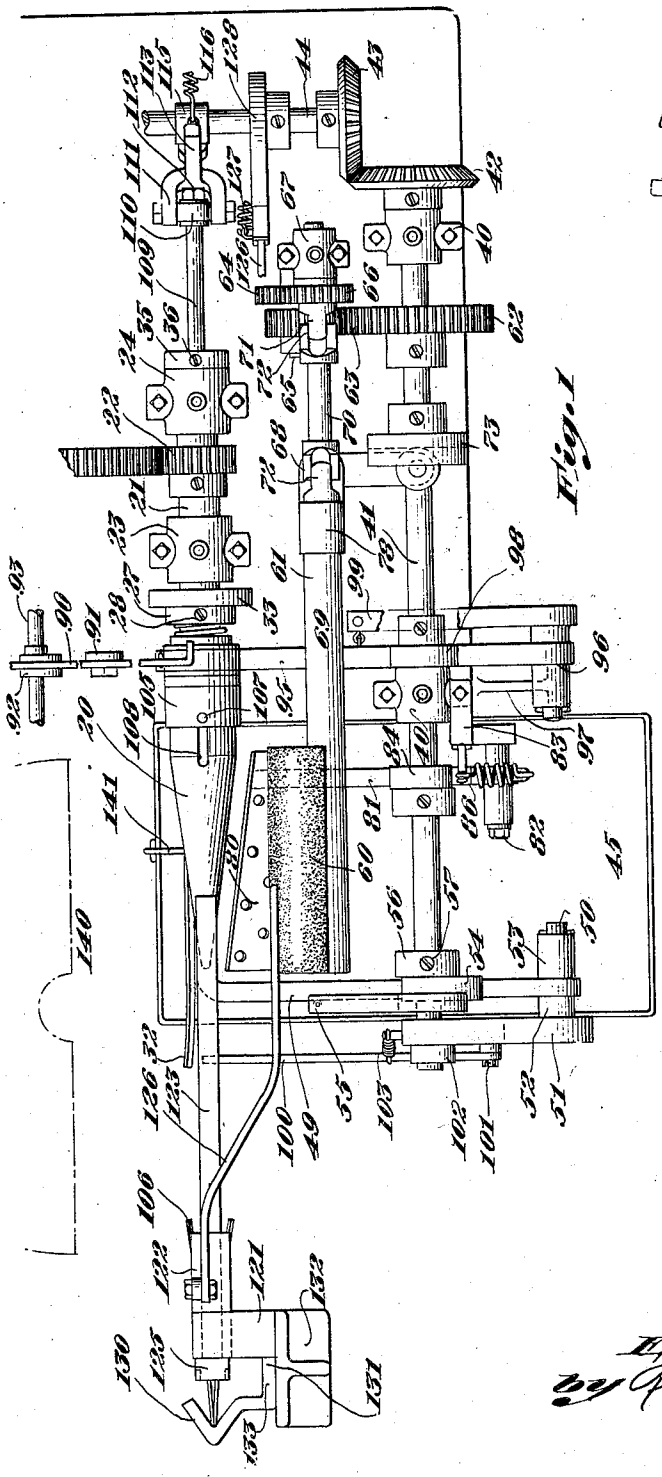


Fig. 1

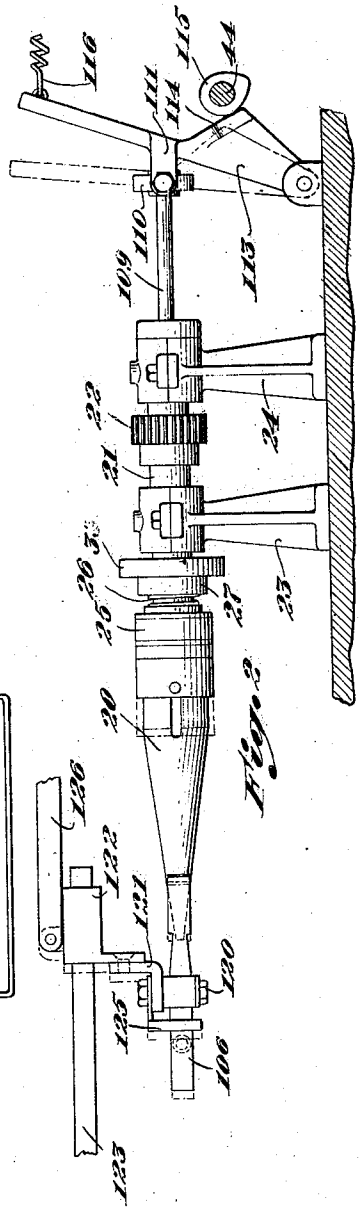


Fig. 2

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SHEET WINDING MACHINE

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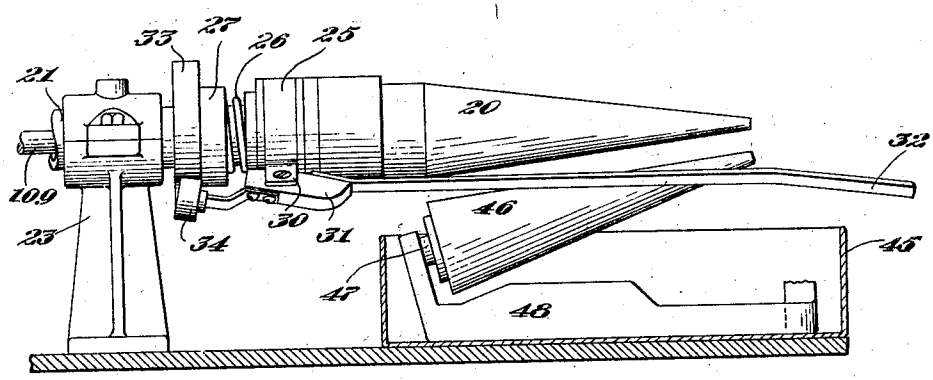


