June 2, 1936. H. J. McCOY 2,042,792

STATIC ELIMINATOR

Filed March 12, 1934 2 Sheets-Sheet 1

FIG. 1

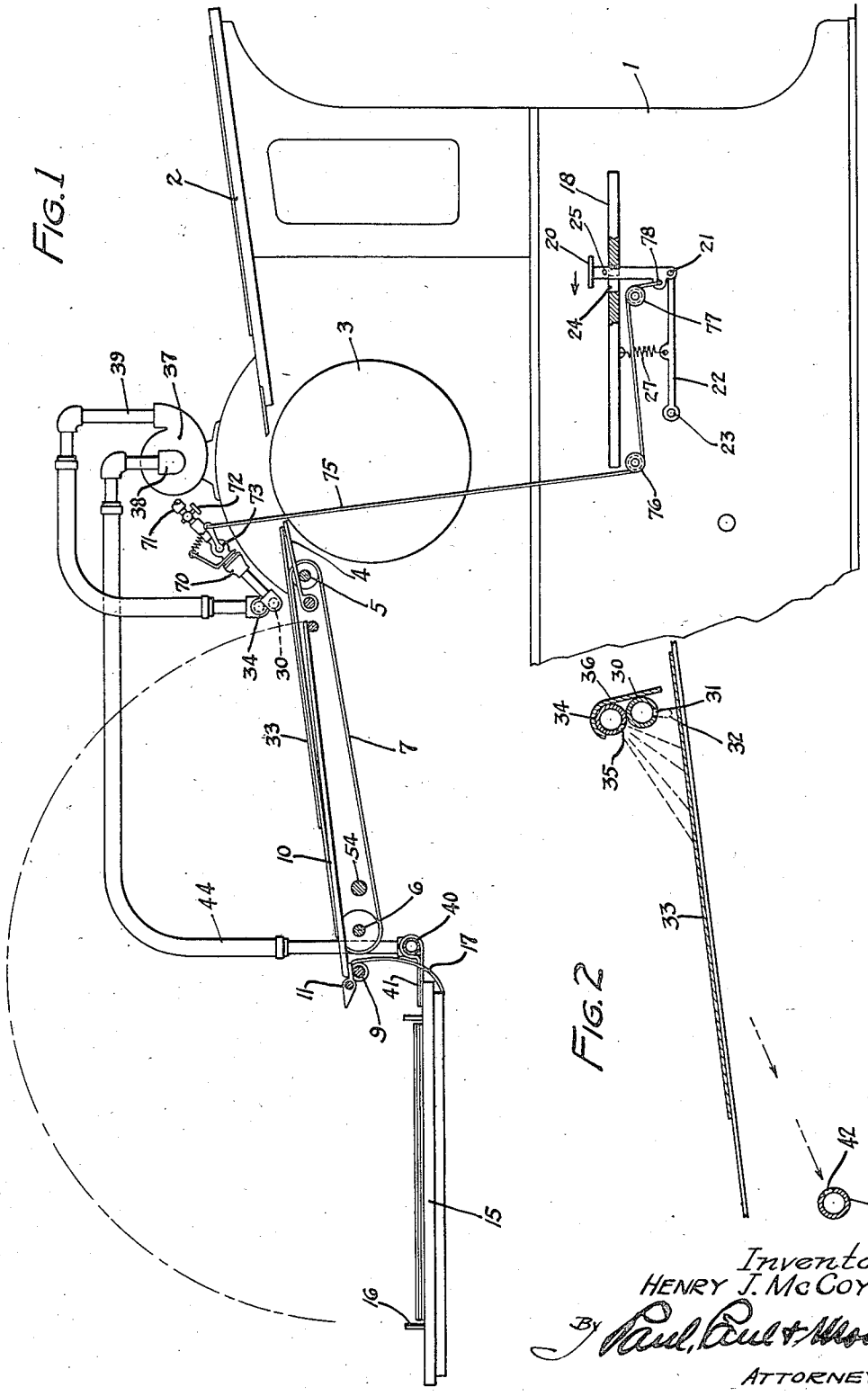


FIG. 2

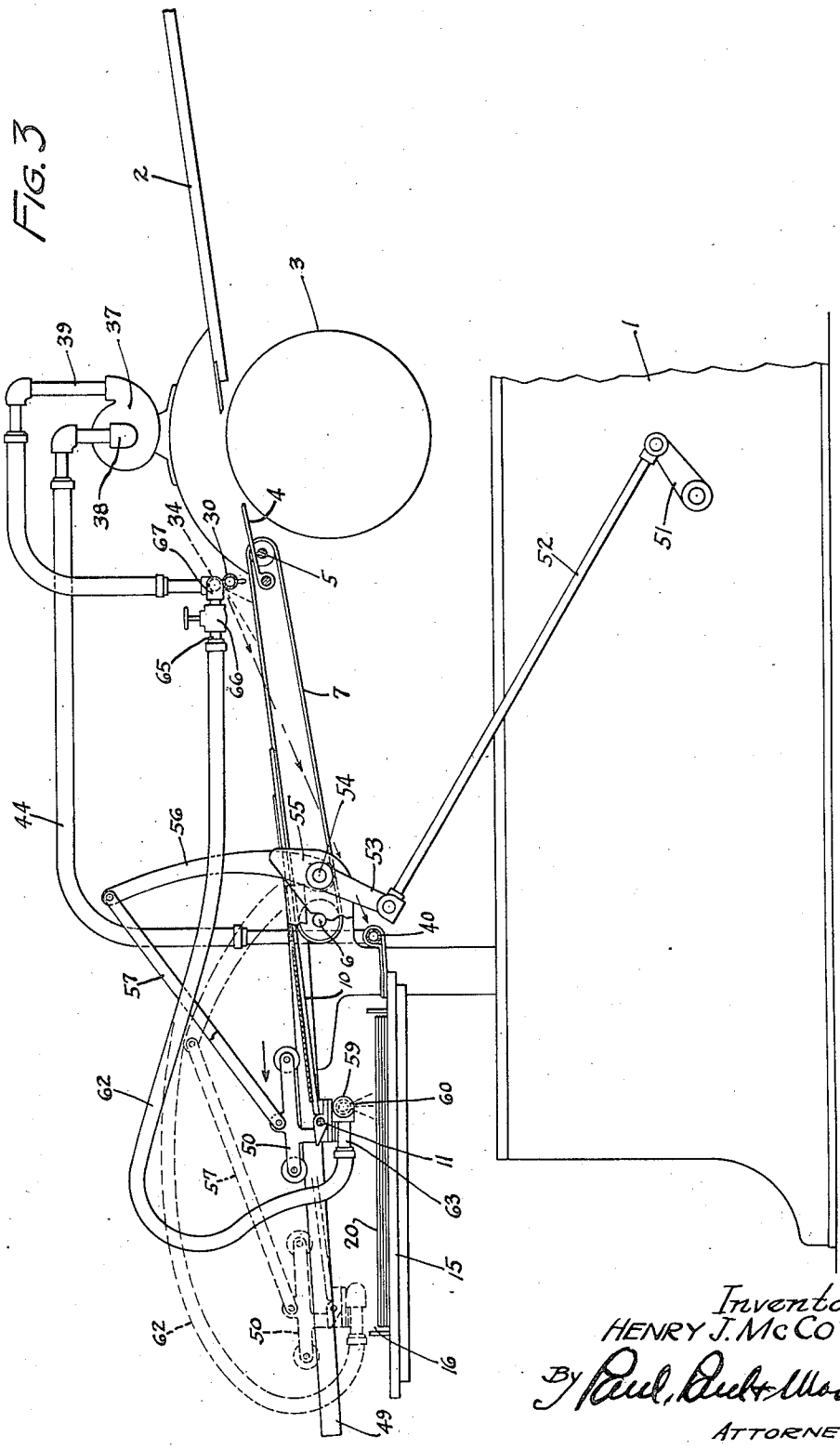
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FIG. 3



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STATIC ELIMINATOR

Henry J. McCoy, Minneapolis, Minn.

