Jan. 24, 1956 C. F. SCHAEFER 2,731,945

GLUING MACHINE FOR SHEET MATERIAL

Filed March 19, 1954 2 Sheets-Sheet 1

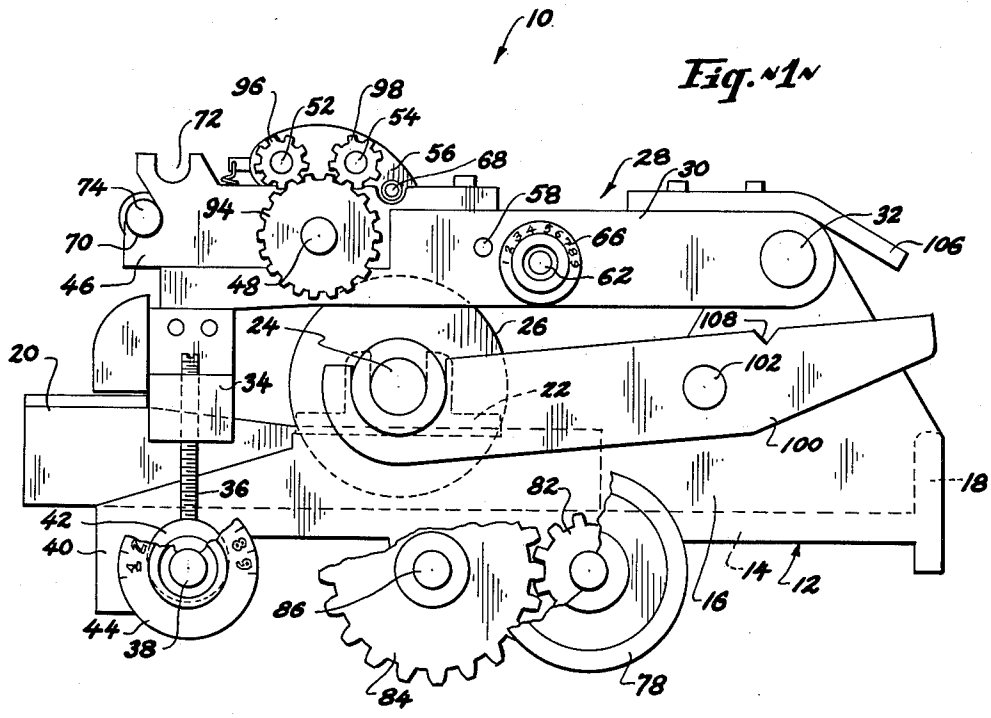


Fig. 1

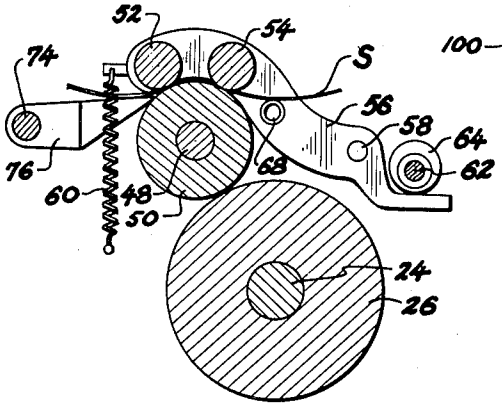


Fig. 3

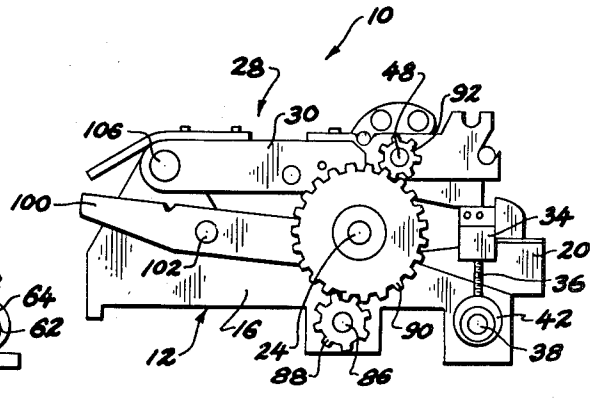


Fig. 2

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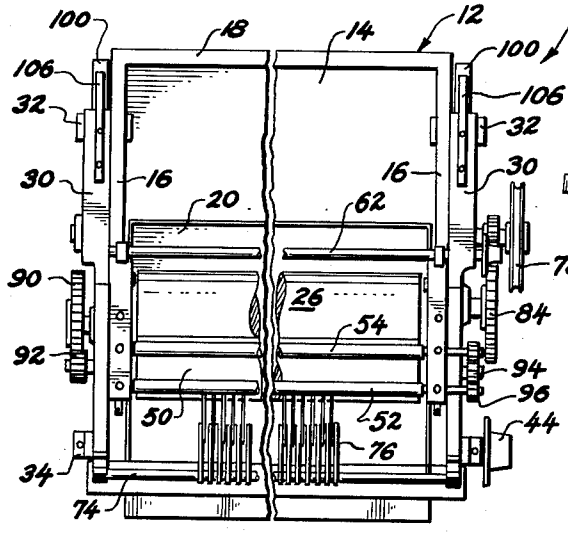


Fig. 5

Fig. 4

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GLUING MACHINE FOR SHEET MATERIAL

Charles F. Schaefer, Stratford, Conn.

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8 Claims. (Cl. 118—246)

This invention relates to improvements in gluing machines and is particularly directed to machines for applying adhesive to one face of sheets of material, for example, as disclosed in my prior Patent No. 2,506,650, issued May 9, 1950.

Heretofore, gluing machines of the described character have presented several important disadvantages in that, during cleaning of the machine, the tank roller would be removed from its bearings on the frame for cleaning and to permit withdrawal of the tank, and, in the absence of any provision on the machine for supporting the tank roller prior to re-assembly of the parts, the tank roller would be placed on a convenient surface, for example, the top of a work bench, off which it could roll and be damaged. Further, in such existing machines, adjustment of the contact between the feed rollers and the gluing roller thereof had to be effected independently at each of the opposite sides of the machine thereby increasing the time required for such adjustment.

One of the objects of the present invention is to provide a machine of the character indicated wherein the various parts are readily adjustable for proper assembly and can be easily disassembled, as for cleaning and the like, with provision being made to prevent damage to the parts during such cleaning.

Another object resides in the provision of simple and readily operable means for varying the contact or distance between the tank roller and glue roller and between the feed rollers and glue roller.

