Oct. 6, 1936. A. H. HABERSTUMP 2,056,451

METHOD AND MEANS FOR APPLYING COVERING MATERIAL

Filed Jan. 30, 1936 2 Sheets-Sheet 1

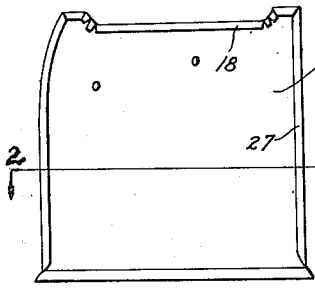


Fig. 1

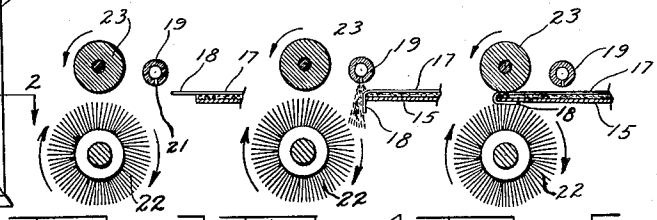


Fig. 3 Fig. 4 Fig. 5

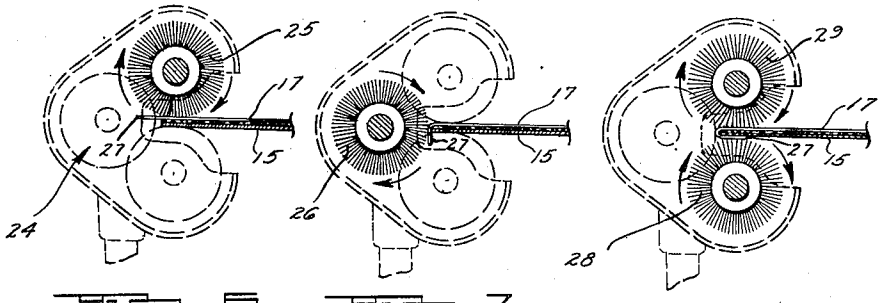


Fig. 6 Fig. 7 Fig. 8

Fig. 9

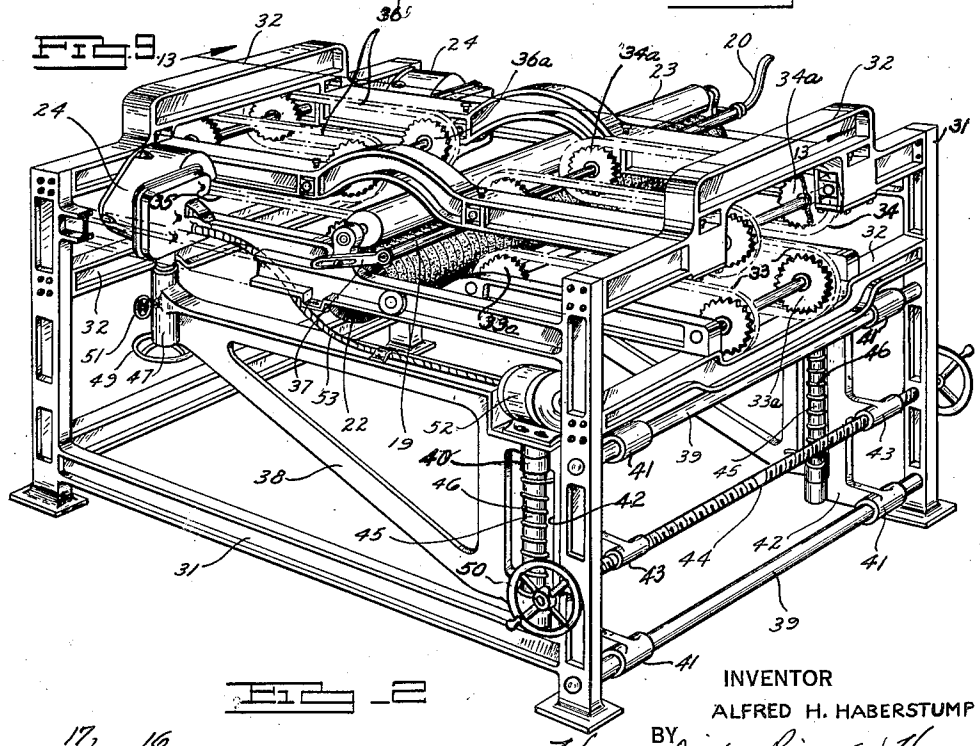
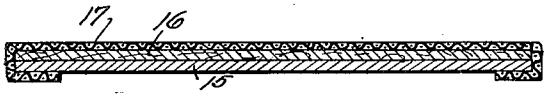


