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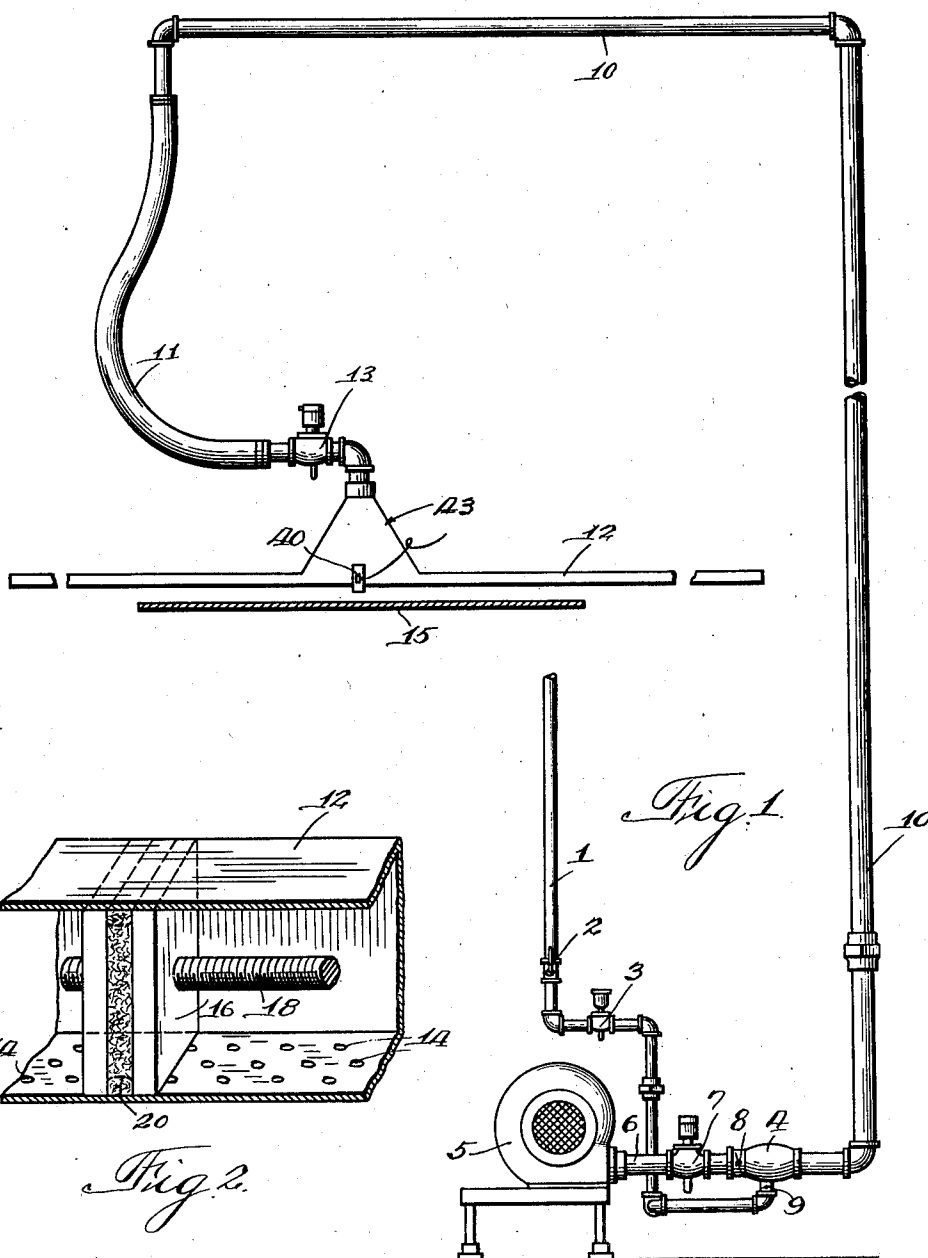
J. B. BURDETT ET AL

