

Dec. 8, 1936.

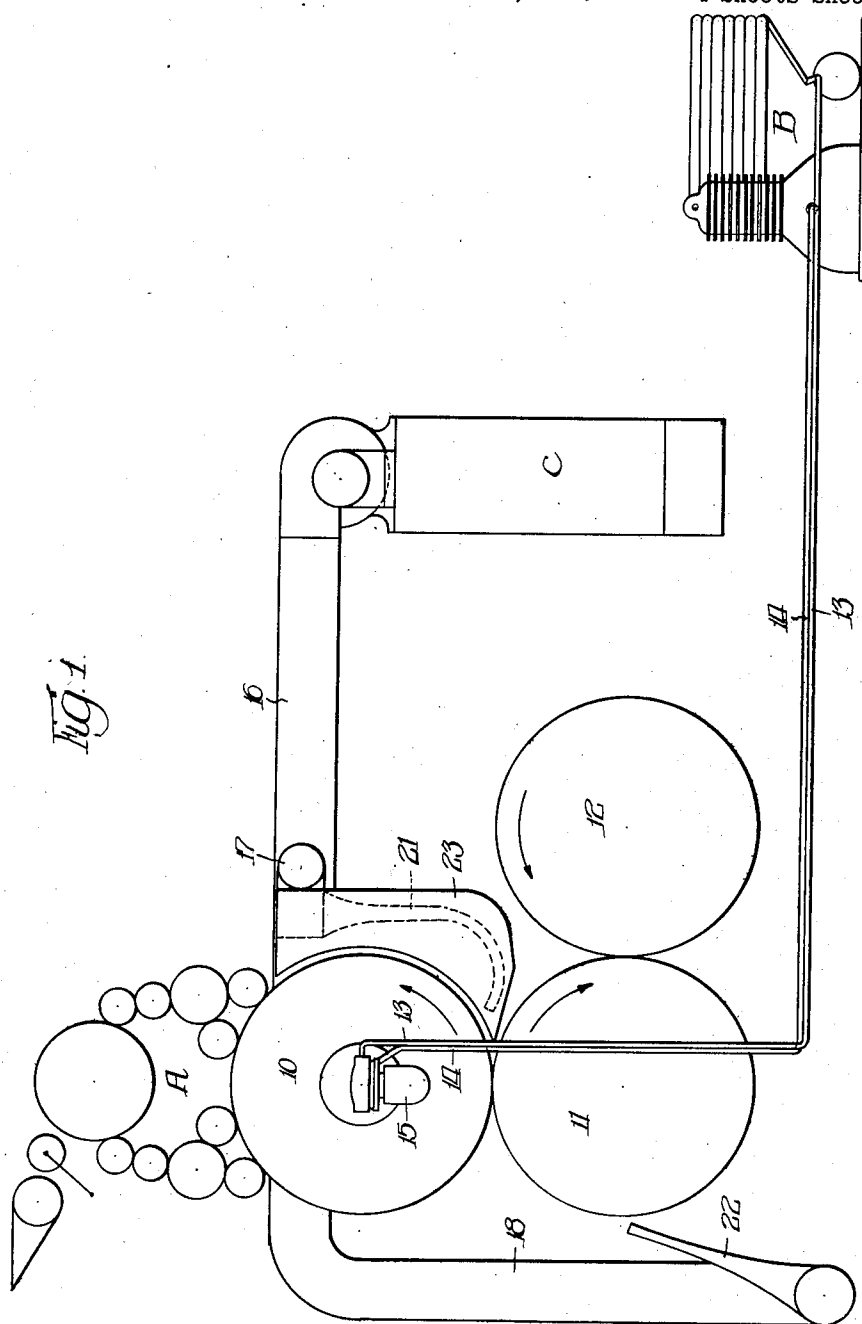
B. D. STEVENS ET AL

2,063,636

METHOD OF AND MEANS FOR DAMPENING PRINTING PLATES

Filed Feb. 24, 1932

4 Sheets-Sheet 1



Inventors:
Burt D. Stevens,
Benjamin L. Sites,
By Wilkinson, Huxley, Boyron & Knight
Attys.

Dec. 8, 1936.

