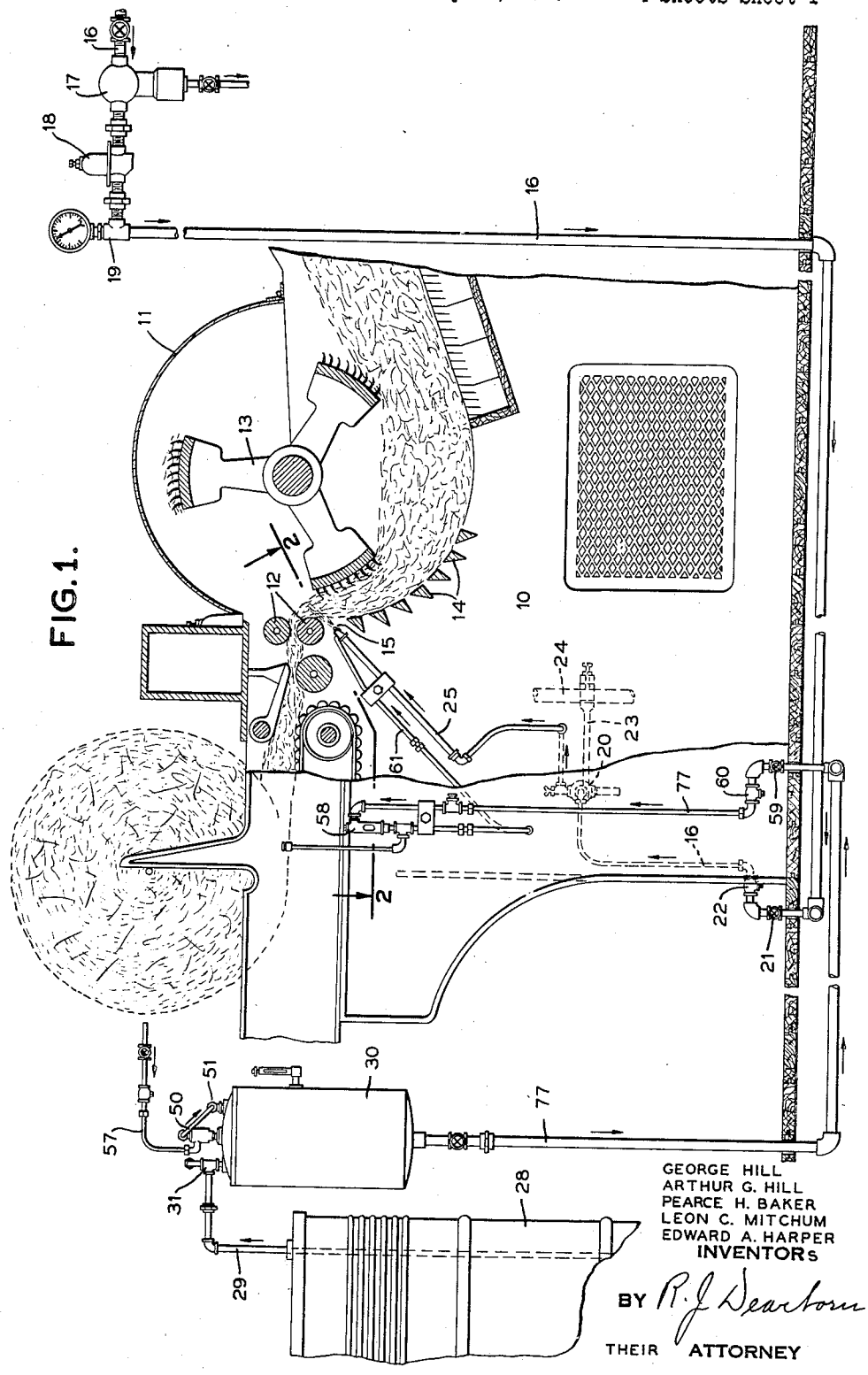
Nov. 7, 1939. G. HILL ET AL 2,178,539

APPARATUS FOR CONDITIONING FIBROUS MATERIAL

Filed May 16, 1936 4 Sheets-Sheet 1

FIG. 1.



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APPARATUS FOR CONDITIONING FIBROUS MATERIAL

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FIG. 2.

