Aug. 13, 1968 E. SIEMPELKAMP 3,396,783

TEMPERATURE-CONTROLLED PRESS PLATEN

Filed Aug. 23, 1966 3 Sheets-Sheet 1

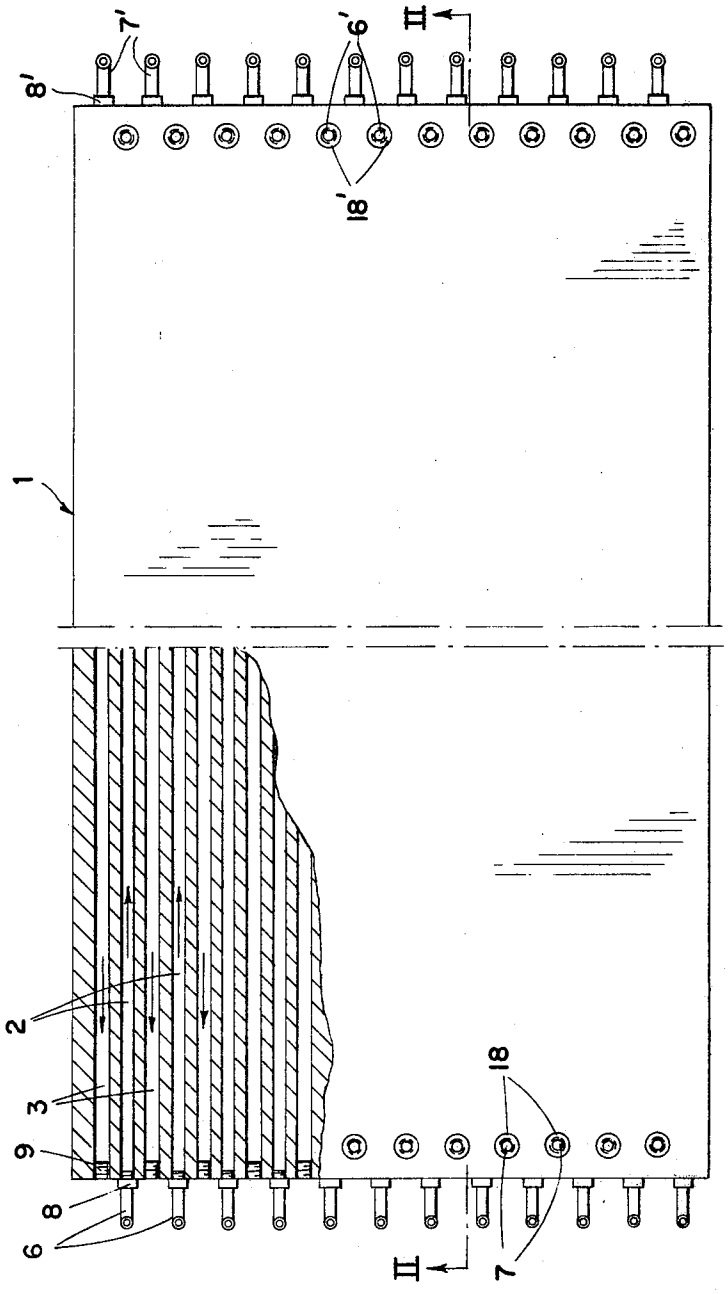


FIG. 1

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BY

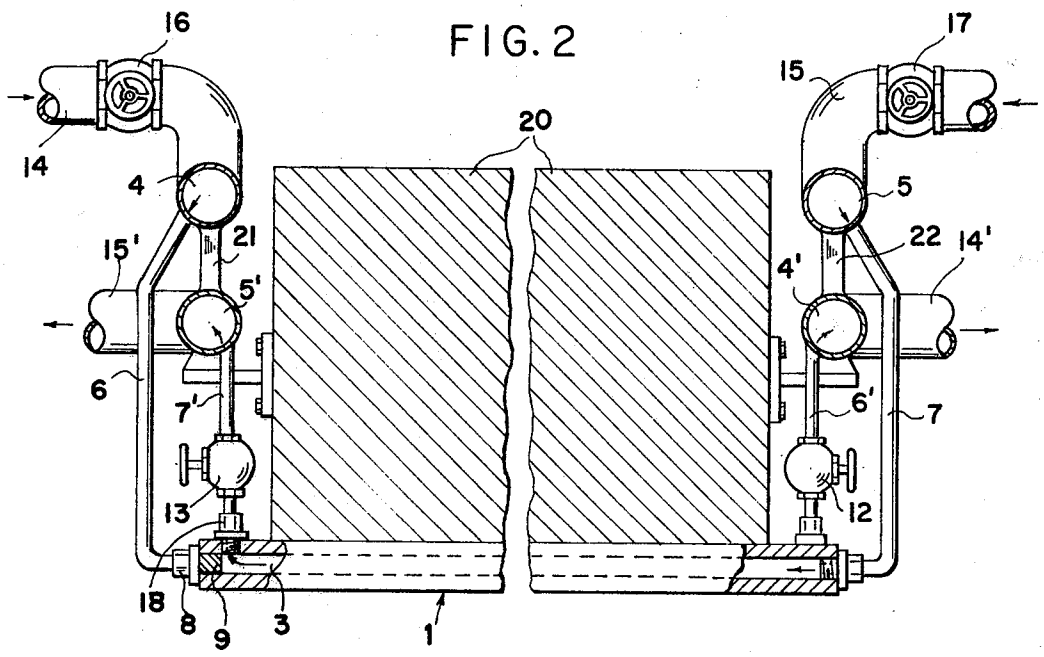
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TEMPERATURE-CONTROLLED PRESS PLATEN