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6 Claims. (Cl. 34—18)

This invention relates to static eliminators for paper handling machines. As is well known, considerable static electricity is generated during the handling of webs or sheets of paper, particularly during movement of the web or sheet in a paper-making machine or in a printing press.

I am aware that attempts have been made to remove this static electricity, but none of the devices of others with which I am acquainted really removes it. For example, it has heretofore been the practice to apply direct heat from a flame to a paper sheet, but I have found that no dependable results can be obtained by such application. I have discovered that static electricity can be eliminated by supplying heat by direct flame in combination with the application of hot air, over a relatively large area of the paper while it is traveling. I have also found that the blasting of very hot air diagonally against the sheet in direction of its travel, so that it is spread over the entire surface of the sheet gives results not heretofore obtainable. I have also found that the application of this hot air blast forwardly of and adjacent the means which applies flame heat, results in a more thorough static elimination than any known to me, before this invention.

Features of the invention include the application of the heat of flame and of a heated blast of air simultaneously against a moving sheet; the application of the hot air blast adjacent and forwardly of the flame in a direction diagonally against the sheet; the application of the blast in a manner to prevent curling of the sheet as it travels; and the maintenance of a sheet or film of hot or warm air through which the sheet travels in a manner to have heat applied at both sides.

Objects, features and advantages of the invention will be set forth in the description of the drawings forming a part of this application, and in said drawings

Figure 1 is a somewhat diagrammatic sectional elevation taken vertically and longitudinally of the press;

Figure 2 is a similar fragmentary section showing the relations of the burner, air blast, and suction pipe to the sheet and tapes; and

Figure 3 is a figure somewhat similar to Figure 1 showing the application of the invention to the delivery mechanism.

The invention is shown applied to a printing press of the cylinder flat bed type which also has a delivery mechanism. It is to be understood, however, that the invention may be applied to any paper sheet handling or making device, or to other types of presses, and no limitation in this regard is intended.

Numeral 1 indicates the bed of a press, 2 the feed table, 3 the cylinder, 4 the stripper fingers, 5 and 6 the feed tape shafts and 7 the feed tapes. The flystick operating shaft is indicated at 9, the flysticks at 10. The flystick attaching shaft is indicated at 11, this shaft being attached in the usual manner to the shaft 9 as shown in Figure 1 when the delivery mechanism is not being used.

The jogger board is indicated at 15. The jogger box is generally indicated at 16 and the jogger operating strap is shown at 17. Numeral 18 indicates a platform upon which the operator stands, and 20 generally indicates a foot lever, pivoted as at 21 to a rod 22. The rod 22, in turn, is pivoted to a shaft 23 which is connected by a mechanism (not shown) for raising the cylinder 3 when the press is stopped. The foot lever passes through a T-shaped slot 24 and has a pin 25, normally lying above the board 18 and adapted when the pedal is moved downwardly to pass through the transversely extending part or head of the T-shaped slot to a level below the board 18, whereafter by moving the foot lever in direction of the arrow, the pin 25 is brought to a position beneath the longitudinally extending part or stem of the slot to prevent rise of the foot lever until said lever is moved in a reverse direction to again bring the pin in opposition to the transverse portion of the slot. A spring 27 connected respectively to the board and rod 22 tends to automatically raise the lever to the position shown in Figure 1.

Referring to Figures 1 and 2: Numeral 30 indicates a burner tube having burner openings 31 from which a row of flames 32 applies heat to the top surface or printed side of a sheet 33 as it is fed. The application of flame is made transversely at a point adjacent the cylinder, and above the tripper fingers 4 and tapes 7 and rearwardly of the outer ends of the flysticks 10 in direction of the cylinder. This tube is spaced the proper distance from the sheet to get the greatest amount of heat with the least risk of burning. The length of the tube is substantially equal to the width of the paper being fed so that flame is applied in a transverse line entirely across the sheet.

