

July 6, 1943.

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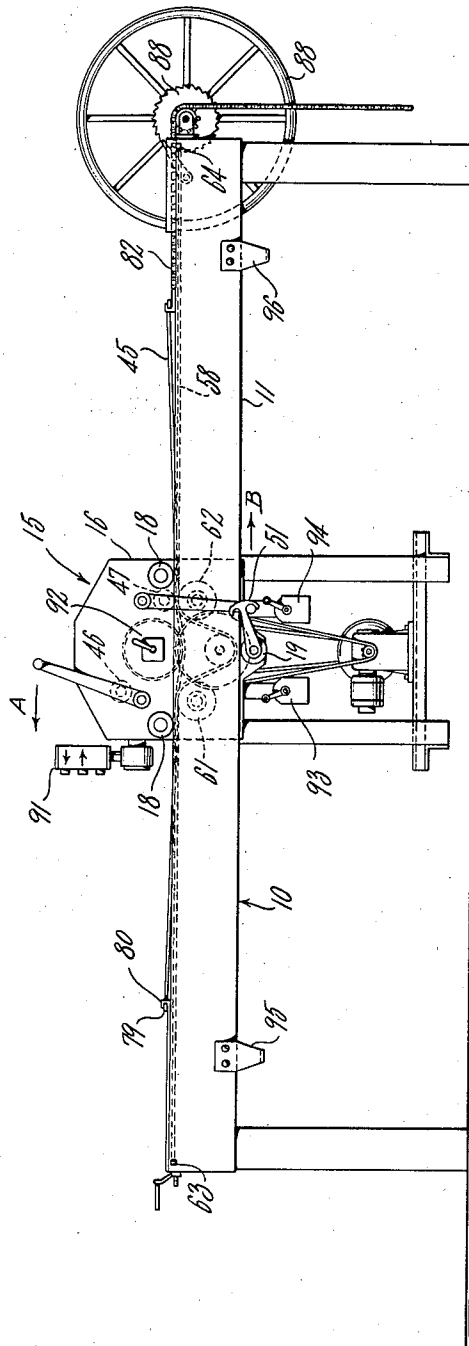
2,323,744

