March 20, 1934. F. D. SPRAGUE 1,951,999

PRESS

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Fig. 2

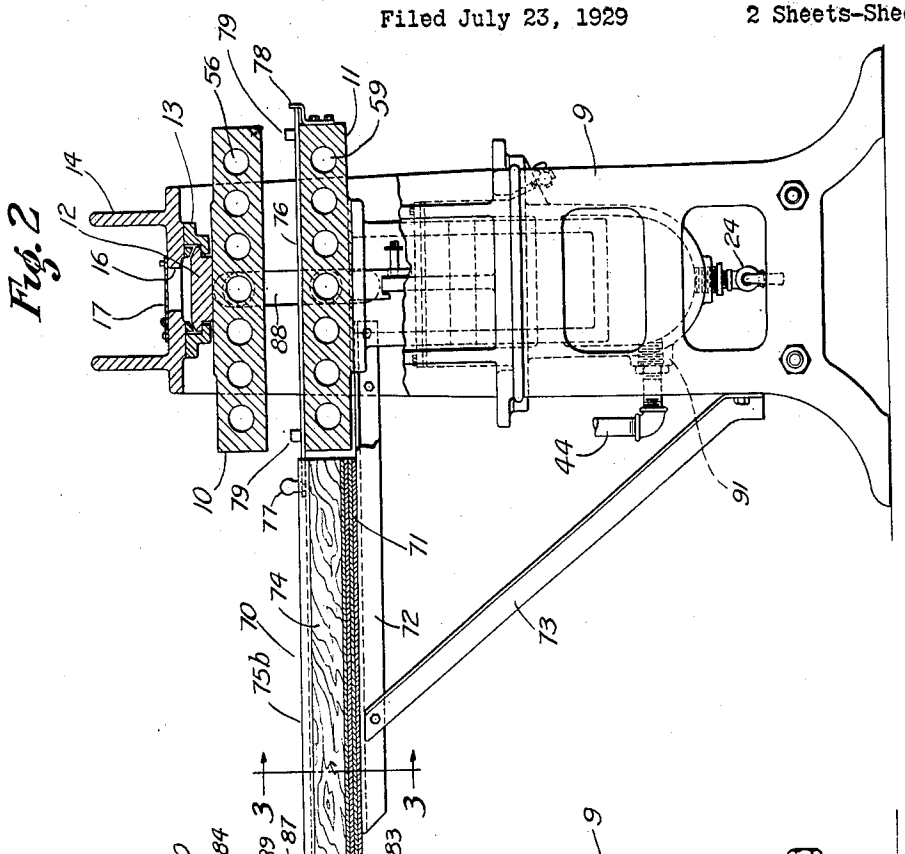
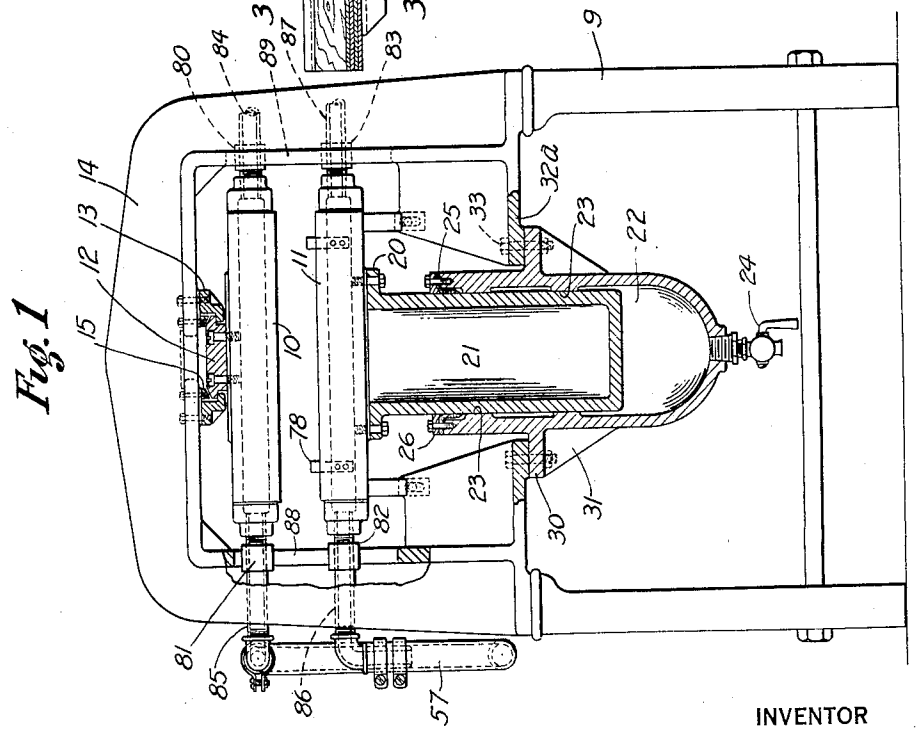


