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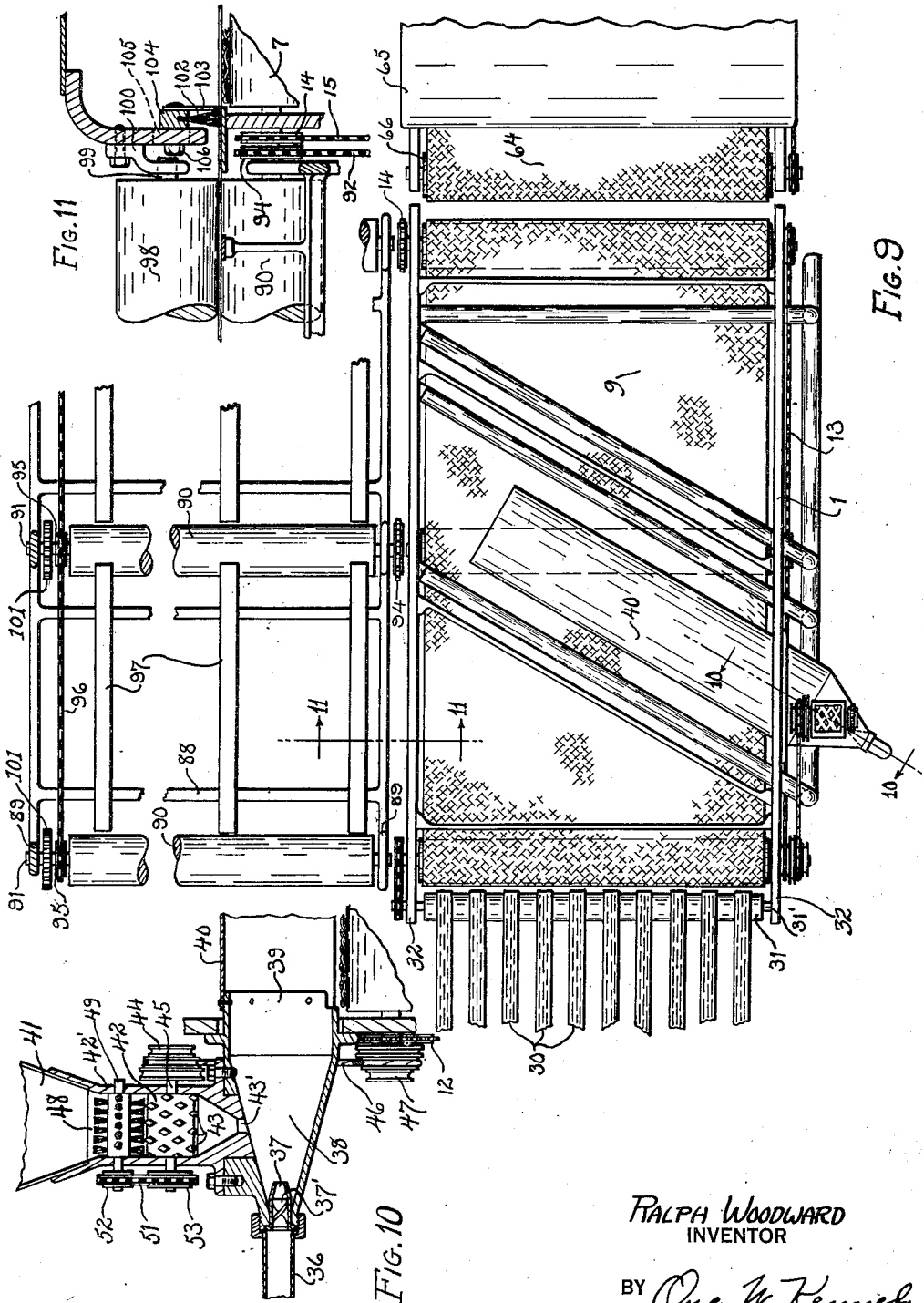
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MACHINE FOR PRODUCING RAISED PRINTING

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MACHINE FOR PRODUCING RAISED
PRINTING

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5 Claims. (Cl. 91—59)

The present invention relates to an improvement in a machine for distributing finely divided powders upon printed sheets on which the printed design is still moist, so that the powder will adhere thereto and the design will be raised or embossed above the plane of the paper.

