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[54] **ADHESIVE APPLYING MACHINE**

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[21] Appl. No.: **153,564**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 4,702, Jan. 21, 1970, abandoned.

[52] **U.S. Cl.** **118/5**, 118/202, 118/203, 118/245, 118/250

[51] **Int. Cl.** **B05c 1/08**

[58] **Field of Search** 118/245, 250, 251, 118/261, 203, 202, 5

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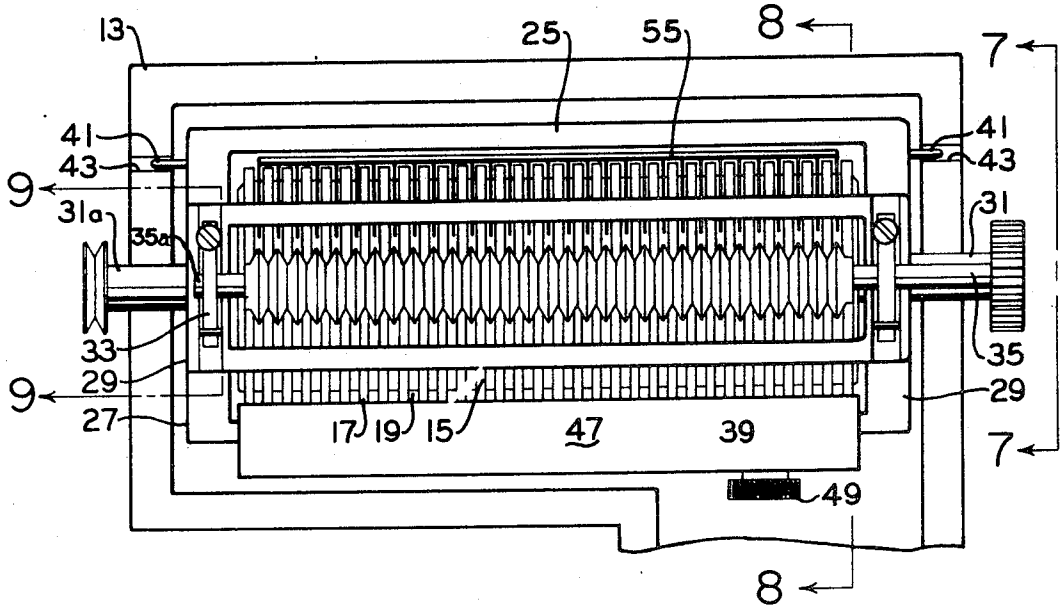
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[57] **ABSTRACT**

The invention relates to a compact, inexpensive, and highly efficient adhesive wax applying machine which utilizes an adhesive applying roller dipping into a heated tank carrying the adhesive. A top roller is arranged in cantilevered relationship to cooperate with the bottom roller. Means are provided to drive both rollers. The adhesive tank is heated, and is preferably cast aluminum to facilitate heat transfer to both rolls. The cover is plastic to provide insulation, and is easily removable. Adjustments are provided for doctor bars, and takeoff means, as well as for the rollers to facilitate its use and cleaning.

