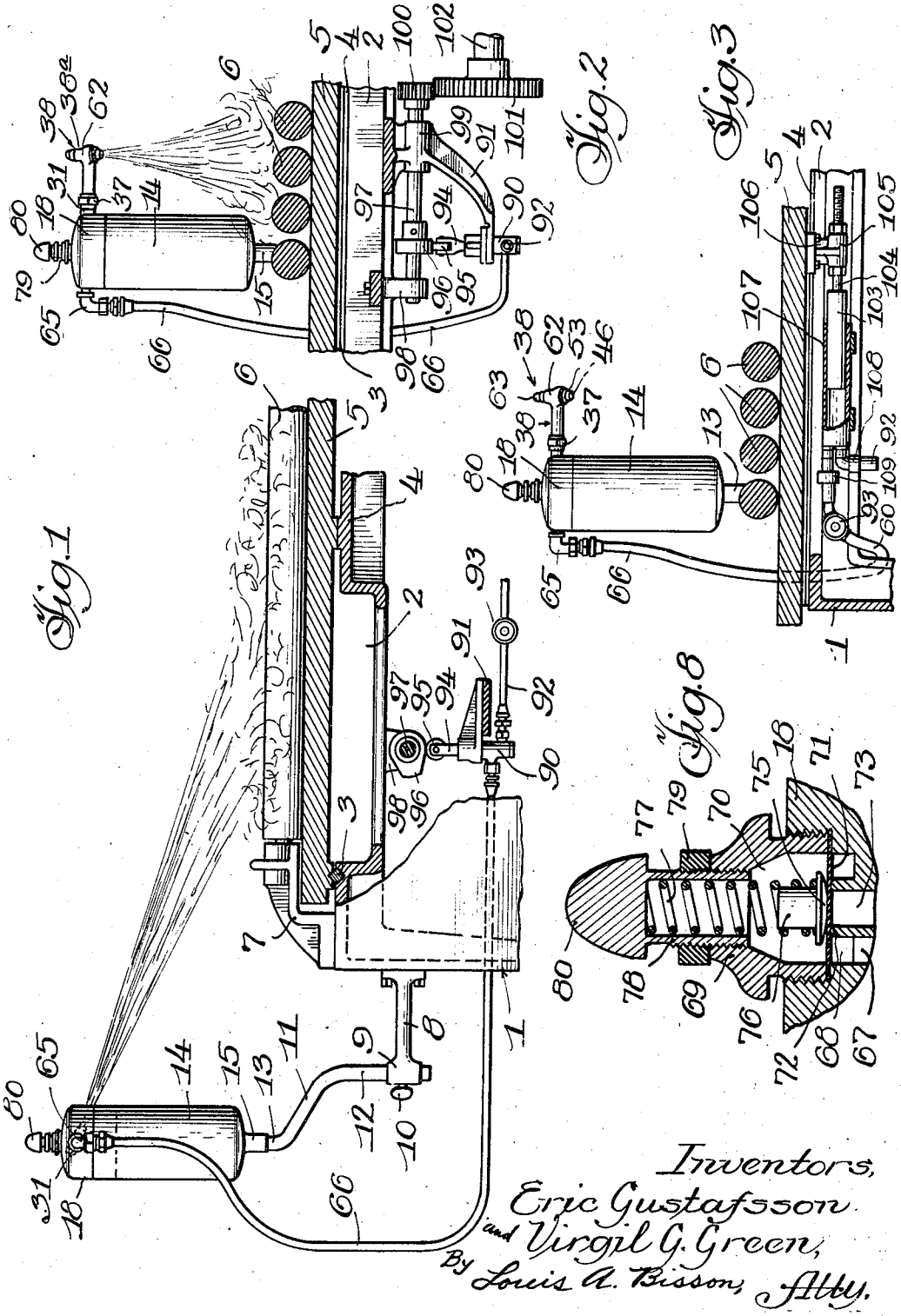
Dec. 2, 1941. E. GUSTAFSSON ET AL 2,264,523

MEANS FOR DISTRIBUTING HUMIDITY IN PRINTING PRESSES

Filed Aug. 8, 1938 2 Sheets-Sheet 1



Inventors,
Eric Gustafsson
and Virgil G. Green,
By Louis A. Bisson, Atty.

