Jan. 2, 1945. J. H. MURCH ET AL 2,366,210

COATING MACHINE

Filed July 12, 1940 5 Sheets-Sheet 1

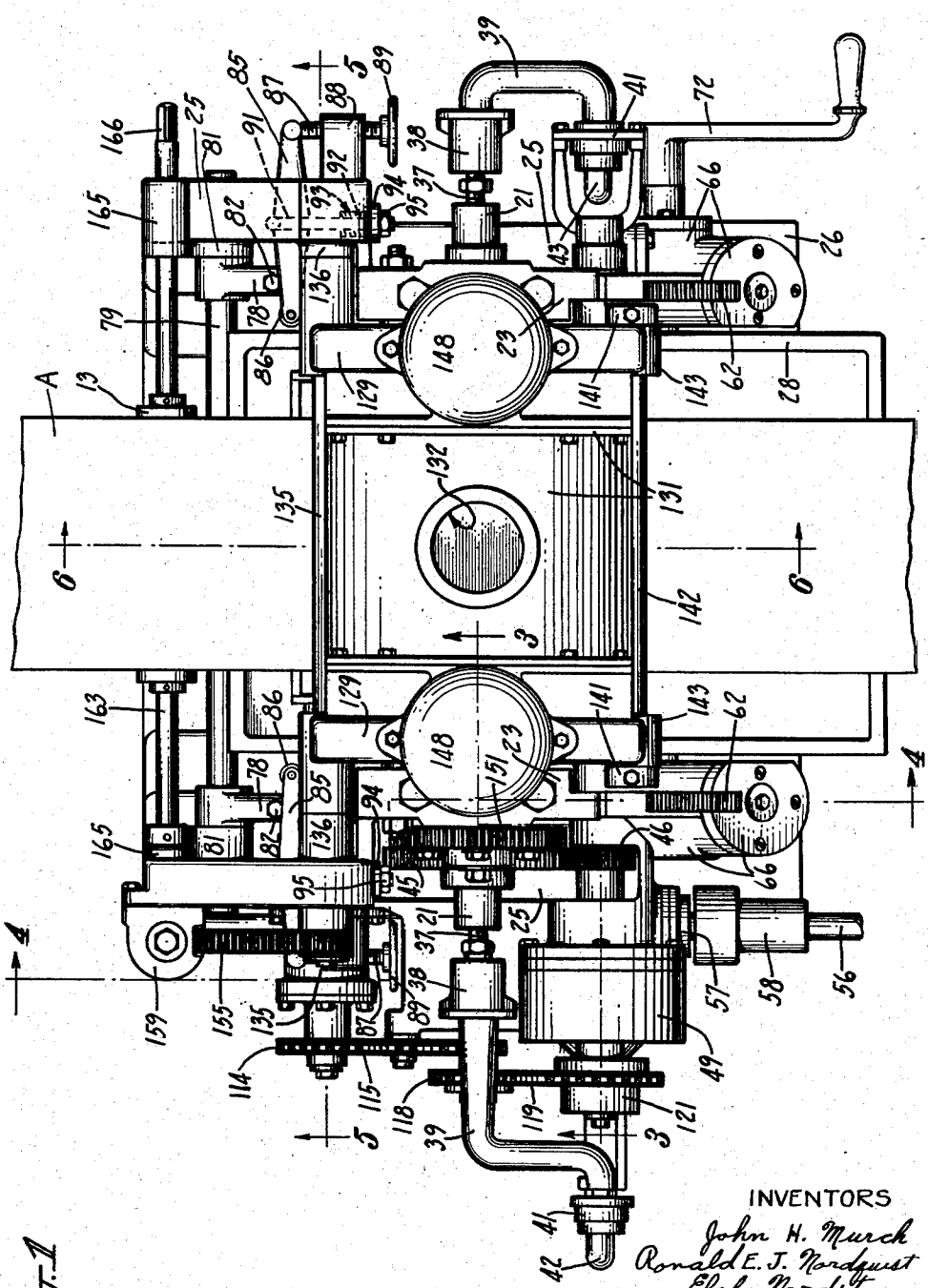


Fig. 1

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