Feb. 4, 1969 E. L. LEIBOLD 3,425,686

AIR TREATING APPARATUS FOR SHEET MATERIAL SEPARATOR

Filed Aug. 21, 1967

Fig. 1

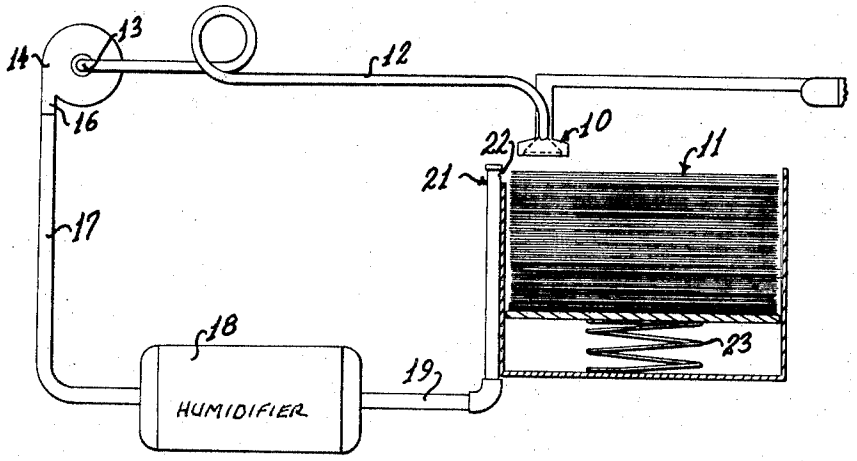


Fig. 2

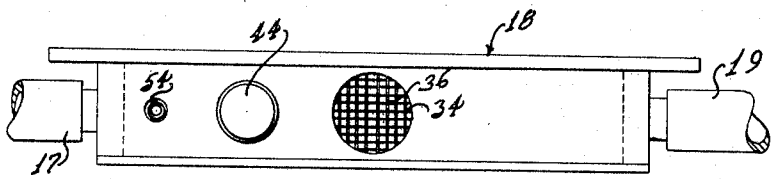


Fig. 3

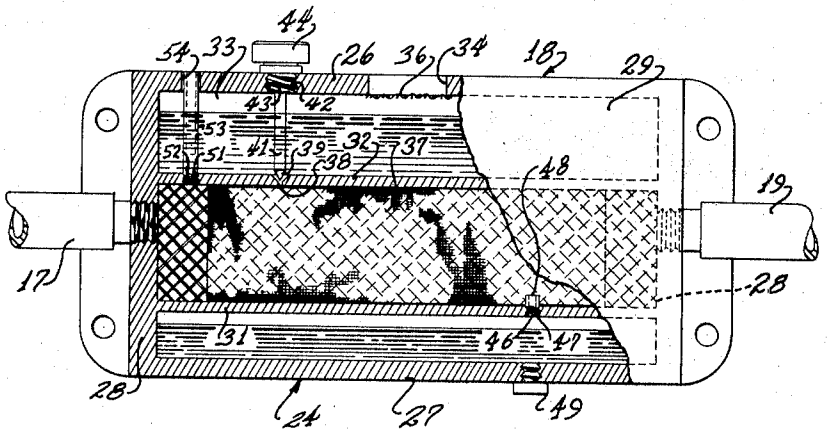
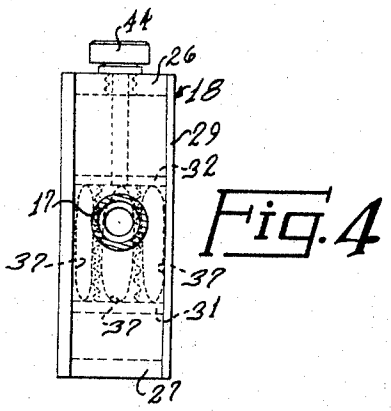


Fig. 4



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AIR TREATING APPARATUS FOR SHEET MATERIAL SEPARATOR

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Int. Cl. B65h 3/08

ABSTRACT OF THE DISCLOSURE

Apparatus for cooling and humidifying air for a sheet material separator having vacuum type feed means connected to a vacuum pump. A humidifier is interposed between the exhaust of the vacuum pump and an air blower which supplies the treated air to the sheet material at the point of separation.

