May 20, 1941. G. A. ALTENBERN ET AL 2,242,444

PROCESS FOR MAKING MOP SWATS

Filed Aug. 15, 1938 4 Sheets-Sheet 1

Fig. 1

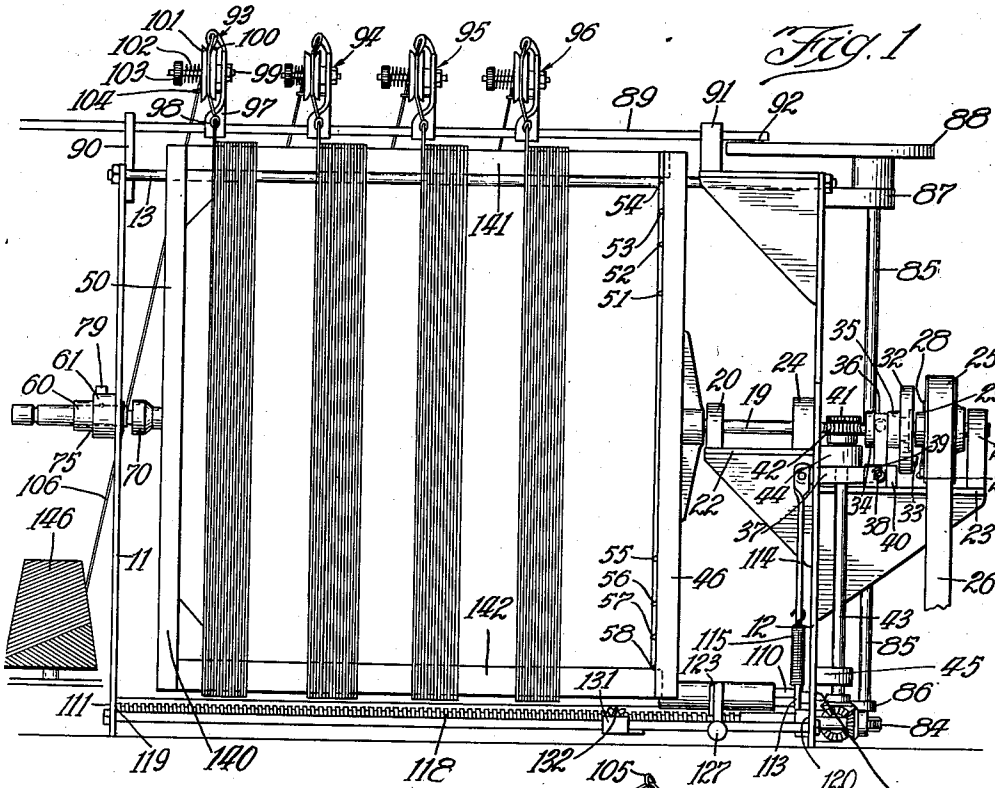
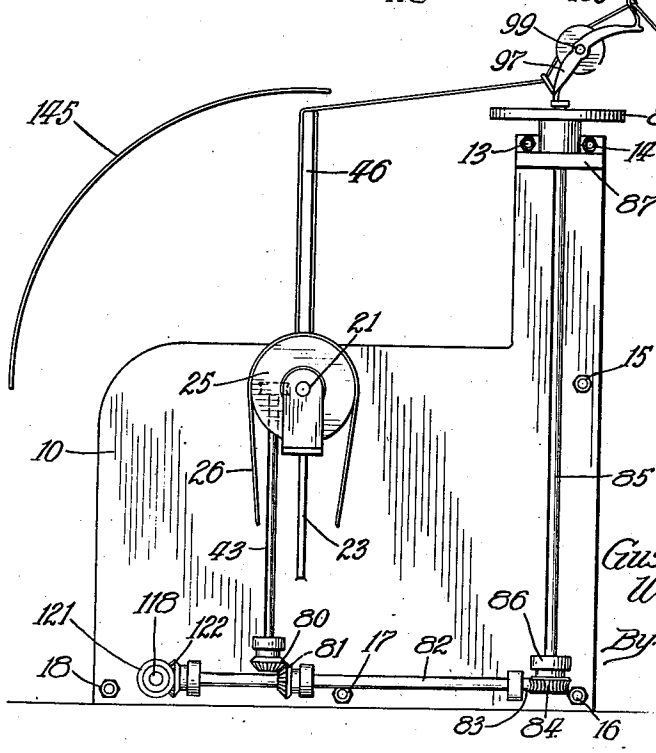


