

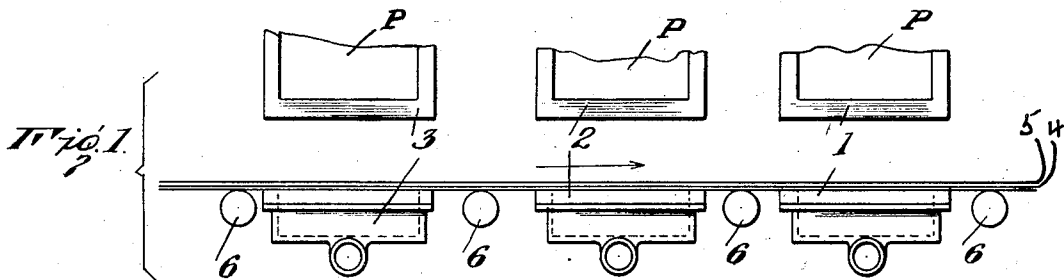
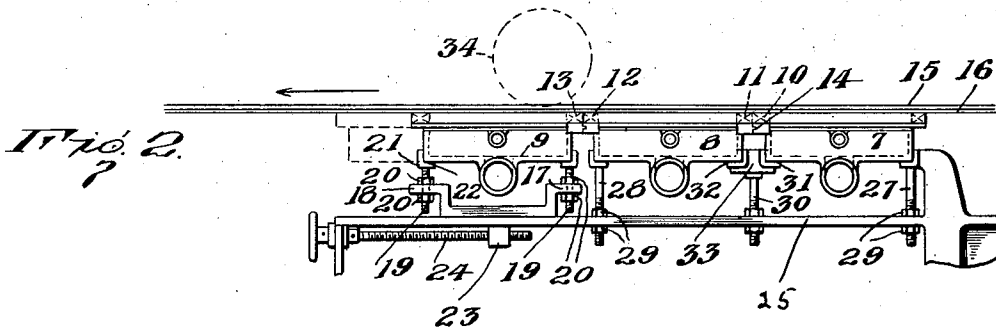
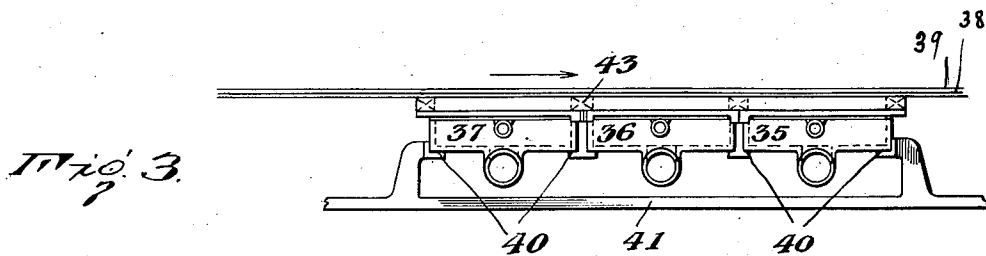
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J. HEESS

EXTRACTING MOISTURE FROM PLASTIC MATERIAL

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EXTRACTING MOISTURE FROM PLASTIC MATERIAL.

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(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, JACOB HEESS, citizen of the German Empire, residing at Ebertsheim, Rhenish Palatinate, Germany, have invented certain new and useful improvements in Extracting Moisture from Plastic Material (for which I have made applications for patents as follows: Germany, Patent 295,007, filed Jan. 29, 1916; Switzerland, Patent 74,454, filed Jan. 19, 1917; Sweden, Patent 43,861, filed Jan. 16, 1917; Austria, Patent 79,159, filed Jan. 20, 1917; France, 511,466, filed March 11, 1920; and Switzerland, 75,454, filed January 19, 1917), of which the following is a specification.

This invention relates to an arrangement of suction boxes in paper or board making machines, press plate machines, or the like, and has for its object an increase in the amount of moisture extracted from the sheet, at the same time lengthening the life of the wires and felts and reducing the amount of power consumed in operating the apparatus in addition to other advantages, which will appear from the following description.

Hitherto in paper making and similar machines, it has been customary to arrange a number of flat suction boxes at intervals on the underside of the wire, or felt. From two to six or even more have been employed, depending on the nature of the sheet, the speed of the machine and other practical considerations.

Usually small rolls termed wire carrying rolls are inserted in the intervals between suction boxes.

