Nov. 22, 1938. L. T. SUTHERLAND 2,137,634

PRESS PLATEN

Filed April 30, 1937

Fig. 1.

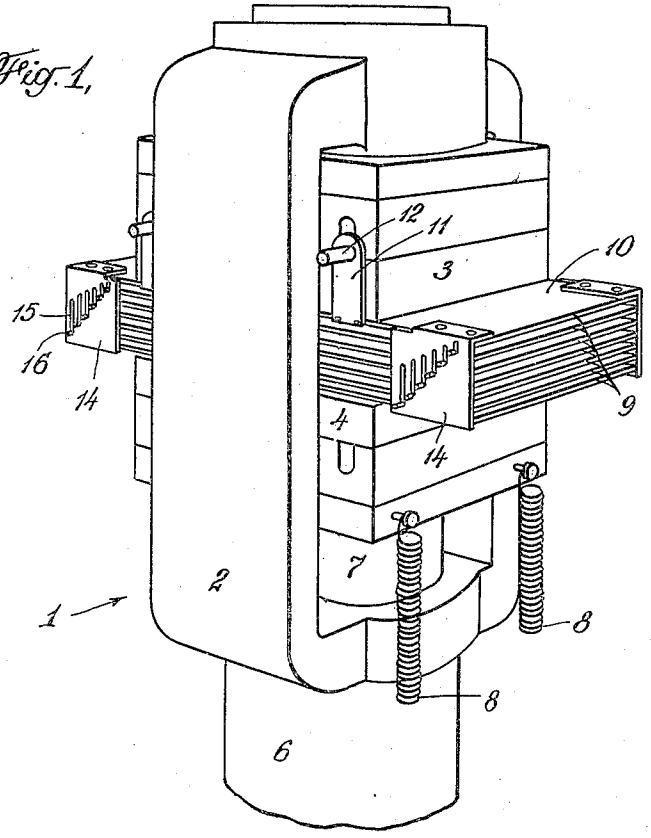
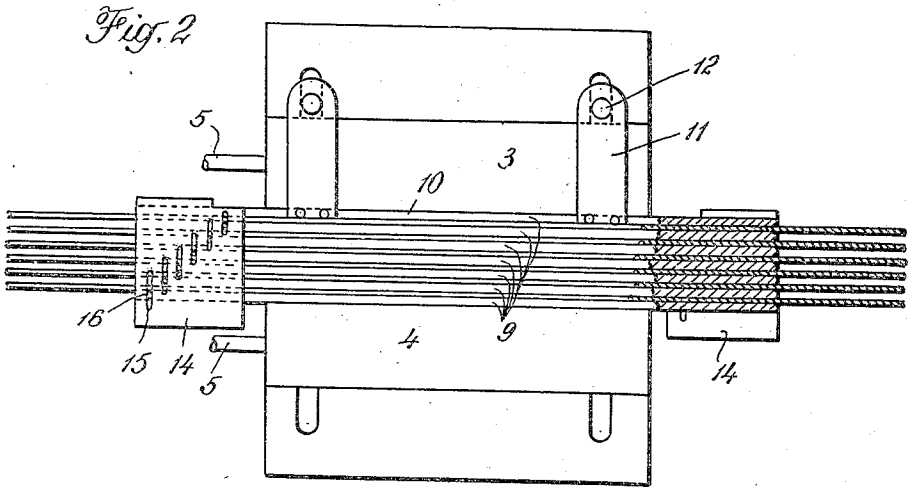


Fig. 2



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PRESS PLATEN

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5 Claims. (Cl. 18—17)

The present invention relates to platen presses in which vertically movable press platens are employed for pressing sheet material of greater length than the platens by subjecting the material to a series of successive pressing steps along the length of the material.

