

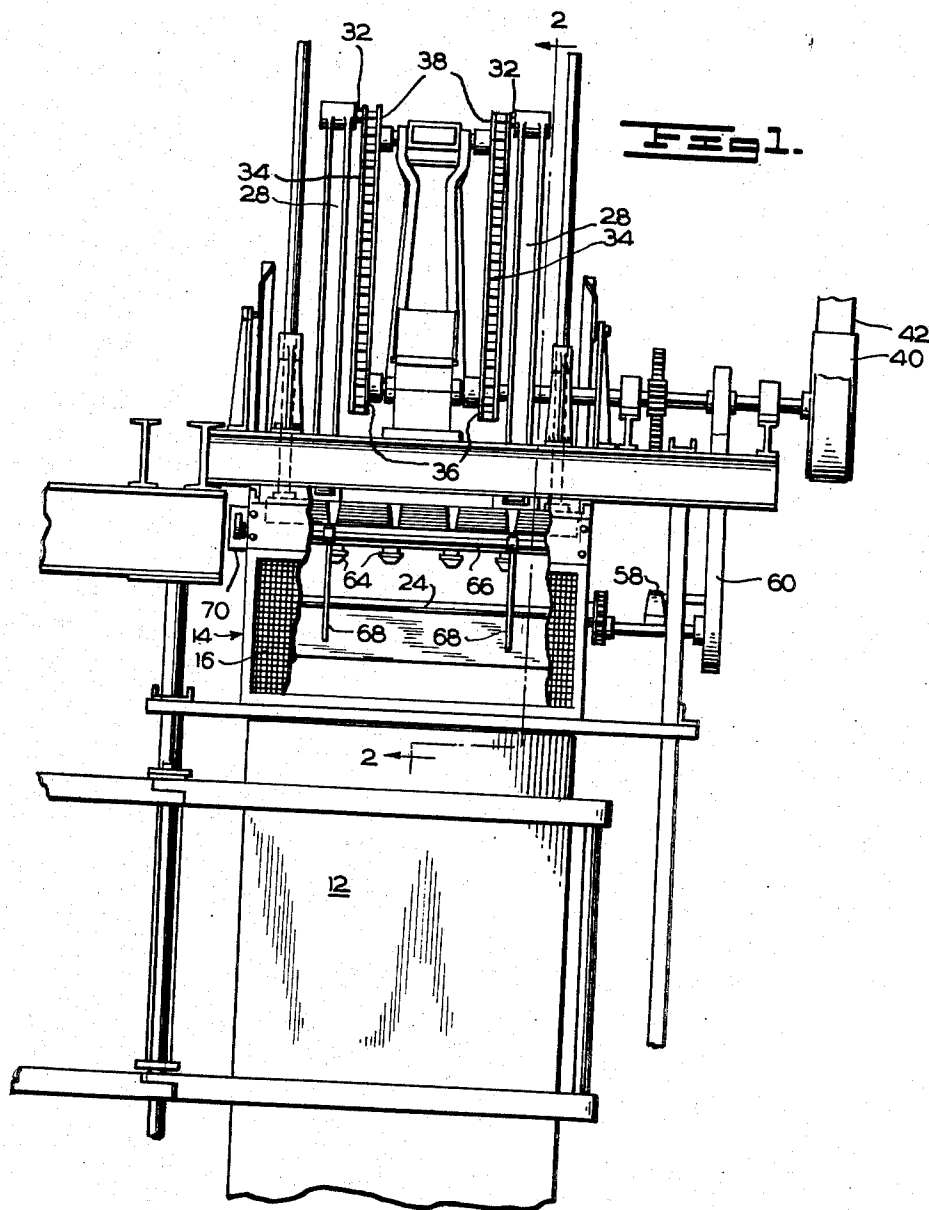
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H. M. WADDLE ET AL
TEXTILE FIBER TREATING APPARATUS

