April 5, 1966 J. T. LINDQUIST 3,244,325

APPARATUS FOR APPLYING A FILM OF POWDER

Filed Jan. 16, 1964 2 Sheets-Sheet 1

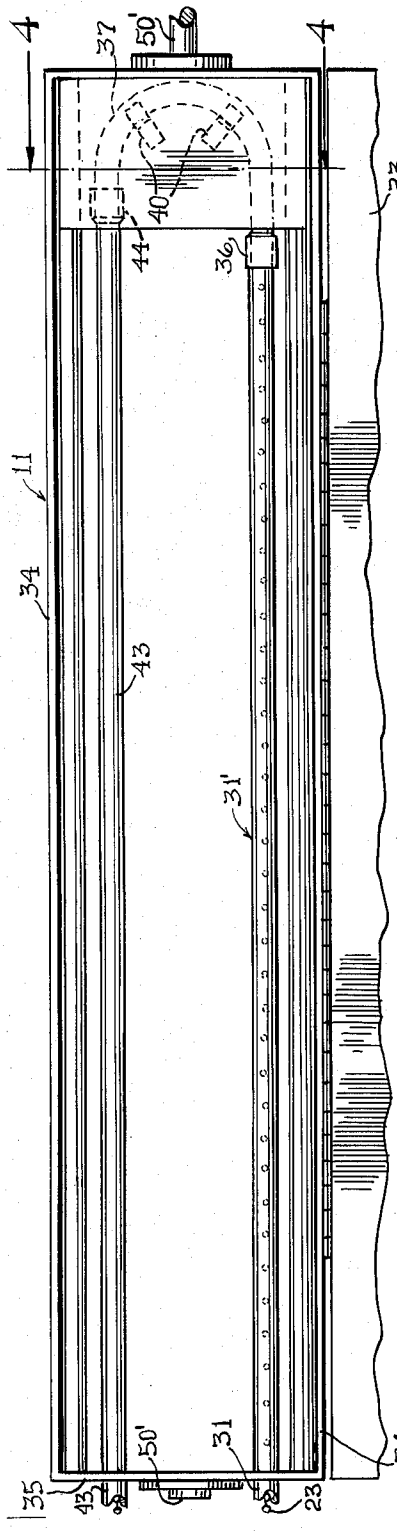


Fig. 2.