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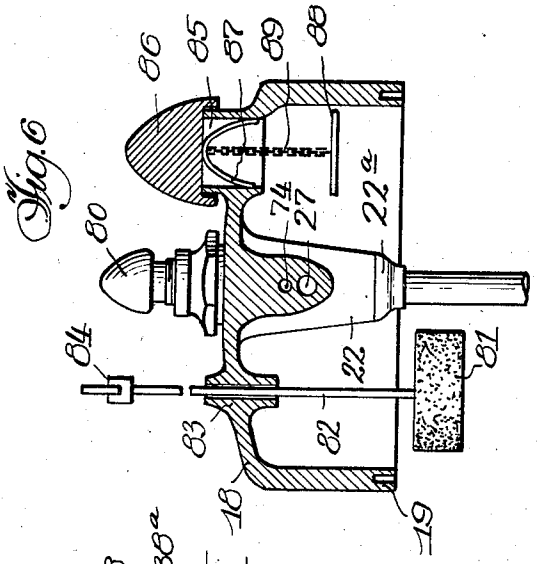


Fig. 6

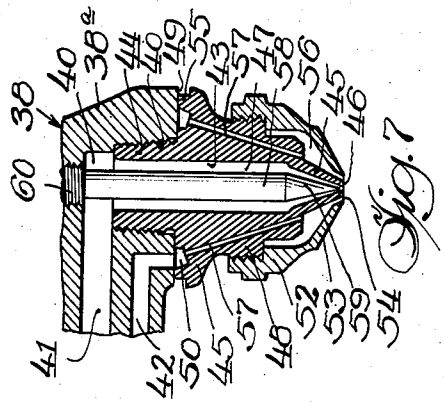


Fig. 7

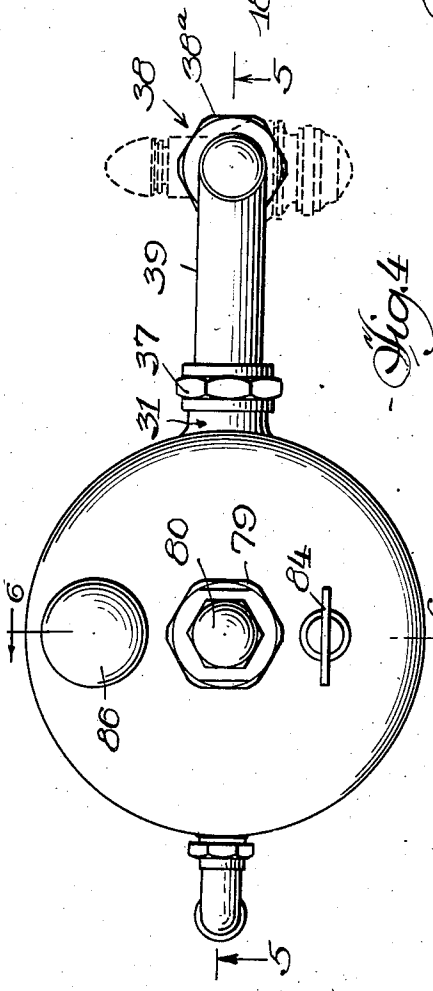


Fig. 4

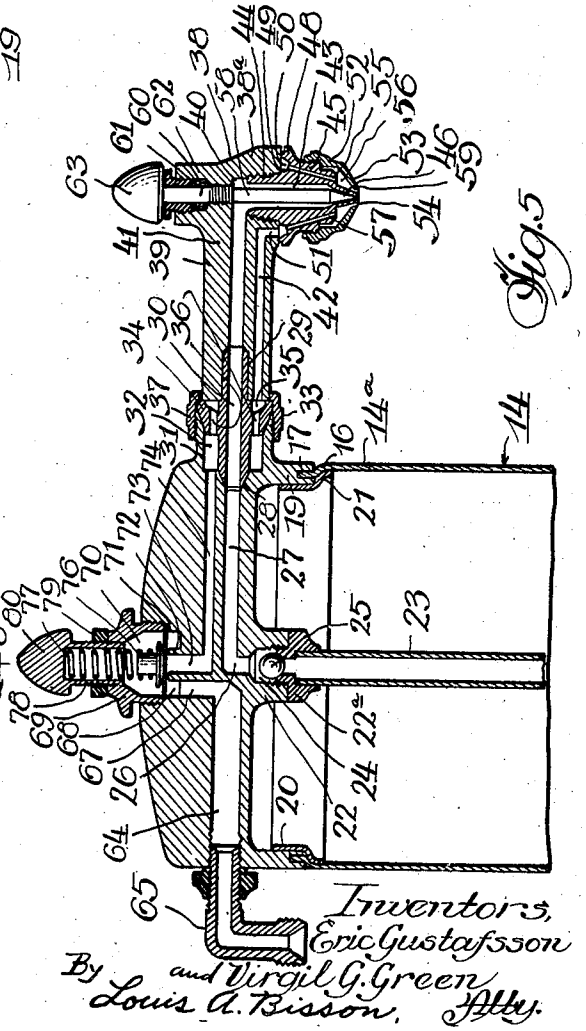


Fig. 5

Inventors,
Eric Gustafsson
and Virgil G. Green
By Louis A. Bisson, Atty.

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MEANS FOR DISTRIBUTING HUMIDITY IN PRINTING PRESSES

Eric Gustafsson and Virgil G. Green, Chicago, Ill., assignors to Binks Manufacturing Company, Chicago, Ill., a corporation of Delaware

Application August 8, 1938, Serial No. 223,606

4 Claims. (Cl. 299—86)

The present invention relates to means for distributing humidity in a printing press so as to treat the inking means and the paper therein, and to a means adapted to distribute various liquids for any desired purpose, including the above mentioned method.

Among the objects of the invention is to provide a novel means for projecting from a point, as at the side of a printing press, an extremely fine mist-like spray of material more or less in the form of nebulous puffs, such as water, a solution of non-solidifying materials, or the like, in the vicinity of an object to be treated, such as rollers for transferring ink to the plate, in very small amounts, so that the minute, practically invisible particles of the material will be distributed substantially evenly over the length of the rollers and be conveyed with the ink to the impression surface, thus supplying sufficient moisture or like material to the paper to give it the various advantageous characteristics that paper gains when it receives a proper amount of moistening or humidifying.

The idea, in general, of supplying moisture or humidity to the paper web in printing presses is quite old. Various means and methods have been used. In some cases the moisture has been applied directly to the paper, as by spraying water against the paper, or projecting thereagainst of jets of water, steam in different degrees of wetness, water vapors with and without air, etc. In other cases the application has been more indirect, as by directing or casting water and water sprays against deflectors or baffles so that the moisture is in turn deflected or reflected in more divided state before reaching the paper. In still other cases the moisture has been conveyed by wet surfaces, as