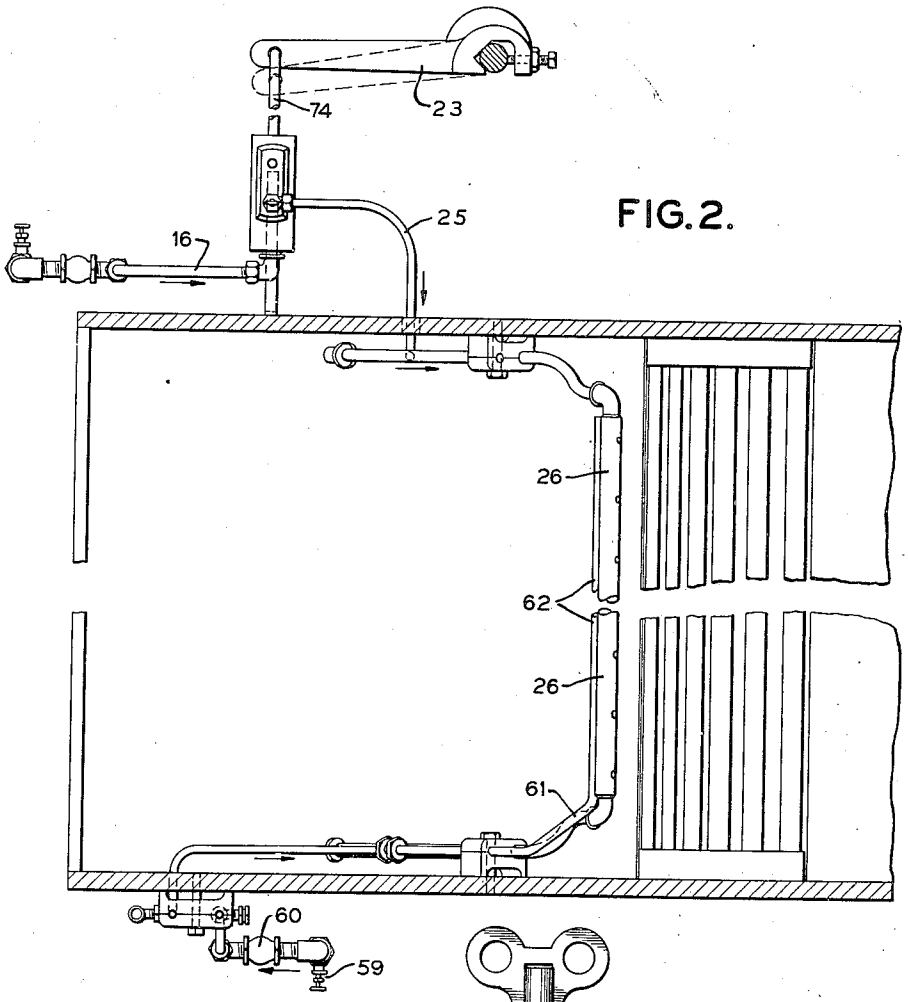
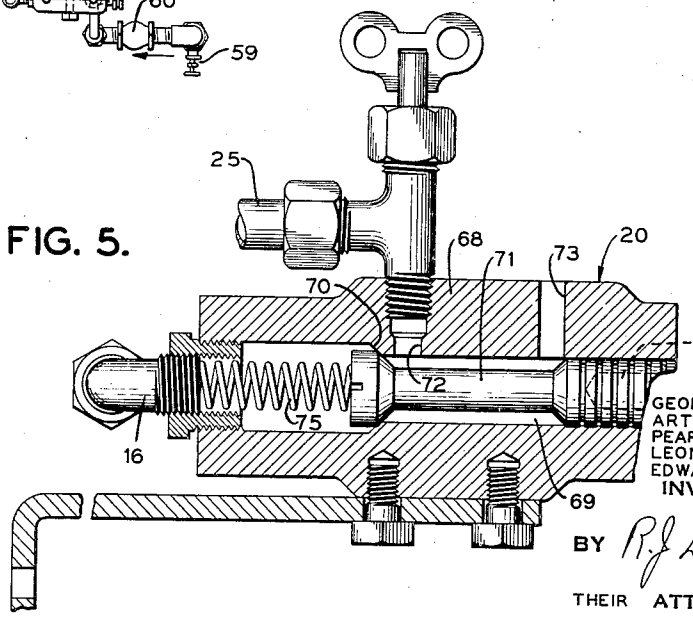


FIG. 5.