Fig. 2



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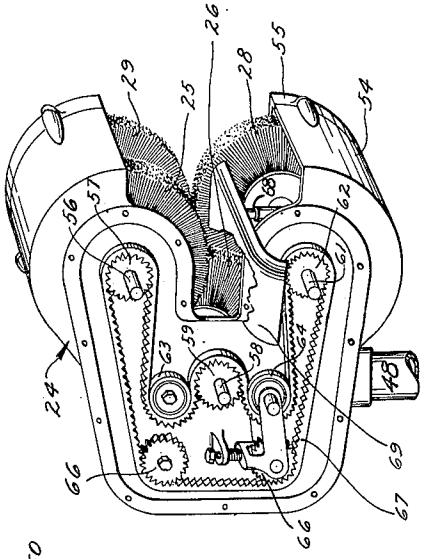


Fig. 10

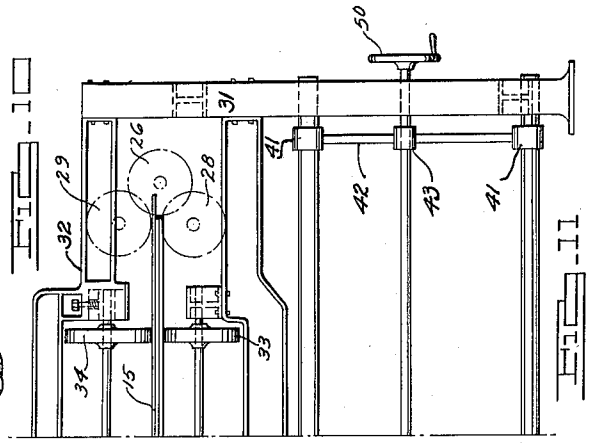


Fig. 11

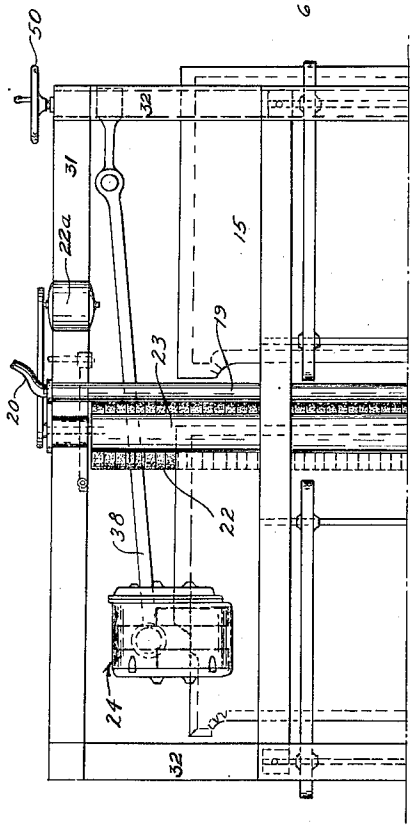


Fig. 12

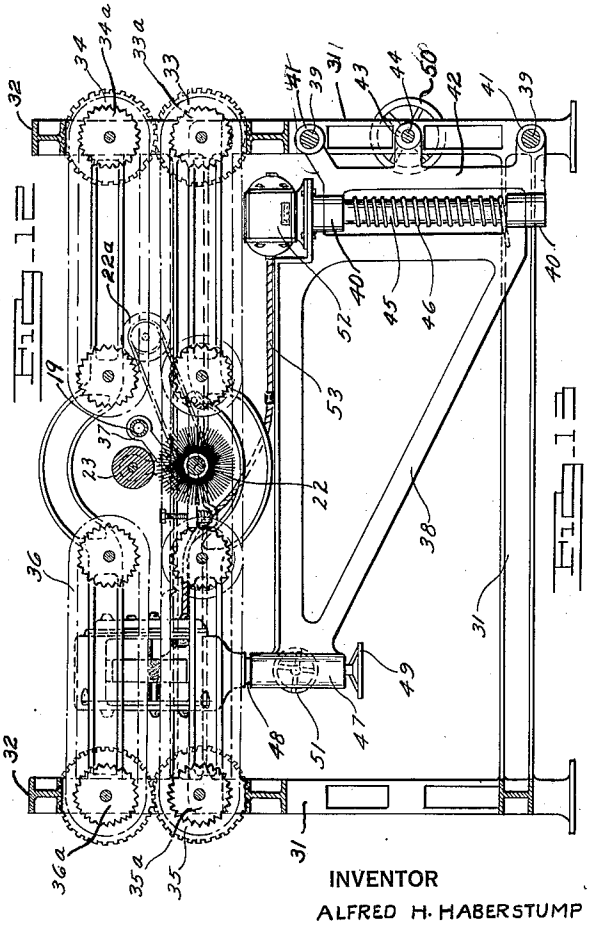


Fig. 13

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UNITED STATES PATENT OFFICE

2,056,451

METHOD AND MEANS FOR APPLYING COVERING MATERIAL

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Application January 30, 1936, Serial No. 61,535

11 Claims. (Cl. 154—41)

This invention relates to apparatus for automatically applying fabric trim materials to backing sheets which have been covered with suitable padding to provide an inner trim panel construction primarily adapted for use in automotive vehicles. More particularly the present application relates to a machine which serves to automatically stretch and secure a layer of fabric trim material over a padded backing sheet.

Applicant's assignee's prior co-pending application, Serial No. 54,121, filed December 6, 1935, and assigned to the assignee of the present application, illustrates a method of preparing backing sheets by applying a uniform layer of non-woven fibrous padding material thereto and subsequently treating the edges of the padded backing sheets in order to impart a neat and uniform finish thereto. After preparation of such backing sheets, it is necessary that the padded backing sheets as a whole be covered with a layer of fabric finish material which is generally stretched over the padded surface of the backing sheets, folded around the edges thereof, and adhesively secured to the reverse side thereof.

It is a general object of the present invention to provide automatic means for stretching a section of fabric material over padded backing sheets, automatically folding the marginal edges of the fabric trim material around the edges of the backing sheets and adhesively securing these marginal edges to the rear side of the sheets.

Another object of the present invention is to provide mechanism which efficiently and effectively performs the above operations in a substantially automatic and continuous manner, resulting in a completed trim panel construction in which the fabric finish material is tightly and uniformly stretched over the padded backing plate.