10 Claims, 9 Drawing Figures



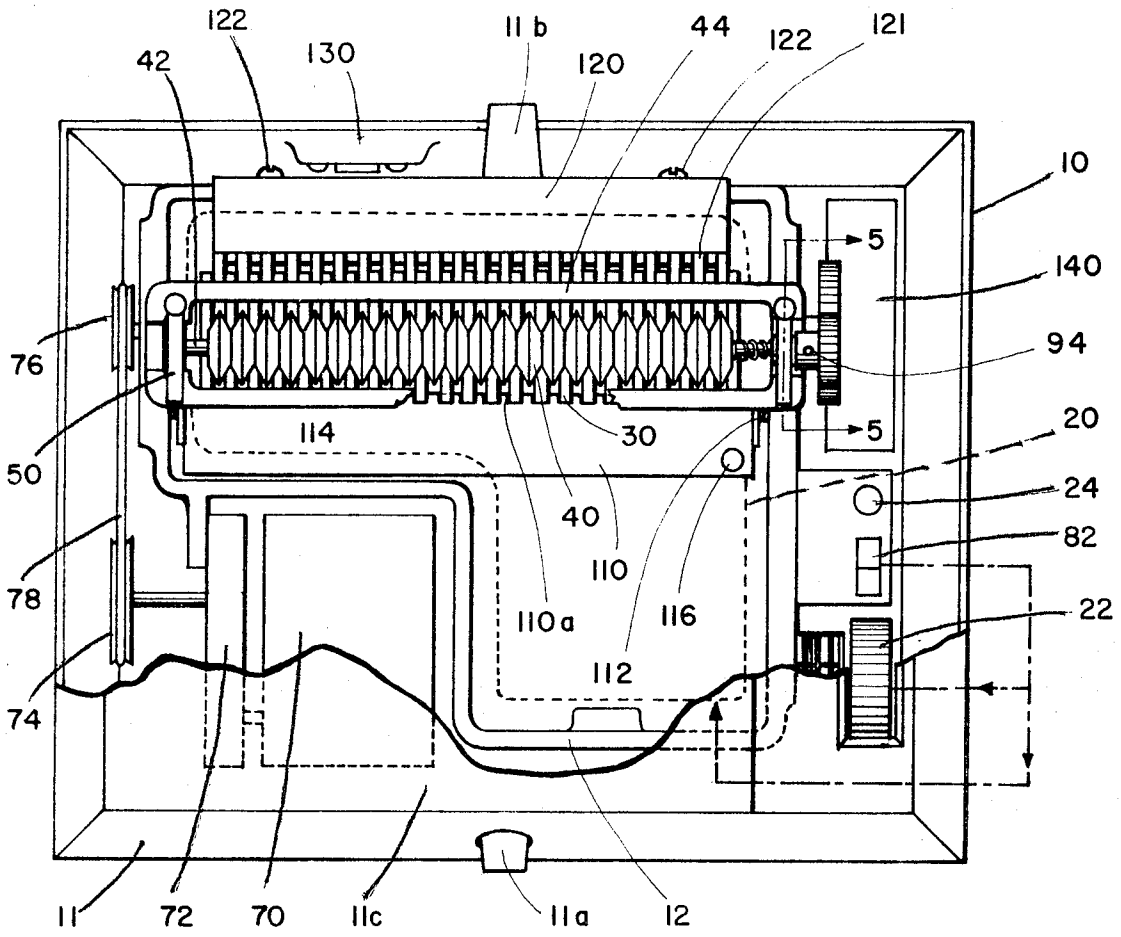


FIG. 1

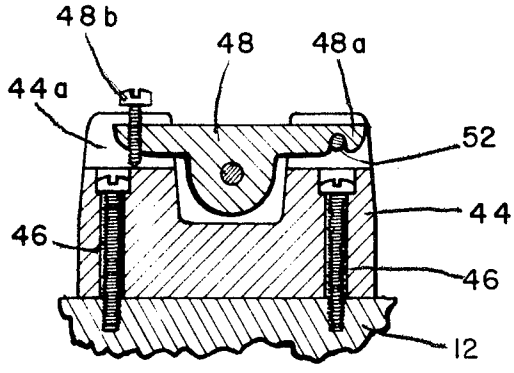


FIG. 5

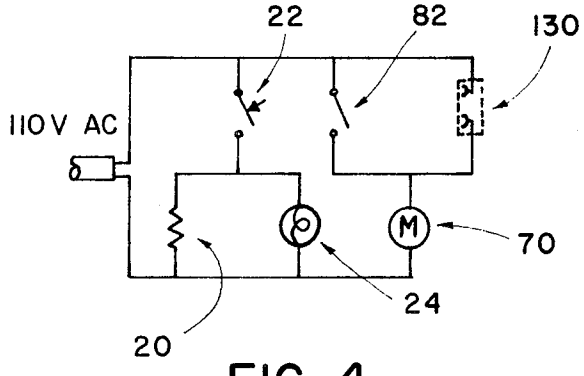


FIG. 4

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