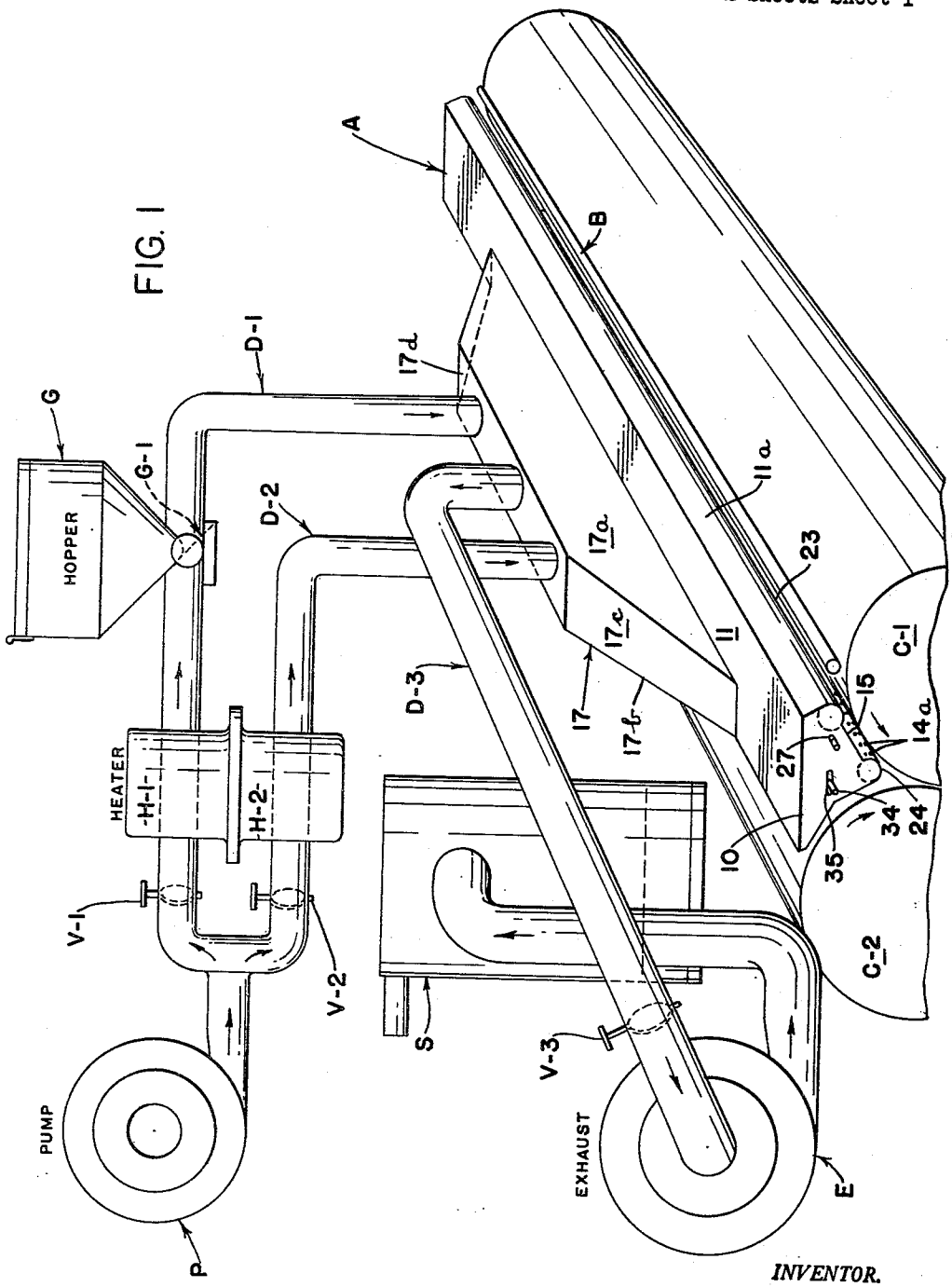
Sept. 11, 1962 D. J. DOYLE 3,053,180

ANTI-OFFSET POWDER SPRAY AND CLEANER SYSTEM

Filed March 17, 1960