Another object resides in the provision of means whereby the glue roller and feed rollers can readily be moved out of position for inspection and cleaning of the machine without disturbing the setting or adjustment of such rollers, and whereby such movement of the gluing and feed rollers automatically raises the tank roller out of the tank containing the adhesive to permit removal of the latter from the machine and cleaning of the tank roller.

A further object is to provide a gluing machine of the described character wherein the tank roller, when automatically raised out of the adhesive tank, is removably supported in that position so that it can be separated readily from the supporting structure for thorough cleaning and then returned to the supporting structure and there held to prevent damage to the tank roller during cleaning of other parts of the machine.

In accordance with the present invention, a gluing machine of the described character includes a main frame on which the adhesive tank is slidably supported. The main frame carries upwardly opening bearings in which the ends of the tank roller are journalled so that the tank roller normally dips into the supply of adhesive in the tank and can be lifted out of the bearings for cleaning purposes. An auxiliary frame is swingably mounted on the main frame and rotatably carries a gluing roller for rolling contact with the tank roller from above. Adjustable means are provided for limiting the downward swinging movement of the auxiliary frame thereby to

control the contact between the gluing and tank rollers. A series of strippers are carried by a lateral shaft which is removably supported in suitable open bearings on the auxiliary frame so that the strippers contact the glue roller for separating sheets from the latter after adhesive has been applied to the sheets. Feed rollers are rotatably mounted in support levers which are swingably carried by the sides of the auxiliary frame, and a cam adjustment is provided for simultaneously varying the swinging positions of such supporting levers thereby to adjust the contact between the feed rollers and the gluing roller.