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APPARATUS FOR CONDITIONING FIBROUS MATERIAL

Filed May 16, 1936 4 Sheets-Sheet 3

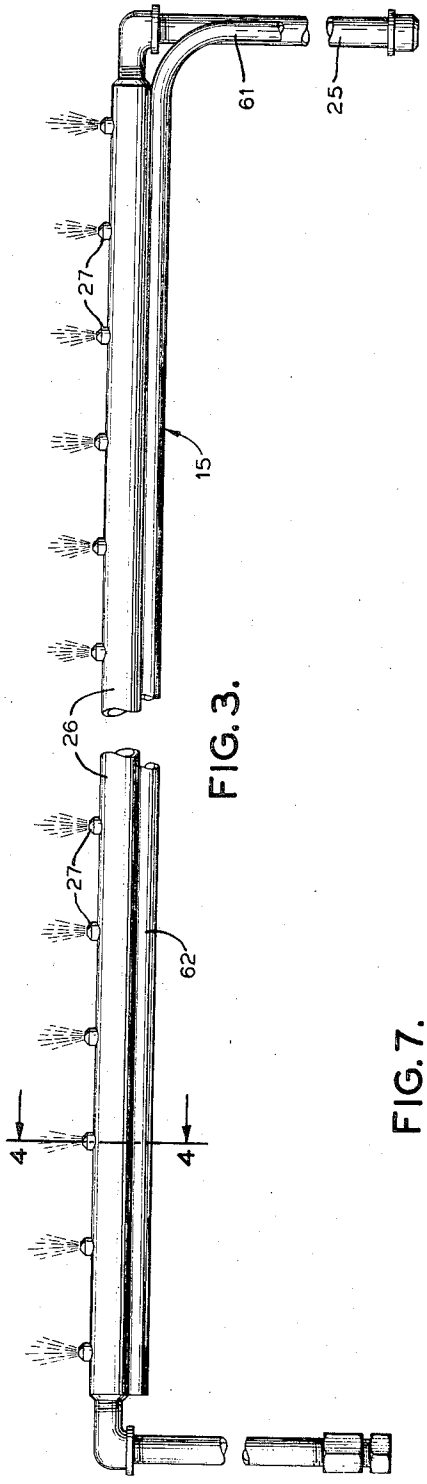


FIG. 3.

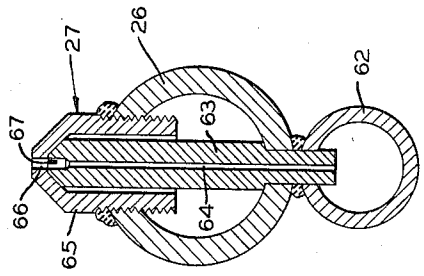


FIG. 4.

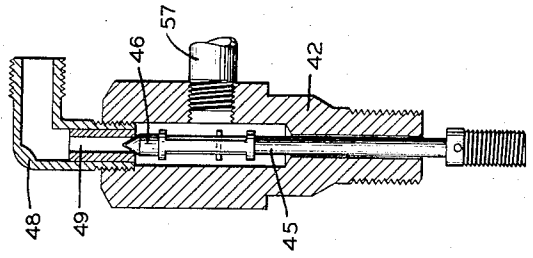


FIG. 7.

