

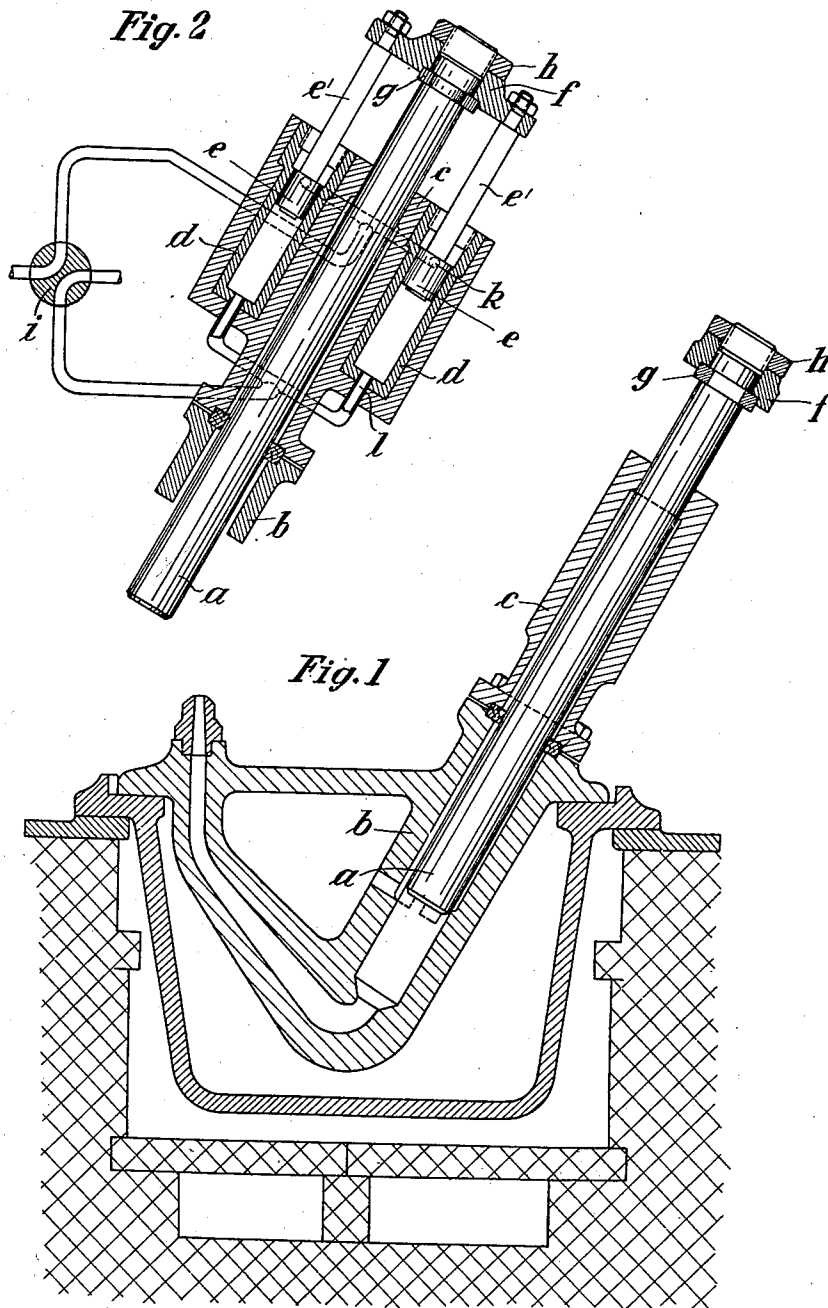
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PRESSURE CASTING APPARATUS

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## PRESSURE-CASTING APPARATUS

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This invention relates to pressure-casting apparatus of the hydraulic plunger type and to a method of operating such apparatus.

When working with metals of high melting point in casting apparatus of the plunger type in which the plunger is in constant contact with the molten metal when the apparatus is in use, certain drawbacks frequently arise. Thus, on prolonged use, the plunger seizes in its guide sleeve and this becomes particularly troublesome when the seizing occurs during the delivery stroke of the plunger and the return thrust of the hydraulic medium is insufficiently powerful to free the plunger and force it back into its initial position. Another inconvenience is that after prolonged use, the play between the plunger and the sleeve is gradually increased to such an extent that work can no longer be continued without prejudice to the quality of the castings.

In both cases it is necessary to change the plunger, and this, in the case of apparatus in which the plunger is directly connected with the operating hydraulic cylinder (that is, without intermediate levers, plate connectors or the like) entails the complete dismounting of the pressure unit operating the plunger, and frequently of the melting apparatus as well.

The present invention aims at obviating these inconveniences.

To this end, the invention provides in a pressure-casting apparatus of the type in which the plunger is in contact with the molten metal, a construction in which the plunger is actuated by a cylinder located on the pressure chamber and the hydraulic pressure is applied not directly to the plunger but to lateral means attached thereto, thus enabling the plunger to be detached from the actuating mechanism and replaced without dismounting the latter.