It is an important feature of the present invention to provide a gluing machine having the above described structural elements with tank roller lifting arms which are swingably mounted on the main frame and tilted by raising of the auxiliary frame to lift the tank roller out of the related bearings on the main frame and to hold the tank roller in an elevated position so that the adhesive tank can be removed from the main frame and the tank roller can be thoroughly cleaned.

Other objects, features and advantages of the present invention will be manifest from the following description of an illustrative embodiment and from the accompanying drawings, wherein:

Fig. 1 is a side elevational view of a gluing machine embodying the present invention, with certain of the parts being broken away and with the housing of the machine being removed to better disclose the novel features of the illustrated machine;

Fig. 2 is a side elevational view of the machine in Fig. 1 but on a smaller scale and showing the opposite side of the machine;

Fig. 3 is a detailed, vertical sectional view showing the devices included in the gluing machine of Fig. 1 for adjusting the contact between the feed rollers and the gluing roller thereof;

Fig. 4 is a side elevational view, similar to Fig. 1, but showing the parts of the machine positioned for cleaning and removal of the several rollers and the adhesive tank;

Fig. 5 is a top plan view of the machine shown in Fig. 1 but on a smaller scale.

Referring to the drawings in detail, a gluing machine embodying the present invention is there illustrated and generally identified by the reference numeral 10. Gluing machine 10 includes a rigid main frame 12 which may be mounted with a suitable casing (not shown). Frame 12 includes a bottom 14 and side walls 16 and a rear wall 18 extending upwardly from the related edges of the bottom, so that the frame 12 opens forwardly to slidably receive an adhesive tank or reservoir 20 through the open front of the frame. Upwardly opening bearings 22 are mounted upon the upper edges of the frame side walls 16 (Fig. 4) to rotatably receive the opposite end portions of a shaft 24 carrying a tank roller 26. When shaft 24 is disposed in bearings 22, tank roller 26 dips into the contents of adhesive tank 20 resting upon the bottom 14 of the frame.

An auxiliary frame is generally identified by the numeral 28 and includes two side members 30 which are pivotally mounted at their back ends on pins 32 carried by upward extensions of the frame side walls 16 so that auxiliary frame 30 is swingable relative to the main frame 12 between a substantially horizontal position (Fig. 1) and a substantially vertical, raised position (Fig. 4). Each of the side members 30 has a block 34 depending from the forward end thereof, and a support screw 36 extends threadably through each block 34 to project downwardly from the latter. An adjustment shaft 38 extends laterally below the bottom 14 of frame 12 and is rotatably journalled adjacent its opposite ends in suitable pads 40 depending from the side walls 16 of the main

frame adjacent the front of the latter. Eccentric cams 42 are fixed to shaft 38 at locations disposed outwardly of the side walls 16 of the main frame so that, when the auxiliary frame 28 is in its substantially horizontal position (Figs. 1 and 2) the support screws 36 ride upon the peripheries of the cams 42 to support the front of the auxiliary frame. A knob 44 is secured to one end of shaft 38 to provide for rotational adjustment of the latter whereby the auxiliary frame 28 may be angularly adjusted with respect to main frame 12.

Removably mounted on top of the front portion of each of the side members 30 of the auxiliary frame is a roller support member 46. The support members 46 contain suitable bearings in which the end portions of a shaft 48 are journalled, and a gluing roller 50 is mounted on shaft 48 for rolling contact with tank roller 26 adjacent the top of the latter. It is apparent that, during assembly of the gluing machine 10 adjustment of the support screws 36 with respect to the blocks 34 provides means for varying the substantially horizontal or operative position of the auxiliary frame 28 thereby to roughly establish the desired contact between tank roller 26 and gluing roller 50. After assembly, fine adjustment of the contact between the tank and gluing rollers may be achieved by rotational manipulation of shaft 38 and the cams 42 thereon.

