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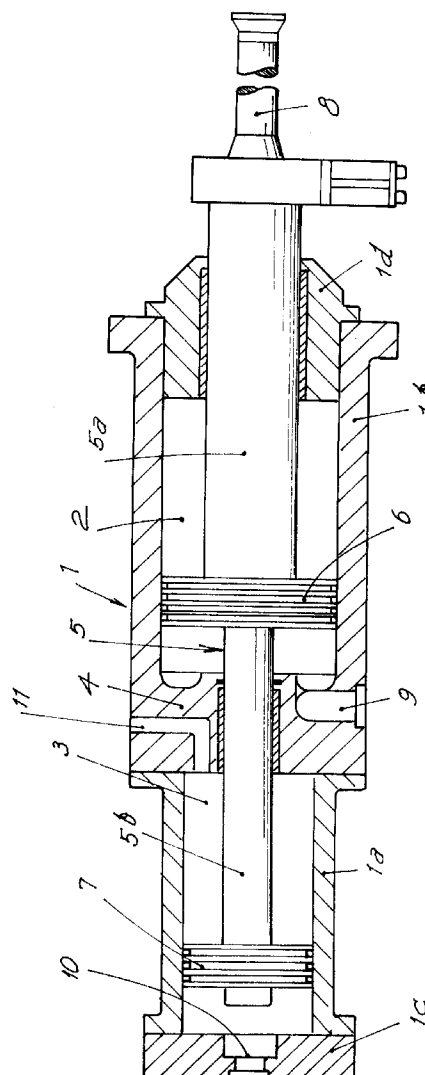
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(54) **Improvements in cylinders for aluminium extrusion presses.**

(57) They apply to presses having multiple cylinders with combined fluid-dynamic actuating pistons for forcing the aluminium inside the die ; the improvements are characterized in that the multiple cylinders comprise at least two coaxial chambers or cylinders (2,3) for the corresponding pistons (6,7), said pistons being arranged in tandem on a common shaft (5) which passes through both chambers (2,3) and which is connected by its protruding end (8) to the impeller actually forcing the aluminium inside the mould.

They provide a pressure multiplier system of simple construction, small volume and high efficiency.

FIG. 1



The present invention relates to improvements in the impulsion cylinders of aluminium extrusion presses, by the application of which the construction of such cylinders is simplified significantly, and so is that of the extrusion press in general, giving rise to a considerable reduction in the total volume of the machine and a large energy saving in its operation.

BACKGROUND OF THE INVENTION

As is well known, aluminium extrusion presses force the aluminium, which has a suitable degree of fluidity, by exerting pressure with at least one cylinder, generally fluid-dynamic (hydraulic or the like), the external end of whose rod is joined to the actual impeller which forces the aluminium inside the die.

The problem arising in this type of press is always related to the power or pressure which is necessary for the correct impulsion of the aluminium, forcing constructors to provide the press with secondary cylinders for high speeds, complementary to the master cylinder, in order to add forces and achieve the pressure and speed which are necessary for correct operation.

Nevertheless, this arrangement of independent cylinders implies the construction of independent casings for each of them, which means the machine must have a large volume, and at the same time complicates to a large extent the supply of actuating fluid, in particular when it is considered that all of the cylinders, both the master one and the secondary or complementary ones, have to be of the double-acting type and as such supplied by double pressure and return circuits.

Another disadvantage of this type of multiple cylinder arrangement arises from the difficulty in achieving accurate synchronization between the movements of each of the cylinders, leading to uncertainty regarding correct operation.

DESCRIPTION OF THE INVENTION

The improvements which form the object of the present invention therefore relate to presses provided with multiple cylinders and tend to alleviate the drawbacks indicated above, providing a pressure multiplier system which is simple and small in volume but has high efficiency.

To this end, the improvements are characterized in that the multiple cylinders comprise at least two actual chambers or cylinders, which are coaxial, for the corresponding pistons, said pistons being arranged in tandem on a common shaft which passes through both chambers and which is connected outside said chambers to the actual impeller which forces the aluminium inside the mould, said mould being of conventional construction and not affecting the present invention.

Advantageously, said actual chambers or cylinders have different diameters, the cylinder of larger diameter corresponding to the first piston, taking the end of the rod which is connected to the impeller as a reference, said cylinder being of the single-acting type, to which end a port for the inlet and discharge of actuating fluid is provided in said chamber behind the piston, whilst the other chamber or chambers are smaller in diameter and are of the double-acting type, such that they, and in particular the last of them, are provided with two independent inlet and discharge ports for the same purpose.