Arranged above and against the burner tube 30 is a hot air blast tube 34. The tube has openings 35 arranged substantially at the angle shown,

to blast the air glancingly in a forward direction against the sheet, forwardly of the point of application of flame by the burner tube 30. In this way, the heat is spread over a relatively large area entirely across the sheet and is spread well forwardly of the actual area of application, thus causing the heat to be supplied substantially over the entire surface of the sheet as it is fed.

The tube 34 being placed directly against the burner tube is highly heated thereby. This highly heated air is supplied under the proper regulated pressure to the blast tube 34 by means of an air fan or pump 37, having a suitable intake or suction pipe or line 38 and a suitable pressure or blast pipe or line 39. The blast pipe is suitably connected to the blast tube 34. The pump is driven by a motor, not shown, and any suitable type of pump and connections may be used. In this instance, the pump is mounted on the cylinder gear guard. It is contemplated herein to use the hot air by itself independently of the burner and to blast the very hot air diagonally, to spread it in the manner above set forth.

A feature of the invention relates to the heating of the sheet on both sides, which is herein accomplished by the creating of a suction beneath the tapes to draw the air downwardly and forwardly and to prevent waste of air, and also to pre-heat the air before it is forced to the tube. To this end, a suction pipe 40 is arranged as shown in Figures 1 and 2, the same being connected by suitable supports 41 to the jogger board 15, rearwardly of the tape 17 in direction of the cylinder. One end of this tube has suction openings 42 which are pointed upwardly and rearwardly generally in a direction toward the pipes 30 and 34. Suction line 44 connects this pipe with the suction pipe 38 of the pump, and hot air which passes downwardly through the tapes during the intervals when no sheets are being fed is preheated and returned to the pump. In this way the heated air is shot downwardly between the belts and the flysticks when no paper is passed, is sucked into the tube 40 and is delivered to the suction side of the fan or pump. By drawing the heat downwardly below the sheet, a heated film or atmosphere is maintained both above and below the sheet and both sides are heated and dried, and static electric effects are eliminated.

By this means the paper is relatively highly heated over practically its entire surface and curling and folding of the sheet as it travels is prevented and thorough drying of the ink is accomplished. Jogging up is made easier in the bindery and there are no folded sheets to be unfolded. Moreover, when a slitter is used, there is no curling in any of the sheets, all being held flat by the air blast. On the particular type of press herein shown, anywhere from one to two hours time is saved on a ten thousand sheet run. With this device, backing up can be started immediately, whereas heretofore where printing included a large number of half tone impressions, it was necessary to wait for two hours or more to back up.

It appears that the forceful application of the warm or hot air glancingly against the sheet immediately after application of flame heat, acts, so to speak, to sweep the sheet clear of the static electric effect.

Numeral 36 indicates a sheet or sheets of material acting to facilitate conduction of heat from the burner to the air blast pipe, and as a guard to substantially prevent radiation in a rearward direction.

Another feature of this invention relates to the application of the invention to the delivery mechanism, so that there are successive applications of hot air blasting to the sheet, and so that after each sheet is delivered into the jogger box, hot air is blasted against and entirely across the top surface of the sheet as it lies piled in the box, the heat blast being twice applied to each sheet. The invention therefore includes the application of simultaneous pressure and heat of a hot air blast, and of a flame, as well as the application of hot air blast to the sheet after delivery in the jogger box.