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3 Sheets-Sheet 1



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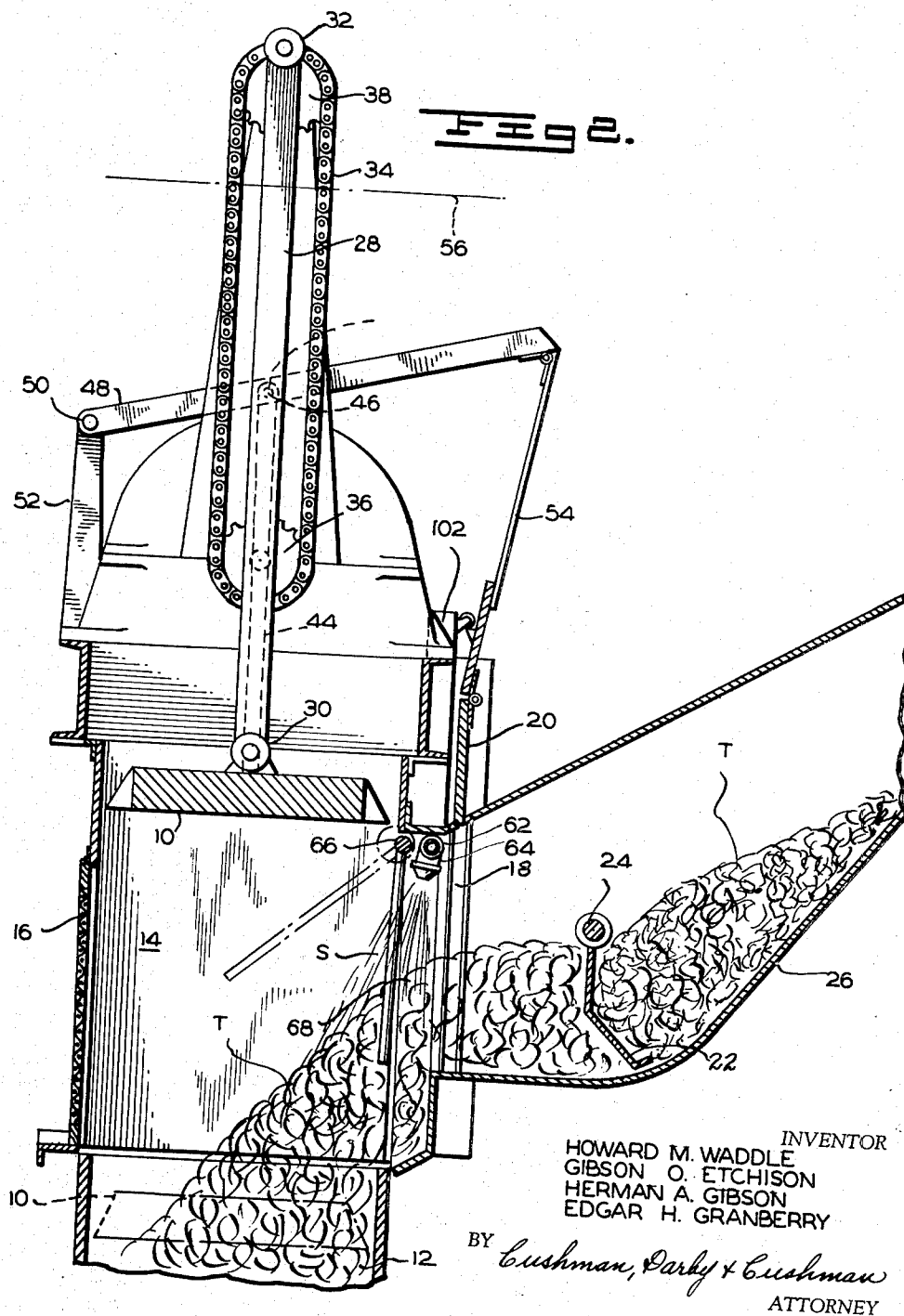
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3 Sheets-Sheet 2