BUFFING MACHINE

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3 Sheets-Sheet 1

Fig. 1



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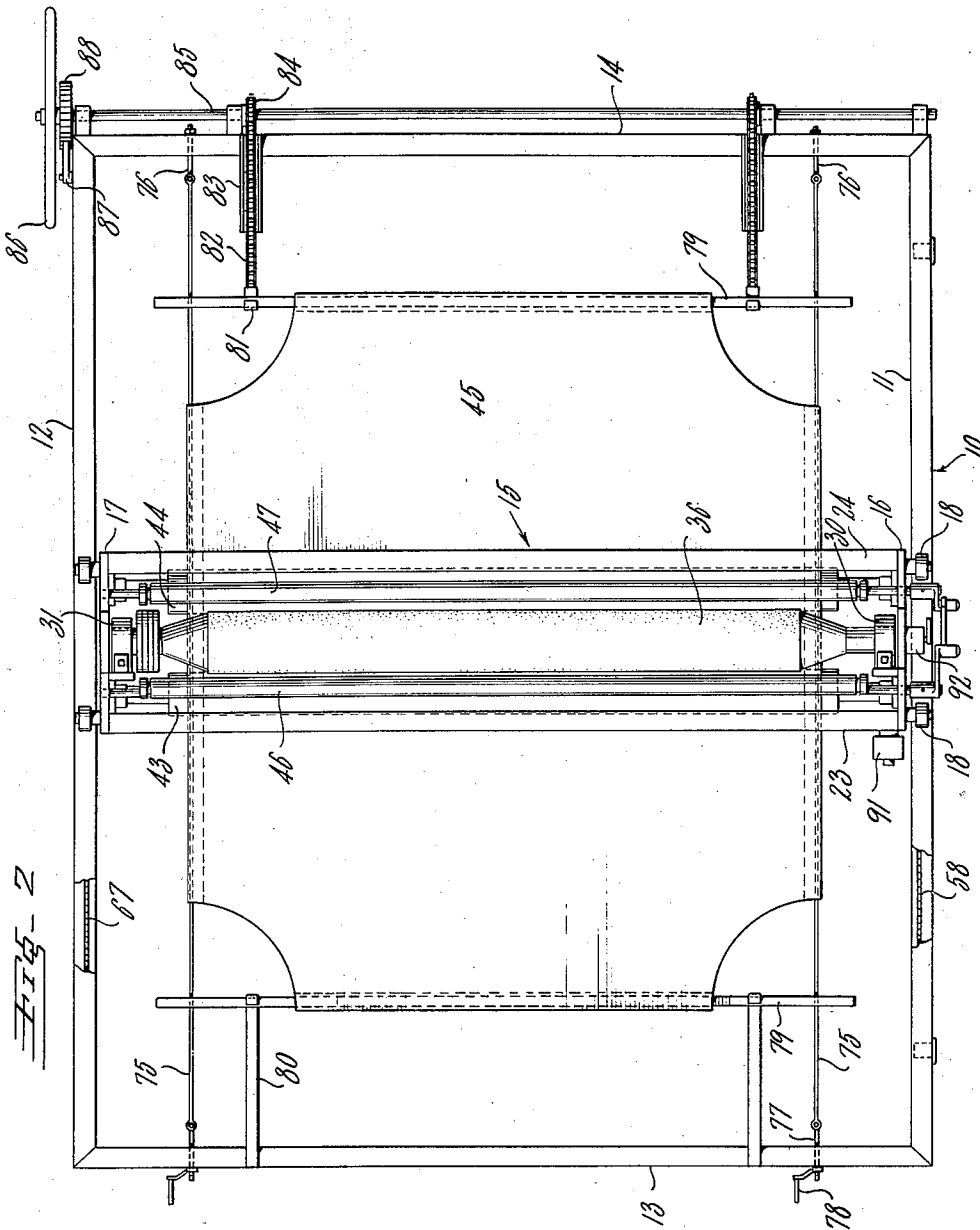
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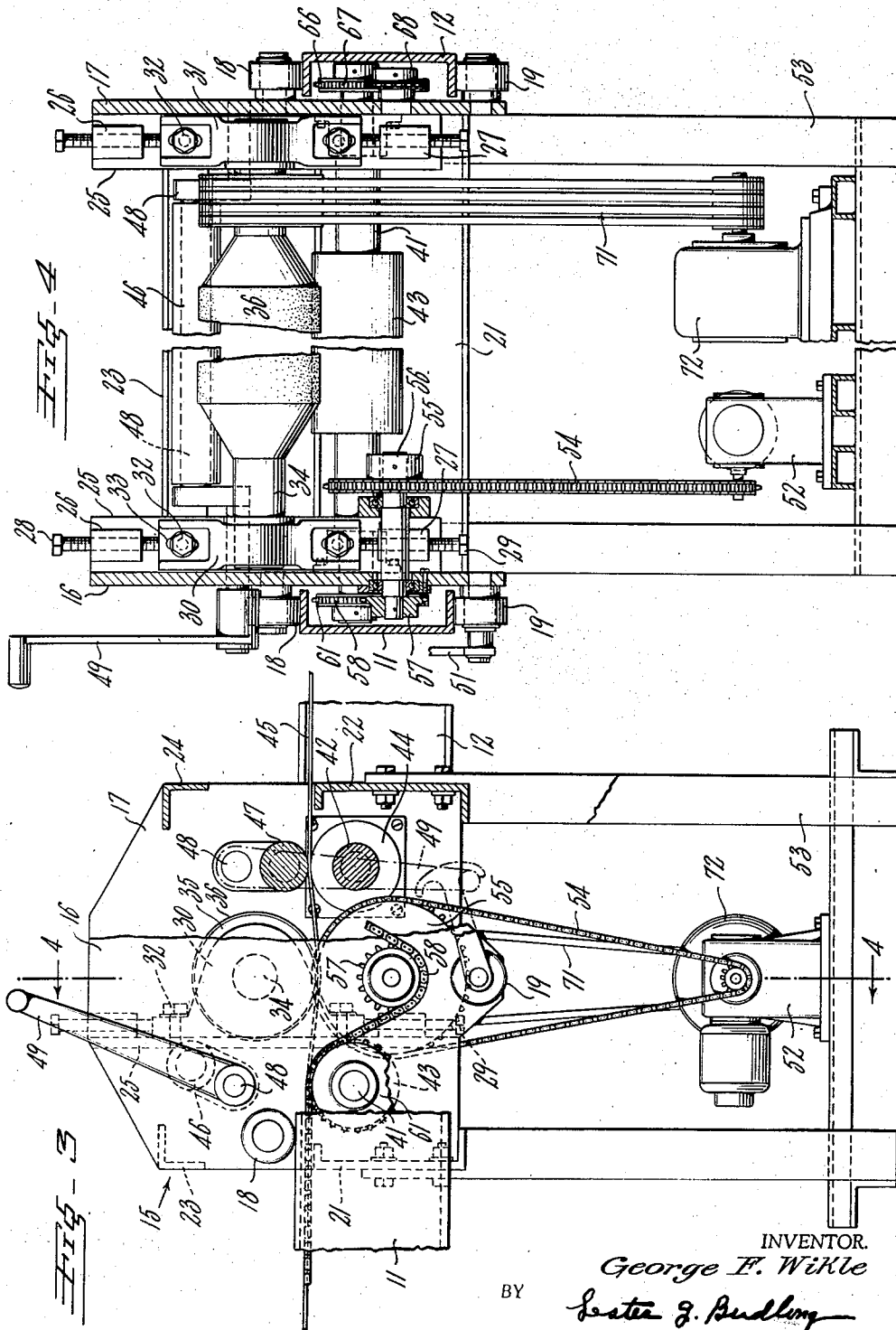
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BUFFING MACHINE