2 Sheets-Sheet 1

FIG. 1



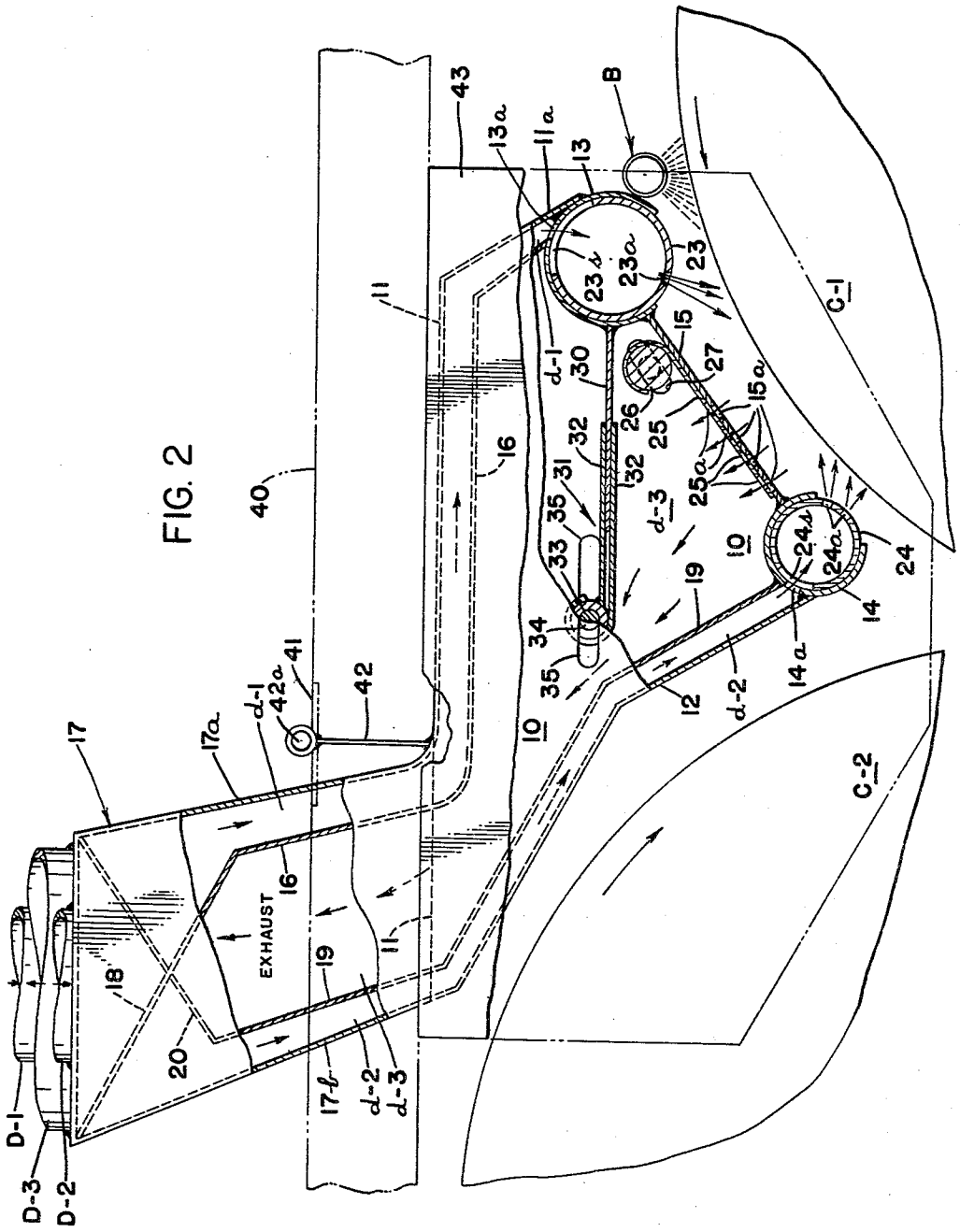
INVENTOR.
DONALD J. DOYLE
BY Williams, Tilberry & Golrick
ATTORNEYS

