March 7, 1950 P. H. DUNAKIN ET AL 2,499,572

INK DRIER FOR PRINTING PRESSES

Filed Feb. 14, 1947 2 Sheets-Sheet 1

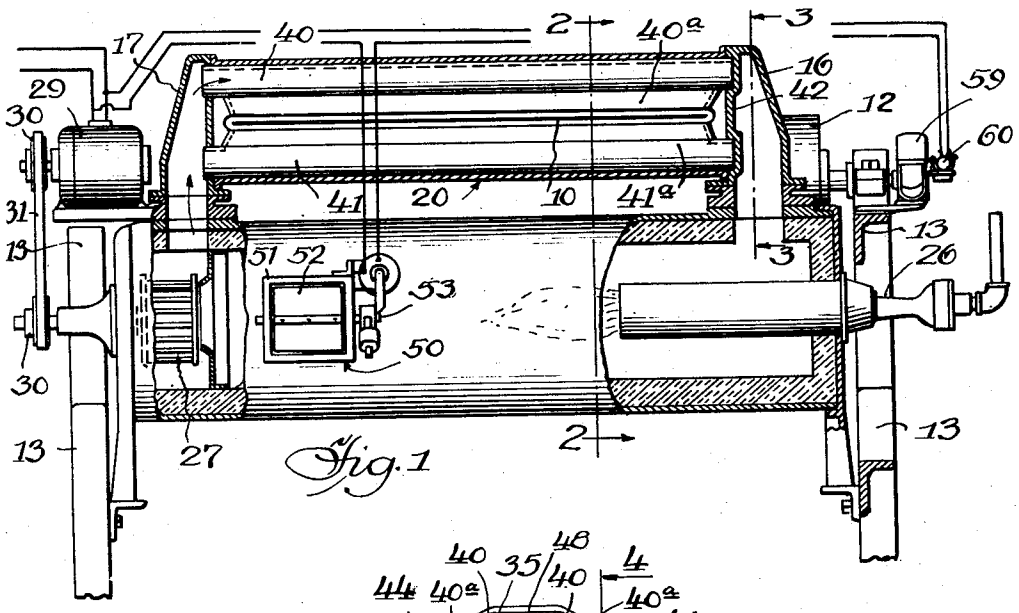


Fig. 1

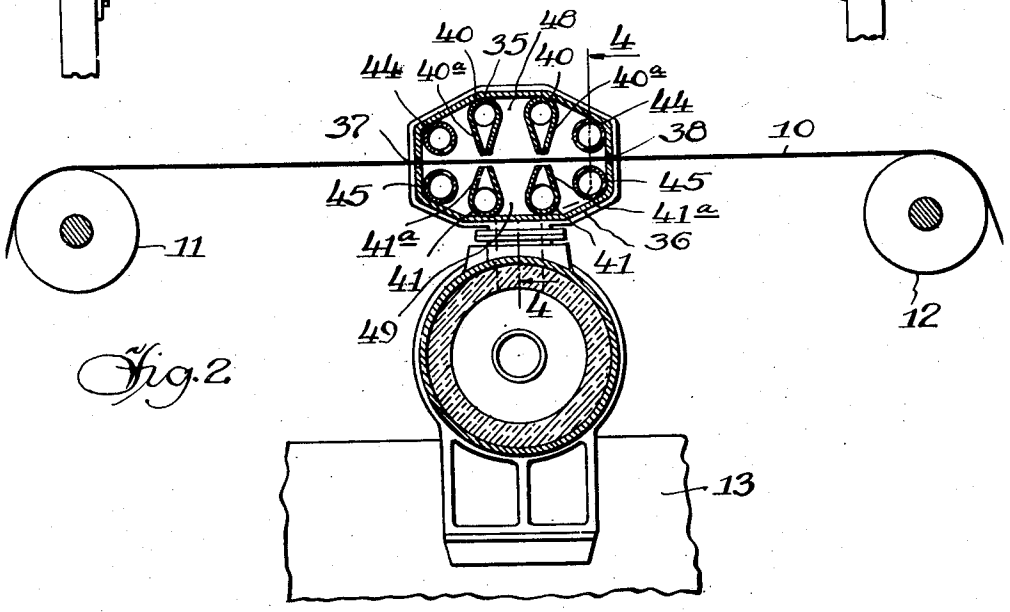


Fig. 2

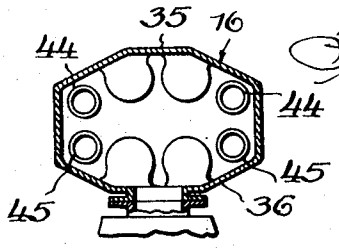


Fig. 3

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INK DRIER FOR PRINTING PRESSES

