Jan. 8, 1935. K. BERGNER 1,987,046

DEVICE FOR SPRAYING FRESHLY PRINTED SHEETS WITH A SUBSEQUENTLY SOLIDIFYING LIQUID

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Fig.1

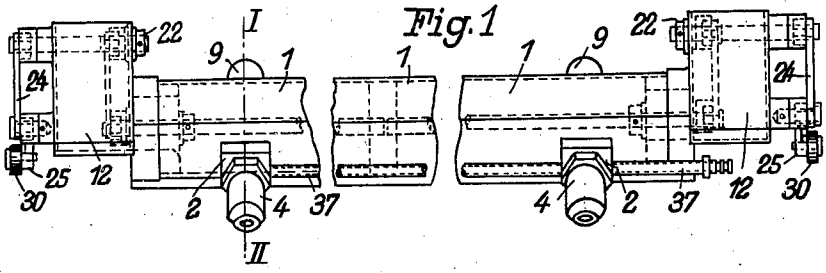


Fig.2

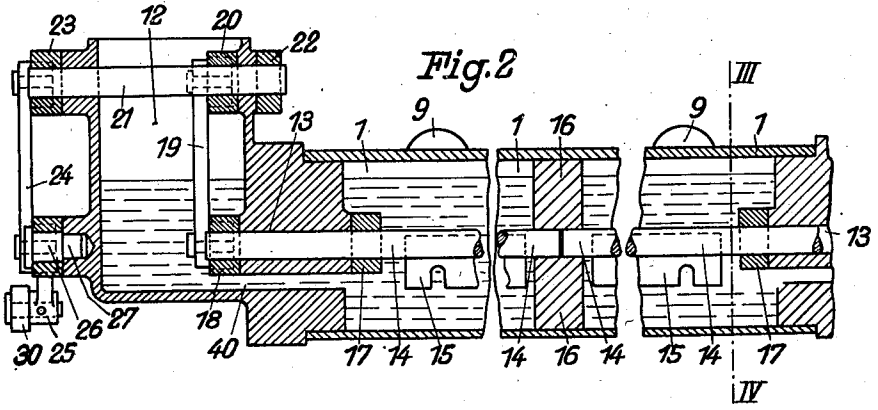


Fig.3

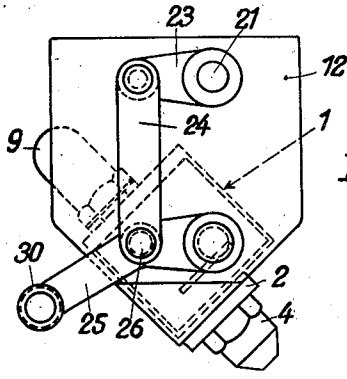
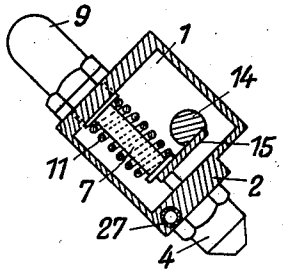