COATING MACHINE

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Fig. 2

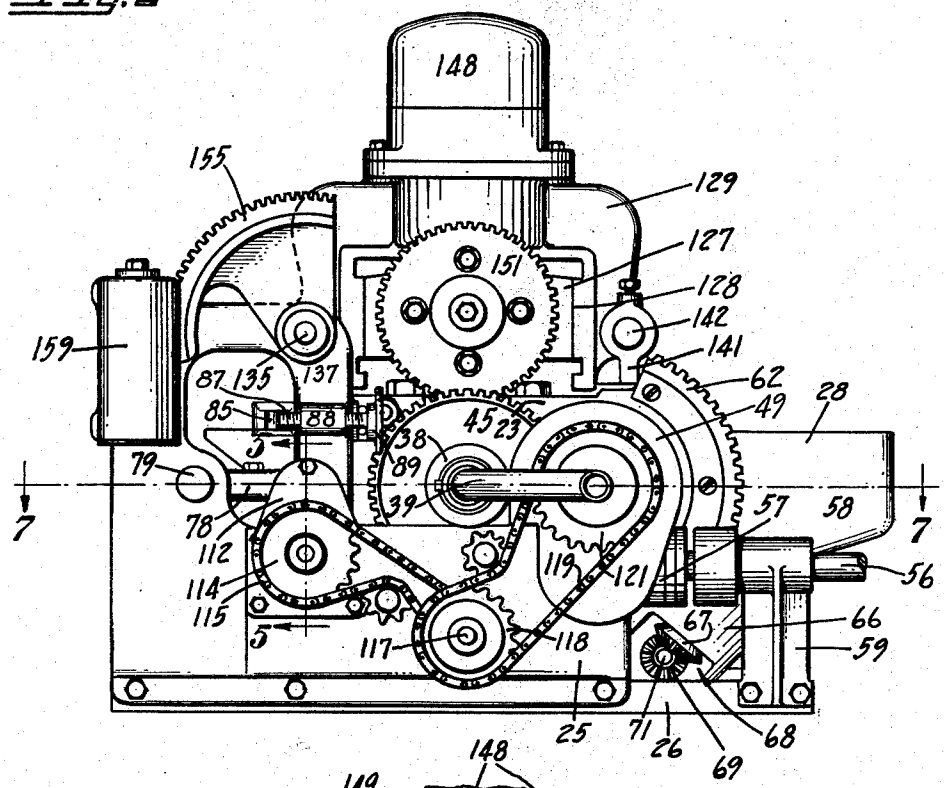
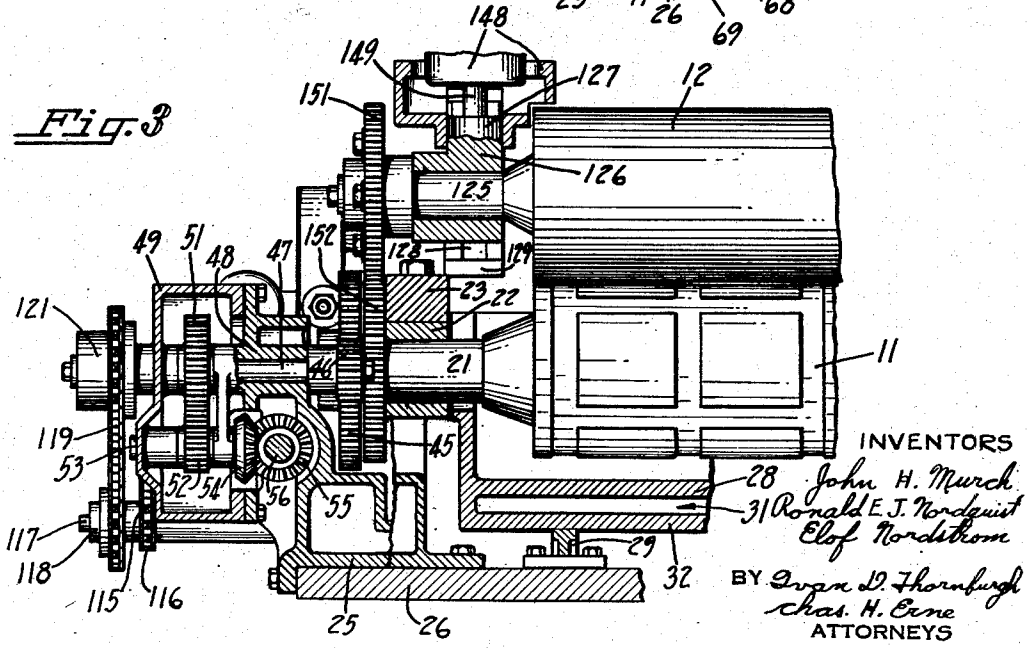


