March 7, 1950 H. F. COX, JR 2,499,359

MACHINE FOR FLAKING PLASTIC MATERIAL

Filed April 1, 1946 2 Sheets-Sheet 1

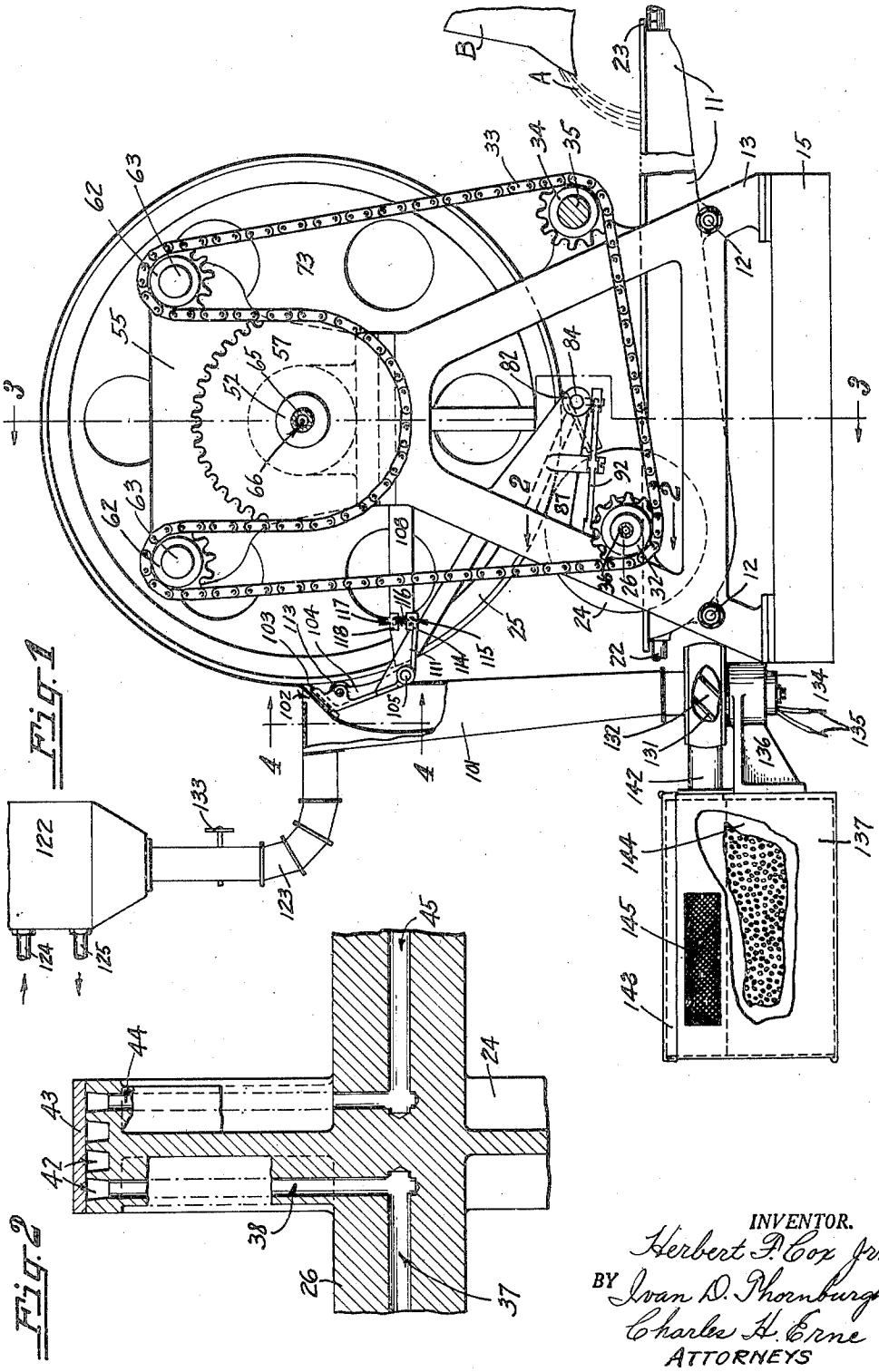


Fig. 1

Fig. 2

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Filed April 1, 1946 2 Sheets-Sheet 2