In producing printing of this character the powder or raising compound is applied to the printed sheets of paper, or other material, while the ink or size previously applied by any suitable printing machine is still wet, in order that the compound may adhere to the printed design. The powder which does not adhere to the moist ink or size is then removed and the printed sheets, with the adhering compound thereon are heated to a temperature sufficient to dry the ink and in some cases to fuse the powder into a solid mass, thereby providing an embossed effect on the sheet. One of the objects of the invention is to provide for the application of the raising compound to printed sheets while in motion from the printing machine, and the device of the invention is arranged to accommodate extremely large sheets.

Another object of the invention is the provision of a device by which the raising compound is blown across the printed sheets by an air jet for a uniform distribution of the compound over the surface of the printed material, and the device provides for controlling the amount of compounds applied for determining the extent of the embossing. The surplus compound after being removed from the printed matter is returned to the source of supply and a further object of the invention is the removal of dust from this returned compound to avoid the accumulation of dust in said compound. The machine also contemplates the alternative discharge of the unused compound to an independent container, as when the device is to be cleaned, in readiness to use with a raising compound of a different character.

Other and further objects and advantages of the invention will more fully appear from the following detailed description taken in connection with the accompanying drawings, in which:—

Fig. 1 is an end elevation of a device embodying the invention.

Fig. 2 is a side elevation of the device of Fig. 1.

Fig. 3 is a vertical sectional view along the line 3—3 of Fig. 1.

Fig. 4 is a fragmentary vertical sectional view along the line 4—4 of Fig. 1.

Fig. 5 is an enlarged sectional view of a part of the device shown in Fig. 3.

Fig. 6 is a sectional view substantially along the line 6—6 of Fig. 2.

Fig. 7 is a sectional view substantially along the broken line 7—7 of Fig. 2.

Fig. 8 is a fragmentary perspective view of the container of Fig. 7.

Fig. 9 is a horizontal sectional view along the line 9—9 of Fig. 1.

Fig. 10 is a vertical sectional view substantially along the line 10—10 of Fig. 9, on an enlarged scale.

Fig. 11 is a vertical sectional view substantially along the line 11—11 of Fig. 9.

Like reference characters refer to like parts in the different figures.

As best shown in Figs. 1 and 2, the device of the invention comprises a box-like frame 1 supported by legs 2 and 3 at opposite ends thereof. The frame 1 has an integral hood 4 connected to said frame at one edge thereof, as at 5, the hood extending in cantilever fashion in parallel relation to the frame. The frame has a plurality of transversely extending rollers 6, 7 and 8, Fig. 3, which support a belt 9 of wire mesh fabric, the latter moving in the direction of the arrow 10, Fig. 3. The supporting shafts 11 for each of the rollers 6, 7 and 8 extend through the side walls of the frame and have positioned on the outer ends thereof, at one side of the frame, sprockets 12 which are all engaged by a chain 13 for a rotation of the several rolls in unison. At the end opposite to the sprocket 12 the shaft 11 for the roller 6 has a second sprocket 14, Fig. 1, engaging with a chain 15 extending from a sprocket 16 on a countershaft 17 journaled in a lug 18, Fig. 2 provided by the leg 2. The shaft 17 is driven from a driving motor 19 mounted on a bracket 19' on the leg 2. The rotating shaft 20 of the motor has a sprocket 21 connected by a chain 22 to a sprocket 23 on a countershaft 24 journaled at opposite ends in lugs 25 and 26 provided by the leg 2. A second sprocket 27 on the shaft 24 is connected by a chain 28 to a sprocket 29 on the shaft 17 so that when the motor 19 is in operation, the fabric belt 9 is driven by the rotation of the rollers 6, 7 and 8.

