March 8, 1955 W. T. DANIELS 2,703,551

ANTIOFFSET POWDER DISTRIBUTOR AND COLLECTOR

Filed Aug. 22, 1951 2 Sheets-Sheet 1

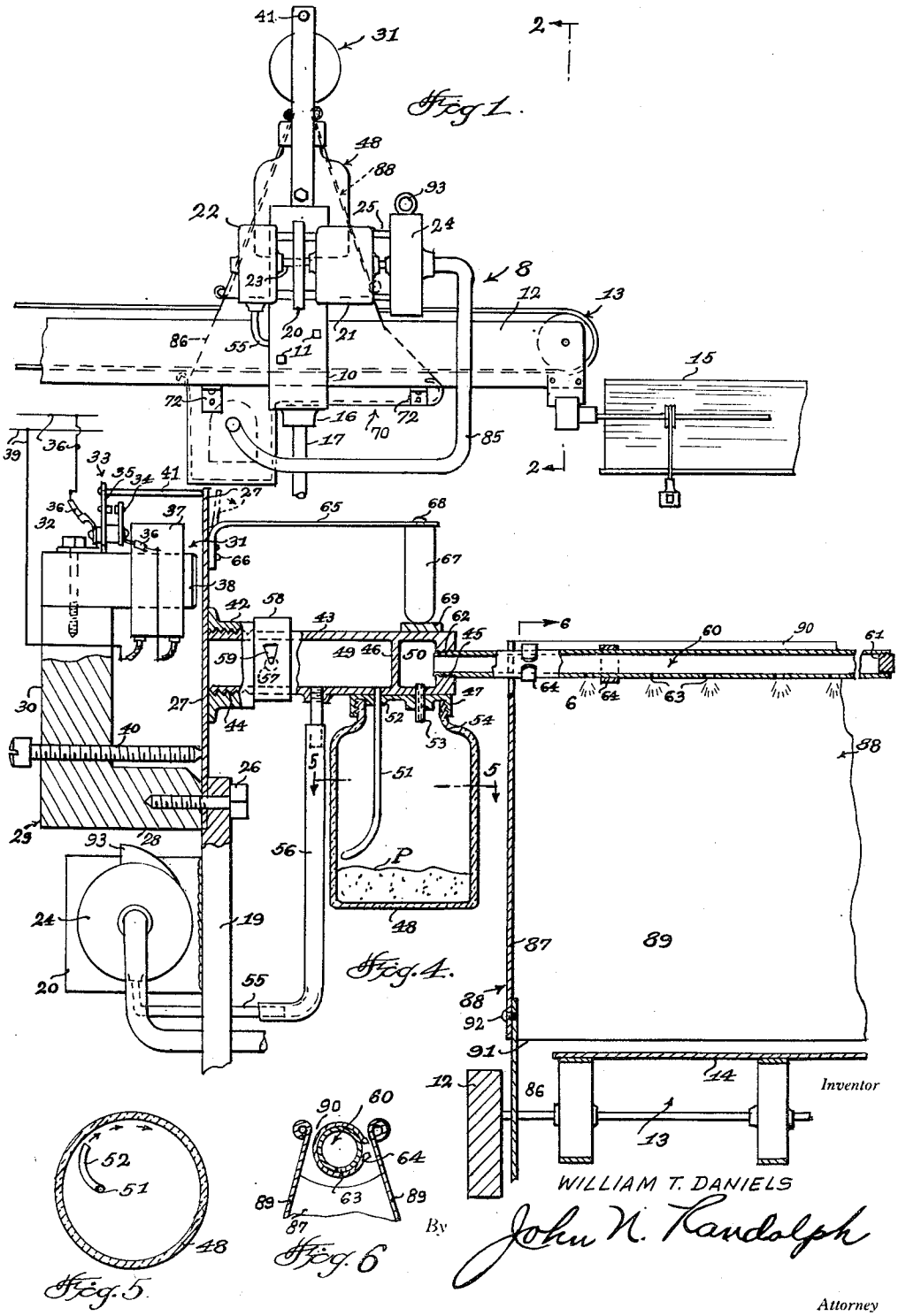


Fig. 1.