By suitably designing the lateral means as differential pistons, this arrangement also enables the seized plunger to be withdrawn and replaced in any circumstances.

In carrying out the invention, the plunger may, for example, be detachably mounted (for example, by wedging) in an annular piston on which the hydraulic force acts.

In a particularly suitable embodiment of the invention, two pressure cylinders may be disposed laterally of the plunger and secured to its guide, said cylinders housing two pistons operating synchronously and under equal pressure and being connected to the working plunger by means of a cross-head.

This latter embodiment is illustrated by way

of example in the accompanying drawing, in which:—

Fig. 1 represents the whole of the pressure unit in the casting machine; and

Fig. 2 is a detail of the pressure unit on a larger scale.

In the charging position, the working plunger *a* is situated in the pressure chamber *b*, on which the hydraulic unit *c* is directly mounted. Said unit *c* is provided with a central bore for the passage of the working plunger, on either side of which are the two symmetrically disposed hydraulic cylinders *d* housing pistons *e* of equal dimensions and connected by means of piston rods *e'*, in a rigid but detachable manner to a cross-head *f* which in turn is connected to the working plunger *a* by two divided rings *g* and a nut *h*.

By selecting piston rods *e'* of relatively large cross sectional area, the effective areas of the upper faces of the pistons *e* to which the positive injection pressure is applied can be made smaller than those of the lower faces receiving the pressure for the return stroke, so that the pistons *e* act as differential pistons.

The plungers are controlled by the distributor *i*, the pressure medium being admitted into the hydraulic cylinder through a port *k* for the downstroke of the working plunger, and through a port *l* for the return stroke.

The machine is operated in the following manner:—

By suitably setting the distributor *i*, the pressure medium enters the hydraulic cylinders *d* at *k*, whilst the port *l* is open to exhaust. In consequence of the rigid connection between the two hydraulic pistons *e* and the working plunger *a*, this latter descends, so that the molten metal is injected through the nozzle of the pressure chamber into the mould. On the distributor *i* being reversed, the pressure in the hydraulic cylinders *d* is also reversed; the pressure then acts on the larger faces of the pistons *e*, so that the force applied to the working plunger for the return stroke is substantially greater than that for the injection stroke. Hence, although the working plunger may occasionally seize in its guide during the injection stage, it can be returned to its initial position, in any circumstances, when the pressure is reversed for the return stroke.

The working plunger *a* can be replaced, in an extremely simple manner, by unscrewing the nut *h* and the divided rings *g*, whereupon it can be drawn out, at once, through the cross-head *f*, and replaced by another.

## I claim:—

1. In a pressure-casting apparatus of the class described comprising a working plunger, a pressure-applying mechanism including a plurality of fluid-pressure cylinders disposed laterally with respect to said plunger, pistons movably mounted within said cylinders, piston rods secured to said pistons, said piston rods and plunger being connected to a cross-head, the connection between the cross-head and plunger incorporating a split ring and nut whereby the plunger may be withdrawn through the cross-head.

2. In a pressure-casting machine of the character described having a working plunger, a pressure-applying mechanism including pressure cylinders radially disposed with respect to said plunger, said cylinders having their axes parallel to the axis of the working plunger and equidistant therefrom, pistons provided with piston rods movably mounted within the cylinders, a cross-head attached to said piston rods, a central aperture in said cross-head adapted to receive the plunger and permit the same to pass therethrough, a reduced threaded end on said plunger providing a shoulder, said shoulder being adapted to support a split ring, said split ring and a nut in threaded engagement with the reduced end of the plunger being adapted to clamp the plunger to the cross-head.

3. A pressure-applying mechanism for a pressure-casting machine having a working plunger, comprising a plurality of pressure cylinders dis-

posed equidistant from said working plunger, said pressure cylinders and working plunger having parallel axes, pistons within said pressure cylinders, said pistons being provided with piston rods secured to a common cross-head, a central plunger-receiving aperture in said cross-head, said aperture being adapted to receive the working plunger and permit the same to pass there-through, a groove in said working plunger adapted to receive halves of a split ring, said split ring constituting a laterally extending shoulder for bearing abutment against the cross-head, and a clamping nut in threaded engagement with the extreme end of the working plunger adapted to draw the split ring into clamped relationship with the cross-head.

4. In a pressure-casting apparatus of the class described comprising a working plunger, a pressure-applying device including a plurality of fluid-pressure cylinders disposed laterally with respect to said plunger, pistons mounted within said cylinders, piston rods secured to said pistons, a cross-head connected to said piston rods, said cross-head having an opening therethrough, said plunger being disposed in said opening, said opening being larger than the greatest cross-section of the part of the plunger below said cross-head whereby said plunger is adapted to be withdrawn therethrough, and detachable means associated with said plunger and said cross-head for securing the plunger to the cross-head.

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