Fig. 3



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COATING MACHINE

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Fig. 4

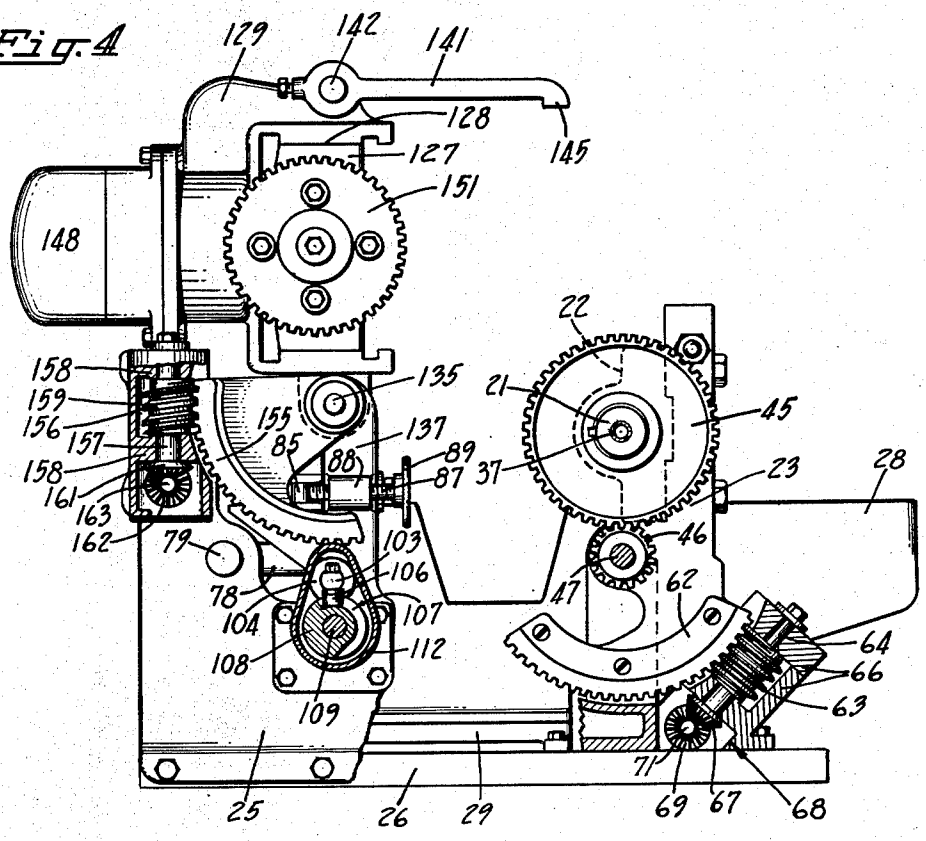
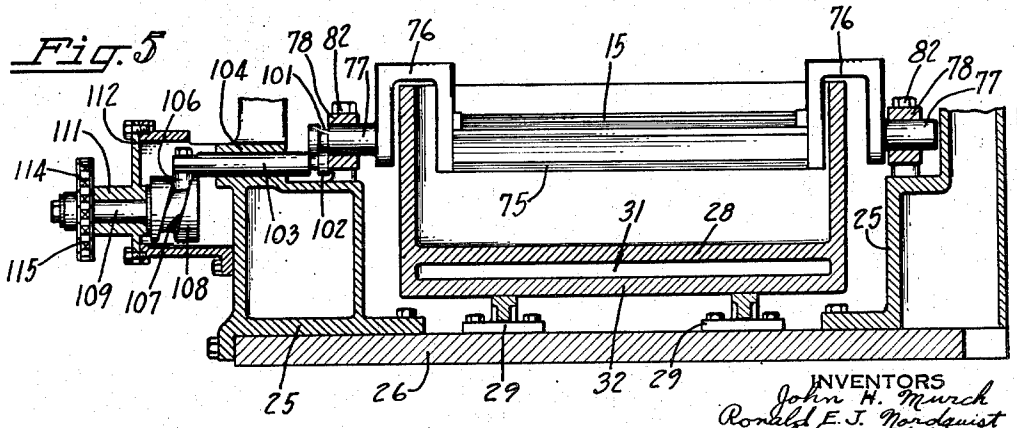