Still further, the present invention contemplates the provision of apparatus which is so constructed and arranged that it will operate with uniform success upon backing sheets of irregular configuration. In accordance with the present invention, means are provided for accurately positioning the devices which operate upon the marginal edges of the sheet in order that these devices will accommodate themselves to irregularities in the configuration of the backing sheets being treated and consequently produce a neat and attractive finish irrespective of the specific shape of the sheet under treatment.

Many other and further objects and advantages of the invention will become apparent from the following specification when considered in connection with the accompanying drawings forming a part thereof.

In the drawings:

Figure 1 is a view in rear elevation of a trim panel, showing the manner in which the fabric surface trim is adhesively secured to the reverse face thereof.

Fig. 2 is a transverse sectional view taken substantially on the line 2—2 of Fig. 1, showing in detail the structure of the completed panel.

Figs. 3, 4 and 5 are diagrammatic sectional views, illustrating the manner in which the forward edge of the panel is treated to fold the fabric trim material around the edge and secure the same to the reverse side of the backing sheet.

Figs. 6, 7 and 8 are diagrammatic sectional views illustrating the manner in which the devices at the side marginal edges of the trim panel under treatment serve to engage the fabric material, stretch the same, fold it around the edges of the sheet, and secure it to the reverse side of a backing sheet.

Fig. 9 is a perspective view of a machine embodying the improvements of the present invention, showing the apparatus for treating the marginal edges of the sheet and the manner in which the backing sheets are fed through the machine.

Fig. 10 is an enlarged perspective view with portions broken away, illustrating one of the devices for operating on the side marginal edges of the backing sheets.

Fig. 11 is a fragmentary front elevational view of the machine of Fig. 9, illustrating the relative position of the trim panels as they pass therethrough;

Fig. 12 is a fragmentary top plan view of the machine of Fig. 9 with portions broken away.

Fig. 13 is a view in central vertical section, taken on the line 13—13 of Fig. 9, and showing in detail the means for supporting and driving the devices for operating on the side marginal edges of the panels and also the construction and arrangement of the apparatus for operating upon the forward end of the panels fed to the machine.

With more particular reference to the drawings, it will be appreciated that the specific construction shown in the drawings, and described below, is merely illustrative of one form which the generic inventive concept presented herein may take.