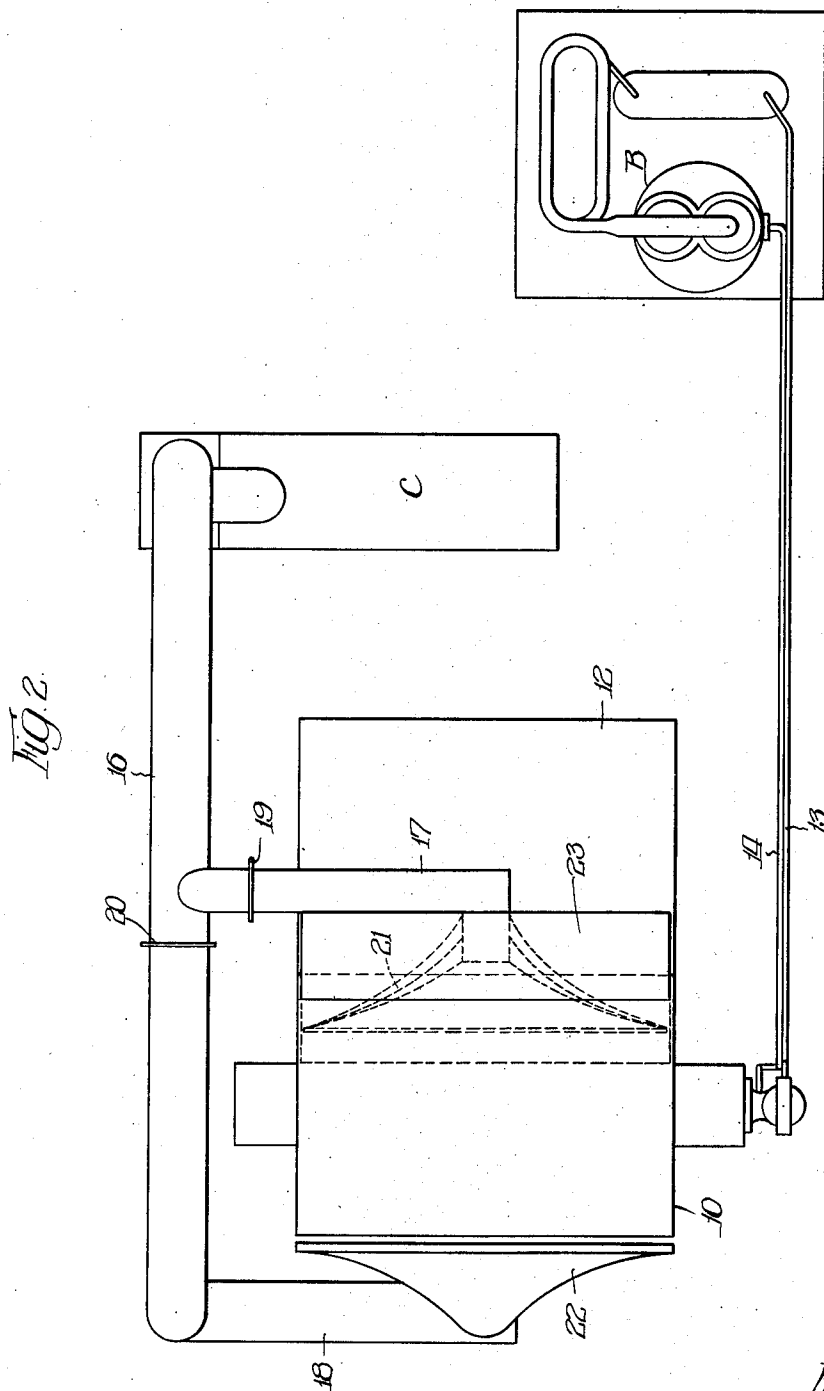
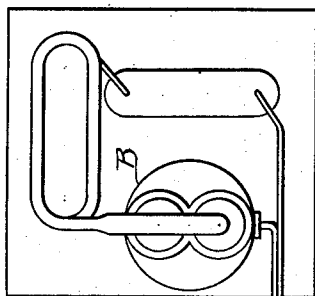
B. D. STEVENS ET AL

2,063,636

METHOD OF AND MEANS FOR DAMPENING PRINTING PLATES

Filed Feb. 24, 1932

4 Sheets-Sheet 2



Inventors:
Burt D. Stevens,
Benjamin L. Sites,
By Wilkinson, Huxley, Byron & Knight
attys.

Dec. 8, 1936.

B. D. STEVENS ET AL

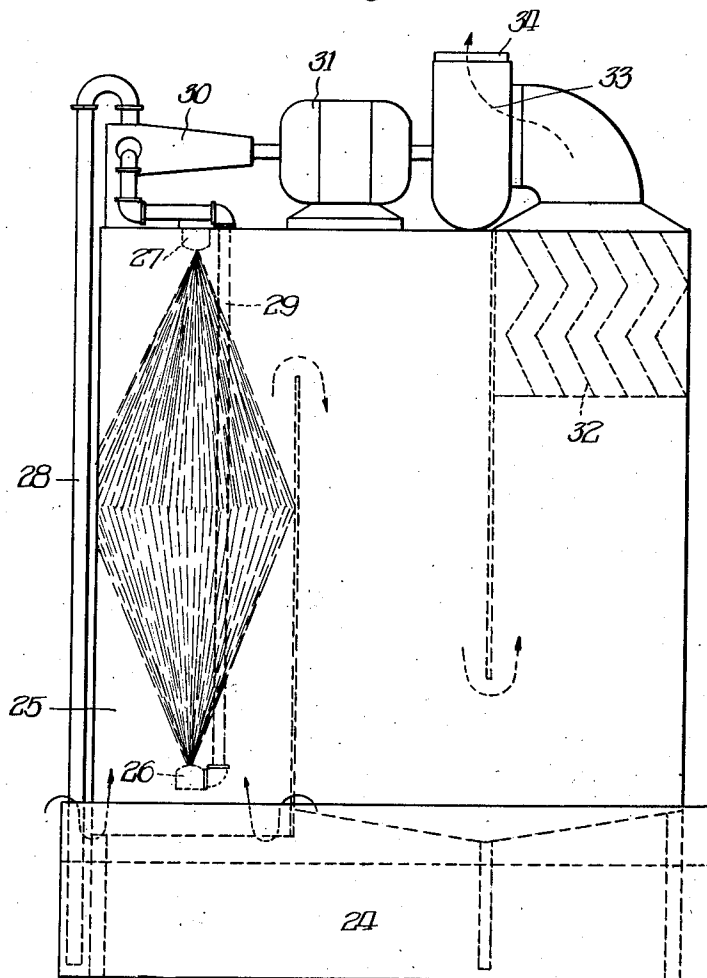
2,063,636

METHOD OF AND MEANS FOR DAMPENING PRINTING PLATES

Filed Feb. 24, 1932

4 Sheets-Sheet 3

FIG. 3



Inventors:
Burt D. Stevens,
Benjamin L. Sites,
By Wilkinson, Hawley, Byrum & Knight
attys

Dec. 8, 1936.