Referring to Figure 3 in which the proper adjustments and transfer of the flysticks, have been made to make the delivery mechanism operative. The flysticks 10 are now non-swingingly attached by the rod 11 to the delivery carriage 50 moving on the usual tracks 49. The usual mechanism is provided for operating the carriage, and includes the arm 51, connecting link 52 and arm 53 operating shaft 54 journaled in suitable bearings 55. To the shaft 54 is attached the arm 56 in turn operating the carriage 50 through the usual links 57. The general operation of the delivery mechanism is so well known that further description is thought unnecessary.

Attached to and movable with the carriage 50, below the point of attachment of the flysticks, is an air blast tube 59 having suitable openings 60 directed downwardly as shown upon the top sheet 20 in the jogger box 16. This tube receives a supply of hot air through flexible tube 62 attached at one end to tube 63 of the air blast tube 59 and attached at the opposite end to a nipple 65 connected with a valve 66, in turn connected by a nipple to an elbow 67 attached to the end of the air blast passage 34. Any suitable connections can be made for this purpose, it being understood, of course, that when the delivery mechanism is not being used, the air connection 62 and the valve 66 can be dispensed with. The air for tubes 34, 59 may be heated by means other than the burner 30, although the detail wherein heating is accomplished by burner 30 is also claimed. All connections are, of course, so placed as not to interfere with the proper operation of any of the parts of the machine. Certain phases of my invention are considered broader than the mere details.

It is evident that hot air will be blasted against the sheet from the tube 59, both as the carriage moves forwardly and as it moves rearwardly. This is itself a valuable feature of the invention, and also is a feature in conjunction with the application of heat from flame, and with a hot air blast as described for the form shown in Figure 1.

It is noted that the heat for both air blast systems can be provided by a single burner, and that both air blasts are operated from the same blower and that the preheating suction pipe 40 can operate both when the delivery is and is not being used.

Another feature of the invention relates to means for shutting off the gas supply to the burner 30 when the press stops. This is advisable because of the fire hazard when the burner 30 continues to operate with the press inoperative.

Broadly the idea is to interrupt the gas supply to the burner as a result of the operation of some part of the press which is operated when it is desired to stop the press, and to relight the burner when the reverse operation takes place. Such a part has been previously described, to-wit the

cylinder-raising foot lever 20. The burner is preferably of the Bunsen type having the usual air mixer generally indicated at 70 and of course provided with a pilot which, however, has not been shown. The gas supply connection is indicated at 71, and a valve controlling the supply to the burner is shown at 72. A second valve is indicated at 73 and is shown in Figure 1 in its open position. The valve handle is attached at one end to a flexible cable 75 which runs over a first pulley 76 and then over a second pulley 77, the end cord being attached as at 78 to the lower end of the foot lever 20. When the lever 20 is depressed to bring the pin 25 below the board 18, the valve is closed and the burner operation is stopped. The depression of the lever 20 always accompanies the operation of stopping the press, and the release of this lever or pedal always accompanies the operation of starting. As before stated, after the pin is brought to a point below the level of the board 18 the lever is moved in direction of the arrow or, in this instance, to the left to lock it in its lower position. To unlock it, it is merely moved to the right to bring the pin 25 in opposition to the slot, when upon release it automatically moves to the position shown in Figure 1 of the drawings. The result is opening of the valve 73 and relighting of the burner.

As a result of the efficiency of this device in thoroughly eliminating static, the necessity for slip-sheeting is also avoided, because with the static thoroughly eliminated no offsetting from one sheet to another takes place, whatever the proportion of the inked surface on the sheet is. The elimination of slip-sheeting means a large saving in time and therefore in expense of operation.

In cases where the job has been gotten as a result of close competitive estimates, the necessity for slip-sheeting might involve such an amount of extra expense, as to result in a loss of the contractor's profit, or even cause him a loss of money.

Another important result is the avoidance of necessity for highly heating the press room, which heating causes much discomfiture to the operators. By my invention, the heat as applied, acts (in addition to its static eliminating function) to heat the ink plate and facilitate the transfer of ink to form rollers and type. It is noted that the ink plate reciprocates below the tapes. By placing the suction pipe 40 at the level shown (which is substantially at the level of reciprocation of the ink plate) the heat is drawn toward the ink plate, and since this device has come into use it is no longer necessary to resort to heating of the ink plates or rollers, by other means.