2,230,826

BURNER FOR DRYING PRINTING INK

Filed Oct. 1, 1938

2 Sheets-Sheet 1



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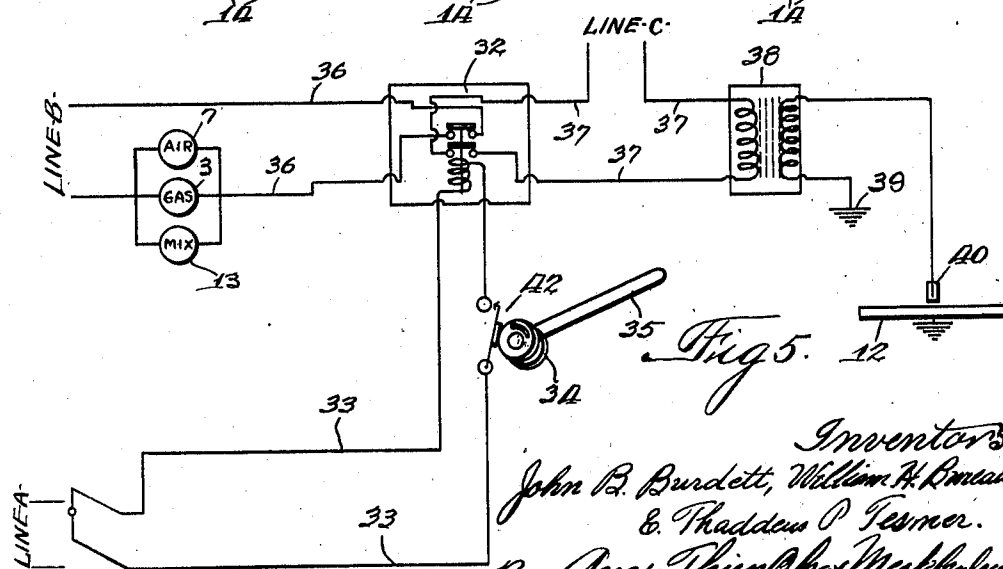
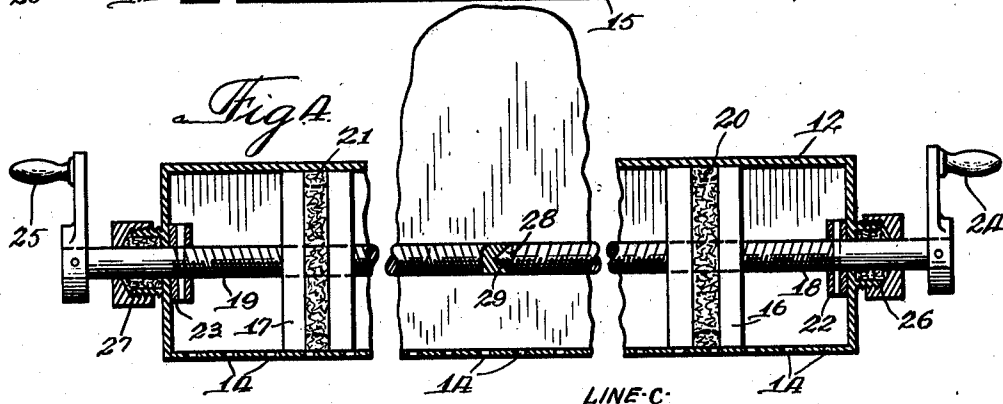
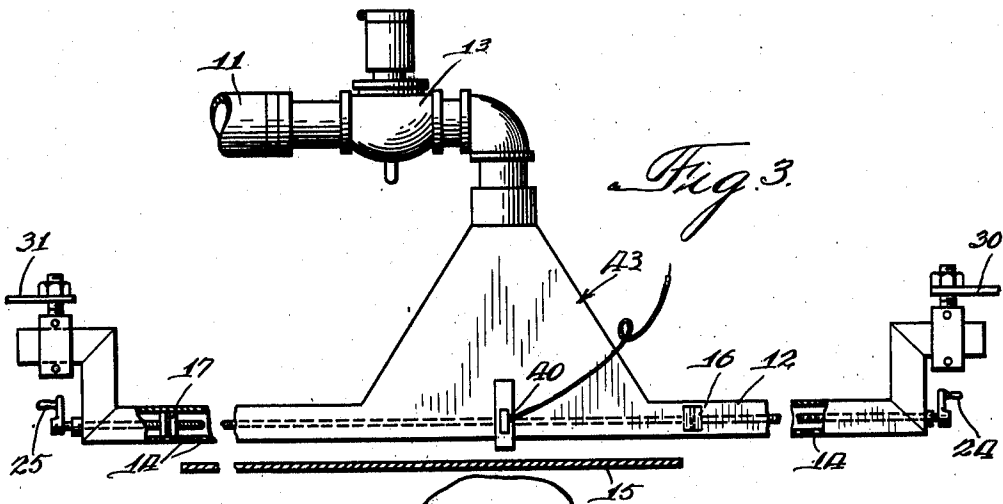
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BURNER FOR DRYING PRINTING INK

