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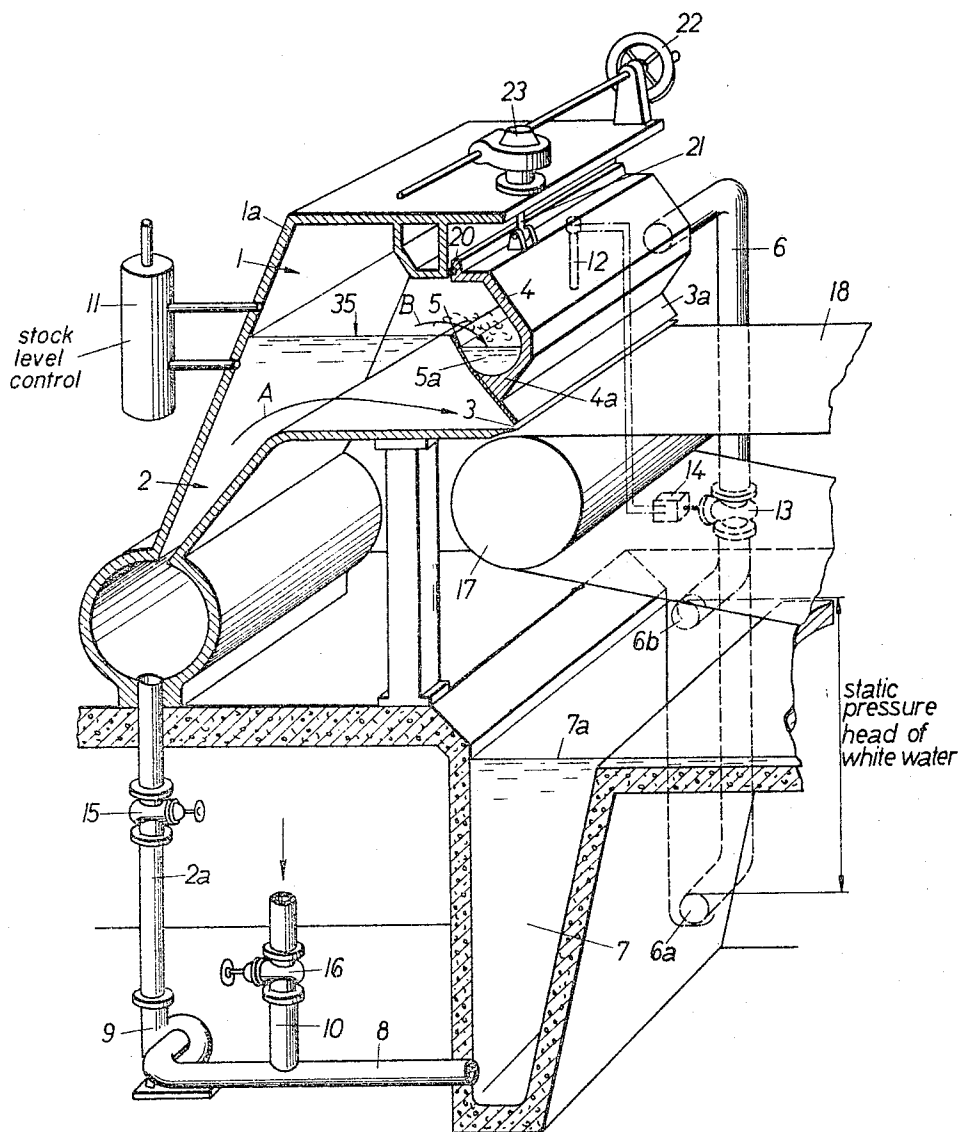
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STOCK INLET FOR PAPER MAKING MACHINES AND THE LIKE

