

Nov. 18, 1930.

J. C. SOLBERG ET AL

1,782,103

HIGH PRESSURE HYDRAULIC PRESS

Filed May 4, 1928

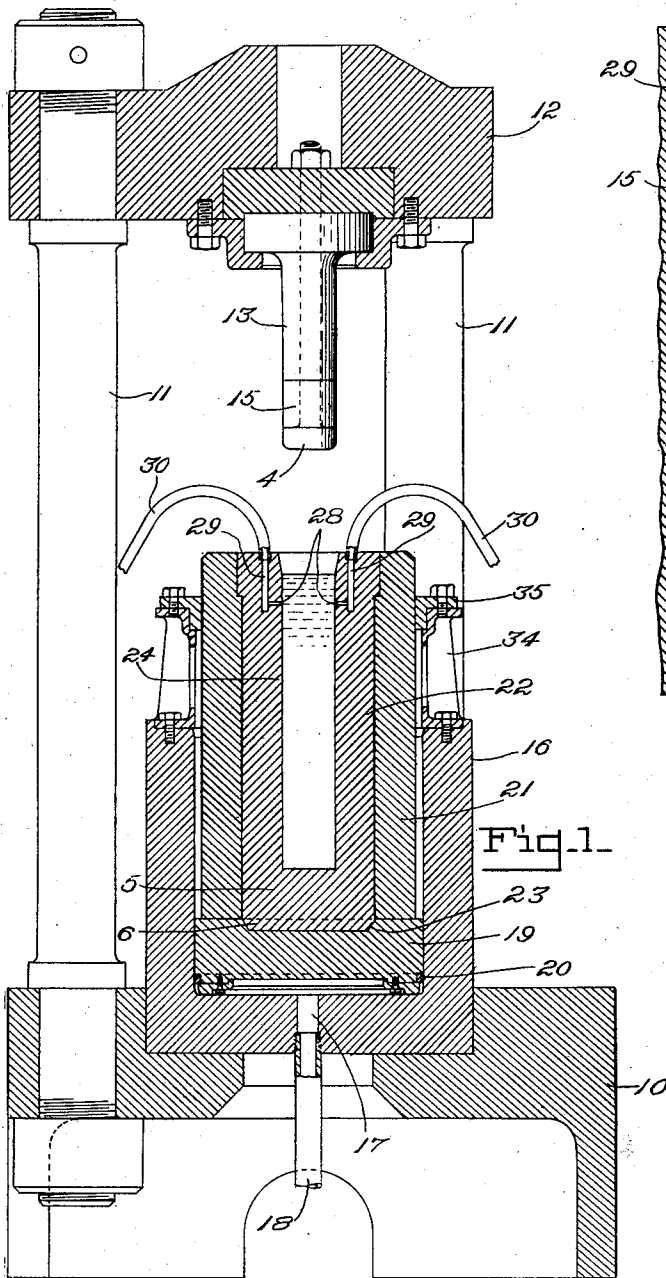


Fig. 1.

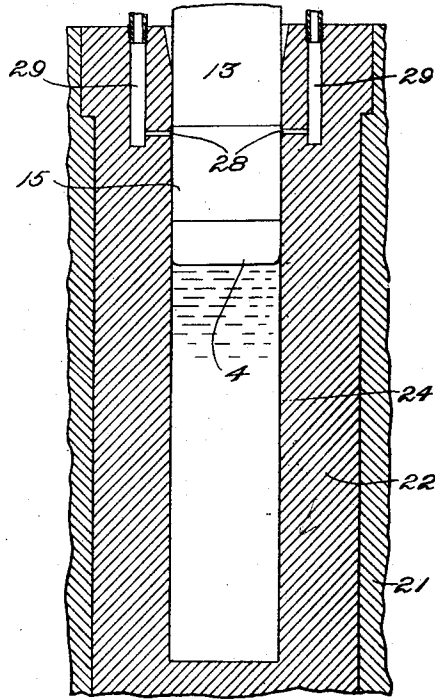


Fig. 2.

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UNITED STATES PATENT OFFICE

JOHN C. SOLBERG, OF ARLINGTON, AND FREDERICK C. LANGENBERG, OF WATERTOWN, MASSACHUSETTS, AND EDMUND M. SAWTELLE, OF NEW YORK, N. Y., ASSIGNORS TO ONEIDA COMMUNITY, LIMITED, OF ONEIDA, NEW YORK, A CORPORATION OF NEW YORK

HIGH-PRESSURE HYDRAULIC PRESS

Application filed May 4, 1928. Serial No. 275,228.

Our invention relates to hydraulic presses of a peculiar character intended particularly for use in applying high pressures. Presses of ordinary construction cannot be employed, for applying pressures of from 125,000 to 150,000 pounds. To make a hydraulic press commercially practical it is necessary that it be so constructed that the work can be put in place and removed quickly, and the pressure applied promptly; the press being capable of withstanding the great strains to which it is subjected; and that there shall be no leakage which will reduce the pressure beyond that necessary to accomplish the desired result. Our present invention has for its object a new and improved type of hydraulic press capable of use under these conditions. Such a press is capable of applying a pressure of 150,000 pounds per square inch to the work, can make at least twelve strokes an hour, and is durable and not likely to be injured in the course of operation.

