March 4, 1941. R. O. HUFFMAN ET AL 2,233,451

AUTOMATIC HOSE SHEARING AND STRIPPING APPARATUS

Filed June 3, 1940 3 Sheets-Sheet 1

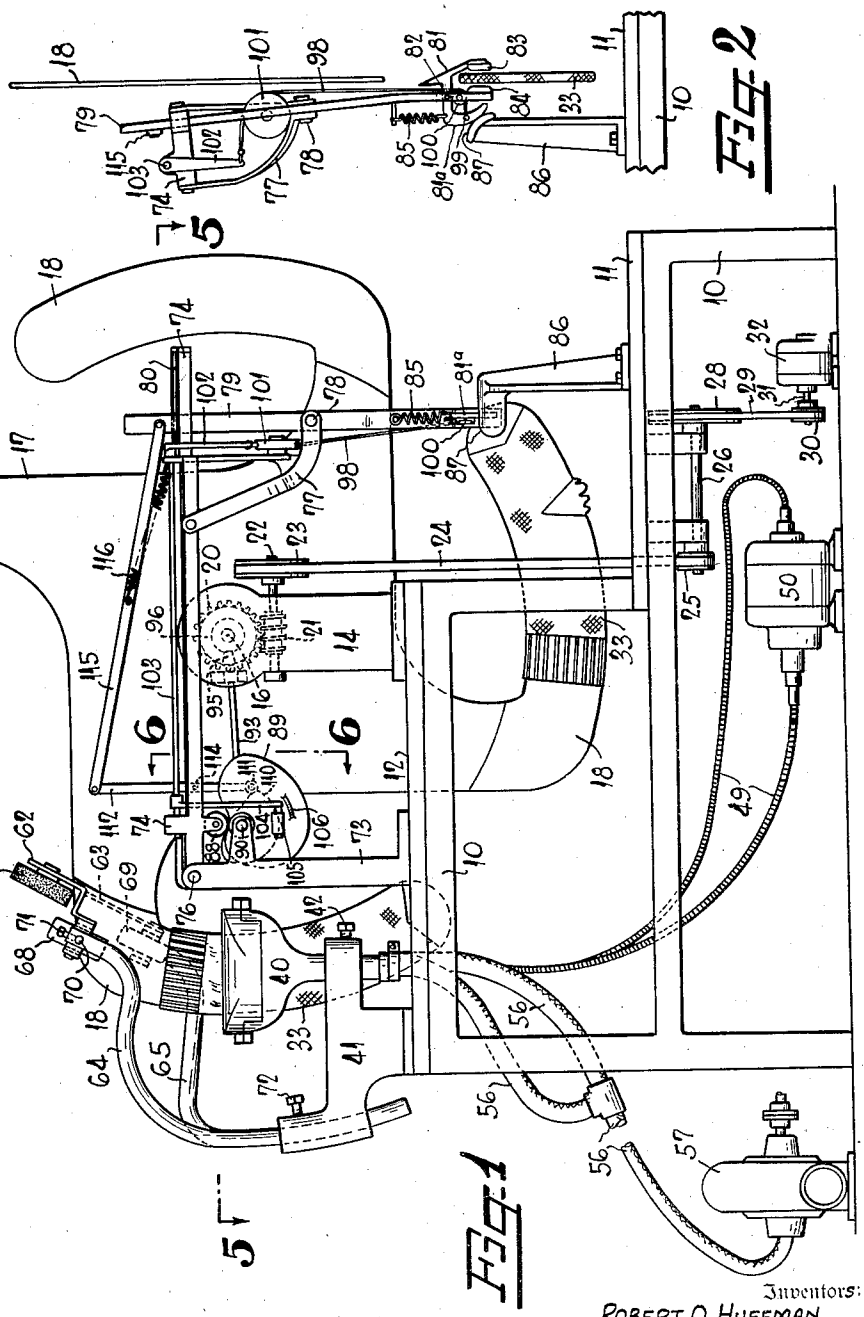


Fig. 2

Fig. 1

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AUTOMATIC HOSE SHEARING AND STRIPPING APPARATUS

Filed June 3, 1940 3 Sheets-Sheet 2

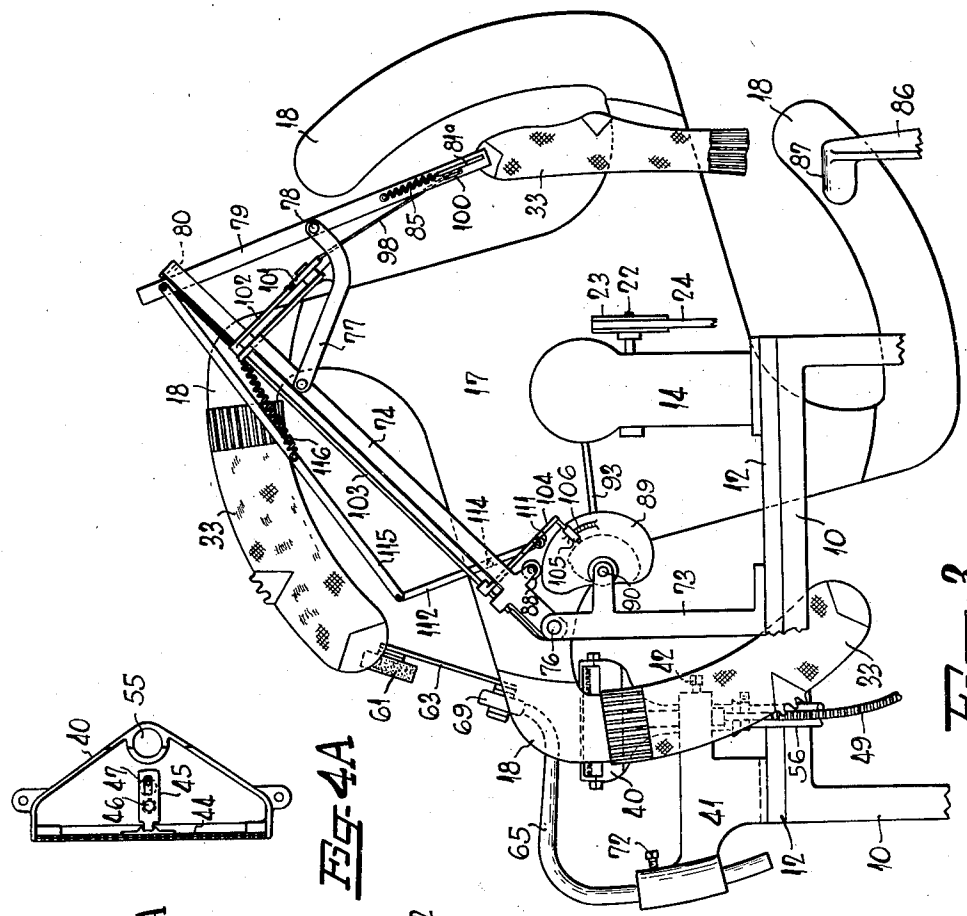


FIG. 3

FIG. 4A

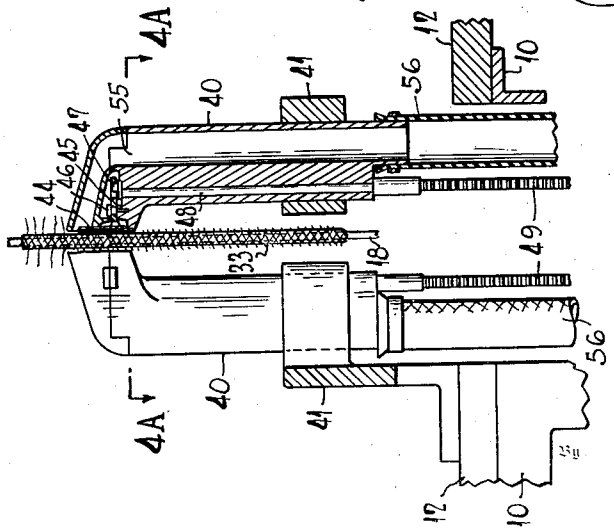


FIG. 4

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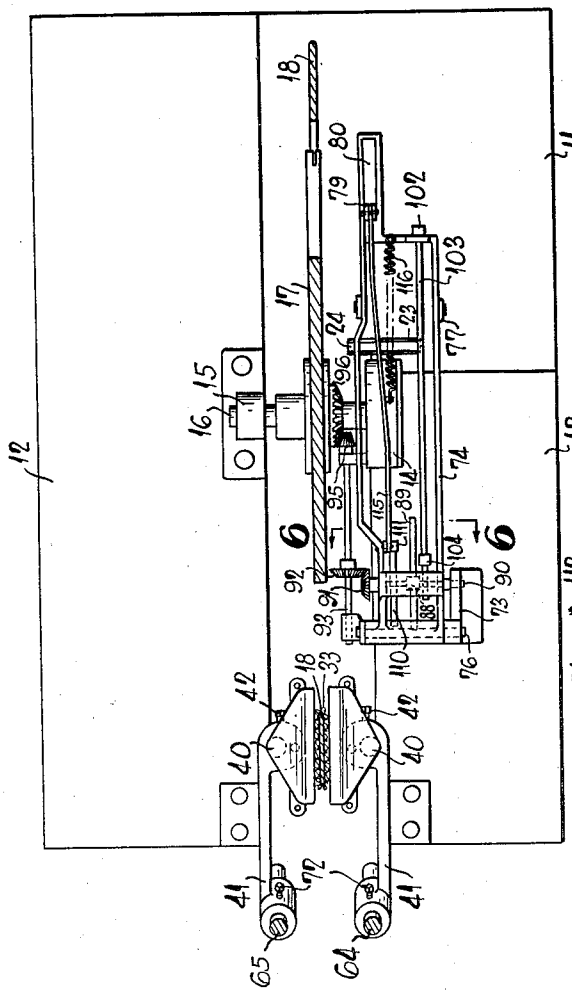


FIG. 5

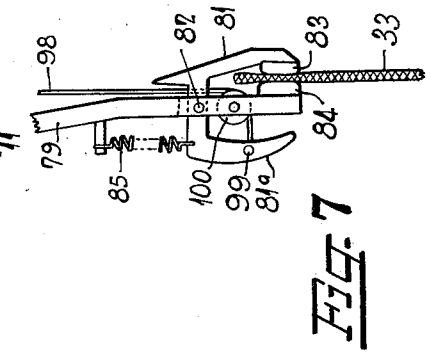


FIG. 7

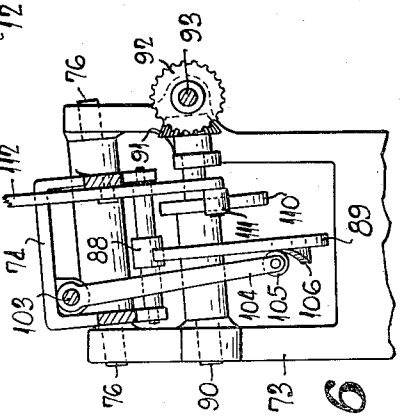


FIG. 6

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Patented Mar. 4, 1941 2,233,451

UNITED STATES PATENT OFFICE

2,233,451

AUTOMATIC HOSE SHEARING AND STRIPPING APPARATUS

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Application June 3, 1940, Serial No. 338,662

11 Claims. (Cl. 26—7)

This invention relates to a shearing machine and more especially to means for shearing loose ends of threads on hosiery and the like.

It is a well known fact that during the knitting of seamless hosiery, many loose and floated ends of the yarn are formed on the inside of the hose, as a result of reinforcing threads being knitted in for portions of courses, or by mock-wrapping and like operations. These ends must be sheared so as to provide a relatively smooth interior surface which will not cause discomfort to the wearer. Heretofore, it has been the practice to shear these ends manually, thereby necessitating the placing of each hose on a form and then using a pair of shears or clippers to remove the loose and floated ends. This procedure has been found to be unsatisfactory, both as to uniformity of work produced, and as to the output of the number of hose sheared. Float threads are usually severed intermediate the ends of the floated portion before the stockings are placed on the forms for a shearing operation.