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3 Sheets-Sheet 3



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BUFFING MACHINE

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11 Claims. (Cl. 51—34)

This invention relates to buffing machines and more particularly relates to buffing machines adapted for processing relatively large sheets of thin flexible vulcanized rubber composition, and the like, in an efficient, rapid and uniform manner.

When the adjacent surfaces of two or more pieces of cured or vulcanized rubber composition are to be joined together by a subsequent vulcanization therebetween, it is common practice to buff, sand or otherwise roughen these adjacent surfaces before the vulcanizable rubber cement, or similar material, is applied thereto. This buffing or roughening is necessary in order to obtain a secure integral union between these surfaces of cured stock during the subsequent vulcanizing operation.

Heretofore, in cases where such buffing of the cured rubber composition was to be performed manually, and particularly where this composition was in the form of relatively large sheets of thin flexible material, much time and effort was required and much care had to be exercised in order to obtain the complete and uniform results desired without too much buffing and consequent injury to any part of the thin sheet material.

The buffing machine of the present invention substantially eliminates these and other objectionable conditions encountered heretofore by providing means for holding thin sheets of vulcanized rubber composition, rubberized fabric or the like, in a slightly tensioned and properly positioned manner while a uniformly rotating buffing wheel is automatically and progressively moved over the sheet material for buffing a surface thereof. Convenient and quickly operable means are also provided adjacent the buffing wheel for releasably holding and guiding the sheet material as the buffing wheel passes thereover and for preventing improper stretching or elongation of the sheet material under the "dragging" influence of the buffing wheel. The machine is so constructed and arranged that its operation is immediately subject to the control of the operator and automatic means is provided for completely terminating the operation of the entire machine after each successive buffing operation has been performed thereby.

The invention will be more readily understood from the following description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a side elevational view showing a preferred embodiment of the buffing machine of this

invention and showing a sheet of flexible material positioned therein;

Fig. 2 is a plan view of the buffing machine of Fig. 1;

Fig. 3 is an enlarged side elevational view, partly in section and partly broken away, of the details of a portion of the machine shown in Fig. 1; and,

Fig. 4 is an enlarged transverse view taken substantially upon section line 4—4 of Fig. 3, but with the flexible sheet material removed therefrom.

