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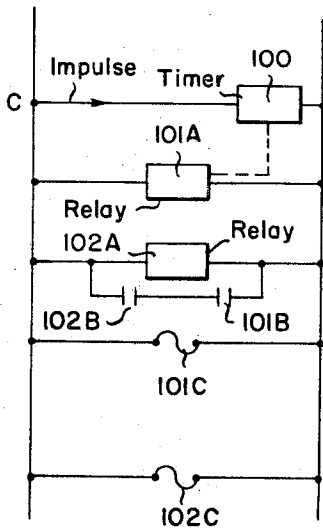
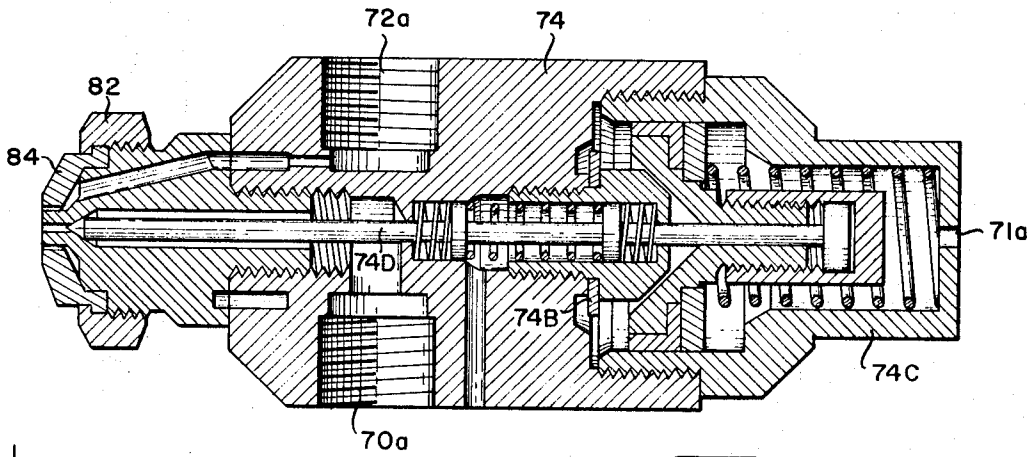
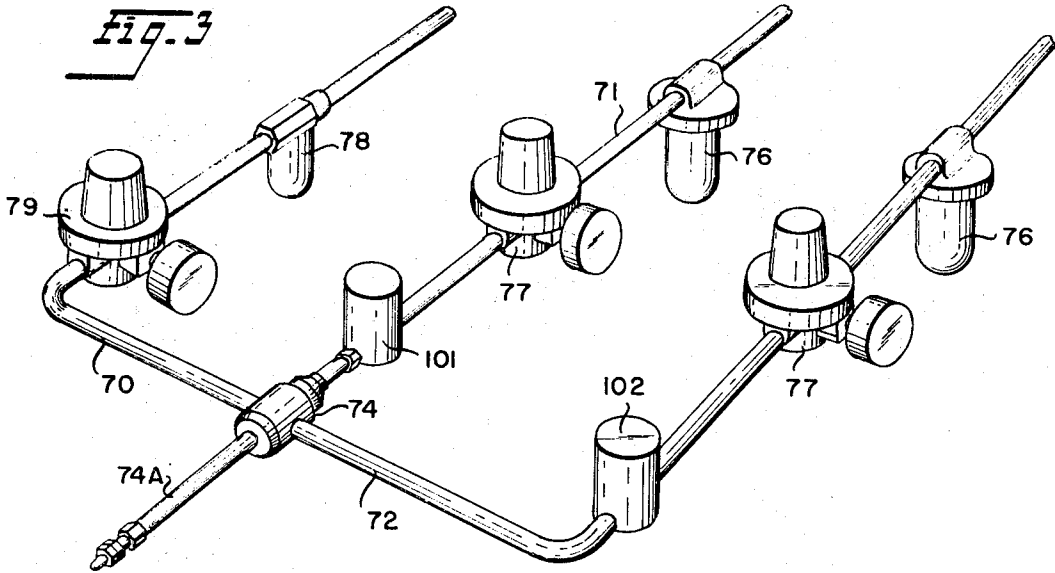


