RECORD MAKING PRESS

Inventors: Alan Phillipson; Basil Harry Royston Spiller; Cyril Leslie Newman; Robin Smith, all of London, England

Assignee: Decca Limited, London, England

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References Cited
UNITED STATES PATENTS
2,988,622 9/1961 Renoux......................... 425/810 X
3,830,459 8/1974 Strausfeld................... 425/810
3,860,382 1/1975 Spiller et al................ 425/810

Primary Examiner—J. Howard Flint, Jr.
Attorney, Agent, or Firm—Edward F. Connors

ABSTRACT

A record making press comprises a narrow hydraulic pressure chamber of which one broad wall is constituted by a flexible thermally conductive diaphragm capable of impressing contours of a matrix onto a sheet of thermoplastic material, a hydraulic fluid inlet and hydraulic fluid outlet for the chamber, and a thermally conductive structure which extends throughout a substantial part of the chamber for inducing turbulence into the flow of fluid therethrough.

5 Claims, 2 Drawing Figures
RECORD MAKING PRESS

This invention relates to a record making press which has a hydraulic pressure chamber for exerting pressure on a thin flexible conductive diaphragm in order to impress the contours of a matrix on a thin flexible thermoplastic sheet. Such a press is particularly, although not exclusively, intended for making disc records each bearing a physical representation of a television signal.

The main object of the invention is to facilitate the provision of a rapid cycle of operation of such a press.

According to the invention, there is provided a record-making press comprising a narrow hydraulic pressure chamber of which one broad wall is constituted by a flexible thermally conductive diaphragm capable of impressing contours of a matrix onto a sheet of thermoplastic material, a hydraulic fluid inlet and hydraulic fluid outlet for the chamber, and a thermally conductive structure which extends throughout a substantial part of the chamber for inducing turbulence into the flow of fluid therethrough.

The structure facilitates rapid transfer of heat between liquid in the chamber and the diaphragm. Preferably the thermally conductive structure is a multi-partite structure, which may be a mesh. Means are preferably provided for supplying hot and cold hydraulic fluid alternately to the inlet of the chamber.

In a preferred embodiment, a second narrow hydraulic pressure chamber containing a thermally conductive structure as aforesaid for inducing turbulence into the flow is arranged adjacent and parallel to the first-mentioned chamber with the outlet of the second chamber in fluid communication with the inlet of the first chamber.

There follows a description of a record-making press incorporating one embodiment of the invention by way of example.

Reference will hereinafter be made to the accompanying drawings of which:

FIG. 1 illustrates part of a record press embodying the invention, and

FIG. 2 illustrates an enlarged portion of FIG. 1.

The press illustrated in the drawing is particularly intended for the production of disc records of television signals by the impression of the contours of a matrix onto a thin sheet of thermoplastic material. The sheet may be elongate and be traversed between pressings so as to receive a series of impressions spaced apart along the sheet; subsequently the impressed regions may be trepanned from the sheet. It is alternatively possible to impress appropriately shaped pieces of sheet material separately.

The press includes a thin conductive diaphragm which is rigidly supported around its perimeter and which backs a thin conductive matrix 2 which on its front surface carries a negative of the physical contours that are to be impressed on the thermoplastic sheet. The sheet may be supported against the pressure of the diaphragm by a resilient cushion 3 or other means.

The diaphragm 1 forms one broad wall of a narrow, substantially circular, pressure chamber 4, by which hydraulic pressure can be applied fluidly over the area of the diaphragm. The flexible diaphragm ensures that the matrix and the thermoplastic sheet, both flexible components, are centred horizontally between the compressing platens even though these may not be parallel and the matrix and the thermoplastic sheet may not be of constant thickness. It is desirable to produce impressions by a combination of pressure and heat and for this purpose heat can be transferred from the fluid in the pressure chamber through the thermally conductive diaphragm and matrix to the sheet of thermoplastic material which is disposed between the matrix 2 and the cushion 3. It is appropriate to provide a cycle of operation in which the inlet of relatively hot liquid is displaced by relatively cool liquid in preparation of the next pressing.

The chamber 4 is bounded at its periphery by a wall 5 and its other broad wall is formed by an annular plate 6 which is connected at its inner periphery to a rubber securing ring 6a, which is in turn connected to a flange 7 of a flanged bush 8 having a central bore 9 communicating with the chamber 4 at the centre thereof. This bore provides a central outlet for liquid from the chamber 4. The perimeter gap between the plate 6 and the side wall 5 constitutes an annular inlet for liquid to the chamber 4 to facilitate the provision of a circumferentially symmetrical flow of liquid in the chamber.