Referring to the drawings in detail and particularly Figs. 1 and 2, the reference numeral 10 indicates generally a rigid rectangular main frame comprising a pair of channel shaped side frame members 11 and 12 and a pair of end frame members 13 and 14 integrally connected together, such as by welding or the like. A movable or travelling carriage, generally indicated by the numeral 15, is positioned transversely between the side frame members 11 and 12 and is provided at its opposite ends with a pair of spaced end plates 16 and 17, upon each of which is rotatably mounted a pair of supporting rollers 18 arranged to travel upon the upper flanges of the side frame members 11 and 12. Also carried on the end plates 16 and 17 are lower retaining rollers 19 engageable with the lower surface of the bottom flanges of the side frame members 11 and 12 so as to insure proper positioning of the carriage 15 at all times as the carriage moves longitudinally along the main frame 10 during operation of the machine. The travelling carriage 15 (Figs. 3 and 4) also comprises a pair of lower cross beams 21 and 22 and a pair of upper angle bars 23 and 24 rigidly secured, by welding or similar means, to the end plates 16 and 17 adjacent the front and rear edges thereof.

Secured to and projecting inwardly from the inner faces of the end plates 16 and 17 of the travelling carriage are a pair of vertically disposed guide plates 25, each having upper and lower threaded lugs 26 and 27 projecting from a side thereof for the reception of a pair of opposed bolts 28 and 29, respectively. These pairs of bolts upon the end plates 16 and 17 are arranged to bear against the upper and lower ends, respectively, of bearing blocks 30 and 31, which are in turn bolted to the vertical guide plates 25, as indicated at 32, and are provided with slots 33 to allow for a limited amount of vertical adjustment of the blocks relative to the carriage 15. The blocks 30 and 31 are arranged to rotatably support the opposite ends, respectively, of a shaft

34 having a relatively wide buffing wheel 35, or the like, removably mounted thereon in any well known manner. The wheel 35, in this preferred embodiment of the invention, is provided with an abrasive covering 36, such as sand paper or emery cloth, of predetermined grade or coarseness depending upon the hardness and other physical characteristics of the sheet material being processed by the machine.

Rotatably mounted in the end plates 16 and 17 are a pair of shafts 41 and 42 carrying rubber covered supporting drums 43 and 44, respectively, at opposite sides of and in spaced parallel relation to the buffing wheel 35. The supporting drums have their uppermost surfaces positioned slightly above the lowest surface of the buffing wheel 35. In this manner a relatively thin wide sheet 45 of vulcanized rubber composition, vulcanized rubberized fabric or the like, mounted within the main frame 10 in a manner and by means to be hereinafter more fully described, is supported and tensioned to bear evenly against the bottom surface of the buffing wheel 35.

In order to hold the vulcanized sheet material 45 in proper position against the supporting drums 43 or 44, depending upon the direction of travel of the carriage 15 and the rotation of the wheel 35 during the operation of the machine and thus prevent slippage of the sheet material relative to the supporting drum ahead of the wheel under the "dragging" influence of this wheel, a pair of retractable pressure rolls 46 and 47 are provided above the drums 43 and 44, respectively. Each pressure roll is rotatably carried upon an intermediate off-set portion of a crank 48 pivotally mounted in the end plates 16 and 17 and each crank is provided with an operating lever 49. Thus it will be seen that either pressure roll, 46 or 47, can be easily swung into or out of operative position against the thin sheet material 45 upon the respective supporting drum, 43 or 44, positioned therebetween. The arrow A (Fig. 1) indicates the general direction of movement of one of the levers 49 from its inoperative position to its operative position while the other lever 49 is shown in its operative position for holding the pressure roll 47 in engagement with the sheet material upon the drum 44. A latch 51 is mounted upon a fixed part of the carriage 15 and serves to engage and lock one or the other of the levers 49, and thus the corresponding pressure roll, 46 or 47, in operative position.