Fig.4



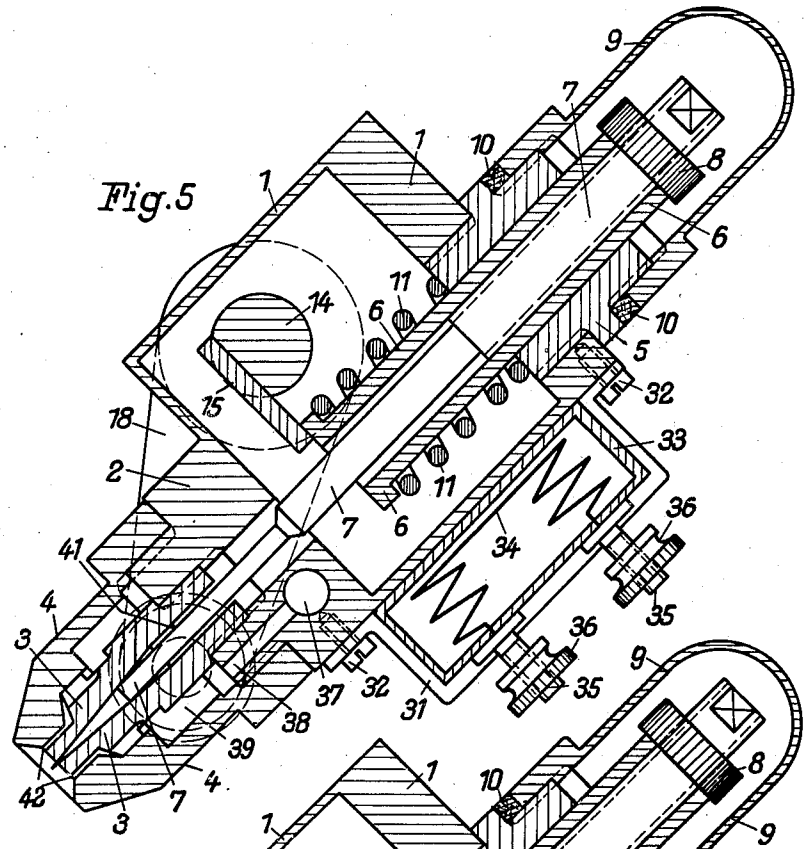
Inventor:
Kurt Bergner
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DEVICE FOR SPRAYING FRESHLY PRINTED SHEETS WITH A SUBSEQUENTLY SOLIDIFYING LIQUID

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Fig. 5



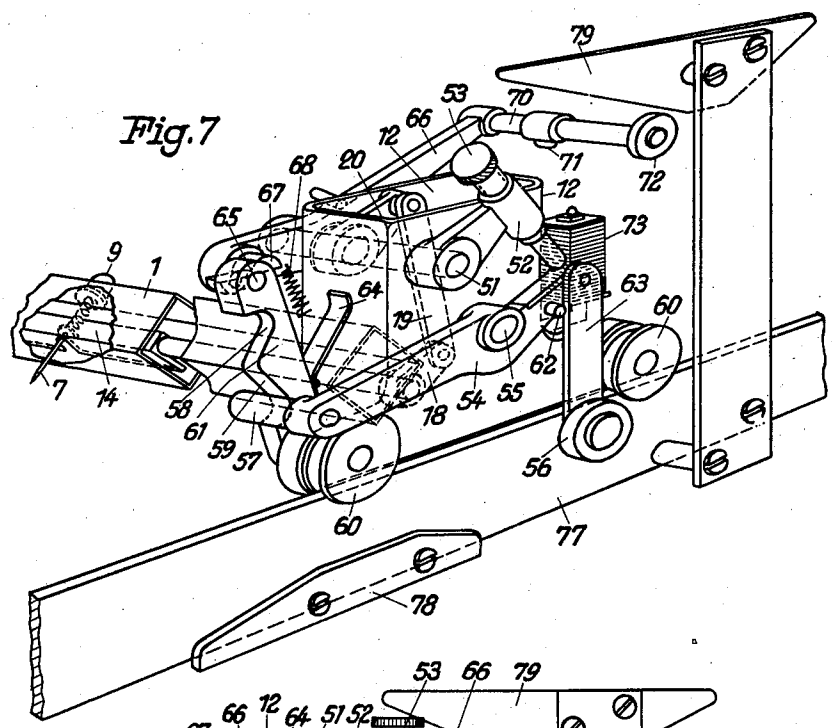
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DEVICE FOR SPRAYING FRESHLY PRINTED SHEETS WITH A SUBSEQUENTLY SOLIDIFYING LIQUID

