My invention relates to improved means for dampening or moistening a printing surface, and refers more particularly to improved mechanisms for dampening the plate cylinders of a rotary offset press by means other than the usual water fountain and dampening rolls.

The object of my invention are, among other things, to provide simple and efficient means for dampening the plate cylinders by impinging on the printing surfaces of the plate regulated streams of humidified air with the resulting condensation of the moisture from the air so saturated upon the colder printing surfaces. Such film of condensed moisture on the plate may be advantageously regulated and controlled in different zones across the plate by varying the volume of such humidified air that is delivered to various sections of the plate as the nature of the job requires.

A further object of my invention is to provide novel means for cutting off the supply of humidified air when the press is tripped and the cylinders are separated, so as to prevent the plate from gathering too heavy a film of moisture as would occur if the air were left blowing, since none of the applied moisture would be taken off by the inking rollers or rubber transfer cylinder.

Furthermore I have devised novel means for shutting off the air when the inking form rollers are dropped into inking contact with the plate-cylinder. Such improved mechanism becomes necessary at times when starting up the press so that the plate may be properly dampened before the form rollers are lowered into contact, since if the plate was dry when the form rollers were dropped, such plate would roll up solid with ink thereby necessitating washing off by hand.

Other objects and advantages of my invention will be hereinafter described and then particularly set forth in the appended claims. My invention is applicable to various types of printing presses, for example, the rotary offset press in connection with which I have shown my improvements in the drawings. Such drawings, which are more or less diagrammatic, serve to illustrate one form of my invention that is capable of embodiment in many different forms.

In the accompanying drawings, Fig. 1 is a side elevation of a rotary offset press with the humidified air compartment shown partly in section; Fig. 2 is an enlarged end view of the plate-cylinder with my improved dampening mechanism applied thereto; Fig. 3 is a detail section on the line 3-3 of Fig. 4 showing the transverse air nozzle and regulating devices therefor; Fig. 4 is an enlarged end view of the transverse air nozzle; Fig. 5 is a top plan view of the nozzle shown in Fig. 4; Fig. 6 is a diagrammatic side elevation of an offset press showing the automatic throw-off for the air blast connected to the inking form rollers. Fig. 7 is an enlarged detail view of the plate-cylinder and associated devices shown in Fig. 6, coupled with the hand-operated valve for operating the air blast independently of the form roller control shown in Fig. 6; and Fig. 8 is an end elevation, partly in section, of means for applying a cooling medium to the interior of the plate-cylinder.

Similar numerals refer to similar parts throughout the several figures.

Referring more particularly to Figs. 1 and 2, the plate-cylinder 9 is suitably journelled in the side-frames 10 and 11, with the inking form rollers 12 resting in contact with the plate-cylinder 9. The plate-cylinder 9 coats with the rubber offset cylinder 13 which in turn cooperates with the impression-cylinder 14 having the grippers 15 to take the successive sheets from the feed-board 16 in the usual way. The rubber cylinder 13 is mounted in eccentric bearings (not shown) so as to be separated from both plate-cylinder 9 and impression-cylinder 14 in the usual way when the press is tripped. In Fig. 1 the rubber cylinder 13 when in printing relation is shown in full lines; when out of printing contact the cylinder 13 is shown in dot and dash lines. The cylinders 9, 13 and 14 are geared to revolve in unison as shown by the arrows in Fig. 1.

Mounted on the brackets 17 in the side-frames 10 and 11 is the housing 18 from which upwardly projects the transverse and elongated air nozzle 19 having the elongated slotted opening 20 in proximity to the surface of the plate-cylinder 9 as shown in Figs. 1, 6 and 7. Referring to Figs. 2-5, the base 21 of the air nozzle 19 is slitted at 22 to carry the thin flexible transverse plate 23 secured at its base in slits 22 by the rivets 24. The upper edge 25 of the plate 23 is coincident with the opening 20, and the upper part of the nozzle 19 has horizontally arranged therein a
series of adjusting thumb-screws 28 that bear upon the upper margin of the plate 23 by which the size of the opening 20 may be varied and controlled by the several thumb-screws 26 as shown in Fig. 5 in different zones or sections of the plate. By this mechanism a greater or lesser volume of air is delivered through the variable size opening 20 to impinge on different portions of the plate on the cylinder 9 to suit the requirements, all of which is regulated by the adjustment of the several thumb-screws 26.

The frame 18 is closed at one end by the screw-plug 27, and the opposite end (Figs. 2 and 4) is fitted with the air supply pipe 28 that extends through the sidewalls 29 of the air compartment 30 to the blower 31 operated by the motor 32, both blower 31 and motor 32 being mounted on the standard 33 within the compartment 30. Suitably located in the pipe 28 is the control valve 34 operated by the lever arm 35 having the slotted end 36 engaging the stud 37 on the link 38 pinned to the arm 39 that moves the eccentric bearings of the plate-cylinder 9 when the press is tripped as has been herein-before described. When the arm 35 is in full line position the valve 34 is open; when in its dotted line position (Fig. 1) the valve 34 is closed.