Sept. 11, 1962 D. J. DOYLE 3,053,180

ANTI-OFFSET POWDER SPRAY AND CLEANER SYSTEM

Filed March 17, 1960 2 Sheets-Sheet 2

FIG. 2



INVENTOR.
DONALD J. DOYLE
BY Williams, Tilberry & Gobrick
ATTORNEYS

United States Patent Office 3,053,180 Patented Sept. 11, 1962

3,053,180
ANTI-OFFSET POWDER SPRAY AND CLEANER SYSTEM

Donald J. Doyle, 1297 W. 114th St., Cleveland 2, Ohio

Filed Mar. 17, 1960, Ser. No. 15,681
16 Claims. (Cl. 101—416)

The present invention is generally concerned with applying anti-offset spray to a printed paper or the like and the removal of excess sprayed material from the paper; and more particularly with the effective application of an anti-offset powder to a moving printed web or sheet in a printing press with a simultaneous removal or clearing from the sheet of excess powder, while at the same time preventing spreading of the powder to other parts of the press to which the system is applied.

The application of a spray powder, that is an anti-offset powder, in a printing press to a freshly printed sheet or web has in the past been attended by certain difficulties in the overall printing operation. Since the powder is generally dropped or blown upon a moving sheet or web, as a practical matter it must pass through some free or unconfined space, however small, in its path to the paper. Apart from the question of the removal of excess powder from the web itself, the airborne powder may be carried by the non-dissipated currents of air by which it is blown, or may even merely drift to other parts of the press, there to foul the press mechanism and so increase the maintenance burden; or to the paper itself at more remote regions in its path of press travel. Further all excess powder actually on the paper must be removed, as required in cleanliness of the printed product and also to avoid transport of the powder by the paper to parts of the press which would be fouled thereby.

The general object of the present invention is then to provide a means in a printing press for applying to freshly printed paper, either moving individual sheets or a continuous web, an anti-offset powder in effective manner and at the same time to remove all excess from the web or paper. A further object is to provide means for applying the anti-offset powder and simultaneously removing all excess from the sheet, while preventing air transport of powder from the region of application to other parts of the press. A still further object is to provide a system for applying anti-offset powder to freshly printed paper moving in a press by means minimizing the spread of powder to other parts of the press, thereby to diminish powder-caused wear of press parts and as well to diminish maintenance required merely to keep the press clean enough for satisfactory production.

The means by which these and other objects and advantages of the invention are achieved will be set forth in the following description and the drawings wherein:

FIG. 1 is a more or less schematic representation of the system showing the general relation of the system components, and also a suitable disposition of a powder distributing and cleaning manifold or head relative to paper transport cylinders in a printing press; and

FIG. 2 shows in greater detail the structure and operation of said head.

In general organization, as shown in FIG. 1, the system comprises the anti-offset distributing and scavenging head A and associated anti-static bar B, disposed adjacent the sprocket and transfer cylinders C–1, C–2 of a printing press to operate on the moving web of paper passing over C–1; an electric motor-driven air pump or centrifugal fan P, drawing air from the surrounding atmosphere to supply the head A; preferably, a dual heater with separate halves H–1 and H–2 included in the respective air duct branches D–1 and D–2 leading from the outlet of the pump; an anti-offset powder storage and dispensing hopper unit G for introducing the powder through a powder

mixing and feed control valve G–1 into the air stream in D–1 to be carried thereby to the head; and an electric motor driven exhaust air pump E drawing powder-laden air from the head through exhaust duct D–3 to pump the same through a dynamic precipitator S for separation and recovery for re-use of powder before venting of the air to free atmosphere. Valves V–1, V–2 before the heater and V–3 before the exhaust pump are provided in the corresponding ducts to regulate and balance air flow and pressure in the system as required for operations hereafter detailed.