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Fig.7



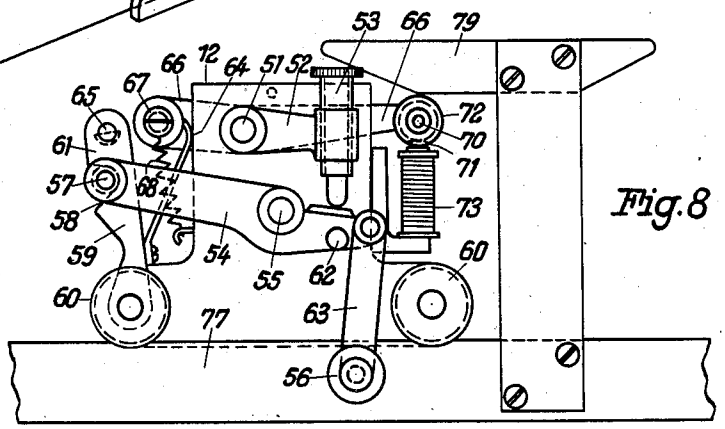


Fig.8

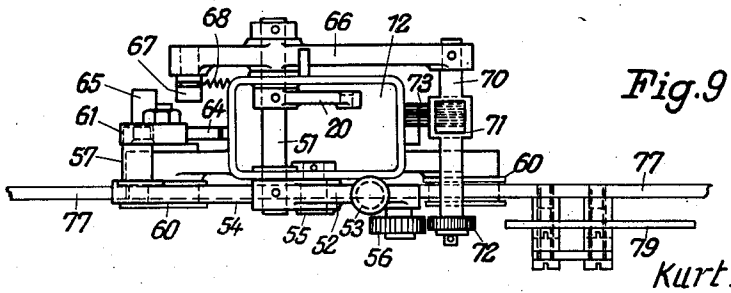


Fig.9

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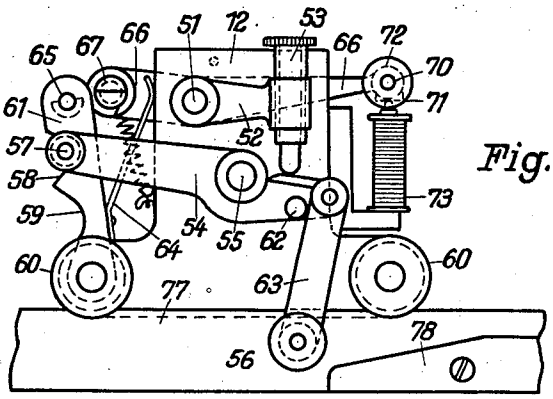
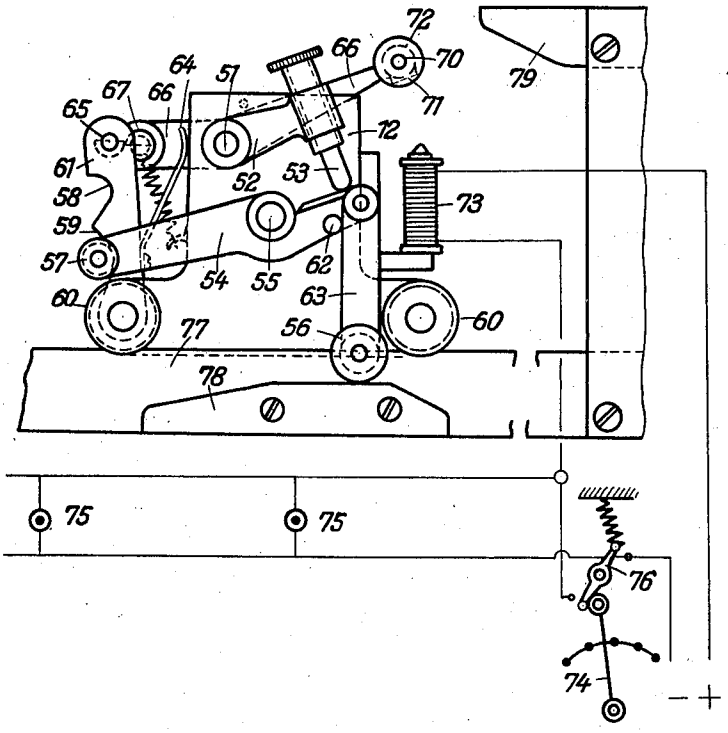


Fig.10

Fig.11



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UNITED STATES PATENT OFFICE

1,987,046

DEVICE FOR SPRAYING FRESHLY PRINTED SHEETS WITH A SUBSEQUENTLY SOLIDIFYING LIQUID

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Application March 1, 1933, Serial No. 659,083
In Germany March 10, 1932

7 Claims. (Cl. 91—45)

It has already been proposed to provide devices for spraying freshly printed sheets with subsequently solidifying liquids, such as paraffin or wax, in order to prevent smearing of the sheets when stacked.

