Sept. 30, 1958 G. H. BRANDT ET AL 2,853,941

FOG GENERATING DEVICE IN LITHOGRAPHIC PRINTING MACHINES

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FIG. 2

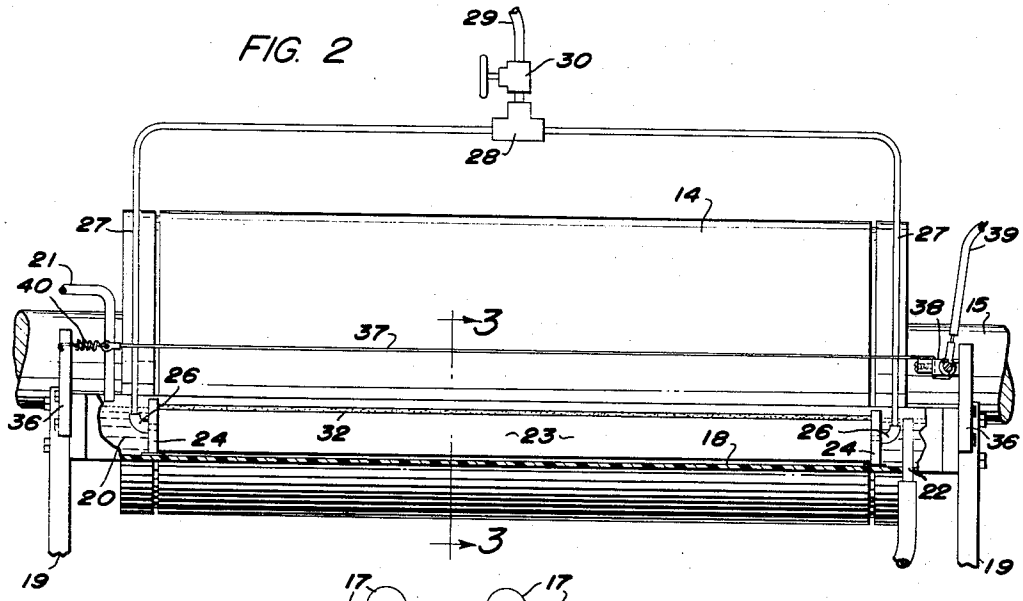
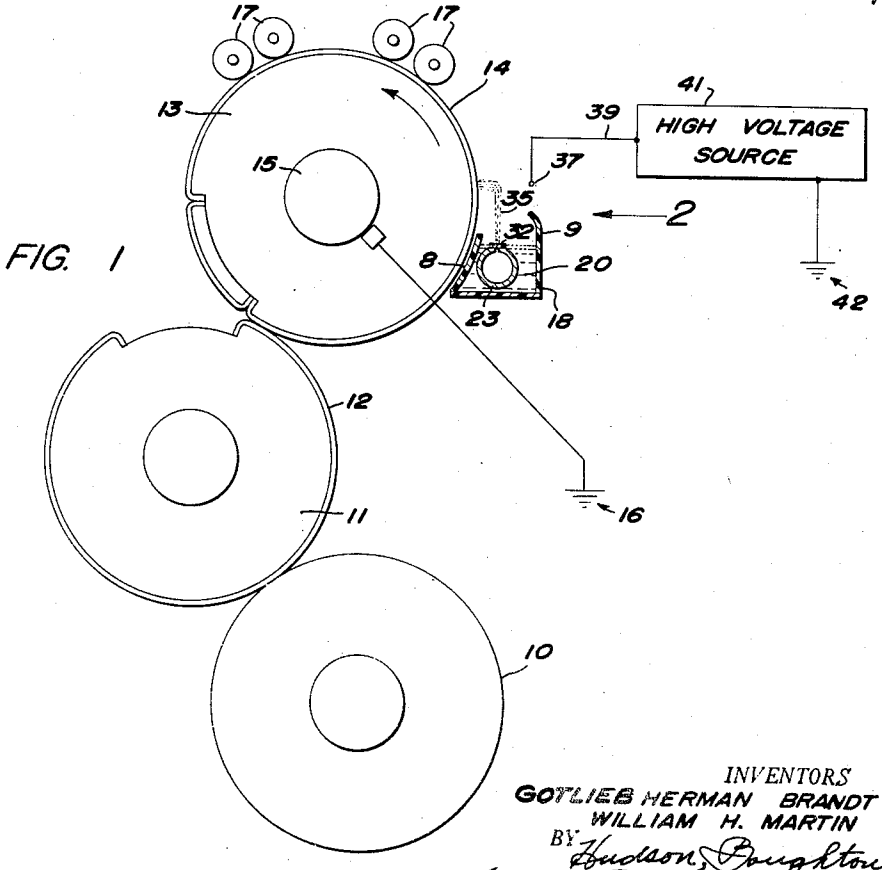