Fig. 5



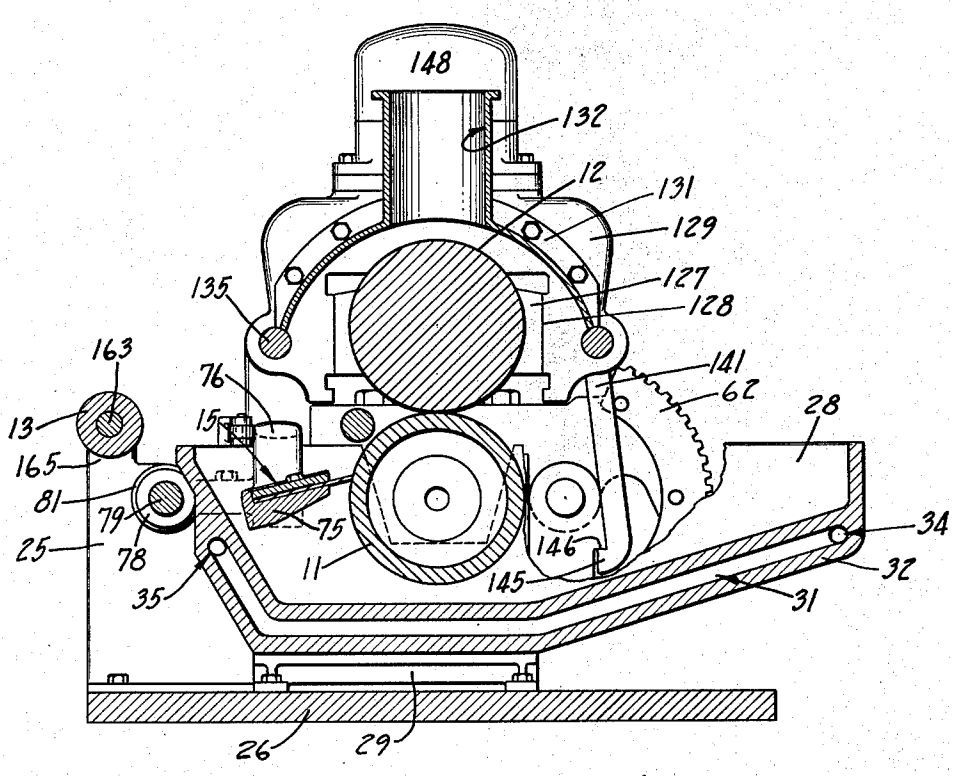
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COATING MACHINE

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Fig. 6



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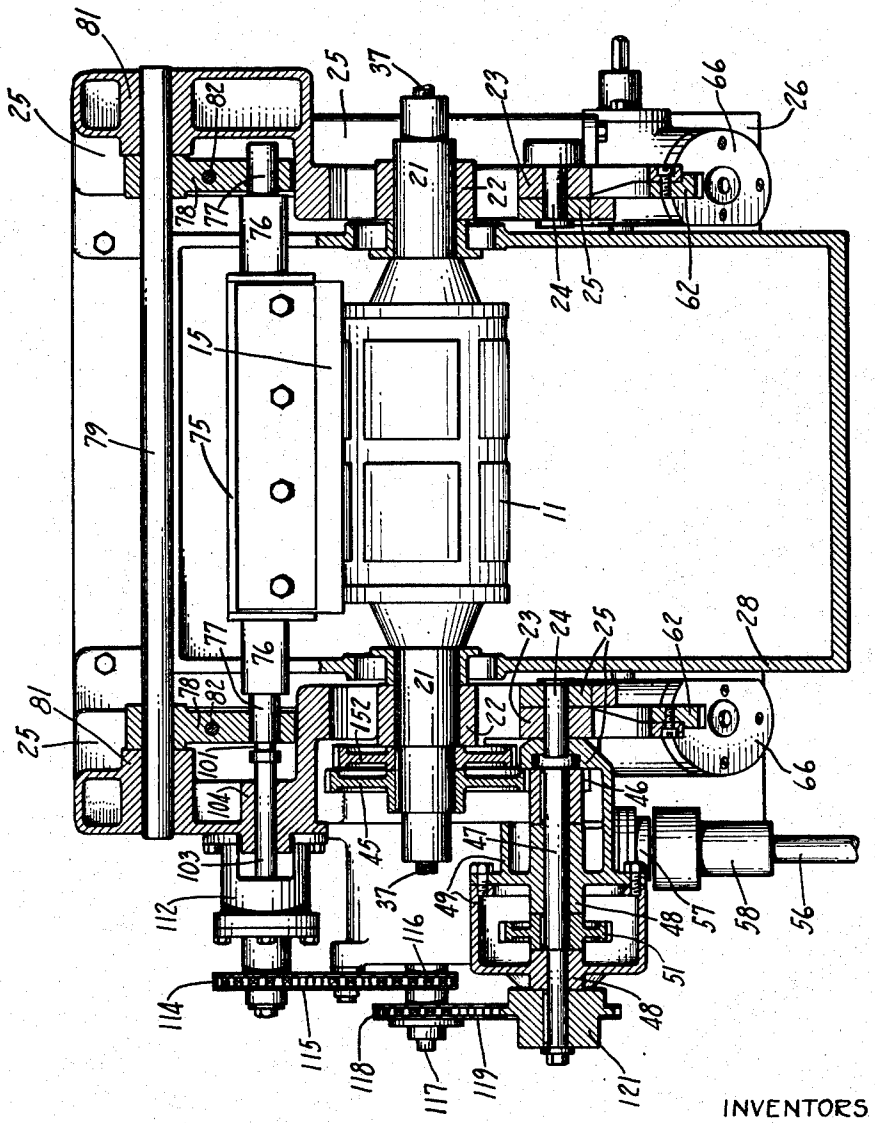


