March 14, 1950 H. C. RATHKE 2,500,569

MACHINE FOR APPLYING A LIQUID COATING

Filed Jan. 3, 1947 2 Sheets-Sheet 1

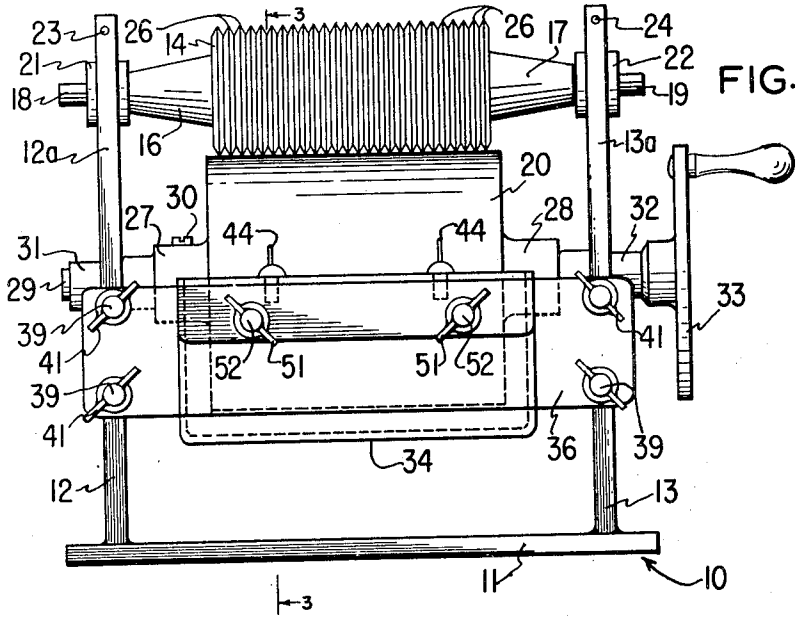


FIG. 1

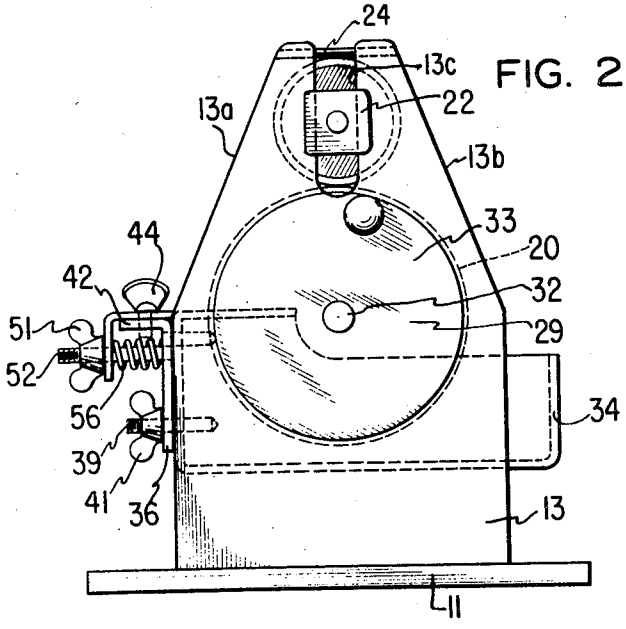


FIG. 2

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MACHINE FOR APPLYING A LIQUID COATING