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FIG. 2



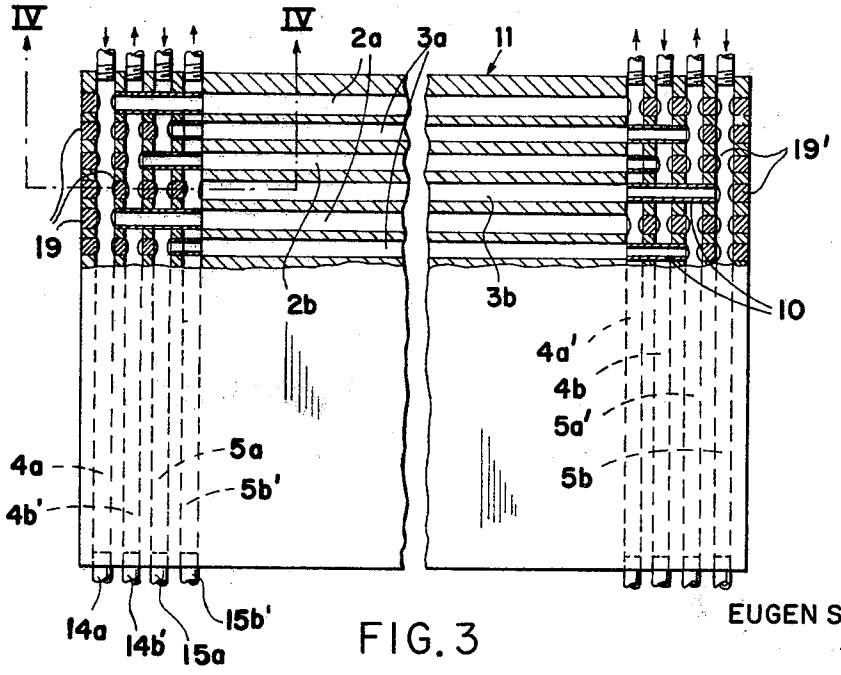


FIG. 3

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TEMPERATURE-CONTROLLED PRESS PLATEN

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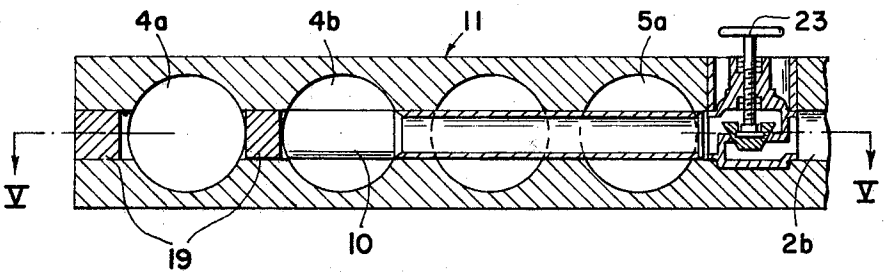