In a preferred embodiment the cylinder has only two chambers of the type described, said chambers being of different diameters, one of them having an inlet and discharge port behind the piston of greater diameter and the other with ports placed respectively in front of and behind the corresponding piston of smaller diameter.

The coaxial shaft of both pistons slides through the walls of the respective chambers by means of friction sleeves, while the piston slides by means of conventional sealing rings, in order to prevent the loss of actuating fluid.

In another advantageous embodiment the double cylinder is hydraulic and the diameter of the coaxial shaft is also different in each of the chambers, depending on the pressure in each of them.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the present invention be better understood, the accompanying drawings show by way of non-limiting example one practical embodiment of a cylinder constructed according to the improvements which form the object of the invention.

In said drawings, figure 1 is an axial section view of a cylinder according to the invention, and figure 2 represents an elevation view of an aluminium extrusion press provided with a cylinder according to the previous figure.

DESCRIPTION OF A PREFERRED EMBODIMENT

As can be seen in figure 1, the multiple cylinder comprises a casing 1 consisting of two intermediate elements 1a and 1b and two caps 1c and 1d to make it easier to machine. It is divided internally into two chambers or cylinders 2 and 3, of different diameters, by an intermediate wall 4 through which a shaft 5 passes, the shaft being similarly divided in two sections 5a and 5b, also of different diameters, onto which corresponding pistons 6 and 7 are fitted. The shaft 5 passes through the wall 4 and the cap 1d, guided by anti-friction metal sleeves, and is connected externally to the arm 8, which is to be connected to the impeller for the aluminium of the press, as is shown diagrammatically in figure 2. The pistons 6 and

7 are provided with conventional sealing rings so that they fit inside the chambers 2 and 3.

As can be seen, the pistons 6 and 7 are assembled on the respective sections 5a and 5b of the shaft 5 in a tandem arrangement and the chamber of greater diameter 2, placed upstream, has a single port 9 for the inlet and discharge of the actuating liquid, said liquid acting under pressure only in the region of chamber 2 which is located behind the piston 6, in the manner of a single-acting cylinder.

The second chamber 3, on the contrary, which is of smaller diameter and situated behind the first cylinder, is connected to two ports 10 and 11 which are respectively designed for the inlet of liquid under pressure and the discharge thereof, during the movements of pressure actuating and return of the piston 7 and, correspondingly, of the piston 6.

The tandem arrangement of both pistons 6 and 7, combined with the operation as single and double-acting cylinders respectively, constitute the real novelty of the improvements which form the object of the invention, defining, by means of the difference in diameters, a pressure multiplier system, the pressure being the sum of the two pressures originated in each chamber or cylinder 2 and 3. The system has a minimum consumption of energy and hydraulic fluid, by taking advantage of the actuation of the second piston 7 to bring about its own return together with that of the piston 6.

Furthermore, it should be pointed out that this tandem arrangement on a common shaft helps the synchronized actuation of both pistons 6 and 7, this being difficult to achieve with independent cylinders, as has been the case until now.

Obviously, the arrangement of the cylinder 1 in a single casing also constitutes a significant reduction in volume of the assembly and of the press in general. This can be seen in figure 2, since the cylinder 1 is totally integrated with the structure of the machine, as if there were only one single cylinder, but with the advantages of tandem operation that have been indicated above.

As can be seen, the hydraulic fluid under pressure is supplied to both cylinders from a common tank 12 via the respective conduits 13, 14, ..., which are connected to the corresponding ports 9, 10, 11.

Both the press itself and its constituent parts are of conventional type, according to the prior art, and are not further described herein in order not to complicate the description of the improvements, which are limited to the specific constitution of the cylinder 1 as a result of applying the improvements which form the object of the invention.

It is therefore understood that all details regarding the assembly of the various constituent parts of which the cylinders thus constructed are made, as well as the type of aluminium extrusion press to which they are applied, the materials, shapes and dimen-

sions, are independent of the object of the invention providing that they do not alter the constitution of said cylinders according to the improvements described.