Fig. 7

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UNITED STATES PATENT OFFICE

2,366,210

COATING MACHINE

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Application July 12, 1940, Serial No. 345,232

7 Claims. (Cl. 91—51)

The present invention relates to a coating machine for applying a film of fluid coating substance to a web of material passed between a pressure roller and an applying roller operating in a bath of the coating substance and has particular reference to mountings for the rollers so that they may be independently moved free of the bath for cleaning purposes.

An object of the invention is the provision of a coating machine having a pressure roller and an applying roller between which a web of material is passed to receive a coating of a fluid substance wherein the rollers are carried in subframes which independently may be swung clear of the bath so that the rollers and the bath may be readily cleaned.

Another object is the provision of such a machine wherein the roller sub-frames are fitted with devices which may be manually operated to facilitate shifting of the rollers independently of each other into and out of operating position.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a top plan view of a machine embodying the instant invention and showing a web of material in the machine, with parts broken away;

Fig. 2 is a side elevation as viewed from the left in Fig. 1;

Fig. 3 is a fragmentary sectional view taken substantially along the broken line 3—3 in Fig. 1;

Fig. 4 is a sectional view taken substantially along the broken line 4—4 in Fig. 1, the view showing certain parts in a different position;

Fig. 5 is a transverse sectional view taken substantially along the line 5—5 in Fig. 1;

Fig. 6 is a longitudinal section taken substantially along the line 6—6 in Fig. 1; and

Fig. 7 is a plan section taken substantially along the line 7—7 in Fig. 2.

As a preferred embodiment of the invention the drawings illustrate an adhesive applying machine in which a strip A (Figs. 1 and 6) of web material, such as fibre or the like, is imprinted with a thermoplastic adhesive applied in a desired pattern as the web is advanced through the machine. The strip or web may be substantially continuous and may be fed into and away from the machine in any suitable manner.

While in the machine, the web is fed by upper and lower cooperating rollers between which the web passes. These rollers constitute an adhesive applying roller 11 (Figs. 3 and 6) and a pressure roller 12. The pressure roller 12 presses the moving web against the applying roll 11. During its travel through the machine the web is held taut by an idler roller 13.

The adhesive applying roller 11 is preferably of the intaglio type and rotates in a bath of heated thermoplastic adhesive maintained in liquid form which is picked up by the roller and is carried toward the web as the roller revolves. All of this picked-up adhesive except that contained within the pockets or intaglio recesses of the roller is scraped off by a doctor blade 15 which bears upon the periphery of the intaglio roller. It is this retained adhesive which is applied to the moving web in the pattern laid out on the surface of the intaglio roller.

The applying or intaglio roller 11 is formed with trunnions 21 (Figs. 3 and 7) which are journaled in bearing blocks 22 secured to pivotal mountings or sub-frames 23 (see also Fig. 4). There is one of these sub-frames adjacent each end of the roller and they are mounted on short pivot pins 24 carried in side frames 25 which constitute the main frame of the machine. These side frames are secured to a machine base 26.

The intaglio roll 11 rotates in the heated adhesive which is contained in an open top reservoir or receptacle 28. This receptacle is disposed between the side frames 25 and is mounted on brackets 29 secured to the machine base 26. The adhesive may be maintained in a hot fluid condition in any suitable manner, preferably by hot oil which is circulated through a heating chamber 31 enclosed by a casing 32 formed on the bottom of the receptacle.

Circulation of the oil through the heating chamber is preferably effected by way of an inlet pipe 34 and an outlet pipe 35 the machine ends of which are threaded into the casing 32. The inlet pipe 34 leads from any suitable source of the heated oil while the outlet pipe 35 may return to the oil source or may lead to any suitable place of discharge for the used oil.