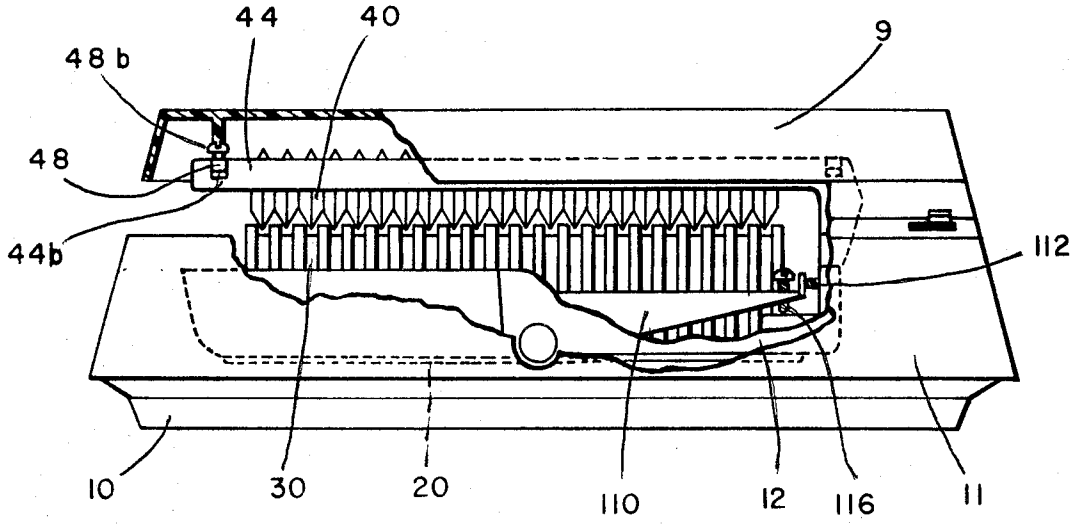


FIG. 2

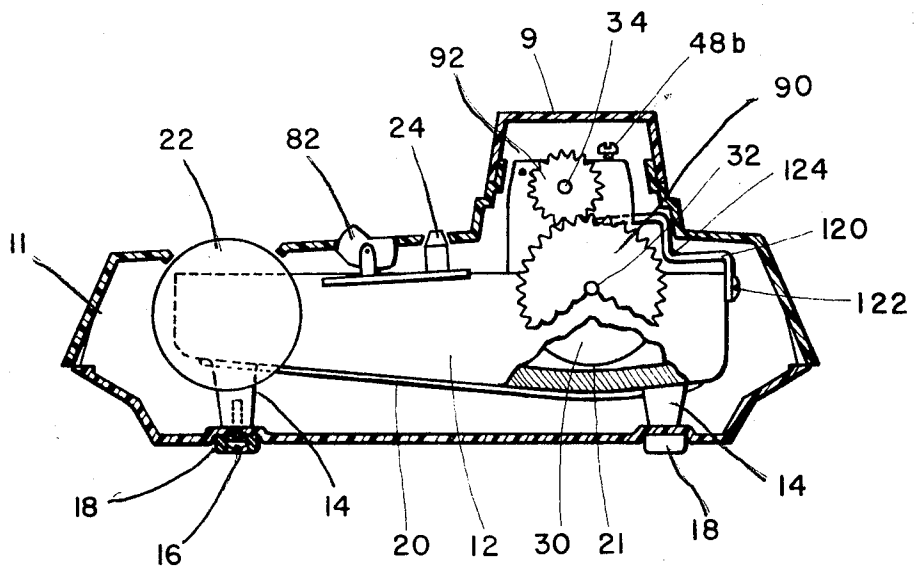


FIG. 3

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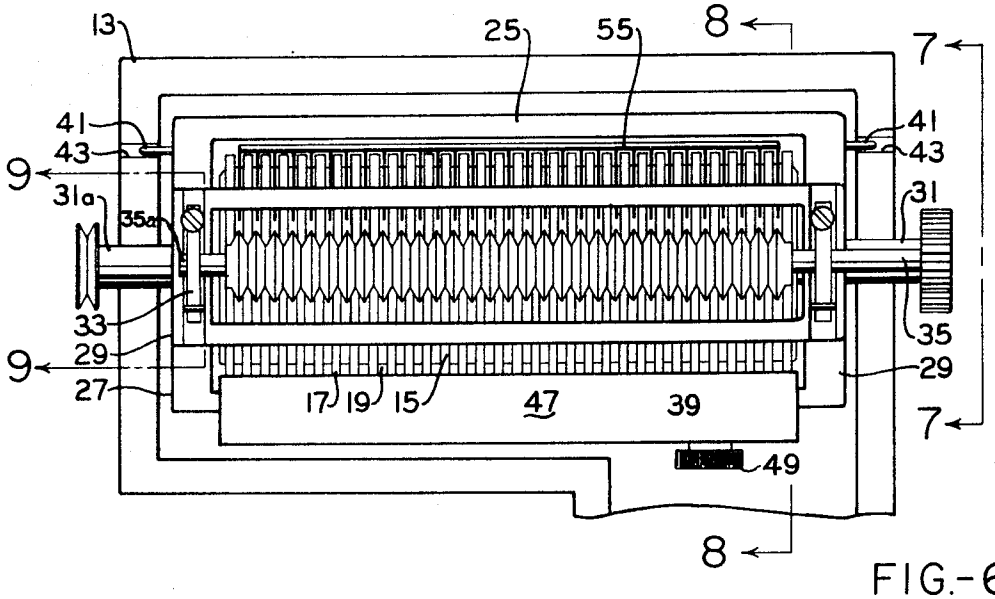
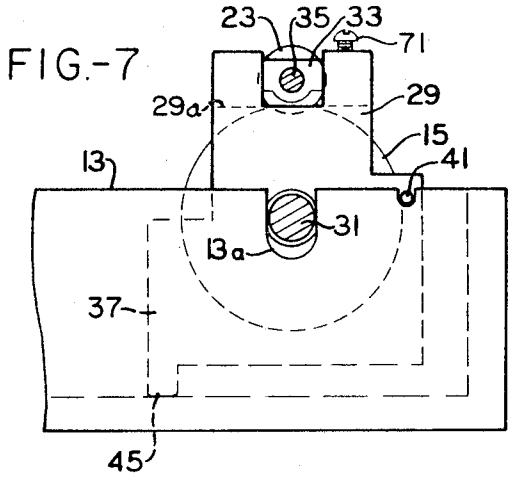


