Feb. 28, 1939. O. W. FROST 2,148,613

HEAD BOX FOR FOURDRINIER MACHINES

Filed March 23, 1936

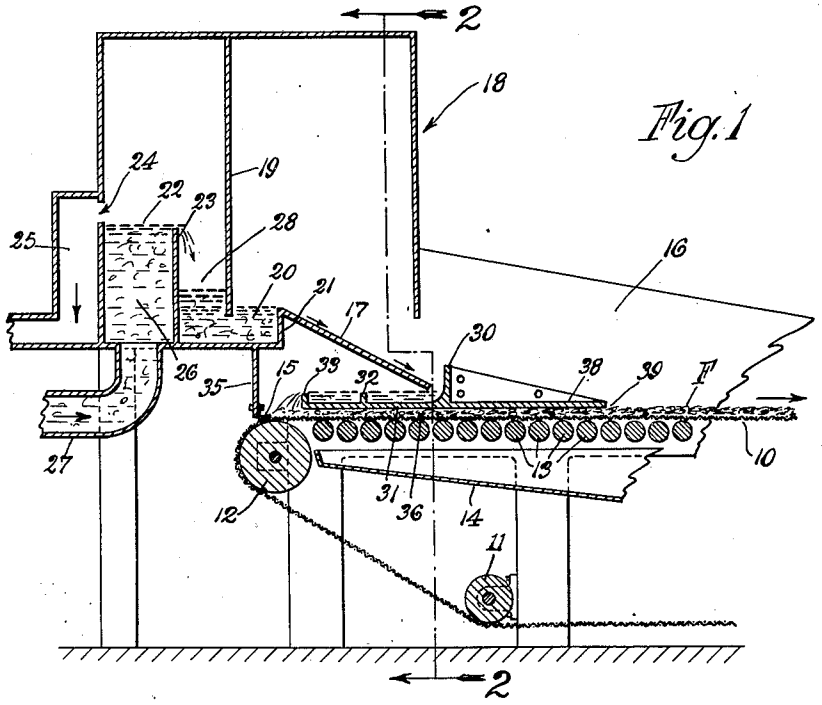

Fig. 1

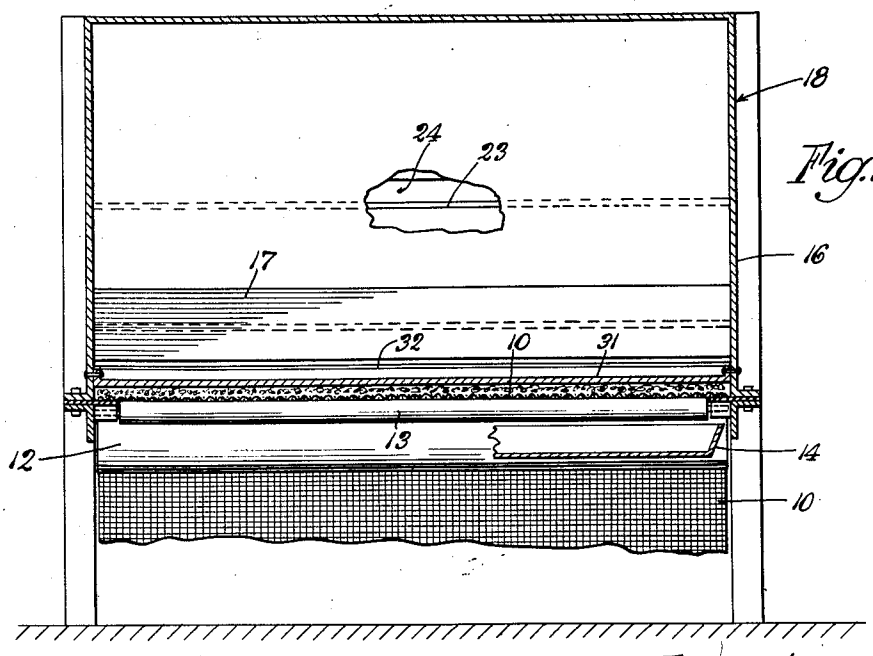

Fig. 2

Inventor
Orcutt W. Frost
by W. Bartlett Jones.
Attorney.