Fig. 4.

Fig. 5.

Fig. 6.

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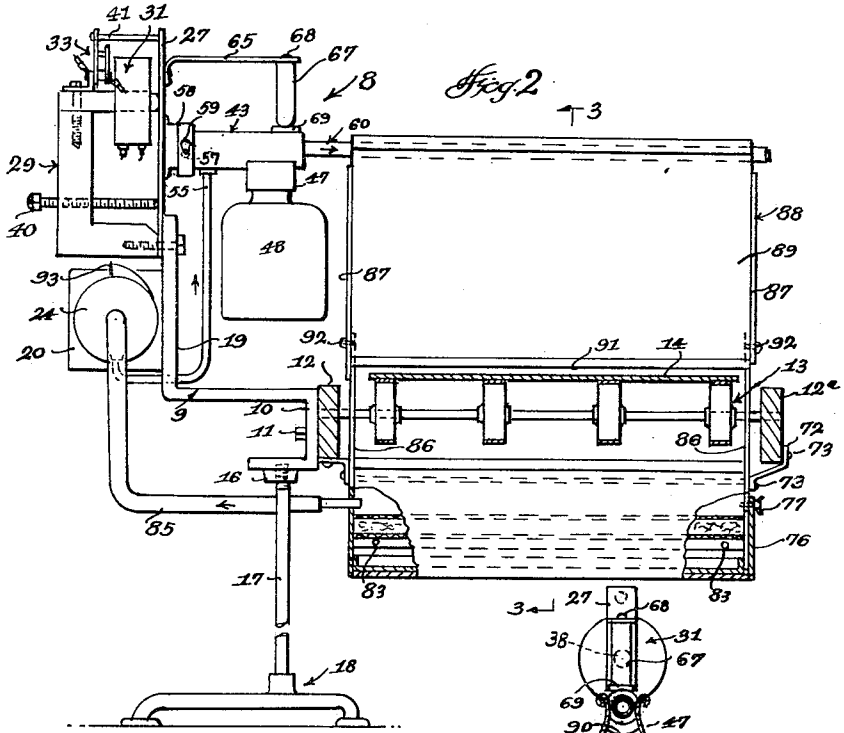


Fig. 2

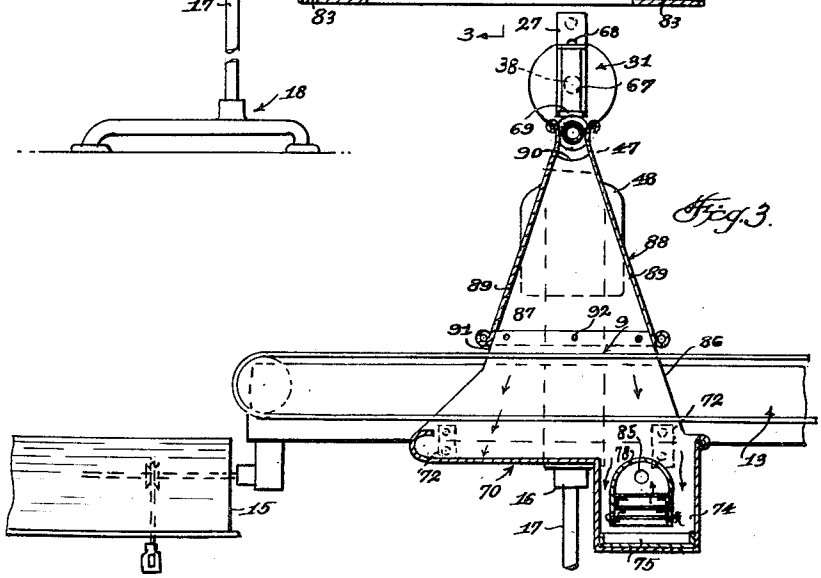


Fig. 3.