Fig. 2



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Fig. 3

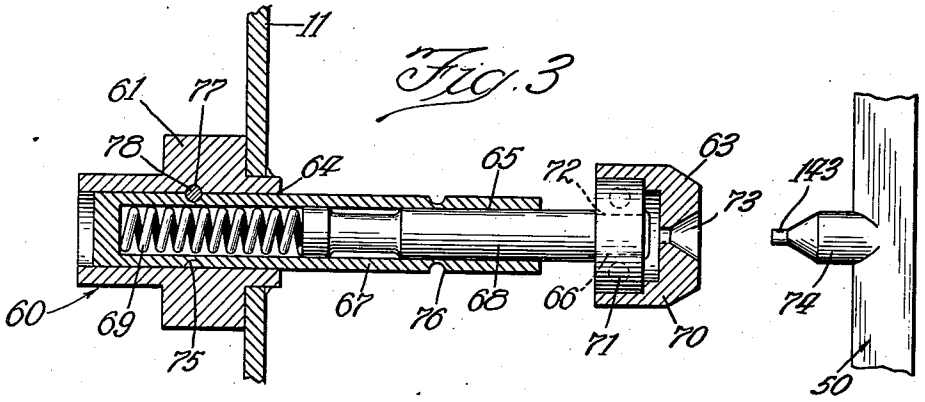


Fig. 4

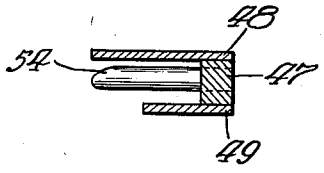


Fig. 5

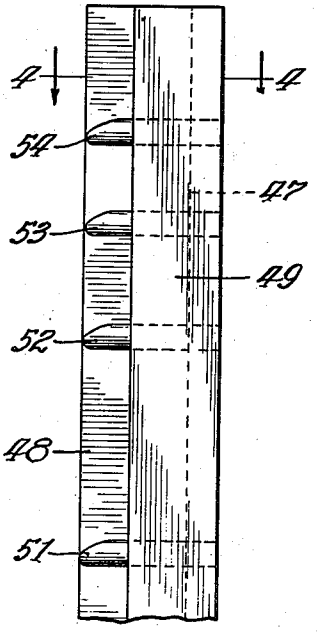
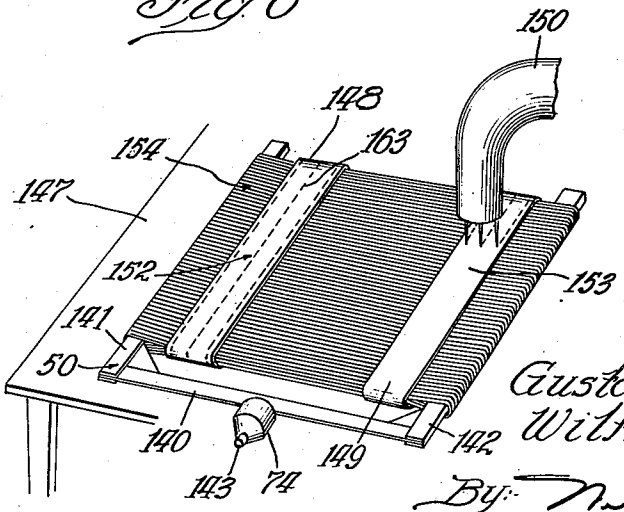