of rollers covered with porous material, or porous endless webs, etc., which contact the surface of the paper web for adherence of some of the moisture to the paper surface. In still further cases water has been sprayed on the ink transfer rollers so that they will convey the water or moisture to the printing plate which in turn transfers some of the water or moisture to the paper web.

In all these cases there is a considerable use of the material, and the operation is usually continuous, whereby there is great waste of the material, and also unnecessary cost of the operation of the means for supplying the material.

The present invention comprehends the economic supplying of the material with a discontinuous or intermittent action so timed as to furnish only the moisture or humidity necessary for the desired result, and to do this with a very simple and inexpensive means as well as one that has very low cost of operation and maintenance. The moisture or humidity is projected into an extremely fine mist-like cloud in adjacency with the surfaces of the ink transfer rollers so that the minute particles of moisture or humidity will be distributed substantially evenly over the lengths of the rollers and will adhere to the ink and be transferred with the ink to the printing parts of the printing plate. The terms water, humidity, moisture, etc., are used generically and include any solution of non-solid forming constituent, such as glycerine or the like. Preferably, it is an aqueous solution, and it may include alcohol or the like.

The invention also comprehends the idea of moistening or humidifying the rollers for the various advantages gained as explained below. In operation, the rollers usually become heated. Such heating decreases or shortens the life of the rollers because of the deteriorating effect on the composition of the rollers. Also the rollers rapidly harden. By moistening or humidifying the rollers in accordance with the present invention, the rollers are maintained cool, their life is greatly lengthened, and hardening is reduced to a minimum. Frequent changing of the rollers is avoided, thus permitting the operation of the rollers for much longer periods of time. This reduces the time the press must be shut down. Recoating and remolding of the rollers also are made much less frequently. Hence, the cost of operation is greatly diminished.

