

March 6, 1951

D. R. ROBBINS

2,543,870

SUCTION BOX COVER FOR PAPERMAKING MACHINES

Filed Dec. 10, 1947

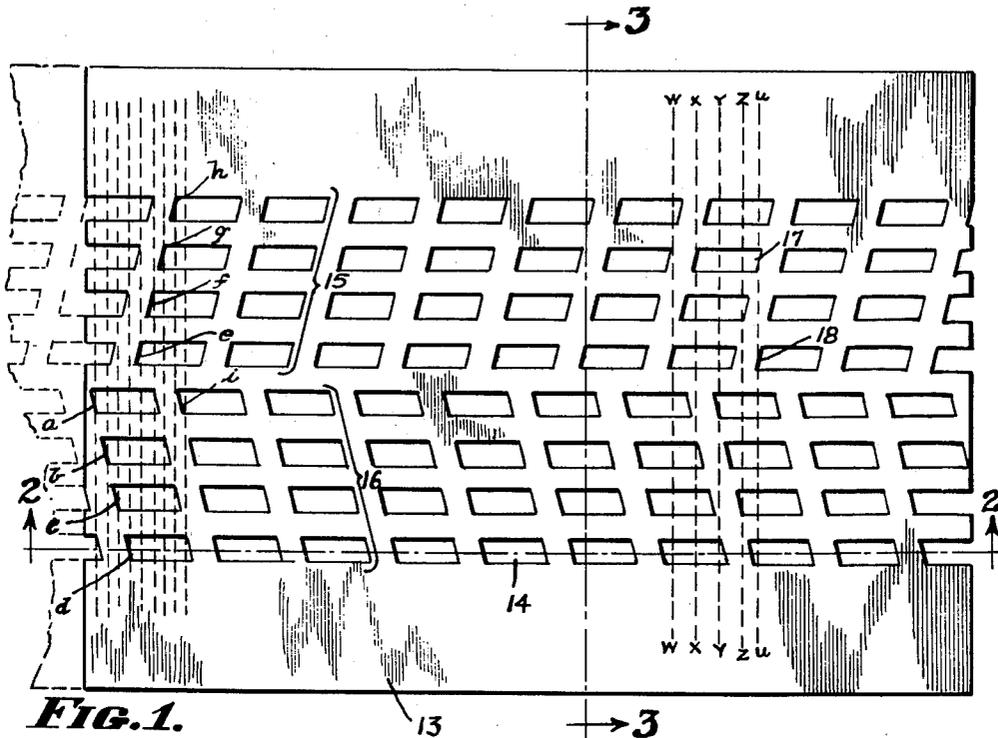


FIG. 1.

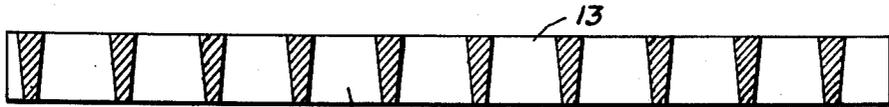


FIG. 2.

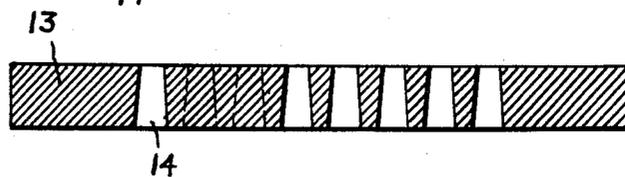


FIG. 3.

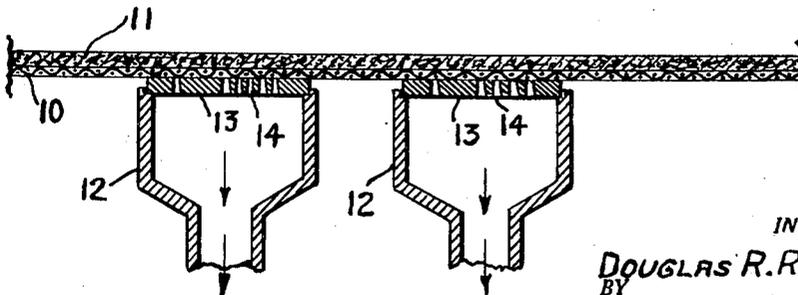


FIG. 4.

INVENTOR.
DOUGLAS R. ROBBINS,
BY
Allen & Allen
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,543,870

SUCTION BOX COVER FOR PAPERMAKING MACHINES

Douglas R. Robbins, Middletown, Ohio

Application December 10, 1947, Serial No. 790,915

7 Claims. (Cl. 92—51)

1

2

This invention relates to suction box covers for paper making machines. It is conventional in connection with modern paper making machines, to provide suction boxes transversely of the web of the paper being made and disposed under the screen in order to remove excess water from the stock.

In most paper making machines there are a number of such transverse suction boxes. This invention is directed specifically to covers for such suction boxes in connection with which a number of problems present themselves for solution.