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2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

2,230,826

## BURNER FOR DRYING PRINTING INK

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5 Claims. (Cl. 158—99)

This invention relates to ink drying mechanism for printing presses, and more particularly to mechanism whereby the fresh, moist ink on printed paper, and the like, may be dried or hardened immediately as it leaves the press.

It is an object of the invention to provide an improved type of drying burner for accelerating the rate of drying of ink on printed paper whereby the paper may shortly thereafter again be run through the press for printing on the reverse side thereof. This process is commonly called backing, and, with the present invention, it may be accomplished without smudging or offsetting of the ink upon the tympan or upon the adjacent sheets.

More specifically, it is an object of this invention to provide an improved type of burner adapted to be attached to the usual printing press and to operate in conjunction therewith whereby the freshly printed paper as it leaves the press is treated so as to greatly accelerate the evaporation and oxidation of the solvents contained in the ink and more quickly to set the resinous ingredients.

A further object of the invention is to provide an improved type of burner for printing presses having means to adjust the flame area without requiring the burner or parts thereof to be dismantled and new parts substituted.

A still further object of the invention is to provide simple and inexpensive control apparatus, in connection with the aforesaid improved type of burner, that will provide a low pressure flame whereby air compressors and like expensive equipment heretofore required in this type of burner may be eliminated. It is believed that the present invention is the first to suggest the use of control apparatus that will permit employing a low pressure burner in connection with the drying operation of printing presses.

A still further object of the invention is to provide ignition means of the type and character for said burner that will cause operation of the burner preferably on the return travel of the burner across the printed sheets and that will maintain an adequate supply of combustible mixture between the burner jets and mixing chamber to assure immediate ignition as the burner starts its return stroke and to continue supplying this mixture to the burner so that at the end of the return stroke another supply will be stored at the same point for the next operation.

Other objects and advantages of the invention will be noted from the following detailed specification in connection with the accompanying drawings which form a part hereof.

In the drawings:

Figure 1 is a somewhat diagrammatic elevation of one embodiment of the invention and illus-

trates generally the gas and air connections and control valves therefor;

Fig. 2 is a fragmentary sectional view of the burner and one of the adjustable pistons therein;

Fig. 3 is a front elevation, partially in section, showing the burner and adjustable pistons;

Fig. 4 is an enlarged longitudinal section through the burner and illustrates one embodiment of the piston control mechanism; and

Fig. 5 is a diagram of an electrical circuit control whereby the periodic flow of gas and air is effected.

Referring to the drawings in detail, the embodiment illustrated comprises a gas main 1 having the usual shutoff cock 2 and an electrically operated valve 3 which may be of the solenoid type. The gas main 1 communicates with a gas and air mixing chamber 4. This chamber is provided with a supply of air by means of a constantly driven centrifugal fan 5 which forces a continuous supply of air under pressure through the short pipe 6 and a solenoid valve 7 into the mixing chamber 4. In addition to the automatic on-and-off control of the gas and air flow accomplished by means of the solenoid valves 3 and 7, suitable manually controlled valves, such as butterfly valves 8 and 9, are provided whereby proportionate gas and air flow to the mixing chamber 4 may be effected.