FIG. 1



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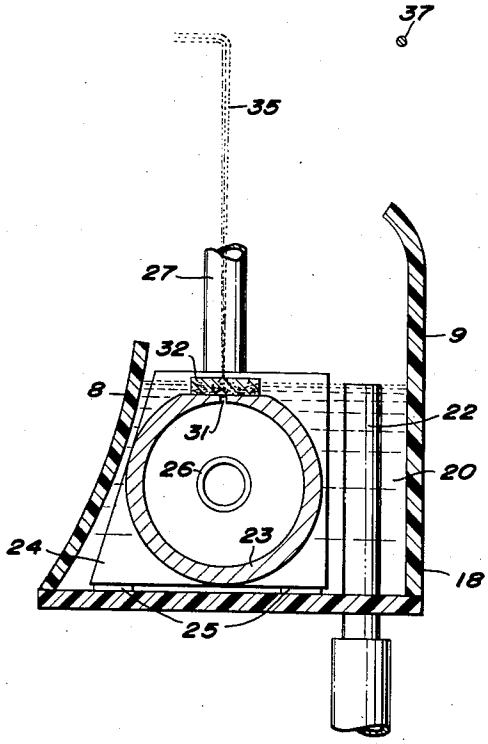


FIG. 3

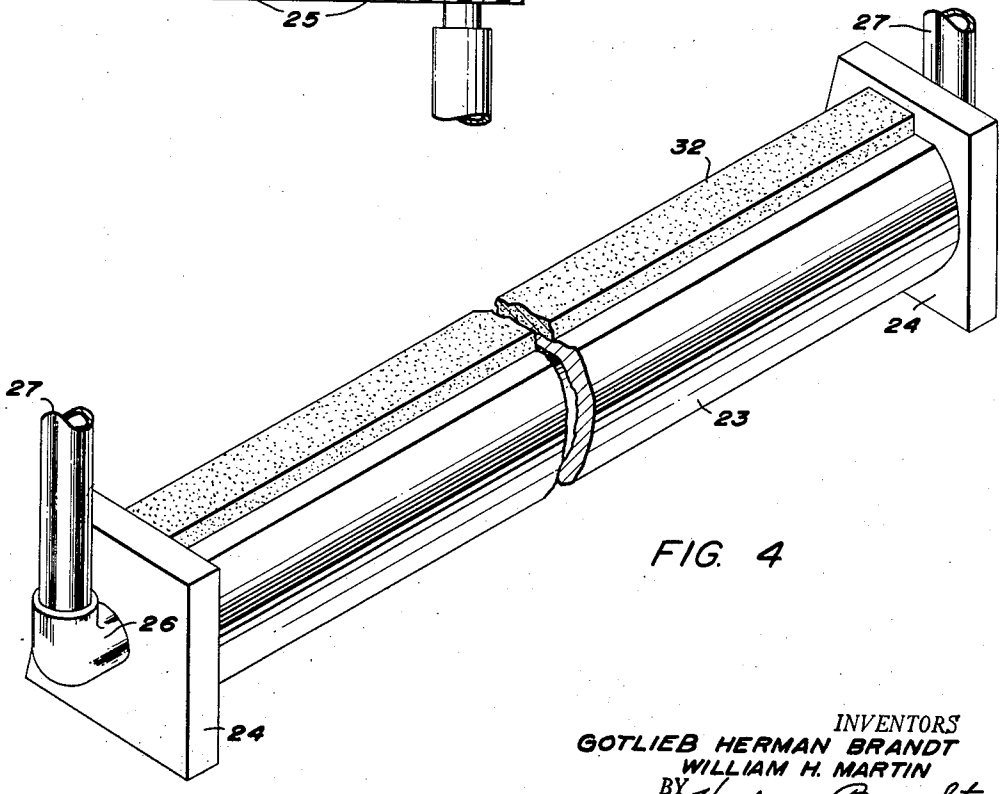


FIG. 4

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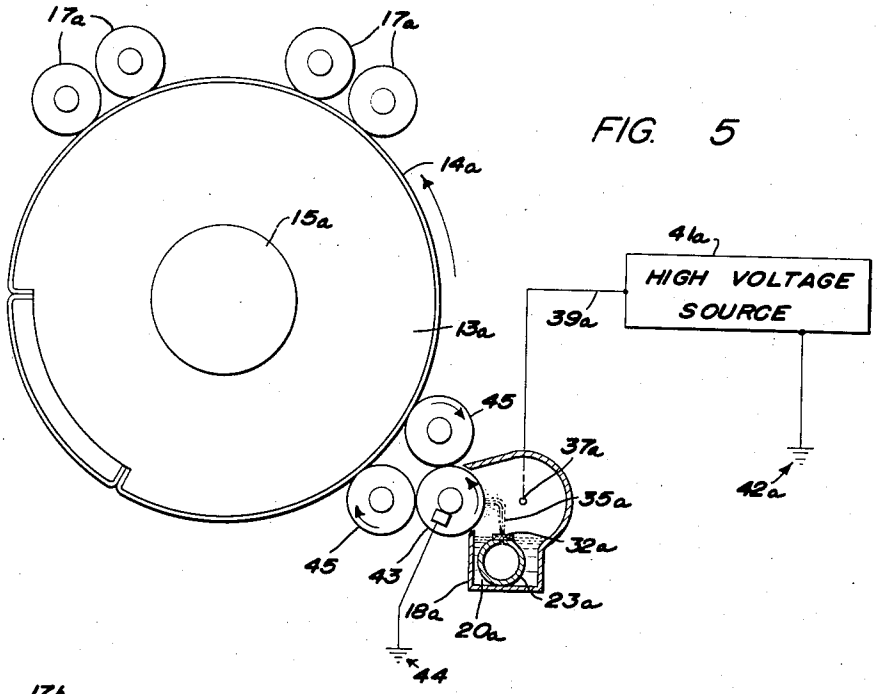


FIG. 5

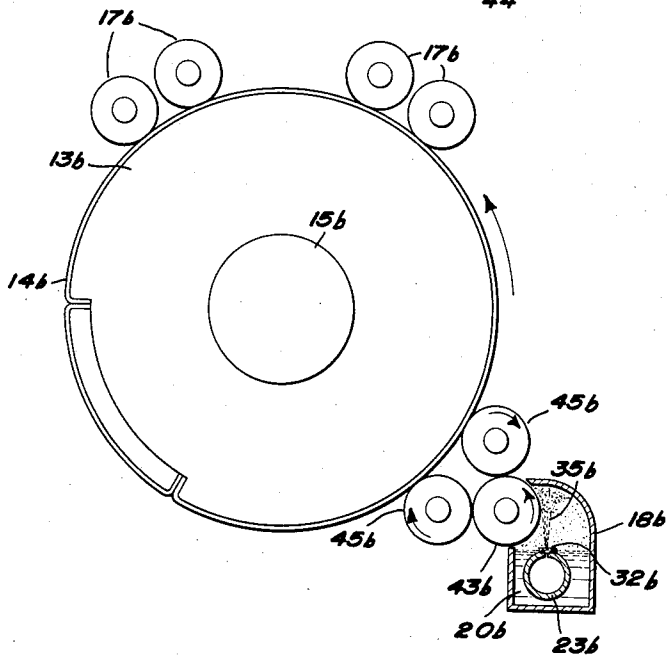


FIG. 6

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FOG GENERATING DEVICE IN LITHOGRAPHIC PRINTING MACHINES

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Application April 12, 1954, Serial No. 422,292

12 Claims. (Cl. 101—147)

This invention relates to improvements in fog generating devices, that is to say devices for finely dividing liquid particles and suspending them in air. The invention has utility in various connections, but especially in printing machines where plate dampening material is to be applied to the non-image portions of a lithographic plate.