It is, therefore, an object of this invention to provide a plurality of rotating hosiery forms for successively passing between opposed shearing elements, which elements will simultaneously shear the loose ends from the opposed sides of the hose on the forms. This type of mechanical structure insures a better and more uniform shearing and also obtains a much larger output.

It is a further object of this invention to provide a rotary shearing mechanism of the class described in combination with an improved automatic stripping mechanism for removing the hose from each form after the shearing has been accomplished.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of the improved shearing and stripping apparatus;

Figure 2 is an elevation looking at the right-hand end of Figure 1;

Figure 3 is a view similar to Figure 1 with certain portions broken away and showing the parts in slightly different positions;

Figure 4 is an enlarged view looking at the left hand end of Figure 1, showing certain portions thereof in elevation and other portions in section;

Figure 4A is a plan view through a clipper and taken along line 4A—4A in Figure 4, a portion of only one clipper being shown;

Figure 5 is a sectional plan view taken along the line 5—5 in Figure 1;

Figure 6 is a vertical sectional detail view taken along the lines 6—6 in Figures 1 and 5;

Figure 7 is an enlarged view of the clamping means shown in the lower portion of Figure 2, but showing a hose engaged by the clamp after being removed from a form or support.

Referring more specifically to the drawings, the numeral 10 denotes a framework having tables 11 and 12, the table 11 being at a lower elevation than the table 12. Mounted upon the table 12 are suitable bearings 14 and 15 in which is rotatably mounted a shaft 16. The intermediate portion of shaft 16 has fixedly mounted thereon a plate casting 17, and the outer periphery of this casting is adapted to support, at spaced points, suitable arcuate forms 18. These forms have a relatively thin depth as compared to their width. The outer periphery of each form is adapted to follow in the same circumferential path when in operation.

The shaft 16 also has a worm gear 20 fixedly mounted thereon, which gear is adapted to be housed in the upper portion of bearing 14 (Figure 1). The lower portion of the worm gear 20 is adapted to mesh with a worm 21 on shaft 22 which is likewise rotatably mounted in the bearing 14. The projecting end of shaft 22 has a pulley 23 fixed thereon upon which a belt 24 is mounted, said belt 24 being also mounted upon a pulley 25 on shaft 26 which is disposed below the table 11. Shaft 26 also has a larger pulley 28 mounted on its other end upon which a belt 29 is mounted and this belt is also mounted upon motor pulley 30 which, in turn, is secured on motor shaft 31 of motor 32. It is therefore seen that the plate casting 17 and the forms 18 are driven at the desired speed by virtue of the parts designated by the reference characters 20 to 32 inclusive.

By observing Figures 2, 4 and 5, it is seen that the forms 18 are relatively thin as compared to width. This type of construction permits a stocking or hose 33 to be placed thereon, and when the hose is properly positioned practically the entire surface of the hose will be disposed either on one face of the form or on the other. Usually it is the practice to turn the hose inside-out and then insert it on a form so that the loose ends and float threads which have been produced during the knitting operation will be properly exposed for shearing purposes.

In order to properly shear these loose ends or loose threads from the hose after it has been

placed on the form, it is necessary to provide suitable clippers adjacent the path traveled by the opposed faces of the form. These clippers are preferably mounted in a stationary position so that the clipping blades will engage the loose ends and shear them as the forms rotate. The clippers used for this purpose are designated by the reference character **40**, each clipper being secured in a bracket **41** by means of a set screw **42**. The clippers are of a conventional structure, preferably of the type shown in Figure 2 of the patent to Kitzmiller, No. 2,113,112 of April 5, 1938. Although any type of clipping apparatus may be employed which will properly sever the loose ends as they pass thereby.