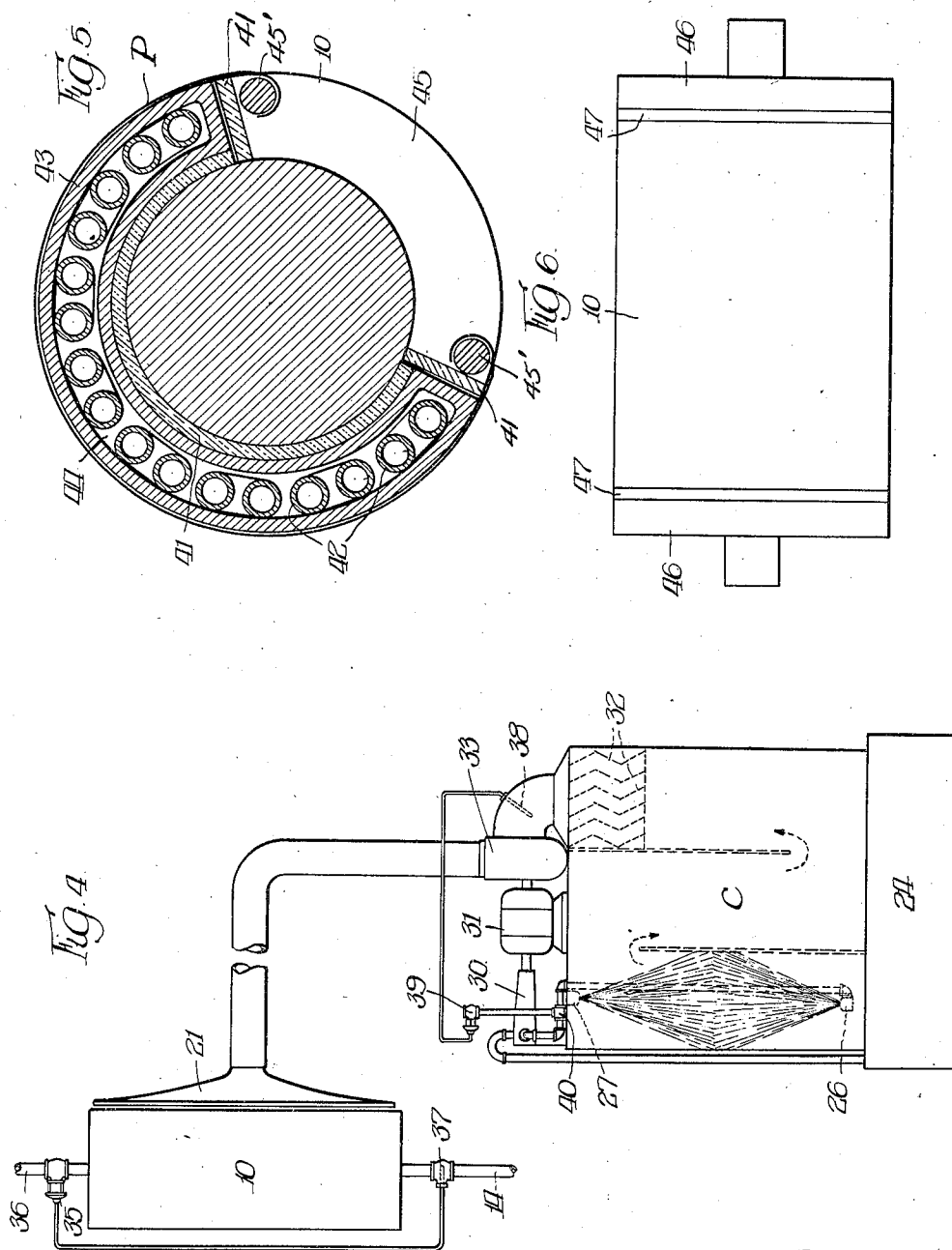
B. D. STEVENS ET AL

2,063,636

METHOD OF AND MEANS FOR DAMPENING PRINTING PLATES

Filed Feb. 24, 1932

4 Sheets-Sheet 4



Inventors:
 Burt D. Stevens,
 Benjamin I. Sites,
 By Wilkinson, Husley, Byron & Knight attys.

UNITED STATES PATENT OFFICE

2,063,636

METHOD OF AND MEANS FOR DAMPENING
PRINTING PLATES

Burt D. Stevens, Evanston, and Benjamin L. Sites,
Chicago, Ill., assignors to The Miehle Printing
Press & Manufacturing Company, Chicago, Ill.,
a corporation of Illinois

Application February 24, 1932, Serial No. 594,954

24 Claims. (Cl. 101—147)

This invention relates to planographic printing and it more specifically concerns that method of printing which requires a treatment of the printing surface in order to render the non-design portions thereof ink repellent.

Plates used in planographic printing are usually of the flexible type and the design or printing image which is produced on the grained surface of the plate is very shallow so that it lies substantially in the same plane as the grained or non-design portions of the plate. Therefore, during the printing operation, the plate must be continually treated with ink repelling moisture in order to prevent ink from adhering to its non-design portions.

