Sept. 29, 1925. 1,555,797

A. L. GRAMMER

SPRAYING APPARATUS

Filed Sept. 12, 1924 5 Sheets-Sheet 1

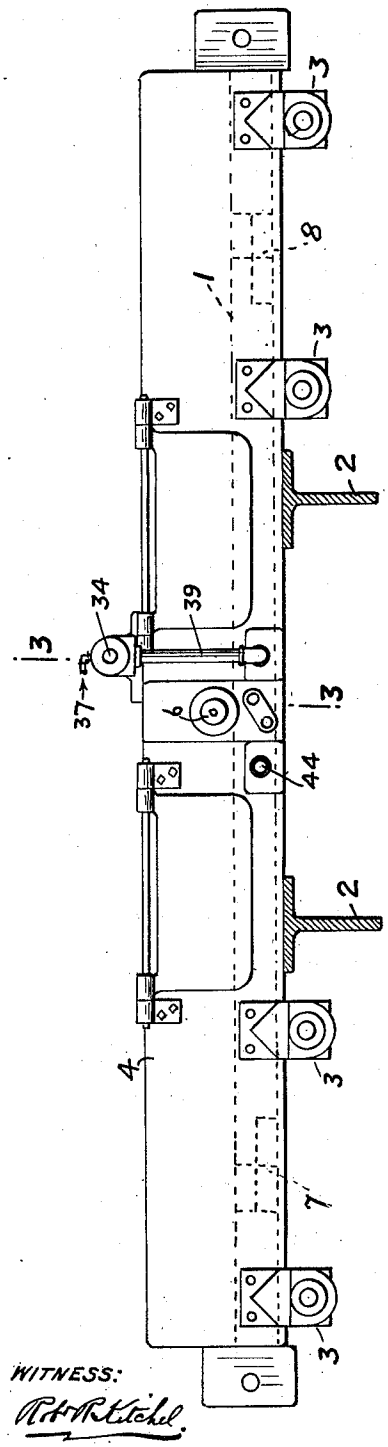


FIG. 1.

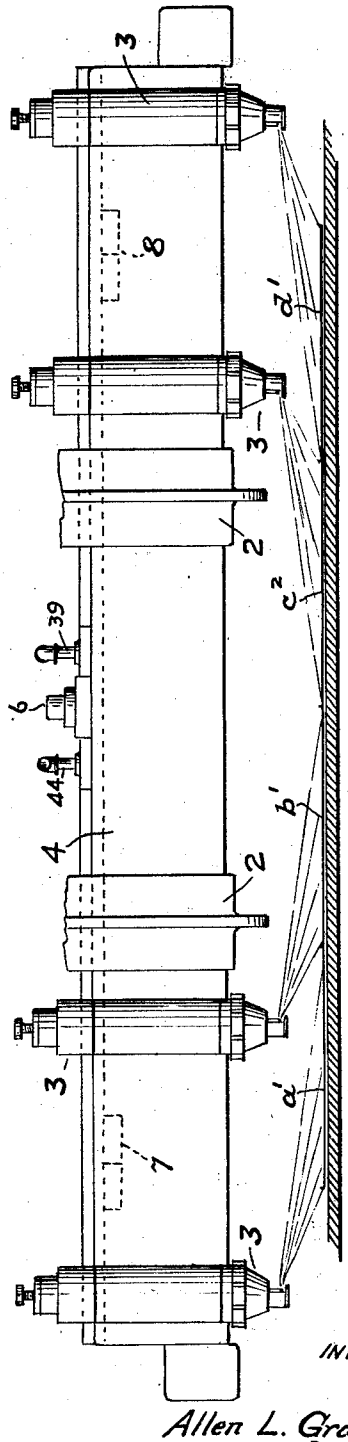


FIG. 2.