Feed rollers 52 and 54 are arranged above gluing roller 50 to contact the upper surface of sheet S (Fig. 3) and to guide and drive the sheet over the upper portion of the surface of gluing roller 50. The opposite ends of feed rollers 52 and 54 are rotatably journalled in suitable bearings provided in feed roller support levers 56. The support levers 46 are rockably mounted at locations adjacent to, and spaced from, their rear ends on pivot pins 58 carried by the adjacent side members 30 of the auxiliary frame. Thus, rocking of the support levers 56 serves to vary the contact pressure between feed rollers 52 and 54 and gluing roller 50. In order to urge the feed rollers into contact with gluing roller 50, a spring 60 (Fig. 3) is secured to the front end of each of the support levers 56 and is anchored to the adjacent side member of the auxiliary frame. Adjustment of the contact pressure between feed rollers 52 and 54 and gluing roller 50 is effected by a laterally extending shaft 62 which is journalled adjacent its opposite ends in the side members 30 and carries eccentric cams 64 inwardly of the side members 30 to bear downwardly against the rear end portions of the related support levers 56. A knob 66 (Figs. 1 and 4) is secured at one end of shaft 62 to permit manual adjustment of shaft 62 and the cams 64 thereon for simultaneously varying the angular aspects of levers 56. In accordance with the present invention, each of the feed roller support levers 56 is provided with a third bearing 68 (Fig. 3) so that with the feed rollers disposed as shown in Fig. 3, stiff or semi-stiff materials can be correctly coated, while the roller 52 can be removed from its location as shown in Fig. 3 and supported in the bearings 68 so that the proper feed pressure will be applied for coating of thin or flexible materials.

The roller support members 46, at their forward ends, are provided with upwardly opening bearings 70 and 72 for removably receiving the opposite ends of a shaft 74 carrying a series of strippers 76 which engage the surface of gluing roller 50 to separate the coated sheets from the latter. The stripper supporting shaft 74 may be supported in either the bearings 70, as shown in the drawings, or in the bearings 72 depending upon the stiffness of the material being coated.

The several rollers are driven by an arrangement which includes a drive pulley 78 rotatably mounted upon a stub shaft 80 carried by one of the side walls 16 of the main frame and a gear 82 (Fig. 1) fixed to the pulley for rotation with the latter. The pulley 78 is suitably driven, for example, by a belt transmission from the shaft of an electric motor (not shown). Gear 82 meshes with a

relatively large spur gear 84 mounted on one end of a shaft 86 which extends laterally below the frame bottom 14 and is journalled adjacent its opposite ends in suitable pads depending from the frame. A relatively small spur gear 88 is fixed on the end of shaft 86 remote from gear 84 and meshes with a relatively large spur gear 90 (Fig. 2) which is fixed on the adjacent end of shaft 24 carrying the tank roller. Gear 90 is arranged to mesh with a gear 92 on the adjacent end of shaft 48 carrying the gluing roller when the auxiliary frame 28 is in its substantially horizontal, operative position (Fig. 2). The gears 90 and 92 are dimensioned so that the tank and gluing rollers rotate at the same peripheral speeds. Another gear 94 is fixed on the end of shaft 48 remote from gear 92 and meshes with gears 96 and 98 secured to the adjacent ends of feeding rollers 52 and 54, respectively, so that the feeding rollers are rotated at the same peripheral speeds as that of the gluing roller 50. Thus, the tank, gluing and feeding rollers are all rotated from the drive pulley 78 at the rotational speeds necessary for achieving the same peripheral speeds for all of the rollers.