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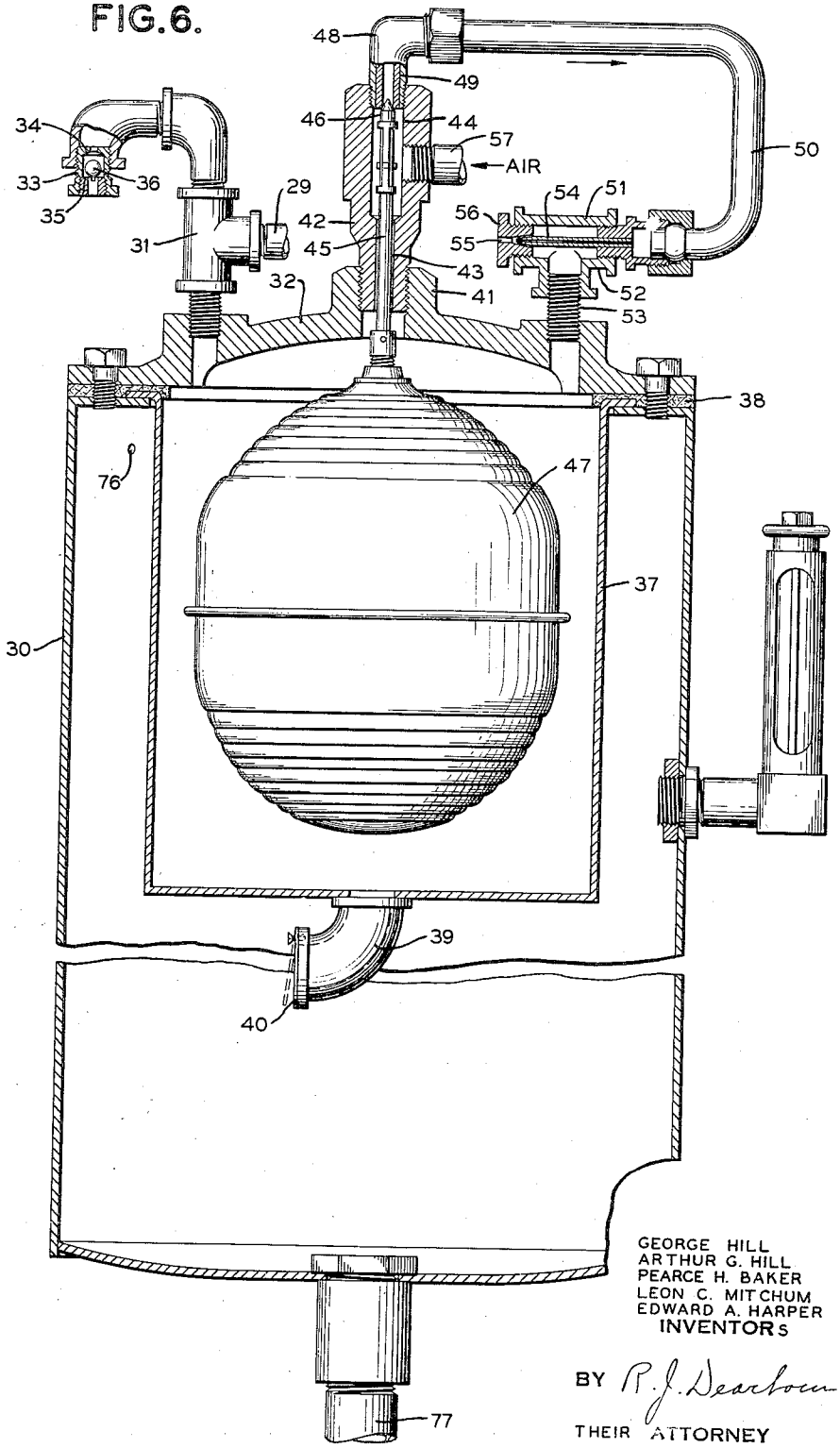
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APPARATUS FOR CONDITIONING FIBROUS MATERIAL

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FIG.6.



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UNITED STATES PATENT OFFICE

2,178,539

APPARATUS FOR CONDITIONING FIBROUS MATERIAL

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Application May 16, 1936, Serial No. 80,114

2 Claims. (Cl. 299—86)

This invention relates to apparatus for oiling or otherwise moistening fibrous materials, such as cotton, wool, jute, hemp, and the like during the processing of such materials, and the invention has particular reference to the application of oils or oil compounds to fibrous material while the material is being subjected to a cleaning or paralleling operation as, for example, while the material is being subjected to the action of a beater in the beater chamber of a picker.

While the invention will be described for the purpose of illustration with specific reference to the treatment of fibrous material in the beater chamber of a picker, it will be understood that it is equally applicable to the treatment of any such materials in any type of cleaning or paralleling apparatus.