Power means is provided to cause the travelling carriage to move slowly forwardly or rearwardly along the side channels 11 and 12 of the main frame 10 and comprises a conventional reversible electric motor and reduction gearing 52 (Figs. 3 and 4) supported upon a cradle 53 suspended from the carriage 15. The power means is in turn connected to a chain drive 54 engaging a relatively large driving sprocket 55 keyed to the inner end of a shaft 56 rotatably carried in bearing means in the end plate 15. Upon the outer end of this shaft 56 and within the channel side member 11 is positioned a small sprocket 57. A relatively long chain 58 extends beneath the sprocket 57 and has its opposite end portions (Figs. 1 and 3) passing upwardly therefrom and over a pair of sprockets 61 and 62 keyed, respectively, upon the shaft 41 and 42. It should be noticed that the diameters of the sprockets 61 and 62 and drums 43 and 44 are substantially equal for reasons to be more fully hereinafter set forth. The free end portions of the chain 58 are

anchored at points 63 and 64, respectively, at opposite ends of the main frame 10.

Thus it will be seen that power transmitted from the power means 52 will rotate the sprocket 57 and, since the chain 58 associated therewith is anchored at opposite ends of the main frame 10, the carriage 15 will be caused to move along the side channels 11 and 12 toward one end or the other end of the main frame 10. As the carriage moves along the frame the sprockets 61 and 62 meshing with the chain 58 will be caused to rotate and thus actuate the supporting drums 43 and 44 in such a way that these drums will roll along the under surface of the thin flexible sheet material 45 at a speed substantially equal to the lineal speed of the moving carriage.

In order to insure simultaneous movement of both ends of the travelling carriage 15 in either direction, a second pair of sprockets 65 (only one of which is shown, Fig. 4) are keyed, respectively, to the opposite ends of the shafts 41 and 42 from the ends carrying the sprockets 61 and 62. A second chain 67 (Fig. 2), similar to the chain 58, is located within the side channel 12 and secured to opposite ends of the main frame 10 and has its intermediate portion extending over the sprockets 66 and downwardly beneath an idling sprocket 68 mounted upon a stub shaft carried by the end plate 17. Thus, rotation of the drum supporting shafts 41 and 42 will cause rotation of the sprockets 66 along the under side of the chain 67 and immediately cause an equal longitudinal movement of the opposite end of the travelling carriage 15. Relatively rapid rotation of the buffing wheel 35, during operation of the buffing machine, is produced by means of a multiple V-belt drive generally indicated by the numeral 71 operatively connected thereto and to a conventional reversible electric motor 72 carried upon the cradle 53 suspended from the carriage 15.

The means referred to heretofore for positioning and tensioning the thin sheet material 45 of vulcanized rubber composition, or the like, comprises a pair of tie-rods 75 (Figs. 1 and 2) extending through looped over and cemented edge portions of the sheet material at opposite sides thereof. Each of these tie-rods has one end thereof detachably secured to a hook 76 upon the end frame member 14 and has its opposite end detachably secured to a hook 77 extending through the end frame member 13 and threaded so as to receive a hand crank 78 thereon for holding the tie-rod 75 in a proper tensioned position when the sheet material 45 is mounted thereon.

The end edges of the sheet material 45 are also provided with looped over and cemented portions through which bars 79 extend. One of these bars is releasably retained in place in a pair of stationary hooks 80 upon the end frame member 13 while the other of these bars is engaged and slightly tensioned by a pair of hooks 81 connected to flexible chains 82 arranged to slide in horizontal guide channels 83 rigidly secured upon the end frame member 14. The opposite ends of the chains 82 pass over sprockets 84 secured upon a shaft 85 rotatably mounted upon the end of the main frame 10. A hand wheel 86 is secured upon an end of this shaft so that rotation thereof will cause the chain 82 to be drawn over the sprockets 84 and thus tension the sheet material 45 for buffing purposes. A pawl 87 and a ratchet 88 are provided to prevent improper reverse rotation

of the shaft 85 when the sheet material 45 is tensioned in the machine.