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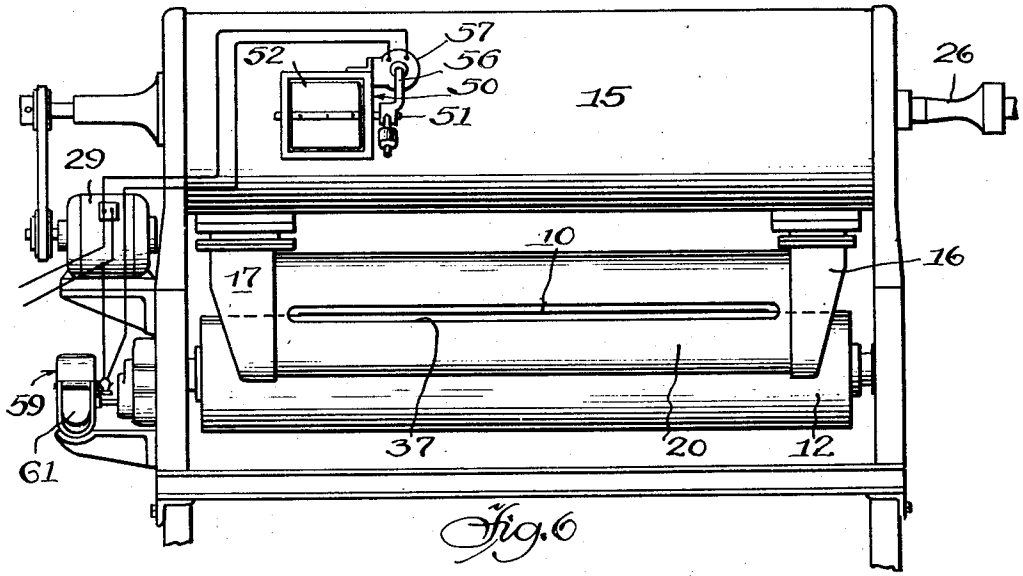


Fig. 6

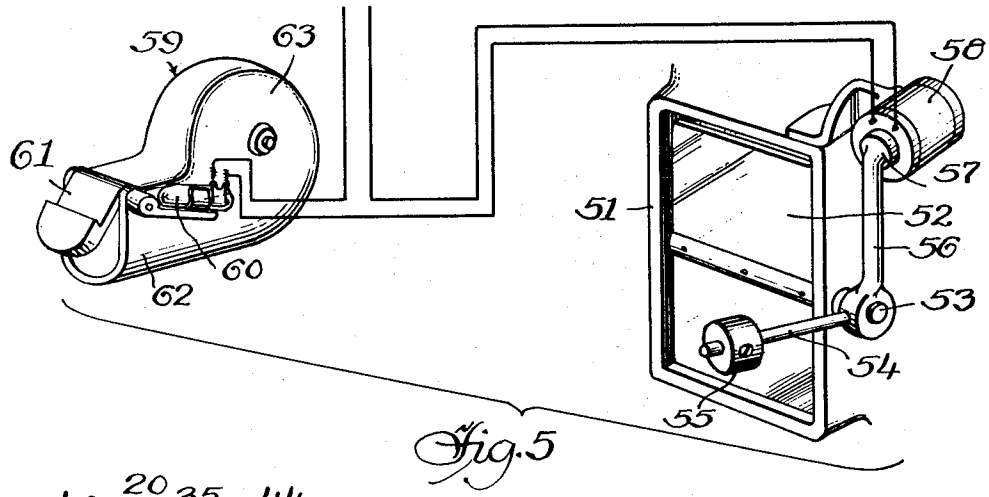


Fig. 5

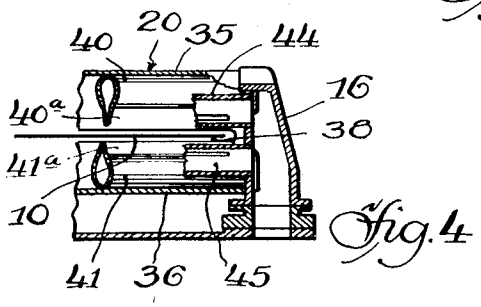


Fig. 4

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INK DRIER FOR PRINTING PRESSES

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1 Claim. (Cl. 34—87)

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This invention relates to improvements in ink dryers for printing presses and has for its principal object to provide a simple, compact and effective apparatus for applying heated gases to the paper web as it leaves the inking rolls of a printing press, so as to facilitate the drying of the ink and make it possible to increase the speed of the press.