FIG.-6

FIG.-7



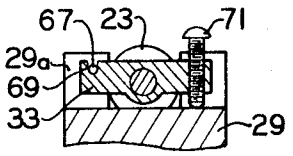
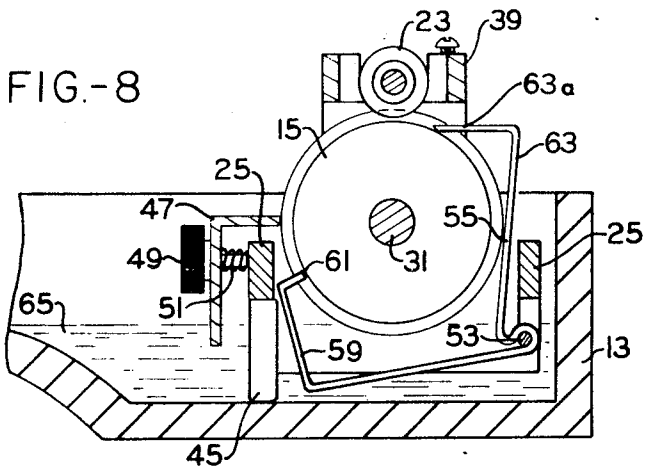


FIG.-9

FIG.-8



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ADHESIVE APPLYING MACHINE

This application is a continuation-in-part of my co-pending application Ser. No. 4,702, filed Jan. 21, 1970, now abandoned.

Heretofore it has been known that there have been many different types of adhesive applying machines, such as that shown in U.S. Pat. No. 3,335,696. However, these prior art machines have been expensive to manufacture, difficult in operation, hard to clean and keep in good running order, and unduly complicated. Further, adjustability thereof has been difficult, and they are not applicable to large pieces of paper, envelopes of the like.

Therefore, it is the general object of the invention to provide an improved adhesive applying machine which is characterized by having a unique cantilever arm so that large papers, envelopes, or the like can be passed through the apparatus.

A further object of the invention is to provide an adhesive applying machine which has adjustable rollers, high heat transfer capability, unique doctor bar and takeoff finger arrangements, and a heat insulating case to prevent heat transfer which is readily removable to add adhesive, or provide cleaning.

For a better understanding of the invention, reference should be had to the accompanying drawings wherein:

FIG. 1 is a top plan view of a first embodiment of the apparatus with the top casing off illustrating the arrangement of the components;

FIG. 2 is a front elevation of the apparatus of FIG. 1 with the casing and roll cover in position;

FIG. 3 is a side view in partial section taken on line 3—3 of FIG. 1;

FIG. 4 is an electrical schematic for the components illustrated in the embodiment of FIG. 1;

FIG. 5 is a cross section of one of the pressure roll shaft support plates illustrating its relation to the cantilevered arm;

FIG. 6 is a fragmentary top plan view of a second embodiment of the apparatus the top casing being removed to show the arrangement of the components; and

FIGS. 7, 8, and 9 are sectional views taken along the lines 7—7, 8—8, and 9—9, respectfully, of FIG. 6.