In accordance with the present invention, tank roller lifting arms 100 are swingably mounted intermediate their opposite ends on pins 102 carried by the frame side walls 16 for swinging movement in vertical planes disposed immediately outside of the side walls. At their forward ends, the lifting arms 100 are formed with upwardly opening bearings 104 (Fig. 4) adapted to receive the end portions of the tank roller shaft 24 projecting beyond the bearings 22 secured to the main frame. During operation of the gluing machine 10, the tank roller lifting arms 100 are disposed as shown in Figs. 1 and 2 and shaft 24 rests upon and is supported by bearings 22. However, when auxiliary frame 28 is swung upwardly, to the position shown in Fig. 4, arms 100 may pivot about the axes of pins 102 to lift shaft 24 out of bearings 22 and thereby to elevate tank roller 26 so that the tank 20 may be removed forwardly from frame 12 with the tank roller 26 being lifted sufficiently to provide clearance therebelow for passage of the rear wall of tank 20.

Further, in accordance with the present invention, raising of the auxiliary frame 28 automatically tilts lifting arms 100 to raise or elevate the tank roller. Such automatic tilting of the lifting arms 100 is achieved by actuating members 106 extending rearwardly and downwardly from side members 30 of the auxiliary frame to bear downwardly and slide upon the upper edges of lifting arms 100 in back of the swinging axes of the latter. Thus, as auxiliary frame 28 is swingably raised, actuating members 106 bear downwardly on the rear portions of lifting arm 100 to tilt the latter in the direction lifting the tank roller shaft 24 out of its bearings 22.

Preferably, the upper edges of lifting arms 100 are formed with notches or indentations 108 which receive the ends of actuating members 106 when the auxiliary frame is in its fully raised position (Fig. 4) thereby to resist swinging of the auxiliary frame from that raised position. Since the notches 108 are substantially V-shaped, the actuating members can be freed from the notches by manually swinging the auxiliary frame from its raised position with sufficient force to cause the free ends of the actuating members 106 to cam over the inclined rear surfaces of the notches.

During normal operation of the gluing machine 10, auxiliary frame 28 is in its substantially horizontal position, as shown in Figs. 1 and 2, with the tank roller 26 dipping into the adhesive in tank 20. As tank roller 26 is rotated, it picks up adhesive from tank 20 and then transfers the adhesive to gluing roller 50, with the contact between rollers 26 and 50, and hence the thickness of the adhesive film applied to the gluing roller, being controlled by the adjustment afforded through the cams 42 engaging the support screws 36 of the auxiliary

frame. The sheet material to be coated is fed forwardly between the feed rollers **52** and **54** and the gluing roller **50** so that the latter applies the adhesive to the lower surface of the sheet material. The spring **60** and the cams **64** cooperating with the feed roller support levers **56** provide for adjustment of the pressure with which the feed rollers **52** and **54** urge the sheet material against gluing roller **50**. Following application of adhesive to the sheet material, the strippers **76** carried by shaft **74** separate the sheet material from gluing roller **50** for discharge from the gluing machine.

When it becomes necessary to clean the several parts of the machine **10**, and particularly the rollers thereof, auxiliary frame **28** is swingably raised about the pivots **32**, and the actuating members **106** tilt lifting arms **100** in response to such swinging of the auxiliary frame. The tilting movements of arms **100** raise shaft **24** of the tank roller out of its fixed bearings **22** so that the tank roller is elevated above tank **20** to provide sufficient clearance between the tank roller and the bottom **14** of the main frame for forward withdrawal of tank **20** from the frame. The tank roller **26** may then be cleaned in its elevated position on the lifting arms **100**, or the tank roller may be lifted out of the open bearings **104** of arms **100** for thorough cleaning after which it is immediately replaced on the arms where it will be safely held until such time as the machine is again placed in operation. Thus, there is no danger that the tank roller **26** will be placed upon a flat surface, for example, the top of a work bench, off which it may roll and be damaged.