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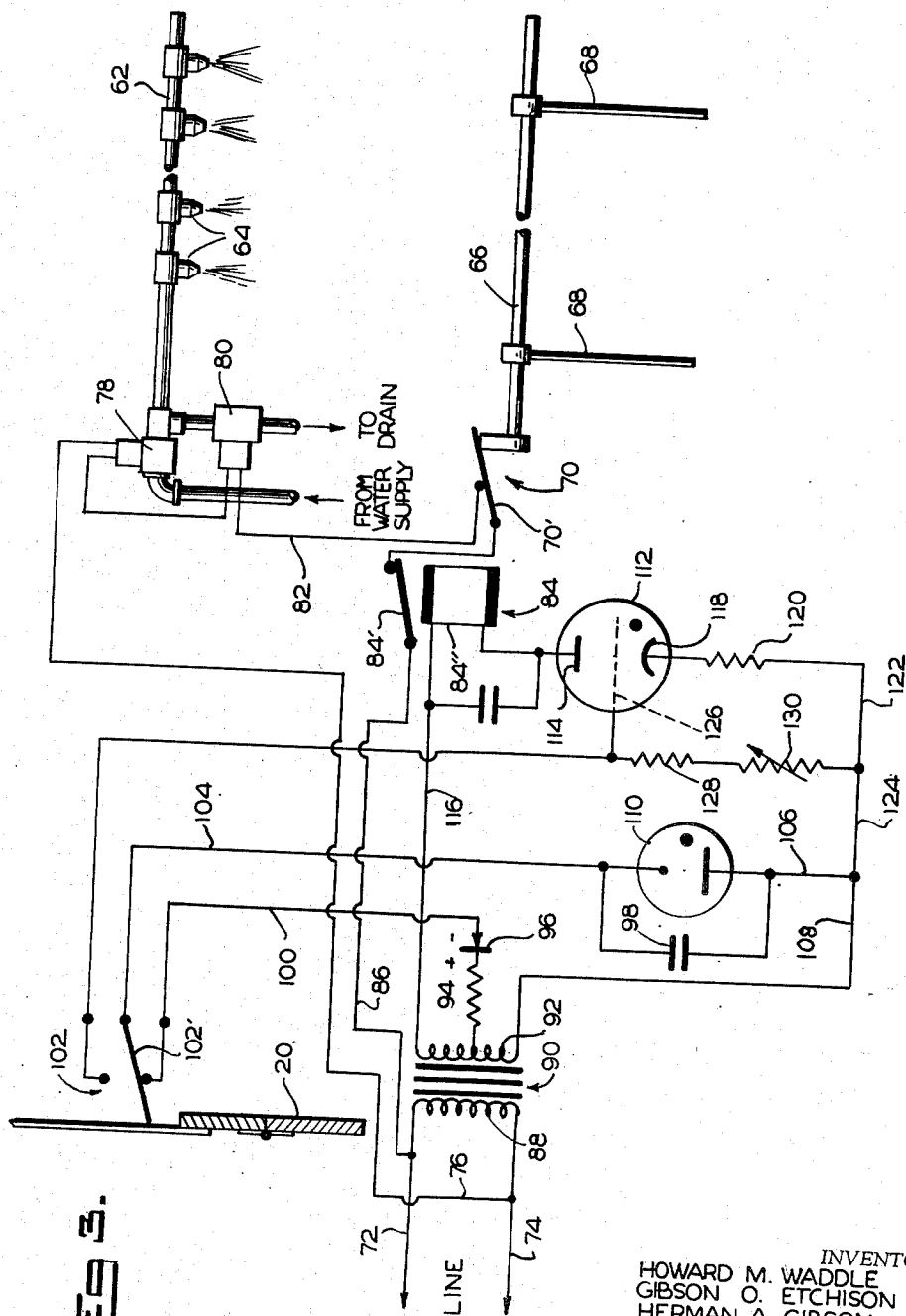


FIG. 3.

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TEXTILE FIBER TREATING APPARATUS

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1

This invention relates to apparatus for treating textile fiber in a fibrous condition.

In the processing of textile fiber it is often desirable to dampen the fiber with water, or to otherwise treat the fiber by adding chemicals in the form of liquids and dispersions.

Heretofore no completely satisfactory means for thus treating fibers has been known. In all previous apparatus with which we are familiar the lack of control of the applications of liquids and the like results in either too little or too great an amount of the applied matter per unit of fiber treated.

By the present invention there is provided a control apparatus, preferably incorporated into a press box of conventional design, which accurately controls the quantities of matter which are applied to fiber passing within the "spray" area.

Accordingly, it is an object of this invention to provide apparatus for controlling the application of liquid and the like to textile fibers.