With reference to the embodiment of the invention illustrated in FIG. 1 of the drawings, the numeral 10 illustrates a housing which is preferably made of plastic, and acts as an excellent insulator from the heat generated by the apparatus to be described hereinbelow. A cast aluminum adhesive receiving tray is illustrated by numeral 12, with tray 12 having legs 14, as best seen in FIGS. 2 and 3 which mount the tray to housing 10 by means of appropriate bolts 16 which also carry rubber legs 18 that act to support the housing 10 on a table top, or the like, without scratching or otherwise defacing.

The tray 12 is heated by a silicone heating blanket 20 which is preferably adhesively applied to the bottom of the tray 12 as best seen in FIG. 3, and which covers substantially the entire bottom surface of tray 12 as best seen by the dotted lines in FIG. 1. The blanket 20 of course provides direct heat to the bottom of the tray 12 and eliminates coiled, stripped, or any other means of heat conduction. The actual electrical control to blanket 20 is through a thermostat indicated generally by numeral 22, with a pilot light 24 indicating when the thermostat 22 is turned to an on position, and power is supplied thereto.

The tray 12 is preferably cast aluminum so as to provide excellent heat conduction uniformly for the adhesive or wax which is melted therein. Preferably, the invention contemplates utilizing "Artwax," a product made by the Portage Newspaper Supply Company of Akron, Ohio, with the properties of this wax being a solid at normal room temperature, but melting easily and forming a liquid in the tray 12 upon application of electricity and generation of heat by blanket 20. The tray 12 is also shaped so as to provide a low point as indicated at 21 which is directly beneath the main roller, as will be more fully described hereinafter, so that in effect substantially all the wax or adhesive in the tray will be utilized before the roller runs dry and fails to dip into the remaining wax in the tray.

The essential operation of the invention is achieved by an adhesive distributor roll 30 carried in rotatable journaled relation by tray 12 through shafts 32 on each end thereof. The roll 30 cooperates with a pressure roll 40 which is carried on shaft 42 and supported by a cast aluminum arm 44 which is mounted in cantilevered relationship to tray 12 by a pair of bolts 46, as best seen in FIG. 3. In effect, the cantilevered arm 44 is substantially rectangularly shaped with a large opening in the middle receiving the pressure roller 40. However, it has slots 44*a* and 44*b* cut in each end thereof, as best shown in FIG. 5 which receive pillow blocks or shaft support plates 48 and 50, that actually rotatably receive the shaft 42 of roller 40, as is best seen in FIG. 1.

The construction of plate 48 is best shown in FIG. 5, and it should be understood that plate 50 is constructed in the same manner. In effect, a pin 52 is carried by the cantilevered arm 44, and engages a notch 48*a* cut into plate 48 to provide a pivotal support for plate 48. A thumb adjustment screw 48*b* is threadably received through the other end of plate 48 and engages onto the bottom of the slot 44*a* to adjustably support the other end of plate 48 about its pivotal mounting on pin 52. The screw 48*b* is preferably plastic so it will not be too hot to be manually adjusted during operation of the apparatus, if desired. Hence, it can be seen that by the adjustment of screws 48*b* and 50*b*, the vertical height of pressure roller 40 can be quite easily and readily adjusted.

The adhesive applying roller 30 preferably has a plurality of raised lands and recessed grooves which is quite clearly shown in FIG. 1 and FIG. 2 with the spacing of the lands and grooves being approximately equal across its surface. The lands and grooves are concentric with the axis of roller 30, and extend substantially its full length. The roller surface could be smooth or of other configuration, if desired, however, Naturally, any type of bronze bushing or the like might be utilized to achieve the rotatable mounting of the shafts 32 carrying roll 30 with the sides of tray 12. Cooperating with the grooves of roll 30, the pressure applying roll 40 has a peak and valley configuration with the peaks extending slightly into the grooves of the roller 30.

In order to provide drive to the rollers so that paper or the like might pass therebetween upon the rotation thereof, the invention utilizes any appropriate motor indicated generally by numeral 70 operating through a reduction gear box 72 to drive a pulley 74. The shaft 32 for roller 30 extends through the side of tray 12 and

also mounts a pulley 76. An endless neoprene or other suitable type O-ring 78 extends between the pulleys so that upon rotation of motor 70, roll 30 is rotated on its axis. The motor and reduction gear combination uniquely fits into the housing, and preferably the reduction gear 72 is mounted to the tray 12 on an arm 12*b* extending thereoff, as is best seen in FIG. 1. The O-ring pulley provides no motor overload when the wax or adhesive in the tray is insufficiently melted in the tank preventing rotation of roller 30. The O-ring simply slips, until the adhesive is sufficiently melted. An on-off control 82 is provided for the motor 70 on the control panel as seen in FIG. 1.