One of the objects of the invention is the provision of apparatus for creating and dispensing a fog containing moisture particles.

Another object is the provision of means for creating a curtain of moisture carrying fog along the length of a grounded revolving cylinder carrying a lithographic plate and providing a field of high potential electrostatic force in the area of said curtain for directing the fog toward and onto the plate.

Another object is the provision of a method and means for creating a fog which comprises saturating a porous slab with the liquid to be diffused and blowing air under pressure through the porous slab.

Another object is the provision of means for maintaining automatically the state of saturation of said slab in order that the generation of the fog may be continuous.

Another object is the provision of dampening apparatus for a lithographic plate, the parts of which do not contact the plate and thus cannot cause wear of the plate.

Another object is the provision of plate dampening apparatus which is smaller in size and lower in cost as well as in operating expense than conventional types presently in use.

Another object is the provision of apparatus of the character stated which eliminates the cleaning and sewing that is necessary when conventional cloth covered rolls are employed.

Another object is the provision of a dampening device which can be cleaned without removing it from the machine.

A further object is the elimination of the periodical etching of the vibrating metal roller which forms a part of the conventional dampening apparatus.

Still another object is the provision of a dampening device having a longer life than conventional devices and one that has no moving parts.

Another object is the provision of a dampening device which does not have to be cleaned when the color of ink employed in a printing unit is changed.

Other objects and features of novelty will appear as we proceed with the description of that embodiment of the invention which, for the purposes of the present application, we have illustrated in the accompanying drawings, in which

Fig. 1 is a diagrammatic side elevational view of an offset printing unit embodying the invention;

Fig. 2 is an elevational view looking in the direction of arrow 2 of Fig. 1;

Fig. 3 is a vertical sectional view taken substantially on the line 3—3 of Fig. 2, showing the fog generator on a larger scale;

Fig. 4 is a perspective view of certain parts of the fog generator;

Fig. 5 is a simplified elevational view of the fog generator embodied in another form of printing unit, and

Fig. 6 is a view similar to Fig. 5 illustrating the generator embodied in still another form of printing unit.

Referring first to Fig. 1 of the drawings, the impression cylinder of one unit of an offset printing press is shown at **10**. In printing relation with cylinder **10** there is an offset cylinder **11** upon which is mounted the usual blanket **12**. **13** is a plate cylinder carrying a lithographic plate **14** which may be of conducting or non-conducting material. The plate is preferably of conducting material and is electrically joined to the shaft **15** of the cylinder, this shaft being grounded as indicated at **16**. Inking form rollers running in contact with plate **14** are indicated at **17**. They are supplied from an ink fountain, not shown, in the usual way.

Disposed close to one side of cylinder **13**, preferably below the axis thereof, there is a pan or housing **18** which extends lengthwise of the cylinder somewhat beyond the ends of the plate **14**. This housing is preferably constructed of insulating material, such for example as plastic. If constructed of non-insulating material it is preferably insulated from the rest of the press. Any suitable means may be employed for mounting the housing including uprights **19** carried by the main frame.

Housing **18** carries water or other plate dampening liquid indicated at **20**. This liquid may be supplied continuously through a conductor **21**, Fig. 2. An overflow pipe **22** extends upwardly through the bottom of housing **18**, and thus determines the depth of liquid in the housing. Suitable means, not shown, are employed to adjust this overflow upwardly or downwardly in order that the level of the liquid may be regulated as desired. The side of the housing adjacent the cylinder **13** is preferably curved as shown at **8** on a radius struck from the center of the cylinder, so that the housing may lie as close as possible to the cylinder. The other side **9** of the housing extends upwardly a considerable distance.

Within the housing **18** there is a cylinder **23** supported by and sealed to end blocks **24**. These blocks may rest upon the bottom surface of housing **18** or upon shims **25**, the latter constituting one means for adjusting their height. Such height adjustment is important as will presently appear. Each of the blocks **24** is bored to receive an elbow **26** by means of which the interior of the housing is connected with conductors **27** which may be joined to a central T-connection **28** that receives air under pressure from a pipe **29** provided with a valve **30** by means of which the pressure of the air conducted to the cylinder **23** may be regulated.