It is a further object to provide such applicator apparatus in press box devices of conventional construction.

It is a further object of this invention to provide applicator apparatus in which feeler devices responsive to movement of material to be treated control the application of matter to the material, and/or timer means are provided for limiting the application of material in the event that the feeler means are operated for an excessive time period.

Further objects and the entire scope of the invention will become further apparent from the following detailed description and from the appended claims. It will be understood that the following detailed description is for purposes of illustration only and is not intended to limit the scope of the invention.

The various features which go to make up the invention may be best understood with reference to the accompanying drawings, in which:

Figure 1 illustrates a front view of a press box apparatus in which the present invention is incorporated.

Figure 2 illustrates a sectional view taken substantially along the line 2-2 of Figure 1, and

Figure 3 illustrates a schematic diagram of electrical and electronic circuits employed in the present invention.

While it is contemplated that the basic features of the present invention may be incorporated in various types of apparatus, the preferred use of the invention is in connection with

2

devices commonly referred to as press boxes. Such devices are employed in tamping fibrous textile material into compact bales for further processing. For convenience in this description the following will pertain entirely to the incorporation of the invention into such press box. Further, for purposes of convenience in the following description the matter which is applied to the fibrous material will be described as a liquid. However, it will be understood in the following and in the appended claims, that the spray may actually be of a dispersed or finely divided solid material. Additionally, the spraying devices may actually incorporate a mechanically agitated unit for dispensing solids as required.

Referring jointly to Figures 1 and 2, there is illustrated a press box device which is commercially available and is known as a "Lummus" press box. Since these press boxes are well known in the textile trade, it is believed sufficient in this specification to give only a brief explanation of the construction and operation of this device.

The press box is characterized by a tramper member 10 which reciprocates between an upper position as shown in solid line in Figure 2 and a lower position substantially as shown in chain line in Figure 2. In moving from the upper position to the lower position the tramper 10 is arranged to engage a supply of fibrous textile material T to force this material downwardly into a box 12 in which the material T is compressed during several cycles of the tramper 10 until a compact bale of the material has substantially filled the box 12 up to the lower limit of travel of the tramper 10. Thereupon, means (not shown) swing the box 12 away so that it may be emptied.

The tramper 10 reciprocates within a feed box which is designated generally as 14 and is bounded at its front side by a semi-fixed screen panel 16 and at its rear side by an opening 18 which is intermittently closed by means of a sliding door 20.

When the door 20 is in its open position, as shown in Figure 2, a feeder beater 22 is rotated clockwise as shown in Figure 2 about a shaft 24 to feed textile material T from a feed chute 26 into the previously mentioned feed box 14.

The tramper 10 is caused to reciprocate within the feed box 14 by reason of connecting rods 28 which extend from pivotal joints 30 at the tramper to pivotal joints 32 which interconnect the connecting rods 28 with a link of chains 34. Chains 34 are trained over a set of lower driven

3 sprockets 36 and a set of upper idler sprockets 38. Power is supplied to the apparatus at pulley 40 by means of belt 42 and this power is supplied through suitable gearing to continually rotate the driven sprockets 36. Accordingly, it will be clear that the chains 34 will continuously revolve and in so doing the connecting rods 28 will drive the tramper in its reciprocating motion by reason of the joints 32 between the connecting rods and the chains 34.

Each time the tramper nears the upper limit of its reciprocating travel of the tramper A, door-operating rod 44 engages the upper surface of the tramper 10 and moves upwardly therewith. The rod 44 is pivotally connected as at 46 to a transverse connecting arm 48 which is pivoted at 50 to a fixed upright 52. The end of arm 48 remote from pivot 50 is operatively connected to previously mentioned door 20 by means of a connecting linkage 54. Accordingly, during the period in which the pivotal joints 32 are above the position designated by chain line 56 in Figure 2, the tramper door 20 will be opened to permit material T to be moved from the chute 26 into the feed box 14. During the interval when the door 20 is opened, a suitable clutch means comprising a belt tightener 58, Fig. 1, will be actuated by means (not shown) interconnected with the operating means for door 20 to cause a belt 60 to rotate the shaft 24 to operate the feeder beater 22. The rate of feed may be conveniently adjusted to any desired quantity by the selection of reduction gearing in the drive which comprises the belt 60.