A removable plastic cover 11 is provided to removably snap onto housing 10 to cover the operable components of the apparatus and provide an uniquely attractive appearance. The cover 11 preferably is removably received over spring lug detents 11*a* and 11*b* as best seen in FIG. 3. The cover 11 also provides a tray surface 11*c* which acts as a paper guide and to facilitate feeding between the rolls 30 and 40. A separate removable cover 9 fits over the cover 11, as best seen in FIG. 3, and simply covers the cantilever arm 44 and roller 40.

As seen in FIG. 1, the right hand end of each of the rolls 30 and 40 carries intermeshing gears 90 and 92, respectively, to transfer the input rotation of roll 30 to roll 40 so that they drive in meshed relationship at the same speed. Preferably, these gears may be formed appropriately from synthetic resins such as "nylon" or the like which is of self-lubricating nature, durable and highly suitable for such purposes. Preferably, these gears 90 and 92 slidably fit over their respective shafts 32 and 42, and are locked in place as by appropriate set screws such as that indicated by 94 in FIG. 1.

It is an important feature of the invention that the arm 44 be cantilever as this in effect doubles the width capacity of the apparatus by allowing the turning of the paper end to end and passing it through the device again, or allows large envelopes, or the like to pass only a small portion at the end thereof through the cantilever portion. Also, the cantilever arm 44 is preferably cast from aluminum, and because of the intimate contact with tray 12, it also tends to heat up, and maintain the pressure roller 40 in heated condition during operation of the apparatus. Further, it should be readily understood because of the removable attachment of plates 48 and 50 journally supporting the roller 40 that the pressure roller 40 can be easily removed and cleaned in case wax or adhesive build-up occurs. The invention contemplates that a helical coiled spring 100 will be positioned between the plate or pillow block assembly 48 and the roller 40 to insure proper alignment of roller 40 with respect to roller 30 when the plates 48 and 50 have been appropriately positioned in the slots 44*a* and 44*b* of the cantilever arm 44.

Another important feature of the invention is a doctor bar 110 which is a stamped metal plate that is mounted in pivotal relationship on its ends to the sides of tray 12 by adjustable pins 112 and 114, as best seen in FIGS. 1 and 2. Preferably, the doctor bar 110 has a surface at 110a configured to cooperate with the land and groove configuration of the adhesive applying roller 30. This is best seen in FIG. 1. The pivotal mounting screws 112 and 114, naturally can adjust the lateral relationship of the doctor blade 110 with respect to roller 30 so that the mating configuration will be appropriately aligned so that proper doctor blade wiping can occur to insure a uniform and proper thickness of adhesive or wax on the surface of roller 30 as it rotates. An adjustment in the tilted or pivotal relation of doctor bar 110 as achieved by an adjustment screw 116 positioned through the right hand corner thereof, and resting upon an appropriate surface formed in tray 12 for that purpose. This is best seen with respect to FIGS. 1 and 2. Again the screw 116 is preferably plastic to prevent heat transfer and allow manual adjustment during operation.

A paper guide takeoff is formed by a stamped sheet metal plate 120 which has pickup fingers 121 formed thereon to extend into the grooves of the adhesive applying roller 30, with this also being indicated in FIGS. 1 and 3. Preferably, this plate or sheet 120 is bolted to the rear of tray 12 by appropriate screws 122 as illustrated in FIG. 3. Preferably, the holes receiving screws 122 in plate 120 are laterally slotted so as to allow some lateral adjustment of plate 120 so that the fingers 121 extending therefrom will be properly aligned with the grooves of roller 30. Also, it is an important feature of the invention that plate 120 be inclined as illustrated in FIG. 3 so as to have a low point at 124, so that any wax or adhesive which tends to come off onto the plate as paper or the like is passed through the machine, will tend to be heated and as a liquid run off the edges of the plate 120 back into the reservoir of tray 12. The plate 120 will preferably be aluminum, and because of its direct attachment by bolts 122 to tray 12, it will tend to remain heated and thus maintain the wax or adhesive in a liquid condition as it drips off into the low point 124. Naturally, it should be understood that the purpose of the finger portion 121 of plate 120 is to prevent wrap around of the material passing between rollers 30 and 40, and force it on out through the apparatus to complete the adhesive application to the paper or the like. The web pickup fingers 121 of plate 120, unlike wire means or individual means, form a part of a total stamped metal part to assure proper flow of the web from the top and bottom rollers.