One of the most general methods used heretofore, for the purpose of treating printing plates as indicated above, was to dampen the plate by means of mechanism including a water fountain, fountain-roller, ductor-roller, and water distributing or dampening rollers, the latter being brought into contact with the surface of the printing plate and intermittently supplied with the required volume of moisture by means of the ductor roller alternately contacting with a fountain roller and with the dampening rollers.

Planographic printers are well aware of the fact that with dampening mechanisms of constructions heretofore known, it is extremely difficult to effect and maintain the fine adjustments necessary for a perfect distribution of ink repelling fluid over the entire printing surface of a planographic plate.

Furthermore, such mechanisms are the source of many disturbances and delays in the operation of a press, one of the reasons being, for example, that owing to the contact of the dampening rollers with the printing plate a certain amount of ink is picked up by these rollers, and eventually transferred to the fountain roller by the intermittent contact of the ductor roller, thereby gradually saturating or clogging up with ink the molleton material with which these dampening rollers are covered. This necessitates very frequent interruptions of the printing operation for the purpose of cleaning or replacing the dampening mechanism rollers, resulting in considerable loss of time in addition to the expense involved in recovering the rollers with molleton.

It is also well known in planographic printing that the printing quality is seriously impaired by dampening mechanism of the type heretofore known, because, owing to the physical contact of the inking i. e. form rollers with the dampened surface of the printing plate, some of the damp-

ening fluid will cling to the inking rollers and eventually become mixed with the ink as it is being applied to the plate, particularly so when an excess volume of moisture is applied to the plate. This results in an objectionable greyish appearance of the print when black ink is used.

There are a number of other undesirable features inherent in the method of dampening a printing plate by means of dampening roller mechanism. For example, it has been found essential to carry a certain amount of acid in the water used for dampening the plate, the principal purpose for this being to avoid "scum" on the plate, caused by the wiping action of the dampening rollers, and to thereby keep the design on the plate clean and sharp. However, it appears that acidified water tends to have a gradual etching effect on the printing plate so that the commercial usefulness of a plate is prematurely impaired by the presence of acid.

Various methods have been proposed in the past with a view to developing some dampening means which will not necessitate the use of any dampening rollers, nor the addition of any acid to the dampening fluid. For example, it has been suggested to apply the ink repelling substance to the printing plate by means of spraying devices. This method, however, according to experiments carried out, does not appear to meet with the desired practical success, which condition may be attributed principally to the fact that it is extremely difficult to control the density of the spray and to maintain the necessary accurate adjustments of such devices in order to assure an even distribution of the ink repelling fluid over the entire plate. Furthermore, no matter how fine the spray might be, it is always likely to deposit the moisture i. e. ink repelling substance in the form of comparatively large globules, thereby providing an excess amount of moisture which results in an uneven distribution of the moisture as well as in poor printing because of the ink repelling substance becoming unduly mixed with the ink as indicated above.

Such spraying devices are of necessity intricate in construction for the reason that extremely accurate mechanism is required for adjusting and holding constant the volume of moisture to be applied to the plate. Some means must also be provided whereby the spray will be prevented from entering the "gap" of a printing plate support such as a plate cylinder, this requiring further complicated and unreliable mechanism which tends to impair the productive power of a printing press.

With a view to eliminating the above referred to and other defects found in dampening mechanism heretofore used, we have carried out extensive experiments in connection with methods of dampening planographic plates and like printing elements by means of condensation. Practical tests furnished us with conclusive proof that the application of the principle of dampening printing plates by means of condensation produces ideal conditions in planographic printing such as in direct or offset lithography, because primarily it eliminates a large number of complicated mechanical devices heretofore necessary in connection with dampening mechanism. Furthermore, we find that with simple devices for regulating the degree of condensation, the volume of condensed moisture required on a printing plate can be very readily controlled by taking into account the prevailing surrounding atmospheric condition, that is, the temperature and relative humidity in the surrounding air. The requirement for acids is also minimized when dampening is done by condensation.

We are aware that various attempts have been made in the past with a view to dampening planographic printing plates by the method of condensation. For instance, it has been suggested to produce in the vicinity of the printing surface a "cloud" of mist by mixing cooled air with air saturated or nearly saturated with water vapor. However, this scheme was not found practical and therefore further attempts to use it were abandoned.

Many years ago a method was conceived of dampening lithographic stones by first applying to the printing surface thereof a stream of cooled air and then discharging onto the cooled surface an atmosphere of air saturated with water vapor at a temperature above that of said cooled surface. We have reasons to believe that some experiments were carried out with that method but apparently any thought of further developing this idea of dampening lithographic stones was discouraged in view of the difficulties involved, such as for instance in controlling the cooling effect on the printing surface which is essential to obtain an even condensation over the entire surface whereon moisture is to be applied.

Furthermore, in connection with rotary planographic printing presses it has been proposed to dampen the printing surface by applying a cooling fluid to the interior of a printing member and simultaneously applying a heated moistening vapor to the cooled surface of such member, the moisture so produced being distributed over the printing surface through the medium of distributing rollers.

It has also been found that, provided atmospheric conditions are favorable, that is, provided the degree of humidity in the surrounding air is sufficiently high, satisfactory dampening of the printing surface can be obtained merely by reducing the temperature of said surface or plate carrying member below the atmospheric dew point. Extensive experiments which we have carried out, however, have proven conclusively that under other conditions, namely when the prevailing moisture in the atmosphere is low, satisfactory dampening by condensation cannot be obtained merely by reducing the temperature of the printing surface.

