

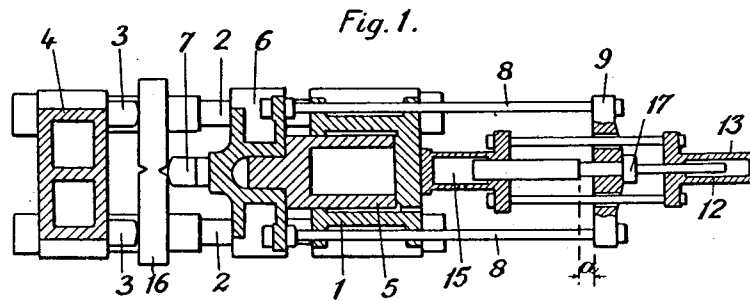
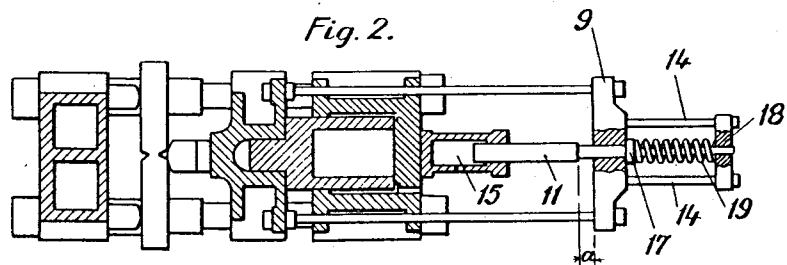
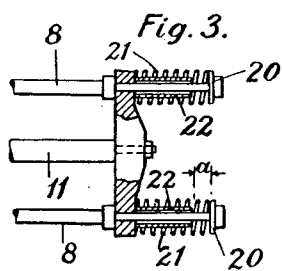
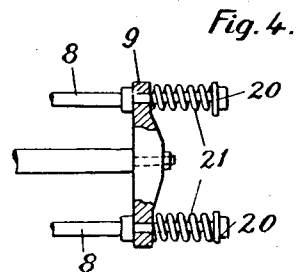
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HYDRAULIC PRESS

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HYDRAULIC PRESS.

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Before steel blocks or the like are machined or otherwise operated upon, they are often first broken in the use more particularly of hydraulic presses by means of which the blocks are notched and then broken. During this operation all the parts which are under pressure, such as the crossheads, tension bolts and cylinders, are subjected to extremely high stresses. As the blocks break there is a sudden release of the load more particularly from the ram, because at the moment of breaking all resistance offered to the elements subjected to the load ceases. The pressing element, namely the ram, together with the broken block then travels, with very great speed, over a shorter or longer distance in the direction of the fracture. Presses of the type referred to are usually provided with a special return piston, which is firmly connected to the ram. This construction has the disadvantage that as the ram continues to move forward at a great speed, the return piston is carried forward in the return cylinder at the same speed. Thus the return piston must, for the fraction of a second, force water under pressure back through the conduit. The result is that there is momentarily an extremely high pressure in the return cylinder, so that fracture of the cylinder or of the rods of the return mechanism frequently occur.

According to the invention the ram and the return piston are movable with respect to each other within certain limits, and are so disposed with respect to each other at the moment of fracture that the ram may freely continue its movement. Presses of this type which are provided with a feed piston for adjusting the ram are advantageously so constructed that the relative disposition of the ram and the return piston which is necessary for the free movement of the ram is effected by means of the feed piston.

It is obvious that the apparatus, according to the invention is not limited to the construction hereinbefore described; for example the before mentioned adjustment between the ram and the return piston can be effected by means of springs in various ways, and it is also possible to provide resilience between the ram and the return piston without departing from the invention.

In the accompanying drawing several types of construction of apparatus according to the

invention are illustrated diagrammatically, by way of example:

Figure 1 shows a construction of press with a special feed piston, and

Figures 2, 3 and 4 illustrate the spring mechanism referred to.