Such known devices are provided either with open or with closed containers for the spraying substance. If the container is open, it is necessary, to install a pipe line from a pump disposed in a storage vessel for the liquefied spraying substance to a trough, and a return pipe line for the superfluous liquefied spraying substance from the trough to the storage vessel. If a closed tank is employed for the spraying substance, a separate pipe line is employed for feeding each spraying member with spraying substance.

Such pipe lines develop various defects. Thus, if the return pipe is blocked, the open trough may overflow. The pipe lines, due to frequent dismantling for cleaning purposes, become leaky. The pipes themselves as well as soldered joints become leaky due to the presence of fatty acids in the wax. When this happens, the liquid spraying substance flows or drips into the printing machine and interferes with the printing process.

In spraying devices, wherein spraying pistols as used for spraying lacquer are employed, the adjusting needle of each nozzle must be controlled separately from outside. This makes it impossible to seal the chamber containing the spraying substance perfectly tight, because the usual packing substances are easily penetrated by the highly liquid hot wax. The use of stuffing boxes with leather packing or similar packing has proved to be ineffective.

These defects may be eliminated by the improvements described in the following.

The improvements consist in the employment of a container of rectangular cross section which serves as receptacle for the spraying substance, one longitudinal side of which is provided with any desired number of spraying members or nozzles. The elements for actuating these nozzles are disposed inside of the chamber itself and in extensions mounted on the side of the rectangular chamber opposite to that carrying the spraying members. Governor shafts for such nozzles extend from the rectangular chamber into melting pots. The governor shafts are actuated by levers, coupled to connecting rods the upper end of which is connected to similar levers, the shafts of which are disposed above the surface of the liquid. These latter shafts only extend through the wall of the melting pots and are coupled on the outside thereof with similar lever systems.

The passages for the spraying substance are opened and closed by the rotation of the governor shaft and the duration of the opening is controlled by cams. Fluid under pressure necessary for the spraying is fed to the spraying members in a well known manner.

A form of construction of the device is shown in the drawings by way of example.

Fig. 1 is a front view of the spraying device in the closed position of the nozzles.

Fig. 2 is a longitudinal sectional view on an enlarged scale of the device in the same position as Fig. 1.

Fig. 3 is a side elevation of the device.

Fig. 4 is a sectional view of the device along the line III—IV of Fig. 2.

Fig. 5 is a sectional view of a spraying member in the closed position, taken on the line I—II of Fig. 1.

Fig. 6 is a sectional view of a spraying member in the operative or open position, taken on the line I—II of Fig. 1.

Fig. 7 is a perspective view of the spraying device while closed, including the control mechanism.

Fig. 8 is an elevation of the control mechanism of the spraying device Fig. 7, in the tripped position, actuated by a governor cam.

Fig. 9 is a plan view of the parts shown in Fig. 8.

Fig. 10 is an elevation of the spraying device, Fig. 7, in tripped position, actuated by a magnet coil.

Fig. 11 shows the device, Fig. 7, in a position wherein the spraying nozzles are open.

The device comprises a receptacle 1 for the spraying substance, which, for example, has the shape of a rectangular pipe, provided with bosses 2. Screwed into the bosses 2 are nozzles 3 which are enclosed by the threaded caps 4. Screwed to the heavy rear wall of the receptacle 1 are bushings 5 (Figs. 5 and 6) in the bores of which are slidably mounted the sleeves 6. These sleeves are provided with an internal thread into which are screwed the needles 7. Milled lock nuts 8 provide for adjusting and locking of the needles 7. The needles 7 together with the lock nuts 8 and the sleeves or bushes 6 are covered by caps 9 which are sealed to the bushings 5 by means of packing rings 10. Surrounding the bushes 6 within the receptacle 1 are compression springs 11. Securely attached to both ends of the receptacle 1 are melting pots 12. The neck por-

tion of the melting pots 12 extends above the highest point of the rectangular pipe 1.