Occasionally the suction boxes have been built as double, or multiplex boxes, i. e., one box containing 2 or more suction compartments, but this arrangement has not proved serviceable. It is difficult to handle such heavy boxes and the vacuum cannot be independently adjusted in each compartment, nor can one compartment alone be removed or put out of action.

The interval between suction boxes is very detrimental. The work of suction, i. e. the extraction of moisture from the sheet is thereby interrupted each time the sheet leaves a suction box. The water which that particular box has sucked to the underside of the sheet, and into the wire, flows back into the sheet partly by capillarity and partly by the pressure of the air, which nat-

urally comes into operation on the underside of the sheet immediately it leaves the surface of the suction box.

Consequently, each suction box has to recommence operating, not only on the sheet but also on the water adhering to the wire, practically de novo, and a relatively high vacuum is necessary in each box to accomplish this. The employment of high vacua, however, creates very considerable friction between the wire and the surface of each suction box, as well as heavy strain on the wire between the suction boxes and the couch press, two factors most detrimental to the life of the wire. Even with high vacua in this arrangement the extraction of moisture from the sheet is not very efficient, and can only be effected by great expenditure of power at the vacuum pumps and on the drive of the wet end of the machine.

I have found that by arranging the suction boxes contiguously, i. e. without any interval exposing the underside of the sheet to full atmospheric pressure, an entirely new effect is obtained. By preventing the return of normal atmospheric pressure to the sheet between the contiguous boxes I create in effect a plurality of contiguous areas of suction effective upon the sheet, with said areas forming a continuous zone of uninterrupted suction over which said sheet is adapted to pass. However, a further important adjunct to this continuous suction zone is that the sheet must be sustained uniformly in the same plane against the pull thereof while it is being exposed thereto. Whereas for example formerly with a 3 box installation, vacua of 90 cm., 100 cm. and 130 cm. of water were required in the first, second, and third boxes respectively, with my arrangement vacua of only 10 cm., 15 cm., and 110 cm. of water respectively are necessary, which furthermore give a considerably drier sheet than that obtained with the far higher vacua of the old arrangement. The advantages are manifest: less wear and a longer life of the wire, less power to drive the vacuum pumps and the paper making machine, less "wiremark" in the sheet, longer life of the wet felts due to the sheet being drier and all the other advantages inherent in a drier sheet, less wear on the surfaces of the suction boxes, as well as many other advantages which will be apparent.

In my invention each suction box may be independently constructed and supported, and provided with adjustable means for approaching it to its neighbour, or any number
5 of boxes may be constructionally combined.

It may sometimes be desirable to insert a dandy roll or the like, between a number of the boxes, and for this purpose means of adjustment can be employed to introduce the
10 requisite interval between two suction boxes for such a roll.

Figure 1 is a side elevation and top plan view respectively of the old arrangement of suction boxes, three of which are shown; but
15 as many as eight or ten are used;

Figure 2 is a side elevation of one form of my invention, showing the boxes independently constructed and supported;

Figure 3 is a side elevation of another
20 form of my invention showing the boxes constructed as a unit, each box being nevertheless independent in its adjustment and action.

A comparison between Figures 1, 2 and 3,
25 which are all to the same scale, shows the saving of space effected by the invention.

Referring to Figure 1, the reference figures 1, 2, and 3 designate flat suction boxes suitably supported beneath the wire 4, over
30 which travels the sheet or web of paper, board or the like 5. Wire carrying rolls 6 arranged between the boxes are employed to support the wire 4. As the construction and arrangement just described is all old and
35 well known in the art further description thereof is deemed unnecessary, except to say that each suction box has its usual perforated top plate P.

In Figure 2, the numerals 7, 8 and 9 designate suction boxes with packing strips 10—11—12—13 therebetween of which the pairs 10—11, and 12—13 are contiguous. The boxes, themselves, are shown fitted together by a tongue and slot arrangement at
45 14 (Figure 2) but any other suitable device may be employed. 15 is the sheet or web of paper, board, or the like and 16 the wire which passes over the suction boxes, it being important however, that the wire be maintained or sustained in substantially the same
50 plane while it travels over said suction boxes and therefore, I arrange the packing strips and perforated plates to so sustain the wire as it passes over areas of suction produced
55 by the said boxes and as it passes from one contiguous suction area into another.