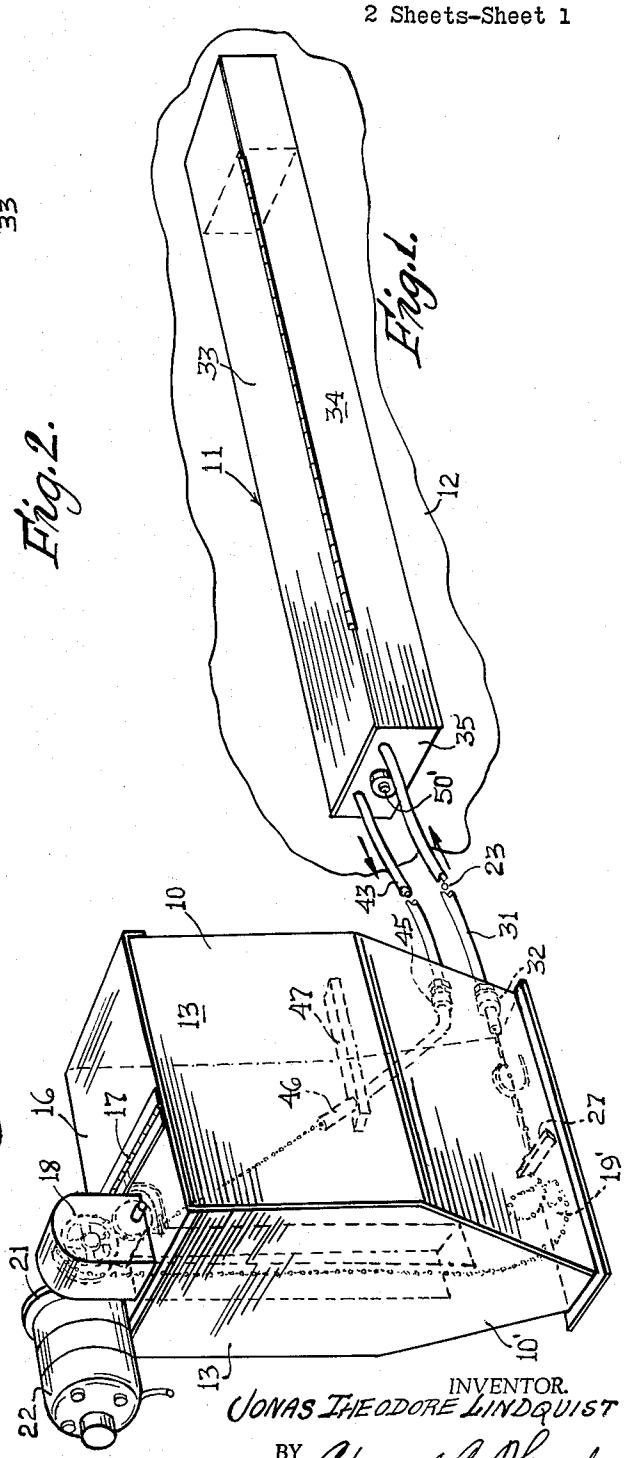


Fig. 1.

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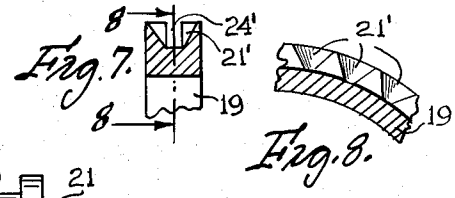


Fig. 7.

Fig. 8.

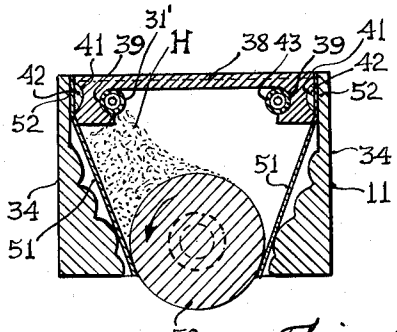


Fig. 4.

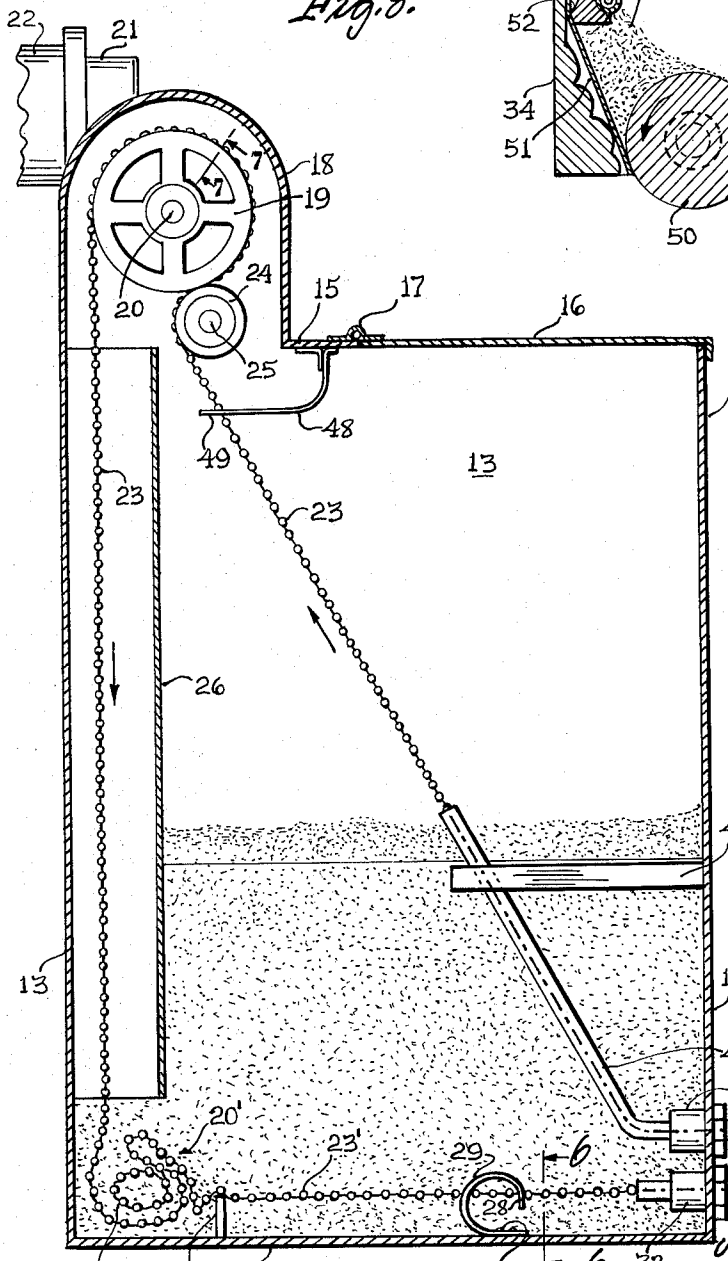


Fig. 3.