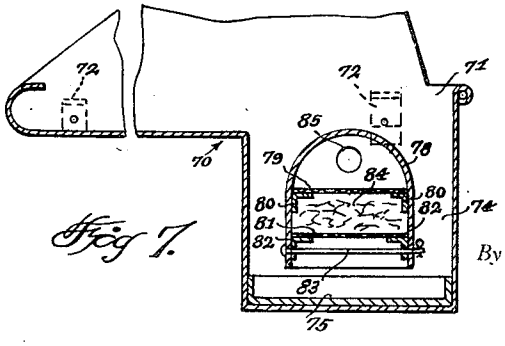


Fig 7.

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ANTI-OFFSET POWDER DISTRIBUTOR AND COLLECTOR

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5 Claims. (Cl. 118—308)

This invention relates to an apparatus of extremely simple construction capable of being mounted on or adjacent to the frame portion of a printing press conveyor by which the freshly printed sheets are conveyed to a stacker or jogger for causing each printed sheet to pass through or beneath a fine film or screen of powder which coats the inked upper surface of the sheet to prevent the ink therefrom being offset onto the bottom side of a superposed sheet of the stack.

More particularly, it is a primary object of the present invention to provide an apparatus whereby a uniform film or screen of powder may be discharged downwardly for uniformly coating the upper surfaces of freshly printed sheets passing therebeneath and wherein the amount of powder dispensed may be varied as required by extremely simple adjusting means.

Another object of the invention is to provide an apparatus which will effectively prevent the accumulation of a powder cake within any part of the powder dispensing system and which would result in lumps of powder being from time to time dispensed onto a freshly printed sheet.

A further object of the invention is to provide an apparatus whereby the storage container for the powder will be constantly subjected to a vibratory motion and also to a swirling air pressure creating a whirlwind action for breaking up small lumps which may occur in the powder and for dispensing only the powder which is in a finely divided form capable of travelling upwardly with the upwardly moving swirling air.

Still a further object of the invention is to provide an apparatus wherein the powder storage container and the powder dispensing head will each be constantly subjected to a vibratory and tapping action to retain the powder constantly in motion and in suspension and to prevent it from accumulating or caking in either the container or the dispensing head.

Still a further object of the invention is to provide an apparatus having collector means for collecting the powder not discharged onto the printed sheets by a suction action and which powder would otherwise be carried in the air and blown onto other equipment including moving parts of the machinery, thus causing considerable damage.

Still a further object of the invention is to provide an apparatus having a shield through which the screen of powder is dispensed onto printed sheets to prevent the powder from being blown by drafts of air away from the sheet during its downward travel from the dispensing head.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a presently preferred embodiment thereof, and wherein:

Figure 1 is an end elevational view of the invention shown in an applied position;

Figure 2 is a side elevational view, partly in vertical section thereof, taken substantially along a plane as indicated by the line 2—2 of Figure 1;

Figure 3 is a cross sectional view of the apparatus taken substantially along a plane as indicated by the line 3—3 of Figure 2;

Figure 4 is an enlarged fragmentary longitudinal sectional view, partly inside elevation, of a portion of the apparatus;

Figure 5 is a horizontal sectional view taken substantially along a plane as indicated by the line 5—5 of Figure 4;

Figure 6 is an enlarged cross sectional view taken substantially along a plane as indicated by the line 6—6 of Figure 4, and

Figure 7 is an enlarged cross sectional view, similar to Figure 3 of the collector portion of the apparatus.