The box 9 is carried by a frame 17 having oppositely extending apertured ears 18 in which threaded posts 19 are held in any desired vertical adjustment by means of nuts
60 20. The tops of these posts 19 are formed with enlarged heads 21, recessed as at 22 to receive the bottom edge of the suction box. The frame 17 is formed with a downwardly
65 extending threaded lug 23 through which a

spindle 24 operates and by means of which the frame is supported and also adjusted horizontally. The spindle 24 is mounted in any suitable support or base such as 25 and is provided with a hand wheel 26.

The boxes 7 and 8, are supported at their ends most remote from each other by means of threaded posts 27 and 28 identical in structure with the posts 19, and further description thereof is deemed unnecessary except to state that the posts 27 and 28 are supported directly from the base 25 and are mounted thereon for vertical adjustment by means of clamping nuts 29. The adjacent
70 ends of the boxes 7 and 8 are similarly supported by a threaded post 30 which differs only from the posts 19, 27 and 28 in that the former has the double recesses or seats 31 and 32 in its enlarged head 33. The principal object in mounting one of the boxes
75 namely the box 9, for slidable adjustment is to permit of the introduction of a dandy roll 34 between this box and the next adjacent box.

In Figure 3 I have illustrated a somewhat similar modified form of my invention in which the suction boxes 35, 36 and 37 are supported beneath the wire 38 and web of paper 39, directly upon the seats 40 formed in the base 41. No provision is made
80 in this modified structure for adjusting the boxes either as to height or toward or from each other. Furthermore, in lieu of the double packing strips 10—11 and 12—13 employed in the preferred embodiment of my
85 invention the single bearing or packing strips 43 are used in the Figure 3 modification.

While only two forms of the invention are illustrated, I do not desire to limit myself
90 to these two forms. Any other form which will produce the same effect may be employed. Such other forms will be easily apparent to those skilled in the art.

A further advantage, which will be evident from the drawings, is the fact that in the invention the number of packing strip edges over which the wire is dragged is considerably smaller than in the arrangement
95 hitherto in use.

While the invention is described as applied to the wire of a Fourdrinier paper making machine, it can be applied with similar advantages to analogous machines, and for instance, as to the felt or felts of a
100 board machine, or to the felts of a paper making machine, press plate machine, or the like.

Should it be desired, the invention can be adopted in combination with one or more independent suction boxes, arranged separately along the wire in the manner hitherto
105 adopted.

It will thus be seen that my invention consists essentially in so connecting or associat-
110

ing the suction boxes, that I make an air-tight connection between them, whereby as the web passes over the boxes, it is exposed to an area of suction over the box, but that
5 in passing over the space between two boxes, the web has excluded therefrom the full normal atmospheric pressure—that is, it has excluded from its under side, the usual or normal upward compensating pressure of
10 the atmosphere. It is this preclusion of air, or more properly or accurately, the preclusion of the normal atmospheric pressure upwardly upon the under side of the web, in that space between the suction boxes, that I
15 consider the essence of my invention.

Another way of expressing what I have invented is to say that I provide a zone of continuous suction with progressively
20 greater degrees of suction in successive sections of said zone—the suction zone being represented by the combined length and width of the suction boxes and the sections being represented by the individual suction boxes.

25 Whereas I have described the invention as being used specifically in connection with paper machines and the like, I mean it to be broad enough to include such treatment of water bearing materials which are plastic,
30 gelatinous, or colloidal in character, and from which water is to be extracted. These materials are many and their distribution wide, so I include the treatment of many of them as being comprehended by this inven-

tion but by way of illustrative example I
35 have mentioned the extraction of water from the web or water leaf in a paper machine or the like. It is understood, however, that I reserve the right to patent subsequently,
40 further specific uses of the invention in its board aspect.

Having now particularly described and ascertained the nature of the invention, and in what manner the same is performed, I
45 declare that what I claim is:

1. A method of extracting moisture from a web which consists in exposing one side of said web successively to contiguous areas of progressively increasing degrees of suction
50 while excluding normal atmospheric pressure from the space between said areas.

2. A method of extracting water from a sheet or web of material which consists in exposing said sheet or web to a continuous
55 zone of uninterrupted suction made up of a plurality of areas of graduated suction with the greatest suction in the last of said areas.

3. A method of extracting moisture from a sheet or web of material by the use of a
60 relatively low suction which consists in exposing said sheet or web to a continuous and stationary zone of uninterrupted suction made up of more than two different areas of graduated suction with the greatest suction
65 in the last of said areas and decidedly less suction in the preceding areas.

In testimony whereof I affix my signature.
JACOB HEESS.