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FIG. 3

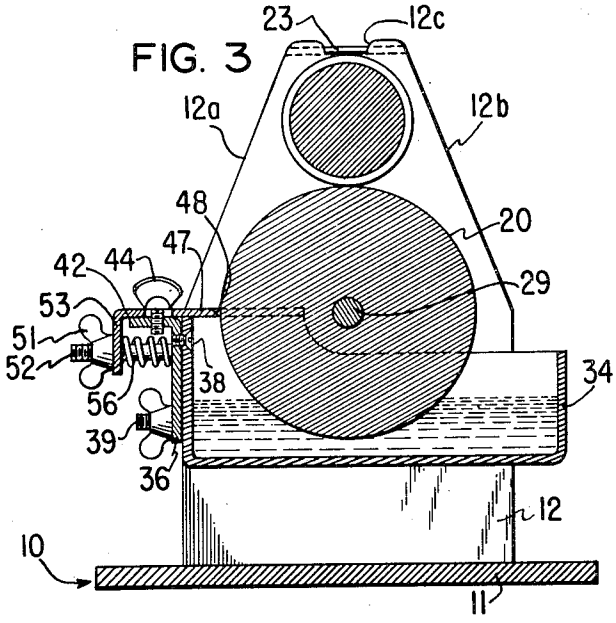


FIG. 4

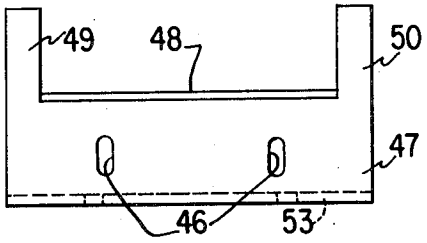


FIG. 5

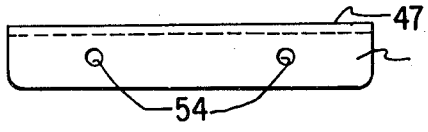


FIG. 6

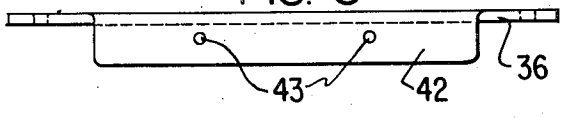


FIG. 7

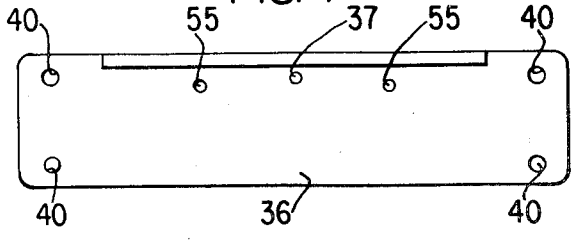


FIG. 8

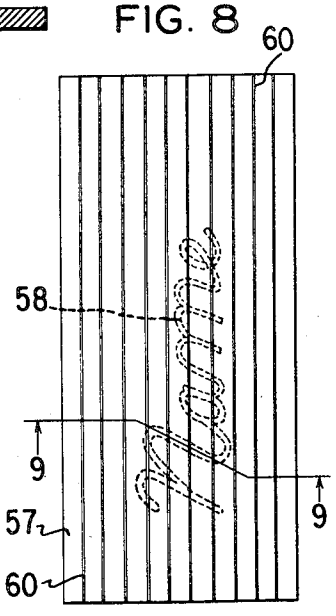
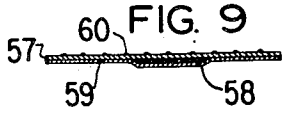


FIG. 9



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UNITED STATES PATENT OFFICE

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MACHINE FOR APPLYING A LIQUID COATING

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Application January 3, 1947, Serial No. 719,953

1 Claim. (Cl. 91—51)

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This invention relates to an applicator or machine for applying a coating of liquid to but one side of a sheet or other like article, and more particularly to a machine for readily applying an even, solid coating of liquid adhesive material to only the decalcomania side of of a decalcomania bearing strip or sheet.

It has long been recognized that the hand application of a coating of liquid, such as an adhesive material or a solvent, to the surface of a sheet or the like is relatively unsatisfactory because of the slowness of the operation and because of the inability to apply the coating solidly and evenly over the entire surface desired to be coated. Where the sheet to which the liquid coating has been attempted to be applied was a strip bearing a decalcomania secured to one surface thereof, it was found that oftentimes the operator in brushing a quantity of adhesive on the decalcomania side of the sheet and hence on the exposed surface of the decalcomania, failed to apply the coating evenly so that the coating was either too thick or too thin to effect proper adherence of the decalcomania to the surface to which it was to be affixed. In fact, in some instances, there were areas on the decalcomania which, through inadvertence and carelessness, were not touched by the brush and were totally devoid of any coating whatsoever.