Convenient and readily operable means is provided upon the movable carriage 15 for controlling the operation of the machine. This control means comprises a conventional electric switch 91 (Figs. 1 and 2) having "forward," "reverse" and "stop" push buttons thereon for controlling the electric motor 52 and thus the longitudinal movement of the carriage 15 upon the main frame. A second conventional electric switch 92, having a three-position lever thereon, is provided for controlling the motor 72 and thus the forward and rearward rotation and the starting and stopping of the buffing wheel 35. Throw-out switches 93 and 94 are provided upon the carriage 15 and are so positioned as to strike, respectively, stop members 95 and 96 upon opposite ends of the main frame 10 when the carriage travels to either of its extreme end positions and serve to automatically terminate the operation of the power means 52 and 72 simultaneously.

During operation of the buffing machine, the buffing wheel 35 rotates rapidly while in engagement with the slightly tensioned sheet material 45 being held in proper position thereagainst by the supporting drums 43 and 44. At the same time the carriage 15, being propelled slowly and uniformly by the motor 52 and the gear 57 in engagement with a chain 58, travels from one end of the main frame to the other. This lineal movement of the carriage causes the gears 61 and 62, in engagement with the chain 58, to rotate in a direction opposite to that of the gear 57 and thus drive the drums 43 and 44 in such a direction as to cause these drums to roll along the under surface of the sheet material 45 at a peripheral speed approximately equal to the lineal speed of the carriage. Rotation of the drums 43 and 44 also actuates the pair of gears 66 at the opposite side of the main frame, and since these gears are operatively connected to the anchored chain 67, both ends of the carriage are caused to move in the same direction and in unison.

During the lineal movement of the carriage toward one end of the main frame, or the other, the pressure roll, 46 or 47, immediately ahead of the buffing wheel 35 is in a position to bear against the upper surface of the thin sheet material upon the respective supporting drums, 43 or 44, and thus serves to prevent slippage of the sheet material relative thereto under the "dragging" influence of the buffing wheel 35. It should be noted that the buffing wheel normally rotates in the same direction as the gear 57 driving the carriage and thus places this "drag" or direct pull upon the material extending between the buffing wheel and the forward pressure roll. Figure 1 shows the roll 47 in engagement with the sheet material, at which time the carriage 15 may be propelled in the direction indicated by the arrow B. When the carriage 15 reaches one end of its travel along the main frame, thus completing a buffing operation, the throw-out switch, 93 or 94 as the case may be, engages its respective stop member, which in turn terminates the operation of the carriage 15 and also the operation of the drum 35.

When it is desired to replace one sheet of flexible material by another, the latch 51 holding one of the handles 49 in operative position is released and the handle is moved to its upper or inoperative position. The tie-bars 75 and the tensioning bars 79 extend through loops in the

edges of the sheet material, are released and thereafter the sheet material can be removed from the buffing machine and a new sheet placed therein. In placing a new sheet of material in the machine, it is first threaded through the carriage 15 and then the tie-bars 75 are slipped through the loops at the opposite sides of the sheet material and tensioned, after which the bars 79 are placed through the loops at the ends of sheet material and the sheet material tensioned slightly by operation of the hand wheel 86. When handle 49 on the forward side of the carriage has been moved to a lowered or pressure applying position and the switches 91 and 92 actuated, the carriage will start to travel along the main frame and the buffing wheel 35 will rotate rapidly in contact with successive portions of the upper surface of the sheet material 45. When the carriage 15 has reached the opposite end of the machine the throw-out switch, 93 or 94, will be actuated and automatically terminate the operation of the carriage and the buffing wheel.

Thus, it will be seen that I have invented a buffing machine which will easily, quickly and substantially automatically roughen or buff relatively wide, thin flexible sheets of vulcanized rubber composition, rubberized fabric, or similar sheet material, in an efficient, complete and uniform manner.