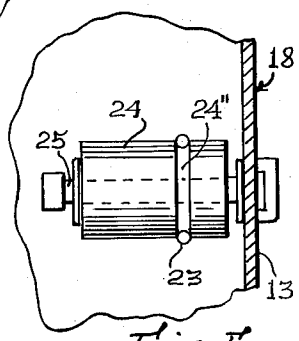


Fig. 5.

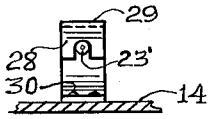


Fig. 6.

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United States Patent Office

3,244,325

Patented Apr. 5, 1966

3,244,325

APPARATUS FOR APPLYING A FILM OF POWDER

Jonas Theodore Lindquist, Skokie, Ill., assignor to Oxy-Dry Sprayer Corporation, New York, N.Y., a corporation of New York

Filed Jan. 16, 1964, Ser. No. 338,053

9 Claims. (Cl. 222—56)

My invention relates to an improved Apparatus for Applying a Film of Powder which apparatus is especially designed and constructed to deliver a predetermined amount of powder to a trough to be dispensed therefrom by a roller upon the freshly printed surface of a sheet of material to dissipate the normal static in the sheet which interferes with the separation of the sheets and also to reduce adhering together of the freshly printed sheets of material.

A principal object of the invention is the simple, novel, and efficient arrangement for maintaining a supply of powder to be contained within a trough commensurate with the amount of powder to be dispensed therefrom, thus preventing an excessive amount of powder being delivered to the trough as well as overflow of the powder therefrom.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings showing the preferred form of construction, and in which:

FIG. 1 is a perspective view of the invention;

FIG. 2 is a top plan view of the same;

FIG. 3 is a vertical sectional detail view of FIG. 1;

FIG. 4 is a sectional detail view taken substantially on line 4—4 of FIG. 2;

FIG. 5 is a fragmentary sectional detail view of FIG. 3;

FIG. 6 is a fragmentary sectional detail view taken substantially on line 6—6 of FIG. 3;

FIG. 7 is a fragmentary sectional detail view taken substantially on line 7—7 of FIG. 3;

FIG. 8 is a fragmentary sectional detail view taken substantially on line 8—8 of FIG. 7.

The preferred form of construction of the invention is shown in the drawings wherein a storage hopper is indicated at **10** and an elongated trough at **11**. The hopper **10** is adapted to hold a quantity of powder for delivery to the trough **11**.

The storage hopper **10** and trough **11** are mounted in any suitable manner on preselected elements (not shown) of a printing press which includes a table (not shown), across the surface of which a freshly printed sheet **12** passes from the printing press to a stacking table or platform (not shown). The trough **11** is arranged with respect to the sheets **12** in a manner such that as the freshly printed sheets pass therebeneath a relatively fine film of powder will be deposited upon the printed surface of the sheet for the purposes hereinbefore stated in connection with the objects of this invention.

The storage hopper **10** may be in the form of construction shown in the drawings, having a tapered bottom portion **10'** and including side walls **13**, a bottom wall **14**, and a top wall **15**, the latter including a cover **16** hinged as at **17**.

The top wall **15** provides a housing **18** within which is arranged a gear **19**. The gear **19** is fixedly journalled on a shaft **20** extending transversely of the housing **18**. Through the medium of gears contained within a gear train housing **21**, the shaft **20** has driving connection with a shaft of an electric motor **22**.

The gear **19** has formed circumferentially therein a groove **24'** divided into semicircular sockets **21'** which receive the ball elements of a ball chain **23** extending around the gear **19** and over a guide roller **24** within a groove **24''** former therein. The roller **24** is freely rotatable upon a shaft **25** carried by the adjacent side wall **13**.