The sides of the melting pots 12 adjacent to the rectangular pipe 1 are provided with bearings 13 for the governor shafts 14, to which are attached tappets 15. The inner ends of the governor shafts 14 are mounted in a central bearing 16. Extending from the central bearing toward the right there is a second governor shaft 14. Each shaft 14 controls a group of spraying members 4, or, if desired, an individual spraying member. Mounted on the governor shafts 14 within the receptacle 1 are collars 17 to prevent axial displacement of the shafts. Fixed to the ends of the governor shafts 14 extending into the melting pots 12 are control levers 18. Fig. 2 illustrates the lever 18 in section, since this lever protrudes into the melting pot 12 in a direction vertical to the plane of the drawings. Hinged to the control levers 18 are connecting rods 19, which are coupled to levers 20, the latter being solidly connected to shafts 21. Shafts 21 are secured against axial displacement by means of collars 22, and are disposed above the surface of the liquid in the melting pots 12. Secured to the shaft 21 on the outside of the melting pot 12 are levers 23 which may be connected by means of connecting rods 24 to hinged roller levers 25 mounted on pivots 26 which are mounted in receses 27 of the melting pots 12. The free ends of the hinged levers 25 are provided with rollers 30 designed to engage a control cam mounted on the machine. Alternatively of the control cam may operate the governor shaft 14 in a manner described in connection with Figs. 7 to 12. Attached to the lower side of the receptacle 1 by means of brackets 31 and screws 32 (Figs. 5 and 6) is a heating body 33 comprising a resistance coil 34. Screws 35 and nuts 36 provide for the connection of an electric circuit. The bosses 2 have communicating passages 37 and 38 adapted to convey fluid under pressure to air chambers 39 surrounding the nozzles 3. The melting pots 12 are provided with channels 40 for leading the spraying substance into the container 1.

The operation of the device is as follows: The solid spraying substance introduced into the melting pots 12 is melted by the heat developed by the resistance coil 34 of the heater 33. The liquid spraying substance enters the receptacle 1 through the passages 40, fills the same up to a predetermined level and penetrates into the passages 41 of the nozzles 3.

The fluid under pressure continuously supplied through the air passage 37 enters the nozzle air chamber 39 through passages 38, surrounds nozzle 3 and escapes through the annular passages 42 producing an ejector effect on the nozzles. The opening of the nozzles necessary for the spraying process is initiated by the upward movement of the hinged roller levers 25. The movement of the levers 25 is transmitted to the levers 23 by means of the connecting rods 24, whereby the shaft 21 is rotated. The shafts 21 rotate the levers 20 and the latter transmit the motion by means of the connecting rods 19 to the control levers 18. The control levers 18 effect the rotation of the governor shaft 14 and of the tappets 15. Tappets 15 push back the sleeves 6 against the action of compression springs 11. Since the needles 7 of the nozzles are locked to the sleeves 6, the said needles are withdrawn from their seats in the nozzle 3 (Fig. 5), and the nozzles 3 are opened (Fig. 6). The issuing spraying material is atomized by the ejector action of the fluid under pressure and is sprayed on the printed sheet.

When the spraying of the printed sheet is completed the hinged roller levers 25 are again moved downward after being disengaged from the control cam of the machine, and the entire lever system is moved in a reverse direction from that described and the governor shafts 14 together with the tappets 15 return to their initial position. The needles 7 again move forward into the nozzles 3 by the action of the compression springs 11 and close the nozzle passage 41. This operation may be controlled by a movement produced by the printing machine.

The control of the spraying members is produced by some movement of the press which takes place at regular intervals of time and which synchronizes with the running of the press. If, however, the press is stopped at a point where the spraying members are normally open, the spraying members continue their operation until stopped manually. This may frequently occur when sheets are adjusted in the press, whereupon the sheet is covered with too much spraying matter so that it becomes useless. Apart from this, time is always wasted when the spraying members are cut out by hand and the operation is complicated.

In the known controls for spraying devices the latter are operated by control rollers which, during the spraying operation run over raised control cams. The resulting friction often considerably increases the power consumption, and the life of the control parts is short.