Fig. 3

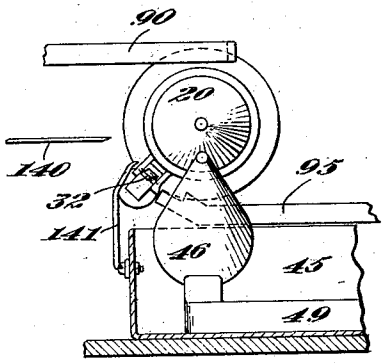


Fig. 4

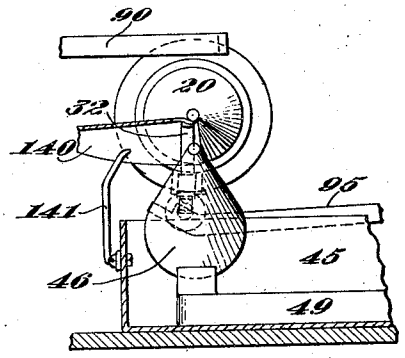


Fig. 5

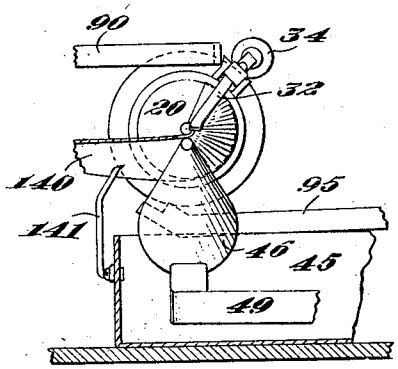


Fig. 6

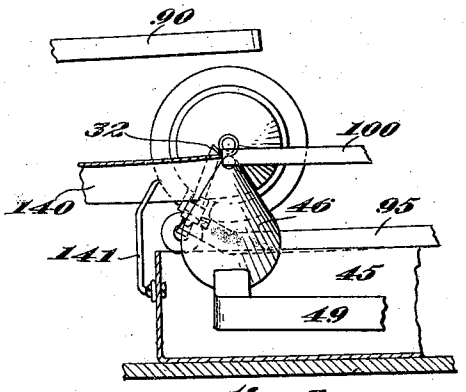


Fig. 7

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SHEET WINDING MACHINE

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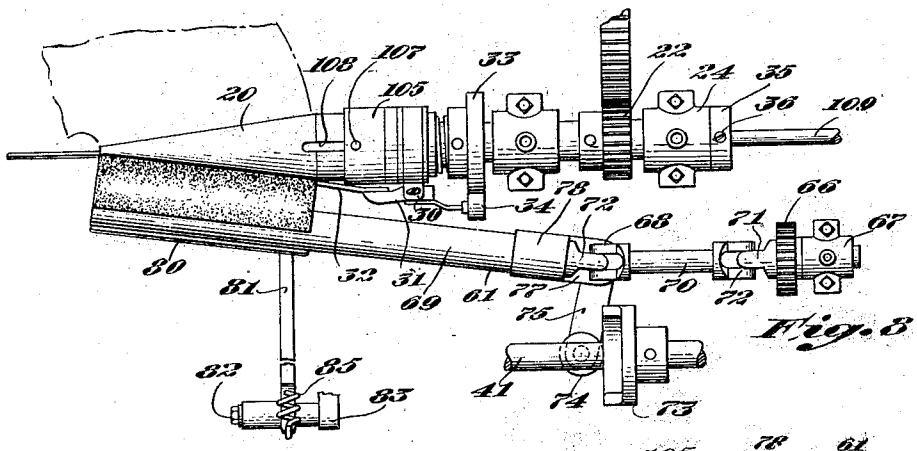


Fig. 8

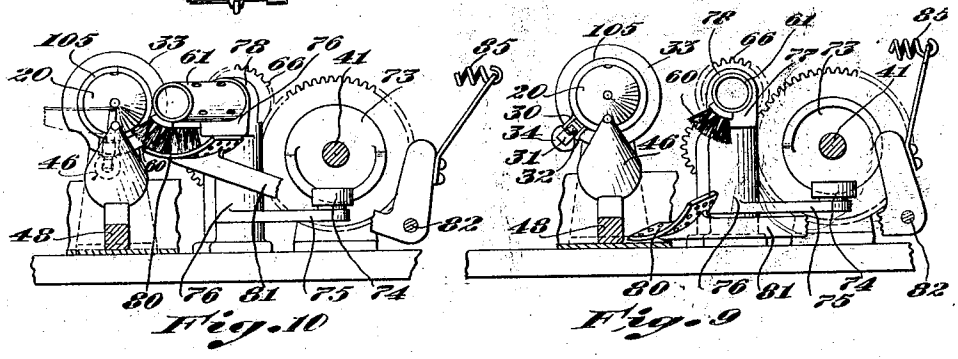


Fig. 10

Fig. 9

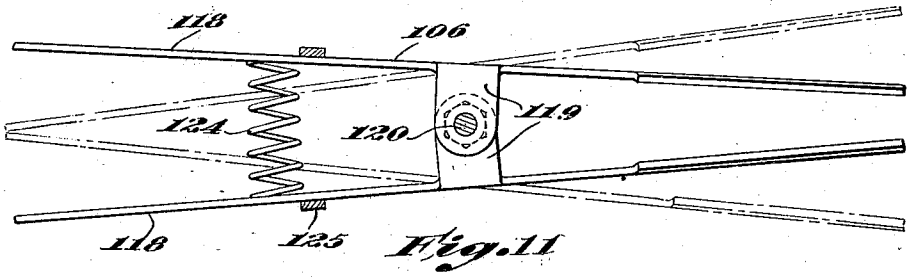


Fig. 11

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UNITED STATES PATENT OFFICE

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SHEET-WINDING MACHINE

Application filed August 8, 1928. Serial No. 298,276.

The primary object of this invention is to provide, in a machine of the type in which a cone is formed by winding a blank in layers upon a mandrel, means which grips the blank and secures it to the mandrel during the initial portion of the winding operation, and which functions as soon as one layer of the cone has been wound around the mandrel as a supplementary slicker and paster, thereby ensuring the proper securement to each other of the layers of the blank which form the cone.

Another object of this invention is to provide means for arresting momentarily the cone forming movement of the blank at the time the paste is applied thereto. A further object of this invention is to provide means for removing the completely formed cone from the mandrel which means include two factors, one for loosening the cone on the mandrel and the other for withdrawing the loosened cone.

Other objects of the invention reside in the structure and details of the various elements through which the results above mentioned are obtained, as will be apparent to one skilled in the art upon an examination of the following specification and of the drawings which form a part and in which

Fig. 1 is a plan view of one type of machine embodying this invention, the parts being shown in the position which they occupy before the blank is fed to the mandrel;

Fig. 2 is a side elevation of a mandrel illustrating particularly the means for removing the completed cone from the mandrel, such means being shown in full lines prepared to function and in dotted lines after the removing operation has been initiated;

Fig. 3 is an enlarged side elevation illustrating particularly the mandrel, slicker and gripper in the inoperative position;

Figs. 4, 5, 6 and 7 are detail views illustrating the positions that the various parts occupy prior to and during the formation of the first layer of the cone;

Fig. 8 is a plan view of a mandrel illustrating the relation of the paster to the mandrel just prior to the time when the paste is applied to the blank;

Fig. 9 is an end elevation of the winding and pasting mechanism in the position prior to the feeding of a blank;

Fig. 10 is a view similar to Fig. 9 with the blank partially wound on the mandrel and the pasting mechanism preparing to apply paste to the blank; and

Fig. 11 is an enlarged plan view of the cone removing factor.