Fig. 4

Fig. 5

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SPRAYING DEVICE AND METHOD

This invention relates to a spray mechanism that is associated with a piler for handling cut paper sheets. Preferably, the spray mechanism is associated with a cutter-piler so that as sheets are being slit and cut, they are also counted. This can be done conveniently with a counting device connected or associated with a rotary knife. The usual operation of a cutter piler is to slit and cut a traveling web of paper into individual sheets. A rotary knife normally receives a web that has been slit and cuts same into sheets. The sheets are moved by a conveyor and dropped in a piling section, usually equipped with jiggers to maintain the piles straight.

Sheets of paper are frequently packaged and sold in increments ranging from 100 to 1,000 sheets, with 500 sheets (1 ream) being the most common size. The current practice is to assemble cut sheets in a piler section and mechanically insert a marker to separate the increments. Other methods include manual steps such as counting the sheets by hand and inserting a colored slip or waxed paper sheet at the desired place. After being piled and marked, the sheets are usually trimmed to final salable size and the increments are separated from the piles and wrapped. The waxed paper or colored paper marker can be discarded.

In copending application Ser. No. 684,423 filed Nov. 20, 1967, a cutter-piler is disclosed in which paper sheets are first slit and then cut from a traveling paper web using a rotary cutter. The rotary cutter includes a photoelectric eye 103 which is associated with the cutter to sense the revolutions of same and signal a counter as sheets are cut with each revolution of the knife.

The counter associated with the circuit of FIGS. 8-10 in application Ser. No. 684,423 can also be used in the circuit of the instant application. Also, the conveyor and piling section disclosed in FIG. 2 of that application can be referred to by way of example to a type of piler with which the spray mechanism of this invention can be associated.

FIG. 1 is a side elevation of a spray mechanism with a nozzle positioned between the conveyor tape system and the piling section.

FIG. 2 is a front elevation of the mechanism of FIG. 1 showing a nozzle arranged between side jiggers in the piler section.

FIG. 3 is a schematic view of a spray nozzle assembly with a single nozzle shown.

FIG. 4 is a section of a spray nozzle.

FIG. 5 is a diagram of the circuit for activating and opening the nozzles shown in FIG. 2.

In FIGS. 1 and 2, a nozzle 74 with extension tube 74A is mounted to spray liquid parting materials on the underside of a paper sheet 10 before the sheet drops on a pile 12. The nozzle 74 and extension 74A are shown mounted beneath a conveyor mechanism. Conveyor pulleys 14 and 16 are positioned over the piler section at one end of the cutter-piler. Pulleys 14 and 16 are secured to shafts 15 and 17 respectively and rollers 18 and 20 are splined on these shafts journaled in bearings 22 and 24, attached to frame 25 of the piler.

A back jogger with a fixed back guide 27A mounted on a support 27B is connected to a crank mechanism having pivoted arms 28 and 29 which actuate shaft 30 and the back jogger blade 27. For the sake of clarity, only one jogger assembly is shown, but normally, a plurality of such assemblies are mounted across the entire width of the conveyor. Spray nozzles can be mounted to extend between the jogger plates so that a plurality of nozzles will spray a pattern to substantially coat the entire undersurface of the paper sheets being piled. For instance, in a 100 inch cutter piler, eight jogger assemblies can be included with a nozzle tube 74A extending between each plate.

The conveyor rollers 18 and 20 hold a plurality of tapes 34 and 36 which oppose one another to bear on cut paper sheets and convey the sheets to the piling section. The arrangement of rollers, tapes and jogger assemblies is conventional and well known per se.