A further object of the invention is to provide an improved form of drying hood and a recirculating air heater of specially compact arrangement which is capable of being readily applied to printing presses of conventional construction.

A still further object of the invention is to provide an improved form of auxiliary air intake for the recirculating system including a cool air vent which automatically opens when the speed of the press is reduced below a predetermined rate so as to avoid the application of an excessive amount of heat to the web when the press is slowed down or stopped.

Other objects and advantages of the invention will appear from time to time as the following description proceeds.

The invention may best be understood by reference to the accompanying drawings, in which

Fig. 1 is a side view of one embodiment of our invention in which the furnace is mounted on the printing press below the moving web, with parts of the apparatus shown in section;

Fig. 2 is a section taken on line 2—2 of Fig. 1;

Fig. 3 is a detail section taken on line 3—3 of Fig. 1;

Fig. 4 is a detail section taken on line 4—4 of Fig. 2;

Fig. 5 is a composite figure in part diagrammatic showing the automatic control mechanism for the auxiliary air intake; and

Fig. 6 is a side view showing a modified form of apparatus in which the furnace is mounted on the press above the moving web.

Referring now to details of the embodiment of our invention illustrated in Figs. 1 to 5 of the drawings, the paper web to be dried is indicated at 10 as it passes from the inking rolls (not shown) and over spaced rollers 11 and 12 mounted as usual between side rails or frame members 13, 13 of the press.

The drying apparatus is formed as a composite structural unit for attachment to the side rails 13, 13 and 14, 14 and includes an elongated furnace or heating element 15 having inlet and outlet manifolds 16, 17 at opposite ends thereof connected to the ends of a hood 20 having an elongated restricted passage 21 through which the web 10 passes.

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The heating element 15 consists of a cylindrical casing 25 having a gas burner 26 mounted at one end thereof. An air blower indicated at 27 is mounted at the opposite end of the casing adjacent the outlet manifold 17 and is driven by any suitable power device such as an electric motor 29 connected thereto by pulleys 30, 30 and belt 31. The current supply to the motor 29 can be controlled independently or can be connected for simultaneous control with the power switches for the press.

The hood 20 includes a top plate 35 and a bottom plate 36 which are generally arched or curved in opposed relation to each other and are connected to each other to form an enclosed housing excepting for elongated slots 37, 38 at opposite sides of the hood, which define the ends of the passage 21 through which the web 10 is passed.

The manifold 17 which in Fig. 1 is at the left end of the hood 20, is connected with two pairs of discharge ducts 40, 40 and 41, 41 extending respectively through the length of the hood and disposed in symmetrical relation to the passage 21. Said discharge ducts are closed at their opposite ends against the inner wall 42 of the manifold 16. The upper ducts 40, 40 are disposed in parallel spaced relation to each other, along the top plate 35 of the hood, and the lower ducts 41, 41 are similarly disposed along the bottom plate 36. The two pairs of ducts 40 and 41 have continuous restricted nozzles 40*a* and 41*a*, respectively directed downwardly and upwardly toward each other and terminating in spaced relation to each other on opposite sides of the passage 21 as shown in Figs. 1 and 2.

The manifold 16 communicates with two pairs of exhaust ducts 44 and 45 in said hood which are closed at their opposite ends against the inner upright wall 46 of the manifold 17. The upper exhaust ducts 44 are disposed along opposite sides of the upper pair of nozzles 40*a*, 40*a* and closely adjacent the slots 37 and 38 of the hood. Said exhaust ducts 44 have inlet apertures 44*a* therealong, preferably opening toward the center of the hood, close to the path of the web 10 and at an angle of approximately 45° thereto. The lower exhaust ducts 45 with inlet apertures 45*a* are similarly disposed near the slots 37 and 38 of the hood in spaced relation to the lower pair of nozzles 41*a*.