Claims

1. Improvements in the cylinders for aluminium extrusion presses which comprise multiple cylinders with combined fluid-dynamic actuating pistons for forcing the aluminium inside the die, characterized in that the multiple cylinders comprise at least two coaxial chambers or cylinders (2,3) for the corresponding pistons (6,7), said pistons being arranged in tandem on a common shaft (5) which passes through both chambers (2,3) and which is connected by its protruding end (8) to the impeller actually forcing the aluminium inside the mould.
2. Improvements according to claim 1, characterized in that the cylinder (2) corresponding to the first piston (6) has a greater diameter and is of the single-acting type, to which end a port (9) for the inlet and discharge of actuating fluid is provided in said chamber (2) behind the piston (6), whilst the other chamber or chambers (3) are smaller in diameter and are of the double-acting type, such that they, and in particular the last of them, are provided with two independent ports (10,11), both for the inlet under pressure and discharge of said fluid, for the same purpose.
3. Improvements according to claims 1 and 2, characterized in that the cylinder has only two chambers (2,3) of the type described, of different diameters, one having an inlet and discharge port behind the piston of greater diameter (6) and the other having ports (10,11) respectively arranged in front of and behind the corresponding piston of smaller diameter (7).
4. Improvements according to claims 1 to 3, characterized in that the double cylinder (1) is hydraulically actuated and the coaxial shaft (5) comprises two sections (5a,5b) which have also different diameters in each of the chambers (2,3), depending on the pressure in each of them.