Cylinder **23** along its upper edge is provided with a narrow slit **31** which extends for substantially the full length of the cylinder. The surface at the top of the cylinder on either side of the slit is preferably flattened, and to this flattened surface we cement or otherwise secure a porous slab **32**. The slit **31** is completely covered by the slab and the joint between the cylinder and slab is sealed so that no air or liquid can enter or exit along that joint. The level of liquid in the housing must be at a height somewhere above the bottom of the slab and below the top thereof, and this condition is maintained throughout the length of the slab by adjusting the height of one of the blocks **24** so that the slab will be accurately leveled.

With the slab **32** immersed at least partially in the liquid **20**, the pores of the slab will be quickly filled with the liquid to be dispensed, and when the valve **30** is opened the cylinder or air chamber **23** will be filled with air under pressure. Consequently an upwardly flowing blast of air will pass through the slit **31** and through the

thickness of slab 32. The air in passing through the slit and out through the pores of the slab 32 above and adjacent to the slit expels the solution from the pores as a fine mist or fog. The slit may be of various widths but the best result has been found to be achieved with a slit of from 1/64 inch to 1/32 inch in width. Capillary attraction draws the solution inwardly from the sides of the slab to replace that expelled by the air blast. The provision of the narrow slit permits the majority of fog particles to be projected as a thin curtain marked 35 in Figs. 1 and 3.

The amount of solution applied to the plate may be controlled by varying the air pressure by means of valve 30 or by changing the water level through the adjustment of the overflow pipe 22 as previously mentioned. The upwardly extending side wall 9 of the housing tends to deflect back into the housing any liquid particles which may spread outwardly away from the main curtain 35.

Brackets 36 made of insulating material may be supported upon the uprights 19 for supporting a wire electrode 37, at one end of which there is a clamp 38 having electrical connection with the wire and with an electric conductor 39. A spiral spring 40 at the other end of the electrode may be supplied to maintain the electrode under tension so that it will not sag. A high voltage source of electricity, preferably direct current, indicated at 41 is connected with ground at 42 and with wire electrode 37 for charging the wire and creating an electric field between the wire 37 and the plate 14 across the path of fog curtain 35.

When the apparatus is in operation the particles of liquid in the curtain 35 will be electrostatically charged by the electrode 37 and attracted toward or onto the plate 14 carried by the grounded shaft 15. An even application of moisture to the plate throughout its length will therefore be obtained.

The pores of the slab 32 may be flushed when desired by withdrawing the dampening material and filling the housing 18 with distilled water after which air under pressure may be passed through the cylinder 23 and the slab. Alternatively, a non-porous plate may be placed over slab 32 and the air in cylinder 23 driven outwardly through the sides of the slab to produce a cleaning job.

The cylinder 23 and slab 32 may be of any suitable material. However it has been found that an impervious graphite cylinder and a porous carbon slab work well. They may be cemented together by a resinous graphite cement.

It may be stated that for a printing plate 23 inches across, using a porous slab having an average pore size of .0013 inches, an air pressure between 8 and 16 pounds per square inch has been found to be satisfactory. The volume of air for a cylinder 23 used with a plate of that width should be between 12 and 14 cubic feet per minute at about 8 pounds air pressure.

Figure 5 illustrates the fog generator of the invention embodied in a different printing arrangement. Everything is substantially the same as in Fig. 1, except that conventional cloth-covered dampening rollers and a metal vibrating roller are placed intermediate the fog generator and the plate cylinder 13*a*. In this case the vibrating roller 43 is grounded as at 44 and the moisture particles from the thin curtain 35*a* are projected by the electrode 37*a* directly onto the grounded roller 43. Liquid is transferred to the covered rollers 45 and then to the plate 14*a* in the conventional manner. This arrangement retains those features of a conventional dampening mechanism found most advantageous while eliminating the conventional ductor roller, pan roller and cumbersome framework and driving mechanism for each of those rollers.

The housing 18*a* may be shaped as shown in Fig. 5 to better retain particles of moisture not attracted to the plate 14*a*.