The heating effects cause the composition of the rollers to become dry and hard or, when excessive, to even melt. The moistening or humidifying of the rollers prevents the drying and the hardening of the composition, thus preserving the original consistency of the composition and its suppleness, as well as smoothness and efficiency for the adherence of the ink film, and also so maintains the rollers cool as to prevent danger of melting or becoming deformed by reason of excess heat. By maintaining the rollers clean and smooth, the necessity for cleaning or washing the rollers also has been greatly reduced. The transfer of the ink is also aided, by being effected more smoothly and with much less tendency to picking when using very viscous or stiff ink.

Many other benefits are derived or gained from and by the present invention. There is usually, in printing, a certain amount of paper lint, dust, dirt, and dried ink formed or produced

which accumulates on the form in the crevices between the type or the like, and around the edges of the plate. By humidifying the rollers, ink, etc., especially with a solution having some glycerine, by the means and method in the present invention, such accumulations or collections are avoided; the rolls are maintained soft and pliable, and the tackiness is increased to such extent that the dirt, and other foreign matter, as mentioned above, are constantly picked out of the form, thus avoiding the formation of accumulated matter which would have a tendency to come out all at one time in pieces or the like. Without the use of the means of the present invention it would be necessary to wash the form frequently, many times per day, to eliminate the accumulation or collection of the foreign matter referred to and to prevent it from getting into and clogging or otherwise affecting the mechanism. All of these disadvantages are avoided by the present invention.

There are also many advantages in moistening or humidifying the paper in the press. One of the advantages is that up to a certain point of humidifying the paper web, the paper web is greatly strengthened or toughened so that it will not readily tear. Hence, the web may be run through the press at much greater speed than if the web were dry.

Another advantage is that the presence of moisture or humidity in the paper web results in obtaining more intensified ink printing. When using black ink, the imprint is blacker. This is probably due to the moisture occupying the interstitial spaces which the ink would otherwise occupy. Hence, considerable saving in ink is effected since less ink is absorbed in the paper. The desired imprint is obtained with less ink.

A further advantage is that, by moistening or humidifying the paper web, static electricity is avoided or reduced to a minimum. Any that may be generated will be rapidly dissipated and conducted to the metal parts of the press and to ground in a well known manner.

While the invention is herein disclosed, as by way of illustration, to the humidifying of rollers and paper in a printing press, it is to be understood that the invention is applicable to other uses where it is desired to distribute evenly the liquid material of any kind. As for example, the invention may be used to prevent offset in printing, as disclosed in the Green and Gustafsson Patents Nos. 2,110,218 and 2,110,219, issued March 8, 1938; or the invention may be used in the treatment of the surfaces of any object, such as the chemical treatment of hides, etc.; or for the treatment of air, gases, vapors, powders, or the like.

Other objects, advantages, capabilities, features, or the like are comprehended by the invention as will later appear, and as are inherently possessed by the invention.

Referring to the drawings:

Fig. 1 is a view in end elevation, with parts shown in broken section, of a press with means in accordance with the present invention for carrying out the process thereof;

Fig. 2 is a similar view in side elevation thereof;

Fig. 3 is a view similar to that shown in Fig. 2 and showing a form of means operable by a part of the press for supplying pressure fluid to the spraying device;

Fig. 4 is a top plan view of a spraying means forming part of the invention;

Fig. 5 is a fragmentary sectional view of the means shown in Fig. 4, and taken in a plane represented by line 5—5 of Fig. 4 of the drawings;

Fig. 6 is a similar view taken in a plane represented by line 6—6 of Fig. 4 of the drawings;

Fig. 7 is a fragmentary sectional view, on an enlarged scale, of the spray nozzle shown in Fig. 4; and

Fig. 8 is a sectional view, on an enlarged scale, of the diaphragm check valve device shown in Fig. 4.