Background of the invention

Heretofore in the art to which my invention relates difficulties have been encountered in separating individual sheets of material, such as paper, from other sheets thereof whereby the separated sheet may be transferred to another location due to the fact that movement of the sheets in dry air produces static electricity which makes it difficult to separate the sheets from each other. Also, hot air blown onto the paper causes the paper to curl.

Brief summary of invention

In accordance with my invention I provide a humidifier between the discharge end of a vacuum type pump and the inlet of a blower which is positioned to discharge air at the point of separation of the sheet material whereby cool air having increased humidity is discharged onto the sheets at the point of separation, thus providing for positive feed and delivery of the sheets and reducing missfeeds to a minimum. By cooling and increasing the humidity of the air discharged from the vacuum type pump as it passes through the humidifier, I not only reduce static electricity but reduce the tendency of the paper to curl to a minimum.

Apparatus embodying features of my invention is illustrated in the accompanying drawing, forming a part of this application, in which:

FIG. 1 is a side elevational view, partly in section, showing my apparatus employed with a conventional type vacuum type feed unit;

FIG. 2 is an enlarged, top plan view of the humidifier unit, the conduits connected thereto being broken away and in section;

FIG. 3 is a side elevational view, partly broken away and in section, showing the interior or the humidifier unit; and,

FIG. 4 is an end view of the humidifier unit, parts being shown in section.

Referring now to the drawing for a better understanding of my invention, I show a vacuum type feed unit indicated generally at **10** which is adapted to move to pick up position relative to a stack of sheet material indicated generally at **11** and then transfer the uppermost sheet to another location. Since the apparatus for handling paper may be of various types well known in the art to which my invention relates, no further description thereof is deemed necessary.

Communicating with the pick up and transfer unit **10** is one end of a conduit **12** having its other end communicating with the receiving or inlet **13** of a vacuum-type pump **14**. The discharge end or exhaust **16** of the pump **14** communicates with one end of a conduit **17**. The other end of conduit **17** communicates with one end of

a humidified unit indicated generally at **18**. The other end of the humidifier unit **18** communicates with a conduit **19** which in turn communicates with a blower **21** having discharge openings **22** which are located in position to discharge air at the point of separation of the uppermost sheet of material from the remainder of the stack **11**. Suitable spring means **23** may be provided beneath the stack of sheet material **11**, as shown in FIG. 1, whereby the uppermost sheet paper is in alignment with the discharge openings **22** of blower **21**.

The humidifier unit **18** comprises a housing **24** which communicates adjacent one end with the discharge end of conduit **17** and communicates adjacent its other end with the receiving end of conduit **19** whereby air blown into the housing **24** by pump **14** is discharged through conduit **19** to the blower unit **21**. The housing **24** is provided with a top wall **26**, a bottom wall **27**, end walls **28** and side walls **29**, as shown in FIG. 3. Mounted within and spaced vertically above the bottom wall **27** is a horizontal partition **31** and mounted above and in spaced relation to the partition **31** is a second horizontal partition **32**. The partition **32** defines with the upper portion of the housing **24** a reservoir **33** for receiving water which is introduced through an opening **34** having a screen **36** therein, as shown in FIGS. 2 and 3.

Mounted between the horizontal partitions **31** and **32** are a plurality of upstanding absorbent members **37** which may be of a suitable material, such as Molleton. An opening **38** is provided through the horizontal partition **32**, as shown in FIG. 3, the upper portion of opening **38** being in the form of a conical recess which is adapted to receive the lower tapered end **39** of a vertical member **41** which is threaded externally as at **42** for engaging a threaded opening **43** provided in the top wall **26**. An operating knob **44** is provided at the upper end of the member **41** for rotating the same whereby the valve opening defined between the tapered portion **39** and the opening **38** may be varied to thus regulate the flow of water through the opening **38** into the chamber defined between the partitions **31** and **32**.