FIG. 1

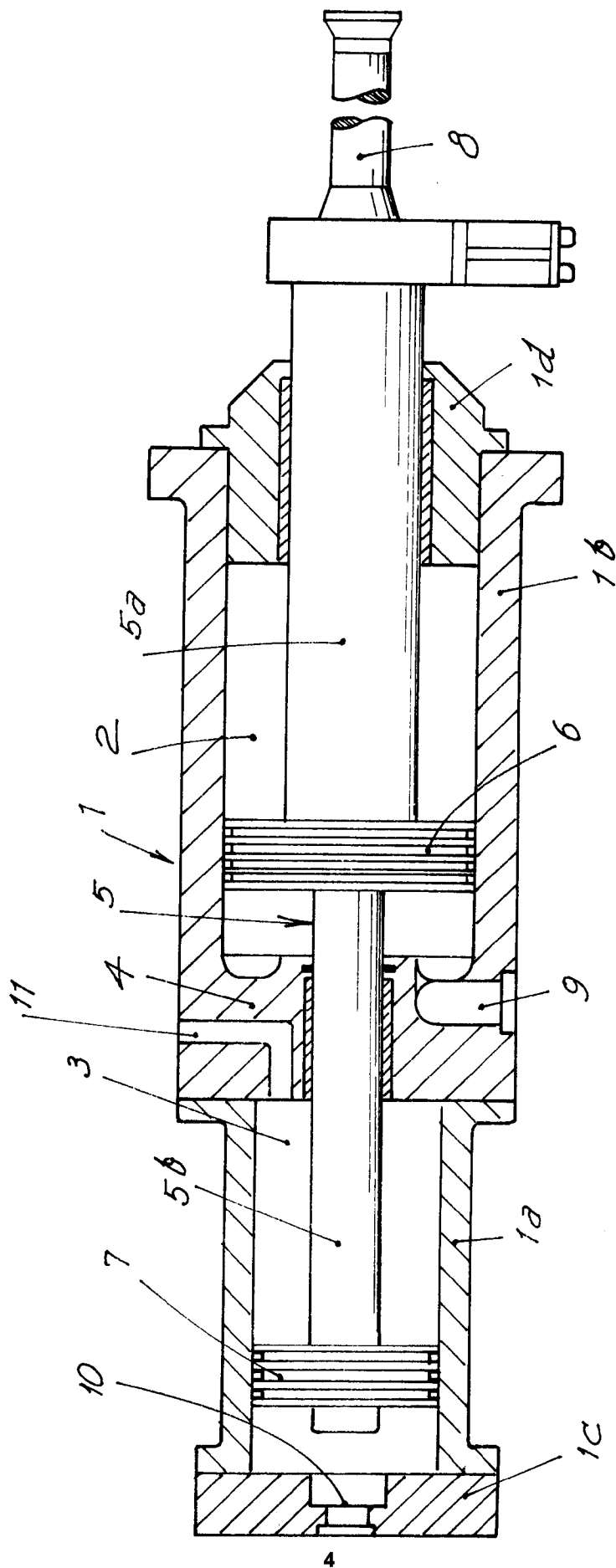
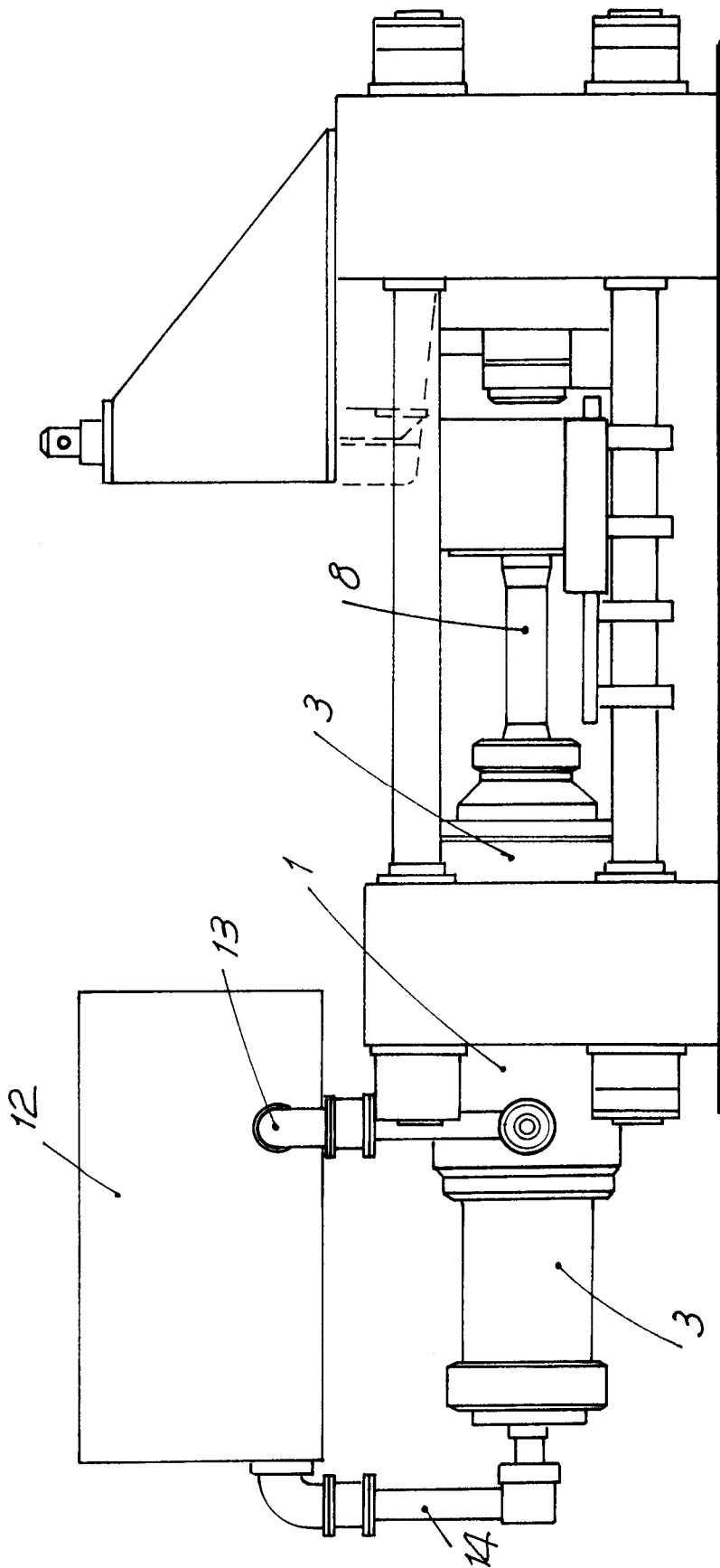


FIG. 2





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 50 0083

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	US-A-2 753 847 (REYNOLDS) * claim 1; figures 3,4 * ---	1,4	B21C23/21 B30B11/26
A	DE-A-14 52 314 (HYDRAULIK GMBH) * claim 1; figure 2 * ---	1	
A	US-A-3 243 984 (HOFFMANN) * claim 1; figure 2 * -----	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.5) B21C B30B
Place of search BERLIN		Date of completion of the search 11 July 1994	Examiner Schlaitz, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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