

Nov. 19, 1963

D. L. SCHUBERT

3,111,149

CONTINUOUS BALL-BEARING-TYPE PRESS FOR MAKING
COMPOSITION BOARD, PLYWOOD AND LIKE PRODUCTS

Filed May 2, 1960

3 Sheets-Sheet 1

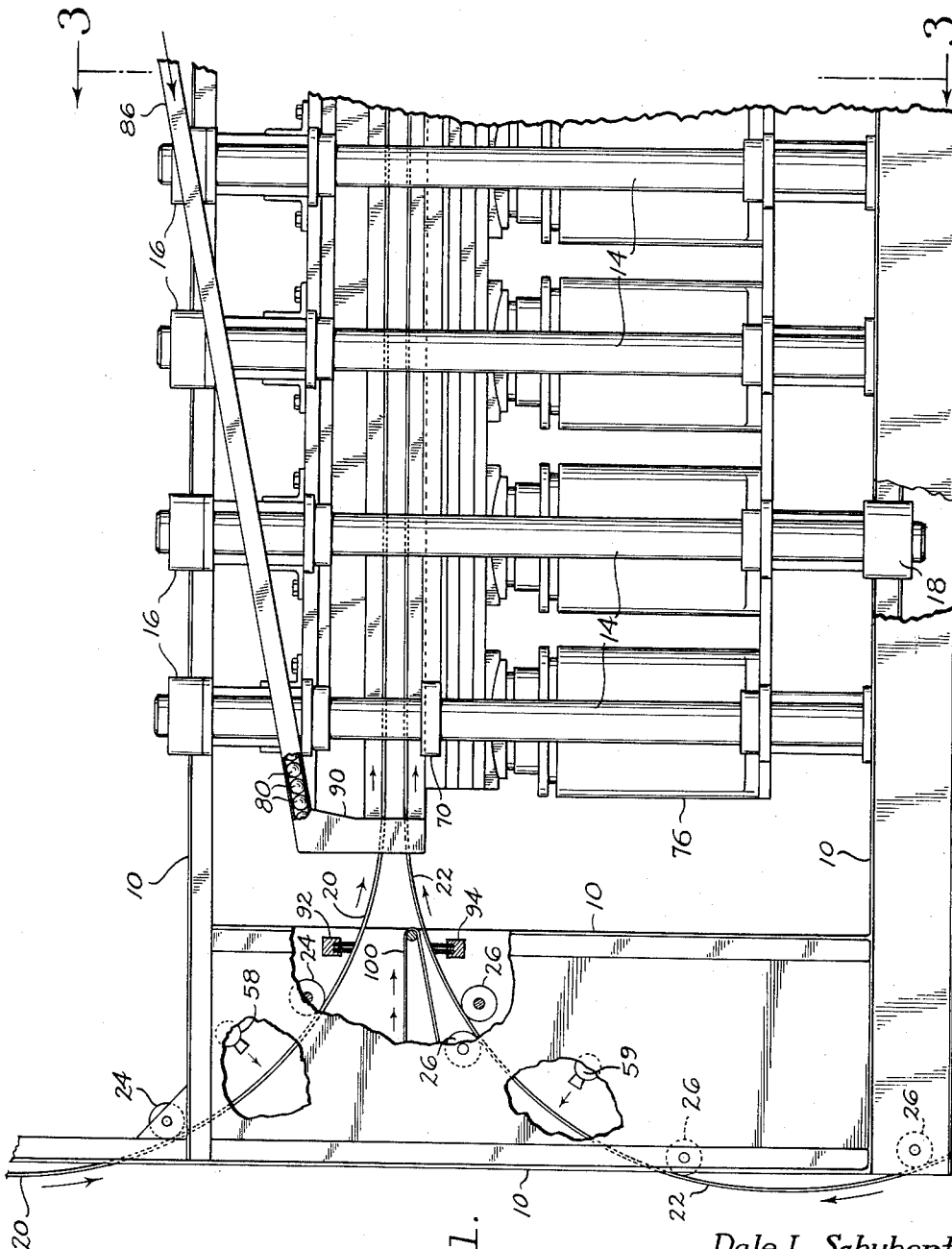


Fig. 1.