Fig. 3

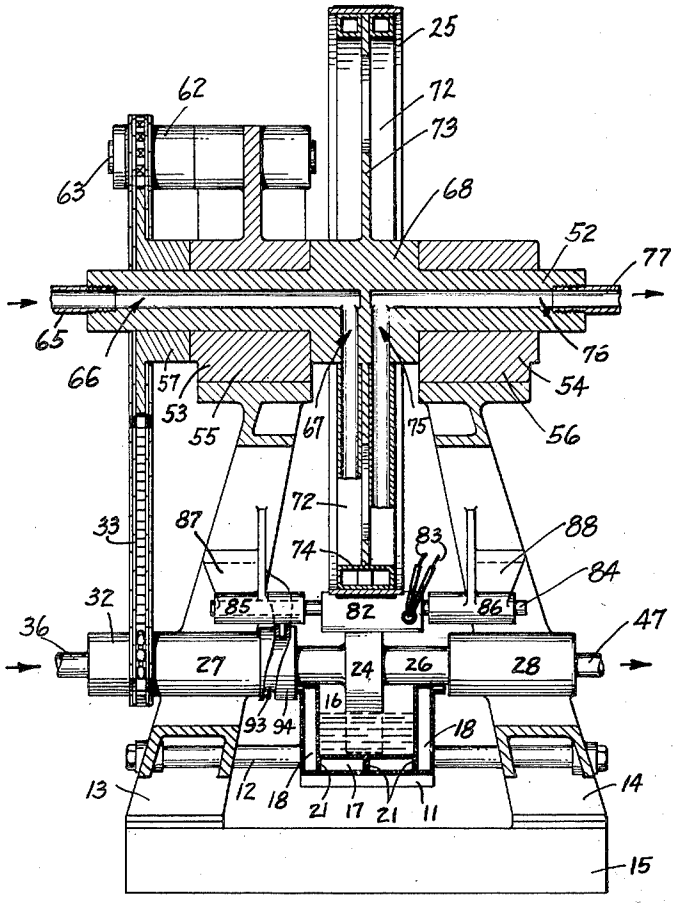
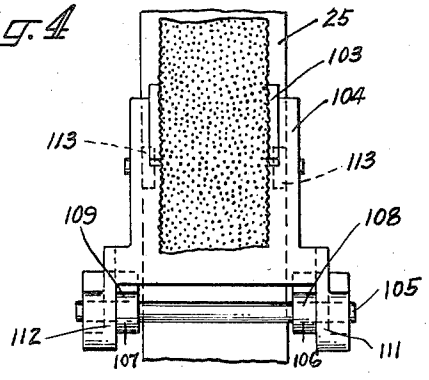


Fig. 4



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Patented Mar. 7, 1950

2,499,359

UNITED STATES PATENT OFFICE

2,499,359

MACHINE FOR FLAKING PLASTIC MATERIAL

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Application April 1, 1946, Serial No. 658,784

7 Claims. (Cl. 18—1)

1

This invention relates to treating machines for flaking plastic materials such as glue and the like and has particular reference to a machine wherein heated thermo-plastics are prepared into film or ribbon form, are cooled and solidified into a brittle state so that upon being passed into the path of flaking devices such as rotating blades are cracked and broken up into flakes which then may be collected for subsequent use.

An object of the invention is the provision of an adhesive treating machine wherein glue or the like is prepared in a flaked form so that it may be added more conveniently to glue pots of adhesive applying equipment this form being melted more rapidly without materially changing the temperature of the molten glue.

Another object of the invention is the provision of an adhesive treating machine for receiving either molten or solid thermo-plastic adhesive which is heated to a desired liquid state and cast into a thin continuous film or ribbon of adhesive which then is cooled to a brittle condition for easy breaking into flakes.

Another object of the invention is the provision in a machine of the character described, of a cooling chamber wherein a thin continuous film of thermo-plastic adhesive passes while being solidified and wherein such a film thereafter is directed into the path of a plurality of rapidly rotating fan or propeller blades which break the film adhesive into flakes for subsequent use in adhesive applying machines.

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:

Fig. 1 is a view in side elevation of a treating machine embodying the instant invention;

Figure 2 is an enlarged sectional detail view taken substantially along the line 2—2 of Fig. 1;

Fig. 3 is a vertical sectional view of the machine taken substantially along the line 3—3 in Fig. 1; and

Fig. 4 is an enlarged fragmentary view taken substantially along the line 4—4 in Fig. 1.