From the mixing chamber 4 in which the gas and air are thoroughly intermingled in the proper proportions to provide a quickly combustible mixture, the mixture is forced through pipe 10 and a flexible hose 11 to a burner 12. The burner inlet is automatically controlled by an electrically operated valve 13. Burner 12 is provided with a central funnel-shaped body portion 14 forming an integral part thereof, the inlet for the mixed gas and air being at the apex thereof.

This burner may be of any suitable length to accommodate the widest sheet of printed matter which the press will deliver. The width of flame employed may vary, however, so as to match the width of narrower stock and not extend beyond the edges thereof. The housing of this burner may be rectangular in cross section and may be provided in its bottom face with a plurality of openings 14 through which the gas is forced in small jets. When the gas is ignited the flame impinges upon the entire upper surface of the freshly printed paper 15, which passes thereunder and in immediate proximity thereto in a manner shortly to be described in detail.

To control the flame in accordance with the width of paper used, the elongated burner 12 is provided with a pair of sliding pistons 16 and 17, which, in the embodiment illustrated, are rectangular in shape to conform to the cross-sectional contour of the burner. With a square shape, such as is illustrated, these pistons are

kept from bodily rotation within the burner 12 during adjustment. If, however, it is desired to employ a round burner, these pistons may be secured from rotation by any suitable means, such as keys, guides, or the like.

The pistons 16 and 17 are controlled by means of elongated rods or screws 18 and 19, respectively, threaded therethrough. By rotation of these screws, the pistons may be moved longitudinally of the elongated burner 12 in a direction depending upon the direction of rotation of the screws.

The pistons 16 and 17 may be provided with suitable packing, such as the packing 20 and 21 positioned in a suitable recess in each of the pistons and encompassing the periphery thereof more effectively to keep gas from leaking beyond the pistons.

The screws 18 and 19 may be provided with collars 22 and 23, respectively, which are pinned to the shaft of said screws so as to rotate therewith. The screws also have suitable handles 24 and 25 by means of which the shafts may independently be rotated in the same or opposite directions to cause their respective pistons to approach toward or retreat from the center of the burner and thereby vary the width of the flame from the burner.

The piston screws are supported in suitable bearings at the ends of the burner. These bearings may form stuffing boxes 26 and 27, and the screws are preferably of sufficient length so that their inner ends engage in the middle of the burner. To insure that the ends remain in alignment and do not slip by one another at any time, one of the screws, such as the screw 18, may be provided with a tapered end 28, while the other screw may be provided with a complementary, conical depression 29. It is obvious that without these ends bearing together the screws when turned to move the pistons outwardly would, instead of moving the pistons, cause the shaft rotated to move inwardly until the operating handle engaged the end of the burner. Though a collar similar to the collars 22 and 23 could be mounted on the shafts outside of the bearings 26 and 27, or the hub of the handles 24 and 25 could be secured closely adjacent the outside of said bearings, it is preferred to have the end portions 28 and 29 engaged so as to keep said screws in place and insure a proper axial alignment at all times. In addition, this makes unnecessary the removal of an outside collar whenever it is desired to remove the pistons or piston screws from the burner.

By independently adjusting the pistons 16 and 17, it is possible to direct the flame to any portion of the burner and thereby fully cover printed matter which is not being delivered from the press in central alignment therewith. As illustrated in Fig. 3, the piston 16 may be positioned close to the center of the burner while the piston 17 is positioned near the end thereof. With this arrangement only the printed matter 15 would be subjected to the blast of the hot flame despite the fact that it is not centered with respect to the center of the burner.