Fig. 6



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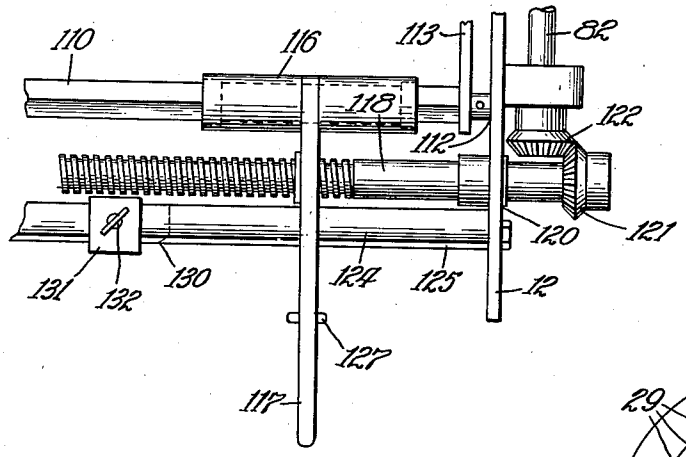


Fig. 7

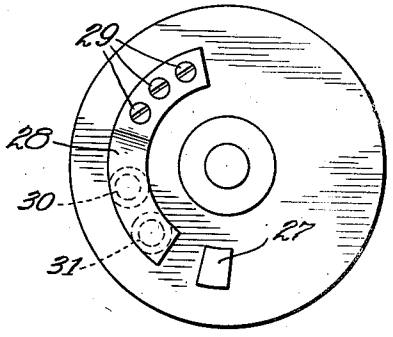
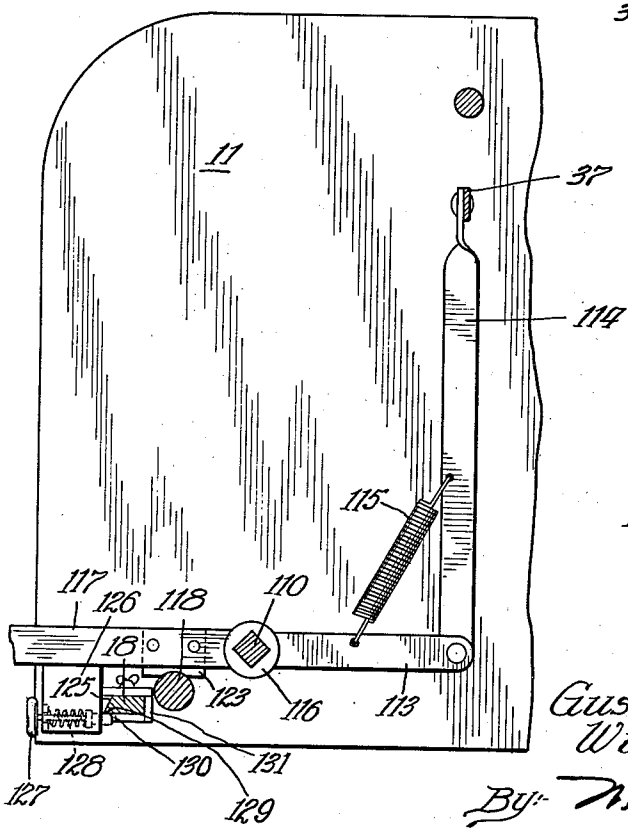


Fig. 8

Fig. 9



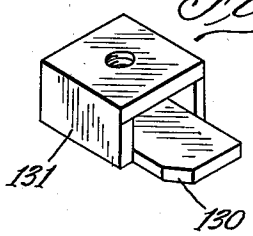


Fig. 10

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Fig. 11

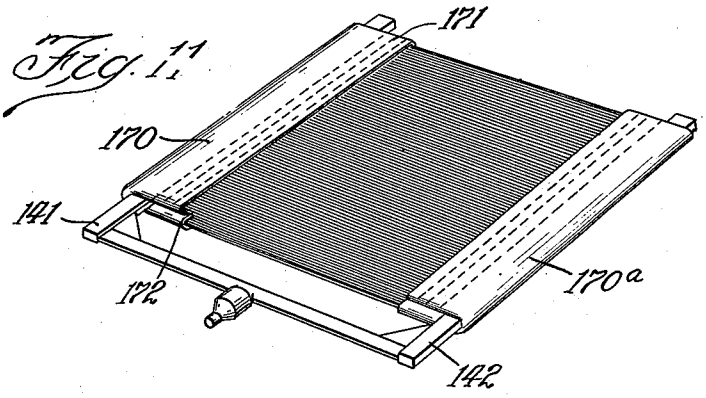
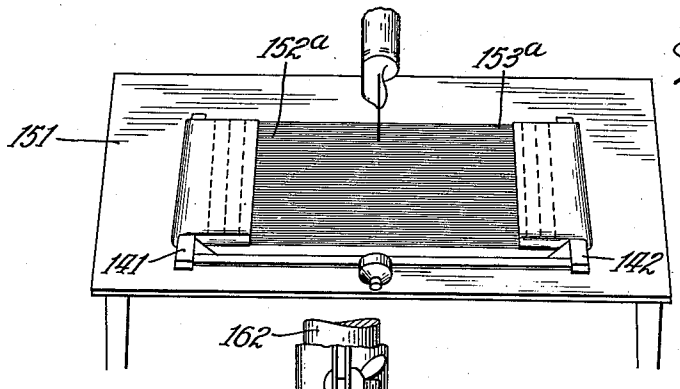