Patented Feb. 28, 1939

2,148,613

UNITED STATES PATENT OFFICE

2,148,613

HEAD BOX FOR FOURDRINIER MACHINES

Orcutt W. Frost, Cloquet, Minn., assignor to Wood Conversion Company, Cloquet, Minn., a corporation of Delaware

Application March 23, 1936, Serial No. 70,332

2 Claims. (Cl. 92—44)

The present invention relates to a head-box construction for low-speed Fourdrinier machines.

There are numerous types of head-box constructions which are more or less standard in the paper-making industry wherein high speeds are used for the Fourdrinier wire. The head-boxes are arranged to discharge the stock, which usually is a very thin slurry of fibers, at a high speed in keeping with the high speed of the wire, thus making a slow relative motion between the wire and the stock. Such head-boxes are not suitable for low speed Fourdrinier machines, inasmuch as high speed in the stock as it runs onto the wire causes irregular formation or streaks. In other words, the stock should not flow extensively on the wire itself. When it does, it usually flows further in the center of the wire than on the edges, producing bad formation, or thin or ragged edges, and sometimes ripples in the sheet. This is especially true where thick sheets of felt are made, such as is necessary in forming insulation board on a continuous Fourdrinier machine.

Stock for thick and thin sheets of felt must be highly agitated and thin for uniformity in the felt. Relatively larger volumes are used per unit area of wire, than in making papers, or cardboard stock, or other thinner types of felt. In high speed machines the high velocity of the stock gives a suitable agitation. The volume of stock per unit of time may be generally the same for a slow-speed board process, as for a high-speed paper process. But the agitation by velocity of flow onto the wire in the direction of the wire, is not desirable because such velocity is too great for the slower moving wire of the board machine.

According to the present invention, the advantages of high speed flow to maintain agitation are retained, and such velocity of flow is actually employed in the direction of the wire, but there is disposed between the wire and the place of said high velocity flow, a baffle means which may be a reversing structure, which causes the high speed stream to be stopped or reversed and then discharged onto the wire in a suitable manner. The invention also provides for dropping the stock onto the wire. It may also provide a dam or covered sluice-way above the wire into and through which the stock flows or is carried, the cover of said sluice-way serving as a leveling device to discharge a smooth watery felt of uniform thickness.

The primary object of the invention is to provide large volumes of a thin slurry to a slow moving wire in such a way that high velocity in the stock maintains agitation, and at the same time to provide for depositing the stock on the wire so as to prevent any great amount of speed of the stock on the wire itself.

Various other and ancillary objects and advantages of the invention will appear in the following description and explanation of the invention as it is set forth in the accompanying description of an exemplary embodiment of the invention shown in the accompanying drawing in which:

Fig. 1 is a longitudinal section of the head end of a Fourdrinier machine showing the construction of a head-box and its relation to the Fourdrinier wire.

Fig. 2 is a vertical cross-section of the structure shown in Fig. 1 on the line 2—2 of Fig. 1.

In the drawing, the Fourdrinier wire 10 is of the usual endless type, coming up from the lower stretch over idler roll 11 and breast roll 12, to a substantially horizontal plane, and preferably a true horizontal plane, although it may slope upwardly towards the right in Fig. 1. The upper stretch is supported on a series of small rolls 13, beneath which there is a drain pan 14 for receiving water which drains through the wire and between the rolls. Near the point where the wire leaves the breast roll 12 there is a sealing lip 15, as of rubber, attached to suitable dam-forming structure, to provide a pool above the wire for receipt of the furnish. The sides of the wire may be dammed off by customary means, such as deckel straps or side-boards, the latter being shown at 16 extending back to form side walls for the head-box.