The shafts 18 and 19 are preferably oppositely threaded so that if desired, they may be securely fastened together at their ends or made integral so as to rotate together whereby both pistons will at all times be spaced an equal distance from the center of the machine.

The burner may be attached to the delivery end of the usual printing press by means of suit-

able brackets 30 and 31, secured to the usual reciprocating mechanism, which latter moves counter to the direction of movement of the printed paper as it issues from the press. As previously indicated, this burner is mounted so as to closely approach the printed matter as it issues from the press and the flame from the burner closely impinges upon the freshly printed surface. By the use of the previously mentioned reciprocating movement, which is common to printing presses whether of the rotary or cylinder type, the burner, fixed thereto by means of the supports 30 and 31 or other suitable supports, is rapidly moved backward and forward over the surface of the paper as the paper extrudes. That is, as the paper moves forwardly the burner moves rearwardly thereover.

The solenoid valves 3, 7, and 13 may be simultaneously controlled as follows: an electrical circuit of the character illustrated in Fig. 5 may be employed, wherein current from a power line A may intermittently energize a relay 32 through conductors 33, one of which is provided with an interrupter switch 42 which may be intermittently operated by means of a cam 34 which is preferably of the well-known split type and may be adjusted to permit variation in the length of time that the relay is energized. The cam 34 may be secured to any suitable operating portion of the press, such as the shaft 35, and adapted to close the interrupter switch 42 as the burner 12 is moved backward over the surface of the printed stock. When energized, the relay 32 operates to close two circuits, one of which involves line B, which is preferably direct current for energizing the circuit comprising conductors 36. Solenoids 3, 7 and 13 are in parallel in this circuit. Thus, upon operation of the relay 32, the circuit of line B is closed so as to simultaneously energize all of the solenoid valves 3, 7 and 13 whereby the valves are opened to permit the passage of gas, air, and mixture, respectively, therethrough. Relay 32 likewise simultaneously controls the current flow from line C, which is preferably alternating current, and wherein the circuit comprises conductors 37, and the primary side of a high voltage spark coil 38. One side of the secondary of the spark coil 38 is grounded at 39, while the other side extends to a suitable high voltage ignition means or spark plug 40, which operates to ignite the gas emerging from the burner 12.

The cam 34 is synchronized with the paper feed, so that at the time the burner 12 starts to pass rearwardly over the paper the circuit 33 is closed, thereby energizing the relay so that the two secondary circuits are closed, circuit B serving to energize the solenoids 3, 7, and 13, whereby a readily combustible mixture is delivered to the elongated burner 12, and circuit C serving to energize the spark coil 38, whereby a high tension spark is delivered to the spark gap ignition device 40. By the simultaneous operation of the three solenoid valves illustrated, it becomes impossible for there to be any time lag between the cessation of current and the stoppage of the gas flow, and, likewise by this arrangement, any tendency of the gas pressure to build up in the conduit 10 so as to force its way back through the centrifugal air fan 5 is avoided.

The use of this method of controlling the flow of the gas to the burner at relatively low pressure eliminates the necessity for expensive and cumbersome equipment such as the air reserve tank and compressor otherwise necessary when

air at high pressure is used. With this control, an inexpensive centrifugal fan of suitable capacity may be employed to supply necessary air. Without the simultaneous operation of the air, gas, and mixture valves, the gas could escape back through the air inlet of the centrifugal fan as soon as delivery of the mixture to the burner was interrupted and thereby constitute a grave fire and explosion hazard.

This invention, therefore, effectively eliminates the possibility of such gas escaping and, in addition, assures that a constant supply of a readily ignitable mixture will be present at the burner at all times and capable of substantially instantaneous application at full working capacity to the burner proper.

In operation, the burner 12 is mounted upon the delivery mechanism of the printing press so as to reciprocate over and close to the surface of the freshly inked paper as it issues from the press, and the split cam 34 is mounted upon the delivery mechanism drive and synchronized therewith so as to close circuit A when the burner starts to pass rearwardly over the paper as it issues from the press.

