

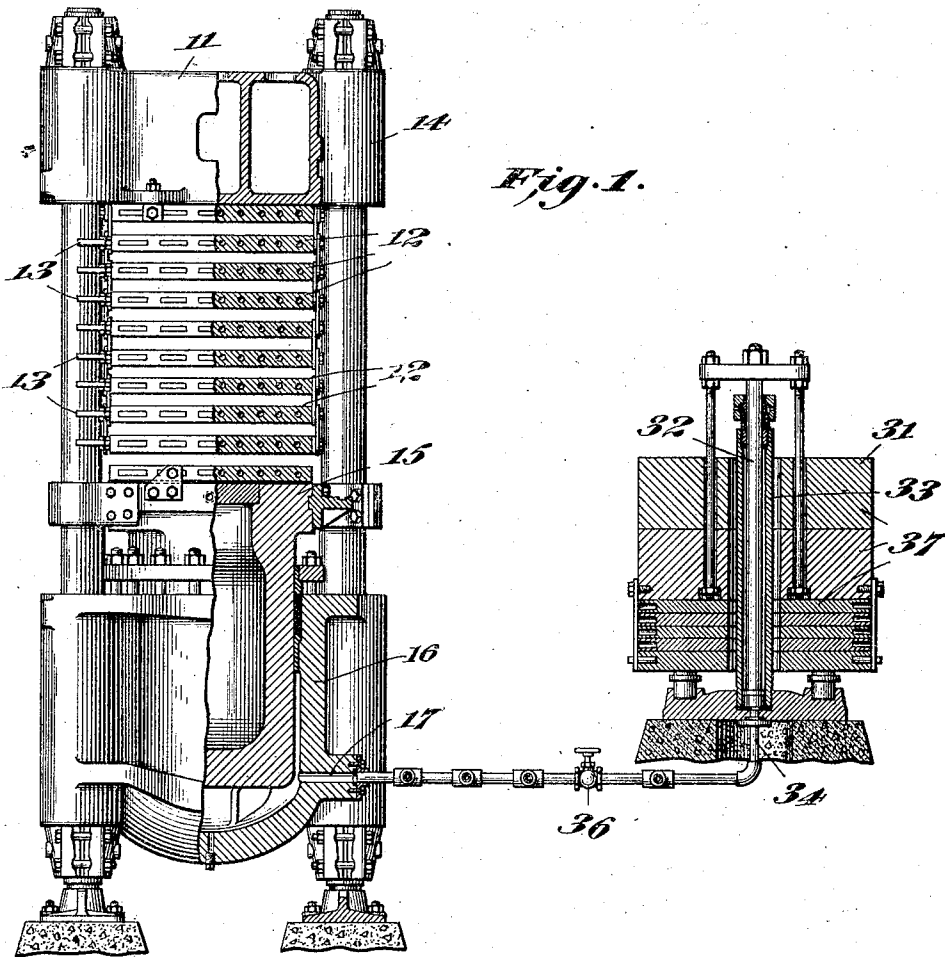
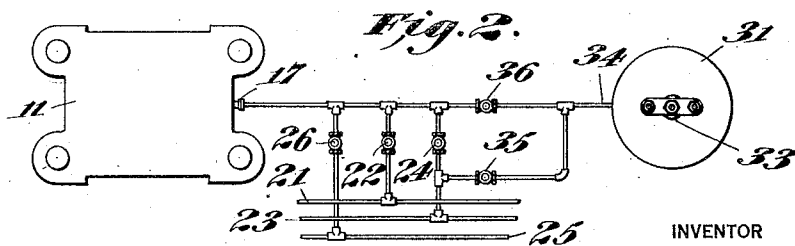
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FLUID PRESSURE SYSTEM FOR PRESSES

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UNITED STATES PATENT OFFICE.

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FLUID-PRESSURE SYSTEM FOR PRESSES.

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My invention relates to a method for controlling the pressure reduction due to leakage losses in a hydraulic system and is particularly applicable to hydraulic presses in which a sustained pressure is required to be applied to a heated body during the cooling and the corresponding contraction thereof.

In the manufacture, for example, of artificial resins and bone substitutes by the condensation of aldehydes and phenols, the condensation product is submitted to a predetermined degree of initial pressure. After said initial pressure has been applied the product is heated by steam or other convenient means and a substantially higher pressure is applied to the heated product for the desired period of time. During the subsequent cooling of the mass this higher pressure should be evenly maintained, but owing to the contraction of the mass in cooling, it is difficult to fully maintain the desired pressure. This condition is aggravated by the leakage losses inevitable in a hydraulic system. Furthermore, when a number of such presses are in use, their independent operation from a common main causes local fluctuations in pressure that are undesirable in a process of this nature.