WITNESS:

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Sept. 29, 1925. 1,555,797

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SPRAYING APPARATUS

Filed Sept. 12, 1924 5 Sheets-Sheet 2

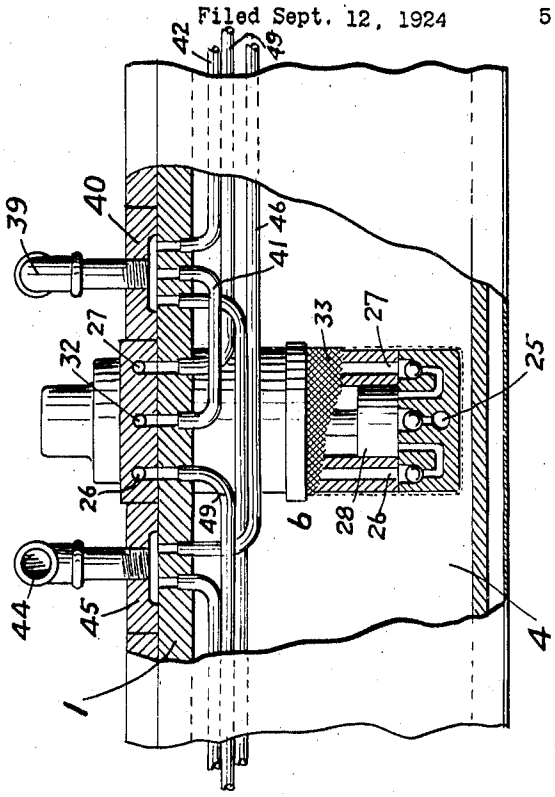


FIG. 4.

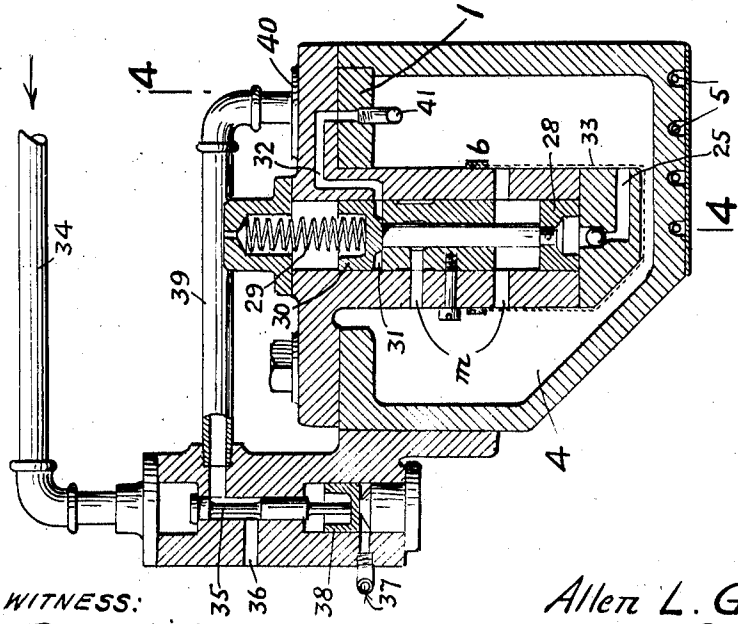


FIG. 3.