The handles 24 and 25 are then adjusted so that the flame issuing from the burner will cover only the width of the paper being printed.

The press is then started and as each sheet issues therefrom, the circuits A, B, and C are closed so as to operate solenoid valves 3, 4, and 13 to permit the flow of the inflammable mixture to the burner. At this time the spark gap 40 is also operated to ignite the gas as it leaves the nozzle 12.

The ignited burner then passes rapidly over the freshly printed surface as it is delivered from the press, the high temperature developed serving to evaporate the ink vehicle and set the resins. As the burner reaches the end of the stroke, the circuit A with its relay and also circuits B and C are broken so that the solenoid valves are closed, stopping the flow of inflammable gas to the burner and extinguishing the flame during the return stroke. This cycle is repeated for each successive sheet as it is delivered from the press.

It will be understood that if desired, the three valves illustrated may be enclosed in one housing. Also, that instead of completely extinguishing the flow of gas from the burners, the valves may be so constructed as to simply reduce the flow of fuel thereto, thus eliminating the ignition means.

Modifications may be made without departing from the spirit of the invention and it is desired, therefore, that the invention be limited only by the prior art and the scope of the appended claims.

Without further elaboration, the foregoing will so fully explain the gist of our invention that others may, by applying current knowledge, readily adopt the same for use under varying conditions of service, without eliminating certain features, which may properly by said to constitute the essential items of novelty involved, which items are intended to be defined and secured to us by the following claims.

We claim:

1. The combination with a gas supply, an air supply, a mixing chamber for said gas and said air, a burner, and a delivery connection between said chamber and said burner, of control means for each of said supplies and at the end of said delivery connection adapted to control the flow

therefrom, and electric relay means regulating the operation of said control means and simultaneously controlling said supplies and the flow through said delivery connection from said mixing chamber in accordance with predetermined flow demands.

2. The combination with a gas supply, an air supply, a mixing chamber for said gas and said air, a reciprocating burner, and a delivery connection between said chamber and said burner, of control means on each of said supplies and at the end of said delivery connection adjacent said burner, said control means adapted to simultaneously control the flow from said supplies and said delivery connection, electric relay means regulating the operation of said control means in accordance with predetermined flow demands, and automatic ignition means operating to ignite said mixture each time it is permitted to pass through the delivery connection.

3. The combination with a gas supply, an air supply, a mixing chamber for said gas and said air, a reciprocating burner, and a delivery connection between said chamber and said burner, of control means on each of said supplies and at the end of said delivery connection adjacent said burner adapted to simultaneously control the flow therefrom, electric relay means regulating the operation of said control means in accordance with predetermined flow demands, and automatic ignition means synchronized with said flow control means and operating to ignite said mixture each time it is permitted to pass through the delivery connection.

4. The combination with a gas supply, an air supply, a mixing chamber where said gas and said air are intermingled, a reciprocating burner and a delivery connection between said chamber and said burner, of control means on each of said supplies and at the end of said delivery connection adjacent said burner adapted to simultaneously operate whereby to control the flow from said supplies and said delivery connection, electric relay means regulating the operation of said control means in accordance with predetermined flow demands, and automatic ignition means synchronized with said flow control means and operated by said electric relay to ignite said mixture each time it is permitted to pass through the delivery connection.

5. A burner having a heat emitting surface mounted for rectilinear reciprocating movement, a source of fuel supply, ignition means therefor, means for effecting operation of said ignition means to ignite the fuel supplied to said burner as it moves in one direction, said fuel supply comprising a gas supply, an air supply, a mixing chamber therefor, a connection leading to said burner from said mixing chamber, electrically actuated valve means for said gas and air supplies to control the flow of each to said mixing chamber, a separate valve means at said burner to control the flow of the mixture to said burner through said connection, said valve means controlling a charge of mixture in said connection for immediate use at said burner when said ignition means is operated, and means to actuate said valve means to release said charge to said burner and to supply additional gas and air to said mixing chamber when said ignition means is operated.

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