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2 Sheets-Sheet 1

Fig. 1



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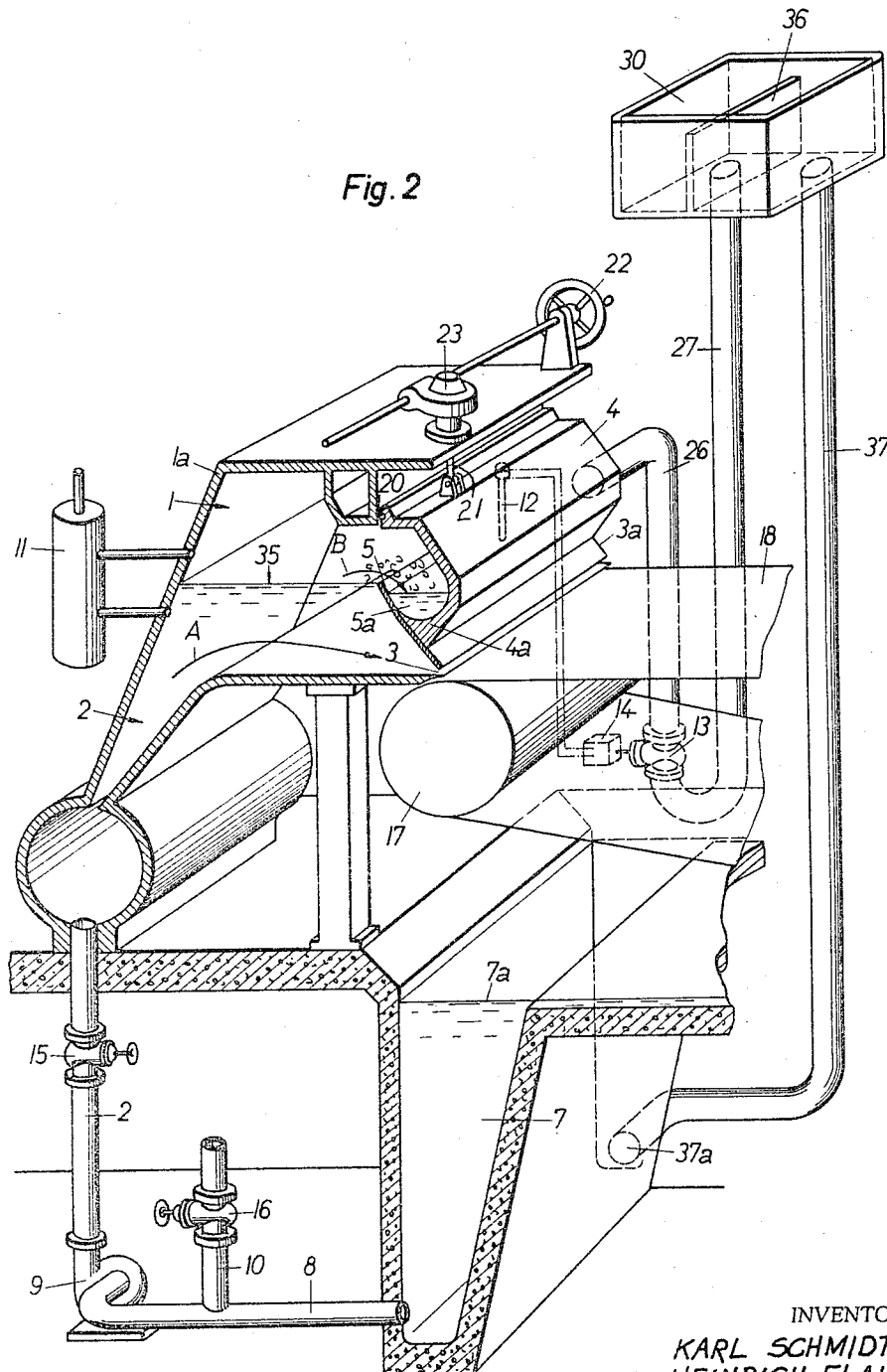
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Fig. 2



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STOCK INLET FOR PAPER MAKING MACHINES AND THE LIKE

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8 Claims. (Cl. 162-259)

This invention relates to a stock inlet for paper making machines and the like.