WITNESS:
Rob't Pritchel

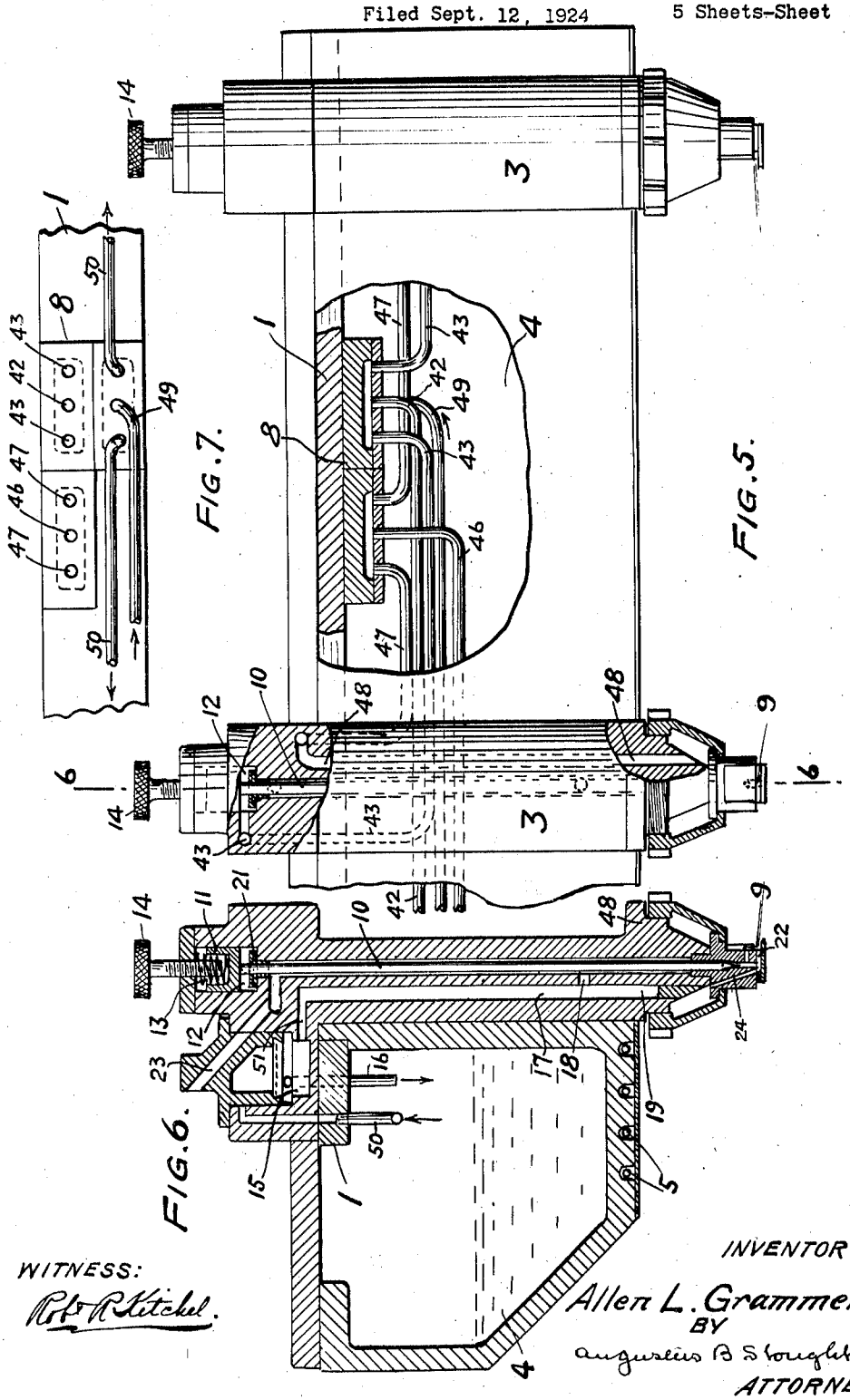
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Sept. 29, 1925. 1,555,797

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SPRAYING APPARATUS

Filed Sept. 12, 1924 5 Sheets-Sheet 3



WITNESS:
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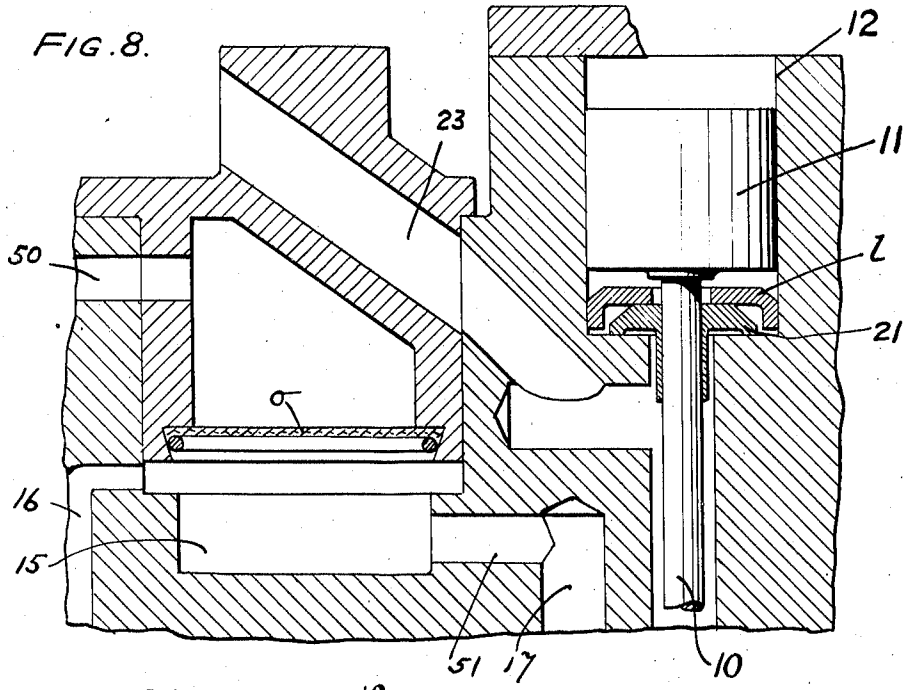
Sept. 29, 1925. 1,555,797