The intaglio roller 11 is itself heated to facilitate maintenance of the adhesive in its fluid condition and this is preferably brought about by circulating a fluid heating medium such as hot oil through the roller. For this purpose the roller is made hollow and its trunnions are connected by short pipes 37 (Fig. 1) into stuffing boxes 38.

The stuffing boxes 38 are formed on the inner ends of angularly bent movable conduits 39 which

extend back into axial alignment with the roller sub-frame pivot pins 24 and there enter swivel connections 41 formed on the machine ends of stationary supply and return pipes 42, 43. These pipes may connect with or lead to the same source of oil and to the same place of discharge as the oil pipes 34, 35 hereinbefore mentioned.

Rotation of the intaglio roller 11 in the adhesive bath is preferably effected by a gear 45 (Figs. 1, 2, 3, 4 and 7) which is mounted on one of the roller trunnions 21. The gear meshes with and is driven by a pinion 46 which is mounted on an auxiliary drive shaft 47 journaled in bearings 48 formed in a gear casing 49 bolted to the machine main frame 25. The axis of shaft 47 is in alignment with the axis of the sub-frame pivot pins 24.

Within the casing 49 the shaft 47 carries a gear 51 (Fig. 3) which meshes with a gear 52 mounted on a short shaft 53 journaled in bearings formed in the casing. Shaft 53 carries a bevel gear 54 which meshes with and is driven by a driving bevel gear 55 mounted on a main drive shaft 56. The drive shaft is journaled in a bearing 57 in the gear casing and in a bearing 58 in a bracket 59 (Fig. 2) secured to the machine base 26. This drive shaft may be rotated in any suitable manner.

Provision is made for swinging the intaglio roller 11 upwardly out of the adhesive receptacle 28 when the machine is stopped in order to clean the receptacle and also when the roller requires such cleaning. Since these rollers are rather heavy it would be extremely difficult to handle the rollers without some such provision which includes mechanical devices for easy manual actuation so that the shifting of the roller may be under control at all times. For this purpose the roller sub-frames 23 carry segment rack gears 62 (Figs. 2, 4 and 7) which center around the pivot pins 24. There is one of these rack gears on each sub-frame.

Each rack gear meshes with a worm 63 mounted on an angularly disposed shaft 64 carried in bearings formed in a worm housing 66 secured to the machine base 26. The lower end of each shaft 64 carries a bevel gear 67 which is disposed in a recess 68 in the bottom of the worm housing. These two bevel gears mesh with similar gears 69 which are mounted on a cross-shaft 71 carried in bearings formed in the two worm housings. The shaft extends across the machine and at one end is cut away in a square shank which projects beyond the housing and which is adapted to receive a crank handle 72.

Thus by manually turning the applied crank handle 72 the cross shaft 71 and its bevel gears 69 may be rotated. Rotation of these gears revolves the gears 67, worm shafts 64 and worms 63 and hence moves the segment rack gears 62 and the sub-frames 23 on their pivot pins 24. By turning the crank handle in the proper direction the roller carried on the sub-frames may be thus raised out of the adhesive receptacle as shown in Fig. 4 where it is clear of the machine and free to work on. It may be just as easily returned to operating position within the receptacle. This roller shifting device provides quick and easy shifting of the roller and prevents removal of the roller from the machine when it is desired to gain access to the adhesive receptacle or to the roller itself.

The doctor blade 15 hereinbefore mentioned is also mounted so that it may be swung back out of the way to permit removal of the intaglio roller 11. This blade is carried in a carriage 75 (Figs. 5 and 6) which is located in the adhesive receptacle 28. At each end, the carriage merges into an inverted U-shaped arm 76 which extends up out of the adhesive receptacle, over the top, and down adjacent the outside wall of the receptacle. At the terminal outer ends, the arms are formed with trunnions 77 which are carried in the inner ends of a pair of swing arms 78. The outer ends of the swing arms are mounted on a stationary cross shaft 79 which is carried in bearings 81 in the main side frames 25 of the machine.

When the doctor blade 15 is in its normal operating position in contact with the intaglio roller 11, the swing arms 78 are held down by bolts 82 which are threaded into the machine side frames. This holds the carriage 75 against vertical movement. When it is desired to remove the carriage and blade from the adhesive receptacle, the bolts are loosened or taken out and the unit may thereupon be swung upwardly and outwardly with the swing arms 78 rocking on the cross shaft 79.