The invention will be fully understood from the following description when taken in connection with the accompanying drawings and the novel features thereof will be pointed out and clearly defined in the claims at the close of this specification.

In the drawings:

Fig. 1 is a vertical section of a press embodying our invention.

Fig. 2 is a similar section of a part of the press, showing the ram after entering the bore of the cylinder.

The press embodying our invention includes a frame composed of a base 10, uprights or tie rods 11 and a head 12. To the head is secured the ram 13 provided with a movable plunger member 4 and a suitable packing 15 preferably constructed as shown and described in a prior application for United States patent for Fluid pressure intensifier filed June 12, 1925, by John C. Solberg, Serial No. 36,755. On the base 10 is placed a low pressure cylinder 16 having a port 17 connected with a pipe 18 which is connected with a so-called high pressure pump (not shown) ordinarily capable of delivering water under a pressure of 10,000 pounds to the square inch or thereabout.

Within the bore of the cylinder 16 is located a movable cylinder acting also as a piston which is built up from three pieces which are a piston head member 19 provided with a packing 20; a sleeve 21 and a cylinder lining 22, the lining 22 being provided with a bore 24 to cooperate with the ram 13. The head 5 of the lining 22 is integral with the walls thereof and is provided at its lower end with a tapered portion 6. The head 19 is provided with a similarly shaped depression 23 within which the tapered end of the lining is received. This construction centers the member 22 with relation to the piston head member 19 thereby aligning the parts coaxially and also tends to secure all the parts together, so that they will act as a unit in resisting the high pressures to which they are subjected. It will be seen that when water under pressure is introduced through the pipe 18, the movable cylinder will rise, the ram 13 will enter the bore 24 and subject the liquid contents to an intensified pressure which will in turn be transmitted to the work contained therein. Surrounding the sleeve 21 and carried by a spacing head 34 is a guide ring 35 which insures that the movement of the movable cylinder shall always be in line with the axis of the ram 13.

It will also be seen that the head 19 is of a larger diameter than the sleeve 21 and that the head makes a tight joint with the walls of the bore of the fixed cylinder 16 but that the sleeve 21 does not contact with the walls of the bore. By this construction the friction is materially reduced and the operation of the press is less affected by any elastic expansion of the lining 22 and sleeve 21 as a result of the tremendous pressure which is produced in the bore 24.

At a short distance below the mouth of the work chamber 24 there are located one or more radial ports 28 connected to vertical ports 29 which are themselves connected with pipes 30.

In the operation of the machine the work is placed in a suitable container which is lowered into the work chamber. The chamber is then filled with water to the top. Water under pressure is then supplied

through the pipe 18 to the interior of the low pressure cylinder 16. This raises the cylinder 22 rapidly since no substantial resistance is offered. When the end of the ram 4 enters the bore of the work chamber 24, the surplus water in the work chamber is ejected through the radial ports 28 and pipes 30. This permits the plunger to enter the bore quickly and easily and its downward movement can continue until the ports are passed. Thereafter no more water can escape from the work cylinder and the pressure is applied to the work. These ports and the provision for permitting the escape of water during the first part of the stroke of the press contribute greatly to the usefulness of the machine, since if the bore has no ports and is filled with water to the brim the piston plunger 14 is resisted before the packing has entered the bore and the packing is forced out horizontally and destroyed by the further upward movement of the cylinder. On the other hand, if the work chamber is not filled completely with water great care must be exercised that exactly the right amount of water is in the cylinder since otherwise the work will be injured. By the provision of the ports described and the pipes connecting them the safety of the press and the work is insured, and the press may be operated rapidly. Thereafter the pressure is released and the parts are permitted to return to their normal position. The work is then withdrawn from the work chamber.

What we claim is:

1. The improved pressure applying apparatus comprising a ram and cylinder cooperating with each other and capable of movement to cause the ram to enter or to be withdrawn from the bore of the cylinder, said ram having a packing thereon, said cylinder being provided with a port entering the side of the bore at a point distant from the mouth of the bore greater than the length of the packing on the ram.

2. The improved pressure applying apparatus comprising a ram and cylinder cooperating with each other and capable of movement to cause the ram to enter or to be withdrawn from the bore of the cylinder, said ram having a packing thereon, said cylinder being provided with a port entering the side of the bore at a point distant from the mouth of the bore greater than the length of the packing on the ram, said port emerging through the end face of said cylinder.

3. The improved pressure applying apparatus comprising a fixed ram, a fixed cylinder, a movable cylinder within said fixed cylinder acting as a piston therein, said movable cylinder being composed of a sleeve, a closed ended lining within said sleeve adapted to receive said ram, and a separate head closing one end of the sleeve, said head having a diameter greater than the exterior di-

ameter of the sleeve and provided with packing making a tight joint with the bore of the fixed cylinder, and means for centering said lining on said head with respect to said ram.

In testimony whereof we affix our signatures.

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