Referring more in detail to the drawings, the embodiment chosen to illustrate the invention is shown in connection with a printing press having a supporting frame 1 and a table 2, the latter being provided at its upper surface with tracks 3 and 4 upon which reciprocably slides an ink transfer plate 5. Above the plate 5 and in rolling contact with the upper surface thereof are transversely disposed ink transfer rollers 6 rotatably mounted in bearing brackets 7 secured to side portions of the press frame top 2 (Fig. 1 showing these at one side of the press but like means are provided also at the other side, even though not shown). Any suitable means (not shown) may be employed to reciprocate the plate 5 in a known manner.

To the side of the press frame is secured a bracket 8 having a hub 9 in which is adjustably fastened, as by a thumb screw 10, a bracket stand 11 of bent form with vertical lower and upper offset portions 12 and 13, the part 12 being both vertically and angularly adjustable in the hub 9. On the upper end of the part 13 is mounted a material supply container 14 having at its lower end a socket 15 for rotatably receiving the upper end portion of the part 13 so that the container may be angularly adjustable about the vertical axis of the part 12 so as to locate the container near to or further away from the press as desired or found necessary. Any suitable means, such as a thumb screw (not shown) may be used to secure the parts 13 and 15 in adjusted relation.

The container 14 (see Fig. 5) comprises an upright hollow cylindrical body 14a having at its upper end an annular shoulder 16 and an upwardly extending annular rim portion 17.

Upon the upper end of the body 14a is a closure top or head 18 having a depending annular flange 19 provided with a channel in which the rim 17 is seated and sealed. To the inner face of the flange 19 is suitably fixed a band 20 with its lower edge portion 21 extending below the flange 19 and outwardly to seat against and seal with the inner face of the shouldered portion 16 of the container.

The head or top 18 has a depending boss 22 to which is threadedly engaged a coupling element 22a carrying a pipe 23 leading to a low point in the container. In the boss 22 is provided a valve chamber 24 in which operates a ball check valve 25 adapted to seat and seal on a seat provided at the upper end of the coupling element 22a and to come to a stop against a non-sealing stop provided at the upper end of the chamber 24. The distance between the seat and stop is such as to afford a given amount of play or movement of the check valve 25 when moving during the operation of the device as later explained.

The chamber 24 opens into a port 26 from which radially extends a material passage 27 leading to the rim of the cover 18, the end of

the passage 27 having a flared seat 28 against which seats a tapered end of a tubular member 29 having a bore passage 30 in line with the passage 27 and constituting an extension thereof.

Concentric with the member 29 and extending outwardly from the rim of the head 18 is formed a tubular boss 31 between which and the inner end portion of the member 29 is provided an annular air chamber 32. The outer end of the boss 31 has a flared seat 33 against which seats the tapered rim of an annular enlargement 34 formed with an intermediate portion of the tubular member 29. It will be noted that the seats 28 and 33 are disposed in a common conical surface. In the outer face portion of the enlargement 34 is provided an annular air chamber 35 which communicates, by way of passages 36 provided in the enlargement 34, with the annular air chamber 32.

The boss 28 is suitably threaded to receive a coupling retainer 37 having a thrust flange overhanging the peripheral portion of the enlargement 34 for seating it when the retainer is screwed home. The member 29 with the enlargement 34 serves as a swivel coupling for the spray gun 38. The latter has a shank 39 provided with a socket 40 in which tightly fits the outer end portion of the tubular member 29 so that, when adjusting the position of the gun 38 about the axis of the shank 39, the tubular member 29 with its enlargement 34 will turn with the shank 39, assuming that the retainer 37 has been sufficiently loosened for that purpose. On tightening the latter, after making the desired or required adjustment, the parts 34, 29 and 39 are held in place as a unit.

The shank 39 has a bore passage 41 in line with the passage 30 in the member 29 to act as an extension of the passages 30 and 27 and to conduct the material to the gun 38. The shank 39 also has an air passage 42, eccentric to the passage 41, in communication at an end thereof with the annular chamber 35, and at the other end thereof with the gun 38. By having an annular chamber 35 at the end of the shank 39 and opposite the passage 42, any relative turning of the shank 39 and the tubular member 29 will not destroy the communication between the air passage 42 and the air chamber 32 (via annular recess 35 and passages 36).