In an effort to provide some mechanical means for readily and quickly applying such a liquid to a surface of a sheet in an even and solid coating, some attempts have been made in the way of devices comprising brushes, rollers, plates and the like in various combinations. These devices, however, proved for the most part to be relatively unsuccessful and hence unacceptable because of the fact that the liquid that was desired to be applied to or coated on but one surface of a sheet or strip also became applied thereby either as a solid coating or over large areas to the other or back surface where it was not needed and wholly undesirable. Because of the inherent nature of those devices, the undesirable coating on the back side of the sheet was unavoidable. It was particularly important in coating the decalcomania side of a strip that the adhesive material be kept off the reverse side thereof as a coating or as a deposit over a large area. If too much of such adhesive material was permitted to be applied or coated on the reverse side of the decalcomania strip, portions or all of the body of the strip between the two coatings were effectively sealed off, and thus when water was applied to the back of the strip in order to loosen the decalcomania from the front surface thereof, it was unable to penetrate through the back coating to the strip and therethrough to the decalcomania.

It is, therefore, one of the objects of the present invention to provide a machine or device of simple, inexpensive construction for applying a liquid material in a solid, even coating to but one side of a sheet.

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Another object of the present invention is to vide a machine or device for applying a liquid material in an even, solid coating to but one side of a sheet and to control and limit the deposits of said liquid material on the reverse side of said sheet and to space said deposits apart to prevent the material from sealing off all or a large area of said sheet.

Still another object of the invention is to provide a machine for applying a liquid material, such as an adhesive, in an even and solid coating to but one side of a sheet or the like, comprising a plurality of rollers between which the sheet may be passed upon rotation of the rollers, one of the rollers having a surface adapted to be engaged by said one surface of the sheet and to carry a quantity of the liquid material, and the other of the rollers having a plurality of spaced, annular and sharp-edged ribs adapted to engage the other surface of said sheet.

A further object of the invention is to provide a machine for applying an adhesive in an even, solid coating to but one side of a sheet or strip bearing a decalcomania comprising a coating roller and a pressure roller supported for rotation in engagement with each other and between which the sheet may be passed upon rotation of the rollers, said coating roller having a surface adapted to be engaged by one surface of the sheet and to carry a quantity of the adhesive and the pressure roller comprising a plurality of spaced, annular and sharp-edged ribs adapted to engage the other surface of the sheet, whereby any adhesive that may come off on the sharp-edged ribs from the coating roller will be deposited in thin, spaced non-sealing lines on the other surface of the sheet so that water may readily penetrate into said strip and loosen the decalcomania for application to a surface.

Further objects comprise the provision in combination with a machine of the foregoing character of a means for rotatably supporting the pressure roller for movement toward and away from the coating roller, of a means for applying a quantity of liquid or adhesive material to the coating roller, and of an adjustable means for removing the excess of said liquid from the coating roller.

Other objects and advantages of the present invention will become apparent as this description progresses, reference being had to the accompanying drawings, in which:

Figure 1 is a front elevational view of a preferred embodiment of the liquid or adhesive ap-

plying machine comprising the present invention;

Fig. 2 is a side elevational view of the same;

Fig. 3 is a vertical sectional view of the adhesive applicator taken on the line 3—3 in Fig. 1, looking in the direction of the arrows;

Fig. 4 is a detailed top plan view of the scraper plate of the machine detached therefrom;

Fig. 5 is a detailed front elevational view of the scraper plate;

Fig. 6 is a detailed top plan view of the front supporting plate for the liquid adhesive container;

Fig. 7 is a detailed front elevational view of the container supporting plate;

Fig. 8 is a top plan view of the back side of a paper strip or sheet bearing a decalcomania, after the strip has been passed through the adhesive applicator comprising the present invention, thereby being thoroughly and evenly coated with adhesive on its front side and being provided with only thin, narrow and spaced lines of adhesive on its rear or reverse side; and

Fig. 9 is a vertical sectional view of the decalcomania strip taken on the line 9—9 of Fig. 8.