Fig. 12



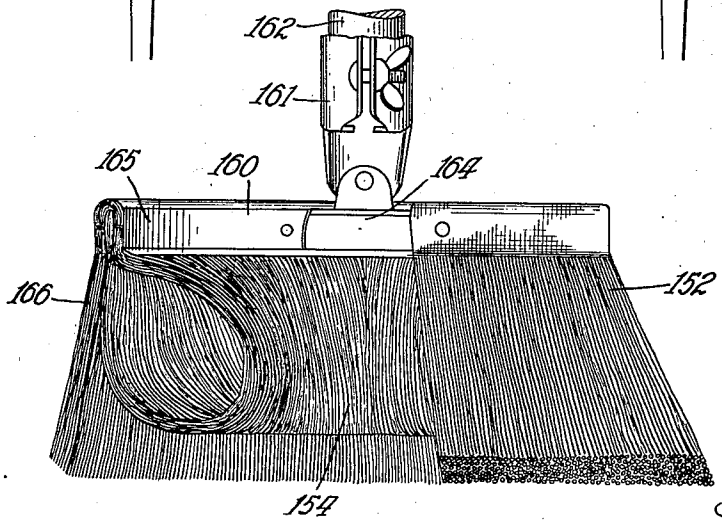


Fig. 13

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UNITED STATES PATENT OFFICE

2,242,444

PROCESS FOR MAKING MOP SWATS

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Application August 15, 1938, Serial No. 224,962

6 Claims. (Cl. 300—21)

This invention relates to a process for making mops which utilizes a novel winding frame stitching step and cutting step. More particularly it has to do with a frame upon which the mop yarn is wound and with methods of binding the yarn and cutting to form mop swats prior to removing the yarn from the frame.

One method of making dry or oil mop swats in use today is that of winding a predetermined amount of yarn upon a rectangular frame, of removing the frame from the winding machine, of sewing a strip of canvas across the yarn at a point midway of the frame, and of thereafter slitting the yarn at the outer edges of the frame so that the completed swat falls clear of the frame. Under this method, a girl operates three winding machines simultaneously, the rate of winding being such that while two frames are being wound with yarn, the girl may remove the loaded frame from the third machine and replace it with an empty frame. With the yarn on the frame, the next step under present practise is to sew a strip of canvas to the yarn along the winding axis of the frame, which is done by a girl at a sewing machine. The frame is then taken to a cutter which slits the yarn at the two outside edges of the frame so that the completed swat falls clear. It should be noted that after leaving the winding machine, a girl handles each frame separately and completes her particular operation on one mop at a time.

The principal object of this invention is to provide and a process of sewing and stitching mop swats on a frame whereby two mop swats will be produced from each frame with the following distinct advantages in the process of making mops: each frame may be left in the mop winding machine for twice the length of time heretofore required whereby a girl may operate twice the number of machines; the girl handling the stitching operation can do the stitching operation on two mops without setting down the frame, while heretofore there was one stitching operation for each frame handled; and one slitting operation will produce two mops.

A second object of this invention is so to position a binding means, such as canvas, upon the yarn in the frame that unbalanced mop swats can be produced. If has been found that short or looped inside tufts will form a nice pad beneath the mop head while the outside long strands, which provide an attractiveness to the mop which the purchasing women demand, are retained. This invention, therefore, aims to provide a sewing and cutting operation which will enable the manufacturer to vary the length of the tufts and to provide looped tufts where desired.