The general form and disposition of head A is apparent in FIG. 1 and further details of construction in FIG. 2. In the head a pair of irregularly shaped end walls or plates 10, a top wall plate 11; a rear wall plate 12; a pair of three-quarter cylindrical elements 13, 14 secured respectively in parallel spaced relation to the inside of the bottom edges of plates 11, 12 and to front and rear edges of a bottom plate 15, form a main housing structure of the head extending substantially the full length of the cylinders.

An internal partition 16, running from end to end of the housing in spaced relation to wall 11 and having a forward edge secured to member 13, at its rear is carried up into a dome structure 17, here likewise in spaced relation to the forward dome wall 17*a* to define a spray manifold, an air passage *d*–1 putting a longitudinal series of apertures 13*a* formed in 13 in communication with duct D–1, the back edge portions of 16 underlying the wall 11 being curved up to join the latter; an extended sloping irregular portion 18, cooperating with other partitions, partition 19 and irregular partition 20, sides 17*c* and top 17*d* in the dome, in bounding distinct passages.

Similarly an internal partition 19 spaced from the rear wall 12 and dome rear wall 17*b*, with extension 20 defines a cleaning air passage or manifold putting duct D–2 in communication with the longitudinal series of apertures 14*a* in 14. The remaining free space bounded by the said partitions then provides an exhaust air manifold, the larger passageway *d*–3 from perforations covering a major part of plate 15 to exhaust duct D–3.

The three-quarter cylindrical elements 13 and 14 serve as casings for rotatably mounting spray and cleaner or scavenging air tubes 23 and 24, with series of arcuate kerfs or slots 23*s*, 24*s* respectively matching apertures 13*a*, 14*a*, so that by rotational tube adjustment, the direction of air issuing from apertures 23*a*, 24*a* to impinge upon the web may be altered. Friction between a tube and its casing, or positive locking means can be used to hold a tube setting.

A perforated control plate 25 with apertures 25*a* is slideably adjustably supported on the inner face of plate 15 (to vary flow through apertures 15*a* and for a given exhaust volume the velocity of the air picked up) by a transverse rod 26 secured along its upper margin and having axially projecting studs at opposite ends extending through slots 27 in plates 10 for manipulation and locking by external washers and wing nuts or like fasteners.

Also for further control of exhaust air flow, a partition 30 running from end to end and extending horizontally rearwardly from 13 leaves an opening between its rear edge and partition 19, which is varied by a control or sliding valve structure 31, comprised of a pair of spaced plates 32, 32 slideably sandwiching the rear part of partition 30, and at the rear mutually secured and supported by a rod 33, again having stud-like projections 34 extending through horizontal slots 35 in plates 10 for external manipulation and locking.

The anti-static device B is conveniently mounted on the head A, in proximity to the moving paper web; and also to the spray tube 23 as shown since the charges on the spray powder particles will, as well as the web, be

thereby neutralized for a better application to the printed paper. The particular form of the mounting will of course depend on the specific type of device used, as known to the art.

The head A is supported from surrounding environmental press structure such as parallel lateral press frame members **40** by say a transverse hinge plate **41** and a vertical hinge plate **42**, through the hinge knuckles of which a long removable rod **42***a* extends as a pintle.