Prior to this invention, considerable difficulties have been encountered in the manufacture of long sheets of material, such as roll material or sheet material, of determinate or indeterminate length by processes which necessitate treatment by pressure for a substantial time. Conventional platen presses have been used to cure such sheets by subjecting the material to a series of successive pressing steps. However, such platen presses are disadvantageous due to the formation of what are termed "press marks" on the material at or near the ends of the platens. These press marks both impair the strength of and detract from the appearance of the finished sheet material. Also in pressing long resin-impregnated sheets in a platen press which employs heat to cure resin in the sheet and in which the platens are not coextensive in length with the sheet material, a visual line of demarcation and differences in properties between the cured and the uncured sections are produced which usually are not entirely removed in the subsequent curing of the uncured sections. Hence, a sheet free of press marks and having substantially constant physical characteristics throughout the length of the sheet does not result from such pressing.

An object of the present invention is to provide a press for curing resin-impregnated sheet material by a plurality of successive pressing steps along the sheet so as to produce a cured product of constant and uniform physical properties and substantially free of press marks.

In accordance with my invention, a conventional platen press, having relatively movable platens between which sheet material is passed intermittently and successive sections thereof pressed, is modified by inserting resilient plates between the platens, the plates extending beyond or overhanging the platens. The resilient plates are sufficiently flexible and extend such a distance beyond the ends of the platens that the pressure applied to the sheet material at the ends of the resilient plates is insufficient to cause the formation of visible marks on the sheet material during the pressing operation, and the plates are of sufficient rigidity and elasticity to allow a slight deformation of the plates during pressing without being permanently deformed. In the area of the resilient plates extending beyond the platens where the pressure is applied by the press, the pressure exerted on the sheet material varies, the maximum pressure being applied at points contiguous to the platens and the pressure tapering gradually to a minimum at the ends of the resilient plates. Also, the temperature tapers from a maximum at the points contiguous to the platens to a minimum at the ends of the resilient plates. I have found that resin-impregnated sheet material can be cured in the press of my invention by passing successive sections thereof through the press and pressing them to produce a cured product substantially free of press marks and of uniform physical characteristics.

Further objects and advantages will be apparent from a consideration of the following description taken in connection wth the accompanying drawing showing my invention applied to a conventional, vertical, plunger-type press, wherein—

Figure 1 is a perspective view of a press in open position embodying a preferred form of the invention; and

Figure 2 is a side elevation, partly in section, of the press platens and the resilient plates in closed position of the press of Figure 1, with sheet material in the press.

The embodiment of the invention illustrated includes a platen press 1 comprising a frame 2 having an opening through the upper end to receive the press platens 3, 4 which may be suitably heated, as by steam introduced through pipes 5. The lower end 6 of the frame may be hollow to receive a ram 7 which may be raised hydraulically or mechanically, as desired, to operate the lower press platen 4. Springs 8 are secured to platen 4 to retract this platen in order to open the press. As these portions of the press are well known in the art, this structure need not be further described.

According to the present invention a plurality of resilient metal plates 9, preferably steel plates, for instance stainless steel such as "Allegheny metal" are secured to the press between the press platens. The uppermost plate 10 is secured to the upper press platen 3 by a plurality of arms 11 attached to the upper plate 10 and secured to the upper press platen 3 by rods 12 passing through openings therein and in the arms. A depending spacing plate 14 is secured at each corner of the upper plate 10. Each spacing plate is provided with a plurality of slots 15; in the embodiment shown in the drawing there are six slots in each spacing plate, one for each of the six plates beneath the top plate. Each of these six plates is provided near each corner with a pin or projection 16 adapted to move in a slot individual thereto. The slots extend upwardly far enough to allow the plates to close; the lower ends of the slots control the spacing of the plates when the press is in open position and are so spaced vertically that the plates are suspended in spaced position each from the other, when the press is in open position as appears from Fig. 1. Accordingly, the slots in plates 14 guide the plates from

open to closed position and hold the plates in spaced relation when the press is open.

The plates 9 overhang the ends of the press platens and are so constructed and designed and of rigidity such that the pressure exerted on the material between the plates tapers gradually from the section between the press platens 3, 4 to the ends of the overhanging portions of the plates. The inherent rigidity and elasticity of the plates are such as to permit a small degree of temporary deformation thereof by the pressures to which they are subjected in use with return to their original shape on release of pressure, but not to permit sharp bends at the ends of the press platens; thus the formation of press marks at the ends of the platens is avoided. The plates overhang the platens a distance at least sufficient to avoid formation of press marks at the ends of the plates 9.