In carrying the invention into effect as illustrated in the accompanying drawing the pressure cylinder 1 is connected to the crosshead 4 carrying the abutments 3 by the tension members 2. The ram 5 is provided in the cylinder 1 and has mounted upon it the crosshead 6, which is provided with the breaking tool 7. The crosshead 6 is connected to a second crosshead 9 by the rods 8, which are guided in the casing of the cylinder 1, and in the crosshead 9 is fitted the rod 10 of the return piston 11. This rod 10, as will be seen from Figure 1, is movable in the crosshead 9 through a distance which is shown in the drawing as *a*, and its rear portion serves as the plunger within the feed cylinder 13.

The press which is hereinbefore described operates as follows:—

After the work 16 has been notched by means of the press, the ram 5 is in the retracted position, the return piston 11 lying against the crosshead 9. In order to fix the work 16 between the abutments 3 and the breaking tool 7, the piston 12 is moved forward. The collar 17, which limits the movement of the return piston 11 with reference to the crosshead 9, thus comes to lie in position against the crosshead 9, thus causing the ram 5 with the breaking tool to move forward and to place the tool against the work 16. In moving, the return piston 11 traverses the distance *a* with respect to the crosshead 9, so that when pressure is applied to the ram it moves forward without affecting the return piston. This causes the work to break and the load upon all the working parts is suddenly relieved. The ram moves forward with very high velocity, and the clearance between the crosshead 9 and the return piston 11 is such that the crosshead 9 does not strike against the piston 11. The ram 5 thus moves forward freely, without producing in the return cylinder 15 the dangerous effects due to pressure hereinbefore mentioned. The return of the ram 5 is then effected by applying pressure to the return piston 11, which then

moves into contact with the crosshead 9 and draws back the crosshead 6 and the ram 5 by means of the rods 8. When the ram is again thrust forward to repeat the breaking operation, the return piston 11 has, as hereinbefore described, previously moved through the distance a with respect to the crosshead 9, so that when the work is broken the ram may travel freely through a distance equal to a .

10 The press made in accordance with Figure 2 operates in a manner similar to the foregoing. In this case the feed piston 12 is omitted and a spring 19 is disposed between the collar 17 and a crosshead 18 connected by the rods 14 to the crosshead 9, the spring having for its object to force the return piston 11 into the cylinder 15, that is to say, to move the collar 17 against the crosshead 9.

20 Figures 3 and 4 illustrate further constructions in accordance with the invention in which springs are used. In Figure 3 the return piston 11 is firmly connected to the crosshead 9. The rods 8 pass slidably through the crosshead 9 and are provided with heads 20 by which the pressure of springs 21 is taken. 25 Between each spring 21 and the part of the corresponding rod 8 which passes through the crosshead 9 there is provided a sleeve 22, the outer end of which is disposed at the distance a from the head 20 of the rod 8.

30 In this arrangement the operation is such that at the moment the block is broken, the ram 5 moves forward unimpeded by overcoming the tension of the spring, so that when the withdrawal of the ram 5 is effected, the heads 20 lie against the respective sleeves 22 and thus move the ram back into the initial position.

The arrangement according to Figure 4

operates in similar manner. In this case the sleeves 22 are omitted and between the crosshead 9 and each head 20 there is merely provided a strong spring 21 which, it will be quite clear, makes possible the desired relative movements between the rods 8 and the crosshead 9 and therefore, also the free movement of the ram 5 at the moment the work is broken and the springs must be of such dimensions that by their means the ram can be caused to return. In such a case the compressibility of the springs has the same purpose as the clearance a in the other constructions hereinbefore described.

I claim:—

1. A hydraulic press for breaking metal blocks comprising a ram, a return piston, cylinders for the ram and piston, and connecting means between the ram and piston permitting the ram to move forwardly to a limited extent without moving the piston. 40

2. A hydraulic press for breaking metal blocks comprising a ram, a return piston, cylinders for the ram and piston, connecting means between the ram and piston permitting the ram to move forwardly to a limited extent without moving the piston, and means for moving the ram and the return piston forwardly together to engage the work. 45

3. A hydraulic press for breaking metal blocks comprising a ram, a return piston, cylinders for the ram and piston, a cross-head connected to the ram, connecting means between said piston and cross-head permitting the former to move back and forth relatively to the cross-head to a limited extent, a feed cylinder, and a piston in the feed cylinder connected to the return piston. 50

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