We found that under such conditions, in order to obtain any condensation at all on the printing surface, the degree of cooling would have to be such that the precipitated moisture would ac-

tually freeze, thereby producing frost on the printing surface which condition of course would make printing impossible. Therefore we find that the most successful and reliable method for controlling the condensation of moisture on a printing surface is by applying to the vicinity of the printing elements moisture conditioned air which, however, should not contain mechanically entrained moisture, and should be preferably at a temperature substantially equivalent to that of the room in which the press is located.

Our experiments also convinced us of the fact that if the temperature of the conditioned air is considerably above that of the room, the quality of printing will often be impaired.

The novel effects produced and the advance in the art made possible by our invention, will be more readily and fully appreciated by pointing out the various conditions which apparently were not realized heretofore by others and which must be met in order to accomplish and maintain a perfect dampening of printing plates by the method of condensation, more especially by that method according to which the printing plate carrier is cooled by circulating therein a cooling fluid and which method we believe lends itself best for the purpose in view.

First of all, in order to eliminate the danger of impairing the ink quality and therewith the printing result, it is extremely essential to positively control the amount of precipitated or condensed moisture on the plate so that it will be evenly distributed and furthermore limited in quantity to the smallest possible volume. In this respect it should be pointed out that to attain the best results in planographic printing where grained plates are used, the volume of ink repelling moisture should be limited to the very minimum, because there should be just sufficient moisture to form a light coating over the grain without, however, flooding it. This can be accomplished by means whereby the cooling effect is positively controlled, also by regulating or holding constant the percentage of humidity with which the air applied to the vicinity of the printing surface will be charged.

The cooling effect should also be restricted as much as possible to that part of the printing member which carries the subject matter to be printed. For example, in the case of a cylinder, the cooling fluid should be circulated close to the design or plate carrying surface, and in order to eliminate spreading of the cooling effect to the bearers and other parts of the cylinders, some method of insulating such parts from the plate carrying surface of the cylinder should preferably be applied.

When our invention is used in connection with that type of sheet fed press where printing is done from flexible plates, in which the plate cylinder is provided with a gap for accommodating the plate securing means, it is also very desirable to provide some means whereby condensation of moisture in such gap will be minimized. This can be accomplished in various ways.

Other conditions that should be met and which contribute towards the successful functioning of our improved method will be apparent from the following specification in which we show our invention applied to a sheet fed offset press, although it will be readily understood that our scheme could be applied equally well in connection with any other type of presses where dampening of the printing surface is essential.

It is therefore the primary object of our inven-

tion to provide a novel combination of means whereby the above and other conditions will be successfully met, thus making available to the printing trade the commercial possibilities and usefulness of a method which will accomplish results long sought in the field of planographic printing, and which it was impossible to obtain heretofore due to the undeveloped state of the art.

Another object of our invention is to provide means whereby the degree of cooling can be controlled automatically.

A further object of our invention resides in means, preferably operating automatically, for suitably conditioning the air adjacent to the printing surface so that it will be charged with sufficient moisture at room temperature to assure adequate condensation without having to resort to excessive cooling of the printing member.

A still further object of our invention is to provide means for localizing the cooling action so that condensation of moisture on other parts than the printing surface will be minimized.

Other objects and features of our invention will be apparent from the following description and appended claims taken in conjunction with the accompanying drawings, in which:

Figure 1 is a diagrammatic view in elevation showing our invention as applied by way of example to a rotary lithographic offset printing press;

Figure 2 is a diagrammatic plan view of the arrangement shown in Figure 1;

Figure 3 illustrates one preferred form of a humidifying unit used in connection with our invention;

Figure 4 shows diagrammatically a scheme whereby the surface of a printing member may be held at constant temperature, also one manner by which the percentage of humidity of the conditioned air to be supplied to the vicinity of a printing surface can be automatically controlled, the printing member being shown in plan, whereas the conditioning unit is shown in vertical section;

Figure 5 is a view in cross section illustrating an arrangement whereby condensation of moisture may be confined to the actual printing surface of a printing member such as a plate cylinder; and

Figure 6 indicates one manner by which the bearers of a plate cylinder may be insulated from the plate carrying portion thereof in order to minimize condensation of moisture on such bearers.

Referring to Figures 1 and 2, the printing unit of the lithographic offset press in connection with which our invention is illustrated includes a plate cylinder 10, a blanket or transfer cylinder 11, and an impression cylinder 12, the sheets to be printed being fed in any conventional manner to the latter and to receive their impression from said blanket cylinder as they pass between the latter and the impression cylinder. The inking of the printing surface on the plate cylinder may also be accomplished in any suitable manner such as by means of an inking mechanism A which includes the usual ink distributing and form roller units.

According to our preferred form of arrangement, we supply cooling fluid to the plate cylinder 10 by means of a compressor unit B whereby the fluid is conveyed under pressure to and returned from the interior of said cylinder by way of refrigerant lines 13 and 14 respectively. This unit,

which may be of any known commercial type and design, includes an expansion valve 15 which operates to control the supply of cooling fluid and therewith the degree of cooling of the printing surface of cylinder 10. For example, when the temperature of the fluid leading from the cylinder 10 should rise above a predetermined degree, then the expansion valve would act to allow more cooling fluid to enter the cylinder 10 until the desired condition is again established, thereby maintaining the temperature of the printing surface substantially constant.

As hereinabove indicated, we found that if the temperature of the printing surface is maintained too low, the quality of printing will be impaired because the ink becomes tacky. Therefore, it is very essential that the dew point of the air surrounding the surface to be dampened be held within practical limits. By extensive experiments, we succeeded in ascertaining that the establishment of a certain relationship between the temperature of the printing surface and the dew point of the air surrounding it, is instrumental to a large degree in assuring the success which we have attained with our method of dampening printing surfaces by condensation.