FIG. 4

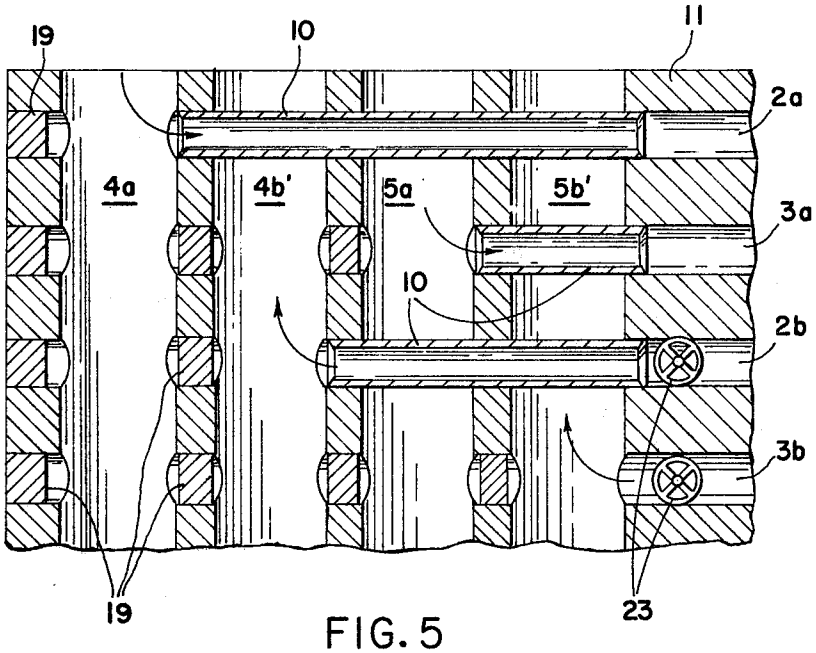


FIG. 5

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United States Patent Office 3,396,783
Patented Aug. 13, 1968

3,396,783

TEMPERATURE-CONTROLLED PRESS PLATEN

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Filed Aug. 23, 1966, Ser. No. 574,422
Claims priority, application Germany, Apr. 28, 1966,
S 103,471
6 Claims. (Cl. 165—165)

ABSTRACT OF THE DISCLOSURE

A temperature-controlled press platen having at least two sets of channels each provided with respective inlet and outlet manifolds, the platen body being rigid with an adjoining press plate and having horizontal pipes supported thereon. The manifolds may be passages formed in the body with the inlet manifold of one set of channels and the outlet manifold of another set being disposed on one side of the body while the remaining manifolds are located on the other side.

My present invention relates to a temperature-controlled press platen as used, for example, in lamination presses with one or more levels, e.g., as disclosed in my U.S. Patent No. 3,241,189.

In such press platens it is convenient to control the temperature by the alternate passage of heating and cooling fluids through channels provided therein for this purpose. Because of space considerations, it has heretofore been the practice to interconnect several or all of these channels in series so that they were consecutively traversed by the fluid. This type of arrangement, however, does not afford uniform heating or cooling of the platen because of the unavoidable temperature differential existing along the fluid path. Moreover, the length of this path increases the thermal inertia of the system by considerably delaying the effect of a change in fluid temperature upon the temperature of the platen.

The general object of this invention is, therefore, to provide means for more effectively controlling the temperature of the press platen by the passage of a fluid throughout.

A more particular object of my invention is to provide, in a press platen, a highly compact channel system for the uniform heating and/or cooling of the platen by means of respective fluids.

These objects are realized, in accordance with my present invention, by the provision of a press platen whose flat horizontal body is traversed by a multiplicity of parallel horizontal channels which alternately form part of a first and a second set of such channels, each set of channels being connected on one side of the platen to an inlet manifold and on the opposite side of the platen to an outlet manifold whereby heating and/or cooling fluids can be passed through the two sets of channels in opposite directions. If heating or cooling fluids of the same initial temperature are thus concurrently admitted to the inlet manifolds on opposite sides of the platens, the temperature gradient existing along one set of channels will be compensated by the inverse temperature gradient along the other set of channels so that uniform heating or cooling of the entire platen will result. Pursuant to an important feature of this invention, all the manifolds are rigid with the platen and, for the realization of the shortest possible connections with the channels, are disposed within the substantially rectangular outline of its body.

Within that outline, the manifolds may lie above or below the platen, for greater dimensional freedom, and may in this case consist of individual pipes carried on either the platen body or an associated press plate rigid with that body. A more compact arrangement accommodates the manifolds within the body of the platen itself, in the form of transverse passages, the width of these passages being of course limited by the thickness of the platen so that it may be desirable to split each manifold into several parallel branches. With a minimum of four transverse passages on each side of the channel network it then becomes possible to use two of these four passages as inlet and outlet manifolds for a heating fluid and the two other passages as inlet and outlet manifolds for a cooling fluid, the two fluids traversing different channels respectively connected with the manifold passages assigned to them.