Although the invention is described in connection with the specific details of a preferred embodiment thereof, it will be readily understood that such details are not intended to be limitative of the invention except insofar as set forth in the accompanying claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. A machine for buffing thin flexible sheet material comprising supporting means for releasably holding a sheet of flexible material under tension, a carriage arranged to move substantially parallel to the sheet material, a buffing wheel and a work-supporting drum rotatably mounted upon said carriage and positioned upon opposite sides of the sheet material, said drum being arranged to hold said sheet material in operative contact with said buffing wheel, means operatively associated with said supporting means and said carriage for moving the carriage relative to the supporting means, and means for rotating said buffing wheel as the carriage moves relative to the supporting means and the flexible sheet material.

2. A machine for buffing thin flexible sheet material comprising supporting means for releasably holding a sheet of flexible material under tension, a carriage arranged to move substantially parallel to the sheet material, a buffing wheel and a pair of spaced work-supporting drums rotatably mounted upon said carriage and positioned respectively upon opposite sides of the flexible sheet material, said spaced drums being laterally positioned at opposite sides of the buffing wheel and so arranged as to hold said sheet material in operative contact therewith, means operatively associated with said supporting means and said carriage for moving the carriage relative to the supporting means, and means for rotating said buffing wheel as the carriage moves relative to the supporting means and the flexible sheet material.

3. A machine for buffing thin flexible sheet material comprising supporting means for releasably holding a sheet of flexible material

under tension, a carriage arranged to move substantially parallel to the sheet material, a buffing wheel and a pair of spaced work-supporting drums rotatably mounted upon said carriage and positioned upon opposite sides of the flexible sheet material, said spaced drums being laterally positioned at opposite sides of the buffing wheel and arranged to hold said sheet material in operative contact therewith, pressure rolls also mounted upon the carriage, each roll being located adjacent one of said drums for releasably and selectively holding the sheet material in operative engagement therewith, means operatively associated with said supporting means and said carriage for moving the carriage relative to the supporting means and for rotating said drums simultaneously, and means for rotating said buffing wheel as the carriage moves relative to the main supporting means and the flexible sheet material.

4. A machine for buffing thin flexible sheets of rubber composition comprising supporting means for releasably holding the sides and ends of a sheet of flexible rubber composition to hold the sheet under tension, a carriage positioned upon the supporting means and arranged to move substantially parallel to the flexible sheet, a buffing wheel and a drum rotatably mounted upon said carriage and positioned respectively upon opposite sides of the flexible sheet, said drum being arranged to hold the flexible sheet in operative contact with the buffing wheel, a pressure roll mounted upon the carriage and located adjacent said drum for releasably holding the flexible sheet in operative engagement therewith, means operatively associated with supporting means and said carriage for moving the carriage relative to the supporting means and for rotating said drum simultaneously, and means for rotating said buffing wheel as the carriage moves relative to the flexible sheet.

5. A machine for buffing thin flexible sheets of rubber composition comprising supporting means for releasably holding a sheet of flexible rubber composition under tension, a carriage arranged to move substantially parallel to the flexible sheet, a buffing wheel and a drum rotatably mounted upon said carriage and positioned respectively upon opposite sides of the flexible sheet, said drum arranged to hold the flexible sheet in operative contact with said buffing wheel, means upon said carriage for moving the carriage relative to the supporting means and for simultaneously positively rotating said drum to cause said drum to roll along a surface of the flexible sheet at a speed substantially equal to the lineal speed of the carriage, and means for rotating said buffing wheel as the carriage moves relative to the supporting means and the flexible sheet.

6. A machine for buffing thin flexible sheets of rubber composition comprising supporting means for releasably holding a sheet of flexible rubber composition under tension, a carriage arranged to travel substantially parallel to the flexible sheet, a buffing wheel and a work-supporting drum rotatably mounted upon said carriage and positioned respectively upon opposite sides of the flexible sheet, said drum being so arranged as to hold the flexible sheet in operative contact with said buffing wheel, means operatively associated with the supporting means and the carriage for moving the carriage relative to the supporting means, said last named means comprising a flexible chain anchored to the sup-

porting means and a driving sprocket rotatably carried upon the carriage and in engagement with the chain, said drum being geared to said chain for rotating said drum as the carriage moves so as to cause said drum to roll along a surface of the sheet material at a speed substantially equal to the lineal speed of the carriage, and means for rotating said buffing wheel as the carriage moves relative to the supporting means and the flexible sheet.