Secured to one of the walls **13** and extending horizontally with respect thereto, is a vertical chute **26**, the lower end of which terminates short of the bottom wall **14** to provide with a partition **27**, an opening **20'** (FIG. 3). Through this opening **20'** the chain **23** from the gear **19** passes to the bottom portion of the hopper **10** where a portion **19'** thereof is loosely confined as seen in FIG. 3.

The endless chain **23** passes through the opening **20'** over the partition **27** and through the bifurcated end **28** of a vibratory spring **29** secured as at **30** to the bottom wall **14** of the storage hopper **10**. The purpose of this spring **29** will presently be explained.

From the spring **29**, the chain extends into the through a tube **31** secured to the adjacent wall **13** of the storage hopper **10** as at **32**. The tube **31** has a portion **31'** which extends into and through the trough **11**. The trough **11** includes a hinged top wall **33**, and side and end walls **34** and **35**, respectively, the tube **31** extending through the adjacent end wall **35**. The end of the tube portion **31'** within the trough **11**, has connection with a nipple **36** formed as a part of a U-shaped return tube **37**.

The tube **37** through which the chain **23** passes is supported within the trough **11** by a plate **38**, the underside of which provides recesses **39** into which the return tube **37** is positioned as shown in FIG. 4. Suitable spring clips **40** carried by the plate **38** securely hold the return tube **37** in the recesses **39**. The opposite corresponding edges of the plate **38** are grooved as at **41** to receive a strip **42** carried by the side walls **34** of the trough **11** and formed in cross section to conform to the grooves **41**.

From the return tube **37**, the chain passes through a tube **43** arranged in parallel relation to the opposite side wall **34** of the trough **11** and which, like the tube **31**, is connected to the return tube **37** by a nipple **44**. The tube **43** extends into the storage hopper **10** through a coupling **45** similar to the coupling **32**. From this coupling **45** the tube **43** extends in an angular direction upwardly as at **46** and is firmly held in such position by a suitable bar **47** secured in any suitable manner to the adjacent wall **17** of the hopper **10**. The chain **23** from the return tube **37** extends through the tube **43** back into the hopper **10** and thence around the roller **24** as shown in FIGS. 3 and 5. Carried from the top wall **15** is a vibratory spring **48** having a bifurcated end **49** similar to the bifurcated end of the spring **29**. The chain **23** passes through this bifurcation **49** of the spring **48** for reasons hereinafter explained.

The storage hopper **10** has confined therein a quantity of powder such as is suitable for use in dissipating the static in paper sheets and which will serve to prevent the sheets from adhering together.

As the chain 23 is made up of a plurality of balls secured together in a manner well known in the art, it is apparent that the chain will be non-kinking. Its movements throughout its course are free and uninterrupted. The loose or stacked portion 19' will be submerged in the powder as will the horizontal run 23' of the chain. As the gear 19 is rotated by operation of the motor 21, the gear 19 will pull the chain 23 in an upward direction as indicated by the arrow in FIG. 3. When moved in this direction, the chain will pass around the roller 24 and the gear 19 and then by gravity move down through the chute 26 where it will form the loose stack 19', at the open end of the chute 26. As the chain 23 is drawn out of the tube 43, the chain will be drawn into the tube 31. As the chain run 23' is drawn across the hopper 10 into the tube 31, it will carry with it a predetermined amount of powder which is carried into the tube portion 31' within the trough 11. The powder, as the chain passes through the tube portion 31', will pour out of the tube portion 31' through the perforations 33' formed in the tube portion 31' within the trough 11.

As each ball of the chain 23 engages the bifurcated end of the spring 29, a vibratory action will be set up so as to vibrate the chain portion 23' to break up the powder at the bottom of the hopper 10, keeping the same loose and also preventing clogging of the powder in the tube 31. Likewise, as the chain 23 passes through the bifurcation 49 of the spring 48, the chain 23 will be vibrated and any powder clinging thereto will be shaken therefrom before the chain passes onto the roller 24.

In the trough 11 there is a roller 50 extending longitudinally through an elongated opening 51 formed in the bottom of the trough. Engaging the opposite long sides of the roller 50 are spring plates 51 having their upper edge portion connected to the edges 52 of the walls 34 of the trough 11. These spring plates 51 yieldably bear upon the long sides of the roller 50 and cooperate with the roller 50 to permit a fine spray of powder to be discharged from the trough 11 onto the surface of the freshly printed paper.