The invention has for its object to provide a simplified apparatus for spraying fibrous materials with oils or oil compounds. To accomplish this object the apparatus has been designed to eliminate any possibility of its becoming air-bound, to provide a positive and constant oil supply by maintaining a uniform head on the oil line, to prevent the accumulation of motes on the spray manifold, to facilitate the regulation of the quantity of oil sprayed, and to obtain better atomization and more uniform distribution of the fluid sprayed. Other and more obvious objects, features and advantages of the invention will appear as the description thereof, taken in connection with the accompanying drawings, proceeds. In the drawings:

Fig. 1 is a view in elevation, partially in section, of a portion of a picker or cleaning mechanism,

Fig. 2 is a sectional plan view taken on the line 2—2 of Fig. 1,

Fig. 3 is an enlarged view of the spray manifold shown in Fig. 2,

Fig. 4 is a still further enlarged sectional view of the spray manifold taken on the line 4—4 of Fig. 3,

Fig. 5 is an enlarged longitudinal sectional view of the two-way air valve shown in dotted lines in Fig. 1,

Fig. 6 is an enlarged and partially sectional view of the vacuum operated constant head tank shown in Fig. 1, and

Fig. 7 is an enlarged sectional view of the air valve shown in Fig. 6.

Referring to the drawings, there is illustrated a spraying apparatus which is particularly adapted for spraying fibrous material such as cotton, wool, jute, hemp and the like with a wetting agent such as oil or oil compounds. For the purpose of illustration the invention will be described with reference to the application of oil to cotton, with the understanding that the invention is not so limited but may be used with equal success for the application of any desired wetting agent to any desired fibrous material at any point in the process of manufacture.

The apparatus shown in Fig. 1 includes a picker indicated generally by the reference numeral 10. The picker, which is of conventional design, includes a beater chamber 11 wherein cotton which is introduced into the chamber through feed rolls 12, 12 is acted upon by a revolving beater 13. A perforated grid provided with a plurality of grid bars 14 is positioned in the lower portion of the beater chamber. Dust and motes separated from the cotton by the action of the beater 13 pass from the chamber through the grid bars and are subsequently removed.

Oil is applied to the cotton substantially at the point of its entry into the beater chamber 11 and in the apparatus illustrated a spray manifold 15 is shown in position beneath the bottom feed roll 12 and placed well forward so that it lies along the arc formed by the grid section. The top grid bar 14 is preferably removed from the usual assembly to provide sufficient space for convenient insertion of the spray manifold 15 which then takes the place of the bar which has been removed and which is maintained in the desired position by any suitable securing means. The oil may, of course, be applied at any other convenient or desired point within the beater chamber of the picker or cleaning machine mechanism.

Air and oil under regulated pressure are supplied to the spray manifold 15 wherein the oil is atomized and from which the atomized oil is discharged in a fan-like spray so as to be discharged upon the cotton substantially at the point of separation of the individual fibers from the mass.

For the purpose of supplying air to the manifold 15 connection is made to a source of air supply such as a compressor (not shown). From this source of supply the air passes through a valved pipe 16, a filter 17, a reducing valve 18 and a pressure gauge 19. From the gauge the main air line extends to a two-way valve 20, the line being provided at convenient points between the gauge 19 and valve 20 with a manually operable control valve 21 and a strainer 22. The two-way valve 20 is so arranged as to automatically stop the flow of air to the manifold 15 simulta-

neously with the stopping of the feed mechanism of the picker, thus discontinuing the spray of oil in the beater chamber 11 whenever the picker ceases to operate. The valve 20 is operated by a knock-off arm 23 which in turn is actuated by any desired mechanism operating in timed relation with the cleaning machine or picker, such as a vertical motion rod 24 on the picker. When the picker is in operation air passes from the valve 20 through a pipe 25 to the air manifold 26 which is provided with one or more, preferably about twenty (20), jets or nozzles 27.

Oil is supplied to the spray manifold 15 from interchangeable oil drums such as that indicated by reference numeral 28 in Fig. 1. A pipe 29 extends into the drum and almost to the bottom thereof. The opposite end of pipe 29 connects with a constant head tank 30 through a T fitting 31, one side of which connects directly with the head 32 of the tank 30 while the other is provided with a vacuum breaker 33 which includes upper and lower seats 34 and 35, respectively, for a ball valve 36, the operation of which will later be described.

A vacuum cup 37 is secured inside the tank 30 and to the under side of the head 32 by means of screws, bolts or the like, suitable packing 38 being provided to insure an air-tight connection. An outlet pipe 39 is secured in the bottom of the vacuum cup 37 and on its free end a flap valve 40 is hingedly mounted. Whenever a partial vacuum is maintained in the cup 37 the valve 40 is held in a closed position but when the vacuum is broken the valve 40 responds to the head of oil acting upon it within the cup 37 and opens to permit the oil to flow into the main tank 30.