Printed sheets of material with the ink or size thereon still moist are directed onto the moving belt 9 beneath the hood 4 by suitable feeding means, as by a plurality of parallel moving belts supported by a set of parallel rollers 31, only one of which is shown, see Fig. 9. The belts 30 have their top surfaces moving in the same direction as the upper side of the belt 9 and carry the printed sheets from the printing machine, not

shown, directly to the powder distributing device. The shaft 31' for the roller 31 adjacent the frame 1 may be journaled in lugs 32 extending from the frame.

5 Powder is applied to the still moist ink or size by an air jet provided by a blower 33, the shaft 34 of which is connected directly to the shaft 20 of the motor. The blower is supported by the bracket 19' on the leg 2 and has its discharge pipe 35 connected by a conduit 36 to a nozzle 37 positioned in a chamber 38, see Fig. 10. The discharge opening 39 of the chamber 38 is connected to a hood 40 extending diagonally across the belt 9 and having its opposite lower edges spaced slightly above said belt, see Fig. 3, the air passing through the nozzle 37 being given a rotary motion by helical vanes 37'. Powder is supplied to the chamber 38 from a supply chamber 41 through a measuring device consisting of a roll 42 having intersecting passages defined by protuberances 43 thereon, said roll 42 being positively driven at a predetermined rate. The roll 42 is positioned in a portion of the bracket 42' which connects the chamber 41 to the chamber 38, and the amount of powder discharged through the opening 43' from the chamber 41 is controlled by the rate of rotation of the roll 42 which may be varied as desired.

The roll 42 is rotated through a multi-step pulley 44 on the shaft 45 on which said roll is mounted, a belt 46 providing a connection between the pulley 44 and a corresponding multi-step pulley 47 on the shaft 11 for the roller 6, the pulley 47 being positioned adjacent to the sprocket 12. In vertical alignment with the roll 42 is a rotatable brush 48 carried by a shaft 49 journaled in the bracket 42', the brush agitating the powder to prevent clogging of the measuring roll. The brush and roll are connected for rotation in unison by a chain 51 passing over sprockets 52 and 53 on the brush and roll shafts respectively.

As the printed material passes beneath the powder hood 40 the blast of air from the nozzle 37 carries powder from the opening 43' into the hood which serves to distribute the powder across the material for uniformly coating the wet ink or size with the powder. The powder is retained beneath the hood 40 by air jets from elongated nozzles 54 and 55 extending transversely of the belt 9 in parallel relation to the hood. As shown in Fig. 3, the air jets from these nozzles are directed at an angle toward the edges of the hood and aid in preventing the escape of powder from beneath said hood. An additional nozzle 56 parallel to the nozzle 55 and spaced therefrom also aids in agitating the powder lying on the printed material and, being directed at an angle to the belt 9, blows the loose powder on the material in a direction opposite to the movement of the printed material. At the delivery end of the belt 9 is provided a transverse nozzle 57 directed vertically downward to remove the loose powder from the printed matter before it passes from beneath the main hood 4. The several air nozzles are connected to the blower 32 by a conduit 58 which extends upwardly from the blower and has a horizontal portion 58' to which the several nozzles 54, 55, 56 and 57 are all connected through short pipes 54', 55', 56' and 57', respectively, see Fig. 2.

The powder suspended in the air beneath the main hood 4 is prevented from escaping by depending flanges 60 and 61 carried by the underside of said hood. These flanges are located ad-

5 adjacent to opposite ends of the belt 9 and extend downwardly almost into engagement with the upper pass of the belt 9. Additional diagonally extending flanges 62 and 63 are positioned adjacent to the nozzle 54 and between the nozzles 55 and 56 respectively to aid in controlling the movements of the air currents and the suspended powder beneath the large hood.