It is desirable that the perforations in the suction box cover give complete coverage so that water may be abstracted from all portions of the web. It is also desirable that there not be long elements of the web which are unsupported by the suction box cover. The suction box cover should be relatively easy and inexpensive to manufacture and should not cause excessive wear on the material of the screen which passes over it.

There have been in the past suction box covers having straight slots extending entirely across the web. These covers have given complete coverage which is of very great importance, but they have left long portions of the screen and the web thereon unsupported, so that excessive wear has resulted on the edges of the slots as well as on the knuckles of the wire, which with the repeated flexing of the wire resulted in rapid wear. Another type of suction box cover has been provided with what is known as herringbone slots and these have been objectionable because they have left a considerable length of the web in the direction of motion unsupported. Attempts have also been made to provide suction box covers with circular drilled holes, but it has been found that such suction box covers are extremely difficult and expensive to manufacture because of the need for precision.

With the above considerations in mind, it is an object of my invention to provide a suction box cover which eliminates the disadvantages and objections set forth above. It is therefore an object of my invention to provide a suction box cover which is easier to make and which can be made much less expensively. An object of my invention resides in the provision of a suction box cover which will give complete coverage over the width of the web so as to insure an even and uniform evacuation.

It is yet another object of my invention to provide a suction box cover in which the evacuation slots are echeloned and in which the echelons are

arranged in such a way as to neutralize possible lateral thrust on the screen.

A still further object of my invention involves the provision of a suction box cover of a material which to some extent absorbs moisture so as to have a lubricating effect upon the screen which passes over it.

Yet another object of my invention includes the provision of a sectionalized suction box cover so that the cover may be manufactured in unit sections, and so that any desired number of sections may be placed end to end, depending upon the width of the machine. In this connection an ancillary object is to provide a construction whereby the evacuating effect in the region of the joints is not changed with respect to the evacuating effect between joints.

These and other objects of my invention which will be set forth in more detail hereinafter or which will become apparent to one skilled in the art upon reading these specifications, I accomplish by that certain construction and arrangement of parts of which I shall now describe an exemplary embodiment.

Reference is made to the drawings forming a part hereof and in which—

Figure 1 is a plan view of a suction box cover unit.

Figure 2 is a cross sectional view of the same taken on line 2—2 of Figure 1.

Figure 3 is a cross sectional view of the same taken on the line 3—3 of Figure 1 and Figure 4 is a cross sectional view through a portion of a paper making machine showing two suction boxes with their covers in place thereon and with a screen and paper web passing thereover.

Since this invention has to do only with the suction box cover itself, the suction boxes and other details of the paper making machine will not be described except in connection with the more or less diagrammatic view of Figure 4, in which I have shown a Fourdrinier screen 10, carrying a web of partially formed paper 11 passing over the suction boxes 12, of which I have shown only 2. Many paper making machines of course will have more than two suction boxes. Suitable means are provided for drawing air through the suction boxes in the direction of the arrows so as to draw water out of the web 11. Each suction box is provided with a cover indicated generally at 13, which provides a supporting cover for the screen 10 as it travels over the suction box and which is provided with apertures of one form or another for the passage of water.

Coming now to a description of the particular suction box cover of my invention, I prefer to make the same of a monolithic homogeneous material. This material is a dried shredded material consisting of vegetable fibers impregnated with a resin which, under heat and pressure, flows and cures into a hard monolithic homogeneous slab. In manufacturing a suction box cover according to my invention, I provide a suitable cored mold and place the dry, shredded resin impregnated vegetable fibers therein and then cure the slab under heat and pressure.

The suction box cover 13 is provided with a number of slots 14 which slots are tapered as best seen in Figures 2 and 3 so that they flare outwardly toward the bottom. This construction tends to prevent fouling of the slots during a paper making operation. It is desirable to provide as much taper for these slots as is consistent with adequate strength. I have found a satisfactory taper to be about $\frac{1}{4}$ " where the slot is about $\frac{1}{8}$ " thick.

In order to provide for complete coverage and yet to avoid continuous lines in the direction of motion of the screen, I dispose the slots 14, in two groups indicated by the brackets 15 and 16, and I echelon the slots in each of these groups oppositely so that, for example, in Figure 1 the slots of group 15 are echeloned to the left and the slots in group 16 are echeloned to the right. The purpose of this opposite echeloning is to neutralize any lateral thrust upon the screen, it being understood that the direction of travel of the screen in Figure 1 is vertical. Furthermore, I dispose the slots in the two groups so that the lowermost row of slots in group 15 is in break-joint relationship with the uppermost row of slots of group 16.

While the slots themselves may be rectangular in plan view, I prefer to make them rhomboid in shape so as to avoid longitudinal lines in the direction of movement of the screen.

It will be noted that the obliquity of the rhomboids is in the same direction and of the same degree as the echeloning of the slots. Thus the lateral ends of a group of slots in the group 15 are aligned and similarly the lateral ends of a series of slots in the group 16 are aligned.

While I have shown four rows of slots in each of groups 15 and 16, this does not constitute a limitation upon my invention, so long as the echeloning is such as to achieve the complete coverage discussed above.