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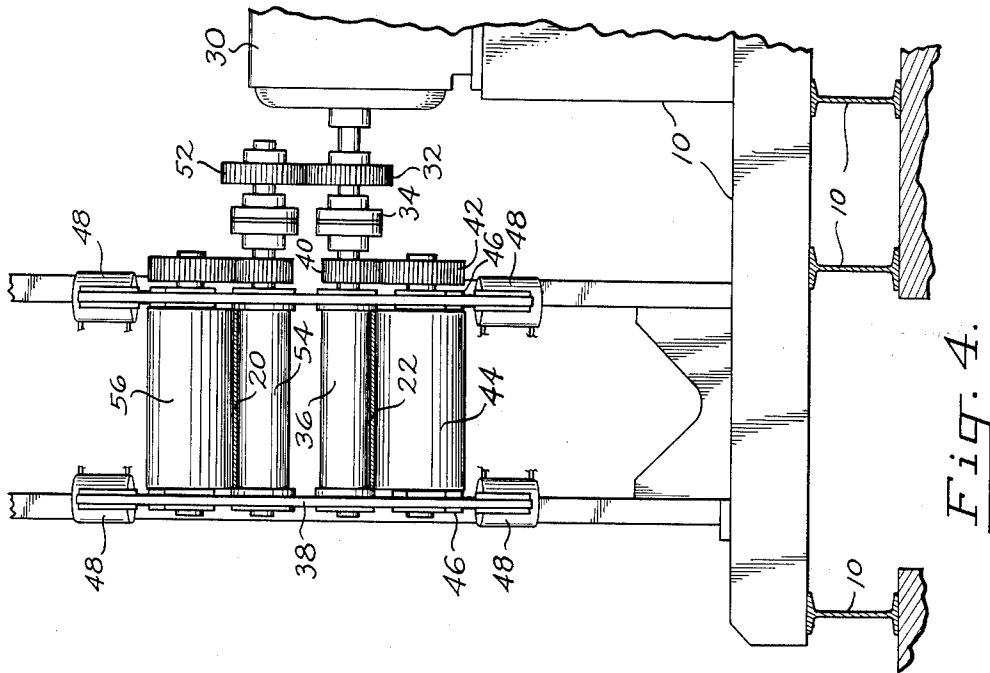


Fig. 4.

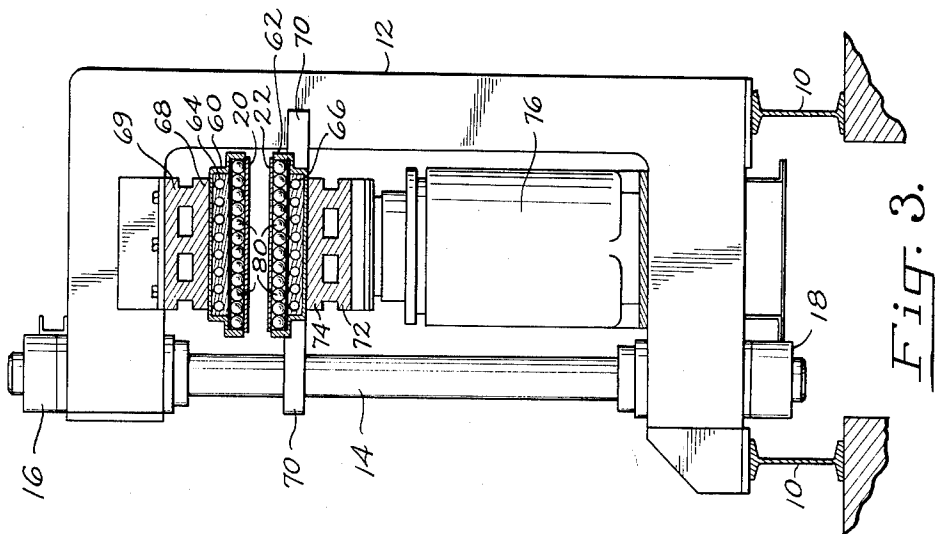


Fig. 3.

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CONTINUOUS BALL-BEARING-TYPE PRESS FOR MAKING COMPOSITION BOARD, PLYWOOD AND LIKE PRODUCTS

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6 Claims. (Cl. 144-281)

This invention relates to presses for the continuous manufacture of various pressed products, particularly pressed sheet materials such as wood composition board and plywood.

It long has been the practice to manufacture plywood and wood composition board batchwise in multi-opening presses which must be loaded, pressed for a substantial period of time, and then unloaded. These three cycles of operation are time consuming, laborious, and require elaborate equipment. It obviously would be desirable to provide a press into which the work could be introduced continuously, pressed continuously, and withdrawn continuously without the necessity of stepwise handling.

