This invention relates to devices for pressing and heating corrugated board to be installed in a corrugating equipment adapted to dry a semi-fabricated corrugated board being fed between an endless conveyor belt and a plurality of hot plates arranged in the direction of feed, and, more particularly, to devices adapted to apply uniform pressure on said board by way of the compressed air blown into a plurality of air chambers with their bottoms open as disposed on the upper side, as opposed to the contact side with respect to the board being fed, of the conveyor belt so that a closer contact may be attained between said hot plates and the corrugated board being so fabricated.

As will be hereinafter described in detail, the conventional device designed for stated purpose merely comprises a plurality of presser rolls arranged on the back surface of the conveyor belt so as to press the board being fed under uniform pressure.

A major drawback of such an arrangement is instantly clear. It will be obvious that the spacing between any two adjacent rolls is not conducive but rather detrimental to the uniform distribution of pressure to act upon the board through the thickness of the conveyor belt.

This invention has as one of its objects to effect uniform and increased drying of the corrugated board which has been fabricated and bonded together but has not yet been sufficiently dried. Other objects and advantages of this invention will become apparent as the following description proceeds.

This invention will be hereinafter described in detail, reference being had to the accompanying drawings, in which:

FIG. 1 represents a front view, in section, of an embodiment of this invention for pressing and heating corrugated boards (first example of application);

FIG. 2 is a plan view of the same device of this invention;

FIG. 3 is a side elevation of the above-mentioned device of this invention;

FIG. 4 represents a front elevation of another embodiment of the invention for pressing and heating corrugated boards (second example of application);

FIG. 5 is a front sectional view, on an exaggerated scale, of the air passageway therefor;

FIG. 6 is a side elevation, on an exaggerated scale, of said air passageway; and

FIG. 7 is a cross-sectional plan view of the butting section of heating plates.

Now, this invention will be described in detail with reference to two preferred embodying examples. In the first example, which is illustrated in FIGS. 1-3, freshly glued, double faced, corrugated board 81 is paid out of a conventional manufacturing means designated in FIGURE 6 as the board supply and the glue means. The board contacts the belt 64 advancing around belt roll 62 and is guided into the space defined by and between heating plates 63 and the conveyor belt 64.

From this point the board goes through a heating and drying process. A remarkable feature of this invention lies in its numerous air chambers 75 that are arranged lengthwise on the upper side of a conveyor belt 64 running in contact with the heating plates 63. These air chambers are open at their bottoms, each being so adapted that the compressed air that has been sent out of a blower 76 is forced into these air chambers and applies direct pressure to the upper surface of the belt.

There is, however, some clearance between the lower edges of the air chambers 77 and the upper surface of the belt, allowing small portions of the air to leak out.

But as the blower 76 constantly supplies a sufficient volume of compressed air, its pressure operates on the upper surface of the belt and, accordingly, on the double faced corrugated board lying immediately below the same, thus forcing said corrugated board into intimate contact with the heating plates 63. Indicated with numeral 78 is an elastic material which, by virtue of its elasticity, is always kept in touch with the upper surface of the belt and substantially prevents leakage of the air.

In the second example of this invention, which is illustrated in FIGS. 4-6, a double faced corrugated board emerges out of a gluing device as in FIGURE 1.

The freshly glued board is then guided into the space defined by and between heating plates 63 and conveyor belt 64, wherein it goes through a heating and drying process as has already been explained hereinbefore. Similarly, it has also been explained with respect to the first example of this invention that a plurality of air chambers with their bottoms open are arranged end-to-end on the conveyor belt 64. The compressed air forced into said air chambers acts directly on the upper surface of the conveyor belt, thereby forcing the underlying corrugated board against the heating plates 63.

It should be understood, however, that according to the second embodiment of this invention, an air blower 79 is rigidly secured to the lower side of the frame 65 and the compressed air that is sent out of said air blower 79 is led through a pipe 80 in the direction of arrow 81.

In this manner, the compressed air plays a triple role of acting directly on the entire upper surface of the conveyor belt 64, of applying uniform pressure to the underlying double faced corrugated board 81 through the thickness of the conveyor belt, and of heating and drying the double faced corrugated board from both sides, that is, from the heating plates 63 and from the air chambers.

Thus, in this second embodiment, the conveyor belt is made of a porous material, e.g. thick fabric, through the texture of which some of the compressed air flows to the upper surface of the double faced corrugated board, to be finally discharged through the spaces 82 at both edges of the corrugated board in the direction k. The air that is discharged into said spaces 82 flows into passageways 83, whence it further flows to vertical passageways 84, and, then, to a main duct 85.

The air is heated while it flows through the passageways 83 and 84 and the resulting hot air returns to the above-mentioned air blower 79 by way of a pipe 86 through a control valve 87. In this way the compressed air that is supplied by the blower is continuously heated during circulation. The control valve 87 helps adjust the volume of the air, while the elastic material 88 secured rigidly to the lower edges of each air chamber 75 serves to minimize the leakage of the air.

Thus, in the second embodiment of this invention, the compressed air that is supplied to the air chambers is forced through the fine meshes of the conveyor belt, and while circulating in the described heater, this not only applies uniform pressure to the upper surface of the conveyor belt but also effectively heats the double faced corrugated board from the upper side thereof.

It will be apparent from the foregoing description that this invention provides an economically feasible means of manufacturing an improved type of corrugated board.

It should be understood, of course, that the foregoing disclosure relates to only preferred embodiments of the invention and that it is intended to cover all changes and
modifications of the examples of the invention herein chosen for the purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention set forth in the appended claims.

We claim as our invention:

1. In a double faced corrugated board manufacturing equipment comprising a plurality of hot plates and an endless conveyor belt, in which a double faced corrugated board is fed through the space defined by said hot plates and said conveyor belt so as to heat and dry the board, the arrangement of devices adapted to press and heat the corrugated board, said devices comprising a plurality of fluid chambers having open bottoms and disposed on the conveyor belt in the direction of feed, a blower, and a fluid forced by said blower into said chambers, whereby a constant pressure is exerted uniformly onto the entire upper surface of the corrugated board through the thickness of the conveyor belt.

2. An arrangement as claimed in claim 1, wherein the fluid is air.

3. An arrangement as claimed in claim 1, wherein the endless conveyor belt is made of a porous material.

4. An arrangement as claimed in claim 3, further comprising spaces along the edges of the board, a plurality of horizontal channels extending laterally along the joints of each two adjoining hot plates, a plurality of vertical channels communicating with said horizontal channels, and a main fluid duct communicating with said vertical channels and discharging into the blower, the compressed air from the fluid chambers being forced through said porous belt to emerge onto the corrugated board, along the surface of which it returns to the blower through the spaces along the edges of the board, said horizontal channels, vertical channels, and main fluid duct in such a manner that the air is heated by the hot plates as it passes through said channels, so that the corrugated board is effectively heated and dried not only from the bottom side thereof but also the upper side thereof.

5. An arrangement as described in claim 4, wherein elastic elements are provided along the lower edges of the fluid chambers to prevent leakage of the hot air for improved circulation.

References Cited by the Examiner

UNITED STATES PATENTS

2,236,056 3/1941 Grimm ---------------- 34—155 X
2,272,383 2/1942 Poor et al. ------------- 34—160

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