The above identified co-pending application, illustrates and describes a device for operating on one side of an assembled backing and trim panel to stretch the trim material and secure the mate-

rial to the under-edge of the backing element. The present invention contemplates the use of two of such devices in face-to-face relation to operate simultaneously on opposite edges of the trim material. In the present arrangement the material is stretched toward the edges from the center. The extending material is first deflected and then brushed under and secured to the adhesive material provided on the under-side of the backing sheet. The present device is further novel in that the material is secured to the advancing edge of the padded backing element by elements of the device which operate ahead of the side securing devices above mentioned.

The panel to be finished is illustrated in Fig. 1 as embodying a backing element 15 which is preferably made of cardboard but which may be made of other materials such as masserated particles or sheets of cloth or paper bonded together by a phenol resin compound or similar materials. The board has applied to its outer face a layer of padding material 16 (Fig. 2) which may be applied in any well known manner, but which is preferably constructed of comminuted fibers as illustrated and described in the co-pending application referred to above. The trim material 17 is placed over the top of the padding material 16 and the edges are secured to the under-side of the sheet 15 after being stretched thereacross by the device of my present invention. Before passing a sheet through the machine adhesive material is applied to the marginal edge of the under surface of the backing sheet 15, and preferably also to the projecting edge of the trim material 17.

The sheet thus assembled from a panel 15, padding 16 and trim 17, is advanced into the device (Fig. 3) until the front projecting edge 18 of the trim material passes over an air nozzle 19 which is provided with a plurality of fine apertures 21 along its under edge. The air deflects the projecting edge 18 of the material 17 as illustrated in Fig. 4, downwardly over the edge of the backing element 15. Immediately thereafter (Fig. 5) a brush 22 engages the projected edge 18 and securely brushes it against the under surface of the panel 15, in which position it is retained by the adhesive. A roller 23 is positioned opposite the brush 22 to prevent the assembled sheet from being deflected by contact with the brush.

The further passage of the assembled elements through the device (Figs. 6, 7 and 8) causes each of the side edges to be engaged by a deflecting device 24, which may be constructed as described in detail in the co-pending application above mentioned. These devices stretch the trim material 17 toward the side edges, deflect the projecting material and brush the deflected portion across the under surface of the backing element 15, against the adhesive previously applied thereto, to cause it to be securely bonded to the panel in taut relation. The stretching is effected by brushes 25 associated with devices 24 which first operate on the trim material 17 to draw it toward the edge of the backing element 16. Further passage of the material causes brushes 26 to deflect the projections 27 of the trim material downwardly over the edge, after which a brush 28 sweeps the deflected projection 27 across the under surface of the backing element 15. During this last brushing operation by the brush 28, a brush 29 is available for retaining the material 17 stretched across the backing element.

The front advancing edge of the illustrated panel 15 is of irregular form, and the lefthand edge of the panel, as illustrated in Fig. 1, is arcuate in form. As described below, the device is so constructed as to operate as readily on such irregular edges as on a straight side, such as illustrated on the righthand portion of Fig. 1.

The machine as a whole is shown in Figs. 9 to 13. In these figures, a pair of side frames 31 are interconnected by cross-elements 32 to form a support for the devices. The cross-members 32 carry the conveyors 33 and 34, between which the assembled sheets are carried into the device. Conveyors 33 and 34 advance the material from the entering end of the machine to the folding device including brush 22 of Figs. 3, 4 and 5. After passing through the folding device the sheets are received by a similar pair of conveyors 35 and 36 which pass the assembled material completely through the device and out the discharge end thereof. The conveyors 33 and 34, and 35 and 36 are carried upon and driven by sprocket wheels 33*a*, 34*a*, 35*a* and 36*a*, respectively, which so support the conveyors that the surfaces of adjacent pairs thereof operate on opposite sides of the assembled sheets to retain them in an assembled relation during their advance through the device. The present invention contemplates that the conveyors will be driven in synchronism. This may be done in any conventional way, forming no part of the present invention, and has not been illustrated.

The brush 22 (Figs. 3, 4 and 5), mounted centrally of the device and extending transversely thereacross, is arranged to be driven in rotation at a relatively high rate from a suitable external source illustrated as a motor 22*a*. The nozzle 19 is adjustably supported on arms 37, in a position frontwardly of the brush 22 and above the space between the conveyors 33 and 34. An illustrative source of air for nozzle 19 is represented as comprising conduit 20. An idler roller 23 is supported above the brush 22.