A. L. GRAMMER

SPRAYING APPARATUS

Filed Sept. 12, 1924 5 Sheets-Sheet 4

FIG. 8.



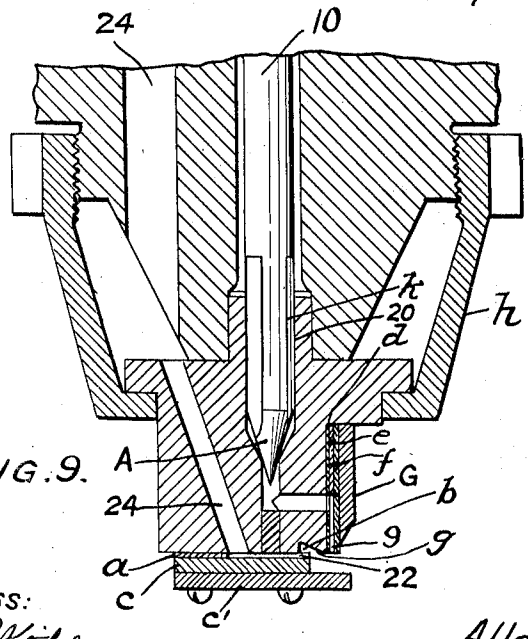


FIG. 9.

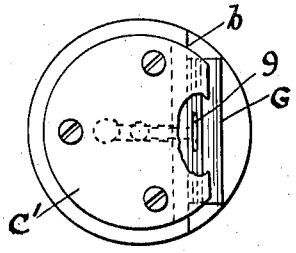


FIG. 10.

WITNESS:

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Sept. 29, 1925.