Fig. 1



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Fig. 7

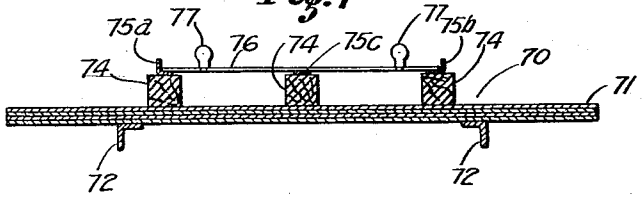


Fig. 6

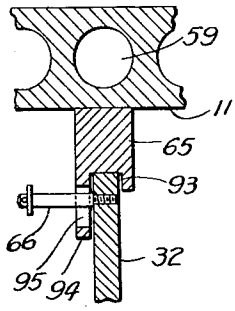


Fig. 5

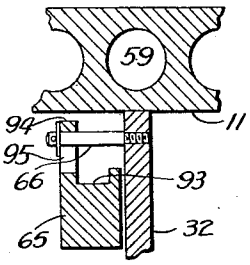


Fig. 3

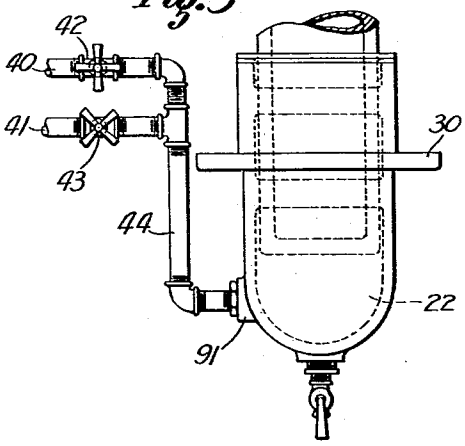
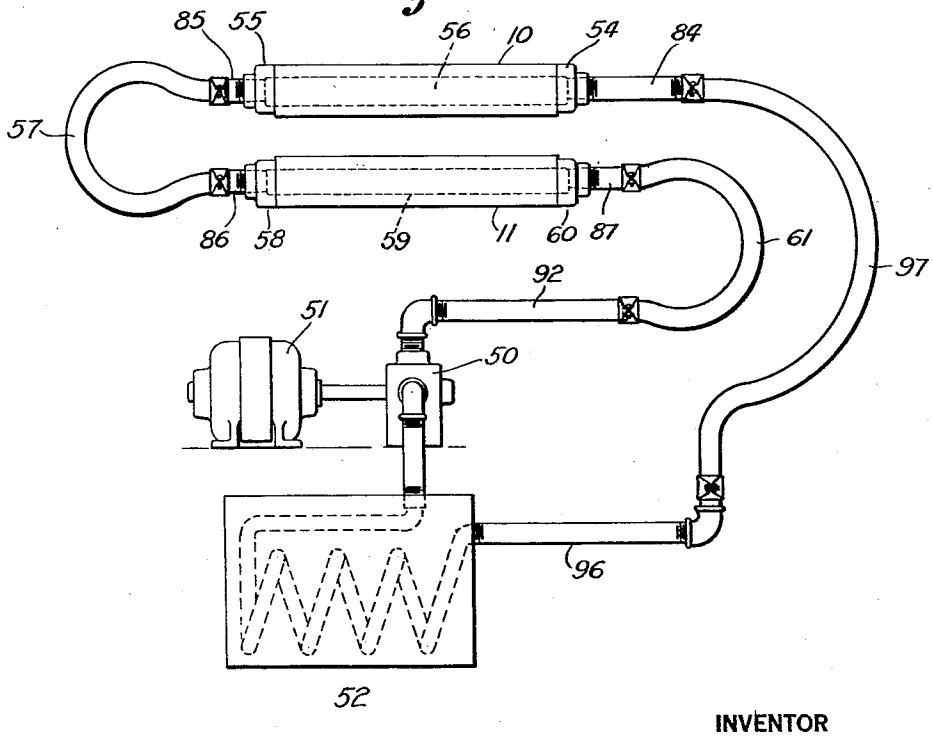