A dew point within a desired range which will enable the production of a satisfactory film of moisture on a printing surface, despite variations in the humidity condition of air surrounding said surface, and which will not impair printing quality or performance, may be termed a "practical dew point".

For instance, when the temperature of the room in which a press embodying our invention operates, is 76 degrees Fahrenheit, which is considered about normal, then in order to assure a practical dew point of the air surrounding the surface to be dampened, in other words, in order to obtain adequate but not excessive precipitation on said surface, the relative humidity in said air should be held at about 60 per cent, with the temperature of said surface at approximately 40 degrees Fahrenheit. The dew point of the air would be about 60 degrees Fahrenheit and this would assure a desired film of moisture at a temperature well suited for printing operation. It will be readily understood of course that the relationship of these factors varies, depending on the prevailing atmospheric condition.

To counteract the various conditions and to establish a practical dew point of the air, we find that for successful results, it is essential to provide means whereby the relative humidity of the air adjacent the surface to be dampened will be held at a desired percentage with respect to a given temperature.

The means whereby we propose to supply to the vicinity of the printing unit conditioned air for the purpose of promoting condensation as aforesaid, includes a humidifying unit which may be of any suitable construction such as we have illustrated for example in Figure 3.

The conditioned air is preferably conveyed to the printing unit by means of an air duct 16 and branches 17 and 18 which may be provided with gate valves 19, 20 whereby the supply of conditioned air to the vicinity of the printing unit may be partly or altogether shut off as required. In order to evenly distribute the conditioned air, we provide nozzles 21 and 22, one arranged on one side of the cylinder 10, that is, on that side of the rotating cylinder which recedes from the point of contact of said cylinder 10 and the blanket cylinder 11, and the other on the op-

posite side, namely on the side which approaches the point of contact.

In carrying out our tests it developed that any obstruction in the longitudinal orifice of these nozzles will result in an uneven distribution of the conditioned air, because such obstructions will cause the air to be deflected, thereby leaving certain areas of the printing surface insufficiently dampened, while other sections will be excessively dampened. This condition becomes noticeable in the finished print in the form of streaks or other defects due to improper dampening.

Therefore, it is very important that those nozzles have a continuous, unobstructed orifice. Furthermore the nozzle 21 may be curved so that the conditioned air discharged therefrom will flow in the direction of rotation of the plate cylinder 10.

We found that under certain conditions it is preferable to provide a hood 23 to extend over one or each of said nozzles in order to confine the conditioned air to a predetermined restricted area and to bring it into close contact with the printing surface to be dampened.

The humidifier unit C, of the preferred form illustrated in Figure 3, includes a water container or tank 24 which is open at the top in order to permit atmospheric air to enter into spray chamber 25. Within said chamber are arranged spraying nozzles 26 and 27 to which water is supplied from the tank 24 through pipes 28, 29 by means of a pump 30 driven by motor 31. The atmospheric air which enters the chamber 25 is drawn through said chamber and through a series of eliminators 32 by means of a fan 33 and then conveyed to duct 16 at the air outlet 34. We will again emphasize that for the reasons set forth hereinabove, it is our object to produce moisture conditioned air at a temperature of the surrounding atmosphere and that the air so conditioned must be positively free of any entrained moisture, i. e. moisture in the form of globules such as would be the case if the water were mixed with the air in the form of vapor or steam.

The percentage of humidity carried by the conditioned air is controlled automatically by means of suitable instruments and/or mechanism such as illustrated by way of example in Figure 4.

Said figure shows one preferred form of controlling means whereby the degree of cooling of a printing surface and the percentage of humidity and quantity of the conditioned air to be supplied to the vicinity of such surface can be controlled automatically.

This controlling means, the constructional features of which do not form part of the present invention, includes an expansion valve 35 through which the cooling fluid is supplied to the interior of the cylinder 10 from the feed line 36. Said valve is responsive to the operation of a thermal control element 37 provided in the outlet line 14. Assuming that more cooling effect is required upon the surface of cylinder 10, then more refrigerant will be admitted and the pressure within the cylinder will tend to rise. The usual back pressure valve, not shown, will open wider to allow the compressor to reduce the pressure to a desired degree, with the result that more refrigerant will go to the compressor and consequently a greater refrigerating effect will be produced.

While according to Figure 4 the cooling fluid is fed into the cylinder 10 from one side and re-

turned to the refrigerating unit from the other side of said cylinder, it is evident that the feed line 36, as well as the return line 14, could both be applied to the same side of the cylinder, as for example, shown in Figure 1.

The humidifier unit C shown in Figure 4, supplies conditioned air to the blower 33, which, in turn, discharges that air through one or more nozzles 21 against the surface of the cylinder 10. For effectively controlling the dew point of the air, a series of spray nozzles 26 and 27 are provided, which by means of the pump 30, are fed with water from the tank 24 supplied from any suitable source.

In order that the temperature of the water passing through the nozzles 26 and 27 may be varied automatically, for the purpose of controlling the dew point of the air delivered to the vicinity of the cylinder 10, we preferably provide a thermostat 38, which controls a valve or device 39 whereby heat to be supplied by steam coils or electrical resistances or the like 40, is regulated. Eliminators 32 serve to remove entrained moisture from the air passing through the sprays, so that the conditioned air which is delivered to the fan 33 will be entirely free of entrained moisture.