The head 32 is formed to provide a centrally disposed and internally threaded boss 41 in which there is secured a valve housing 42. Housing 42 is bored longitudinally at two diameters as indicated at 43 and 44. The lower and smaller bore 43 is adapted to support a stem 45 which extends upwardly into the upper and larger bore 44. A tapered valve 46 is secured on the upper end of the stem 45, and on the lower end of the stem which extends downwardly into the vacuum cup 37 there is secured a hollow float 47.

One end of an elbow fitting 48 is secured in the upper end of valve housing 42. A bushing 49 is secured in this end of the fitting 48 to provide a restricted orifice for the passage of air and also to provide at its end a seat for the tapered valve 46. The opposite end of the fitting 48 connects with a pipe 50 which extends to and connects with a vacuum creator or entrainment nozzle 51 which includes a T fitting 52 secured by a nipple 53 to the head 32 through which communication is made with the interior of the vacuum cup 37. The vacuum creator 51 is provided with a tube 54 of restricted diameter through which air from the pipe 50 passes under pressure at high velocity. One end of the tube 54 is tapered and extends in spaced relation into a correspondingly tapered portion of an orifice 55 in a plug 56 which is screwed into an end of the T fitting 52. Thus air passing from tube 54 through the orifice 55 of plug 56 entrains with it air from the vacuum cup 37 and thereby creates a partial vacuum in the cup. The air thus used to create a partial vacuum in the cup 37 may be taken from any convenient source of air supply and is introduced into the enlarged portion of valve housing 42 through a pipe 57.

An outlet is provided in the bottom of the constant head tank 30 and to it there is connected one end of a pipe 77 which connects at its opposite end with a sight feed needle valve 58 by means of which the supply of oil fed to the spray manifold 15 is given a final and minute regulation. The pipe 77 is provided with a valve 59 and an oil filter 60. Oil which passes through the needle valve 58 in regulated quantities is conveyed through a pipe 61 to an oil manifold 62 which is secured in longitudinal relation to the air manifold 26, the air manifold 26 and oil manifold 62 together constituting the spray manifold 15.

As previously stated, the spray manifold is provided with a plurality of spray nozzles or jets 27. Each spray jet includes an oil delivery tube 63 which is formed with a centrally disposed restricted bore 64 and which is in open communication at one end with the oil manifold 62. The opposite end of the delivery tube is suitably tapered and extends through the air manifold 26 and into the correspondingly shaped interior of a jet housing 65 which is screwed into a suitable threaded opening in the air manifold 26. The jet housing 65 is provided with a centrally disposed discharge orifice 66 which is co-axial with the bore 64 in the delivery tube 63. The delivery tube 63 is formed on its tapered end with off-set slots 67 and the end is so positioned within the housing 65 as to provide an annular clearance space between the exterior of the tube 63 and the inner wall of the housing 65. Thus air from the air manifold 26 passes around the oil delivery tube 63 and finally passes out through the off-set slots 67 and orifice 66, the off-set position of the slots 67 causing the air to be discharged through the orifice 66 in a fan-shaped spray. The air discharged through orifice 66 entrains with it oil which is caused to rise in the bore 64 by the vacuum produced therein.

In Fig. 5 there are shown the details of construction of the two-way air valve 20 shown generally in Figs. 1 and 2. The valve assembly includes a housing 68 formed with a longitudinal bore 69 drilled at two diameters to provide a tapered valve seat 70 for a spool valve 71 which is adapted to move longitudinally in the bore 69. Housing 68 is provided with air discharge outlets 72 and 73, outlet 72 connecting with pipe 25 which leads to the air manifold 26 and outlet 73 being provided to vent any air in the housing 68 or pipe 25 to the atmosphere when the spray manifold ceases to operate. The position of the valve 71 is regulated by means of a push rod 74 (Fig. 2) which in turn is actuated by the knock-off arm 23. Movement of the arm 23 actuates the push rod 74 in a substantially longitudinal direction and pushes the valve 71 to the left (as viewed in Fig. 5) to close outlet 73 and remove the valve from its seat 70. When thus opened air enters the bore 69 from pipe 16, passes around the valve and out through outlet 72 to pipe 25. When arm 23 is moved in the opposite direction the rod 74 ceases to act upon the valve 71 which is then forced back upon its seat 70 by the action of air entering from pipe 16 and by the further action of a spring 75. Thus the action of the valve is entirely automatic and dependent upon the operation of the feed mechanism.