The component parts of the preferred embodiment of the liquid coating machine comprising the present invention may be comprised of various kinds of materials, although a machine composed of aluminum and brass has been found to be quite satisfactory from the standpoint of cost of production, ease of operation and its ability to resist corrosion or surface alteration which might result from the use of various types of cements, glues, solvents and the like. Hereinafter, the liquid coating machine comprising the present invention will be described in connection with the application of a liquid adhesive material to a paper strip or sheet carrying a decalcomania, although it is to be understood that the applicator may be utilized for other purposes where it is desired to thoroughly and evenly apply a liquid to one side of other types of sheets or other similar articles and to restrict to a minimum and control the deposit of the amount of liquid that may be applied to the other or reverse side of the sheet or article. The liquid that may be coated on the various articles or sheets may comprise not only an adhesive such as glue or cement but also a solvent, a dye, water or other various classes of liquids.

As shown more particularly in Figs. 1 to 3, inclusive, of the drawings, the adhesive applicator or coater is provided with a supporting frame 10 comprising a flat, horizontal base plate 11 and upstanding side plates 12 and 13 that may be secured to, or formed integrally with, the base 11 adjacent its side edges. The side plates 12 and 13 are identical in construction and of the same dimensions, and their upper front and back edges 12*a* and 12*b* and 13*a* and 13*b*, respectively, are tapered or inclined upwardly toward each other. The side plates 12 and 13 are also provided with vertical and relatively wide slots 12*c* and 13*c*, respectively, which extend downwardly a limited extent from the upper central edges of the side plates. As shown in the drawings, the side plates 12 and 13 and the slots 12*c* and 13*c* thereof are in alignment and they are adapted to support therebetween most of the component parts of the applicator.

A solid pressure roller 14 having integral hub portions 16 and 17 and integral stub shafts 18 and 19, respectively, at its respective ends is rotatably supported in the vertical slots 12*c* and 13*c* of the side plates and it is adapted to rotate

and bear downwardly against a larger coating roller 20 also rotatably supported by and between the side plates 12 and 13. The integral stub shafts 18 and 19 at the respective ends of the pressure roller 14 are each journaled for free rotative movement in slidable bearing blocks 21 and 22 supported for vertical sliding movement in the slots 12*c* and 13*c*, respectively, the bearing blocks 21 and 22 each being provided with vertical grooves in their respective front and rear faces into which are received the vertical side edges of the slots 12*c* and 13*c*, respectively. The pressure roller 14 may thus be readily mounted in operable position between the side plates 12 and 13 by placing the bearing blocks 21 and 22 over the stub shafts 18 and 19, respectively, and then sliding the bearing blocks 21 and 22, with the pressure roller 14 therebetween, downwardly in the side plate slots 12*c* and 13*c*, the extent to which the bearing blocks 21 and 22 may slide downwardly in the slots 12*c* and 13*c* being limited by engagement of the ribbed central portion of the pressure roller 14 with the large coating roller 20.

After the slidable bearing blocks 21 and 22 have moved downwardly to their extreme lowered position with the rollers 14 and 20 in rotatable engagement, the upper ends of the slots 12*c* and 13*c* may be closed by pins 23 and 24, respectively, which are secured in and extend between the upper bifurcations of the side plates 12 and 13. It is to be noted that when the rollers 14 and 20 are in engagement and the bearing blocks 21 and 22 are in their lowermost position, the pins 23 and 24 are spaced vertically from the upper surfaces of the bearing blocks. This construction serves to permit the pressure roller 14 to move away from the coating roller 20 to a limited extent equal to the thickness of the strip of decalcomania paper or other article being passed between the roller, the bearing blocks 21 and 22 being freely slidable upwardly as well as downwardly and thus maintaining a constant desired pressure on the coating roller 20 and the strip being coated. The pins 23 and 24 act to prevent the bearing blocks 21 and 22 from coming out of the slots 12*c* and 13*c* altogether during handling of the applicator by the operator, particularly when it is being cleaned, such as by immersion in a solvent.