1,555,797

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SPRAYING APPARATUS

Filed Sept. 12, 1924

5 Sheets-Sheet 5

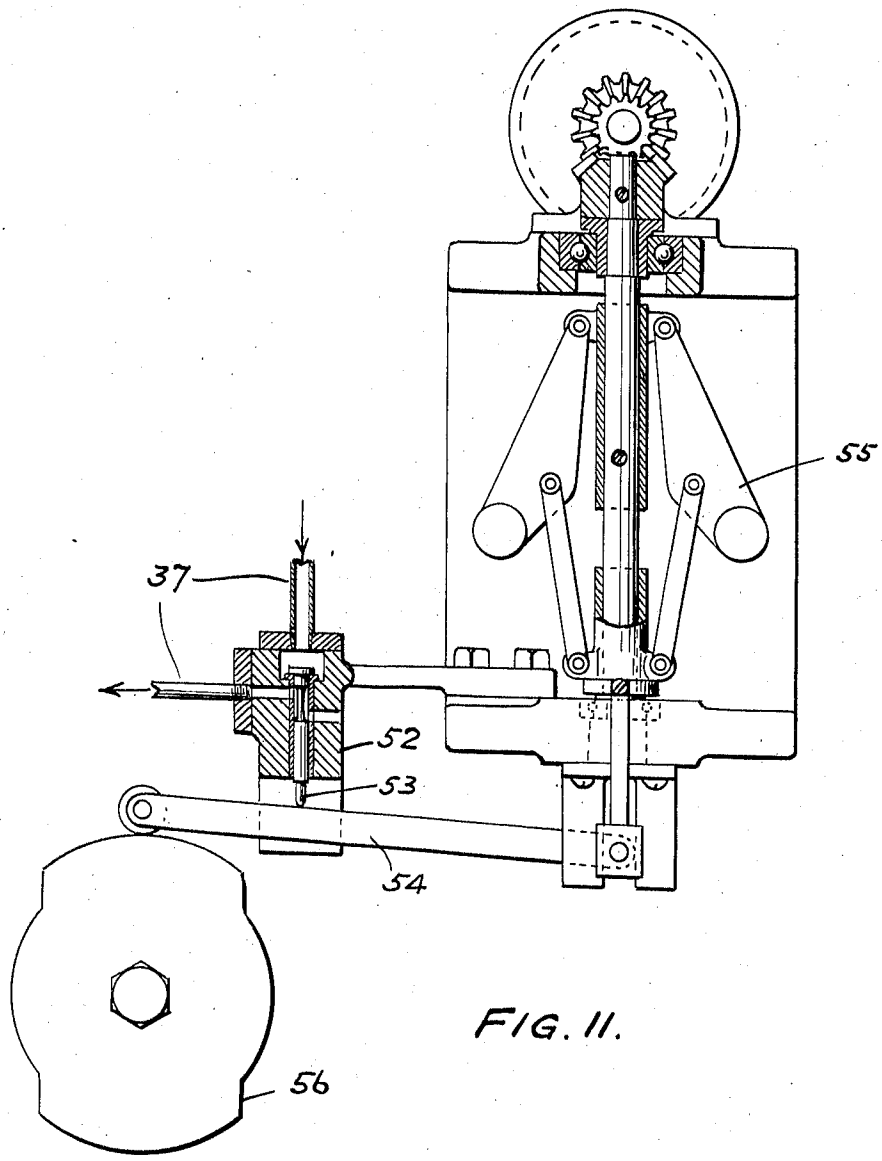


FIG. 11.

WITNESS:

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Patented Sept. 29, 1925. 1,555,797

UNITED STATES PATENT OFFICE.

ALLEN L. GRAMMER, OF PHILADELPHIA, PENNSYLVANIA.

SPRAYING APPARATUS.

Application filed September 12, 1924. Serial No. 737,232.

To all whom it may concern:

Be it known that I, ALLEN L. GRAMMER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Spraying Apparatus, of which the following is a specification.

The principal objects of the present invention are, first, to improve the delivery of the material to be sprayed and the application of the air for spraying it; second, to provide apparatus for spraying particles of material fused by heat and which solidify at ordinary shop temperatures, of which paraffine is an example, onto a web or plurality of sheets as it is or they are intermittently delivered from a printing press; third, to provide for delivering the material in fused or fluid condition thereby avoiding clogging of the apparatus; fourth, to provide a construction and arrangement of parts such that they can be readily assembled and disassembled; fifth, to provide for automatically spraying the material in finely divided form intermittently so that it may fall or be fed when a web or sheets is or are present and may be checked in the absence of a web or sheets or when the press stops; and sixth, to provide satisfactory, reliable and efficient apparatus for practicing the method set forth in my Patent 1,445,273 of February 13, 1923.

The invention will be claimed at the end hereof but will be first described in connection with the embodiment of it chosen for illustration in the accompanying drawings forming part hereof and in which—

Figure 1 is a top or plan view, partly in section, illustrating apparatus embodying features of the invention.

Fig. 2 is a front view of the same diagrammatically illustrating a printed web or sheets upon which the material is sprayed.

Fig. 3 is a sectional view drawn to an enlarged scale and taken on the line 3—3 of Fig. 1.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3.

Fig. 5 is a front view drawn to an enlarged scale with parts broken away and it may be said to be a front view of the right-hand end portion shown in Fig. 2.

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 5.

Fig. 7 is an inverted plan view of some of the pipe connections illustrated in a general way at the center portion of Fig. 5.

Fig. 8 is a sectional view drawn to an enlarged scale in order to illustrate features of construction not shown in detail for lack of room at the upper portion of Fig. 6.