Fig. 4



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Patented Mar. 20, 1934

1,951,999

UNITED STATES PATENT OFFICE

1,951,999

PRESS

Frank Desmond Sprague, Quincy, Mass., assignor to Sprague Specialties Co., Quincy, Mass., a corporation of Massachusetts

Application July 23, 1929, Serial No. 380,348

1 Claim. (Cl. 18—17)

The present invention relates to presses and more particularly to a new and improved form of hydraulic press, having fluid-cooled pressing members.

Such presses have various possible applications one of which is in the manufacture of electrical condensers. Such condensers and their manufacture are described in various U. S. applications of Robert C. Sprague as Ser. No. 135,342 of September 14, 1926 now Patent 1,767,412, Ser. No. 331,292 of January 9, 1929 and Ser. No. 367,749 of June 1, 1929, and I shall illustrate my invention in connection with such manufacture.

In the manufacture of such condensers, at a certain stage thereof the condenser assemblies are withdrawn from a bath of impregnating medium and then rapidly pressed to a uniform thickness whereby a desired amount of impregnating medium is retained between the turns of the condenser and the excess thereof removed. To obtain good results the pressure has to be gradually applied and the pressing plates have to be maintained sufficiently cool.

It is therefore an object of my present invention to provide a hydraulic press whereby the pressure can be gradually applied.

A further object of the invention is to provide a sensitive and flexible control for such press.

A still further object of the invention is to provide fluid-cooled pressing plates so as to maintain them at a substantially uniform temperature irrespective of their repeated contact with the warm condenser units.

A still further object of my invention is to provide means to permit the articles to be pressed to a predetermined thickness.

A still further object of my invention is to provide means which permit accurate and convenient feeding of the articles to be pressed when moved into pressing position.

A still further object is to provide an adjustable stop to vary the downward movement of the movable press plate and thus vary the stroke of the press.

Further objects of my invention will appear as the description proceeds:

In the accompanying drawings which form a part of this application:

Figure 1 is a front elevation, partly in section, showing a press incorporating one form of my invention.

Fig. 2 is an end elevation of Fig. 1 with parts broken away and partly in section, also showing the loading mechanism for the press.

Fig. 3 is a fragmental side elevation showing the pipe connections to the press cylinder and their control valves.

Fig. 4 is a diagrammatic representation of the cooling means for the pressing members.

Figs. 5 and 6 are vertical sections showing one of the adjustable stops in its relation to the lower pressing plate 11. Fig. 5 illustrates the swinging blocks thereof in disengaged or lower position, and Fig. 6 in operative or upper position.

Fig. 7 is a transversal section of the loading table and feeding plate along line 3—3 of Fig. 2.

Detailed reference will now be made to the drawings in which same reference numbers designate corresponding parts.

The two pressing members of the press are a substantially stationary upper plate 10, and a reciprocally mounted lower plate 11.

The upper plate 10 is fixedly connected to a mushroom head 12 which is carried by an internally flanged collar 13 supported by a channel frame 14, which forms the upper part of a press frame 9. The upper surface of the mushroom head 12 is ground and lapped to fit a thrust-bearing ring 15 placed within the collar 13 and likewise attached to the channel frame 14. The mushroom head 12, the supporting collar 13, and the thrust ring 15 constitute a suitable universal thrust joint and bearing for the upper plate, well adapted to take the thrust exerted on this plate. An aperture 16 covered by a plate 17 permits inspection and lubrication of the component parts of the universal joint and bearing. It should be noted that the center of curvature of the under-surface of the thrust ring 15 is located on the under-surface of the upper plate 10.

The lower plate 11 is carried by and affixed to a flange 20 provided on the upper end of a hollow cylindrical piston plunger 21, which is reciprocally mounted in a cylinder 22.