As clearly shown in Figs. 1 to 3 of the drawings, the main central portion of the pressure roller 14 is formed with a plurality of sharp-edged annular ribs 26 which are of the same height and extend from one end of the main central portion of the pressure roller 14 to the other. It is to be noted that only the sharp edges of the ribs 26 of the pressure roller 14 engage the smooth, even surface of the larger coating roller 20, thus reducing the overall area of contact between the two rollers and providing only fine line contacts therebetween at regular spaced points. Thus, when a strip bearing a decalcomania is inserted and passed through the machine between the two rollers 14 and 20, the pressure roller 14 will engage the back surface of the strip at regularly spaced points and the contact therewith will be along fine lines only as the strip progresses through the machine.

The coating roller 20 is provided with projecting hub portions 27 and 28 at its respective ends and it is secured to a rotatable shaft 29 for rotation therewith by means of a set screw 30 in the hub portion 27, the shaft 29 passing through the roller 20. The respective ends of the shaft

29 are journaled for rotative movement in bearing members 31 and 32 secured in openings extending through the side plates 12 and 13, respectively. On the extreme right end of the shaft 29 extending beyond the side plate 13 there is secured a handwheel 33 which is adapted to be rotated manually by the operator to effect rotation of the coating roller 20 and consequent rotation of the pressure roller 14 when a decalcomania strip is being fed through the applicator.

The lower portion of the coating roller 20 rotates within an open-topped, rectangular box or container 34 in which may be contained a liquid cement or glue of sufficient depth as to cause the roller 20, when it rotates therethrough, to pick up on its outer smooth surface a quantity of the cement or glue. The container 34 is supported in operable position under the roller 20 by an elongated rectangular supporting plate 36 (Figs. 6 and 7) having a hole 37 coinciding with a hole in the upper portion of the front wall of the container 34 through which a screw 38 extends and secures the two elements together. The supporting plate 36 is mounted on four spaced studs 39 which extend through plate openings 40 positioned adjacent the four corners thereof. The studs 39 are threaded at each of their ends, the rearward ends being received in threaded openings in the front edge faces of the upstanding side plates 12 and 13 and the forward ends thereof being threadedly engaged with wing nuts 41, which, when tightened down, serve to clamp the supporting plate 36 in elevated position against the front edge faces of the side plates 12 and 13 and thus firmly hold the adhesive container in operable elevated position under the coating roller 20.

The rectangular box-supporting plate 36 is also formed with a flange 42 extending forwardly and outwardly from the upper portion of the plate 36, this flange being provided with spaced threaded holes 43 adapted to threadedly receive set screws 44 projecting downwardly through rearwardly extending spaced slots 46 (Figs. 3 and 4) in a scraper plate 47. The scraper plate 47 is provided with a beveled portion comprising a rearwardly directed scraping blade 48 positioned adjacent the coating roller 20 to scrape the excess adhesive liquid therefrom. Arms 49 and 50 extend rearwardly along the left and right sides of the scraper plate 47, these arms and a portion of the plate proper being supported on the top edges of the front wall and the forward portions of the side walls of the adhesive container 34. The forwardly directed flange 42 of the rectangular supporting plate 36 also serves to support the forward end of the scraper plate 47 which, by means of the slots 46, may be moved forwardly away from or rearwardly toward the coating roller 20 depending upon the thickness of the adhesive coating desired to be carried on the roller 20 and applied to a sheet. In order to afford a fine adjustment of the scraper blade 48 with respect to the roller 20, there are provided adjusting means comprising wing nuts 51 threadedly supported on the forward threaded ends of studs 52 and adapted to bear against the outer face of a flange 53 depending from the forward portion of the scraper plate 47. The depending flange 53 is provided with spaced holes 54 through which the studs 52 project rearwardly so that their rearward threaded ends are received in spaced threaded openings 55 of the container supporting plate 36. The scraper plate 47 is constantly urged forwardly by springs 56 which encircle the studs 52 and are compressed between the rear vertical face of the depending flange 53 and the supporting plate 36.