The printed sheets with the powder coating adhering thereto pass from beneath the hood 4 onto a belt 64, the upper path of which is moving in the same direction as the upper pass of the belt 9. The belt 64 passes through a drying oven 65 of suitable construction, said belt being supported by suitable rollers 66, only one of which is shown. A horizontal plate 67, Fig. 3, secured to the frame 1, has its upper surface in substantial alignment with the upper passes of the belts 9 and 64 to support the printed sheets between said belts.

The powder beneath the hood 4, which does not adhere to the ink or size on the printed sheets as they are carried through the device, passes through the belt 9 or is carried around with said belt and falls off from the underside thereof into a funnel-shaped collecting chamber 68 positioned beneath the frame 1. The lower end of the collecting chamber is connected by a pipe 69 to the upper end of the chamber 41, the pipe entering said chamber substantially tangential thereto, as shown in Fig. 1, to provide for a centrifugal action of the air and suspended powder directed into the chamber. This centrifugal action results in a discharge of the powder suspended in the air against the side walls of said chamber. An airtight cap 70 on the chamber 41 has a short connection 71 to a porous bag 72, into which the air from the chamber 41 is directed. The bag 72 removes any dust carried by the air, this dust, being much lighter than the powder used in the machine, remaining in suspension instead of being separated from the air in the chamber 41. A bracket 73 on the hood 4 aids in supporting the bag 72 in desired position. As shown in Fig. 4, the discharge pipe 35 of the blower 33 is connected by a short conduit 74 to a nozzle 75 positioned in a bracket 75' at the base of the collecting chamber. The discharge end of the nozzle 75 is positioned at the contracted entrance to the pipe 69 and as air passes through said nozzle it picks up the powder from the lower end of the chamber 68 and carries it through the pipe 69 to the supply chamber 41. The nozzle 75 has a threaded flange 76 for adjusting its position relative to the mouth of the pipe 69.

The pipe 69 has a branch conduit 77, Fig. 7, connecting said pipe to a chamber 78, the latter having a screened top 79 which prevents escape of powder therefrom though allowing the escape of air and small particles of dust. Butterfly valves 80 and 81 in the pipe 69 and conduit 77 respectively, have actuating arms 82 and 83 connected together by a link 84, to Fig. 1, to permit the amount of air passing into the supply chamber 41 or to the chamber 78 to be controlled, the arrangement being such that one valve is entirely open when the other is closed. Thus when the device of the invention is to be cleaned, as in preparation for the use of a different powder, the valve 80 is closed and the unused powder is then directed to and collected in the chamber 78, the latter being removably supported on a bracket 85 on the leg 3. It will be noted that the collecting chamber 68 is removable for cleaning and to this end the opposite upper edges of

said chamber have flanges 86, Figs. 4 and 5, forming ways slidable on flanges 87 provided by the legs 2 and 3. The frame 1 is supported above and out of engagement with the flanges 86. In removing the chamber the pipe 69 and conduit 74 are disconnected from the bracket 75', to which they are releasably connected in any desired manner.

For accommodating large sheets having only a small amount of printed matter, the machine is provided with a supplementary frame 88, Figs. 1 and 9, which has upwardly extending lugs 89 at opposite side edges thereof for supporting a plurality of parallelly arranged rollers 90, the shafts 91 of the rollers being journaled in the lugs 89. The rollers 90 are in alinement with the rollers 6, 7 and 8 respectively, and are positively driven from the shaft 17 through a chain 92 which passes over sprocket 93 on the shaft 17, and a sprocket 94 on one of the shafts 91. The opposite end of the middle shaft 91, and also the other shafts 91, have sprockets 95, Fig. 9, engageable with a chain 96 which provides for rotation of the several rolls 90 in unison. Bars 97 carried by parts of the frame 88, substantially in the plane of the upper surfaces of the rollers 90, support the printed material between successive rollers.