The stock inlet of a paper making machine serves for supplying stock to the Fourdrinier wire with the greatest possible uniformity of thickness, consistency and width and with a minimum formation of air bubbles in the stock.

It is the object of our invention to provide a stock inlet for paper making machines and the like which operates with a minimum of foaming and thus avoids the unfavorable effects of foaming on the formation of the web of paper on the wire.

Foaming on the free surface of the suspension occurs in the top chest or stock distributor and in the breast boxes or headboxes of paper making machines, in particular in the case of sized paper stock suspensions, and leads to accumulations of foam. These foam accumulations may increase in height at the front wall of the headbox due to stagnation in the flow of the suspension and thus form a heap of foam which causes an undesirable lump formation in the suspension immediately beneath the heap. From time to time these lumps will drop to the headbox discharge outlet thus carrying batches of the foam onto the wire, thereby bringing about irregularities in the formation of the web and breaks in the web.

Various methods have been suggested in the paper-making art with a view of eliminating this foam formation. Thus, water was to be sprayed onto the suspension in finely distributed jets by means of spray nozzles. Only fresh water can be used for this purpose, since white water from the white water pit of the machine would soon clog the narrow openings of the nozzles. However, in stock inlets operated with compressed air and having a relatively low depth of the suspension, and wherein the flow of the stock extends over the whole width and depth of the latter, the use of fresh water leads to a variation in the stock consistency at the surface of the latter. The sprayed-on fresh-water layer which thus tends to form, is carried along by the flow of the stock without properly mixing with the suspension on the short way to the headbox discharge outlet, and thus disturbs the web formation and leads to an unsatisfactory look-through of the paper.

It is furthermore known to provide an overflow in the headbox in the vicinity of the rear wall of the latter, close to the entrance for the suspension into the headbox. This overflow serves to control the stock level in the headbox but is not suitable for a withdrawal of appreciable foam accumulations from the head box. Indeed, it would not be possible to remove foam in substantial amounts by means of this known overflow even when applying special foam dispersing means, since these foam accumulations tend to move with the stock in the main direction of flow of the latter toward the discharge outlet for the suspension from the headbox, and thus move away from the rear wall of the latter.

The difficulties heretofore caused by excessive foam formation in stock inlets are avoided by our invention in which the stock inlet comprises a closed headbox through which a suspension of fibrous material is caused to flow from a stock entrance to the slot-like stock dis-

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charge gate or outlet with the help of air pressure from above. The improved stock inlet is further characterized by an overflow board mounted in the path of the flowing stock immediately above the stock outlet, which overflow board extends across the entire width of the path of the flowing stock. A foam collecting trough or gutter emptying into one or several drain pipes is provided on the downstream side of the overflow board, immediately behind the front wall of the headbox.

All accumulations of foam, floating matter and the like, which gather at the surface of the suspension and move with the suspension in the direction of stock flow toward the front wall of the headbox, are continuously removed via the overflow and through the above-mentioned drain pipes, and are thus prevented from reaching the discharge gate and the wire.

The desired amount of overflowing stock can be adjusted by means of the stock level control means which are conventionally provided with each stock inlet headbox operated with compressed air.

In order to prevent the escape of air under pressure from the air cushion in the headbox through the drain pipes and in order to maintain a constant stock level in the overflow means, corresponding control means can be provided in the collecting gutter and in the drain pipe or pipes. These means preferably comprise a valve arranged in the drain pipe and controlled by a bead tube mounted in the overflow gutter. The valve regulates the amount of liquid withdrawn from the gutter and thus prevents a sudden increase in the amount of overflowing stock which would cause entrainment of larger quantities of air from the air cushion in the upper part of the headbox and its transfer into the drain pipe.

The drain pipe preferably ends in the white water pit from which the liquid that was withdrawn from the overflow gutter is returned together with the white water to the feeding pipe leading to the headbox. In order to prevent a continuous escape of air from the air cushion during the continuous draining of the overflow from the stock, which escape of air would cause fluctuations in the pressure in the headbox, the pressure in the drain pipe must at all times be at least equal to the required pressure of the air cushion. This may be achieved in several possible ways to be described hereinafter.