When in operating position the doctor blade 15 is held against the intaglio roller 11 by pressure adjusting devices which are located one on each side of the machine. Each of these devices includes a pressure lever 85 (Fig. 1) which carries at its inner end a roller 86. The roller bears against the adjacent U-shaped arm 76 of the carriage 75. The outer end of each pressure lever is engaged by the end of an adjusting screw 87 which is threaded into a lug 88 formed on the machine side frame 25. A hand wheel 89 is provided on each screw for turning it against its associated lever.

Intermediate the length of each pressure lever 85, a clamp rod 91 holds the lever in place in the machine side frames. Each rod is held under pressure of a compression spring 92 which is coiled around the rod in a recess 93 formed in the side frames. A washer 94 and nut 95 on each rod bear against each spring and thus yieldably hold the rod in place.

Provision is also made for shifting the doctor blade 15 longitudinally of the intaglio roller 11 as the latter rotates in the adhesive receptacle 28. This is a usual practice in adhesive applying machines. For this purpose one of the doctor blade carriage trunnions 77 is formed with a groove 101 (Fig. 5) in which operates a head 102 of a reciprocating slide 103. Such a connection between trunnion and slide is quickly detachable and provides for easy raising of the carriage out of the adhesive receptacle 28.

The slide 103 is carried in a suitable bearing 104 formed in the adjacent side frame 25. The outer end of the slide carries a cam roller 106 which operates in a cam groove 107 of a barrel cam 108. The cam is mounted on a short shaft 109 journaled in a bearing 111 in a cam housing 112 bolted to the machine side frame 25. The shaft extends beyond the bearing and carries a sprocket 114 (Figs. 1, 2, 3, 4 and 7) which is rotated by an endless chain 115. The chain is driven by a sprocket 116 carried on an idler shaft 117 journaled in suitable bearings formed in the machine side frames. The shaft 117 also carries a sprocket 118 which is driven by a chain 119. Chain 119 takes over a driving sprocket 121 carried on the auxiliary driving shaft 47 hereinbefore mentioned.

The pressure roller 12 which holds the web of fibrous material A in engagement with the intaglio roller 11 is mounted directly above the intaglio roller as best shown in Figs. 3 and 6.

This pressure roller is formed with trunnions 125 which are journaled in bearings 126 in vertically movable slides 127 carried in slideways 128 formed in sub-frames or pivotal mountings 129. There are two of these sub-frames 129, one located adjacent each machine side frame 25 and they are connected to a rigid intervening hood 131 which extends over the pressure roller. An exhaust pipe or stack 132 formed on the hood permits the escape of fumes and heat from the adhesive receptacle.

The two sub-frames 129 are carried on a pivot shaft 135 (see also Figs. 1, 2 and 4) which extends transversely of the machine. This shaft is carried in bearings 136 formed in a rib section 137 of the machine side frames 25.

When the pressure roller 12 is in operating position against the web A passing over the intaglio roller 11, as best shown in Figs. 2, 3 and 6, it is locked against displacement by a pair of latches 141 (see also Fig. 4). These latches depend from a cross bar 142 which is carried in lugs 143 formed on the sub-frames 129. The lower ends of the latches are formed with hooks 145 which engage under shoulders 146 formed on the machine side frames 25.

While in this locked position, the pressure roller 12 is forced down against the web A on the intaglio roller 11 by pressure exerted through compressed air pressure devices 148 which are located one on each side of the machine. These devices exert their pressure against stems 149, each of which is connected with an adjacent slide 127. This shifts the slides in their slideways 128 and hence presses the roller carried therein against the web A.

The pressure roller 12 is rotated in unison with the intaglio roller 11. This is brought about by a pair of meshing gears 151, 152 which are mounted on the respective roller trunnions 125, 21. Hence as the intaglio roller 11 rotates it also revolves the pressure roller 12 in time with it, and preferably at the same peripheral speed.

As in the case of the intaglio roller 11 provision is also made for swinging the pressure roller 12 out of operating position so that the intaglio roller may be removed from the machine. This swinging of the pressure roller is performed independently of the intaglio roller. For this purpose the pressure roller sub-frame pivot shaft 135 carries a segment rack gear 155 (Figs. 1, 2 and 4) which is in mesh with a worm 156 mounted on a vertical worm shaft 157 caried in bearings 158 formed in a worm housing 159. The housing is bolted to the adjacent machine side frame 25.

The lower end of the worm shaft 157 carries a bevel gear 161 which meshes with a bevel gear 162 mounted on a cross shaft 163. This cross shaft also carries the freely rotating idler roller 13 which keeps the web A taut as hereinbefore mentioned. Shaft 163 is carried in bearings 165 formed in the machine side frames 25. The free end of the shaft is formed with a square shank 166 (Fig. 1) which is adapted to receive the crank handle 72 on other operating device.