The clippers **40** have a shearing mechanism **44** associated therewith, said shearing mechanism being operated by means of a lever **45** which is pivoted as at **46** on the interior of the clipper housing (Figure 4). The upper end of the lever **45** is oscillated about the pivot **46** by means of an eccentric **47** which is disposed on the upper end of drive shaft **48**, said drive shaft having its lower end connected to a flexible drive **49**, which in turn has its lower end driven by a suitable motor **50**.

A suction inlet **55** is adapted to communicate with the cutting mechanism so that the sheared ends will be withdrawn and be prevented from falling upon the mechanism nearby. The lower end of this suction inlet **55** is connected to a flexible conduit **56**, the lower end of said conduit being connected to a suction fan **57**. It is therefore seen that both sides of the hose **33** on the forms **18** are simultaneously shared by the clippers **40** as they pass therebetween in the manner shown in Figure 4, and that the ends are removed as sheared by a suction mechanism.

A pair of opposed brushes **60** and **61** are adapted to be located on opposite sides of the hosiery forms at a point in advance of the clippers **40**. These brushes are employed to hold the stocking on the form as it moves downwardly toward the clippers **40**. The brushes **60** and **61** are mounted upon extension **62** and **63**, which in turn are mounted upon the upper end of brackets or rods **64** and **65** respectively.

Also supported on the upper ends of supports **64** and **65**, and disposed adjacent the opposed sides of the forms **18** are suitable rollers **68** and **69**, these rollers being identical in construction and being mounted in the forked end of suitable members **70**, which are adjustably secured in the upper ends of the supports **64** and **65** by means of set screws **71**. When it is desired to move the rollers **68** and **69** into closer contact with the opposed sides of the form **18**, it is only necessary to manipulate the set screws **71** and adjust the members **70** accordingly. The rollers **68** and **69** serve to stabilize the forms to insure that they will be held in the proper position while the shearing by the clippers is being effected. Supports **64** and **65** are adjustably mounted in the brackets **41** therebelow by means of set screws **72**.

Automatic stripping mechanism

After the hose have been sheared by the clippers, it is very desirable that some means be employed for removing the hose immediately so that an operator can place an unsheared hose thereon. In this manner, all of the operator's time can be employed in placing hose upon the forms **18**. By observing Figures 1, 3 and 5 it is seen that the upper end of a bracket **73** has a cantilevered frame **74** pivoted thereto as at **76**. The free end of frame **74** has a depending structure **77**, which has pivoted thereto as at **78**, a vertically disposed bar **79**. The upper end of the bar **79** is adapted to penetrate a slot **80** in the extreme right hand free end of framework **74**.

The lower end of bar **79** has an inverted U-shaped dog **81** pivoted thereto as at **82**, one leg of this dog having a suitable cushion or pad **83** on its lower end which is adapted to engage the hose on the form. Disposed on the opposite side of the form is a similar cushion member **84** which is secured to the lower end of bar **79**. A spring **85** normally tends to rotate the dog **81** in a clockwise manner in Figure 2 to thereby clamp the hose while on the form between the cushion members **83** and **84**. It is to be understood that when the bar **79** is in lowermost position as shown in Figures 1 and 2, that it is necessary for the cushion members to be spread apart sufficiently to allow the hose and the form to pass therebetween. This is accomplished by providing a suitable stationary bracket **86** having a cam surface **87** on its upper side to be engaged by the left hand cam surface **81***a* of the dog **81**. When the bar **79** and dog **81** are in lowermost position as shown in Figure 2 this is sufficient space between pads **83** and **84** to allow the hose and form to center. When the bar **79** and the associated framework **74** are moved upwardly, a slight amount by the mechanism hereinafter to be described, the spring **85** will rotate the dog **81** in a clockwise manner (Figure 2) to cause the hose on the form to be engaged.