Fig. 9 is a transverse section through the nozzle portion of the spray head shown in Fig. 6, but drawn to an enlarged scale in order to show features of construction not shown in Fig. 6 for lack of room.

Fig. 10 is a plan view with parts broker away and parts omitted looking up at the bottom of Fig. 9, and

Fig. 11 is a view principally in section showing the governing mechanism.

The invention has been illustrated in application to a printing press and will be described in that use, but it must be remembered that it, in certain of its aspects, is intended for other uses.

Referring to the drawings the frame or bar 1 extends across the delivery end of a printing press and is suitably supported as by supports 2. The printing press is not shown because it is too well understood to require illustration. However, in the present description reference will be made to the delivery of sheets or webs of pages shown at a^1, b^1, c^2 and d^1, under the frame or bar with the freshly printed surfaces confronting the bar or frame, Fig. 2. The bar or frame is fitted with spray heads embodying features of the invention and generally indicated at 3 and of which four are shown, although the number is not essential and may be increased or diminished. In the description reference will be made to paraffine descriptively and not necessarily exclusively as the material employed. From these spray heads paraffine is sprayed by air jets, in the present instance intermittently, because the printed sheet or sheets or web or webs is or are delivered intermittently. There is a reservoir or receptacle 4 in which paraffine is heated and made fluid by electric heaters 5. A pump, generally indicated at 6, operates intermittently in response to what will be called, for the sake of description, high pressure air to supply paraffine to manifolds generally indicated at 7 and 8, from which paraffine is distributed to the spray heads. High pressure air also operates to intermit-

tently open the paraffine outlets of the spray heads as will be described and for that purpose the high pressure air is also delivered to the manifolds in a way that will be hereinafter set forth, and similarly low pressure air is constantly delivered to the spray heads and it operates to spray the paraffine as the latter escapes from the nozzles. Inasmuch as the spray heads are duplicates a description of one will suffice. Each spray head is provided with a rectangular wax outlet 9 and with a rectangular low pressure air outlet 22, arranged at an angle to the wax outlet, so that air discharged from the air outlet will comb across the wax outlet. The air liner or plate *a*, has a notch cut in it and it projects beyond the vertical wall of the cut or space *b*. The plate *c* at the bottom also extends beyond the vertical wall of the cut or space *b*, as does also the plate c^1. The side walls of the notch in the liner *a* and the top of the plate *c* provide a rectangular air outlet open at its top or trough shaped beyond the vertical wall of the space *b* and towards the wax outlet 9. The rectangular wax opening is produced by three liners *d*, *e* and *f*, the first, *d*, provided with an opening for wax, the second, *e*, with a slot forming the side walls of the rectangular opening, and the third, *f*, forming the fourth side of the rectangular wax opening. The inclined wall *g* extending from the vertical wall of the space *b* to the liner *d*, forms a guide surface for air leaving the open upper portion of the air outlet 22, so that the air will comb properly across the wax outlet 9. The described nozzle is not distorted by heat and it can be readily taken off by removing the conical nut *h*, which also provides means for horizontal angular adjustment. By replacing the liners with others it is possible to provide rectangular outlets of different size. The nozzle is generally cylindrical with a flat face where the liners *e*, *f* and *g* are applied by means of the plate G, and the liner *a*, and plates *c* and c^1 are applied to one of the bases and the retaining plate c^1 extends and underlies the wax outlet 9. The other base is provided with a hub that fits into a recess in the body of the head. The supply of wax to the outlet 9 is normally interrupted as shown, by means of a needle valve A of which the stem 10 is fitted at the top with a piston 11, Fig. 8, working in a cylinder 12 and pressed by a spring 13, Fig. 6, into position for normally closing the needle valve A. 14 is a set screw for limiting the extent to which the piston 11 can open the valve when high pressure air is introduced into the cylinder 12 as will be described. Paraffine is delivered to the needle valve A by a constant head gravity feed. For this purpose there is a tank 15 having an overflow 16. This tank 15 communicates by 51 to a passage 17 and by a branch 18 with the chamber surrounding the needle valve stem 10. The passage 17 extends below the branch 18 as at 19, and in this portion 19 impurities may be collected for removal if necessary. In cross-section the lower portion *k* of the stem 10 may be cruciform and the passage 20 in which it is arranged may be circular in cross-section, thus affording a comparatively minute passage for the delivery of the paraffine. The sleeve 21, Fig. 8, on its surface as well as the surface upon which it rests may be finished in order to provide a tight joint, and the cap 1, may clear the stem 10 and hug the wall of the chamber in which it is arranged to cause the sleeve to properly guide the spindle 10. 23 is a vent for any air that may leak past the fitting 21 and 1, so that pressure on the wax in passage 20 does not exceed atmospheric pressure. 24 is a low pressure air duct which leads to the air outlet 22. The paraffine pump 6 consists of a body having a valved inlet connection 25 and two valved outlet connections 26 and 27. There is a pump plunger 28 worked in one direction by a spring 29 and in the other direction by a piston 30 working in a cylinder 31 and subjected intermittently to high pressure air by way of the duct 32, Fig. 3. A gauze 33 is shown and it serves to strain the paraffine entering the pump from the reservoir. *m* are vents for leakage.