The above described structure is that which in itself has been known and, by itself, forms no part of the presently claimed invention.

The present invention is concerned with the addition of the following described equipment to the above press box structure. A transverse tubular header 62 is located transversely of the feed box 14 at the upper end of the entrance 18 between the chute 26 and feed box 14. Attached to the header 62 at spaced intervals across the width of the feed box 14 are a plurality of spray heads 64 for directing a spray of liquid as designated by S. From this description it will be understood that whenever liquid is applied under pressure to the header 62, a more or less uniform spray pattern will be applied to the material T as it passes through the opening 18.

Also positioned at the upper end of entrance 18 is a transverse rotatable feeler bar 66 to which are fixed at intervals across the width of box 14 a plurality of feeler arms 68. Feeler arms 68 are resiliently urged as by a spring (not shown) to normally lie in a vertical position as shown in solid line in Figure 2. However, when material T is moving through the entrance 18 the reaction of the material against the feeler arms 68 will move the feeler arms into a position corresponding more or less to that shown in chain line in Figure 2. That is, the feeler arms rotate with the feeler rod 66 about the axis of the latter.

It will be noted at this point that when the press box 12 is becoming filled, the material T fed into the feed box will not immediately drop into the press box and therefore the accumulation of material T may cause the feeler arms 68 to remain in an extended position such as the chain line position shown in Figure 2. However, when the tramper 10 moves downwardly, it will not only force the material T into the press box 12, but will so engage the feeler arm 68 and cause

the latter to be rotated into their vertical position as shown in full line in Figure 2.

The feeler rod 66 is arranged to extend through the left-hand side wall of feed box 14 and is provided at this end with a cam-operated switch 70, the arrangement being such that the switch contacts are closed only when the feeler arms 68 are in their extended position under the action of material T. As will be described more fully below, the closing of switch 70 is employed to apply liquid to the header 62 so that liquid is applied to the material T only while it is moving through the entrance 18. Accordingly, by this means, which relates the amount of material moving through the entrance 18 to the length of time the spray is turned on, the amount of the liquid applied to the material may be closely regulated. This regulation feature is of paramount importance in this present invention and has not been previously found in any known apparatus.

There may be, however, some difficulty experienced when the press box 12 is substantially full and an accumulation of material T may retain the feeler arms 68 in extended position even after the material T has stopped moving through the entrance 18. Obviously, this may result in applying too great an amount of liquid through the spray heads 64. To meet this difficulty, this invention further comprises the use of a timer circuit which will automatically stop the flow of liquid through spray head 64 regardless of the fact that switch 70 remains closed and thus tends to continue the spray. This timer arrangement, as incorporated into a complete circuit for operating our invention, will now be described with reference to Figure 3.

In Figure 3 the various components which correspond to those mentioned above are designated by the use of corresponding reference characters.

In the electrical circuit power is supplied from a supply line to two leads 72 and 74. A branch line 76 is connected with line 74 and is first connected to the coil of a solenoid-operated valve 78. Valve 78 is of a type which will be open to permit flow therethrough when the coil is energized. This valve supplies liquid to the previously mentioned spray header 62. Connected in series with valve 78 is a solenoid-operated drain valve 80. This valve is arranged to be closed when energized and opened when not energized. The circuit which starts with line 76 may be further traced through a line 82, through the arm 70' of previously mentioned cam-operating switch 70, through the arm 84' of a relay 84 and then through line 86 to power line 72.

The power lines 72 and 74 are also connected to feed the primary coil 88 of a transformer 90. The secondary coil 92 of transformer 90 is center tapped and connected through a resistance 94 and a rectifying element 96 to provide a direct current circuit for charging a capacitance 98. This charging circuit may be traced as follows: From element 96 through line 100, through arm 102' of a double throw switch 102 operated by the door 20 in its upper position (see Fig. 2), through line 104, through capacitance 98 and through lines 106 and 108 to the transformer secondary coil 92. A voltage regulator tube 110 may be provided across the capacitance 98.