For positive movement of the printed sheets each roller 90 has directly thereabove a roller 98, the rollers 90 and 98 in each case being spaced apart to receive the printed sheets therebetween. The shafts 99 for the rollers 98 are supported at one end in brackets 100 on the hood 4 and at the other end in the lugs 89. Cooperating gears 101 on the shafts 91 and 99 provide for rotation of each pair of rolls in unison and in opposite direction for advancing the printed sheets therebetween.

The powder carried in suspension beneath the hood 4 is prevented from escape from the side of the hood adjacent to the auxiliary rollers 90 and 98 by a brush 102 and a flexible depending blade 103, both carried by a bar 104 vertically adjustable on the side wall of the hood 4. For this purpose the hood 4 has a plurality of vertically extending slots 105, Fig. 11, through which extend studs 106 engaging with the bar 104.

For cleaning of the device, in addition to the air system above described, the hood has hinged covers 107 and 108 which, as best shown in Fig. 3, open substantially the entire top of the hood to permit access thereto. Said covers are normally held in closed position by their own weight to maintain a substantially air-tight closure, or may be held by springs.

From the foregoing, it will be apparent that the present invention provides for the application of a suitable powder or compound to moist printed material in a relatively wide band extending across the line of travel of the material, thereby insuring uniform distribution of the powder. Furthermore, the invention contemplates the removal of excess compound from the printed material and the collection of the compound in a supply chamber or to a separate container. Moreover in the returning of the unused compound to the supply chamber any dust mixed therewith is removed to prevent the gradual accumulation of objectionable quantities of dust in the compound.

I claim:

1. In a device of the class described, a chamber for powder having a discharge opening therein, means for feeding a predetermined quantity of

powder through said opening, means for advancing printed sheets through the device, an air supply, and means for directing air from said supply past the discharge opening and over the printed sheets in a direction substantially parallel thereto, said air carrying the powder in suspension, and said directing means including a hood extending transversely of the sheet advancing means and having an opening in the underside thereof directly above and spaced from a portion of said advancing means extending diagonally across the sheets for uniformly distributing the powder suspended in the air over the sheets.

2. In a device of the class described, a chamber for powder having a discharge opening therein, means for feeding a predetermined quantity of powder through said opening, means for advancing printed sheets through the device, an air supply, and means for directing air from said supply past the discharge opening and onto the printed sheets, said air carrying the powder in suspension onto said sheets, said directing means including a hood for directing the powder suspended in the air against the printed sheets, said hood extending diagonally across the sheet advancing means, and nozzles connected to the air supply and directed toward the edges of the hood for retaining the powder beneath said hood.

3. In a device of the class described, means for advancing printed sheets through the device, means for distributing measured quantities of powder on said sheets, means for collecting powder not adhering to the sheets, and means for returning said collected powder to the distributing means or to a separate collection chamber selectively, said last means including an air supply and means for blowing powder from said collecting means to the distributing means or the separate collection chamber, selectively.

4. In a device of the class described, a chamber for powder having a discharge opening therein, means for feeding powder through said opening, means for advancing printed sheets through the device, an air supply, and means for directing air from said supply past the discharge opening and onto the printed sheets, said air carrying the powder in suspension onto said sheets, said directing means including a hood for directing the powder suspended in the air against the printed sheet, said hood extending transversely of the sheet advancing means, and nozzles connected to the air supply and directed toward the edges of the hood for retaining the powder beneath said hood.

5. In a device of the class described, a chamber for powder having a discharge opening therein, means for feeding powder through said opening, means for advancing printed sheets through the device, an air supply, means for directing air from said supply past the discharge opening and directly onto the printed sheets, said air carrying the powder in suspension onto said sheets, a collecting chamber beneath the sheet advancing means, means for directing air from said supply through a portion of the collecting chamber for carrying powder therein to the supply chamber, nozzles positioned above the sheet advancing means, and a connection between the air supply and the nozzles for supplying air thereto, said connection being located between the air supply and the connection to the collecting chamber.

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