Referring more specifically to the drawings, the anti-offset powder distributor and collector in its entirety is designated generally 8 and includes a supporting bracket, designated generally 9 having a portion 10 which is adapted to be secured by fastenings 11 to a side rail 12 of a frame of a printing press conveyor 13 by means of which freshly printed sheets 14 are conveyed in a conventional manner from the printing press to a jogger or stacker 15. The bracket 9 is also provided with a bottom portion defining a downwardly opening socket 16 to receive the upper end of a standard 17 of a pedestal 18 which is intended to rest on a floor surface and by means of which the bracket 9 may be supported, in lieu of being secured to the conveyor rail 12. The bracket 9 is also provided with an upwardly extending upper end portion 19 which is disposed outwardly of the rail 12 and which extends upwardly with respect to the bracket portion 10. The portion 19 is provided on its outer side with an outwardly projecting mounting flange 20 which is disposed substantially in a vertical plane and which provides a support for an electric motor 21 which is mounted on one side thereof and a pump 22, which is mounted on the opposite side of the flange 20. One end of an armature shaft 23 of the motor 21 may extend through and be journalled in the flange 20 and forms the drive shaft of the pump 22. The opposite end of the armature shaft 23 projects from the opposite end of the motor 21 into the casing of a blower 24 to form the blower drive shaft. The blower 24 is mounted beyond said last mentioned end of the motor 21 and is supported thereon by suitable supporting elements 25.

As best seen in Figure 4, a screw fastening 26 extends outwardly through the bracket portion 19 above the flange 20, through the lower portion of a resilient plate 27 and is threaded into the shorter leg 28 of an L-shaped supporting arm 29, the terminal of which leg abuts the plate 27 so that the lower portion of said plate is clamped between said leg and the upper end of the bracket portion 19. The other, outwardly offset upwardly extending leg 30 of the supporting arm 29 supports an electromagnet, designated generally 31, on the upper end thereof and which is secured thereto by a fastening 32 which additionally supports a switch, designated generally 33, having a stationary contact 34 and a movable contact 35 which is normally spring biased into a circuit closing position in engagement with the contact 34. The switch 33 is interposed in a conductor 36 which supplies current to the coil 37 of the electromagnet 31 for magnetizing the core 38 thereof. The electric circuit of the electromagnet also includes a negative or ground wire or conductor 39.

The resilient plate 27 extends upwardly from its secured lower end to above the electromagnet 31 and has a portion thereof disposed beyond the outer right hand end of the core 38 and which would normally be disposed in contact therewith when an adjusting screw 40 is retracted. The adjusting screw 40 is threaded through the upright arm portion 30 and extends inwardly therefrom to abut against the plate 27 and is advanced for tensioning the plate 27 and swinging it away from the core 38. A stem 41, preferably formed of an electrical insulating material, has one end secured to the movable contact 35 and projects therefrom toward the upper end of the plate 27 and has its opposite end disposed to be engaged by the plate 27 when the latter is disposed adjacent to the core 38, for a purpose which will hereinafter be described.

An internally threaded boss 42 is secured to the opposite side of the plate 27, to the side thereof disposed adjacent the core 38, and is preferably disposed below the level of the core 38, as seen in Figure 4. A tube 43 has an externally threaded end 44 threaded into the boss 42 and by means of which said end is closed and the tube 43 is supported on the plate 27 in substantially a horizontal plane substantially perpendicular to the plane of

the plate 27. The tube 43 is provided with a restricted internally threaded opposite end 45 and is additionally provided with a partition wall 46 adjacent said end 45 completely closing off direct communication between the ends 44 and 45. The tube 43 has an internally threaded cap 47 secured to the bottom portion thereof beneath the partition 46 to threadedly receive the neck of a transparent container 48 such as a glass jar. The partition 46 forms a relatively long chamber 49 within the tube 43 between said partition and its end 44 and a smaller chamber 50 between the partition 46 and said restricted end 45. A tube 51 has one end mounted in a boss 52 and communicates with the chamber 49 and extends downwardly into the container 48 and has a curved lower discharge end 52, as best seen in Figure 5, which is curved clockwise as viewed from above and which has its lower discharge end opening substantially horizontally and adjacent a portion of the cylindrical side wall of the jar 48, preferably at a level of about two inches above the bottom of said container 48. A short tube 53 is mounted in a boss 54 of the tube 43 and has an upper end opening into the chamber 50 and a lower end opening into the upper portion of the container 48.

A conduit 55 leads from the outlet of the pump 22 and has an outlet end which is secured to the tube 43, between its end 44 and the cap 47 and which opens into the chamber 49, said conduit 55 preferably including a flexible portion 56. The tube 43 is provided with an air release port or opening 57 which communicates with the chamber 49 between the conduit 55 and its end 44.