When a gang of seven plates is used, the plates being of polished, stainless steel, such as "Allegheny metal", each 15 inches wide and $\frac{3}{16}$ inch thick, and with the ends rounded to avoid scratching the material passing therethrough, operated between presser platens 15 inches wide and 15 inches long, under a pressure of 1000 lbs. per square inch and at 170° C. when operating on roofing felt impregnated with a phenol formaldehyde resin, it has been found desirable results are produced with the plates overhanging the press platens at least five inches at each end.

This example is given to illustrate suitable dimensions and not as limiting the scope of the invention, and it is obvious the resilience and length of the extension of the plates may be varied considerably with the accomplishment of the objects of the present invention. For example, the number of plates employed may vary from two upward, the distance which the plates overhang at the front and at the exit ends may differ, the overhanging portions of the plates at the exit end of the press may be cooled, and the plates may be suitably embossed to form identifying data on the material such as a trade-mark, or to form suitable designs on the cured product. Heat insulating material may be placed around the press platens when heated platens are employed. If desired, a mechanical device may be employed to move through the openings between the resilient plates, if the particular material being pressed exhibits a tendency to stick to the plates, for the purpose of removing or preventing adherence of the cured material from or to the plates.

While the above example shows my invention applied to a vertical, plunger-type press, it is obvious that it is equally applicable to other types of presses having relatively movable platens and adapted to press sheet material.

This application is in part a continuation of my copending application Serial No. 28,419, filed June 26, 1935.

I claim:

1. A press for curing resin impregnated sheet material involving the subjection of said sheet material to a series of successive pressing steps along the length of the material, comprising a pair of cooperating press platens and a plurality of resilient plates between said platens, between which plates the material is pressed, said plates extending beyond the ends of said platens in directions substantially parallel to the direction of the movement of the sheet material through said press.

2. A press for curing resin impregnated sheet material involving the subjecting of said sheet material to a series of successive pressing steps along the length of the material, comprising a pair of cooperating relatively movable press platens and a plurality of resilient plates between said platens and movable therewith, between which plates the material is pressed, said plates extending beyond the ends of said platens in directions substantially parallel to the length of the material a distance such that the ends of said plates do not form press marks on said material, and being constructed and arranged so that the pressure exerted on the material tapers from a maximum between the press platens to a minimum at the ends of the plates.

3. A press for curing resin impregnated sheet material involving the subjection of said sheet material to a series of successive pressing steps along the length of the material without producing press marks thereon, comprising a pair of cooperating press platens and a plurality of plates between said platens and attached to one of said platens, between which plates the material is pressed, said plates being of a rigidity such that press marks are not produced on the material at the ends of said platens and said plates extending beyond the ends of said platens in directions substantially parallel to the length of the material a distance sufficient to avoid the formation of press marks on the material at the ends of said plates.

4. A press for curing resin impregnated sheet material involving the subjection of said sheet material to a series of successive pressing steps along the length of the material, comprising a pair of cooperating press platens, a plurality of resilient plates between said platens, between which plates the material is pressed, said plates extending beyond the ends of said platens in directions substantially parallel to the length of the material, and means to guide said plates from closed to open positions and to hold said plates in spaced relation while in open position.

5. A press for curing resin impregnated sheet material involving the subjection of said sheet material to a series of successive pressing steps along the length of the material, comprising a pair of cooperating relatively movable press platens, a plurality of resilient plates between said platens secured to one platen and arranged to be moved by the other platen, means on one of said plates to guide the remainder of said plates from closed to open positions and to hold said plates in spaced relation while in open position, said plates extending beyond the ends of said platens in directions substantially parallel to the length of the material a distance such that the ends of said plates do not form press marks on said material and being constructed and arranged so that the pressure exerted on the material tapers from a maximum between the press platens to a minimum at the ends of said plates, said plates also being of a rigidity and elasticity such that they are temporarily slightly deformed by the pressure to which they are subjected but not sharply bent at the ends of the platens, so that press marks are not produced on the sheet material at the ends of said platens or at the ends of said plates.

LESLIE T. SUTHERLAND.