The displacement of a slot in one row in echelon with respect to the corresponding slot in the adjacent row is equal to the distance between corresponding points of adjacent slots in the same row divided by the number of rows. Thus, considering the lower left hand corners of the slots in group 16 and the upper left-hand corners of the slots in group 15, which correspond to each other, the pattern repeat point is, for example at *a* and *i*. It will be observed that the points *b*, *c*, *d*, *e*, *f*, *g* and *h* are so disposed that they divide the distance *a-i* into eight equal parts. Thus, given the spacings between adjacent slots in the same row equal to *a-i*, and the number of rows of slots equal to 8, the displacement *a-b*, *b-c*, *c-d*, *d-e*, *e-f*, *f-g*, *g-h*, *h-i*, will be equal to one-eighth of the distance *a-i*.

Thus it will be observed that my result may be attained regardless of the number of rows of slots, because the obliquity of the rhomboid shapes and the degree of echeloning are a func-

tion of the number of rows of slots and the distance between slots in a row.

For the sake of simplicity, I have shown the suction box cover unit of Figure 1, as having its side edges cut off at right angles to its length. This, of course, would produce a line of demarkation in the direction of travel of the screen, and it will be clear that this may be avoided by cutting the edges of the unit 13 at an angle. I have, however, shown the right angle configuration to illustrate how an adjacent unit may be placed against the unit 13 to complete the partial slots in the edges thereof, so that a complete suction box cover may be made, of any desired number of such units. It is only necessary that the cuts be at pattern repeat points or a multiple thereof.

From the foregoing description, it will be apparent that numerous variations in the pattern may be made without departing from the fundamental principles set forth which result in complete coverage and uniform evacuation. According to my invention, the amount of suction in the direction of travel is substantially identical for any longitudinal element at any position transversely of the web. For example, in following the broken line *w-w* it will be observed that it intersects six complete slots, and that the same is true of the line *x-x*, *y-y* and *z-z*. It will also be noted that line *u-u*, which partially intersects one slot as at the point indicated at 17, will also partially intersect another slot at a point 18, so that the total number of slots intersected will still be six in this particular arrangement.

For the foregoing reasons, I do not desire to limit myself to the specific arrangement shown except insofar as is set forth in the claims which follow.

Having now fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A suction box cover for paper making machines, comprising a slab arranged to be mounted on a suction box transversely of said machine, said slab being provided with two groups of transverse rows of transverse slots, there being an equal number of rows in each group, the slots in the rows of said two groups being oppositely echeloned and each slot in any row being out of line, longitudinally of said machine, with every other slot.

2. A device according to claim 1, in which said slots are of rhomboid shape, and in which the obliquity of said rhomboids is in the same direction and of the same degree as the echeloning of said slots.

3. A device according to claim 2, in which the displacement of a slot in one row in echelon with respect to the corresponding slot in an adjacent row, is equal to the distance between corresponding points on adjacent slots in the same row, divided by the number of rows.

4. A suction box cover for paper making machines, comprising a slab arranged to be mounted on a suction box transversely of said machine, said slab being provided with two groups of transverse rows of transverse slots, there being an equal number of rows in each group, the slots in the rows of said two groups being oppositely echeloned and each slot in any row being out of line, longitudinally of said machine, with every other slot, the lateral ends of said slab occurring at corresponding pattern repeat points and being parallel, whereby a plurality of slabs may be laid end to end to constitute a suction box cover.

5

5. A device according to claim 4 in which the said ends are oblique, whereby to avoid a continuous line in the direction of travel of a paper web.

6. A suction box cover for paper making machines, comprising a slab arranged to be mounted on a suction box transversely of said machine, said slab being provided with two groups of transverse rows of transverse slots, there being an equal number of rows in each group, the slots in the rows of said two groups being oppositely echeloned and each slot in any row being out of line, longitudinally of said machine, with every other slot, said slab being hard and monolithic such as is produced by curing resin impregnated vegetable fibers under heat and pressure.

7. A suction box cover for paper making machines, comprising a slab arranged to be mounted on a suction box transversely of said machine, said slab being provided with two groups of transverse rows of transverse slots, there being an equal number of rows in each group, the slots in the rows of said two groups being oppositely echeloned and each slot in any row being out of line, longitudinally of said machine, with every

5

10

15

20

25

6

other slot, said slab being constituted of a material capable of absorbing water, whereby to be self lubricating with respect to a paper making screen passing thereover.

DOUGLAS R. ROBBINS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
708,219	Gilbert et al. -----	Sept. 2, 1902
751,095	McAnulty -----	Feb. 2, 1904
920,100	Whisner -----	Apr. 27, 1909
1,236,359	Reynolds -----	Aug. 17, 1917
1,832,844	Cofrin -----	Nov. 24, 1931
2,010,150	Hemphill -----	Aug. 6, 1935
2,042,198	Swauger -----	May 26, 1936
2,346,785	Proulx -----	Apr. 18, 1944

FOREIGN PATENTS

Number	Country	Date
141,045	Austria -----	Mar. 11, 1935