With a valve in the drain pipe, it is possible by properly dimensioning and adjusting the valve opening to maintain above the valve a pressure approximately equal to that of the air cushion in the headbox. Pressure in the part of the drain pipe below the valve may then be relatively low, so that it is possible to have the drain pipe open into the white water pit a short distance below the white water level. This arrangement is particularly suitable for paper making machines in plants with no basement.

The escape of air under pressure from the air cushion in the headbox may also be prevented by a somewhat different arrangement in which the drain pipe opens into the white water pit at about the same level as the return outlet from the white water pit, i.e. near the bottom of the latter, through which outlet the white water may be returned to the headbox. This has the advantage that the concentration of fibrous material in the white water cannot be influenced unfavorably by the introduced liquid from the overflow gutter of the headbox.

With this arrangement, if a constant stock level in the overflow means is required, the valve cross section of the valve in the drain pipe can then be chosen correspondingly larger. Since the static head of pressure of the white water in the white water pit is considerable, it is even possible to omit altogether the control means including the valve in the drain pipe, by disposing the drain

pipe in the vicinity of the white water return outlet. In this case, if the static pressure head of the white water at the last-mentioned outlet is at least equal to the pressure in the air cushion, there is no need to maintain a constant stock level in the overflow means to prevent air from escaping from the air cushion in the headbox.

If, for instance, the operational speed of the paper making machine is such as to require, under conventional operational conditions, a pressure of 1.3 atmospheres absolute in the air cushion, the static head of white water where the drain pipe opens into the white water pit should be about 10 feet.

It is also possible to attain the required pressure in the drain pipe by providing the latter with a U-shaped section and connecting the same to a reservoir on a higher level, so that the geodetic pressure head of the latter is at least equal to the pressure in the air cushion in the headbox. In this reservoir the stock may be deaerated and then flow back under its own gravity to the feed line to the headbox.

The invention will be further explained hereinafter in connection with the accompanying drawings in which

FIGURE 1 is a partially sectional, schematic view in perspective of the stock inlet of a paper-making machine, equipped with the overflow and foam and scum withdrawing means according to the invention;

FIGURE 2 is a partial perspective view of the stock inlet shown in FIGURE 1, showing a somewhat different embodiment of the foam and scum withdrawing means according to the invention.

In these figures like reference numerals designate like parts. More particularly, the headbox of the stock inlet according to the invention is designated by reference numeral 1 and comprises a stock entrance 2, a rear wall 1a, a slot-shaped stock discharge outlet or gate 3, and a front wall forming a wire slice 4 ending into the board 3a forming the upper edge of gate 3.

A suitably shaped portion 4a of the wire slice 4 bears on overflow board 5 fastened to wall portion 4a in a conventional manner, for instance, by welding or detachably by means of bolts or the like. The inwardly directed surface of front wall portion 4a is of concave cross section and forms together with overflow board 5 a trough or gutter 5a. The latter is connected to a drain pipe 6 which leads downwardly to open with its lower end at 6a into the white water pit 7 near the bottom thereof.

According to a different arrangement drain pipe 6 opens with its lower end at 6b into the upper part of the white water pit 7 below the white water level 7a therein, the corresponding lower end at 6b of pipe 6 being indicated in dash-dotted lines in FIGURE 1. A valve 13 is provided in pipe 6 and controlled, for instance, by conventional electrical control means 14 from a bead tube 12, which bead tube is mounted in gutter 5a and registers the level of liquid in the latter. Stock is fed to entrance 2 of the headbox 1 from a feed pipe 10 via pump 9 and a line 2a, while white water is conducted from the bottom region of box 7 via a line 8 and the aforesaid pump 9 to the same headbox entrance 2. Valves 15 and 16 may be provided in lines 2a and 10 respectively.

Reference numeral 17 indicates the breast roll and 18 the Fourdrinier wire of the paper-making machine.