FIG. 4 illustrates the electrical circuit which includes the toggle or on-off switch 82 and, possibly foot switch 130 which is illustrated as mounted to the back of case 10, and seen in FIG. 1, the thermostat 22, motor 70, heater 20, and pilot light 24. Some type of circuit board or terminal block 140 appropriately mounted to the inside or bottom of housing 10 and making the proper interconnection between the units as is readily apparent to anyone skilled in the art completes the operability of the apparatus.

Referring now to FIGS. 6–9 a second embodiment of the adhesive applying machine of the present invention will now be described. As in the previous embodiment there is provided an open top tray 13 which is suitably heated for containing a quantity of adhesive in a molten state. The adhesive applying roll 15 which has alternate lands 17 and grooves 19 and the pressure roll 23 are carried by a subframe 27 which is removably positioned in the tray 13. The subframe 27 has an end plate 29 in which the end shafts 31 of the transfer roll 23 are journaled. A plate 33 carried at the upper end of the end plate 29 journals one end shaft 35 of the pressure roll 23. The subframe 29 also includes a lower portion 25 which extends the length of the transfer roll 15 to a lower end plate 37 in which is journaled the opposite end the shaft 31*a*. A cantilever arm 39 extends from the

upper end of the end plate **29** to the opposite end of the rolls and carries a second plate **33** which journals the opposite end shaft **35a** of the pressure roll. The subframe assembly is received within the tray **13**, notches being provided on opposite sides of the tray for the transfer roll shafts **31** and **31*a***. A pair of pins **41** projecting from opposite ends of the subframe **27** are received in notches **43** in the opposite sides of the tray **13** to provide two support points for the subframe assembly. A foot **45** projects from the lower end of the subframe **27** to contact the bottom wall of the tray **13** providing a third support point for the sub assembly.

A doctor blade **47** is provided for wiping the faces of the lands **17** to control the amount of adhesive carried by the roll **15**. The doctor blade **47** is supported on the lower cross member **25** of the subframe **27**, being adjustably mounted by means of the screw **49** and spring **51**. A rod **53** which extends between the end plates **29** and **37** of the subframe **27**, parallel to the shaft **31**, mounts a plurality of bent wire members **55**, one wire member being provided for each groove **19** of the transfer roll **15**. The configuration of each of the wire members **55** is shown clearly in FIG. **8**. Each of the wire members has a lower portion **57** which extends forwardly from the mounting bar or rod **53** across the bottom of the transfer roll **51**, and upwardly extending portion **59** at the forward end of the lower portion **57**, and an end portion **61** which projects into the groove **19** between adjacent lands **17** of the transfer roll **15**. This inwardly bent end portion **61** serves to prevent the accumulation of excessive adhesive in the grooves **19** of the transfer roll **15**. The wire member **55** also has an upwardly extending portion **63** located on the opposite side of the roll **15** from the portion **59** which terminates at an end portion **63*a*** extending forwardly into the grooves **19** of the transfer roll **15** near the top of the roll and on the rear side thereof. These finger portions **63*a*** serve to strip the sheet to which the adhesive is being applied from the roll, preventing its being drawn downwardly into the adhesive. It should be noted that the lower end of the doctor blade **47** and the lower portion **57** of the wire member **55** are both below the level of the adhesive **65** so that both the doctor blade **47** and the wire member **55** are heated by the molten adhesive to prevent the accumulation of semi-solidified adhesive on the upper ends of these members.

FIG. **9** illustrates the construction of the upper roll journal plates **29**. A pin **67** carried on an upwardly projecting portion **29*a*** of the end plate **29** of the subframe **27** engages an upwardly opening notch **69** adjacent one end of the bearing support plate **33**. A screw **71** is threaded through the opposite end of the bearing support plate **33** to engage the end plate **29**, providing for the adjustful positioning of the end of the plate **33** to control the separation between the roll **23** and the roll **15**.