I claim as my invention:

1. In combination with a printing press, including feed tapes, a burner tube arranged over the tapes and adapted to apply flame heat directly to the printed side of a sheet carried on the tapes, an air pipe having openings adapted for blasting hot air also against the printed side of the sheet downwardly and forwardly in direction of travel of the sheet to spread the air, and a tube arranged below the tapes forwardly of the air pipe in direction of sheet motion, and having openings therein and means for creating a suction in the pipe.

2. In combination with a printing press, including feed tapes, a burner tube adapted to apply flame heat directly to a sheet carried on the tapes, an air pipe having openings adapted for blasting hot air also against the sheet forwardly in direction of travel of the sheet to spread the air, a tube arranged at that side of the tapes opposite the air pipe and forwardly of said pipe in direction of sheet motion, and having openings therein, and means for creating a blasting pressure in the air pipe and suction in the tube, said air pipe being heated by said burner tube.

3. In combination with a paper sheet feeding device of the intermittent feeding type including feed tapes, means to apply flame heat to a sheet on the tapes, means to apply an air blast to the sheet in a direction forwardly of the zone of application of the flame heat and slantingly forwardly in direction of travel of the sheet to spread the air, said means being adapted to be highly heated by contact with the flame heat applying means, a blower and connections by which it creates blasting pressure in the air blast applying means, means arranged below the tapes and connected with the suction side of the blower and adapted to gather heated air which is projected downwardly between the feeding elements during non-feeding periods of the sheets and deliver said pre-heated air to the suction side of the blower.

4. In combination with a printing press of the cylinder flat bed type including feeding tapes, a delivery mechanism and jogger box, a burner arranged over the tapes and adapted to apply flame heat to a sheet carried on and moved by the tapes, an air blast pipe heated by the burner and having openings adapted for blasting air against the sheet forwardly of zone of application of burner heat and glancingly forwardly in direction of travel of the sheet, a blower for forcing air under pressure through the blast pipe, a perforated suction tube arranged beneath the tapes for recovering heated air which passes downwardly through the tapes when no sheet is being fed, means connecting the suction tube with the suction side of the blower and a second perforated air blast pipe mounted on and movable with the delivery mechanism and adapted to blast air against each sheet after delivery into the jogger box, and means by which the air for the second blast pipe is heated and delivered under pressure thereto.

5. In combination with a printing press including feeding means, a delivery mechanism and a jogger box, a burner arranged over and close to the feeding means and adapted to directly apply flame heat to a sheet carried thereon, a first air blast pipe having openings adapted for jetting highly heated air also against the sheet forwardly of the zone of application of burner heat, means for heating and blowing air under pressure through the pipe, and a second perforated air blast pipe mounted on and movable with the delivery mechanism and adapted to blast air against each sheet after delivery into the jogger box, heated air for blasting from said air blast pipes being supplied by said means for heating and blowing air under pressure through said first pipe.

6. In combination with a printing press including a cylinder and feed tapes, a burner adapted for applying flame heat to the upper or printed side of a sheet moving on the tapes and applying the heat in a line transversely of the sheet and substantially entirely thereacross, an air pipe having openings for forcibly jetting hot air against the sheet to hold it on the tapes and prevent curling of its forward edge, and arranged to direct the air glancingly against the sheet in direction of its movement so that it

will contact the sheet substantially over its entire area, means for supplying heated air under pressure to said pipe including an air pump, a perforated air tube arranged transversely of the press beneath the tapes well forwardly of the first air pipe, and means connecting said tube with the air pump for creating a suction in the tube for recovering heated air which passes through the tapes when not interrupted by a sheet and for creating a sheet or body of heated air through which the paper passes so that the lower unprinted surface of the sheet is also air-heated.

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