Since the temperature of the printing surface may be kept constant, as already described, and since the dew point of the air supplied to the surface of the cylinder may be varied by controlling the temperature of the water passing through the spray nozzles 26, 27, it is apparent that any desired differential may be produced between the dew point of the delivered air and the temperature of the printing surface, so that condensation to any desired degree may be brought about.

According to the scheme illustrated in Figure 5, whereby condensation of moisture is confined to the printing surface of a printing member, we provide a layer or sheets 41, of any suitable insulating substance, one portion of which is placed between the body part of the printing member as illustrated, and that part which carries the printing surface to be treated, whereas the other portion of said insulating substance may be placed over the exposed ends of that part of the printing member which carries the printing surface.

In the embodiment shown, the tubes 42 through which the cooling fluid is circulated in order to cool the printing surface 43, is arranged within a chamber 44 which extends immediately beneath said printing surface. In order to assure the best possible cooling effect, the tubes 42 are mounted so as to remain in metallic contact with the outer wall of said chamber. Furthermore, in order to increase the efficiency of the cooling system, the space between the tubes or coils 42 within the chamber 44 could be filled with brine or with any other suitable medium.

It will be seen that in the manner described the gap 45, which is provided to accommodate plate securing means 45' in the event that flexible printing plates P are used, will be insulated from that part of the printing member which is to be cooled, whereby the condensation of moisture will be confined substantially to the printing surface itself.

The principle illustrated in Figure 5, whereby we confine the condensation to the actual printing surface of the cylinder, could be readily applied to any other type of form carrying printing element adapted to accommodate means whereby

printing forms such as flexible plates may be secured.

In Figure 6 we have indicated means whereby the bearers 46 of a printing cylinder 10 could be insulated from the form carrying portion of the cylinder for the purpose of minimizing condensation of moisture on such bearers. For this purpose we insert sheets or discs of insulating material 47 between the bearers 46 and the form carrying portion of the cylinder 10. It will be understood that other methods could be applied whereby condensation of moisture on the cylinder bearers will be effectively minimized or avoided.

As hereinbefore indicated, our method of treating printing surfaces, in order to render the non-design portions thereof ink repellent, is not limited to the specific manner shown in the accompanying drawings, but any other arrangements whereby the same results can be accomplished without departing from the spirit of this invention is deemed within the purview hereof. Therefore it is our intention that modifications of the system and apparatus disclosed herein, shall also come within the scope of the appended claims.

We claim:

1. In a system for dampening printing plates by condensation, the combination with a printing plate support, of means for supplying a cooling medium thereto for the purpose of reducing the temperature of said support below the dew point of the air surrounding said support, means for controlling the temperature of said support by automatically varying the volume of cooling medium supplied to said support depending on the temperature of the cooling medium returning from said support, and means for supplying air in a desired condition to the printing surface on said support for producing a film of moisture thereon of desired character.

2. In a system for dampening planographic printing members by condensation, the combination of means for cooling the printing surface of a printing member from the interior, means for automatically maintaining the temperature of said surface constant, means for impinging conditioned air against said surface at a temperature corresponding substantially with that of the air surrounding said member, and means including a hood arranged adjacent said surface for confining said conditioned air within a predetermined area.

3. In a system for dampening planographic printing members by condensation, the combination of a printing plate carrying member, means for circulating a cooling fluid within said member for cooling the surface thereof, means for automatically maintaining the temperature of said surface substantially constant, and means for impinging conditioned air against said surface at a temperature corresponding substantially with that of the atmosphere surrounding said member.

4. In a system for dampening planographic printing members by condensation, the combination of a printing plate carrying member, means for circulating a cooling fluid within said member and located immediately beneath the printing surface thereof for cooling said surface, means for insulating said latter means from said member and means for supplying conditioned air to the vicinity of said surface.

5. In a system of the character described, a printing surface, a holder for said surface, means for circulating a cooling fluid through the holder for controlling the temperature of the surface,

means responsive to the temperature condition of said fluid for varying the circulation of said fluid, means for discharging a volume of air against the surface, and means for controlling the dew-point of said air.

6. In an apparatus for controlling the formation of a film of moisture upon a surface, the combination with a surface of cooling means, means responsive to the temperature condition of said cooling means for maintaining constant the temperature of the surface, a device for supplying air at a constant dewpoint and at a temperature higher to a desired degree than that of said surface, and means for forcing the air against the surface and causing condensation of moisture thereon.

7. In combination with a planographic printing press, a printing member, means substantially co-extensive with the printing surface of said member for cooling it to thereby condense moisture thereon, means for automatically maintaining the temperature of said surface constant, and means for supplying conditioned air to the vicinity of said surface.

8. In combination with a planographic printing press, a printing member, means substantially co-extensive with the printing surface of said member for cooling it to thereby condense moisture thereon, means for automatically maintaining the temperature of said surface constant, and means for automatically supplying conditioned air to the vicinity of said surface.

9. In combination with a planographic printing press, a printing member, means substantially co-extensive with the printing surface of said member for circulating a refrigerant to reduce the temperature of said surface to a desired dew point and thereby condense moisture thereon, means for automatically maintaining the temperature of said surface constant, and means for supplying conditioned air to the vicinity of said surface.

10. In combination with a planographic printing press, a printing member having a printing plate supporting surface, a printing plate on said surface, a gap in said member for accommodating printing plate securing means, means substantially co-extensive with said surface for cooling it to thereby condense moisture on said plate, means for automatically maintaining the temperature of said surface and plate constant, and means for automatically supplying conditioned air to the vicinity of said plate.