A collar 58 is turnably mounted on the tube 43 and has a circumferentially elongated tapered opening 59 which is movable into and out of registry with the port 57 for closing, opening or partially opening said port whereby a portion of the air entering the chamber 49 from the pump 22 may be released through the port 57 to maintain any desired pressure in the tube 51. The collar 58 has sufficient frictional engagement around the tube 43 to maintain any position to which it is adjusted.

A discharge manifold, designated generally 60, comprises an elongated conduit or pipe having a closed outer end 61 and an externally threaded inner end 62 which threadedly engages the restricted end 45 so that the bore of the pipe 60 is in communication with the chamber 50. The pipe 60 is of a length to extend transversely across the conveyor 13 and is disposed thereabove and provided in its underside with a plurality of longitudinally spaced discharge ports 63. A plurality of split rings or collars 64 are turnably mounted on the pipe 60 for frictional engagement therewith and are slidable longitudinally thereof so that said rings, forming valves, may be disposed over certain selected ports 63 for shutting off said ports and so that the powder dispensed from the pipe 60 will then be concentrated in particular areas located beneath the other, exposed discharge ports 63.

A resilient strip 65, possessing a greater degree of resiliency than the plate 27, has one end secured to the plate 27 above the boss 42, as by fastenings 66, and extends outwardly from the outer side of said plate and substantially perpendicular thereto and is disposed over the tube 43. A weighted block 67 is secured by one or more fastenings 68 to the strip 65 and depends from the free end thereof and has its lower end normally disposed in engagement with a plate 69 which is secured to the upper surface of the free end of the tube 43 and which provides a substantially flat top surface to be engaged by the block 67.

A powder trap or collector, designated generally 70, includes an open top receptacle which is disposed beneath and extends transversely across the conveyor 13. Said receptacle 70 has end walls 71 which are secured by brackets 72 and fastenings 73 to the side rails 12 and 12*a* of the conveyor 13. The receptacle 70 is relatively shallow except for a deepened portion or well 74 which extends from end-to-end thereof and is disposed adjacent one longitudinal side of said receptacle. A tray 75 is removably mounted in the bottom of the well 74 and is removable therefrom through an opening afforded in one end wall 71 by a removable section 76 thereof which is retained in a closed position by a fastening or fastenings 77, as best seen in Figure 2. An elongated, downwardly opening hood 78 of substantially U-shaped cross section extends the length of and is disposed within the well 74 with its open lower end above and adjacent the top of the tray 75 and is secured at its ends to the end walls 71. An upper strip of mesh wire fabric 79 is secured to a pair of angle members 80 and is supported thereby intermediate of the top and bottom of the hood 78 and extends from end-to-end thereof, said members 80 being secured to the side walls of the hood. A bottom strip of mesh wire fabric 81 is similarly secured to a second pair of angle members 82 and likewise extends from end-to-end of the hood 78 below and spaced from the strip 79. The angle members 82 are demountably supported adjacent the open bottom of the hood 78 by a plurality of pins or supporting rods 83 which extend therethrough and through the side walls of the hood. The chamber within the hood 78 between the mesh wire fabric strips 79 and 81 is filled with a mass of cotton or similar loose material 84 which is pervious to air. A conduit 85 has one end extending through one end wall 71 and which opens into the upper portion of the hood 78 above the mesh wire fabric strip 79. The opposite end of the conduit 85 is connected to the intake of the blower 24.