A description will now be given of the so-called high pressure air connection. High pressure air from a suitable supply enters by the connections 34, Fig. 3, and there is an admission and exhaust relay valve 35, the exhaust being at 36. This pilot valve is controlled by a third air line 37 through a piston and cylinder 38. The air line 37 is controlled, as will be described, by the delivery movements of the press in such a way that pilot valve 35 is moved to admission and exhaust at appropriate and predetermined intervals. The pipe 39 connects with a distributor 40 shown to consist of a removable chambered plate. From the distributor 40 a pipe 41 leads to the duct 32 of the pump cylinder 31. The pipe 41 is of generally U-shape and its arms are fitted into the bar 1 which is fitted with ports of which one communicates with the chamber of the distriubtor 40, and of which the other is aligned with the duct 32 in the pump body which is attached to the bar 1, and this construction possesses advantages in regard to assembling and disassembling the parts. To save repetition in description it may be said here that all of the pipe connections may be advantageously of U-shape similarly applied through the bar 1. From the distributor 40 high pressure air is led by pipe 42 to manifold 8, Figs. 5 and 7, and from manifold 8 by pipes 43 to each of a pair of spray heads. From pipe 43 air enters the cylinder 12 in

position for lifting the piston 11 against spring 13 and thus opening the needle valve A. What has been called low pressure air enters at 44, Fig. 2, and reaches the distributor 45, Fig. 4, from which it reaches the manifolds 8 by pipe 46, Figs. 5 and 7, and from the manifold it passes by pipes 47 to the duct 48 that leads to the passage 24 of each of a pair of spray heads. From each outlet of the pump paraffine or wax is conducted by a pipe 49 to a manifold 8, Figs. 4 and 7, and from the manifold by a pipe 50, Figs. 6 and 8, to a screen or sieve *o*, arranged above the tank 15.

In the immediately preceding portion of this description reference has been made to the manifold 8, but the connection to the manifold 7 are substantial duplicates of those described in connection with the manifold 8 and consequently the same reference numbers have been applied to them.

The third air line is controlled by an admission and exhaust valve 52, Fig. 11, interposed in the air line 37. The stem 53 of this valve is operated by a lever 54, which, when raised, operates to let air pass to cylinder 38, Fig. 3, to open valve 35 and effect a spray of wax at the spray heads, as will be described. The centrifugal governor 55, driven from or with the press, is connected with one end of the lever 54 and operates when the press is shut down to drop the stem 53 and close the valve 52 and prevent spraying until the press is started, and then the cam 56 turned with the sheet delivery of the press operates upon the other end of the lever 54 and controls the valve 52 to cause spraying at the proper time or intervals of time.

The mode of operation may be described as follows:

The press delivers sheets or webs with a printed face upwards in the general direction of out of the plane of the paper in Fig. 2, and at each delivery opens and after a proper interval, closes the pilot valve 38 in co-ordination with which the valve 35 admits and exhausts high pressure air. The high pressure air operates the pump 6 to provide a proper supply of melted paraffine in the constant level tanks 15, and also to open and after a short interval to close the needle valve A, thus there is a feed or delivery of paraffine which by the low pressure air escaping at 22 is delivered or deposited as a spray or in finely divided condition upon the printed faces of the sheets or webs as they leave the press where it serves to prevent offset.