In order to compensate for inherent nonuniformities of channel sections or to enable selection of a particular temperature distribution in which certain portions of the platen are heated or cooled more intensely than others (e.g., as described in my above-identified prior patent), I prefer to insert individual flow-control devices, such as throttle valves, in series with the several channels between the associated inlet and outlet manifolds thereof, advantageously in the outlet ends of the channels.

My invention will be described in greater detail with reference to the accompanying drawing in which:

FIG. 1 is a top view (parts broken away) of a press platen with a channel system terminating in lateral inlet and outlet manifolds according to the invention, the manifolds themselves having been omitted in this figure;

FIG. 2 is a cross-sectional view taken on the line II—II of FIG. 1;

FIG. 3 is a plan view similar to FIG. 1, showing a modified platen;

FIG. 4 is a fragmentary cross-sectional view taken on the line IV—IV of FIG. 3; and

FIG. 5 is a sectional view taken on the line V—V of FIG. 4.

In FIGS. 1 and 2 I have shown a platen **1** secured to the underside of a head plate **20** of a laminating press, e.g., as disclosed in my aforementioned U.S. Patent No. 3,241,189.

The flat rectangular body of platen **1** is traversed, in horizontal direction, by two mutually parallel and interleaved sets of channels **2**, **3** through which a heating or cooling fluid passes in opposite directions, i.e., from left to right in the channels **2** and from right to left in the channels **3** as indicated by the arrows in FIG. 1. Channels **2** are connected at their left-hand ends, by way of individual entrance tubes **6**, to a common inlet manifold **4** to which fluid is supplied via a flexible conduit **14**, containing a shut-off valve **16**, from a suitable source not shown, e.g., a supply manifold serving several press platens. The right-hand ends of channels **2** are similarly connected, through individual discharge tubes **6'**, with an outlet manifold **4'** from which a flexible conduit **14'** extends to a sink not shown, e.g. a collecting manifold also common to several platens. In analogous manner, the right-hand ends of channels **3** receive fluid from a source not shown, e.g., the same manifold which supplies the conduit **14**, by way of a common inlet manifold **5** which is connected to the source through a flexible conduit **15** with a shut-off valve **17** and from which individual entrance tubes **7** extend to the respective channels; the left-hand ends of channels **3** are joined through discharge tubes **7'** to an outlet manifold **5'** which delivers the fluid through a flexible conduit **15'** to a sink not illustrated, e.g. the collector manifold mentioned in conjunction with conduit **14'**. The manifold pipes **4** and **5'** on one side of platen **1** and the manifold pipes **4'** and **5** on the opposite

side are supported on respective brackets **21, 22** secured to the head plate **20**.

Outlet tubes **6'** and **7'** are shown as short vertical nipples and incorporate each a respective throttle valve **12** or **13**, designed to equalize or otherwise control the fluid flow through the channels **2** and **3**. These nipples are connected to radial bores of channels **2** and **3** with the aid of coupling nuts **18** beyond which the channel ends are closed by plugs **9**; similar nuts **8** serve to join the inlet tubes **6** and **7** to the remaining horizontal channel ends.

It will be apparent that the fluids from inlet manifolds **4** and **5** pass through the associated channels **2** and **3** in counterflow and that the relatively close spacing of these channels insures a substantially even temperature distribution throughout the platen **1**, assuming of course that the throttles **12** and **13** have been set for uniform flow.

In FIGS. 3–5 I have illustrated a modified platen **11** provided with two sets of channels **2***a*, **2***b* and **3***a*, **3***b*. Channels **2***a*, **2***b* are designed to receive a heating fluid over respective inlet manifolds **4***a*, **4***b* and to discharge this fluid to respective outlet manifolds **4***a'*, **4***b'*, inlet and outlet manifolds **4***a*, **4***b'* being again located on one side of the platen whereas outlet and inlet manifold **4***a'*, **4***b* are disposed on the opposite side thereof. Channels **3***a* and **3***b*, here serving to conduct a cooling fluid, similarly are provided with inlet manifolds **5***a*, **5***b* and outlet manifolds **5***a'*, **5***b'*, each of these inlet manifolds being again paired with a respective outlet manifold on either side of the platen. All the manifolds are shown as parallel passages transversed to the channels **2***a*, etc., their external connections to corresponding sources and sinks for the hot and cool fluids having been only partly illustrated. For simplicity of manufacture, all the channels are throughgoing bores intersecting all the manifold passages and the unused intersections are blocked by plugs **19**. Where necessary, tubes **10** form extensions of the channels which traverse the intervening manifold or manifolds in order to open into a more remote manifold passage.