The lower portion of the framework **74** has a cam roller **88** rotatably mounted therein at a point adjacent the pivot point **76**. This roller normally rests on top of a suitable cam **89** which is fixedly secured upon a cam shaft **90** mounted for rotation in the bracket **73**. The other end of the shaft **90** has a beveled gear **91** fixedly secured thereon which meshes with a beveled gear **92** on shaft **93**. The shaft **93** is rotatably mounted in bearing member **14** and bracket **73**. The right hand end of the shaft has a beveled pinion **95** fixedly mounted thereon which meshes with a larger pinion **96** on shaft **16**. It is necessary that the pinion **96** be approximately four times as large as the pinion **95** in the present instance so that the cam **89** will make four revolutions each time the plate casting **17** and forms **18** make one revolution. Each time the cam **89** makes a revolution, the framework **74**, together with the hose clamping means on the free end thereof will be raised and lowered.

In Figure 1, the roller **88** is shown on the low side of the cam **89**; whereas in Figure 3 the roller is shown on the high side. As the roller moves from the low side to the high side of the cam, the dog **81** in Figure 2 is moved to clamping position with the hose **33** on the form **18** by means of spring **85**, and then as the dog, together with the engaged hose moves upwardly along with the framework the hose will be removed from the form in the manner shown in Figure 3. This gripping action is made possible due to the fact that the framework **74** is caused to move approximately four times as fast as the form from which the hose is stripped.

It is necessary that means be provided for releasing the stripped hose from the dog **81** after it is moved to the position shown in Figure 2. This mechanism comprises a cord **98** which is secured as at **99** to one leg of the dog **81**. The cord **98** passes from point **99** over a small roller

100 and then upwardly over another roller 101 which is rotatably mounted in the depending structure 77. The upper end of the cord is secured to the lower end of a lever 102 which is fixedly secured upon a shaft 103. The shaft 103 is rotatably mounted in the framework 74 and has fixedly mounted thereon another lever 104 having a roller 105 on its lower end. When the framework 74 and its associated parts are raised to the position shown in Figure 3, the roller 105 is adapted to be engaged by a side cam 106, which forms an integral part of the cam 89 previously described. As the cam rides beneath the roller 105, the shaft 103 is rotated in a clockwise manner in Figure 2, thereby causing the dog 81 to rotate in the same direction to release the hose from between the cushion clamping members 83 and 84.

As the shaft 90 and cam 89 continue to rotate in a counterclockwise manner (Figures 1 and 3) the framework 74 with its associated parts is lowered again to the position shown in Figure 1, at which time the dog 81 will be opened sufficiently to receive the next succeeding form with a hose thereon.

The shaft 90 also has a cam 110 mounted thereon which is engaged by a roller 111 on the lower end of a lever 112, said lever 112 being pivoted as at 114 to the framework 74. The upper end of the lever 112 has one end of a horizontally disposed bar 115 secured thereto and the other end of this bar is pivoted to the upper end of lever 79 previously described. It is desirable that the lever 79 be held in a substantially vertical position when it receives the hose from the form; whereas as the framework 74 is rotated in a counterclockwise manner about pivot 76 the lower end of the bar 79 together with the dog 81 should not deviate very far from the normal path of travel of the hose forms; consequently, it is necessary to provide a slot 80 for the reception of the upper end of the bar 79. The cam 110 is also provided to position this bar properly as it moves downwardly subsequent to the release of the stripped hose. Of course, immediately after the bar 79 is moved upwardly the roller 111 leaves the cam 110 thereby allowing a suitable spring 116 to rotate the bar 79 a slight amount in a clockwise manner (Figures 1 and 3) to cause the upper end thereof to engage the right hand portion of the slot 80 in the manner shown in Figure 3. However, as the framework moves downwardly, the cam 110 will engage the roller 111 to restore the bar 79 to a position which is substantially at right angles to the framework 74 and in this position it will be held until the hose on the form is engaged and partially removed.

Particular attention is called to the fact that the pivot point 76 and the cam shaft 90 are shown slightly inclined (see Figure 6). This inclination is necessary so that the dog 81 and the lower end of the bar 79 will be moved laterally out of the path of travel of the preceding form 18 when a stripping action is effected. It is, therefore, seen that a shearing and stripping mechanism has been provided which will allow hose to be mounted upon rotary forms and successively sheared and stripped therefrom in a very effective manner.

In the drawings and specification, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being set forth in the appended claims.