Fig. 6 illustrates an embodiment similar to Fig. 5 with the means for creating the electrical field of force eliminated. While the field of force is preferred, it has been found that satisfactory printing can be achieved without it. It is to be understood that we consider it within the scope of our invention to use our fog generator for dampening the plate directly or dampening intermediate rolls as shown in Fig. 6 with or without the electrical field of force. Furthermore, our fog generator may be employed for producing a fog of some other material, for example ink. It can be seen that an ink mist can be projected onto a gravure plate and a doctor blade utilized to remove the excess ink.

Various other forms of the invention may be made without departing from the spirit thereof.

Having thus described our invention, we claim:

1. In a printing machine, apparatus for producing a fine fog containing liquid particles to be projected onto a rotating cylindrical surface, a rigid porous slab of a length equal to the length of said surface disposed alongside said surface, said slab having greater width than thickness, means for immersing the side edges only of the porous slab in a body of liquid, and means for forcing air upwardly through a limited, intermediate longitudinal zone of said slab for creating a vertical curtain of upwardly flowing air borne particles.

2. Apparatus substantially as defined in claim 1, wherein the means for filling the pores of the said slab comprises a housing containing liquid in which the slab is submerged, at least partially, and means for selecting and maintaining constant the level of liquid in the housing.

3. Apparatus substantially as defined in claim 2, wherein the said means for maintaining the level of liquid constant comprises an overflow from the said housing, said overflow being adjustable vertically, whereby the quantity of liquid entering the pores of the said slab at any given instant may be varied.

4. Apparatus substantially as defined in claim 2, wherein the said means for inducing flow of air under pressure comprises a conductor in which there is a valve for varying the pressure of the air flowing upwardly through the slab.

5. Apparatus substantially as defined in claim 2, wherein the means for inducing the flow of air upwardly through the said slab comprises an elongated air chamber below the level of the liquid in said liquid housing, said chamber having an opening therethrough at its upper side, said slab being mounted upon said chamber and sealed thereto upon opposite sides of said opening.

6. Apparatus substantially as defined in claim 5, wherein said housing is elongated and wherein the said chamber is a cylinder extending throughout the major part of the length of said housing, the opening in said cylinder being a lengthwise slit therein at its upper side and the cylinder being flattened along its upper surface and said slab being mounted upon and sealed to said flattened portion of the cylinder and entirely covering said slit.

7. Apparatus substantially as defined in claim 5, comprising means for introducing air under pressure into opposite ends of said chamber.

8. Apparatus substantially as defined in claim 7, comprising an air conductor through which the air is introduced into both ends of said chamber, and valve means in said conductor for varying the pressure of the air admitted to the chamber.

9. Apparatus substantially as defined in claim 5, wherein said housing is elongated and wherein said chamber is a cylinder with a slit along its upper side, said cylinder being of a length greater than its diameter, whereby the upward discharge of moisture-laden air constitutes an elongated thin curtain of fog.

10. Apparatus as defined in claim 5, wherein said chamber is provided with an elongated slit at its upper edge and wherein the vertical dimension said slab is less than the horizontal dimension on either side of said slit.

11. In a printing machine, a rotating cylinder carrying a printing plate, means for dispensing finely divided liquid onto said plate comprising an elongated housing disposed close to the revolving plate, said housing containing liquid to be dispensed, an air chamber below the upper level of said liquid having a slit extending lengthwise thereof along its upper side, an elongated porous slab mounted above said chamber entirely covering said slit and sealed thereto along opposite sides of said slit, said slab being submerged in said liquid at least partially, and means for introducing air under pressure into said chamber to be driven through said slab for creating a thin curtain of fog extending upwardly from the cylinder along the length of said revolving plate.

12. In a printing machine, a member having an elongated surface to be dampened, a housing parallel to and disposed close to said surface, said housing containing liquid, an elongated air chamber submerged in said liquid, said chamber having a longitudinal slit along its upper

side, a rigid porous slab covering said slit and being at least partially submerged in said liquid, and means for introducing air under pressure into the said chamber to be driven through said slab for creating a thin curtain of fog extending upwardly from the slab along the length of said surface to be dampened.

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