As a preferred embodiment of the invention the drawings illustrate a treating machine wherein molten or solid pieces of the thermo-plastic adhesive first are heated to bring them into a desider liquid state preparatory to forming the adhesive into thin flakes. A film of the liquid thermo-plastic adhesive is picked up onto the

2

peripheral surface of a rotary member such as a drum and lies thereon as a thin continuous layer or ribbon of adhesive. A doctor blade or the like then is brought to bear against the film as it advances with the peripheral surface of the drum and such a blade distributes the film uniformly and reduces it to a desired thickness. The film of adhesive gradually is cooled as it advances so that upon reaching a convenient location it becomes solidified and in such condition may be stripped readily from the drum.

A film scraper is provided to strip the film from the drum. Such a scraper preferably is located adjacent the drum at the entrance of a cooling chamber so that as the film is removed it is cooled to a brittle state while it continues its advancement through the chamber. A fan or the like having a plurality of rotatable blades is located in this cooling chamber directly in the path of the advancing film of adhesive. These rotating blades break the brittle film into flakes which then are discharged from the cooling chamber into a suitable receptacle for subsequent use. The blades of the rotating fan also serve to draw a supply of cooled air into the cooling chamber which may be regulated as desired.

Reference now will be had to Figs. 1 and 3 of the drawing for a more detailed description of the instant machine. A quantity of molten thermo-plastic adhesive A which preferably has been heated is poured from a suitable supply receptacle B into a reservoir 11. It is heated further while in the reservoir to maintain it in a desired liquid or molten condition at a substantial uniform temperature. This may be done by a heating medium applied to the reservoir. Such a reservoir may be extended to receive molten adhesive from one or more receptacles B.

The present invention also lends itself to the use of slabs, bars or other solid forms or pieces of the thermo-plastic adhesive which may be added directly to the reservoir. Some extra heating time may be required when such an alternate procedure is followed.

Reservoir 11 is carried centrally of the machine on horizontal support rods 12 which are secured to frames 13 and 14 (Fig. 3). Frames 13, 14 are mounted on a machine base 15. Reservoir 11 comprises an inner compartment 16 which is surrounded by a jacketed bottom section 17 and jacketed side sections 18.

It is into the compartment 16 that the molten thermo-plastic adhesive is held prior to its removal as a film. The jacketed sections 17, 18 are separated from one another by baffles 21

which have suitable openings therein for communication between the jacketed sections. The latter openings preferably are placed near opposite ends. A suitable heating medium flows completely in a zig zag course through all parts of the jacketed sections.

An inlet pipe 22 is provided at one end of the reservoir 11 through which the heating medium enters. Hot oil may be used as the heating medium and is supplied to one of the jacketed sections 18 by way of the inlet pipe. In similar manner an outlet pipe 23 is provided at the opposite side of the reservoir 11. The outlet pipe connects with another jacketed section 18 and provides for the return flow of the heated oil. The system may be a closed system and the oil may be reheated to a desired temperature for continuous use and recirculation in heating the reservoir 11.

A roll 24 is rotatably mounted in the reservoir and dips down into the molten thermo-plastic adhesive. It picks up a film of the adhesive on its peripheral surface and carries it up for transfer onto the peripheral surface of a rotatable drum 25 (Figs. 1 and 3). The roll 24 is carried on a shaft 26 which may be a separate or an integral part of the roll (see also Fig. 2). Shaft 26 is journaled in suitable bearings 27, 28 in the frames 13, 14.

One end of the shaft 26 carries a chain sprocket 32 driven by a continuous or endless chain 33 which also passes over a chain drive sprocket 34. It also passes over other sprockets which will be described later. Sprocket 34 is mounted on a machine drive shaft 35. Such a shaft may be driven in any suitable manner.

The roll 24 like the reservoir 11 also is heated by a continuous flow of hot oil. The oil passes adjacent the outer periphery of the roll and heats it to substantially the same temperature as that of the reservoir. This maintains the adhesive in a desired liquid state. As it comes into contact with the relatively cooler surface of the drum 25 the adhesive cools and adheres to the periphery thereof. The adhesive which is deposited on the drum is reduced to the desired uniform thickness as determined by the spacing between the roll 24 and the drum 25. This space is maintained by the relative positioning of the axes of roll and drum, the film thickness being the clearance between the peripheral surfaces of roll and drum.