The cylinder 22 is closed on its bottom and open at the top and is provided with internal annular guide surfaces 23—23 for the piston and also provided on its upper end with an annular packing 25 to prevent leakage of the motor fluid. The packing 25 is retained in place by a clamp ring 26. The cylinder 22 is provided on its lower end with a side inlet connection 91 and on its bottom with a draincock 24. The cylinder is provided with an exterior flange 30 reinforced by ribs 31, said flange being attached to horizontal structural members 32a of the frame 9 by means of bolts and nuts 33.

Parallelism of the plates 10 and 11 is insured by means of the universal joint and thrust-bearing

provided for plate 10 which have been previously described.

The control valves and piping for the supply and discharge of the motor fluid of the hydraulic cylinder 22 are illustrated in Fig. 3. A pipe 44 is connected with the opening 91 of the cylinder 22 and connected with a supply pipe 40 and a discharge pipe 41, these branch pipes being provided with a valve 42 and 43 respectively. The pipe 40 is connected with a suitable source of motor liquid under pressure, e. g. to a water supply having the proper hydrostatic pressure, while the pipe 41 connects with a suitable exhaust. The valves 42 and 43 may be of any standard design; for instance, globe or disc type; for precise control, however, a quick-opening valve is preferable.

Figs. 1, 2 and especially Fig. 4, illustrate an arrangement of the fluid-cooling system for the press plates 10 and 11.

A pump 50 driven by a suitable motor 51 supplies and circulates the fluid, which is cooled through a suitable cooling apparatus 52, which may be of any standard commercial type. From the cooling system the cooling fluid is delivered through a pipe 96 flexible connection 97 and pipe 84 to a manifold header 54 of the upper plate 10. The pressing plate 10 is provided with passages 56 interconnected with each other so as to form a continuous passage which terminates on one end in the manifold header 54 and on the other end in a manifold header 55. The manifold header 55 in its turn is connected through a pipe 85 with a flexible connection 57 and a pipe 86 with a manifold header 58 of the lower plate 11. Similarly to the upper plate the lower plate 11 is also provided with passages 59 interconnected with each other and connected on the two ends with the manifold header 58 and a manifold header 60 respectively. The manifold header 60 is connected by means of a pipe 87, with a flexible connection 61 and a pipe 92 to the intake of the circulating pump 50.

It is obvious that the direction of flow may be reversed if so desired without affecting the effectiveness of the system.

Lateral alignment of the two press plates 10 and 11 is governed by suitable means; for instance, by providing vertical slots 88 and 89 in the ribs 101 of the frame and providing the connection pipes 84, 85, 86 and 87 with bearing sleeves 80, 81, 82 and 83, which are guided in these vertical slots.

The press is adjustable to two different strokes by means which are shown in Figs. 1 and 2 and in detail in Figs. 5 and 6. These means consist of two blocks 65, which are pivotally mounted by means of pins 66 on ribs 32, extending inwardly from the press frame.

The block 65 is provided with a recess 93 and an extension 94, which is provided with an elongated aperture 95. The pin 66 is fixedly mounted on the rib 32 and passes through the aperture 95. It should be noted, however, that the elongated aperture 95 provides for sufficient slack to permit raising of the block 65 in excess of the height of the recess 93. Normally, as shown in Figs. 1, 2 and 6, the block 65 is placed on top of the rib 32, which fits in the recess 93. The block 65 thus forms an extension of the plate 32 and their combined height determines the lowermost position of the movable plate 11. When this plate is in its lowermost position the blocks 65—65 bear the weight of plate 11 and piston 21.

If better access to the plate is required, as for instance, for the purpose of cleaning, or if the stroke of the piston is to be increased as in the case where articles of greater thickness than is provided for by the upper position of the plate are to be pressed, the blocks 65 are brought in the position indicated in Fig. 5. As stated, sufficient slack is provided to permit raising of the block 65 so that its recess 93 disengages the top of the rib 32. The block 65 is then moved outwardly towards the head of the bolt 66 and swung downwardly to assume the position shown in Fig. 5. With the block 65 in the position as indicated in Fig. 5, the piston stroke is correspondingly increased and the weight of the plate 11 and the piston 21 in the lowermost position is carried by the upper face of the projection 32.

The loading platform assembly 70 on which the articles to be pressed are placed, and members of which carry these articles into the press, is shown in Fig. 2 and Fig. 7.