Each of the embodiments described operates in the same manner. When the adhesive in the tray **12** has been melted by the heating element **20** and the control switch **82** closed, the motor **70** reducer **72**, pulleys **74** and **76**, and belt **78**. The upper a pressure roll **40** is driven in unison with the transfer roll **30** through the meshing gears **90** and **92**. The sheet of paper or other article to which adhesive is to be applied is placed on the flat upper surface of the cover **11** with the side of the article to be coated downward. As the paper or other article is fed into the bite between the transfer roll **30** and the pressure roll **40**, the rolls grip the article to pull it through. The transfer roll **30** has acquired a coating of molten adhesive on the circumferential surface of the lands as these surfaces pass through the adhesive in the lower portion of the tray **12**. This adhesive coating is transferred to the lower surface of the article as the article passes between the rolls **30** and **40**.

Thus, it should be understood that the apparatus of the invention by offering a unique cantilever arm, adjustability of doctor bar and takeoff fingers, an all aluminum adhesive tank with good heat conduction properties, and a plastic casing provides an adhesive applying apparatus which is simple, highly effective, and yet extremely inexpensive.

One of the good features of the apparatus described above is that it is a space saver, because of the cantilevered arm. This allows extremely large posters, papers, or the like to be passed through, large sheets can be "framed" with adhesive which other waxers cannot do because of their limited width capacities. The plastic housing **10** and covers **9** and **11** provide an insulation feature to actually make the apparatus very cool in operation.

While only a preferred embodiment of the operation has been illustrated and described in detail, it is to be particularly understood that the invention is not limited thereto or thereby, but that the inventive scope is defined in the appended claims:

What is claimed is:

1. Apparatus for applying an adhesive coating to one surface of a sheet of material, comprising:

a tank for holding a quantity of adhesive in liquid form;

a frame positioned within the tank and having a first end plate adjacent one side wall of the tank, a second end plate adjacent the opposite side wall of the tank, an intermediate portion connecting the first and second end plates, and an arm portion extending from the upper end of the first end plate in parallel relation to the intermediate portion;

an adhesive transfer roll journalled at its opposite ends in the first and second end plates, the lower portion of the roll extending into the adhesive;

a pressure roll journalled at one end in the first end plate and at its opposite end in the free end of the arm portion of the frame, the pressure roll being parallel to the transfer roll and operative to press a sheet of material passing between the pressure and transfer rolls into contact with the transfer roll; and

means for rotating the transfer roll.

2. Adhesive coating applying apparatus according to claim **1** wherein the transfer roll has alternate raised lands and recessed grooves, the apparatus including first means projecting into the grooves of the transfer roll to prevent excessive accumulation of adhesive in the grooves and second means also projecting into the grooves of the transfer roll to prevent wrapping of the sheet of material around the transfer roll.

3. Apparatus according to claim **2** where the first and second means include a plurality of bent wire members, one member being provided for each groove of the adhesive applying roller and each member having a first upwardly projecting portion terminating in an end portion projecting into the corresponding groove on one side of the roller and a second upwardly projecting portion terminating in an end portion projecting into the

corresponding groove on the opposite side of the roller the second portion serving as the means to prevent wrapping of the sheet around the adhesive applying roller.

4. Adhesive coating applying apparatus according to claim 2 wherein the first and second means comprise opposite end portions of wire members, one member being provided for each groove of the transfer roll, each wire member having intermediate portions extending downwardly from the end portions and below the transfer roll, a support member being carried by the frame and engaging each wire member to hold the wire members in aligned relationship.

5. Adhesive coating applying apparatus according to claim 4 further including a doctor bar adjustably carried by the frame for controlling the amount of adhesive carried by the lands of the transfer roll, the doctor bar being located closely adjacent the ends of the wire members comprising the first means.

6. Apparatus according to claim 5 where the lower end of the doctor bar and a lower portion of the wire members extend below the level of the adhesive in the tank so both are heated by the heated molten adhesive.

7. Adhesive coating applying apparatus according to claim 1 wherein the ends of the pressure roll are journalled in support plates which extend transversely of the axis of the pressure roll, the first ends of the support plates pivotally engaging pins carried by the first end plate and the free end of the arm portion of the frame, adjustment means being provided at the opposite ends of the support plates to permit adjustment of the position of the pressure roll relative to the transfer roll.

8. Apparatus according to claim 1 which includes a plastic housing mounting the tank, and surrounding all other components to provide a protective and insulating shield to the apparatus.

9. Apparatus according to claim 1 which includes a sheet heater intimately attached to the tank, and a variable thermostat control to effect actuation and control of the heater.

10. Apparatus according to claim 9 where the tank is made from cast aluminum with excellent heat conduction properties.

* * * * *