Thus, by means of the foregoing arrangement of parts, movement of the scraper blade 48 toward or away from the coating roller 20 may be readily accomplished by turning the wing nuts 51 when the set screws 44 are loosened to permit such movement. After the desired adjustment has been made, the set screws 44 may then be tightened down to prevent further forward or rearward movement of the scraper plate 47.

In Figs. 8 and 9 of the drawings there is illustrated somewhat diagrammatically and on an enlarged scale a paper strip or sheet 57 bearing a decalcomania 58 which may be put through the applicator comprising the present invention for the purpose of applying a liquid adhesive in a thin, even coating over the entire extent of the face side of the strip to which the decalcomania 57 is attached. This adhesive coating is indicated in the drawings by the numeral 59. As will be explained more fully hereinafter, the thin parallel lines 60 shown on the back surface of the paper strip 57 in Fig. 8 comprise thin elongated deposits of the liquid adhesive that are applied by the ribbed pressure 14 when the strip 57 is run through the applicator.

In affixing to a surface a decalcomania of the type illustrated in Figs. 8 and 9 of the drawings, the general procedure is to first coat the face side of the strip 57 and the decalcomania 58 with an adhesive material of suitable quality to insure the adherence of the decalcomania to the surface. Then the strip 57, while the adhesive is still tacky, may be placed face down with the decalcomania 58 in contact with that portion of the surface to be marked, after which the strip may be smoothed out and pressed down throughout its entire extent by a roller or other means. Then, by means of a sponge or a brush, a quantity of water is applied to the back surface or reverse side of the strip 57, the water thoroughly soaking and penetrating the strip 57 in order to loosen the bond between the decalcomania 58 and the strip 57 and to permit thereafter the removal of the strip leaving the decalcomania only in permanent adherence to the surface.

Until the advent of the present invention, the usual and most common means of applying the adhesive material to the exposed surface of the decalcomania 58 and the face side of the strip 57 comprised a brush which was dipped in a can of the adhesive and then brushed against the one side of the strip. It was found, however, that the worker, who was usually inexperienced, applied the adhesive coating rather unevenly, having too great an amount in one place on the decalcomania and in another place on its area little or none. This resulted in an imperfect bond between the decalcomania and the surface upon which it was intended to be permanently adhered and consequently all or portions of such decalcomanias cracked or peeled off. The application of the proper amount of adhesive in a uniform, smooth layer to the face side of the strip was all the more critical when the surfaces to which the decalcomanias were to be applied possessed characteristics rendering adherence of the decalcomania thereto somewhat more of a problem and requiring perfect application of the adhesive in the desired amount.

By use of the applicator shown in Figs. 1 to 7, inclusive, of the drawings, the disavantage of

manual application and of prior devices have been eliminated, and a great number of decalcomania strips 57 may be rapidly and properly coated with liquid adhesive in a minimum of time by a relatively inexperienced operator. At the outset, the operator may simply rotate the coating roller 20 by turning the hand wheel 33 so as to insure that a sufficient amount of the liquid adhesive has been picked up by the roller 20 as it turns through the adhesive material in the container 34. Any excess amount of adhesive material is scraped off the roller 20 as its surface rotates adjacent the scraping blade 48 of the scraper plate 47, the amount of adhesive permitted to remain on the roller being determined by the known characteristics of the adhesive material, the type of decalcomania and the nature of the surface to which it is being applied. Then the advance edge of the strip 57 may be inserted between the rollers 14 and 20 with the strip 57 and the exposed surface of the decalcomania 58 face down, after which the operator may again rotate the handwheel 33 to draw the strip through the machine. As the strip 57 passes through the machine, the face side of the strip and the exposed surface of the decalcomania 58 are engaged with the roller 20 and hence a coating of adhesive material carried by the roller is applied evenly and uniformly over the entire front surface of the strip and the decalcomania 58. The pressure roller 14 exerts a uniform downward pressure under its own weight against the back surface of the strip 57, thus insuring an intimate overall engagement between the strip and the adhesive-coated roller 20.