Heated oil or other fluid medium is supplied to the roll 24 through an inlet pipe connection 36 which is secured to one end of the shaft 26 (Fig. 3). Connection 36 leads into an inlet bore 37 in the shaft 26 (see also Fig. 2). Bore 37 communicates with a drilled hole or radial port 38 which connects with one end of a spiral groove 42 formed in the periphery of the roll 24. A ring 43 surrounds the spiral groove 42 in the roll and constitutes a part thereof. Such a ring is or may be welded to the circumference of the roll 24 so that a continuous passageway is formed in the periphery of the roll for the flow of heated oil therethrough.

The heated oil after traversing the length of the groove 42 passes out by way of a drilled hole or axial port 44 which has communication with an outlet bore 45 in the shaft 26. From the outlet bore the oil has egress through an outlet pipe 47.

Oil which provides the heating medium for the roll 24 partially immersed in the reservoir may be reheated for continuous use. For the sake of convenience all of the oil used for heating both the roll 24 and the reservoir 11 may be furnished from a single source if desired since the temperature for heating both elements is substantially the same. Since many different conventional systems could be used it is believed further explanation and/or illustration is unnecessary.

The drum 25 is rotatably disposed above the roll 24 and preferably is offset to one side of the center of the roll, as viewed in Fig. 1. Drum 25 is carried on an integral shaft 52 (Fig. 3) which is journaled in bearings 53, 54 of brackets 55, 56. Brackets 55, 56 are mounted on the frames 13, 14, respectively.

Drum 25 is rotated in time with roll 24 so that their peripheral speed of travel are the same. Reference may be made to other sprockets in addition to sprockets 32 and 34 over which the chain 33 passes. One of these is a sprocket 57 which is mounted on one end of the roll shaft 52 (Figs. 1 and 3). In the embodiment illustrated it is desirable that the drum 25 rotate in a counterclockwise direction, since it receives adhesive from a clockwise rotation roll. To effect the proper direction of rotation two idler sprockets 62 are provided. Each sprocket 62 is journaled on a stud shaft 63 which is secured in the bracket 55. Chain 33 in passing over the five sprockets 34, 32, 62, 57 and 62 rotates the roll 24 and the drum 25 in the desired opposite directions and at the desired peripheral speeds of travel.

The drum 25 like the roll 24 is preferably heated by a fluid medium. This however is preferably at a much lower temperature so that the contacting peripheral surface of the drum actually starts to cool the thermo-plastic adhesive as it is picked up by the latter. For this purpose an inlet pipe 65 is secured to one end of the shaft 52 and conveys a heating medium such as hot water into an inlet bore 66 cut axially inwardly from one end of the drum shaft (Figs. 1 and 3).

Bore 66 has communication with a hole or radial bore 67 drilled in a hub 68 of the drum. At the outside of the hub the drilled hole leads into one end of a radial tube 72, this end being secured in the drum by welding. Tube 72 extends radially outwardly from its connection with the hub to adjacent the periphery of the drum and thereafter it is curved and extends circumferentially inside the peripheral rim of the drum. After forming one turn the tube 72 extends across to the opposite side of a middle web 73 formed in the drum. This cross-over is shown in Fig. 3 as at 74.

From this point the tube makes another complete turn inside the drum's rim. The leading end of this circular part of the tube thereupon bends inwardly in a sharp corner and extends in radially to connect with the hub 68 to which it is welded. The inside of the tube connects with an outlet bore 75 which is drilled radially of the hub, and communicates with an axial outlet bore 76 in the opposite end of the shaft 52. An outlet pipe 77 suitably secured in the end of the shaft completes this path of water circulation. The pipe 77 may lead to any suitable source of discharge.

After a film of thermo-plastic adhesive has been deposited uniformly onto the periphery of the drum 25 adjacent its bottom by roll 24, the applied adhesive advances to the right, as viewed in Fig. 1, toward a doctor blade 82. Such a doctor blade is of conventional form and is directed against the continuous moving film of adhesive. Doctor blade 82 is adjustable relative to the drum 25 so that a smooth thin film of desired thickness may be formed. This blade preferably is elec-

trically heated as by lead wires 83 (Fig. 3) from any suitable source of electrical energy (not shown).

Doctor blade 82 is carried on a horizontal slide shaft 84 which is slidably carried in slide hubs 85, 86 formed in brackets 87, 88 which project outwardly of the frames 13, 14. The doctor blade slide shaft is cam actuated by a suitable lever 92 which is pivotally mounted on the bracket 87. One end of the lever 92 carries a cam roller which operates in a cam groove 93 of a barrel cam 94. After being brought to proper thickness by the doctor blade the film of thermo-plastic adhesive is carried upwardly, thence over at the top of the drum 25 and downwardly as the drum rotates in a counter-clock-wise direction, as viewed in Fig. 1. As the film of adhesive advances it gradually solidifies into a web or ribbon and as such is in condition to be stripped from the drum.