The above and other desirable objects will appear hereinafter in the description of the invention with reference to the accompanying four sheets of drawings hereby made a part of this specification, and wherein:

Fig. 1 is a front view of the winding machine with a frame in position;

Fig. 2 is a side view of the machine;

Fig. 3 is a cross-sectional view of the spindle and spindle mounting and of the stub shaft of a frame shown fragmentarily;

Fig. 4 is a cross-sectional view of the channel bar taken on the line 4—4 of Fig. 5;

Fig. 5 is a side view of the channel bar;

Fig. 6 is a perspective view showing the positioning of the binding means in one embodiment of the invention;

Fig. 7 is a view from above of the control means;

Fig. 8 is a side view of the control means;

Fig. 9 is a view of the pulley face;

Fig. 10 is a perspective view of the control release block;

Fig. 11 is a perspective view showing the positioning of the binding means in a second embodiment of the invention;

Fig. 12 is a view of a loaded frame being fed into a slitter; and

Fig. 13 is a view of a mop made from a mop swat made under the first embodiment of the invention.

The same reference character is used to identify a part in the specification as is used to identify the same part in the drawings.

Examining our invention in detail, the frame of the machine generally referred to as 10, is comprised of side walls 11 and 12 held in fixed relationship by bars 13, 14, 15, 16, 17, and 18. The operable parts of the machine are driven from gear trains deriving power from a single source, and as the machine has three general operating mechanisms, the spindle turning, the yarn feeding, and the control, each mechanism will be described in order.

The drive shaft 19 is journalled in bearings 20 and 21 mounted in the end of supporting shelves 22 and 23, and in pillow block 24. Riding freely on drive shaft 19 is pulley 25, driven continuously by belt 26, which is in engagement with a pulley gang, not shown. The inner face of pulley 25 carries lug 27 and circular spring segment 28, fastened to the pulley 25 at 29, and held in normal

relationship to lug 27 by means of helical springs 30 and 31. Riding drive shaft 19 and adapted for lateral motion as well as rotational motion along drive shaft 19 is clutch 32, carrying on its face lug 33 adapted to engage lug 27 of pulley 25, and carrying on its opposite side shoulders 34 and 35 in which rides shifting fork 36. Shifting fork 36 is formed of the turned end of bell crank lever 37 fulcrumed on bolt 38 mounted in block 39. Between block 39 and clutch 32 is a brake means 40, such as leather, against which clutch 32 is held tightly when the machine control is in the off or idle position. The spring for holding the clutch 32 against brake means 40 will be hereinafter described in treating the control mechanisms. Between clutch 32 and side wall 12 and cut into drive shaft 19 is worm gear 41 which engages pinion gear 42 on shaft 43 which is journalled in blocks 44 and 45 fastened to side wall 12.

To the inner end of drive shaft 19 is permanently and immovably fastened cross arm or channel bar 46. This channel bar 46 is formed of a thick base portion 47 to which is welded flange strips 48 and 49, flange strip 48 being wider than flange strip 49 in order that the channel bar may more readily receive the frame 50 hereinafter described. Seated in the thick base portion 47 are posts 51, 52, 53, and 54 which are equidistant from the axis of drive shaft 20 with the respective posts 55, 56, 57, and 58.

Directly opposite drive shaft 19 and in alignment therewith is spindle assembly, generally referred to as 60, which as a unit is rotatably mounted in side wall 11 and in pillow block 61. Between the side wall 11 and pillow block 61 on the one hand and the tip 63 of the spindle 60 on the other, are three bearing surfaces 64, 65, and 66. Bearing surface 64 lies between the side wall 11 and pillow block 61 on the one hand and sleeve 67 on the other hand. The fit is tight and the sleeve 67 does not rotate easily. Laterally slidable within sleeve 67 is piston 68 which is forced outwardly by spring 69. The piston 68 is free to rotate with respect to sleeve 67. Mounted on the inner end of piston 68 is the spindle 70 proper, there being ball bearing unit 71 mounted between the reduced end 72 of the piston 68 and the spindle 70. The piston 68, ball bearing unit 71, and spindle 70 are held in relationship by means of a pin, not shown. Into the tip 63 is bored at its open end spindle socket 73 to receive a stub shaft 74 on the frame 50, the result being that between the side wall and the frame 50 there are four bearing surfaces 64, 65, 66, and 73.