Since the glue roller **50** and feed rollers **52** and **54** are raised, as a unit, by upward swinging of auxiliary frame **28**, the adjustment of the contact pressure between such rollers is not disturbed by such manipulation of the auxiliary frame for the purpose of cleaning the tank roller. Further, when the auxiliary frame is returned to its operative, substantially horizontal position, the support screws **36** again seat upon the cams **42** to reestablish the previously determined contact between gluing roller **50** and tank roller **26**.

In the event that it is desired to disassemble the gluing roller and feed rollers, as for cleaning or any other purpose, the feed roller support levers **56** can be easily removed from their respective pivots **58** on the auxiliary frame, while the roller support members **46** can be separated from the side members **30** of the auxiliary frame to facilitate removal of the gluing roller shaft **48** from its bearings.

From the foregoing, it is apparent that the gluing machine **10** embodying the present invention provides an arrangement for supporting the tank roller during cleaning of the machine to prevent damage to that roller, and further that the machine **10** includes devices which simplify the adjustments of the contact pressures between the several rollers and which permit easy assembly and disassembly of the several parts making up the machine.

While a particular embodiment of the invention has been described in detail and illustrated in the drawings, merely by way of example, it is to be understood that the invention is not limited to that particular embodiment and that various changes and modifications may be effected therein without departing from the scope or spirit of the invention as defined in the appended claims.

What I claim is:

1. A gluing machine comprising a main frame, a tank for adhesive supported on said main frame and removable from the latter, a tank roller, means rotatably supporting said tank roller on said main frame so that the tank roller normally dips into the contents of said tank, an auxiliary frame swingably mounted on said main frame and rotatably carrying a gluing roller, said auxiliary frame being swingable between an operative position in which said gluing roller contacts said tank roller and a raised, cleaning position, and means operative to lift said tank roller out of said tank in response to swinging of said auxiliary frame to its raised cleaning position and to hold the tank roller in an elevated position so that sufficient clearance is provided therebeneath to permit withdrawal of said tank from said frame.

2. A gluing machine comprising a main frame, a tank for adhesive supported on said main frame and removable from the latter, a tank roller, means rotatably supporting said tank roller on said main frame so that the tank roller normally dips into the contents of said tank, an auxiliary frame swingably mounted on said main frame and rotatably carrying a gluing roller, said auxiliary frame being swingable between an operative position in which said gluing roller contacts said tank roller and a raised, cleaning position, means operative to lift said tank roller out of said tank in response to swinging of said auxiliary frame to its raised cleaning position and to hold the tank roller in an elevated position so that sufficient clearance is provided therebeneath to permit withdrawal of said tank from said frame, two feed rollers extending parallel to said gluing roller, support levers pivoted on said auxiliary frame and rotatably carrying said feed rollers adjacent the opposite ends of the latter, so that rocking of said support levers varies the contact of the feed rollers with the gluing roller, and manually actuable for simultaneously rocking said support levers to adjust the contact between said feed rollers and said gluing roller.

3. A gluing machine comprising a main frame open at the front, a tank for adhesive supported on said main frame and removable from the latter through the open front of the frame, a tank roller, upwardly opening bearings on said main frame to rotatably support said tank roller with the latter dipping into the contents of said tanks, an auxiliary frame swingably mounted on said main frame and rotatably carrying a gluing roller, said auxiliary frame being swingable between an operative position in which said gluing roller contacts said tank roller to receive adhesive from the latter and a raised cleaning position, means operative to lift said tank roller out of said bearings, and means actuated by said auxiliary frame to effect operation of said tank roller lifting means in response to swinging of said auxiliary frame to said raised, cleaning position.