We claim:

1. Apparatus for shearing loose ends from hosiery and the like, comprising a plurality of travelling forms, each adapted to receive a hose, and a stationary shearing device disposed adjacent the path of travel of said forms for shearing the ends projecting from the hose.

2. Apparatus for shearing loose ends from hosiery and the like, comprising a plurality of travelling board forms, each adapted to receive a hose and a stationary shearing device disposed on each side of the path of travel of said form for shearing the projecting ends from the hose.

3. Apparatus for shearing loose ends from hosiery and the like, comprising a plurality of travelling forms, each adapted to receive a hose, a stationary shearing device disposed adjacent the path of travel of said forms for shearing the ends projecting from the hose, and means for removing each hose from its respective form subsequent to its being sheared.

4. Apparatus for shearing loose ends from hosiery and the like, comprising a plurality of travelling board forms, each adapted to receive a hose, a stationary shearing device disposed on each side of the path of travel of said forms for shearing the projecting ends from the hose, and means for removing each hose from its respective form subsequent to its being sheared.

5. Shearing mechanism comprising a travelling support for the article to be sheared having its broader faces in planes normal to its axis of rotation, means for advancing the same in the direction of its length, shearing means comprising a stationary clipper located on each side of the path of said travelling support and adapted to shear projecting ends from the surface of the article on the form.

6. Shearing mechanism comprising an arcuate support for the article to be sheared having its broader faces in substantially vertical planes and being mounted for rotation in a circular path in the direction of its length, means for rotating the same, a pivoted stripping device adapted to engage the article on the support during a portion of its travel, and means for rotating said stripping device and engaged article about its pivot at a relatively greater speed than that of said support.

7. Shearing mechanism comprising a travelling support for the article to be sheared having its broader faces in vertical planes normal to its axis of rotation, means for advancing the same in the direction of its length, shearing means comprising a stationary clipper located on each side of the path of said travelling support and adapted to shear projecting ends from the surface of the fabric on the form, a pivoted stripping device adapted to engage the article on the support during a portion of its travel, and means for rotating said stripping device and engaged article about its pivot at a relatively greater speed than that of said support.

8. Shearing mechanism comprising an arcuate support for the article to be sheared, having its broader faces in substantially vertical planes and being mounted for rotation in a circular path in the direction of its length, means for rotating the same, a pivoted stripping device adapted to engage the article on the support during a portion of its travel, means for rotating said stripping device and engaged article about its pivot at a relatively greater speed than

that of said support, and means for releasing said engaged hose from the stripping device after removal.

9. Shearing mechanism comprising a travelling support for the article to be sheared having its broader faces in vertical planes normal to its axis of rotation, means for advancing the same in the direction of its length, shearing means comprising a stationary clipper located on each side of the path of said travelling support and adapted to shear projecting ends from the surface of the fabric on the form, a pivoted stripping device adapted to engage the article on the support during a portion of its travel, means for rotating said stripping device and engaged article about its pivot at a relatively greater speed than that of said support, and means for releasing said engaged hose from the stripping device after removal.

10. In a shearing machine comprising a plurality of thin wide supports for articles to be sheared mounted for rotation in a circular path with the wide faces travelling in vertical planes normal to the axis of rotation, means for stripping the sheared articles from the supports comprising a pivoted framework, said framework having a clamp on the free end thereof, means for presenting a support with an article thereon to said clamp, and means for rotating said framework and the clamped article above the pivot at a relatively greater speed than that of the support, whereby the article will be removed therefrom.

11. In a shearing machine comprising a plurality of thin wide supports for articles to be sheared mounted for rotation in a circular path with the wide faces travelling in vertical planes normal to the axis of rotation, means for stripping the sheared article from the supports comprising a pivoted framework, said framework having a clamp on the free end thereof, means for successively presenting supports and their respective articles to said clamp, means for rotating said framework and the clamped article about the pivot each time a support is presented at a relatively greater speed than that of the support, whereby the article will be removed from its support, means for releasing the removed hose from the clamp and means for rotating said framework in a reverse direction to a position where the clamp will engage the next succeeding article on its respective form.

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