The formation of a cone by winding a suitably shaped blank in layers upon a mandrel is an old and well known practice but one of the great difficulties which is experienced in its operation is that of providing means which will hold the leading or forward end of the blank in place on the mandrel so that it will be properly covered by the second layer. This difficulty is particularly experienced in the formation of cones in which the leading edge is feathered in order to ensure the smooth interior construction now required in the manufacture of cones to be used in mills for winding yarns, rayons, silk or other materials.

The old practice of using a split mandrel and introducing the leading edge of the blank or a portion thereof into the split cannot be employed where the leading edge of the blank is feathered and the interior of the cone must be smooth. One attempt has been made to solve this difficulty by providing a tongue on the leading edge which enters a slot in the mandrel, such tongue being in the part of the cone which is later trimmed off. Another attempt includes the use of a depression extending longitudinally in the surface of the mandrel and the provision of a gripper which will enter that depression and remain therein during the formation of the cone.

The structure herein described and claimed overcomes this difficulty and avoids the objections to the attempts previously made by ensuring the formation of a cone, the interior of which is entirely smooth and in which the entire surfaces of the various layers are securely pasted together.

The operation of the machine embodying this invention which has been selected for illustration will be described briefly with respect particularly to certain novel features therein. The blank, preferably of sector

form in accordance with the usual practice, is fed to a rotating mandrel and its leading edge is clamped upon the mandrel by a gripper which is supported for movement with or independent of the mandrel. After the mandrel, carrying the blank and the gripper, has completed a part of a rotation the gripper is checked and so holds the blank against rotation with the mandrel. An idle roller, commonly called a slicker and so termed herein, now advances to clamp the blank against the mandrel and when the slicker so acts the gripper is released and the gripper and blank continue the rotation with the mandrel. Simultaneously with the advance of the slicker a paste brush contacts with the leading end of the blank so that the application of a sufficient amount of paste in a line extending the length of the cone is ensured. The paste is applied not only upon the blank but also upon the gripper, which gripper is held against further rotation with the mandrel after the first layer has been formed and thereafter acts as a spreader for the paste and as a supplementary slicker during the formation of the cone. When the cone has been completely formed on the mandrel it is loosened therefrom by one factor and positively removed therefrom by a second factor, thus eliminating any danger of tearing or defacing the cone.

The cone is formed upon a mandrel 20 mounted upon and rotated by a hollow shaft 21 which is driven through a gear 22 from a suitable source of power. The shaft 21 is mounted in bearings carried by a pair of pedestals 23, 24 between which the gear 22 is mounted. The shaft 21 carries a collar 25, which is yieldably held in contact with the base of the mandrel by a spring 26 which surrounds the shaft, one end of the spring bearing against the collar 25 and the other end bearing against a washer 27, which is preferably secured in position on the shaft by a set screw 28 or by other suitable means. The collar 25 is not driven positively by the shaft but when it is held against the mandrel 20 by the spring 26 it is frictionally driven thereby.

The collar 25 includes a pair of tongues 30 between which is pivotally supported a block 31 extending parallel to the mandrel 20. To the other end of the block 31 is affixed a thin strip 32 of metal which functions to clamp against the mandrel the leading edge of the blank from which the cone is formed, and hence will be hereinafter referred to as the gripper. Mounted on the shaft 21 is a cam 33 with which contacts a roller 34 carried by one end of the block 31. Suitable spring means, not shown, are provided for holding the roller 34 at all times in contact with the cam 33 and causing it to function in the manner to be described later. Figs. 3 and 8 show the gripper 32 in its two positions with respect to the mandrel 20, Fig. 3 illustrating the gripper 32 in its idle position and Fig 8 illustrating the gripper in its functioning position. A collar 35 fixed on the inner end of the shaft 21 by a set screw 36 secures the shaft 21 in place in the bearings of the pedestals 23, 24.