7. A machine for buffing thin flexible sheets of rubber composition comprising supporting means for releasably holding a sheet of flexible rubber composition under tension, a carriage arranged to travel substantially parallel to the flexible sheet, a buffing wheel and a pair of spaced work-supporting drums rotatably mounted upon said carriage and positioned respectively upon opposite sides of the flexible sheet, said drums being spaced at opposite sides of the buffing wheel and so arranged as to hold the flexible sheet in operative contact with said buffing wheel, a pair of manually operable pressure rolls mounted upon the carriage, a roll being located adjacent each of said drums for selectively holding the sheet material between a roll and its respective drum, means associated with said carriage for moving the carriage relative to the supporting means, said last named means comprising a flexible chain anchored to the supporting means, a sprocket connected to each drum and in engagement with said chain for rotating said drums simultaneously as the carriage moves at a peripheral speed substantially equal to the lineal speed of the carriage, and means for rotating said buffing wheel as the carriage moves relative to the supporting means and the flexible sheet.

8. A machine for buffing thin flexible sheets of rubber composition comprising supporting means for releasably holding a sheet of flexible rubber composition under tension, a carriage arranged to travel substantially parallel to the flexible sheet, a buffing wheel and a work supporting drum rotatably mounted upon the carriage and positioned respectively upon opposite sides of the flexible sheet, said drum being so arranged as to hold the flexible sheet in operative contact with said buffing wheel, means associated with said carriage for moving the carriage relative to the sheets, means for rotating the buffing wheel as the carriage moves relative to the flexible sheet material, and means for automatically terminating the operation of the carriage and the buffing wheel when the buffing wheel approaches either end of the sheet.

9. Means for buffing sheet material comprising in combination means for stretching a sheet of elastic material and holding it under predetermined tension, a rotatable buffing wheel, a rotatable work supporting drum, means for supporting the wheel and drum adjacent each other and on opposite sides of the sheet material, the drum being adapted to hold the sheet in operative contact with the buffing wheel, and means for rotating the buffing wheel and moving the buffing wheel and drum over the sheet in a direction parallel to the direction of movement of the periphery of the buffing wheel where it makes contact with the sheet to buff the sheet while stretched.

10. A machine for buffing thin flexible sheet material comprising supporting means for releasably holding a sheet of flexible material under tension, a carriage arranged to move parallel to the sheet material, a buffing wheel and a

work supporting drum rotatably mounted on the carriage and positioned on opposite sides of the flexible sheet material, holding means to prevent excess stretching of the sheet material under dragging action of the buffing wheel, said holding means being adapted to act uniformly over the width of the sheet, means operatively associated with the supporting means and said carriage for moving the carriage relative to the supporting means and for rotating the drum, and means for rotating the buffing wheel as the carriage moves relative to the supporting means and the flexible sheet material.

11. A machine for buffing thin flexible sheet material comprising supporting means for releasably holding a sheet of flexible material under tension, a carriage arranged to move parallel to the sheet material supported thereby, a buffing

5 wheel and a work supporting drum rotatably mounted upon the carriage and positioned on opposite sides of the flexible sheet material, means for holding the sheet to prevent undue stretching under the dragging action of the buffing wheel, said holding means including a pair of rolls clamped against opposite sides of the sheet, means operatively associated with said supporting means and said carriage for moving 10 the carriage relative to the supporting means and for rotating the work supporting drum, means for rotating one of the clamping rolls at the same peripheral speed as the peripheral speed of the work supporting drum, and means for rotating the buffing wheel as the carriage moves 15 relative to the supporting means and the flexible sheet material.

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