Further to enclose the head at each end (see FIG. 2) a respective vertical shield plate **43** is provided, removably attached to the end walls **10**, and in close proximity to the ends of the cylinders. Thus such outside air as is drawn into the head will enter in greater part under the front and back tubes, the shield plates serving to reduce the air flow at the ends, usually in some degree to increase the velocity of air entering between shields and head ends, and to minimize thereby the possibility of escape of the powder from the head region to other parts of the press. The air supplying and exhaust fans or blowers P, E, duct work and valving, the separator S, hopper unit G with feed valve G–1, and heaters H–1 and H–2, may be selected from many types of the respective units known to air moving or heating and pneumatic material-conveying arts. Obviously the blowers may be other than electrically driven, and the air heater units may transfer heat to the air from electrical, gas, steam or other heat sources, thermostatically or manually controlled.

So also the anti-static bar can take the form of many devices known in the printing or other arts involving moving sheets, webs, tapes or other materials, which tend to acquire troublesome static charges; the patented arts of which disclose the use of high voltage discharge devices, radioactive or other sources of ionizing radiation for example, usually with a grounded element even such as a press cylinder contacting the moving web in a region close to and opposite the bar.

Since the specific forms of these individual units, and individual control means are not per se part of the invention and suitable forms thereof are known to those skilled in the art, such are not here detailed.

In operation of the system, the valve V–1 and feed from hopper G are adjusted to deliver powder through spray tube **23** across the width of the printed web in sufficient amount to ensure adherence of the same to all yet undried parts of the print; valve V–2 is set to deliver such quantity of air to the tube **24** as will effectively prevent escape of air-borne powder from the web, providing an air wall and sweeping the same toward the middle or exhaust region of the head; while V–3 is set in conjunction with slide-valve members **31** and **25** to draw not only the total air volume supplied by **23** and **24** (with entrained powder) into the exhaust system, but usually also some ambient air under the front, rear and sides of the head A as a further air curtain or wall to prevent escape of air-borne powder at the latter locations. The setting of **25** is primarily chosen to limit the "capture velocity" of the air taken in to avoid picking up too much powder from the paper. On the other hand should need arise, the air from **24** may help to scour from the web powder applied in excess.

The rotational settings of tubes **23**, **24** are adjusted in the first instance to direct their respective air streams most effectively, though inwardly in any event, for their intended purposes of powder application and scouring and to minimize tendencies to allow powder carried therewith to escape the head, under conditions of a given exhaust air volume. Thus the powder-laden air from **23** is directed generally in the direction of web travel; and air from **24** counter to the web travel as an air wall preventing escape of air-borne powder.

The heating of the air delivered through D–1 aids the distribution of the powder from the hopper to the web, one reason apparently being that the powder is thereby dried, tends to disperse the more readily, and any small lumps due to moisture content are the more readily broken up; and further heated air delivered through **23** and **24** accelerates drying of the ink. The temperature of the air thus delivered for a given volume may be increased for this purpose. The greater, then, the drying induced at the head H, generally the lower is the amount of offset powder required.

These various adjustments then may affect one another, but of course under normal adjustments are empirically selected preferably to achieve the necessary functions (powder application to, scouring and cleaning from the web, and confining of the powder to the head region) with a minimum of air consumption, therefore of energy requirements by the system.

Where the offset powder prevents difficulties consequent to lumping or caking the hopper feed control G–1 preferably will comprise a power driven dynamic device; for example including a motor-driven rotary feed roller already known to the patented art for feeding and distributing such powder from a supply space, though usually directly onto a moving web; or including a mechanically or electromagnetically vibrated element, serving to maintain powder flow.

I claim:

1. A system for applying an anti-offset powder in a printing press to a moving printed web and for minimizing fouling of surrounding structure of the press, comprising: a unitary head structure adapted to be disposed in the press entirely on one side of the web path for operation upon the web at a localized area therein and including a powder distributing tube extending transversely across the web, a scavenging air tube parallel to said distributing tube and spaced therefrom in the direction of web movement, said tubes being proximate to said web and having air apertures for directing convergent air streams to impinge upon the moving web across the transverse extent of the web, the spacing of said tubes delimiting the area of localized operation of the said head, the head also including means for applying a vacuum for exhausting powder-laden air from the space between said tubes; continuous vacuum producing means connected with the last said means; means for continuously supplying air to the said tubes; and powder supply means for introducing anti-offset powder to air supplied to the distributing tube.