The head-box includes a part providing for a high velocity in the direction of the wire to secure agitation by flow, such part being shown as a flat inclined spillway 17. Stock may reach the spillway in numerous ways. A suitable structure includes a box 18 with a vertical baffle 19 under which stock flows, to form a pool 20 which flows over dam 21 directly into the spillway. Behind baffle 19 a head is built up to a suitable constant level such as 22, determined by a vertical baffle 23, at the top level of which there is the bottom level of an overflow outlet 24, leading to overflow duct 25. Stock is forced into the resulting constant level chamber 26 through conduit 27; surplus flows out the overflow 24, and the useful stock fills chamber 28 to a constant level to discharge into pool 20. By such an arrangement a high velocity in a thin stream is maintained for agitation by flow. This readily breaks up agglomerates or lumps of fiber.

At the lower end of the spillway 17 there is a stop means, such as a vertical baffle or stop plate 30, arranged to arrest the flow in the direction of wire movement. The stock at this point might be dropped directly down onto the wire near the seal 15, but such construction would necessitate either damming off the wire area to the rear, or otherwise the entire head-box as shown would need to be set further back on the machine. Therefore, in order to shorten the machine the spillway 17 is placed over the wire and the stock is carried backward to the vicinity of the breast roll 12.

A rearward shelf 31 lies under the spillway 17, and it has a vertical mid-web or dam 32 and a vertical edge-dam or web 33. These serve to slow down the stock, to agitate it, and to provide a collecting place for any heavy pieces such as metal that may get into the stock. The stock discharges over the dam 33, onto the wire by a downward and rearwardly slanting drop. A dam or back baffle 35, which carries the seal 15, would prevent rearward motion of the stock on the wire, should the breast roll be further back than shown.

At this stage the stock is very mobile and fluid, and remains so until considerable water has been drained off through the wire. By placing the shelf 31 close to the wire, a slight head may be built up between the dams 33 and 35, causing flow into space 36 between the shelf 31 and the wire. Since water is draining from the screen along this zone the flow compresses the stock slightly lengthwise of the wire as the stock is thickened by dewatering. The space 36 may be lengthened, as by an extension plate 38 to any point desired, such for example that a smooth level felt F, still highly watered, is discharged at the point 39, the felt F being static on the wire at this point. By this arrangement a uniformly felted thick sheet may be formed with a very level surface.

There is no critical relation between the speed of the wire and the stock flowing onto it. The speed of the wire could be increased without change in the construction except perhaps adjustment of the space 36. The construction minimizes flow of stock on the wire after the stock is deposited. Friction is introduced at the top of the felt over the entire width of the wire so that any movement of stock, such as in the space 36, is under the same frictional force, with resulting regularity in formation over the width of the wire. The space 36 operates against variations in thickness of the stock on the wire by eddy currents or splashing.

Various other arrangements may be made to secure these advantageous features of construction and operation without departing from the spirit and scope of the invention as expressed in the appended claims.

I claim:

1. A head-box for a Fourdrinier type of fiber-felting machine comprising a constant level supply device for stock furnish, means providing a spillway for discharging stock from said supply device in the direction of the Fourdrinier wire movement, stop means at the bottom of said spillway, a flow shelf leading under the spillway for reversing flow of said stock backwardly on said shelf, said shelf being arranged to discharge the stock for downward motion onto the Fourdrinier wire, and a dam in advance of the stock leaving said shelf in sealed relation with the Fourdrinier wire, whereby to form a pool area on the wire for receiving the stock from said shelf.

2. A head-box for a Fourdrinier type of fiber-felting machine comprising a constant level supply device for stock furnish, means providing a spillway for discharging stock from said supply device in the direction of the Fourdrinier wire movement, stop means at the bottom of said spillway, a flow shelf leading under the spillway for reversing flow of said stock backwardly on said shelf, said shelf being arranged to discharge the stock for downward motion onto the Fourdrinier wire, and a dam in advance of said shelf in sealed relation with said wire at the breast roll for said wire, whereby to form a pool area on the wire at the breast roll for receiving the stock from said shelf.

ORCUTT W. FROST.