To the rear wall 1a of the head box there may be connected a stock level control device 11 of known construction.

The front wall or wire slice 4 is mounted for angular displacement about a hinge 20, whereby the width of gate 3 can be adjusted. The inclination of wire slice 4 can be varied by raising or lowering link rod 21 which can be done by means of handwheel 22 via gear means 23.

In the embodiment of the drain pipe means shown in FIGURE 2, foam and overflowed stock are withdrawn from the gutter 5a via a U-shaped drain pipe 26, 27, the rising leg 27 of which leads to an overhead tank 30

at a level higher than the level 35 of the suspension in headbox 1. The geodetic head of the drained stock in this overhead tank 30 above the suspension level at 35 in the head box chamber is chosen approximately equal to the pressure in the air cushion filling the upper part of the head box chamber.

The exact level of liquid in tank 30 and consequently the exact head can be determined by adjusting the height of overflow board 36, dividing the tank 30 into two chambers, to one of which there is connected the aforesaid leg 27 of U-shaped pipe, while the other chamber is connected by means of pipe 37 to the bottom zone of white water pit 7 at 37a.

The suspension enters the head box by way of entrance 2 and continuously passes through the same as indicated by arrow A toward gate 3 and out of the latter onto wire 18. Foam formed in the headbox as scum float and air bubbles on top of the suspension surface 35 are carried over the overflow 5 as indicated by arrow B into the gutter 5a, from where they are drawn off continuously through pipe 6 or 26.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions and, accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

We claim:

1. A stock inlet for paper-making machines and the like, comprising a closed headbox having spaced apart entrance means and discharge means for the passage of a flow of stock through said headbox and containing an air cushion under pressure above the level of the stock, an overflow edge disposed inside said headbox so that foam formed on the flowing stock in said headbox, together with small quantities of stock, is carried over said overflow edge and is thus prevented from entering said discharge means, gutter means associated with said overflow edge for collecting the overflowing foam and stock, said gutter means being disposed on the front wall of said headbox, drain pipe means for draining the collected foam and stock from said gutter means, and an overhead tank containing a level of stock, said drain pipe means being U-shaped and connected to said overhead tank, the level of stock in said overhead tank being above the level of said stock flowing through said headbox, so that the pressure in said drain pipe means corresponding to the geodetic head of said stock level in said overhead tank above said level of stock in said headbox is at least equal to the head of stock corresponding to the pressure on said air cushion in said headbox.

2. A stock inlet as described in claim 1, further comprising, in combination, control means adapted for maintaining the overflowed stock in said gutter means at a constant level, said control means comprising level measuring means associated with said gutter means, and valve means in said drain pipe means serving for adjusting the flow of stock through said drain pipe means.

3. A stock inlet for paper making machines and the like, comprising a closed headbox having a front wall and a rear wall, entrance means in the vicinity of said rear wall and discharge means adjacent the lower portion of said front wall, said headbox being adapted for the passage of a flow of stock therethrough from said entrance means to said discharge means under formation of an air cushion under pressure above the level of the stock, overflow means inside said headbox associated with said front wall so that foam formed on the flowing stock in said headbox together with small quantities of stock is carried over said overflow means and is thus prevented from entering said discharge means, gutter means associated with said overflow means for collecting the overflowing foam and stock, drain pipe means for draining the collected foam and stock from said gutter means, and a white water pit having a level of white water therein, said drain pipe means being connected to said white

water pit below the aforesaid white water level therein.

4. A stock inlet for paper making machines and the like, comprising a closed headbox having a front wall and a rear wall, entrance means in the vicinity of said rear wall and discharge means adjacent the lower portion of said front wall, said headbox being adapted for the passage of a flow of stock therethrough from said entrance means to said discharge means under formation of an air cushion under pressure above the level of the stock, overflow means inside said headbox associated with said front wall so that foam formed on the flowing stock in said headbox together with small quantities of stock is carried over said overflow means and is thus prevented from entering said discharge means, gutter means associated with said overflow means for collecting the overflowing foam and stock, drain pipe means for draining the collected foam and stock from said gutter means, control means adapted for maintaining the overflowed stock in said gutter means at a constant level, said control means comprising level measuring means associated with said gutter means, and flow adjusting means associated with said drain pipe means, and a white water pit having a level of white water therein, said drain pipe means being connected to said white water pit near and below the aforesaid white water level therein.