As in the preceding embodiment, throttle valves **23** are disposed in the outlet ends of the channel as particularly illustrated for channels **2***b* and **3***b*.

Like the conduits **14, 15** and **14', 15'** of FIG. 2, the external connections **14***a*, **15***a*, **14***b'*, **15***b'*, etc of the several manifolds in FIGS. 3–5 must be sufficiently flexible to allow for the vertical movement of the platen in the opening and closing of the press. Apart from these flexible conduits, the platen **11** of FIGS. 3–5 has no outside appendages so as to be particularly suitable for use in a multi-level press.

Although the manifolds of FIGS. 3–5 have been particularly described as forming part of separate circulation systems for fluids of different temperatures, it will be understood that, if desired, all the inlet passages **4***a*, **4***b* and **5***a*, **5***b* as well as the outlet passages **4***a'*, **5***a'*, **4***b'*, **5***b'* could be connected in a parallel to a common source and a common sink, respectively, if only one type of fluid were to be circulated.

I claim:

1. A press platen for laminating presses and the like, comprising a flat horizontal body of substantially rectangular outline traversed by a multiplicity of parallel horizontal channels divided into at least a first and a second set of channels, the channels of said first and second sets being alternately interleaved; a first inlet manifold transverse to said channels communicating on one side of said body with said first set of channels for supplying a first fluid thereto; a first outlet manifold transverse to said channels communicating on the opposite side of said body with said first set of channels for removing said first fluid therefrom upon a single traverse of said body, a second inlet manifold transverse to said channels communicating on said opposite side of said body with said second set of channels for supplying a second fluid thereto; and a second outlet manifold transverse to said channels communicating on said one side of said body with said second set of channels for removing said second fluid therefrom upon a single traverse of said body; all said manifolds being rigid with said body and disposed within said rectangular outline thereof, said first inlet manifold and said second outlet manifold comprising a pair of superposed horizontal pipes on said one side of said body, said second inlet manifold and said first outlet manifold comprising a pair of superposed horizontal pipes on said opposite side of said body, said body being rigid with an adjoining press plate, said pairs of horizontal pipes being supported on said plate.

2. A press platen as defined in claim **1** wherein each of said channels is connected between its associated inlet and outlet manifolds in series with a respective flow-control device.

3. A press platen as defined in claim **2** wherein said flow-control device is a throttle valve inserted in the end outlet end of the channel.

4. A press platen for laminating presses and the like, comprising a flat horizontal body of substantially rectangular outline traversed by a multiplicity of parallel horizontal channels divided into at least a first and a second set of channels, the channels of said first and second sets being alternately interleaved; a first inlet manifold transverse to said channels communicating on one side of said body with said first set of channels for supplying a first fluid thereto; a first outlet manifold transverse to said channels communicating on the opposite side of said body with said first set of channels for removing said first fluid therefrom upon a single traverse of said body; a second inlet manifold transverse to said channels communicating on said opposite side of said body with said second set of channels for supplying a second fluid thereto; and a second outlet manifold transverse to said channels communicating on said one side of said body with said second set of channels for removing said second fluid therefrom upon a single traverse of said body; all said manifolds being rigid with said body and disposed within said rectangular outline thereof, all said manifold means being passages formed within said body, each of said manifolds being subdivided into a plurality of branches constituted by a respective group of said passages, said channels including bores and tubular extensions of said bores traversing certain of said passages.

5. A press platen as defined in claim **4** wherein each of said channels is connected between its associated inlet and outlet manifolds in series with a respective flow-control device.

6. A press platen for laminating presses and the like, comprising a flat horizontal body of substantially rectangular outline traversed by a multiplicity of parallel horizontal channels divided into at least a first and a second set of channels, the channels of said first and second sets being alternately interleaved; a first inlet manifold transverse to said channels communicating on one side of said body with said first set of channels for supplying a first fluid thereto; a first outlet manifold transverse to said channels communicating on the opposite side of said body with said first set of channels for removing said first fluid therefrom upon a single traverse of said body; a second inlet manifold transverse to said channels communicating on said opposite side of said body with said second set of channels for supplying a second fluid thereto; and a second outlet manifold transverse to said channels communicating on said one side of said body with said second set of channels for removing said second fluid therefrom upon a single traverse of said body; all said manifolds being rigid with said body and disposed within said rectangular outline thereof, said channels being futher divided into a third and a fourth set of channels provided with respective inlet and out-

let manifolds, the inlet manifold of said third set and the outlet manifold of said fourth set being disposed on said one side of said body, the remaining manifolds being disposed on said opposite side.

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