2. A system as described in claim 1, including means disposed adjacent the path of said web before said distributing tube for diminishing static electrical charges on said web before the web is subjected to a powder-laden air discharged from the distributing tube.

3. A system as described in claim 1, wherein the means for exhausting the powder-laden air comprises an exhaust fan connected by duct-work to the space between said tubes, the space between said tubes and said web being confined endwise by shield plates to minimize dispersal of powder to adjacent portions of the press.

4. A system as described in claim 3 including means for regulating the air flow to said tubes from the air supply means, and from said space to said exhaust fan.

5. A system as described in claim 1, including means for heating air supplied to the respective said tubes.

6. A system as described in claim 5, including means disposed adjacent the path of said web before said distributing tube for diminishing static electrical charges on said web before the web is subjected to a powder-laden air discharged from the distributing tube.

7. A system as described in claim 1, including means receiving the air discharged from the air exhausting means adapted to separate and recover from an exhaust air stream powder entrained therewith.

8. A system as described in claim 1, wherein said tubes are adjustably mounted to vary the angle of impingement of said air streams upon the web.

9. Apparatus for applying to a moving printed web in

a printing press an anti-offset powder and for minimizing powder fouling of the press, comprising: an operating head mounted in the press in proximity to a newly printed side of the web; said head including an elongated closed housing extending across only one side of the web, a pneumatically supplied powder distributing tube along an edge of the head located toward the direction from which the web approaches, and a scavenging air tube in rearwardly spaced parallel relation to the first said tube, said tubes being apertured to direct air upon adjacent moving portions of said web, an exhaust air intake region between said tubes, and air passages within said housing from said tubes and intake region to respective external connections of the head; an air supply fan and valved ducts from said fan to the head external connections of said tubes for continuously supplying air to said tubes; and an exhaust fan and a valved duct therefrom to the external head connection of said exhaust region for continuously exhausting air from the space delimited by said tubes and said web.

10. An apparatus as described in claim 9, wherein said tubes are rotatably mounted in respective casing elements having air apertures communicating with respective said air passages, and said tubes have arcuate slots corresponding to the air apertures and air directing outlet apertures, whereby the direction of air impinging upon the web from the outlet apertures may be varied.

11. Apparatus as described in claim 10, wherein the exhaust air intake region between said tubes is spanned by a perforated plate, said plate being overlapped by a slideable second perforated plated controlling intake of air exhausted into said head.

12. Apparatus as described in claim 9, wherein said

head includes an internal slide valve for controlling air flow from said exhaust air intake region.

13. Apparatus as described in claim 9, including anti-static means extending across said web forward of said powder distributing tube for discharging static charges carried by said web.

14. A system for applying anti-offset powder in a printing press to a moving printed paper, comprising: means for air-spraying the powder on the moving paper, means for directing air upon the paper to establish an air curtain confining air carrying said powder in a limited space near the point of application, the last said means serving to remove excess powder from said paper, and means for exhausting from said region air entering the same by operation of the first two said means.

15. In a system as described in claim 14, means for neutralizing static on the paper before powder is sprayed thereon.

16. In a system as described in claim 15, means for heating air utilized in at least one of the first two said means.

References Cited in the file of this patent

UNITED STATES PATENTS

703,466	Prince	July 1, 1902
1,558,831	Brunner et al.	Oct. 27, 1925
1,566,800	MacArthur	Dec. 22, 1925
1,867,256	Egli	July 12, 1932
2,332,385	Lauring	Oct. 19, 1943
2,479,882	Wallhausen et al.	Aug. 23, 1949
2,961,952	Doyle	Nov. 29, 1960

FOREIGN PATENTS

596,540	Great Britain	Jan. 6, 1942