The spray gun 38 used is preferably of the so-called fixed valve type, that is, the kind in which the needle valve for controlling the material is of the adjustably fixed type. As shown, the gun 38 comprises a body 38a having a chamber 40 at the end of the passage 41 and a forwardly opening threaded bore leading from the chamber 40, wherein is engaged the threaded shank 44 of a material nozzle 45 provided at its forward end with a tapered material discharge tip 46, and a cylindrical bore 47 rearwardly of the tip 46 and leading from the chamber 40 in the body 38a.

The material nozzle 45 is formed with an annular flange 48 to seat against the forward face 49 of the body 38a and to provide within the flange 48, at the face 49, an annular channel 50 which communicates with the air passage 42 by way of a port 51 at the end of the passage 42 and provided in the front portion of the body 38a.

The nozzle 45 is suitably threaded for the connection of an air nozzle 52 having a tapering frontal portion 53 provided with a circular opening at its tip and at the end of the material tip 46 so as to form an annular air discharge orifice 54 around the end of the material tip 46. The forward end of the nozzle 45 is formed with an annular shoulder 55 around the base of the tip 46 so as to provide an annular air channel or chamber 56 around the tip 46, within the air nozzle frontal wall 53, and in communication with the orifice 54.

The nozzle 45 is also provided with a plurality of forwardly converging air passages 57 leading from the annular chamber 50 to the annular chamber 56. The flow of air is from the passage 42 thence by way of port 51, annular chamber 50, passages 57, annular chamber 56, and through the annular orifice 54.

In the material passage 47 is disposed a needle valve 58 having a conical tip 59 for cooperation with the material discharge tip 46, and a shank portion 60 adjustably threaded in the rear portion of the body 38a, the unthreaded portion of the shank 60 extending through suitable packing means 61 provided in a rear packing hub portion 62 of the body 38a. To the rear or outer end of the needle valve shank is secured a knob 63 by which the needle valve may be adjusted for the desired or required feed of the material through the nozzle tip 46.

At the other side the cover head 18 is provided with an air passage 64 suitably threaded at its outer end for connection of an elbowed fitting 65 to which is coupled an air duct or pipe 66 (see Figs. 1, 2 and 3). The inner end of the passage 64 connects with an upright passage portion 67 leading to an annular chamber 68 provided in the upper portion of the head 18. Above this chamber 68 the head 18 is suitably bored and threaded to receive a hollow cap 69 providing therein a chamber 70. Between the lower end of the cap 69 and a shouldered portion of the head 18 is clamped, at its margin, a circular valve disc 71 of any suitable material, such as leather, rubber, composition, resinous compounds, etc., this disc separating the two chambers 68 and 70 and being sufficiently flexible or resilient as to flex when acted upon by air and spring pressures.

Centrally of the chamber 68 is provided an upwardly extending tubular portion 72 the upper end of which constitutes a valve seat when contacted by the central portion of the disc 71, the passage 73 in this tube portion 72 extending downward and being in communication with the inner end of an air passage 74 which leads to the air chamber 32 in the boss 31.

Within the chamber 70 is located a button 75, the lower rounded portion of which is pressed against the upper side of the central portion of the disc 71, this button also having a shank 76 extending into the lower portion of a helical spring 77. The spring extends upward into an adjusting socket 78 adjustably threaded to the upper end of the cap 69, a lock nut 79 being used, if desired, to set the socket 78 in adjusted position. The upper end of the socket 78 is provided with a knob 80 by which the socket may be adjusted to vary the force of the spring 77 on the button 75 of the disc 71.

When the valve disc 71 is in closed position, the pressure air from the passage 64—67 acts only upon the annular area of the disc around the valve seat. The spring 77 may be so adjusted that the disc will open the port of the tube part 72 at a given pressure, as for example, thirty-five pounds pressure to the square inch, which when acting against the annular area of the disc

mentioned will open the valve. As soon as the valve opens, the central area portion of the disc, which normally closes the port, then is subjected to the air pressure, so that the valve will be maintained open by air pressure less than that required to initiate the opening of the valve, as for example, such pressures as may range between thirty-five and twenty-five pounds to the square inch. When the pressure drops to the lower pressure, such as for example, twenty-five pounds to the square inch or less, the spring 77 then acts immediately to close the valve disc, the central area portion of it being no longer subjected to the air pressure then existing. When the air pressure again rises to the opening pressure, the valve disc is again opened as described above.