The objects of my invention are, therefore, to overcome the effects of these fluctuations, to provide compensation for leakage losses and to insure a sustained pressure in the press, regardless of the contraction or deformation of the material under treatment. I attain these objects by interposing a small secondary or auxiliary accumulator between the hydraulic main and the press, said accumulator being of sufficient capacity to compensate for the predetermined displacement of the ram in the press due to the contraction or the deformation of the product, and also to compensate for such pressure leakage as might reasonably occur.

Apparatus made in accordance with my invention is illustrated in the accompanying drawings, forming a part of this application, in which:—

Fig. 1 is a view in elevation of a hydraulic press and an auxiliary accumulator with the necessary valve connections; and,

Fig. 2 is a diagrammatic view of same.

In Figs. 1 and 2, I show a hydraulic press 11 of the multiple hot plate type having a series of plates 12 with steam connections 13

equally spaced between the head of the press 14 and the ram 15, said ram operating in the cylinder 16 in the usual manner. The inlet 17 of the press cylinder is suitably connected to the hydraulic mains 21 and 23 through valves 22 and 24. It is likewise connected to the exhaust or return main 25 through the valve 26. The hydraulic mains 21 and 23 are intended for an initial or low pressure and a higher pressure, respectively.

I also show an auxiliary accumulator 31 of the usual type having a ram 32, a cylinder 33, an inlet 34 and counterweights 37. The inlet 34 of the accumulator is connected to the high pressure main 23 through the valve 35, being also cross connected with the press 11 through the valve 36.

In operation the material to be treated is loaded between the plates 12 of the press and a low pressure is admitted from the main 21 through the open valve 22, valves 24, 26, 35 and 36 being closed. After this initial pressure has been sufficiently applied, steam is circulated in the plates 12 through the steam connections 13 and the material is thereby heated. During the heating process a higher pressure is admitted to the cylinder from the high pressure main 23 by closing the valve 22 and opening the valve 24, valves 26, 35 and 36 remaining closed. When the maximum desired pressure has been attained communication between the press and the high pressure main is cut off by closing the valve 24 and this high pressure is admitted to the auxiliary accumulator 31 by opening the valve 35, valves 22, 26 and 36 remaining closed. As soon as the accumulator has filled to its capacity, the valve 35 is closed and the accumulator is placed in communication with the press by opening the valve 36, being kept in communication therewith during the heating and cooling periods of the treatment. During this time the valves 22, 24, 26 and 35 are kept closed thereby entirely isolating the press 11 and the auxiliary accumulator 31 from the pressure system. The contraction of the heated material during its cooling period is attended by a corresponding upward displacement of the press ram 15. Owing to the reserve of pressure in the auxiliary accumulator 31 said upward displacement of the press ram 15 does not involve a loss of pressure in the press cylinder 16. Likewise any pressure

leakage past the packing of the press ram is compensated by the reserve of pressure in the auxiliary accumulator.

On completion of the cooling period, the valve 36 is closed and the exhaust valve 26 is opened to release the pressure imposed on the material under treatment and effect the downward travel of the press ram.

While I have described a specific application of my invention, it will be evident to any one skilled in the art that this invention is widely applicable to any fluid pressure system where compensation is required for leakage losses or for local reductions in pressure, so as to effect the sustained application of a predetermined pressure. It is also evident that while I have herein described an application of my invention to a single hydraulic press, it is susceptible of application to a series of such presses so as to effect their independent operation. I, therefore, do not limit my invention to the specific purpose I have indicated nor to the specific combination of elements I have described.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:—

1. The combination, with fluid pressure operated mechanism, of an auxiliary accumulator, means for supplying fluid under pressure to said mechanism and to the accumulator, and means for connecting the accumulator with said mechanism.

2. The combination, with fluid pressure operated mechanism, of an auxiliary accumulator, first conduit means for supplying fluid under pressure to said mechanism, a

valve in the conduit means, second conduit means connecting the first conduit means with the accumulator, a valve in the second conduit means, third conduit means for establishing communication of the accumulator with said mechanism, and a valve in the third conduit means.

3. In combination with a fluid pressure system including a press, an auxiliary accumulator connected to the press, to compensate for pressure reduction in the latter, and means to selectively connect the accumulator to the press when the latter is isolated from the system.

4. In combination with a fluid pressure system, a press for effecting an accurately sustained pressure on a heated material during the cooling and contraction thereof, an auxiliary accumulator having a capacity in excess of the displacement of the press due to such a contraction, means to effect the independent entry of fluid under pressure to the press and to the auxiliary accumulator, means to cross connect the latter with the press and means to isolate both the press and the auxiliary accumulator from the fluid pressure system.

5. The combination with a fluid pressure main, of operated mechanism connected to the main, an accumulator connected to the main and to the mechanism, and valves for controlling the passage of fluid from the main to the mechanism and from the accumulator to the mechanism.

In testimony whereof I hereunto affix my signature this 21st day of August 1924.

JAMES PATRICK MADDEN.