4. A gluing machine comprising a main frame open at the front, a tank for adhesive supported on said main frame and removable from the latter through the open front of the frame, a tank roller, upwardly opening bearings on said main frame to rotatably support said tank roller with the latter dipping into the contents of said tank, an auxiliary frame swingably mounted on said main frame and rotatably carrying a gluing roller, said auxiliary frame being swingable between an operative position in which said gluing roller contacts said tank roller to receive adhesive from the latter and a raised, cleaning position, lifting arms pivotally mounted on said main frame intermediate their ends to swing in vertical planes adjacent the sides of said main frame, said lifting arms having upwardly opening bearings at their forward ends to receive the opposite ends of said tank roller, and actuating members on said auxiliary frame engageable with said lifting arms in back of the swinging axes of said arms and bearing downwardly on the latter when said auxiliary frame swings to said raised, cleaning position thereby to elevate the front ends of said arms so that said bearings of the latter engage the tank roller and lift the latter out of said bearings on the main frame to provide sufficient clearance below said tank roller for withdrawal of said tank from said main frame.

5. A gluing machine comprising a main frame open at the front, a tank for adhesive supported on said main frame and removable from the latter through the open front of the frame, a tank roller, upwardly opening bear-

ings on said main frame to rotatably support said tank roller with the latter dipping into the contents of said tank, an auxiliary frame swingably mounted on said main frame and rotatably carrying a gluing roller, said auxiliary frame being swingable between an operative position in which said gluing roller contacts said tank roller to receive adhesive from the latter and a raised, cleaning position, means operative to lift said tank roller out of said bearings, means actuated by said auxiliary frame to effect operation of said tank roller lifting means in response to swinging of said auxiliary frame to said raised, cleaning position, and means on said tank roller lifting means engageable by said means actuated by said auxiliary frame when the latter is in said raised, cleaning position and operative to resist swinging of said auxiliary frame from said raised, cleaning position.

6. A gluing machine comprising a main frame open at the front, a tank for adhesive supported on said main frame and removable from the latter through the open front of the frame, a tank roller, upwardly opening bearings on said main frame to rotatably support said tank roller with the latter dipping into the contents of said tank, an auxiliary frame swingably mounted on said main frame and rotatably carrying a gluing roller, said auxiliary frame being swingable between an operative position in which said gluing roller contacts said tank roller to receive adhesive from the latter and a raised, cleaning position, lifting arms pivotally mounted on said main frame intermediate their ends to swing in vertical planes adjacent the sides of said main frame, said lifting arms having upwardly opening bearings at their forward ends to receive the opposite ends of said tank roller, and actuating members on said auxiliary frame engageable with said lifting arms in back of the swinging axes of said arms and bearing downwardly on the latter when said auxiliary frame swings to said raised, cleaning position thereby to elevate the front ends of said arms so that said bearings of the latter engage the tank roller and lift the latter out of

said bearings on the main frame to provide sufficient clearance below said tank roller for withdrawal of said tank from said main frame, said lifting arms having detents positioned to receive said actuating members when said auxiliary frame is in its raised, cleaning position thereby to resist displacement of said auxiliary frame from said cleaning position.

7. In a gluing machine having a main frame carrying a tank roller, an auxiliary frame pivoted on the main frame and a gluing roller carried by the auxiliary frame for contact with the tank roller; the combination of two spaced apart support levers pivoted on the auxiliary frame and each carrying three bearings in axial alignment with the corresponding bearings of the other of said lever, and two feed rollers removably journalled at their opposite ends in a selected two of said three bearings of the adjacent lever to provide rolling contact of said feed rollers with the gluing roller at the locations which are most desirable for the material to be coated.

8. In a gluing machine; the combination according to claim 7 further comprising means associated with said support levers to urge the latter to swing in the direction contacting said feed rollers with the gluing roller, and a laterally extending adjustment shaft rotatably carried by the auxiliary frame and having an eccentric cam fixed thereon and contacting said support levers to limit the swinging of the latter in the direction contacting said feed rollers with the gluing roller whereby angular adjustment of said shaft simultaneously varies the limits of swinging movement of said levers.

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