When the valve 71 opens, the air under pressure immediately passes to the passage 74 and thence to the spray gun 38. In so passing the pressure will naturally drop, at the valve, but the drop even though below the opening pressure will nevertheless be a sustaining pressure for maintaining the valve open, until the sustaining pressure reaches the closing pressure when the spring 77 acts to close the valve. During the interval the air is in the range of sustaining pressures, the air is projected from the gun with air aspirating effect on the liquid material contained in the nozzle chamber 48, passages 41, 30, 27 and 26, check valve chamber 24, and supply tube 23. The air path is by way of the passages and chambers 74, 32, 36, 35, 42, 51, 50, 57 and 56 to the orifice 54.

The ball check valve 25 acts to prevent the material receding or retreating down the tube 23 and into the container 14a. The ball check valve chamber 24 is of such a length that the ball check valve 25 may have a certain amount of play or movement, especially when retreating to its seat, so that there will be a small amount of retreating of the material from the nozzle tip 59 to prevent dripping or the like when the air ceases its aspirating effect on the material. Then when the next air aspirating effect is initiated there must first be an aspirating of air before the material starts to move, and by the time the material reaches the nozzle tip the projection of the air precedes it and the material has received some momentum whereby there is immediately an efficient atomizing of the material without danger of premature projection of unatomized material.

The head 18 also carries a material level gauge comprising a float 81 (see Fig. 6) connected at the lower end of a gauge rod 82 extending upward through an apertured portion 83 of the top of the head, the outer end of the rod 82 carrying any suitable indicator 84.

Also the head 18 has a filling opening 85 normally closed by a cap 86 to which is connected a resilient member 87 fitting in the opening 85. A retainer comprising a crossbar 88 and a chain 89 is also connected to the cap, so as to prevent the separation and loss of the closure means.

The gun 38 may be turned about the axis of its shank 39 into any desired angular relation, such as the dotted line positions shown thereof in Fig. 4, so as to direct the spray mist in any desired direction.

The air duct or hose 66 leads to a valve device 90 (Figs. 1 and 2) supported in a bracket 91 suitably secured to a fixed part of the press, the device 90 being connected to an air supply duct 92 from a suitable source (not shown) and which may have a pressure regulating valve 93 of any suitable form. The valve device has a valve which is intermittently operated to admit increments of air or air charges into the duct 66 at a given pressure and for a given interval of time. To the valve is connected a reciprocable valve stem 94 carrying a roller 95 against which operates a cam 96. The latter is fixed to a shaft 97 supported in bearings 98 and 99 secured to a fixed part of the press. To an end of the shaft is fixed a pinion 100 driven by a gear 101 on a drive shaft 102.

In the form of device shown in Fig. 3 the air charges to the duct 66 are supplied by a plunger means attached to the press, such means comprising a plunger 103 carried by a rod 104 adjustably secured to a hub 105 carried by a bracket 106 secured to a reciprocating part of the press, such as the reciprocating plate 5. The plunger 103 reciprocates in a cylinder 107 secured to a fixed part of the press.

At the end of the cylinder are connected check valves 108 and 109 respectively connected to the supply pipe 92 and the duct 60, the duct 66, in this case, having the regulating valve 93. As the plunger device operates, charges of air are fed to the duct 66 to supply air under pressure in the duct 66 at a rate sufficient to operate the diaphragm check valve and spray gun.

In either event the air is fed in intermittent charges into the duct 66 to the spraying device. Preferably the compression of the spring 77 (Fig. 5) is so adjusted that the diaphragm check valve 71 will be open for but a fraction of a second so that there will be a quick, sharp projection of the material from the gun to a locus adjacent the rollers 6 so as to form a cloud of very minute particles of the material. If longer intervals of spraying should be desired, the compression of the spring 77 is reduced accordingly, or even a continuous spray action of the gun may be had by so reducing the compression of the spring 77 that the valve 71 will be maintained open for all pressures of the air in the duct above a given minimum.

The timing of the operation of the diaphragm check valve is determined by the effect of the material on the paper in the press, but more proximately the timing is dependent upon the adjusted compression of the spring 77 and the pressure of the air reaching the diaphragm check valve. For given spraying effects at the spray gun, the adjustment of the spring compression will vary with the pressures or the pressure range of the air in the duct 66.