The end walls 71 are provided with upwardly projecting extensions 86 which extend upwardly from the trap receptacle 70 on the inner side of and adjacent the side rails 12 and 12*a* and which are secured at their upper ends to end walls 87 of a shield, designated generally 88. The shield 88 has upwardly converging side walls 89 the upper, adjacently disposed edges of which are laterally spaced from one another and disposed above the upper edges of the end walls 87 to define an open upper portion 90 of the shield 88 in which the portion of the discharge manifold 60, having the discharge ports 63, is disposed. The enlarged open lower end 91 of the shield 88, as defined by the bottom edges of the end walls 87 and side walls 89, is disposed above and adjacent the upper surface of the conveyor 13 so that the sheets of paper 14 travelling thereon may pass beneath the open bottom of the shield 88. As seen in Figure 2, the length of the shield 88 is greater than the width of the printed sheets 14 so that all portions of the sheets will pass beneath the open bottom of the shield. Likewise, as seen in Figure 3, the open top of the trap receptacle 70 is larger than the open bottom 91 of the shield, which is disposed directly thereabove, so that all powder discharged from the bottom of the shield 88 when a sheet of paper 14 is not disposed therebeneath, will be discharged into the trap receptacle 70. The receptacle extensions 86 may be secured by fastenings 92 to the shield walls 87 for detaching the shield from the trap while the parts are removed from or applied to the press conveyor 13.

To use the anti-offset powder distributor and collector 8, the container 48 is filled with anti-offset powder P to a level below that of the outlet end 52 of the tube 51 and the screw 40 is adjusted so that the plate 27 is displaced away from the core 38 and out of engagement with the stem 41 to permit the contact 35 to engage the contact 34. Assuming that direct current is being used, the current will flow through the circuit including the closed switch 33 to energize the coil 37 to magnetize the core 38 which will attract the plate 27 and cause it to swing from right to left of Figure 4 from its dotted line to its full line position thereby causing the tube 43 and discharge manifold 60 to swing upwardly. As the upper end of the plate 27 swings to its full line position of Figure 2 it will strike the stem 41 to thereby displace the stem 41 and movable contact 35 from right to left to disengage the contact 35 from the contact 34 thus opening the switch 33 to de-energize the coil 37 and de-magnetize the core 38. The plate 27 will then be released and will be spring biased back to its dotted line position of Figure 4 by the pressure exerted thereon by the screw 40 to swing the tube 43 and discharge manifold 60 downwardly, thus completing a vibration of these parts with the plate. Each time that the plate 27 swings away from the core 38 it will disengage the stem 41 to permit the switch 33 to resume a closed position for again energizing the coil 37, and it will thus be apparent that the number of vibrations of the plate 27 in a given period of time may be varied by adjusting the screw 40.

If alternating current is used the switch 33 is omitted and the plate 27 will be vibrated a number of times per second corresponding to the number of cycles of the alternating current. Likewise, the vibration of the plate 27 by either a direct or alternating current will cause a more violent but less rapid vibration of the more resilient

strip 65 and as a result thereof the weighted block 67 will be swung into and out of engagement with the plate 69 for producing a sharp tapping of the plate and additional agitation or vibration of the tube 43 and manifold 60 and likewise of the container 48 which will effectively prevent the offset powder P, from caking in the bore of the manifold 60 or in the chamber 50 and which will likewise keep the powder within the container 48 in a constantly agitated condition and in motion. Whenever the apparatus is in operation to produce the vibration and agitation as previously described, the motor 21 is likewise in operation for driving the pump 22 and blower 24. Accordingly, air will be drawn inwardly through the intake, not shown, of the pump 22, and expelled through the conduit 55 and chamber 49 into the tube 51 from which the air is discharged through the tube outlet 52 in a clockwise direction as viewed from above. The amount of air discharged into the container 48 and the pressure of the air therein may be varied to a great degree and within a wide range by adjusting the valve 58, 59 from a position completely closing the port 57 to a position in which the port 57 is fully exposed and in which latter position an extremely low pressure will exist in the container 48. By regulation of the valve 58, 59 a quantity of offset powder which would last for approximately twenty-four hours' operation with the port 57 fully opened can be dispensed in a few minutes with the port 57 completely closed, so that a very accurate control of the amount of offset powder dispensed, depending upon the amount of ink applied to the sheets 14 passing under the apparatus 8, may be efficiently accomplished by means of the valve 58, 59.