As the assembled sheets pass through the brush 22 and roller 23, they are received between the conveyor belts 35 and 36 and are further advanced thereby through the devices 24.

The devices 24 are mounted for adjustment toward or away from each other, upon brackets 38, each of which is pivotally connected to a pintle 45, which extends between upper and lower bosses 40 of a hinge bracket 42. A coil spring 46 encompasses each pintle 45 and acts torsionally to urge the associated bracket 38 toward the other. Brackets 42 are provided with upper and lower bosses 41 by which are mounted for sliding movement upon rods 39 which extend transversely of the machine and are supported in vertically spaced relation in the end uprights of the frame 31. Each bracket 42 is provided with a threaded hub 43, through which a lead screw 44 passes. The threads on the lead screw are of the opposite hand either side of the center line to cause the hinge brackets 42 to move toward and away from each other along the rods 49 as the lead screw is turned. The devices 24 may thus be accurately and adjustably spaced relative to each other so that the machine may operate on assembled elements of various widths. The independently swingable relation of each bracket 38 permits the associated device 24 to independently follow irregularities in the corresponding edge of each sheet.

The brackets 38 are provided with hubs 47 on their ends into which the pillars 48 of the devices 24 extend, and in which they are adjustable, by the hand wheel 49, to determine the height thereof relative to the brackets 38. A clamping handle

51 is provided to lock each device 24 in a selected position of adjustment.

Each device 24 is driven by a motor 52, carried by the associated bracket 38. A flexible driving connection 53 interconnects each motor with the corresponding device in a well known manner.

Fig. 10 is a perspective view of a device 24, which device is described and illustrated in detail in my above mentioned co-pending application. Referring to Fig. 10, a casing 54 encompasses the brushes 25, 26, 28 and 29 and forms the bearings on one side of the brush shafts. An enclosing cap 55 renders the brushes accessible and provides a bearing support for the opposite ends of the shafts. The brushes 25 and 29 are carried on a shaft 56 upon which the sprocket wheel 57 is keyed. Brush 26 is mounted on a shaft 58 upon which the sprocket wheel 57 is keyed. The brush 28 is mounted on a shaft 61 upon which a sprocket wheel 62 is keyed. Idling rollers 63 and 64 are mounted on the side of the casing 54, as are also a pair of sprocket wheels 65 and 66, sprocket wheel 66 being adjustable to take up the slack on a driving chain 67 which cooperates with the rollers and sprocket wheels. The flexible drive connection 53 engages the shaft 58 and through the driving of the shaft in rotation the link chain 67 is driven to cause all of the shafts to be operated at the same time with the same speed. An adjustable support 68 is carried by the housing 54 for positioning the material in height relative to the brushes, and may be provided with a guide element 69.

Summarizing the operation of the machine as a whole, the sheets are assembled, as previously described, of the panels 15, the padding 16, and trim material 17, the marginal edges of the under side of panel 15 and trim material 17 being provided with an adhesive layer. The thus assembled sheets are fed into the machine at the entering end, or righthand thereof, as viewed in Fig. 13, being received between the upper and lower conveyors 34 and 33, respectively, which as previously described are driven in timed relation to each other. As the forward end of the sheet approaches the nozzle 19, the marginal edge 18 thereof is deflected downwardly by the air jets and shortly thereafter is engaged by the rapidly rotating brush 22 and turned under to a completely folded position (Fig. 5). During this final folding and sealing action, the upper surface of the sheet is supported by the idle roller 23. It will be understood that the forward urge given each sheet by the rapidly rotating brush 22 is insufficient to withdraw it or pull it out of the conveyors 33 and 34, so that a plurality of complete revolutions of the brush occur while the marginal edge 18 of the sheet is in brushing position. A smooth folding and a positive sealing action are thus provided. The folding and sealing action thus provided is uniform across the forward edge of the panel, even though such edge is of irregular shape, since as the sheet advances across the brush, all points along the edge thereof are brought under the influence of nozzle 19 and brush 22.

Before the following end of the sheet passes beyond the limits of conveyors 33 and 34, the completely folded forward end thereof enters between the second pair of conveyors 35 and 36, which thereafter act to feed the sheet to the devices 24, which act as described with reference to Figs. 6, 7 and 8 to fold over and seal the marginal side edges of the sheet, brush 25 being first encountered to stretch the trim material 17, brush 27 being next encountered to deflect the marginal edge, and brushes 28 and 29 finally cooperating to continue the stretching action and to fold under and seal the marginal edge.