11. In a system for dampening printing surfaces by condensation, a printing member, refrigerating equipment including means substantially co-extensive with the printing surface of said member for circulating a refrigerant to reduce the temperature of said surface to a desired dew point for condensing moisture thereon, and means associated with said equipment and responsive to temperature changes in said refrigerant for automatically maintaining the temperature of said surface substantially constant.

12. In a system for dampening printing surfaces by condensation, a printing member, refrigerating equipment including means substantially co-extensive with the printing surface of said member for circulating a refrigerant to reduce the temperature of said surface to a desired dew point for condensing moisture thereon, means associated with said equipment and responsive to temperature changes in said refrigerant for automatically maintaining the tem-

perature of said surface substantially constant, and means for supplying conditioned air to the vicinity of said surface.

13. In a system for dampening printing surfaces by condensation, a printing member, refrigerating equipment including means substantially co-extensive with the printing surface of said member for circulating a refrigerant to reduce the temperature of said surface to a desired dew point for condensing moisture thereon, means associated with said equipment and responsive to temperature changes in said refrigerant for automatically maintaining the temperature of said surface substantially constant, means for supplying conditioned air to the vicinity of said surface, and means for automatically controlling the condition of said air.

14. In a system for dampening printing surfaces by condensation, a printing member, refrigerating equipment including means substantially co-extensive with the printing surface of said member for circulating a refrigerant to reduce the temperature of said surface to a desired dew point for condensing moisture thereon, means associated with said equipment and responsive to temperature changes in said refrigerant for automatically maintaining the temperature of said surface substantially constant, an air humidification unit, and a pump for conveying conditioned air from said unit to the vicinity of said surface.

15. The method of producing an ink repelling film upon a printing surface, consisting in cooling the printing surface of a printing member by circulating a refrigerant within said member, automatically controlling the temperature of said surface in accordance with temperature changes in said refrigerant, supplying to the vicinity of said surface a medium capable of being condensed, and controlling the condition of said medium.

16. The method of producing an ink repelling film upon a printing surface, consisting in cooling the printing surface of a printing member by circulating a refrigerant within said member, controlling the temperature of said surface in accordance with temperature changes in said refrigerant, supplying to the vicinity of said surface a medium capable of being condensed, and automatically controlling the condition of said medium.

17. The method of producing an ink repelling film upon a printing surface, consisting in cooling the printing surface of a printing member by circulating a refrigerant within said member, automatically controlling the temperature of said surface in accordance with temperature changes in said refrigerant, supplying to the vicinity of said surface a medium capable of being condensed, and automatically controlling the condition of said medium.

18. The method of producing an ink repelling film upon a printing surface, consisting in cooling the printing surface of a printing member by circulating a refrigerant within said member, automatically controlling the temperature of said surface in accordance with temperature changes in said refrigerant, supplying to the vicinity of said surface a medium capable of being condensed, controlling the condition of said medium, and adjusting the relationship between the temperature of said refrigerant and the condition of said medium to thereby maintain a condition of practical dew point.

19. A method of producing a film of moisture upon a surface under varying conditions affecting the temperature of the surface, consisting in controlling the temperature of the surface in response to changes in heat load affecting the surface to maintain the temperature thereof below a certain point, impinging a volume of air against said surface at a dewpoint above said point, and controlling a desired differential between the temperature of the surface and the dewpoint of the impinging air.

20. A method of maintaining a desired differential between the temperature of a surface upon which moisture is to be condensed, and the dewpoint of air to be impinged against said surface, consisting in circulating a fluid on one side of the surface for regulating the temperature thereof, controlling the dewpoint of a volume of air impinging against the other side of the surface in response to changes in the condition of the air, and varying the circulation of the fluid responsive to variations in heat load affecting the surface, so that the temperature of the surface will always be a predetermined number of degrees below the dewpoint of the air.

21. In a system of the character described, a printing surface, a holder for said surface, means for circulating a cooling fluid through the holder for controlling the temperature of the surface, means operative responsive to variations in heat load affecting the surface for varying the circulation of said fluid, means for discharging a volume of air against the surface, and means for controlling the dewpoint of said air with respect to the temperature of said surface.

22. In a system for regulating the condensation of moisture vapor upon a printing surface, a holder for a printing surface, means for circulating a fluid through the holder, a thermostatic element operative responsive to the condition of fluid discharged from the holder, and a valve controlled by the element for regulating the admission of fluid to the holder, means for supplying a volume of air against a surface attached to the holder, and means for controlling the dewpoint of said air.

23. In a system for producing a film of moisture upon a planographic surface of the character described, a drum mounting a printing surface, means for circulating a fluid through said drum, means for controlling the circulation of fluid within the drum for controlling the temperature of the surface; a humidifying device, means for controlling the dewpoint of air treated by the device, both last mentioned means being arranged so that the differential between the temperature of the surface and the dewpoint of the air may be controlled, and means for impinging said air against the surface on the drum.

24. A combination of apparatus for controlling the formation of a film of moisture on a surface, a drum, a printing surface on the drum, means for supplying a cooling medium to the interior of the drum, a thermostatic device controlled by the cooling medium, a valve for regulating the volume of the medium under the control of said device, a humidifier, means for discharging air treated by the humidifier against said surface, and means for maintaining the humidity of the air discharged from the humidifier at the point of saturation.

BURT D. STEVENS.
BENJAMIN L. SITES.