In referring to a wax outlet and to a low pressure air outlet I do not mean to limit the invention to the use of paraffine or to any particular pressure of air but my intention is to define the outlets and to distinguish them.

It will be obvious to those skilled in the art to which the invention relates that modifications may be made in details of construction and arrangement without departing from the spirit of the invention which is not limited as to such things or as to matters of mere form or otherwise than as the prior art and the appended claims may require.

I claim:

1. Spraying apparatus comprising a spray head having an oblong wax outlet and an oblong low pressure air outlet angularly arranged in respect to each other to cause the discharged air to comb across the discharged wax, there being an inclined air guiding wall provided between the outlets, the air discharge outlet being of open trough shape in confronting relation to said inclined wall, means for supplying air to the air outlet, and feed connections for supplying fluid material to the wax outlet.

2. Spraying apparatus comprising a generally cylindrical nozzle provided at its curved wall and near one of its bases with a flat surface and having through it and through both its bases an air channel and having through one base and through it and through said flat surface a wax channel, an oblong slit-like air outlet provided through liners applied to the flat surface and of which some are notched, an oblong trough-like air outlet provided through liners applied at the first mentioned base and of which some are slotted and some extend in front of the wax outlet, there being an inclined wall between said outlets, means for supplying air to the air outlet, and feed connections for the wax outlet, substantially as described.

3. Spraying apparatus comprising a spray head including a nozzle having a lateral notch and provided with a downwardly directed oblong wax outlet and with a laterally directed oblong air outlet arranged through the top and through the inner walls of said notch, a needle valve for the wax supply, spring pressed pneumatic means for the needle valve, and a gravity wax feed.

4. Spraying apparatus comprising a bar or frame, a reservoir carried by the frame and adapted to contain a supply of paraffine, means for heating the reservoir to melt the paraffine, spray heads in spaced relation carried by the reservoir and each provided with oblong slit-like air and wax outlets, interconnected manifolds and distributors carried by the reservoir, pneumatic spring pressed needle valve mechanism and a gravity feed for the spray heads, a spring pressed pneumatic paraffine pump arranged in the reservoir and connected through the manifolds with the gravity feed devices, a high pressure air supply connected through the distributors and from the manifolds to the needle valve mechanism and from a dis-

tributor to the pump, and a low pressure air supply connected through a distributor to the low pressure outlets of the spray heads.

5. Spraying outlets comprising a spray head having a normally closed needle valved oblong wax outlet and a constant head gravity feed to said outlet and having a low pressure oblong air outlet arranged to discharge across the air outlet, high pressure air connections for opening the normally closed needle valved outlet and including means for limiting the extent of such opening, a heated reservoir, a spring pressed pneumatic pump having high pressure air connection for imparting a pumping impulse to it, connections from the pump to the constant head gravity feed, a low pressure air supply for the air outlet, and relay valve connections for controlling the admission and exhaust of high pressure air, substantially as described.

6. Spraying apparatus comprising a row of spray heads each having an oblong low pressure air outlet and a normally closed needle valved oblong paraffine outlet, means for feeding paraffine under constant pressure to the paraffine outlets, an air supply for the air outlets, and intermittent mechanism for opening the needle valve outlets.

7. Spraying apparatus comprising a spray head having a needle valve and an oblong wax outlet for discharging paraffine and having an oblong outlet for discharging air to spray the paraffine, means for normally closing the needle valve, and air pressure connections for opening the needle valve.

8. Spraying apparatus comprising a spray head having an undercut notch and provided with a downwardly discharging oblong wax outlet confronting the lower wall of the notch and an oblong air outlet arranged in the bottom wall of the notch and adapted to discharge between the top and bottom walls thereof, and an air supply for said air outlet, pneumatic feed and valve means for supplying melted wax to the wax outlet, pneumatic connections for controlling the feed and valve means, and provisions for actuating the pneumatic connections.

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