Preferably the humidified air that impinges on the plate-cylinder 9 from the air nozzle 19 is heated so as to carry the requisite amount of water vapor, and any suitable means for heating such air may be used. In the present embodiment, I have shown the spiral piping 40 coiled about the pipe 28 within the compartment 30 and having the inlet pipe 41 connected with a source of steam and the control valve 42 and the outlet pipe 43.

In place of this steam coil, any hot water, electrical, or gas-heating devices may be employed to raise the temperature of the humidified air passing from the blower 31 through the pipe 28 to the transverse air nozzle 19. In Fig. 1 I have also shown the hood or shield 44 that may be pivoted to the housing 18 to confine the warm moist air issuing from the air nozzle 19 in proximity to the plate-cylinder 9. Such hood 44 may be swung back from the cylinder 9 and out of the way as shown by dotted lines in Fig. 1.

Within the air compartment 30 is arranged any suitable type of air-humidifying apparatus to saturate the air within the compartment 30 with water vapor. In Fig. 1 I have shown in diagrammatic form one type of humidifier usually found in printing plants and known as the "Babson Humidifier." Such device comprises a small motor with hollow shaft through which water from the supply pipe 45 controlled by valve 46 passes to the hub of the rapidly-revolving fan blades 47 that break up the liquid into a very fine spray that humidifies the air within the compartment 30. The drip pan 48 with the outlet pipe 49 carries excess water from the fan blades 47, and the valve 46 regulates the quantity of water supplied to the humidifier to control the amount of moisture within the compartment 30. The heating of the humidified air within the supply pipe 28 for the air nozzle 19 is controlled by the valve 42. The compartment 30 with the associated devices to supply the warm moist air to the plate-cylinders may advantageously be of sufficient size to supply a number of press groups equipped with my improved dampening mechanisms.

Referring to Figs. 6 and 7, I have here shown the sets of inking form rollers 12 mounted in coating frames 80 and 81 on the cross shaft 82 so that when the frames 80 and 81 are swung upwardly in the usual way, the rollers 12 are thrown off the plate-cylinder 9. In this embodiment the link 38 is pinned to the outer end of the frame 34 of the form roller throw-off mechanism. When the parts are in dash and dot position, the air is shut off by the closing of the valve 34 coincident with the raising of the rollers 12 from the plate-cylinder 9. The valve 34 (Fig. 10) regulates the amount of air passing through the supply pipe 28. In Fig. 7 the supply pipe 28 has two branches 54 and 55 meeting with the pipe 56 connected to the housing 18. The branch pipe 54 carries the control valve 34 and associated mechanism connected with the form roller throw-off, while the branch pipe 55 carries the control valve 56 actuated by the hand lever 51. By these devices the air blast impinging on the plate-cylinder 9 from the air nozzle 19 may be controlled independently of the form roller throw-on and off mechanisms so that the plate-cylinder 9 may be moistened or dampened before the rollers 12 are dropped on the cylinder 9 whereby the printing plate may be brought into proper printing condition before the press is started.

In Fig. 8 the interior of the plate cylinder 9 may be connected through the hollow journals 58 and 59 with the inlet pipe 60 and outlet 61 respectively. The journals 58 and 59 carry the threaded nipples 62 (one being shown in detail in Fig. 6) connected with the pipes 60 and 61 through the packing boxes 63 and 64 respectively. The cooling medium, such as cold water or an expanding gas that has been chilled, is passed through the interior of the plate-cylinder 9 from the inlet pipe 60 so that the printing surface on the plate on the cylinder may be of suitably low-temperature relatively to the warm moist air impinging on the plate-cylinder 9 from the air nozzle 19 to readily condense to form a moisture film on the plate.

Referring to Figs. 2-5, adjustment of the several thumb screws 26 that bear against the upper margin of the plate 23 affords a readily controlled and manipulated means for regulating the volume of air impinging on the cylinder 9 in different sections of the plate, since frequently one part of the plate should take more moisture than another. By variably bending the top margin of the plate 23 by the individual screws 26 as shown in Fig. 5, the amount of air passing through the air nozzle 19 may be reduced in different sections or zones by restricting the size of the slotted opening 20 in such zones through the bending of the plate 23.

The operation of my improved dampening mechanism is apparent from the foregoing, and may be summarized as follows: In the Figs. 1-5 construction when the press is in operation the parts in Fig. 1 are as shown in full lines with the warm moist air from the nozzle 19 impinging on the colder plate-cylinder 9 to form by condensation a film of moisture on the plate before the dampened surface reaches the inking form rollers 12. When the press is tripped the rubber cylinder 13 is separated from both plate-cylinder 9 and impression-cylinder 14, with the link 38 raised to lift the lever arm 39 and thereby shutting off the humidified air from the plate-cylinder 9. In the Figs. 6 and 7 construction when the form roller throw-off mechanism is actuated, the rollers 12 are raised from the cylinder 9 and at the same time the link 34 is also lifted to shut off the air from the air.
nozzle 18 by closing the valve 34. Fig. 7 shows the manual control for admitting air to the cylinder 9 when the form rollers 12 are raised as hereinafter described.