Numerous attempts have been made to design such a press, but none heretofore has been completely successful when applied to the manufacturer of such products as composition board and plywood. A primary reason for this lack of success has been the difficulty of applying pressure uniformly to large, moving press surfaces and the complications introduced by the necessity of heating the work to elevated temperatures.

Accordingly it is the general object of the present invention to provide a continuous press particularly suited for the manufacture of wood composition board and plywood which can be employed for pressing the work either hot or cold with a uniform application of pressure, resulting in the manufacture of a product of uniform properties.

It is another important object of this invention to provide a high-capacity, continuous press for wood composition board, plywood, and like products which is simple in construction and trouble-free in operation.

The manner in which the foregoing and other objects of this invention are accomplished will be apparent from the accompanying specification and claims considered together with the accompanying drawings, wherein like numerals of reference indicate like parts and wherein:

FIGS. 1 and 2 are fragmentary views in side elevation of the infeed and outfeed ends, respectively, of the herein described continuous press;

FIG. 3 is a sectional view taken along line 3-3 of FIG. 1 and illustrating particularly the construction of the pressing mechanism of the herein described press; and

FIG. 4 is an end elevation looking in the direction of line 4-4 of FIG. 2 and illustrating particularly the drive employed in the herein described continuous press.

In general, the continuous press of the present invention comprises a pair of opposed, endless caul belts arranged with their working stretches in substantial registration. Drive means are provided for driving the belts synchronously in opposite directions of rotation. Press bed means are present behind the working stretch of each belt. A multiplicity of ball bearings are located in each of the bed means in bearing contact with the belt.

Pressure applying means then are provided for urging the bed means toward a position of pressure contact with each other, thereby applying consolidating pressure to work passing continuously between the belts. Means for heating the work also are provided, in the event that a hot-consolidating operation is contemplated.

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As is evident from the drawings, the presently described press is supported on a suitably arranged framework of structural members 10. These house a plurality of vertically arranged, spaced apart, C-shaped frame members 12 across the open ends of which are mounted threaded posts 14 with nuts 16, 18.

Rotatably mounted within this framework is a pair of opposed, endless caul belts 20, 22 arranged with their working stretches in substantial registration. These belts may be of substantial size being, for example, more than 4 feet in width and 30 feet in length. Preferably they are made of a hard, durable, heat-transmitting material such as heavy gauge stainless steel, or band saw steel.

Belts 20, 22 are mounted for rotation on a plurality of spaced idler rolls 24, 26, journaled between plates supported by the frame of the apparatus. The belts may be driven by squeeze rolls illustrated particularly in FIG. 4.

Thus the shaft of a motor 30 carries a gear 32 and is connected through coupling 34 with the shaft of a roll 36 journaled between plates 38. The shaft of roll 36 carries a gear 40 which meshes with gear 42 on the shaft of a cooperating roll 44. The latter roll is mounted in slides 46, one on each end.

Caul belt 22 passes between rolls 36, 44 and is subjected to the pressure of a pair of fluid operated cylinders 48, the piston rods of which are connected to slides 46, mounting the shaft of roll 44.

Gear 32 on the shaft of motor 30 meshes with a gear 52 on the shaft of the lowermost of a second pair of squeeze rolls 54, 56. These are constructed and driven in the same manner as rolls 36, 44 and furnish the drive for upper caul belt 20.

After being heated by open flame gas burners 58, 59, the working stretches of caul belts 20, 22 pass across press bed means indicated at 60, 62, respectively. The opposed faces of both of the beds are recessed to form sealed chambers which may be heated by circulating hot oil or other fluid, or as illustrated, by steam pipes 64, 66. The upper press bed member is fixed, being connected through an insulating slab 68 to a hollow supporting member 69 which is bolted to the C-shaped frame members 12.

Lower press bed member 62, however, is slidably mounted so that it may be moved in the direction of pressure contact with the upper member, slides 70 being provided for this purpose. It is mounted on hollow structural member 72 insulating slab 74 being interposed. The assembly then is mounted on the crossheads of fluid operated cylinders such as hydraulic cylinders 76. These are mounted one in each of the C-shaped frame members 12 with the result that the lower press bed member 62 may be elevated by the cylinders acting in unison to apply any predetermined degree of pressure to work passing between caul belts 20, 22.