The platform assembly 70 comprises a laminated wood table 71, which is carried on and reinforced by angle irons 72—72. These angle irons are connected to the press frame both directly as well as by angular supports 73—73.

Mounted on the top of the plate 71 are three stringers 74—74—74, the outside stringers being provided with two inwardly facing angle irons 75*a* and 75*b* and the middle stringer with a flat bar 75*c*, and the angle irons 75*a* and 75*b* and the bar 75*c* forming guide rails for a metal feeding plate 76, preferably of a good heat-conducting material, as for instance brass. The plate 76 is shown as being of rectangular form and is provided with handles 77.

It should be noted that with the attachable stops 65—65 in the position indicated in Fig. 6 and the lower plate 11 resting on these stops, as shown in Fig. 2, the upper face of the plate 11 registers with the supporting surface of the guide rails 75*a*, 75*b* and 75*c*, and thus the feed plate 76 may be conveniently slid from the loading platform 70 on the lower press plate 11.

The press plate 11 is provided with stop lugs 78 which limit the motion of the plate 76, when slid under the press.

I shall now describe the operation of the press and for illustrative purposes shall refer to its application in the manufacture of electrical condensers.

Under normal conditions the discharge valve 43 is opened and the supply valve 42 is closed.

The piston 21 is depressed by the combined load of its weight, and that of the lower plate 11 and thereby forces out the excess motor fluid from the cylinder 22 through pipe 44, valve 43 via pipe 41. The plate 11 thereby rests on the stop blocks 65 as indicated in Figs. 1 and 2.

The condensers being removed from the impregnating bath, are laid upon the loading plate 76, this being preferably covered with a sheet of paper, and when the plate is loaded, the condensers are preferably covered with a second sheet of paper. The top surface of the guide rails 75*a*, 75*b* and 75*c* being flush with the upper face of plate 11, the feeding plate 76 is slid on the lower press plate 11 whereby the movement is arrested by the stop lugs 78.

The discharge valve 43 is now closed and the supply valve 42 opened which admits motor fluid under pressure to the hydraulic cylinder 22. Upon reaching the requisite value, the pressure in the cylinder raises the plunger 21 and the lower plate 11 and a continued application of pressure forces plate 11 and its charge of condensers

against the upper plate 10, whereby pressure is applied to the condensers and the excess impregnated medium is forced out.

In U. S. applications of Robert C. Sprague, Serial No. 266,921 of April 3, 1928; Serial No. 331,292 of January 9, 1929, and Serial No. 367,749 of June 1, 1929, there is described a manufacturing method whereby the condensers are not fully compressed, but only to a predetermined thickness, so as to obtain condensers in which a thin layer of dielectric medium is interposed between the layers of paper and metal, these layers having a substantially uniform thickness and dielectric strength throughout the whole condenser. If condensers are to be manufactured according to such method I provide means to limit the upward motion of the lower plate 11; for instance, by affixing stop pins or buttons 79 to the feed plate 76, the height of these stops corresponding to the thickness to which the condensers are to be pressed.

A large portion of the heat contained in the condensers is transmitted to the upper and lower plates 10 and 11, and therefore, as already stated, I prefer to provide cooling means, the temperature and rate of circulation being so determined as to maintain the plate at a suitable, comparatively low temperature. At the same time the heat dissipated by the plates 10 and 11 cools off the condensers during the pressing operation and contributes in obtaining thin interposed dielectric layers of the qualities above referred to.

While I have described a specific embodiment of my invention and have illustrated its use in the manufacture of electrical condensers, no limitations should be therefrom deduced. Various modifications in construction and various uses may suggest themselves without deviating from my invention. The appended claim should therefore be construed as broad as permissible in view of the prior art.

What I claim as new and desire to secure by Letters Patent of the United States is the following:

In a fluid-operated pressing device, a frame and an upper pressing plate loosely supported by same, a lower pressing plate movable towards the upper pressing plate, a slidable feeding plate adapted to be moved into pressing position on the lower pressing plate, guiding means for said feeding plates, and an adjustable stop for arresting the down movement of the lower pressing plate for its registration with the guiding means, said stop being adapted to be moved from such arresting position into a lower position, to increase the distance between the upper plate and the lower plate.

FRANK DESMOND SPRAGUE.