Suitably supported by standards 40 is a shaft 41 constantly rotated by intermeshing beveled gears 42, 43 from a drive shaft 44, which is the main source of power to the machine, and which may actuate the gear 22 in any desired manner. This, however, is not essential since the gear 22 may be driven independently if preferred, and accordingly no means are shown connecting the shaft 44 and the gear 22. The shaft 41 and the mandrel 20 each extend over a paste reservoir 45 from which paste is supplied to the blank formed on the mandrel 20 in accordance with the means to be hereinafter described.

Below the mandrel 20 is mounted a freely rotatable roller 46 which is commonly referred to in the trade as a slicker and will be so designated throughout the specification and claims. The slicker 46 is conical and functions to hold the blank against the mandrel 20 during the greater part of the cone forming operation. The slicker is mounted to rotate freely on a stub shaft 47, which is carried by a bar 48 (see Fig. 3). The bar 48 includes an integral arm 49 which extends along one side of the paste reservoir and is pivoted upon a stud 50 suitably mounted in a support 51. The arm 49 is preferably provided with a collar 52 and is held in position on the stud 50 by a washer 53. Positioned upon the shaft 41 is a cam 54 which controls the position of the arm 49, bar 48 and the slicker 46. A suitable spring 55 holds the arm 49 in contact with the cam 54 which is secured upon the shaft 41 by an integral collar 56 and a set screw 57.

Paste is applied to the blank by means of a paste brush 60 (see Figs. 8, 9 and 10) which is mounted to rotate upon a shaft 61 driven from the shaft 41 by a suitable reduction gearing, comprising a gear 62 on the shaft 41, gears 63, 64 on a jack shaft 65 and a gear 66 on the shaft 61 which meshes with the gear 64. The shaft 61 is supported by a pair of pedestals 67, 68 and comprises sections 69, 70 and 71 connected by universal joints 72.

The outer section 69 carrying the paste brush 60 is oscillated in a horizontal plane toward and from the mandrel 20 by a cam 73 on the shaft 41. The cam 73 engages a roller 74 mounted upon an arm 75 projecting from a rotatably mounted block 76, the axis of the block 76 being below the universal joint 72 connecting the sections 69 and 70. A second arm 77 projects from the block 76 at right angles to the arm 75 and carries a sleeve 78 which embraces the shaft 69 per-

mitting the rotation of the shaft 61. The action of the cam 73 through the arms 75 and 77 causes the forward section 69 to oscillate relative to the section 70, thus advancing and retracting the brush with reference to the mandrel 20.

Mounted in the paste reservoir 45 is a dipper 80 having a perforate bottom and carried by an arm 81 which is pivotally supported upon a stud 82 carried by a bracket 83 fixed to the forward post 40. The arm 81 is controlled by a cam 84 on the shaft 41 and by a spring 85 so that the rotation of the shaft 41 will cause the dipper to rise and fall with reference to the paste brush 60. The cams 73 and 84 are so timed that the dipper 80 is raised into contact with the brush 60 at the time shortly before the brush is advanced into contact with the blank on the mandrel 20 (see Fig. 10). The brush 60 after receiving paste from the dipper rotates under a scraper fixed on the reservoir (not shown) which removes much of the paste from the brush except at the leading edge.

While the gripper 32 is normally rotated with the mandrel 20 through the contact of the collar 25 therewith it is held against rotation in two positions as stated above by suitably actuated trips. Extending above the collar 25 is the first trip which comprises an arm 90, pivotally mounted on a post 91 and actuated by a cam 92 on a jack shaft 93 driven either from the main drive shaft 44 or by an independent source of power not shown. Extending below the collar 25 is the second trip which comprises an arm 95 pivoted upon a stud 96 projecting outwardly from a bracket 97 on the forward post 40. Fixed on the shaft 41 is a cam 98 with which the arm 95 is held in contact by a spring 99 so that the arm 95 is caused to swing on the pivot stud 96 in accordance with the contour of the cam 98. The trips are so formed that when in the functioning position the ends of the arms 90 and 95 contact with one of the tongues 30 and thus prevent the rotation of the collar 25 with the mandrel 21. At a suitable period in the operation of the machine after the gripper is arrested by the second trip the tip of the gripper 32 is held away from the blank on the mandrel by a finger 100 pivotally mounted on a stud 101 carried by the support 51 so that it will not bear upon the blank and impede its travel with the mandrel. The position of the finger 100 is controlled by a cam 102 on the shaft 41, being held in contact with the cam 102 by a spring 103.