A threaded opening **46** is provided in the horizontal partition **31** for receiving the threaded end **47** of an upstanding overflow tube **48** which is of a height above the lower edges of the absorbent members **37**, as shown in FIG. 3, whereby water which is not entrained in the moving stream of air through the chamber defined between the partitions **31** and **32** collects in the bottom of the chamber until it reaches the upper edge of the overflow tube **48** whereupon excess water overflows into a subjacent chamber defined between the bottom wall **24** and the horizontal partition **31**. The water thus collected in the chamber defined between the horizontal partitions **31** and **32** is absorbed by the lower portions of the absorbent members **37** whereby water is supplied to the members **37** by flowing downwardly therethrough from the opening **38** and by absorption from the water collected above the horizontal partition **31**. A suitable drain plug **49** is provided in the bottom wall **24** whereby water collected therein may be drained. However, by setting the valve unit consisting of the tapered portion **39** and the opening **38** properly, there would be little or no water overflowing into the chamber defined between the bottom wall **27** and the horizontal partition **31**. If desired, the drain plug **49** may be omitted whereby the overflow of water could be discharged into a suitable receptacle or conduit.

A threaded opening **51** is provided in the horizontal partition **32** for receiving external threads **52** of a vent pipe **53** which extends upwardly through a suitable opening **54** in the top wall **26**, as shown in FIG. 3. The vent tube **53** is of a size to discharge excess air introduced into the chamber defined between the partitions **31** and **32**

whereby there is an even and controlled amount of air passing from conduit **17** through the chamber defined between the partitions **31** and **32** and then through conduit **19** to the blower **21**.

From the foregoing description, the operation of my improved apparatus will be readily understood. The conduit **12** is connected to a vacuum pick-up unit **10** whereby air drawn inwardly of pump **14** is forced through conduit **17** into the chamber defined between the horizontal partitions **31** and **32**. The valve knob **44** is adjusted to permit the proper amount of water to flow continuously through the opening **38** whereby the water is entrained by the air passing through the chamber. The water which is not picked up by the moving stream of air collects above the horizontal partition **31** whereby the absorbent members **37** continuously absorb this water thus compensating for any slight reduction of flow of water through opening **38**. The water continues to build up on the lowermost partition **31** until it reaches the overflow conduit **48** whereupon excess water, if any, is discharged into the chamber defined between the bottom wall **24** and the partition **31**. The hot air delivered to the humidifier **18** through conduit **17** is also cooled from 15 to 20 degrees by its contact with the cool water carried by the absorbent members **37**. The air passing through conduit **19** to blower **21** has from 15% to 25% more moisture than the air introduced through conduit **17** into the humidifier **18**. Accordingly, the passage of the air alongside and through the absorbent members **37** not only increases the humidity of the air but also cools the air whereby there is no delivery of hot, dry air to the sheets of material to be separated.

From the foregoing, it will be seen that I have devised an improved unit for use with apparatus for separating and handling sheet material having vacuum type feed means. By providing means for increasing the humidity of the air from 15% to 25% and at the same time cooling the air delivered at the point of separation of the sheets of material, I reduce missfeeds to a minimum and provide for improved delivery of the individual sheets of material. Also, by varying the adjustment of the control member **44**, the amount of humidity may be readily varied. Furthermore, by providing a unit which has no moving parts to wear out and has no electrical connections, my improved apparatus is troublefree in operation and requires substantially no maintenance.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. The combination with apparatus for separating and handling sheet material having vacuum type feed means communicating with the negative pressure inlet side of a pump having an inlet and an exhaust, the improvement which comprises:

(a) a humidifier having an air inlet and an air outlet,

(b) means communicating the air inlet of said humidifier with the exhaust of said pump so that air is supplied to said humidifier,

(c) an air blower mounted in position to discharge air onto the sheet material at the point of separation thereof, and

(d) means communicating the outlet of said humidifier with said air blower for supplying air to said blower.

2. The combination as defined in claim **1** in which the humidifier comprises:

(a) a housing having an air inlet adjacent one end thereof and an air outlet adjacent the other end thereof,

(b) upstanding absorbent numbers extending longitudinally of said housing,

(c) means to introduce water at a predetermined rate adjacent the upper portion of said absorbent members so that the water flows downwardly through said absorbent members as air passes through said housing and alongside said absorbent members, and

(d) means maintaining the water in said housing at a predetermined level above the lower edges of said absorbent members so that the water is absorbed by the lower portion of said absorbent members.

3. The combination as defined in claim **2** in which the means to introduce water at a predetermined rate comprises:

(a) a water reservoir in the upper portion of said housing,

(b) a water discharge opening through the bottom of said reservoir.

(c) adjustable control means varying the effective size of said discharge opening.

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U.S. Cl. X.R.

271—30