As uniformity in the rate of discharge of the offset powder is of critical importance to the efficiency of a distributing apparatus, the arrangement of the tube 51 and the means for rapidly vibrating and agitating the tube 43, manifold 60 and container 48 is of extreme importance. The vibration and agitation of the container 48 tend to cause the moving powder to pile slightly toward the left side of the container as seen in Figure 4 and any lumps existing therein will work upwardly therethrough and will then roll downwardly to the right-hand far side of the container and repeat this operation which will gradually grind the lumps into powder of intended fineness. Similarly, the outlet end 52 of the tube 51 will be vibrated so that the air discharged therefrom will not be concentrated entirely in one portion of the powder. The agitation of the powder will prevent the air from forming a hole or cavity therein which tends to cause caking, subsequent wall collapsing and resulting intermittent feeding of large quantities of powder. Actually, very little of the air is blown against the powder but rather the air is expelled circularly around the container above the powder creating a whirlwind effect whereby the loosened powder is picked up by the air rising through the center of this minute whirlwind and carried with this air through the tube 53, chamber 50 and along the manifold 60 to be discharged uniformly through all of the exposed discharge ports 63. Any lumps picked up by the swirling air due to their additional weight will be thrown centrifugally against the wall of the container 48 and in this manner the lumps will be broken up until they assume sufficient fineness to be carried upwardly with the rising air stream into the manifold 60. The constant vibration and tapping of the tube 43 and manifold 60 will prevent any of the powder passing through said manifold and the chamber 50 from accumulating therein so that any danger of the powder caking and subsequently being discharged in a large quantity is completely avoided. As previously stated, certain of the outlet ports 63 can be selectively closed so that discharge of the powder will be concentrated above the area of sheets containing the preponderance of the ink.

It will also be readily apparent that the screen of powder and air being constantly discharged downwardly from the exposed ports 63 will be prevented by the shield 88 from being blown in any direction by drafts so that a substantially uniform screen of powder will be spread over the area of each sheet 14 as it passes under the exposed ports 63. Much difficulty and damage is caused by powder escaping from a distributing apparatus and which will be overcome to a considerable extent by the shield 88. However, a part of the escaped powder results from the fact that powder is discharged through the gaps between the sheets 14 being conveyed over the conveyor 13; however, applicant's apparatus includes the collector 70 which will effectively catch all powder passing downwardly through the conveyor 13 between the sheets 14 travelling thereover. This is accomplished since the shield 88 discharges directly over the larger open top of the collector trap 70 and additionally because the blower 24 creates a suction through the conduit 85 in the top of the hood 78 so that a suction constantly exists in the trap receptacle 70 while the powder is being dispensed and which effectively tends to draw all of the powder not applied to the sheets 14 into the trap 70 and downwardly into its well 74 to be caught in the pan or tray 75. The pervious material 84 is provided as a filter and also functions to insure that a substantially uniform suction or vacuum will exist from end-to-end of the hood 78 so that the powder laden air will be drawn into the trap from all portions of the shield 88 and collected in the tray 75.

It will be readily apparent that the blower 24 could be omitted and the conduit 85 then connected to the inlet of the pump 22 or said pump could be omitted and the conduit 55 could then be connected to the outlet 93 of the blower 24. However, all types of pumps and blowers may not be employed as the pump 22 only supplies air at a very low pressure, of the order of a few ounces, to the container 48. Due to this slight air pressure and the fact that air is not stored, practically no condensation occurs thereby eliminating a problem which causes much trouble in other apparatuses of a similar character where a storage tank having a relatively high pressure is employed and some type of condenser or air filter must be utilized to remove the moisture. This likewise enables the apparatus 8 to be much lighter in weight and to occupy considerably less space.