The electrical circuit is further characterized by a tube 112 having its anode 114 connected to one side of the transformer secondary coil 92 through the coil 84' of relay 84 and through

5

line 116. The cathode 118 of tube 112 is connected through a resistance 120, and lines 122, 124 and 108 to the opposite end of the transformer secondary coil 92. The control grid 126 of tube 112 is connected into the cathode circuit of tube 112 through a fixed resistor 128 and a potentiometer 130 and this grid is further connected to a contact of previously mentioned door switch 102.

When the door 20 is raised it will operate switch 102 so that the capacitance 98 will be connected into the grid circuit tube 112 and the capacitance will gradually discharge through the resistance 128 and the potentiometer 130. By reason of the orientation of the rectifier unit 96 the capacitance 98 will be so charged that the end of the grid circuit connected with lines 122 and 124 will be at a relatively positive potential and the grid 126 will therefore be relatively negative with respect to cathode 118 when the capacitance 98 is fully charged and is connected into the grid circuit by operation of switch 102.

Opening of the door 20 will have two effects, one of which will be to permit the material T to move under the feeler arm 68 to actuate the latter and close the contacts of switch 70. The other effect will be to operate the door switch 102 to connect the capacitance 98 into the grid circuit tube 112. When the capacitance 98 is first connected into the grid circuit of tube 112 the grid 126 is relatively negative the relay 84 will not be energized. Accordingly, a circuit will be complete through arm 84' of relay 84, through arm 70' of cam switch 70 and through the series connected solenoid valves 78 and 80. Therefore, valve 78 will open and valve 80 will close with the result that liquid under pressure will be supplied to the header 62 and spray head 64. If a normal amount of material T moves under the feeler arm 68 and drops from the feed box 14 into the press box 12, the feeler arm 68 will return to unactuated position and the solenoid valve circuit will be broken at switch 70. Valve 78 will then be closed and valve 80 open. The advantage of having valve 80 in the liquid supply system is that pressure will immediately be removed from the header 62 and the residue of liquid in the header will be more inclined to flow into the drain than through the spray head 64. Accordingly, the spray head 64 will not continue to dribble undesired liquid on the material T.

In the event that a quantity of material T has accumulated in the feed box 14 and prevents the feeler arm 68 from returning to their normal position to break the solenoid circuit at switch 70, this circuit will be broken at relay 84 at the limit of the maximum desired period for spraying. The actuation of relay 84 comes about after a predetermined interval by reason of the negative bias of grid 126 gradually disappearing as the capacitance 98 discharges. The rate of discharge may be adjusted by means of the potentiometer 130 as will be well understood by those skilled in the art.

Closing of door 20 will reconnect capacitance 98 into its D. C. charging line.

6

From the foregoing it will be generally apparent that the electronic interval timer comprising the tube 112 will set a maximum time interval during which the spray may operate and the feeler arms 68 will set a variable minimum period of spray operation which directly reflects the amount of material passing beneath the feeler arms 68. It will be further apparent that the feeler arms 68 may be dispensed with if desired and the interval time alone be relied upon to control the application of sprayed matter. Also, it may be desired in some instances to have the timer started by actuation of the feeler means rather than by actuation of the feeding means.

It will be understood that the foregoing detailed description has been made only for purposes of illustration and is not intended to limit the scope of the invention. On the contrary, the scope of the invention will be determined from the appended claims.

We claim:

1. A press box for fibrous material comprising a feed box, a tramper mounted for vertical reciprocation in said feed box, a feed chute discharging laterally into said feed box, means for closing the discharge end of said feed chute when the tramper is in the lower part of its reciprocatory path, means for displacing said feed chute closure means in synchronism with the upward stroke of said tramper, means for feeding material from said feed chute into said feed box when said feed chute is open, means for spraying fluid on said material as it enters said feed box, feeler means disposed in the discharge end of said feed chute and adapted to be displaced by material entering said feed box, means responsive to actuation of said feeler means for actuating said spray means, and timer means associated with said spray actuating means to limit the period of spray application.

2. Apparatus as defined in claim 1, wherein said timer means is electronic, and initially energized by displacement of the feed chute closure means in synchronism with the upward stroke of the tramper.

3. Apparatus as defined in claim 1, including means for adjustably varying the time period of operation of said timer means.

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