When the apparatus is applied to the press, the hood 20 is adjusted so that when the web 10 is passed over the rollers 11 and 12 of the press, said web passes freely through the slots 37 and 38 and between the opposed nozzles 40*a* and 41*a*

of the exhaust ducts, as shown in Fig. 2. When the heater is put in operation, the blower 27 forces the heated gases from the furnace through the manifold 17 and discharge ducts 40, 41 so as to be directed through nozzles 40a and 41a under substantially equal pressure against opposite sides of the web 10. As the gases impinge upon the opposite surfaces of the web they tend to be directed at right angles in both directions from each nozzle, but due to the arrangement of the exhaust ducts 44 in the hood, it will be observed that as the gases are recirculated through the system above described, most of the gases from the left hand discharge nozzles 40a and 41a will tend to be directed along the surface of the web toward the left hand exhaust ducts 44 and 45, while most of the gases from the right hand discharge nozzles 40a and 41a will tend to be directed along the web in the opposite direction, toward the right hand discharge ducts 44 and 45. However, some of the gases from the adjacent pair of nozzles 40a, 40a will be deflected from the web toward a central zone 48 between the ducts 40, 40, and similarly, some of the gases from adjacent pair of nozzles 41a, 41a will be deflected into a central zone 49, opposite the zone 48. Since neither of these central zones 48, 49 have direct communication with the exhaust ducts, there will be a tendency to build up a relatively higher gas pressure in these central zones than in the outer zones adjacent the exhaust ducts 44 and 45. The heated gases will therefore be partially trapped in comparatively static condition in the central zones 48 and 49, which thus form opposed pressure balancing zones extending across the center of the hood.

An auxiliary cool air vent is provided in the recirculating system to protect the web against excessive heat when the press rolls are reduced below a predetermined speed, or stopped. In the form shown herein, said air vent indicated at 50 is mounted at one side of the heater casing 25 between the burner 26 and the blower 27, and preferably immediately adjacent the latter. Said air vent consists of a frame 51 having a door 52 hinged on a horizontal shaft 53. The shaft has a lever arm 54 fixed thereon with a weight 55 at its end, arranged to swing the door into opened position by gravity. The shaft also has a lever arm 56 with an armature member 57 thereon, adapted to hold the door closed when engaged with an energized electromagnet 58.

The electromagnet 58 is connected in circuit with a suitable control device responsive to the speed of movement of the web 10. In the form shown herein, the control device indicated at 59 is for convenience mounted on one of the press frame rails 13 adjacent one end of a web roller 12. Said control device includes a mercury switch 60 carried by a pivoted vane 61. Said vane is placed in a discharge spout 62 of a blower 63 driven through suitable speed increasing gearing 64 connected to the web roller 12. As long as the roller rotates above a predetermined speed, the air from the blower will maintain the vane in an inclined position, with the mercury switch 60 closed, thereby keeping the air vent 50 closed. But as soon as the roller drops below said predetermined speed, the vane 61 will drop by gravity to a position where the mercury switch will open, thus releasing the armature 57 and permitting the door 52 of the cool air vent 50 to open by gravitational action of the weight 55. With the specific control mechanism shown and described, it will be understood that when the printing press is first started and the roller and web have exceeded the predetermined speed required for closing the mercury switch 60, the door 52 is closed by hand and will remain closed until the press again drops below said predetermined speed. In this manner, the web will be protected against excessive heat whenever it slows down or stops.

With our improved drying apparatus, it will be understood that the heated gases can be applied to the moving web at a much higher temperature than would be practicable with a longer or slower run of the web through the hood. Thus, the inked surface is more quickly heated than the body of the web, and the latter does not become heated to a dangerous degree before it leaves the hood. Moreover, some of the drying occurs after the web has left the hood. Consequently, the ink is dried more effectively than with prior devices.

We have found in practice that most of the volatile gases collected from the ink while in the hood are burned when they reach the flame of the burner in the furnace, so that there is usually no necessity for otherwise removing such volatile gases from the circulating systems of the apparatus.

Although we have shown and described certain embodiments of our invention, it will be understood that we do not wish to be limited to the exact construction shown and described, but that various changes and modifications may be made without departing from the spirit and scope of our invention as defined in the appended claim.

We claim:

In an apparatus for applying heated gases to a moving web, an enclosed heat applying hood having a restricted passage therethrough for the web, discharge and exhaust ducts in said hood, manifolds in ends of said hood on opposite sides of said passage connected respectively with said discharge and exhaust ducts, a furnace including a heating chamber connected to said manifolds, and blower means between said heating chamber and said discharge manifold for producing recirculation of gases through said hood and furnace, means for moving the web, said furnace having an auxiliary cool air inlet in the wall of its heating chamber adjacent the discharge manifold, a damper in said air inlet, and control means for said damper responsive to the speed of movement of said web for opening said damper when the web speed is reduced below the predetermined value, and thereby reducing the heat passing into the hood from said furnace.

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