5. A stock inlet for paper making machines and the like, comprising a closed headbox having a front wall and a rear wall, entrance means in the vicinity of said rear wall and discharge means adjacent the lower portion of said front wall, said headbox being adapted for the passage of a flow of stock therethrough from said entrance means to said discharge means under formation of an air cushion under pressure above the level of the stock, overflow means inside said headbox associated with said front wall so that foam formed on the flowing stock in said headbox together with small quantities of stock is carried over said overflow means and is thus prevented from entering said discharge means, gutter means associated with said overflow means for collecting the overflowing foam and stock, drain pipe means for draining the collected foam and stock from said gutter means, a white water pit having a level of white water therein, and return pipe means connecting said white water pit with said entrance means of said headbox, said drain pipe means being connected to said white water pit in the vicinity of where said return pipe means are connected thereto.

6. A stock inlet for paper making machines and the like, comprising a closed headbox having a front wall and a rear wall, entrance means in the vicinity of said rear wall and discharge means adjacent the lower portion of said front wall, said headbox being adapted for the passage of a flow of stock therethrough from said entrance means to said discharge means under formation of an air cushion under pressure above the level of the stock, overflow means inside said headbox associated with said front wall so that foam formed on the flowing stock in said headbox together with small quantities of stock is carried over said overflow means and is thus prevented from entering said discharge means, gutter means associated with said overflow means for collecting the overflowing foam and stock, drain pipe means for draining the collected foam and stock from said gutter means, a white water pit having a level of white water therein, return pipe means connecting said white water pit with said entrance means of said headbox, said drain pipe means being connected to said white water pit in the vicinity of

where said return pipe means are connected thereto, and control means adapted for maintaining the overflowed stock in said gutter means at a constant level, said control means comprising level measuring means associated with said gutter means, and valve means in said drain pipe means serving for adjusting the flow of stock through said drain pipe means.

7. A stock inlet for paper making machines and the like, comprising a closed headbox having spaced apart entrance means and discharge means for the passage of a flow of stock through said headbox and containing an air cushion under pressure above the level of the stock, an overflow edge disposed inside said headbox so that foam formed on the flowing stock in said headbox, together with small quantities of stock is carried over said overflow edge and is thus prevented from entering said discharge means, gutter means associated with said overflow edge for collecting the overflowing foam and stock, said gutter means being disposed on the front wall of said headbox, drain pipe means for draining the collected foam and stock from said gutter means, and a white water pit containing a level of white water, wherein said drain pipe means are connected to said white water pit below the level of said white water and in such a manner that the stock pressure head where said drain pipe means are connected to said white water pit is at least equal to the head of stock corresponding to the pressure under which said air cushion is held in said headbox.

8. A stock inlet for paper making machines and the like, comprising a closed headbox having spaced apart entrance means and discharge means for the passage of a flow of stock through said headbox and containing an air cushion under pressure above the level of the stock, an overflow edge disposed inside said headbox so that foam formed on the flowing stock in said headbox, together with small quantities of stock is carried over said overflow edge and is thus prevented from entering said discharge means, gutter means associated with said overflow edge for collecting the overflowing foam and stock, said gutter means being disposed on the front wall of said headbox, drain pipe means for draining the collected foam and stock from said gutter means and a white water pit containing a level of white water, wherein said drain pipe means are connected to said white water pit below the level of said white water and in such a manner that the stock pressure head where said drain pipe means are connected to said white water pit is at least equal to the head of stock corresponding to the pressure under which said air cushion is held in said headbox, and return pipe means connecting said white water pit with said entrance means of said headbox.

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