Various modifications and changes are contemplated and may obviously be resorted to, without departing from the spirit or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. An anti-offset powder distributing apparatus comprising a stationary supporting structure, an elongated discharge manifold adapted to extend across a printing press conveyor having a plurality of downwardly opening discharge ports, a resilient member secured to said supporting structure and supporting said discharge manifold, means vibrating said resilient member for imparting a vibratory motion to the discharge manifold, a storage container for an offset powder having an outlet adjacent its top communicating with said discharge manifold, and an air pressure supply means having an outlet opening within and adjacent the bottom of said container for picking up and conveying offset powder with the air through the container outlet, along the discharge manifold and outwardly through the discharge ports thereof to form a descending screen of powder for application to freshly printed sheets being conveyed along said conveyor beneath the discharge manifold, a tubular member connecting the manifold and resilient member, said storage container being supported by the tubular member to vibrate with said resilient member and discharge manifold for agitating the offset powder contained therein, the discharge end of said air pressure supply means being disposed to discharge the air into the storage container substantially horizontally and circumferentially thereof and above the level of the offset powder for causing the powder to be further agitated to break up any lumps therein and for lifting powder which is in a finely divided form by a whirlwind action through the outlet in the top of said storage container.

2. An anti-offset powder distributing apparatus comprising a stationary supporting structure, an elongated discharge manifold adapted to extend across a printing press conveyor having a plurality of downwardly opening discharge ports, a resilient member secured to said supporting structure and supporting said discharge manifold, means vibrating said resilient member for imparting a vibratory motion to the discharge manifold, a storage container for an offset powder having an outlet adjacent its top communicating with said discharge manifold, and an air pressure supply means having an outlet opening within and adjacent the bottom of said container for picking up and conveying offset powder with the air through the container outlet, along the discharge manifold and outwardly through the discharge ports thereof to form a descending screen of powder for application to freshly printed sheets being conveyed along said conveyor beneath the discharge

manifold, said resilient member comprising an upstanding resilient plate secured at its lower end to said supporting structure, a rigid tubular member having one end secured to and closed by said resilient plate and having its opposite end connected to an end of said discharge manifold for connecting the discharge manifold and resilient plate, a partition wall dividing said tubular member into conduit portions one of which forms a part of said air pressure supply means and the other of which forms a part of said storage container outlet.

3. A distributing apparatus as in claim 2, a spring secured to and projecting perpendicularly from said resilient plate and disposed above said tubular member, a weighted block secured to and depending from the free end of said spring having a lower end disposed above and normally in contact with said tubular member and forming a tapper, said tapper being oscillated by the vibration of the spring with and relatively to the resilient plate for tapping the tubular member to additionally vibrate said tubular member, discharge manifold and storage container, said spring possessing a greater degree of resiliency than the resilient plate.

4. An anti-offset powder distributing apparatus comprising a discharge manifold adapted to extend across a printing press delivery and having a plurality of downwardly opening discharge ports for discharging an offset powder downwardly onto freshly printed sheets conveyed by said delivery beneath the discharge manifold, means supporting said discharge manifold, a storage container for offset powder supported by said supporting means having an outlet communicating with the discharge manifold, agitating means including means for vibrating a portion of said supporting means for imparting a vibratory motion to the discharge manifold and storage container, an air supply means supplying air under pressure to said storage container and having a discharge end opening into the storage container above and adjacent the level of the powder contained therein, and a stationary shield having an enlarged open bottom adapted to be disposed above and adjacent the printed sheets passing beneath the discharge manifold, said shield having a restricted upper end in which said discharge manifold is loosely disposed for vibration relatively to the shield.

5. An anti-offset powder distributing apparatus comprising a discharge manifold adapted to extend across a printing press delivery and having a plurality of downwardly opening discharge ports for discharging an offset powder downwardly onto freshly printed sheets conveyed by said delivery beneath the discharge manifold, means supporting said discharge manifold, a storage container for offset powder supported by said supporting means having an outlet communicating with the discharge manifold, agitating means including means for vibrating a portion of said supporting means for imparting a vibratory motion to the discharge manifold and storage container, an air supply means supplying air under pressure to said storage container and having a discharge end opening into the storage container above and adjacent the level of the powder contained therein, and a tapper unit supported by the vibrating part of said supporting means for vibrating movement therewith and relatively thereto and having a tapper element for striking a part of said vibrating portion of the supporting means for additionally vibrating and agitating the discharge manifold and storage container.

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