5 It will be observed that by using either one or both of these automatic throw-offs, when the press is tripped, the flow of air to the plate cylinder is shut off, which mechanism renders the press easier to operate by dispensing with any hand operation, while at the same time the operator may advantageously dampen the plate when starting the press before the inking form rollers 12 come into contacting position.

Again all the features described need not be used conjointly because the same may be used to advantage in various different combinations and sub-combinations; my invention is obviously not limited to the precise construction and arrangement of parts shown and described, since the same may be variously modified within the scope of invention and without sacrificing the benefits derived from its use.

I claim as my invention:

1. A dampening mechanism for printing-presses comprising a printing plate, means for impinging humidified air upon the plate comprising an elongated nozzle extending transversely in proximity to the plate, and a single mechanism transversely adjustable within the nozzle for varying the size of nozzle opening transversely of the plate.

2. A dampening mechanism for printing-presses comprising a printing plate, means for impinging humidified air upon the plate comprising an elongated nozzle extending transversely in proximity to the plate, a flexible plate within the nozzle extending along the opening, and means for variably bending the plate to vary the size of the nozzle opening transversely of the plate.

3. In a rotary offset printing-press having a plate-cylinder, a rubber-cylinder and an impression-cylinder, means for separating the rubber-cylinder from both the other cylinders, means for impinging humidified air on the plate-cylinder comprising an elongated nozzle and a therewith associated flexible plate extending transversely in proximity to the plate, means for variably bending said flexible plate to vary the size of the nozzle opening laterally of the plate-cylinder, and automatically actuated means for shutting off the air from the plate-cylinder upon said separation of the rubber-cylinder.

4. In a rotary offset printing-press having a plate-cylinder, a rubber-cylinder and an impression-cylinder, means for separating the rubber-cylinder from both the other cylinders, means for impinging heated humidified air on the plate-cylinder comprising an elongated nozzle and a therewith associated flexible plate extending transversely in proximity to the plate, means for cooling said plate-cylinder, and automatically actuated means for shutting off the air from the plate-cylinder upon said separation of the rubber-cylinder.

5. A dampening mechanism for printing-presses comprising a plate-cylinder and a laterally extending nozzle in proximity to the cylinder, said nozzle having adjusting means comprising a flexible plate transversely adjustable within the nozzle to vary the volume of humidified air impinging on the different sections of the cylinder from said nozzle.

6. In a printing press having a plate-cylinder and inking form rollers therefor, means for separating the form rollers from the cylinder, means for impinging humidified air upon said plate-cylinder comprising an elongated nozzle and a therewith associated flexible plate extending transversely in proximity to the plate, means for variably bending said flexible plate to vary the size of the nozzle opening laterally of the plate-cylinder, and means controlled and actuated by the separation of the form rollers for shutting off the air from said plate-cylinder.

7. In a printing press having a plate-cylinder and inking form rollers therefor, means for separating the form rollers from the cylinder, means for impinging humidified air upon said plate-cylinder comprising an elongated nozzle and a therewith associated flexible plate extending transversely in proximity to the plate, means for variably bending said flexible plate to vary the size of the nozzle opening laterally of the plate-cylinder, and means controlled and actuated by the separation of the form rollers for shutting off the air from said plate-cylinder.

8. In a rotary offset printing-press having a plate-cylinder, a rubber-cylinder and an impression-cylinder with means for separating the rubber-cylinder from both the other cylinders, inking form rollers for the plate-cylinder with means for throwing-off said rollers from the plate-cylinder, means for impinging humidified air on the plate-cylinder, and means controlled by the separation of the cylinders for shutting off the air from the plate-cylinder, last-mentioned means being also controlled by the throwing off of the inking form rollers for shutting off said air from said plate-cylinder.

9. In a rotary offset printing-press having a plate-cylinder, a rubber-cylinder and an impression-cylinder with means for separating the rubber-cylinder from both the other cylinders, inking form rollers for the plate-cylinder with means for throwing-off said rollers from the plate-cylinder, means for impinging humidified air on the plate-cylinder, and means controlled by the separation of the cylinders for shutting off the air from the plate-cylinder, said last-mentioned means being also controlled by the throwing off of the inking form rollers for shutting off said air from said plate-cylinder, and manually-controlled means for impinging humidified air on the plate-cylinder when the form rollers are thrown-off.

10. In a printing press having a plate-cylinder and inking form rollers therefor, means for separating the form rollers from the cylinder, means for impinging humidified air upon said plate-cylinder comprising an elongated nozzle and a therewith associated flexible plate extending transversely in proximity to the plate, means for variably bending said flexible plate to vary the size of the nozzle opening laterally of the plate-cylinder, automatically actuated means for shutting off the air from said plate-cylinder, and independent means for impinging humidified air on said plate-cylinder while said shutting off means are operative.

CHARLES W. HARROLD.