During the passage of the sheet past the side folding devices 24, it will be appreciated that these devices may swing independently upon the brackets 38 individual thereto, thus accommodating the individual devices to irregularities of the edges of the sheet.

It will also be understood that the machine may be operated continuously, a new sheet being introduced into the machine at the entering end as soon as the following end of the preceding sheet has advanced entirely into the conveyors 33 and 34, and the completed sheets being successively discharged at the discharge end of the machine.

The brushes 25 and 29 tend to move the entire brushing assembly in toward the edge of the sheet under treatment and it will be clear that this inward movement is halted by the brush 26 which engages the edge of the sheet. It will therefore be clear that the brushes 25 and 29 serve to urge the brush 26 into engagement with the marginal edge of the sheet.

Although a specific embodiment of the present invention has been described, it will be evident that various modifications in the form, number and arrangement of parts may be made within the spirit and scope thereof. It will also be understood that certain of the elements of the present machine may be used independently of others of the elements thereof, and be applied to specific uses other than those described in detail herein. The foregoing description, accordingly, is to be regarded in an illustrative, and not in a limiting, sense.

What is claimed is:

1. A machine of the class described comprising means for feeding a backing sheet through said machine, means for maintaining a section of trim material upon said backing sheet and a rotating brush extending transversely of said machine for engaging the forward edge of said trim material and folding the same around the edge of said backing.

2. A machine of the class described comprising means for feeding a backing sheet through said machine, means for maintaining a section of trim material upon said backing sheet, a rotatable member extending transversely of said machine for folding the forward edge of said trim material around the forward edge of said backing sheet, and rotary means for folding the side edges of said trim material around the side edges of said backing sheet.

3. A machine of the class described comprising means for feeding a backing sheet through said machine, means for maintaining a section of trim material upon said backing sheet, a rotatable brush extending transversely of said machine for folding the forward edge of said trim material around the forward edge of said backing sheet, and simultaneously operable rotary means for automatically folding the side edges of said trim material around the side edges of said backing sheet.

4. In a machine of the class described, an air jet for partially folding a section of trim material about a backing sheet and a brush for completing said folding operation.

5. In a machine of the class described, a transversely extending downwardly directed series of air jets for partially folding a section of trim material about a backing sheet, and a trans-

versely extending rotary brush for completing said folding operation.

6. In a machine of the class described, a transversely extending downwardly directed series of air jets for partially folding a section of trim material around the marginal edge of a backing sheet, a transversely extending rotary brush for completing said folding operation and a roller cooperating with said brush for positioning said backing sheet and trim material with respect to said brush.

7. In a machine of the class described, mechanism for feeding an assembled backing sheet and section of inner trim material through said machine, a transversely extending rotary brush adapted to engage the forward edge of said trim material and fold the same around the forward edge of said backing sheet, and means for urging said trim material into engagement with said brush.

8. In a machine of the class described, mechanism for feeding an assembled backing sheet and section of inner trim material through said machine, a transversely extending rotary brush adapted to engage the forward edge of said trim material and fold the same around the forward edge of said backing sheet, and means for urging said trim material into engagement with said brush, said last mentioned means comprising a transversely extending downwardly directed series of air jets.

9. In a machine of the class described, means for feeding a backing sheet through said machine, means for maintaining a section of trim material in position on said backing sheet while so fed, a pair of rotary brushing elements adapted to engage the marginal edges of said trim material and backing sheet to tension the trim material laterally with respect to said backing sheet and fold the marginal edge thereof around said backing sheet, and means for adjustably positioning said brushing units with respect to said machine.

10. In a machine of the class described, means for feeding a backing sheet through said machine, means for maintaining a section of trim material in position on said backing sheet while so fed, a pair of rotary brushing elements adapted to engage the marginal edges of said trim material and backing sheet to tension the trim material laterally with respect to said backing sheet and fold the marginal edge thereof around said backing sheet, and means for resiliently urging said brushing units into engagement with the lateral edges of said backing sheet and trim material.

11. In a machine of the class described, means for feeding a backing sheet through said machine, means for maintaining a section of trim material in position on said backing sheet while so fed, a pair of rotary brushing elements adapted to engage the marginal edges of said trim material and backing sheet to tension the trim material laterally with respect to said backing sheet and fold the marginal edge thereof around said backing sheet, said roatry brushing units being movably mounted with respect to said frame, and means for adjusting the spacing thereof to accommodate backing sheets of varying widths.

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