The roller 50 is rotatably supported by the end walls of the trough 11 as at 50' and is rotatable by any suitable means, such, for example, an electric motor (not shown) or other operating part of the printing press.

As the chain moves into and through the tube portion 31', it carries with it a predetermined amount of powder, a portion of which will pour through the perforations in the tube portion 31' within the trough 11. As the powder accumulates in the trough 11, there will be formed beneath each perforation a powder hill H as shown in FIG. 4. When the powder hill reaches a height where it contacts the tube portion 31, the perforations will be closed thereby and further delivery of powder to the trough 11 through the perforations is blocked until the hill is dissipated by the operation of the roller 50 feeding the powder from the trough 11 onto the surface of the freshly printed sheet. By this arrangement, the amount of powder delivered to the trough 11 is controlled and maintained and such trough will not be filled to overflow from the trough. In other words, the amount of powder delivered to the trough is commensurate to the amount fed from the trough by the roller 50.

The amount of powder to be delivered to the tube 31 within the trough 11 will depend upon the speed of rotation of the gear 19 and the movement of the chain 23. Best results are obtained by adjusting the speed of movement of the chain 23 and gear 19 by the length of time it takes to build up the powder hills to a height to close the perforations in the tube portion 31', thus preventing further supply of powder to the trough until the hills are dissipated in the manner above stated. Until the hills H are sufficiently dissipated, the powder will be carried into the hopper 10 by the chain 23.

From the foregoing description, it is apparent that I have provided a simple, inexpensive and efficient arrangement for delivery to a trough of an amount of powder in proportion to the amount of powder being deposited upon the surface of a freshly printed sheet, thereby reducing to a minimum the risk of depositing an unnecessary amount of powder on the surface of the sheet as well as accumulating an excessive amount of powder in the trough.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I therefore do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. A machine for applying a film of powder upon the surface of a freshly printed sheet of material moving beneath said machine, comprising a powder reservoir, means for dispensing powder from said reservoir onto said sheet, and means for delivering powder to said reservoir in an amount commensurate with the amount of powder dispensed therefrom comprising an endless flexible powder conveying chain and a conduit therefor, said chain and its conduit being routed into and out of said reservoir, said conduit having static valveless openings for delivering powder to said reservoir, said static openings being located to be obstructed by said powder when said powder reaches a predetermined level whereby said excess powder is drawn out of said reservoir.

2. The apparatus defined by claim 1 wherein said reservoir is provided with an elongated opening in the bottom thereof and the dispensing means is an elongated roller rotatably mounted in said reservoir.

3. The apparatus defined by claim 2 characterized by the inclusion of elongated spring plates within said reservoir and attached thereto on opposite sides of said roller and having corresponding longitudinal edge portions yieldably bearing against the cylindrical surface of said roller.

4. The apparatus defined by claim 1 characterized by the inclusion of a supply hopper from which the powder is delivered by said powder delivering means to said reservoir.

5. The apparatus defined by claim 3 further characterized by the inclusion of a supply hopper from which the powder is delivered by said powder delivering means to said reservoir.

6. The apparatus defined by claim 4 characterized by the inclusion of powder agitating means in said hopper.

7. The apparatus defined by claim 5 characterized by the inclusion of powder agitating means in said hopper.

8. An apparatus for applying a film of powder upon the surface of a freshly printed sheet of material moving therebeneath, comprising

(a) a hopper having a quantity of powder therein,

(b) an elongated reservoir adapted to receive the powder from said hopper and beneath which said sheet moves,

(c) means for conveying powder from said hopper to said reservoir, said means comprising

(d) a substantially U-shaped tubular structure arranged in said reservoir with one limb of said tubular structure having longitudinally spaced perforations extending downwardly into said hopper,

(e) driving mechanism associated with said hopper and including a rotatable driving gear,

(f) a vertically extending chute carried by a side wall of the hopper and terminating at a point short of the bottom of said hopper to provide a lateral opening opening into said hopper,

(g) and endless ball chain passing over said gear, said chain from said gear passing through said chute and having a portion thereof loosely stacked at the bottom thereon at said opening, said chain extending from said opening through said one of the limbs, said chain returning through the other limb of said tubular structure into said hopper to said gear.

9. The apparatus defined by claim 8 wherein the passage of powder through said perforations is blocked when a hill of powder has been accumulated beneath said perforations, and means for vibrating said chain within said hopper to agitate the powder contained therein.

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