The myriads of fine, minute particles of the material caused to contact and adhere to the ink on the rollers are carried with or on the surface of the ink to the printing plate. As the latter acts to imprint upon the paper surface, because of these particles being carried by the ink, they will contact the paper and humidify the fibres thereof, the ink following the humidifying particles in its contact and adherence to the paper. At the same time, these particles very rapidly absorb heat produced in the rollers and the transfer plate. Because of the comparative high heat absorption factor of latent heat of evaporation, only a very small percentage of the material particles need evaporate to extract the heat produced in the rollers to maintain them cool.

While we have herein described and upon the drawings shown an illustrative embodiment of the invention, it is to be understood that the invention is not limited thereto but comprehends

other structures, arrangements of parts, details, features, process steps, or the like, without departing from the spirit of the invention.

Having thus disclosed the invention, we claim as our invention:

1. A device for spraying liquid material into a fine spray, comprising a spray gun having a connection provided with material and air passages, a container for the liquid and having a top provided with material and air passages in line with the material and air passages of the gun connection, a swivel coupling for connecting the gun connection to the top and having material and air passages in communication with the material and air passages of the top and the gun connection for directing the gun in any direction about the axis of the coupling, a material supply duct in the container and so connected to the top as to be in communication with the material passage in the top, a force resisted check valve in said air passage of said top and so constructed and arranged as to open under given air pressure for passage of pressure air to the gun, said valve having a chamber, a diaphragm in said chamber, said air passage in said top having a port so located as to be normally closed by a part of said diaphragm, and also having an annular chamber around said port at the seating side of said diaphragm whereby air pressure on said side of said diaphragm acts to open the valve by moving the diaphragm away from said port.

2. A device for spraying liquid material into a fine spray, comprising a spray gun having a connection provided with material and air passages, a container for the liquid and having a top provided with material and air passages in line with the material and air passages of the gun connection, a swivel coupling for connecting the gun connection to the top and having material and air passages in communication with the material and air passages of the top and the gun connection for directing the gun in any direction about the axis of the coupling, a material supply duct in the container and so connected to the top as to be in communication with the material passage in the top, a force resisted check valve in said air passage of said top and so constructed and arranged as to open under given air pressure for passage of pressure air to the gun, said air passage in said top comprising entry and delivery portions with the check valve between them, said delivery portion having a ported part extending in the check valve, a diaphragm in said valve and normally closing the port of said ported part at the central portion of said diaphragm, said entry portion having an annular chamber around said ported part and at the seating or closing side of said diaphragm, and adjustable means for pressing on the opposite side of said diaphragm to vary its closing action.

3. A device for spraying liquid material into a fine spray, comprising a spray gun having a connection provided with material and air passages, a container for the liquid and having a top provided with material and air passages in line with the material and air passages of the gun connection, a swivel coupling for connecting the gun connection to the top and having material and air passages in communication with the material and air passages of the top and the gun connection for directing the gun in any direction about the axis of the coupling, a material supply duct in the container and so connected to the top as to be in communication with the material passage in the top, a force resisted check valve in said air passage of said top and so constructed and arranged as to open under given air pressure for passage of pressure air to the gun, said swivel coupling comprising a tubular portion fitting into a socket provided in said gun connection, the coupling being provided with an annular air chamber around the tubular portion thereof and so located as to be always in communication with the air passage of the gun connection regardless of the angular relation of the gun connection to the coupling, and said coupling being provided with an air passage communicating with said annular air chamber and said air passage in said top.

4. A device for spraying material in a printing press comprising a container for the material, a top connected to the container and provided with transversely extending air and material passages therein, said air passage having receiving and delivery portions, a check valve in said top and in said air passage between said portions, and a spray gun having a swivel connection with said top at an end of said passages and having air and material passages in communication with the air and material passages in the top, said valve having a chamber provided with inlet and outlet ports respectively in communication with said receiving and delivery portions, a force resisted valve closing element movable in said chamber to normally close both of said ports under the force acting on the element, and to open both of said ports under pressure of air acting against said element, said element having a part of its area which is opposite to said inlet port subjected to air pressure when in closed position, and all of its area subjected to air pressure when in open position.

ERIC GUSTAFSSON.
VIRGIL G. GREEN.