Hence when the handle 72 is applied to the shank 166 of the shaft 163, turning of the shaft rotates the gears 161, 162 and the worm 156. Rotation of these parts rocks the segment rack gear 155 and swings the shaft 135 and the pressure roller sub-frames 129 out of their normal positions. Thus by turning the crank handle 72 in the proper direction the pressure roller 12 may be lifted clear of the intaglio roller 11 as shown in Fig. 4 or may be returned to operating position as shown in Fig. 2.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

We claim:

1. A coating machine for applying thermoplastic adhesive in fluid form to web material, comprising in combination, a receptacle for holding the adhesive, heating means for maintaining the adhesive in said receptacle in a fluid condition, a rotatable intaglio roller for removing the adhesive from the receptacle and for applying it to a web of material passed over said roller, a rotatable pressure roller disposed adjacent said intaglio roller for pressing the web of material against the intaglio roller, independent movable mountings for separately supporting said rollers, independent fixed shafts for respectively supporting said intaglio and pressure roller mountings, and means for independently bodily moving said rollers with their respective mountings on said shafts independently of one another and in opposite directions into and out of operating position relative to one another and to said adhesive receptacle.

2. A coating machine for applying thermoplastic adhesive in fluid form to web material, comprising in combination, a receptacle for holding the adhesive, a rotatable intaglio roller for removing the adhesive from the receptacle and for applying it to a web of material passed over said roller, a rotatable pressure roller located adjacent said intaglio roller for pressing the web of material against the intaglio roller, pivotal mountings supporting said rollers independently of each other, a segment gear connected with each of said mountings, a worm gear having cooperation with each of said segment gears, and means for manually rotating said worm gears to shift said pivotal mountings and rollers carried thereon into and out of operating position.

3. A coating machine for applying adhesive in fluid form to web material, comprising in combination, a receptacle for holding the adhesive, a rotatable intaglio roller for removing the adhesive therefrom and for applying it to a web of material passed over said roller, a pivotal mounting supporting said roller so that it may be swung into and out of operating position relative to said receptacle, and pivotally mounted inlet and outlet conduits connecting with said roller for circulating a heating medium through the roller, said conduits being adapted to shift with said roller when it is moved into and out of operating position.

4. A coating machine for applying adhesive in fluid form to web material, comprising in combination, a receptacle for holding the adhesive, a pivotally mounted rotatable intaglio roller for removing the adhesive from said receptacle and for applying it to a web of material passed over said roller, a pivotally mounted rotatable pressure roller for pressing the web of material against said intaglio roller, means for forcing said pressure roller against said intaglio roller, and means for bodily swinging said intaglio and pressure rollers on their pivotal mountings and in opposite directions into and out of operative

position relative to each other and to said adhesive receptacle.

5. A coating machine for applying adhesive in fluid form to web material, comprising in combination, a receptacle for holding the adhesive, a rotatable intaglio roller for removing the adhesive from said receptacle and for applying it to a web of material passed over said roller, a rotatable pressure roller located adjacent said intaglio roller for pressing the web of material against said intaglio roller, fixed shafts having movable frame mountings journaled thereon for supporting said intaglio and pressure rollers independently of one another, and means for bodily and independently swinging said roller frame mountings on said shafts to bodily move said rollers in arcuate paths of travel and in opposite directions into and out of operating position relative to each other and to said adhesive receptacle.

6. A coating machine for applying thermoplastic adhesive in fluid form to web material, comprising in combination, a receptacle for holding the adhesive, a rotatable intaglio roller for removing the adhesive from the receptacle and for applying it to a web of material passed over said roller, a rotatable pressure roller disposed adjacent said intaglio roller for pressing the web of material against the intaglio roller, movable mountings supporting said rollers independently of each other, and gearing means for bodily moving each of said rollers independently of one another with their respective mountings in opposite directions in an arcuate path of travel to a position laterally of their normally operative position relative to said receptacle.

7. A coating machine for applying thermoplastic adhesive in fluid form to web material, comprising in combination, a receptacle for holding the adhesive, a rotatable intaglio roller for removing the adhesive from the receptacle and for applying it to a web of material passed over said roller, a rotatable pressure roller disposed adjacent said intaglio roller for pressing the web of material against the intaglio roller, movable mountings for independently supporting said rollers, means for bodily moving each of said rollers independently of one another and in opposite directions with their respective mountings into and out of operating position relative to said adhesive receptacle, and latch devices for holding said mountings and said rollers carried thereby against displacement when the rollers are disposed in operative position.

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