In order that frames of varying widths may be mounted on the winding machine, the spindle assembly 60 is adjustable along its axis with respect to side wall 11. This adjustment is accomplished by turning into sleeve 67 annular grooves 75 and 76. Drilled through pillow block 61 is hole 77 into which is dropped pin 78 having head 79. When spindle assembly 60 is moved so that either of the annular grooves 75 and 76 are in alignment with hole 77, pin 78 drops downward and holds spindle assembly 60 against lateral movement. It will be noted that spindle assembly 60 is free to rotate in the pillow block 61 after the pin 77 is in closed or locked position.

The yarn feeding mechanism derives its power from drive shaft 19 through bevel gears 80 and 81, shaft 82, worm gear 83 and pinion gear 84 and shaft 85 journalled in flange blocks 86 and 87. Mounted on the top of shaft 85 is disc 88 into the upper surface of which is cut a heart-shaped cam, not shown. Cam follower 89 journalled for reciprocation in supports 90 and 91 fastened respectively to side walls 11 and 12 carries lug 92 for following in the channel of the cam.

Mounted on cam follower 89 are four yarn tension controls 93, 94, 95, and 96. Examining 93 for detail, the base 97 is bolted to the cam follower 89 at 98. The position of each yarn tension control may be varied by altering the bolt seats. The base 97 is bent upwardly and twisted at right angles to receive pin 99 upon which is mounted opposing discs 100 and 101 which are gently held against each other by means of spring 102, the tension of which can be controlled by advancing or withdrawing the knurled edge set nut 103 threaded on the outer end of pin 99. Pin 104, welded to base 97, pierces discs 100 and 101, thereby preventing rotational movement of discs 100 and 101. An eyelet 105 is mounted on base 97 through which the yarn 106 is fed into the yarn tension controls.

The control means is mounted in the forward base of the winding machine. It might be appropriate to mention here that these machines are mounted in a battery side by side on low benches and the operator loads a machine and passes to the next. The control means must, therefore, be located at the front of the machine. A shaft 110, square in cross-section except at the ends, is journalled in bearings 111 and 112 in side walls 11 and 12 respectively. Adjacent to side wall 12 and on the inside thereof is welded to rotatable square shaft 110, lever arm 113 which by means of link 114 is coupled to bell crank lever 37, heretofore described. Impressed on link 114 and lever arm 113 is a jack knife clamping action by spring 115 which through shifting fork 36 holds clutch 32 tightly against brake means 40.

Slidably mounted on square shaft 110 is sleeve 116 to which is rigidly fastened control arm 117. In front of square shaft 110 and slightly lower is worm shaft 118 journalled in side walls 11 and 12 at 119 and 120. Worm shaft 118 derives power through bevel gears 121 and 122 from shaft 82. Mounted on the under side of control arm 117 is guide means 123 aligned with the slope of the thread of the worm shaft 118.

Mounted in front of worm shaft 118 and slightly lower is bar 18 having a front sloping surface 125 and permanently mounted to withstand any rotational movement. On the forward lower surface in an underhanging portion 126 of control arm 117 is pin 127 directed by spring 128 against the sloping surface 125 of bar 18. By pressing the control arm 117 downward, the guide means 123 engages the thread of worm shaft 118 and the pin 127 slips under the forward edge 129 of bar 18, thereby holding control arm 117 down. The worm shaft 118 rotates counterclockwise, looking from the right, and the control arm 117 moves to the left with the pin 127 sliding along the smooth under-surface of bar 18. The control arm 117 may be released manually by withdrawing the pin 127.

For the purpose of winding a predetermined weight of yarn upon the frames, however, it is desired that the winding operation continue for a given number of turns only. This is accomplished by the action of pin 127 on cam surface 130 of block 131. The cam surface 130 is adjacent to the under forward edge 129 of bar 18. Block 131 is tightened into position on bar 18 by lock bolt 132. When the pin 127 engages this cam surface 130, the leftward movement of the control arm 117 derived from the worm shaft 118 through the guide means 123, forces the

pin 127 outwardly until it releases the control arm 117 by escaping above the forward edge 129, the control arm 117 snaps upward thereby disengaging guide means 123 from worm shaft 118 and releasing the lever train which terminates in the clutch 32.