In communication with the chamber 4 by means of the perimeter gap 8 is an antechamber 10 which is generally annular. The antechamber 10 is bounded at its inner periphery by a sintered bronze collar 11 which is disposed between an annular portion 14 of a plate 12 which is spaced apart from and parallel to the plate 6, and a clamp ring 7a mounted on the flange 7. The bronze collar 11 fits closely around the flange 7 so as to provide the only means of entry into the antechamber from a substantially cylindrical inlet chamber 13 which is bounded by the bush 8, the collar 11, the flange 7, clamp ring 7a, a portion 12a of the plate 12 and a plate 13a. The other broad wall of the antechamber is principally constituted by a second annular portion 15 of plate 12 which is parallel to plate 6. The plate portion 15 constitutes the outer skin of a cellular structure 17 of which the internal walls 17a are disposed perpendicular to the general plane of the chambers 4 and 10.

Inlet pipes 18 and 19 are provided for supplying hot and cold liquid (preferably oil) alternately to the inlet chamber 13 via a hole 16 in the plate 12. To inhibit nonuniformity of temperature in the liquid from either inlet pipe into the inlet chamber, the plate 12 is formed with a frusto-conical baffle portion 16a which forces the incoming flow towards the bush 8 before it passes through the hole 16. The liquid flow is then forced through the collar, the antechamber 10 and the chamber 4 and out through the outlet bore 9.

The purpose of the cellular structure 17 is to provide for the combined chamber constituted by the chamber 4 and the chamber 10, a wall which is of low thermal inertia and thereby assist rapid, alternate heating and cooling.

At least the main pressure chamber 4 and in this embodiment both the chamber 4 and the chamber 10, are occupied by a multi-partite conductive structure denoted by 20 and 21 for the chamber 4 and the chamber 10 respectively. This structure provides short paths for the liquid which traverses the chambers and helps to prevent laminar flow in the main chamber 4. The consequent increase of the length of travel of liquid across the chamber and the conductive nature of the structure (which may be a mesh) both improve the transfer of heat between the liquid and the diaphragm.

The flexible connection of the plate 6, which supports the structure 20, to the flange 7 via the rubber securing ring 6a allows the plate 6 limited freedom of movement towards and away from the diaphragm so
that an increase in the pressure gradient which causes flow of liquid through the chamber raises the plate against the diaphragm; this action improves the thermal connection between the diaphragm and the liquid. Moreover, the depth of the chamber is adjusted automatically to that which just contains the structure.

The sintered collar provides a physical impedance to the flow of liquid into the pressure chamber from the inlet pipes. By this means non-uniformities in the distribution of fluid to the inlet chamber are very largely vitiated so that liquid flows in the chambers substantially radially and uniformly, that is to say circumferentially invariantly.

The inlet and outlet pipes are connected to appropriate hydraulic circuits preferably including a cold circuit chamber and appropriate valves for diverting hot and cold fluid to the inlet pipes. The circuits may be associated with a pressure intensifier which would normally be operated either immediately before or during the inlet of hot fluid to the pressure chamber.

We claim:
1. A record-making press comprising a narrow hydraulic pressure chamber of which one broad wall is constituted by a flexible thermally conductive diaphragm capable of impressing contours of a matrix onto a sheet of thermoplastic material, a hydraulic fluid inlet and hydraulic fluid outlet for the chamber, and a thermally conductive structure which extends throughout a substantial part of the chamber for inducing turbulence into the flow of fluid therethrough.
2. A record-making press as claimed in claim 1, in which the thermally conductive structure is a multipartite conductive structure.
3. A record-making press as claimed in claim 1, in which the thermally conductive structure is a mesh.
4. A record-making press as claimed in claim 1, in which means are provided for supplying hot and cold hydraulic fluid alternately to the inlet of the chamber.
5. A record-making press as claimed in claim 1, in which a second narrow hydraulic pressure chamber containing a thermally conductive structure as aforesaid for inducing turbulence into the flow is arranged adjacent and parallel to the first-mentioned chamber with the outlet of the second chamber in fluid communication with the inlet of the first chamber.

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