The finished cone is removed from the mandrel 20 by two separate factors, to wit, a collar 105 movable longitudinally of the mandrel 20 and a pair of grippers 106. The collar 105 is held on the mandrel 20 by a pin 107 which extends through a slot 108 in the cylindrical end of the mandrel. The pin 107 is carried by a shaft 109 which extends through the shaft 21 terminating in a bearing 110, which is pivotally supported in a yoke 111, and to which the shaft is secured by a nut 112. The yoke 111 is a part of a pivotally mounted arm 113 which includes a cam face 114 held in contact with a cam 115 on the shaft 44 by a spring 116 which engages the upper end of the arm 113. The shaft 109 is thus free to rotate with the shaft 21 but is advanced at the proper intervals to loosen the completed cone on the mandrel.

The strippers 106 comprise a pair of plates 118 formed as shown in Fig. 11 with overlapping ears 119 through which projects a pin 120 carried by a bracket 121 depending from a sleeve 122 mounted to slide upon a fixed bar 123. The outer end of the stripper plates 118 are normally separated by a spring 124, the limit of separation being determined however by a collar 125 also carried by the bracket 121. The sleeve 122 is reciprocated by an arm 126 which is held by a spring 127 in contact with a cam 128 on the shaft 44. At the outer limit of movement of the stripper 106 (see Fig. 1). the outer end of the stripper plates 118 engage a V-shaped notch 130 of a stop 131 mounted upon an upright 132. The notch forces these ends of the stripper plates together against the action of the spring 124 thus separating the inner ends and allowing the finished cone to drop into a suitable receptacle. The bracket 121 engages the base 133 of the stop 131 and thus positively limits the outward movement of the stripper 106.

The blank 140 is fed to the mandrel 20 by any suitable means not shown, a guiding finger 141 mounted upon the reservoir 45 being provided to insure the proper location of the blank. The rotation of the mandrel 20 has been started and when the blank 140 reaches the mandrel the gripper 32 is swung by the cam 33 to clamp the blank against the mandrel in appreciable distance behind its leading edge (see Fig. 5). The blank 140 is now carried by the mandrel until the first layer of the cone is about one-half completed, at which time the gripper 32 is held against movement by the arm 90 of the first trip (see Fig. 6) and the paste brush applies a roll of paste upon the portion of the leading edge of the blank ahead of the gripper and also applies paste to the gripper 32 itself (see Fig. 8). The slicker 46 is now brought against the blank and the trip 90 is raised so that the blank and gripper continue to rotate with the mandrel. When the first layer is completed the gripper 32 is stopped by the arm 95 of the second trip and its outer end moved slightly away from the surface of the blank by the finger 100 to relieve any pressure thereon. The roll of paste on the leading edge of the blank enters the pocket formed between the layer of the blank on

the mandrel and the face of the portion of the blank being fed to the mandrel. Since the end of the gripper is forced away from the mandrel by the finger 100 and against the unfed portion of the blank, that portion receives from the gripper the paste supplied to the gripper by the brush 60. The gripper 32 also acts with the roll 46 as a supplementary slicker to insure proper winding of the blank into a cone and the cohesion of the various layers.

When the cone has been completely formed on the mandrel 20 the collar 105 is advanced by the cam 115 to bear against the base of the cone and loosen it from the mandrel. At the same time the stripper 106 is brought forward over the tip of the cone, until the plates 118 clamp the cone and is then retracted drawing the cone off the mandrel which continues to rotate. The retracting movement of the stripper 106 is checked by the stop 131 and the plates 118 are opened allowing the finished cone to drop, a suitable receptacle (not shown) being provided to receive it.

I claim:

1. In a machine for winding blanks into cones upon a mandrel, means for rotating the mandrel, means for clamping the blank against the surface of the mandrel, means for applying paste to the blank and means for holding the blank against rotation with the mandrel as the paste applying means operates.

2. In a machine for winding blanks into cones upon a mandrel, means for rotating the mandrel, means for clamping the blank against the surface of the mandrel, means for applying paste to the blank, and means for engaging the clamping means and thereby holding the blank against rotation with the mandrel as the paste applying means operates.