In Fig. 6 is shown a U-shaped or open-end frame 50 such as is used in this winding machine. This frame, comprising spacer bar 140 and side arms 141 and 142, is formed of steel and, consistent with lightness which is desired to assist operatives who are usually women in mounting them in the machines, are strong. The stub shaft 74 terminating in positioning nib 143 for seating in the spindle socket 73, is welded to the frame centrally of the spacer bar 140. The frame is inserted in the machine by placing the open ends of side arms 141 and 142 on their inner side into engagement with complementary posts, i. e., posts equidistant from the axis of drive shaft 19, in the channel bar, for example, 54 and 56. These posts resist the contracting power of the yarn as it is wound on the frame.

The wider flange strip 48 of the channel bar 46 assists in inserting side arms 141 and 142 of the frame 50 into the channel bar 46. With the side arms 141 and 142 in the channel bar 46, the operator pushes to the left the spindle 70 thereby contracting spring 69. The nib 143 and stub shaft 74 are then seated in spindle socket 73. When the operator releases spindle 70, the frame 50 is tightly positioned in the winding machine.

Sketched only in Fig. 2 is a curved guard 145 which extends over a portion of the front of the machine and covers the swing of the channel bar 46. While this guard covers only the right hand side of the machine, it has a marked tendency to keep the operator away from the swing of the frame 50.

While the actual winding operation of the machine is obvious, one fact should be noted. After the four strands of yarn have been threaded through the eyelets and the tension discs, they are pulled down over the upper side of the frame which is moved into vertical position, that shown in Fig. 2. Looking from the right, the frame winds counterclockwise so that the upper edge of the frame moves outward, i. e., toward the operator. When the clutch is engaged, the frame starts with a jerk into full speed and this jerk snaps the yarn strands around the side arm 141 of the frame 50 sufficiently tightly to hold them as winding starts.

One yarn cone 146 is sketched behind the machine in Fig. 1. Upon completion of the winding, the operator severs the strands of yarn and removes the frame 50. Upon removal, side arms 141 and 142 tend to draw together, but they are not drawn appreciably out of alignment. The frame is now removed to a sewing machine table suggested by 147 in Fig. 6, where it is treated in one of two fashions. As shown in Fig. 6, a two-inch strip of canvas 148 is laid over the yarn about two inches from the outer edge of the frame and at right angles to the yarn. A second strip of canvas 149 is fastened at the opposite side. The stitching operation is done successively by one multiple needle, stiching machine 150, or simultaneously by two oppositely disposed multiple needle stitching machines. The frame 50 is then removed to a slitting table 151 and the yarn is slit down the center by any appropriate means as seen in Fig. 12. The finished mop swats 152 and 153 are then slipped off the side arms 141 and 142 of the frame 50 and delivered to riveting machines, where the swat is folded as may be seen in Fig. 13 and, with the loop end 154 turned inside, riveted to the peripheral edge of the mop head in the conventional manner.

By this method of winding and cutting, two mop swats are produced on a single frame with several distinct savings in assembly costs. Firstly, the winding machine winds twice as much yarn per loading as under existing practice. The manufacturers may take advantage of this reduction of the frequency of loading in one of two ways: If the winding machine is already turning at maximum speed for the strength of the particular yarn being used, an operator may be required to attend an increased number of machines; or if the yarn strength permits, the machines may be accelerated to effect increased production.

Secondly, the girl at the sewing machine sews two canvas tapes to each frame and while this operation is performed by a single three-needle sewing machine at the present time, a double sewing machine is being built to perform the stitching operation on both swats simultaneously. Whichever method is employed, the sewing operator completes the stitching on two mops before laying down a frame, which constitutes a definite saving of time over the existing practice of handling two frames.