As the adhesive leaves the drum surface it passes into a vertically disposed cooling chamber 101 which at the top is disposed adjacent the periphery of the drum. An entrance opening 102 into the chamber is located at its upper side edge. A film scraper member 103 is located at this entrance and strips the film of adhesive from the drum and directs it through the opening 102 into the cooling chamber.

Film scraper 103 is secured adjustably to a film scrap carrier member 104 carried on a cross shaft 105 which is pivoted in bearings 106, 107 of extended arms 108, 109 of the frames 13, 14 (see also Fig. 4). This scraper 103 is normally held against the drum by side levers 111, 112 which are integral with the carrier member 104.

The upper end of the film scraper carrier 104 carries rollers 113 which engage the periphery of the drum at its marginal edges (Fig. 4) under spring pressure. Each lever 111, 112 is formed with a boss 114 and each boss has a bore 115. A spring 116 is disposed in the bore of each boss and also is located in a bore 117 of a stationary lug 118 on the arm 108 and on the arm 109.

The solidified film of adhesive upon being stripped from the drum 25 passes down through the cooling chamber 101. During its movement therethrough it is cooled further, preferably to a brittle state by a flow of cold air through the chamber. Such air is admitted in any suitable manner and is cooled by passage through a cooler 122 prior to entrance into the cooling chamber. An air duct 123 delivers the cool air from the cooler into the top of the cooling chamber. Any suitable cooling medium may be supplied to the cooler 122, inlet and outlet connections 124, 125 being shown connected to the cooler to suggest such a cooling arrangement.

The cooled air is drawn into the cooling chamber by a plurality of rotary blades 131 of a rotating fan or propeller 132. Such a fan is located at the lower end of the cooling chamber 101. The supply of air entering this chamber through the air duct 123 may be regulated by a damper 133 (Fig. 1) located in the air duct.

Fan 132 preferably is operated by an electric motor 134 which is closely associated with the fan, the necessary electrical energy for the motor being supplied from any convenient electrical source as through lead wires 135. Motor 134 is carried in a bracket 136 which is secured to a flake housing 137 located adjacent the lower end of the cooling chamber.

The solidified film of thermo-plastic adhesive after passing through the cooling chamber falls into the path of the rotating blades 132 and is broken into flakes. The same fan 132 used to draw the cooled air into the cooling chamber and to break the cooled solidified adhesive film into flakes, also operates to expel the air together with broken flakes of adhesive from the lower end of the cooling chamber 101. The flakes and air thus pass through a pipe 142 which joins the fan chamber with the flake housing.

The housing 137 is preferably provided with a hinged cover 143 for convenience in removing the flakes of adhesive. The flakes preferably are collected in a fabric bag or other receptacle 144 which is located in the housing. One or more of the sides of the housing 137 may be provided with a meshed wire section 145 through which the expelled air from the fan and the bag passes. The flakes of adhesive being collected in the bag or receptacle 144 thus may be removed in any desired or convenient manner.

It is thought that the invention any 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.

I claim:

1. In a machine for treating thermo-plastic adhesives, the combination of a reservoir for heating and maintaining adhesive in a molten state, a rotatable drum located adjacent said reservoir for receiving a film of adhesive on its peripheral surface and for solidifying the same, a cooling chamber disposed adjacent said drum, a film scraper located at the entrance of said cooling chamber and having engagement with said drum for removing therefrom the solidified film of adhesive in ribbon form and introducing the film into said cooling chamber, and rotatable means located within said chamber in the path of the cooled ribbon adhesive for introducing a cooling medium into said chamber and for breaking the cooled ribbon into small flakes.

2. In a machine for treating thermo-plastic adhesives, the combination of a reservoir for heating and maintaining adhesive in a molten state, a rotatable heated drum located adjacent said reservoir for receiving a film of adhesive on its peripheral surface, said drum being heated to a lesser temperature than said reservoir for solidifying the film thereon, an elongated cooling chamber disposed adjacent said drum, a film scraper located at the entrance of said cooling chamber and having engagement with said drum for removing therefrom the solidified film of adhesive in ribbon form and introducing the film into and through said cooling chamber, and rotatable means located at the inner end of said chamber in the path of the cooled ribbon adhesive for introducing a cooling fluid into said chamber and for breaking the ribbon into small flakes.