3. In a machine for winding blanks in layers upon a mandrel, means for rotating the mandrel, a gripper for clamping the blank to the mandrel, means normally causing the gripper to rotate with the mandrel and means for preventing such rotation of the gripper at predetermined intervals.

4. In a machine for winding blanks in layers upon a mandrel, means for rotating the mandrel, a gripper for clamping the blank to the mandrel, means normally causing the gripper to rotate with the mandrel, and means for preventing such rotation of the gripper after the blank has been partially wound into a layer.

5. In a machine for winding blanks in layers upon a mandrel, means for rotating the mandrel, a gripper for clamping the blank to the mandrel, means normally causing the gripper to rotate with the mandrel, and means for preventing such rotation of the gripper after the blank has been wound into a layer.

6. In a machine for winding blanks in layers upon a mandrel, means for rotating the mandrel, a gripper for clamping the blank to the mandrel, means normally causing the gripper to rotate with the mandrel, means for preventing such rotation of the gripper after the first layer of the blank has been partially formed and after such layer has been completed.

7. In a machine for winding blanks in layers upon a mandrel, means for rotating the mandrel, a gripper for clamping the blank to the mandrel, means normally causing the gripper to rotate with the mandrel, and means for positively removing a portion of the gripper from close contact with the blank during the winding operation.

8. In a machine for winding blanks in layers upon a mandrel, means for rotating the mandrel, a gripper for clamping the blank to the mandrel, means normally causing the gripper to rotate with the mandrel, means for preventing such rotation of the gripper after the blank has been formed into a layer and means for positively removing a portion of the gripper from close contact with the blank at such time.

9. In a machine for winding blanks into cones upon a mandrel, means for rotating the mandrel, a gripper rotatable with the mandrel for clamping the blank to the mandrel, the gripper engaging the blank an appreciable distance behind the leading edge thereof and means for applying a roll of paste to the portion of the blank between the leading edge and the gripper

10. In a machine for winding blanks into cones upon a mandrel, means for rotating the mandrel, a gripper rotatable with the mandrel for clamping the blank to the mandrel, the gripper engaging the blank an appreciable distance behind the leading edge thereof, means for applying a roll of paste to the portion of the blank between the leading edge and the gripper, and means for interrupting the rotation of the gripper and the blank at the time the roll of paste is applied.

11. In a machine for winding blanks into cones upon a mandrel, means for rotating the mandrel, a gripper rotatable with the mandrel for clamping the blank to the mandrel, the gripper engaging the blank an appreciable distance behind the leading edge thereof and means for applying a roll of paste to the portion of the blank between the leading edge and the gripper, the roll of paste being carried thereby into the pocket between the portion of the blank wound upon the mandrel and the remainder of the blank.

12. In a machine for winding blanks in layers upon a mandrel, a single means which clamps the blank to the mandrel at the beginning of the winding operation, applies

paste to the remainder of the blank after the first has been formed and slicks the layers of the blank as they are formed on the mandrel.

13. In a machine for winding blanks in layers upon a mandrel, a single means which clamps the blank to the mandrel at the beginning of the winding operation, applies paste to the remainder of the blank after the first has been formed and slicks the layers of the blank as they are formed on the mandrel, means for rotating the mandrel and means causing the single means to rotate with the mandrel.

14. In a machine for winding blanks in layers upon a mandrel, a single means which clamps the blank to the mandrel at the beginning of the winding operation, applies paste to the remainder of the blank after the first has been formed and slicks the layers of the blank as they are formed on the mandrel, means for rotating the mandrel, means causing the single means to rotate with the mandrel and means preventing at intervals the operation of the causing means.

15. In a machine for winding blanks into cones upon a mandrel, means for continuously rotating the mandrel, means for shifting and thereby loosening the finished cone upon the mandrel and means for stripping the cone from the mandrel.

16. In a machine for winding blanks into cones upon a mandrel, means for continuously rotating the mandrel, a collar rotatable with and reciprocable longitudinally of the mandrel, means for reciprocating the collar over the mandrel to shift and thereby loosen the formed cone and means for stripping the cone from the mandrel.

17. In a machine for winding blanks into cones upon a mandrel, means for continuously rotating the mandrel, a collar rotatable with and reciprocable longitudinally of the mandrel, a stripper reciprocable longitudinally of the mandrel, and means for reciprocating the collar and the stripper to remove the finished cone from the mandrel.

Signed by me at New Bedford, Mass., this 1st day of Aug., 1928.

ETHIL TONELLI.