Thirdly, a saving of time is obtained in the cutting operation where a single cutting down the center of the swat produces two complete swats. Also, an expensive cutting machine is eliminated. Under present practice, the mop swat frames contain grooves in their outer edges and the cutting machine carries two oppositely disposed knives adapted to slide in said grooves and cut the yarn as it advances. This machine is costly to build, and at best turns out only one mop swat from each frame. Contrast this cutting process to the simple method of cutting used in connection with the mop swat frame of this invention. Our cutter is not specially built, but of a conventional single rotary blade type, power driven, and available in the market.

Before describing the second method of applying the binding means to the yarn, a mop produced under the above method will be described. In Fig. 13, 160 is a conventional mop head with handle socket 161 and handle 162. A mop swat 152 is folded down the line 163, see Fig. 6, and commencing at the rear joint 164 of the mop head 160, the mop swat 152 with loop end 154 adjacent to the mop head, is riveted to the flange 165 of the mop head 160. The loop end 154 has a tendency to pack beneath the mop head 160 thereby producing a very desirable soft cushion. On the other hand, the open end edges 166 of mop head 160 are on the outer side and give a length and appearance which greatly facilitates the sale of the mop.

The positioning of strips 148 and 149 in respect to the side arms 141 and 142 of the frame 50 may be varied to produce a looped end of greater or lesser length.

When it is desired to produce the conventional mop having all open-end tufts, the process suggested by the stitching of canvas strips 170 and 170*a* in Fig. 11 is followed. Strip 170 is looped under the edges of the yarn at one end of the side arm 141 and is stitched at 171, with the finishing end 172, looped under the edges of the yarn and stitched. The stitching is not too close to the side arm 141 because otherwise it might be difficult to slip the completed swat off the

arm after the cutting operation. Under this process, the slitting operation and the position of the slitter on the table is identical with those employed under the first process.

It should be noticed that if the same size frame were used under the second process as under the first, the tufts under the second process would be much longer than under the first. Some expensive mops warrant such long tufts, but in general the mop market calls for a mop having outer tufts of a standard length and mop swats made under either process should have outer tufts of that length. To reduce the length of the tufts when the second process is employed, a narrow frame is used, which in fact is a frame adapted to engage posts **51** and **55** in channel bar **46** as contrasted with frame **50** which engages posts **54** and **58**.

As for spindle assembly **60**, the rapid passage of yarn through the tension controls flicks wisps of yarn into the air about the machine and these collect in the moving joints. Under normal operation, the spindle **70** turns solely on ball bearing unit **71**. This ball bearing unit **71** is a fairly tightly sealed unit itself and does not readily become jammed with yarn, but when there is a jamming, this spindle assembly provides no less than three auxiliary bearing surfaces for rotation, namely, **64**, **65** and **72**. The chances of stripping gears in the machine are greatly reduced by the structure.

We have shown the preferred embodiments of the invention, but it is to be understood there are many equivalents, and these equivalents are not to detract from the basic conceptions of this invention.

We claim:

1. In making mop swats, the process of winding yarn over opposite arms of a frame, binding the yarn along the inside edges of said arms, slitting the yarn along a line between the arms of the frame, and removing the resulting mop swats from the frame.

2. In making mop swats, the process of winding yarn over opposite arms of a frame, binding the yarn along the inside edges of said arms, slitting the yarn along a line equi-distant between the arms of the frame, and removing the resulting mop swats from the frame.

3. In making mop swats, the process comprising winding yarn over opposite arms of a rectangular frame, binding the yarn along the inner edges of said arms, slitting the yarn between the arms of the frame and removing the resulting mop swats from the frame.

4. In making mop swats, the process comprising winding yarn over opposite arms of a rectangular frame, wrapping a strip of binding material over each arm in engagement with the yarn, stitching the binding material to the yarn on the inner side of said arms, slitting the yarn midway between said arms, and removing completed mop swats from the frame.

5. In making mop swats, the process of winding yarn on a frame, stitching a tape of textile binding material to the yarn inside each side of the mop frame, slitting the yarn midway between the sides of the frame, and removing completed mop swats from the frame.

6. In making mop swats, the process of winding yarn on the outwardly extending arms of an open-end or U-shaped frame, attaching to the yarn at a distance inwardly from said outwardly extending arms determined by the length of closed loop strands desired a tape of textile material, slitting the yarn midway between the sides of the frame, and removing the resulting mop swats from the open end of the frame.

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