The control arrangement shown in Figs. 7 to 11 eliminates the aforementioned defect since the lifting cam controlling the opening and closure of the nozzles is in contact with the control roller only during a short part of the total travel of the spraying device. Upon contact of the control roller with the highest point of the lifting cam the whole control mechanism is stopped. During the further movement of the spraying device towards the control cam and during the return movement the control roller floats idly, that is to say it moves, without influencing the mechanism, and mounts the uplifting cam again during the next operation, whereupon the process is repeated.

Furthermore, a magnet coil is incorporated in the cut out device, which is connected to the starting mechanism of the press in such a manner that it is excited by means of a starter or brake magnet when the press is stopped, whereupon the spraying device is cut out. In addition, at any desired point of the press, push button switches may be arranged, which make it possible to instantly cut out the spraying device during the running of the press from any desired point.

In Figs. 7 to 11 is shown a shaft 14 for transmitting the control to the individual spraying nozzles and mounted in the melting pot 12. Within the melting pot 12 a rocking lever 20 is mounted on shaft 51. The former is coupled to the governor shaft 14 through a rod 19 and a lever 18. Secured to shaft 51 outside of the pot 12 is an adjusting lever 52 which is provided with a set screw 53. The lower end of the set screw 53 rests on a control lever 54, which is rotatably mounted on pivot 55. Mounted on a pivot at one end of this lever 54 is an oscillating lever 63 which carries a control roller 56 at its bottom end. Secured to the other end of the lever 54

is a pin 57 adapted to drop into indentations 58 and 59 of a latch 61 rotatably mounted on a fixed pivot 60. An abutment pin 62 on lever 54 limits the rocking movement of lever 63. Fixed to latch 61, which is biased outwardly by a flat spring 64, is a catch 65. Mounted on the shaft 51 on the opposite side of the melting pot 12 there is a freely rotatable cut out lever 66, to one arm of which is secured a catch 67. A light tension spring 68 biases the cut out lever 66 towards the catch 65. The lever 66 carries a pin 70 to which is fixed a magnet armature 71 and a control roller 72. Fixed to the melting pot 12 is a magnet coil 73, which, by means of insulated wires, is connected to a switch 76 of the starter 74 (Fig. 11) of the press, and also to one or more push button switches 75 disposed at any desired point of the press. Mounted upon the track 77 of the spraying device is a lifting cam 78 and an upper control cam 79.

The melting pot 12 is driven in some suitable manner in unison with the press with the following result:

When the spraying device moves outward, the oscillating lever 63, is prevented from swinging backward by the abutment pin 62, and mounts with its roller 56 the cam 78. This causes the control lever 54 to be so positioned that the pin 57 enters the lower indentation 59 of the latch 61. The slant of this indentation 59 is such that the control lever 54, which tends to rotate clockwise under the action of the spring pressure of the nozzles which rotation is transmitted by the adjusting lever 52 and the set screw 53 to lever 54, would cause it to slip out of the indentation 59 by overcoming the counter pressure exerted by the flat spring 64.

However, the control lever 54 is prevented from leaving the indentation 59 by the cut out lever 66, since the latter is pulled downwards by the tension spring 68 and bears with its catch 67 against the catch 65 of latch 61, thus firmly holding the control lever 54 in place.

The release of the coupling mechanism described is effected by a light downward pressure or pull exerted upon the pin 70 of the cut out lever 66 (Figs. 8 and 10). Such pressure may be exerted by a downward push on the control roller 72 (Fig. 8), when the latter engages the cam 79. The pulling down of the roller 72 may also be effected by excitation of the magnet coil 73 (Fig. 10). The moment when the two flattened catches 65 and 67 are able to slip by each other the spring pressure transmitted by the adjusting lever 52 and the set screw 53 to the control lever 54 causes the control lever 54 to slip into the upper indentation 58 of the latch 61 thereby rocking round its pivot 55 (Figs. 8 and 10), and closing the nozzles whereupon the spraying ceases.