It is apparent that when the roller 20 is initially coated by its rotation in the container 34 prior to insertion of a strip 57, the pressure roller 14 is also rotated by the frictional contact therebetween, with the result that some of the adhesive material comes off the coating roller 20 and sticks to the pressure roller 14. This also occurs after a strip 57 has been coated and has passed from the machine, as above described, and as the operator continues to rotate the handwheel for at least a portion of one revolution. Thus, when a strip 57 is put through the machine between the rollers 14 and 20, some of the adhesive material comes off the pressure roller 14 and becomes deposited on the back surface of the strip. In the event the pressure roller comprised a smooth surface somewhat like the coating roller 20, the adhesive material would be deposited on the back surface of the strip 57 from the pressure roller in a substantially solid and unbroken layer so that both sides of the strip would be coated. Such a coating on the back surface of the strip 57 would tend to effectively seal that surface against the passage of water with the result that it would be impossible to loosen the strip 57 from the decalcomania 58 as above described.

To prevent the deposit of the adhesive material in an impervious layer on the reverse side of the strip 57, the pressure roller 14 has been provided, according to the teachings of the present invention, with continuous, raised and pointed annular ribs 36. Since only the sharp edges of these ribs 26 engage the adhesive-coated roller 20 and the back of the strip 57, the adhesive material that is passed to the pressure roller 14 from the coating roller 20 is deposited on the back of the strip 57 in the thin, narrow lines 60 as shown in Figs. 8 and 9 of the drawing. As these lines are spaced a substantial distance apart, they do not form an impervious seal on the back surface of the strip and hence, when water is applied to the back surface, it may readily penetrate and soak the paper so as to loosen the bond between the strip 57 and the decalcomania 58. Because of the thinness of the adhesive lines 60, the water readily and rapidly penetrates the paper beneath those lines in a diagonal direction so that the lines in no way interfere with the action of the water.

Although one form of applicator comprising the present invention has been described hereinabove, it is to be understood that changes in details of construction and operation may be made without departing from the spirit and scope of the appended claim.

I claim:

A machine for applying a liquid coating to one surface of a sheet or the like comprising a coating roller and a pressure roller supported in parallel relationship for rotation in engagement with each other and between which a sheet or the like may be passed upon rotation of said rollers, said coating roller having a surface adapted to be engaged by said one surface of the sheet and said pressure roller comprising a plurality of upstanding annular ribs adapted to engage the other surface of said sheet, means for applying a quantity of liquid to the surface of said coating roller comprising a container for said liquid supported beneath said coating roller, and adjustable means for removing an excess of said quantity of liquid from said coating roller prior to engagement with said one surface of the sheet, said means comprising a scraping member slidably supported on the top edges of said container and having a scraping edge adjacent the coating roller, side arms projecting rearwardly from said scraping edge and supported on the upper side edges of the container and a front portion forwardly of the scraping edge supported on the upper front edge of said container, and a flange depending from said front portion, and means for adjusting said scraper blade toward and from said coating roller comprising a screw threaded member engaging said flange and the forward portion of the container and a spring supported on said threaded member between said flange and said container normally urging said blade away from the coating roller.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
509,213	Friedlander	Nov. 21, 1893
567,742	Galicher	Sept. 15, 1896
681,961	Flitcroft	Sept. 3, 1901
1,101,200	Leister et al.	June 23, 1914
1,144,717	McMackin	June 29, 1915
1,202,921	Trabue	Oct. 31, 1916
1,260,446	Prior	Mar. 26, 1918
1,312,481	Huneke	Aug. 5, 1919
2,157,874	Webb	May 9, 1939
2,231,748	Clement	Feb. 11, 1941