Housed within the recessed, opposed faces of press beds 60, 62 are a multiplicity of ball bearings 80. These may be of substantial size, being one inch or more in diameter. They transmit to the work the thrust of cylinders 76 which may be of the order of from 100-500 p.s.i. or even more.

When the ball bearings are fed to the press under pressure, they have the virtue of guiding and aligning themselves spontaneously to the closely packed configuration indicated in FIG. 3, wherein they overlie and underlie uniformly every segment of the working stretches of belts 20, 22, respectively, and provide an efficient bearing surface. In addition, they are freely flowing, traveling smoothly with the belts as the latter move through the press. In this respect their action is unique, being distinguishable, for example, from that of roller bearings which tend to creep sideways, thereby moving out of

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alignment and into wedging relationship to each other to the sidewalls of the passageways in which they travel.

One method for circulating the ball bearings is illustrated in FIGS. 1 and 2. As they leave the press at the outfeed end, they are collected in a receiver 82 located at one side of the caul belts and thence are fed into a flight conveyor 84 which lifts them to an elevated station where they are emptied into a descending conduit 86.

After passing through a steam- or gas-fired heater 88, they are discharged into a receiver 90 located at one side of the caul belts at the infeed end of the press. This communicates with the infeed ends of the recesses in press bed members 60, 62.

Means also are provided for lubricating the ball bearings. As indicated hereinabove, the lubricating means may comprise oil introduced into the recessed areas of the press beds which house the ball bearings. In the alternative, or in addition, the lubricating means may comprise applicators 92, 94 (FIG. 1) which apply lubricant to the inner surfaces of the caul belts. They are employed in conjunction with padded rolls 96, 98, which wipe off the lubricant ahead of squeeze roll pairs 36, 44 and 54, 56 so that the latter can grip the belts satisfactorily.

Operation

In operation, the laid up plywood assemblies, fibrous mats, or other work is introduced continuously between belts 20, 22 from infeed conveyor 100. The desired degree of pressure is applied to the working stretch of the lower belt by means of cylinders 76; the desired amount of heat, by gas burners 58, 59, steam pipes 64, 66 and ball bearing heating chamber 88. During operation of the press, an accumulation of ball bearings 80 is maintained at all times in receiver 90. The resulting pressure head drives the ball bearings into the press, where they distribute themselves in closely packed array, uniformly supporting every unit area of the caul belts. As they are discharged from the outfeed end of the press, they are collected in receiver 82 and elevated by flight conveyor 84 to conduit 86, after which they are recycled. The work leaving the press then is conveyed to subsequent processing apparatus, such as saws for subdividing it into unit lengths.

It is to be understood that the form of my invention herein shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A continuous, ball-bearing-type press for making composition board, plywood and like products which comprises a pair of opposed, endless caul belts arranged

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with their working stretches in substantial registration, drive means for driving the belts synchronously in opposite directions of rotation, press bed means behind the working stretch of each belt and having a longitudinal recess the width of which is substantially codimensional with the width of the associated caul belt, a multiplicity of ball bearings disposed freely in and substantially filling the recess in each press bed means in bearing contact with the belts, the ball bearings being movable freely with the belts, circulating means independent of the caul belts for circulating the ball bearings from the outfeed end of the bed means to the infeed end thereof, the circulating means comprising conveyor means communicating with the press bed means for receiving ball bearings discharged therefrom and for conveying them to an elevated station and conduit means interconnecting the elevated station and the infeed end of the bed means, thereby permitting gravitational feeding of the ball bearings under pressure established by a head of ball bearings accumulated in the downstream end of the conduit means, and pressure applying means urging the bed means toward each other, thereby applying consolidating pressure through the ball bearings to work passing continuously between the belts.

2. The press of claim 1 including means for heating the press bed means, and hence the belts passing thereover, for hot-consolidating the work passing between the belts.

3. The press of claim 2 wherein the heating means comprise a plurality of steam pipes housed within the press bed means.

4. The press of claim 2 wherein the press bed means includes a chamber adapted to be filled with circulating hot fluid wherein the ball bearings move, thereby contemporaneously heating and lubricating the same.

5. The press of claim 1 including heating means for heating the belts preliminary to passing them across the press bed means.

6. The press of claim 1 wherein the drive means for driving the belts comprises opposed pairs of driven rollers frictionally engaging the belt surfaces.

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