When the press is stopped the magnet coil 73 may be excited for example by switching off the starter 74 (Fig. 11). The switch 76 is so disposed that upon the starter 74 being cut out it momentarily closes the circuit of the magnet coil 73. In the off position of the starter 74 the switch 76 is returned to its initial position by spring action.

However, the magnet coil may be excited at any time and in any position of the control mechanism and thereby the spraying may be stopped, inasmuch as the parts of the control mechanism may be brought into the closed position shown in Figs. 8 and 10 by operation of a push button switch, upon depression of which the electromagnet 73 is excited. Push buttons 75 may be disposed at any convenient point of the press, and especially at convenient points of the delivery table.

What is claimed is,

1. A device for spraying a freshly printed surface with comminuted liquid substance which subsequently solidifies, comprising a container for the substance whose length is substantially equal to the width of the surface to be sprayed, a melting pot attached to and communicating with said container, means to support said device on a printing machine for reciprocatory motion in the direction of the length of said surface, spraying nozzles depending from and communicating with said container, means to comminute said liquid including means to supply a stream of fluid to said nozzles, mechanical operating and control means associated with said supporting means and arranged to cause discharge of substance by said nozzles while said device moves in a given direction, said last mentioned means comprising cooperating mechanical elements located inside and outside of said container respectively, and a motion transmitting link between the former and the latter elements located above the liquid level in said container.

2. A device for spraying a freshly printed surface with comminuted liquid substance which subsequently solidifies, comprising a container for the substance whose length is substantially equal to the width of the surface to be sprayed, a melting pot attached to and communicating with said container, means to support said device on a printing machine for reciprocatory motion in the direction of the length of said surface, spraying nozzles for said substance depending from and communicating with said container and provided with a needle valve comprising a reciprocatory valve stem, a bushing for guiding said stem and a cap attached to and enclosing the outer end of said bushing, the other end of said bushing being attached to said container, means to comminute said liquid including means to supply a stream of pressure fluid to said nozzles, mechanical means located inside of said container and arranged to control said valves, mechanical operating and control means arranged outside of said container, and a motion transmitting link between the former and the latter means and located above the liquid level in said container.

3. A device as per claim 2 wherein said valve stem is provided with an adjustable sleeve and said mechanical means inside of said container comprise a cam shaft arranged to engage said sleeve.

4. A device as per claim 2 wherein said mechanical operating and control means arranged outside of said container comprise a lever mounted on the device and a cooperating cam mounted on said supporting means, said lever being adapted to initiate closure of said valves.

5. A device as per claim 2 wherein said mechanical operating control means arranged outside of said container comprise a lever mounted on the device, a cooperating cam and an electromagnet mounted on said supporting means, an armature for said magnet mounted on said lever and means to energize said magnet at will, said lever being adapted to initiate closure of said valves.

6. A device for spraying a freshly printed surface with comminuted liquid substance which subsequently solidifies, comprising a container for

the substance whose length is substantially equal to the width of the surface to be sprayed, a melting pot attached to and communicating with said container, means to support said device on a printing machine for reciprocatory motion in the direction of the length of said surface, spraying nozzles for said substance, depending from and communicating with said container and provided with a needle valve comprising a reciprocatory valve stem, an adjustable sleeve on said stem, a bushing for guiding said sleeve and a cap attached to and enclosing the outer end of said bushing, the other end of said bushing being attached to said container, means to comminute said liquid, including means to supply a stream of pressure fluid to said nozzles, mechanical valve control means located inside of said container comprising a cam shaft engaging said sleeves, mechanical operating and control means arranged outside of said container and comprising a lever mounted on the device, a cooperating cam and an electromagnet mounted on said supporting means, an armature for said magnet mounted on said lever, said lever being adapted to initiate closure of said valves, a second lever mounted on the device and a cooperating cam for said second lever mounted on said supporting means, said second lever being adapted to initiate opening of said valves, means to retain said operating and control means in the position to which they are moved by the respective levers until actuated by the other lever, a motion transmitting link between said operating and control means and said valve control means, and located above the level of liquid in said container, and means to energize said magnet at will.

7. A device as per claim 5 including means to stop the printing machine and means for energizing said electromagnet in response to the actuation of said stopping means and independent of said former energizing means.

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