It will be seen from the foregoing that the operation of the herein described apparatus is dependent upon the operation of the feed mechanism and is controlled by regulating the supply of air to the air manifold 26. As long as the feed mechanism is in operation the two-way air valve 20 is maintained in position to permit air to pass

to the air manifold from which it is discharged through the jets 27. As the air passes around and over the tapered end of the delivery tube 63 a partial vacuum is created within the tube and oil is drawn therefrom to be mixed with the rapidly moving air, and the resulting mixture is discharged from the jet 27 in a fan-like spray upon the cotton as the individual fibers are separated from the mass by the action of the beater 13.

Oil is supplied to the oil manifold 62 from the oil drum 28, being drawn therefrom by reason of the partial vacuum created in the vacuum cup 37 by the action of the air passing through the vacuum creator 51. As air is withdrawn from the vacuum cup 37 oil is drawn from the drum 28 by reason of the fact that the pipe 29 fits loosely through the top of the drum and air at atmospheric pressure acts on the oil in the drum to force it through the pipe 29 to the vacuum cup 37. As the oil level rises within the vacuum cup 37 the float 47 rises, and when a predetermined and desired level has been reached the tapered valve 46 closes the opening in the end of bushing 49 and shuts off the supply of air to the vacuum creator 51. During the period that a partial vacuum is maintained in the vacuum cup 37 the ball valve 36 of the vacuum breaker 33 is pulled upwardly and held against the upper valve seat 34, thus preventing the admission of any air to the vacuum cup. When the air supplied to vacuum creator 51 is discontinued by the closing of valve 46, the ball valve 36 quickly drops to the lower valve seat 35 which is suitably slotted to permit ready access of air which quickly enters the vacuum cup 37 and breaks the vacuum. Also, when the vacuum is broken the flap valve 40 in the outlet pipe 39 responds to the head of liquid acting upon it and opens to permit the oil in the vacuum cup to flow into the main tank 30 which is vented to the atmosphere through a suitable opening 76 in the wall of the tank. As soon as the oil level falls in the vacuum cup the tapered valve is drawn away from the opening in the end of the bushing 49 and once again air is allowed to pass to the vacuum creator to start another cycle in the operation of the constant head tank.

The oil from the tank 30 passes through pipe 77 to the sight feed needle valve 58 where the supply of oil is accurately regulated. On passing from the needle valve 58 the oil passes through the oil delivery tube 63 when drawn therethrough by the partial vacuum created by the action of the air in the jet housing 65.

When the feed mechanism discontinues operation the push rod 74 is moved to the right as viewed in Fig. 5, and the spring 75, together with the action of air entering the valve housing 68 from pipe 16, causes the spool valve 71 to move to the right until it is seated on the seat 70. At that time the supply of air through the valve is stopped and the air in the valve housing, together with that in the pipe 25 and the air manifold 26, is vented to the atmosphere through outlet 73, and when air is not being discharged through the jets 27 oil is not drawn from the supply pipe 63 and no oil is sprayed on the cotton during the time that the feed mechanism is out of operation.

Obviously, many modifications and variations of the invention as herein described may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

We claim:

1. In an apparatus of the kind described, a container for oil maintained under atmospheric pressure, a spray manifold comprising nozzles for the spraying of atomized oil, a sight feed needle valve for regulating the supply of oil to the manifold, an air operated constant head tank for withdrawing oil from said container and supplying it to said needle valve, and separate air lines for supplying air under pressure to actuate the constant head tank and to atomize and discharge the oil from said nozzles.

2. In an apparatus for applying a conditioning fluid to fibrous material during the processing thereof, a spray manifold having atomizing nozzles directed to apply the atomized conditioning fluid upon the fibrous material, means for conducting air under pressure to said nozzles, means for conducting the conditioning fluid to said nozzles, air operated means for obtaining a primary regulation of the supply of conditioning fluid to said nozzles, and means for obtaining a secondary and more minute regulation of said supply of conditioning fluid prior to its delivery to said nozzles.

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