In FIG. 3 an automatic pneumatic spray system is shown in which a spray material line 70, and air cylinder control line 71

and an atomizing air line 72 lead into spray nozzle 74. The system shown is also conventional per se, each air line 71 and 72 is provided with a filter 76 and an air pressure regulator with gauge 77. The liquid material line 70 has a liquid pressure regulator with gauge 79 and a strainer 78. In line 71, a three-way valve with solenoid 101 controls air feed to nozzle 74 and in line 72, a two-way valve with solenoid 102 controls atomizing air feed to nozzle 74. In nozzle 74, air pressure from line 71 enters 71A causing air cylinder 74B to retract until relay 101 shuts off the line 71. Spring 74C biases shut off needle 74D to seat, closing off liquid from 70A. Air from line 72 enters 72A before and after relay 101 actuates needle 74A.

The flow of liquid parting compound through line 70 can be by suction, but it is preferred to use pressure and a parting compound in liquid form can be used. As an example, a quick mold release of 3-4 percent by weight silicone, balance castor oil and trichlorethylene in varying portions, depending on intended use, distance of nozzles from workpiece and other factors, is suitable.

When an impulse is sent to energize pneumatic timer 100, which is a time delay relay, timer 100 energizes the coils of two relays 101A and 102A. Relay 102A is activated first to open the valve 102 for atomizing air. After a microsecond delay, relay 101A is activated next to open the three-way valve 102 so that air pressure from line 71 opens nozzle 74.

Relay 102A is connected to the circuit controlled by relay 101A as a safety feature. Thus, relay 102A must be activated first to close contact points 102B and 101B to insure that the air atomizing valve 102 is opened first. Timer 100 is set to activate relay 102A first and to deactivate this relay last while relay 101A is operated only after relay 102A has been energized. Energizing relays 101A and 102A results in closing their respective circuits and energizing solenoids 101C and 102C to open valves 101 and 102 respectively.

As mentioned above, a plurality of nozzles would normally be employed in the usual arrangement, one between each back jogger plate depending on the spray pattern desired. Thus, a plurality of nozzle extensions 74A are attached to a nozzle which is in elongated manifold configuration. In FIG. 1, lines 70, 71 and 72 leading to nozzle 74 are omitted in order to more clearly show the relationship of the nozzle to the machine. Also nozzle extension 74A, omitted in FIG. 4, is simply threaded on the face of nozzle 74 in place of nut 82 and header 84.

I claim:

1. A device for spraying material on a selected one of a plurality of counted cut sheets of paper being moved by a conveyor and to a piling section to form a pile, comprising spray nozzle means mounted adjacent said piling section, a control for directing a spray of liquid material through said nozzle means on said selected counted sheets of paper as the latter is being conveyed to said pile, said control including an electrical circuit with relay means responsive to impulses received from a counter, said relay means being connected to said nozzle means to active and open same as said selected counted sheet is passed by said nozzle means whereby liquid material is sprayed on said selected sheet of paper.

2. The device of claim 1, wherein jiggers are positioned beneath said conveyor to receive piles of counted cut sheets of paper from the conveyor and a spray nozzle of said nozzle means is positioned between said jiggers to simultaneously spray material on selected sheets of paper responsive to impulses received from said counter.

3. The device of claim 2, wherein said spray nozzle is mounted under said conveyor to extend upwardly between said conveyor and said jiggers whereby material is sprayed on the undersides of said selected sheets of paper.

4. A method for handling increments of cut paper sheets, comprising conveying a plurality of counted cut paper sheets to a piling section, spraying a liquid parting agent on a selected counted sheet being conveyed to a pile whereby an increment is formed in said pile and thereafter removing the increment from the pile.

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5. The method of claim 4, wherein the underside of the selected counted paper sheet is sprayed with a parting agent whereby an increment can be piled on the top of said sprayed

sheet and said increment can be readily separated from the rest of the pile.

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