3. In a machine for treating thermo-plastic adhesives, the combination of a reservoir for heating and maintaining adhesive in a molten state, a roll rotatable in said reservoir and within the molten adhesive for picking up a film of adhesive on its peripheral surface, a rotatable drum located in substantial tangential relation to said roll for receiving the film of adhesive from the roll and for solidifying the film thereon, an elongated cooling chamber having an entrance

opening disposed adjacent said drum, a film scraper located adjacent the entrance opening of said cooling chamber and engaging said drum for separating therefrom the solidified film of adhesive in ribbon form and introducing the same into the entrance opening of and through said chamber for cooling the film, and rotatable means located within said chamber in the path of said cooled ribbon adhesive passing therethrough for introducing a cooling fluid into said chamber and for engaging and breaking the cooled film of adhesive into small flakes.

4. In a machine for treating thermo-plastic adhesives, the combination of a reservoir for heating and maintaining adhesive in a molten state, a roll rotatable in said reservoir and within the molten adhesive for picking up a film of adhesive of desired thickness on the peripheral surface of the roll, a rotatable drum located in adjacent tangential relation to said roll for receiving the film of adhesive from the roll and for solidifying the adhesive thereon as a film of uniform and predetermined thickness, an elongated cooling chamber disposed adjacent said drum, a film scraper located at the entrance end of said cooling chamber and engaging said drum for removing therefrom the solidified film of adhesive in ribbon form and for introducing such film into and through said chamber for cooling the film, and rotatable means located within and at the discharge end of said chamber in the path of said cooled ribbon adhesive for introducing a cooling fluid into said chamber and for engaging and breaking the cooled ribbon into small flakes or particles.

5. In a machine for treating thermo-plastic adhesives, the combination of a reservoir for heating and maintaining adhesive in a molten state, a roll rotatable in said reservoir and within the molten adhesive for picking up a film of adhesive on its peripheral surface, a rotatable drum located adjacent said roll for receiving the film of adhesive and for solidifying it, a doctor blade located adjacent said drum and engaging said adhesive to provide a film of desired thickness on the drum, a cooling chamber disposed adjacent said drum, a scraper member located at the entrance end of said chamber and engaging said drum for separating therefrom the solidified film of adhesive in ribbon form and for introducing the ribbon thus formed into said chamber for cooling the film, and rotatable means located within said chamber in the path of said cooled ribbon adhesive for introducing a cooling fluid into said chamber and for breaking the cooled film of adhesive into small flakes or particles.

6. In a machine for treating thermo-plastic adhesives, the combination of a reservoir for heating and maintaining adhesive in a molten state, a heated roll rotatable in said reservoir and within the molten adhesive for picking up a film of adhesive on its peripheral surface, a rotatable heated drum located adjacent said roll for receiving the film of adhesive and for solidifying it, a heated doctor blade located in tangential relation to said drum and directed against the adhesive to provide a film of desired uniform thickness, means for heating said roll and said drum at different temperatures, an elongated cooling chamber disposed adjacent said drum, a film scraper located at the entrance end of said chamber engaging said drum for separating the solidified film of adhesive from the drum as a solid ribbon and introducing the film into said chamber for cooling therein, and a rotary fan located within said chamber in the path of said cooled adhesive ribbon for introducing a cooling medium into said chamber and for breaking the cooled film of adhesive into small flakes or particles.

7. In a machine for treating thermo-plastic adhesives, the combination of a reservoir for heating and maintaining adhesive in a molten state, a heated roll rotatable in said reservoir and within the molten adhesive for picking up a film of adhesive on its peripheral surface, a rotatable heated drum located adjacent said roll for receiving the film of adhesive and for solidifying it, an elongated cooling chamber disposed adjacent said drum, a film scraper located at the entrance end of said chamber and engaging said drum for separating the solidified film of adhesive from the drum in a solid ribbon for passage into and through said cooling chamber, a rotatable fan located at the discharge end of said chamber in the path of said cooled adhesive ribbon for drawing the cooled air into said cooling chamber and for simultaneously breaking the adhesive ribbon into small flakes, said fan being further operative for discharging the flakes of adhesive from said cooling chamber, and means for collecting the flakes as discharged from said chamber.

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