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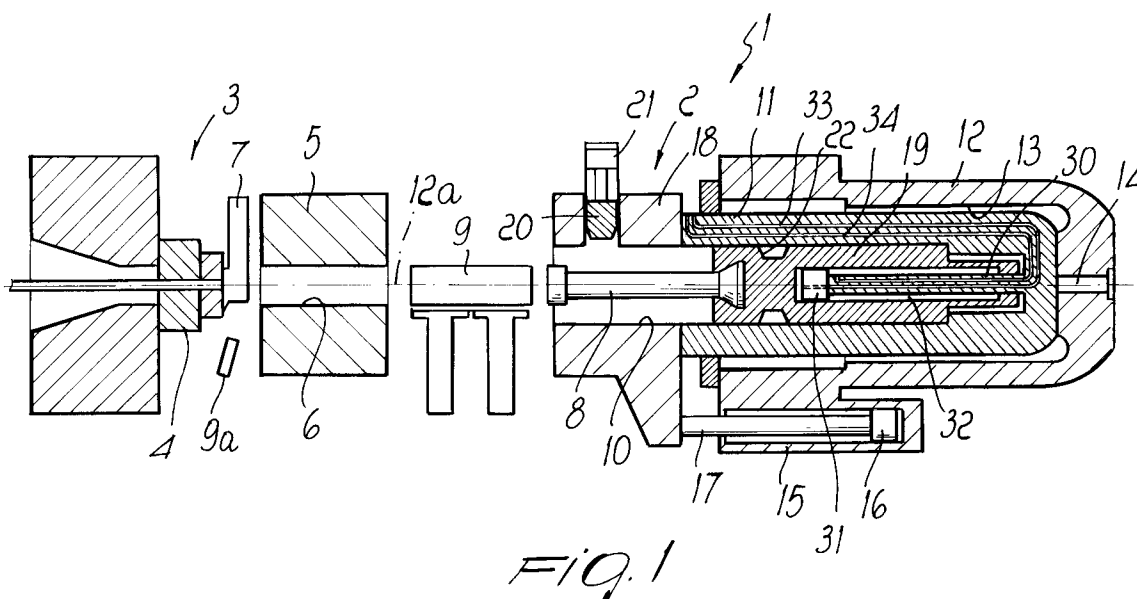
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I-20123 Milano (IT)(54) **Press for extruding nonferrous alloys.**

(57) Press (1) for extruding nonferrous alloys, including a presser element (2) which has, at one of its ends, a presser mandrel (8) facing an extrusion head (3). The presser element is movable by command towards or away from the extrusion head to extrude, through the extrusion head, a billet (9) of material which is interposed between the presser mandrel and the extrusion head. A seat (10) for accommodat-

ing the presser mandrel is provided in the presser element starting from its end directed towards the extrusion head, and the mandrel can move with respect to the presser element to be at least partially accommodated inside the presser element during the movement of the presser element away from the extrusion head.

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The present invention relates to an improved press for extruding nonferrous alloys, which features a reduced stroke.

Presses are known for extruding nonferrous alloys, such as for example aluminum-based light alloys, to form profiles that can be used to manufacture fixed and moving frames for door- and window-frames or other uses; said presses generally comprise a presser element one end whereof faces an extrusion head in which the die for obtaining the desired shape of the extruded element is arranged. The presser element is usually constituted by a hydraulic cylinder inside which a piston can slide; one end of said piston protrudes from the body of the cylinder on the side directed towards the extrusion head. A presser mandrel is associated with said end of the piston and, by actuating the hydraulic cylinder, acts on a billet of material to be extruded, pushing it through the extrusion head and thus performing the actual extrusion. Usually the extrusion head has, upstream of the die, a container for the billet of material to be extruded which can move with respect to the die along the extrusion direction so as to allow the passage, between the container and the die, of a blade for cutting the tailing that remains inside the container at the end of the extrusion operation. In practice, conventional extrusion presses work according to a cycle entailing the placement of the billet of material to be extruded between the presser mandrel and the extrusion head with the subsequent advancement of the presser mandrel towards the extrusion head so as to move the billet of material to be extruded into the container. Then the further advancement of the presser mandrel produces the actual extrusion of the billet through the die of the extrusion head, and when extrusion is completed the mandrel is retracted again while the container is moved away from the remaining part of the extrusion head to allow to cut the tailing from the extruded part and remove it from the extrusion head. During this step the presser mandrel must perform a considerable stroke, since it must protrude from the container and must move away therefrom along the extrusion direction, which is opposite to the advancement direction, thereby allowing the placement of a new billet to be extruded between the container and the end of the presser mandrel that is directed towards the extrusion head. Due to the considerable stroke of the mandrel in this step, in conventional presses there are long downtimes that significantly penalize the productive potential of these machines.

In order to solve this problem, presses have been designed wherein the presser mandrel can be moved away laterally, while the billet to be extruded is loaded automatically inside the container of the extrusion head. In other types of machines

an attempt has been made to solve this problem with carousel devices that automatically replace the presser mandrel and insert a new billet to be extruded inside the container of the extrusion head at the end of each extrusion cycle.

These solutions have allowed to reduce extrusion downtimes but on the other hand have introduced structural complications in the machines. Furthermore, the replacement or lateral movement of the mandrel has caused problems in the alignment of the presser mandrel with respect to the extrusion head.

A principal aim of the present invention is to solve the above described problems by providing a press for extruding nonferrous alloys whose downtimes are reduced even further with respect to conventional presses, consequently obtaining an increase in productivity.

Within the scope of this aim, an object of the invention is to provide a press that is structurally simpler than presses that perform a lateral movement or replace the presser mandrel.

Another object of the invention is to provide a press that is free from problems in alignment between the presser mandrel and the extrusion head.

Another object of the invention is to provide a press that is highly reliable in operation.

With this aim, these objects and others in view, there is provided, according to the present invention, a press for extruding nonferrous alloys which comprises a presser element having, at one of its ends, a presser mandrel which faces an extrusion head, said presser element being movable by command towards or away from said extrusion head to extrude, through said extrusion head, a billet of material which is interposed between said presser mandrel and said extrusion head, characterized in that a seat for accommodating said presser mandrel is provided in said presser element starting from its end directed towards said extrusion head, and in that said presser mandrel can move with respect to said presser element to be at least partially accommodated inside said presser element during the movement of said presser element away from said extrusion head.

The characteristics and advantages of the press according to the present invention will become apparent from the following detailed description of a preferred but not exclusive embodiment thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a schematic axial sectional view of the press according to the invention;

figures 2 to 5 are schematic views, similar to figure 1, of the press according to the invention, illustrating the various steps of the extrusion process.

With reference to the above figures, the press 1 according to the invention comprises a presser element 2 which faces, with one of its ends, an extrusion head 3 and can move by command towards or away from the extrusion head 3.

The extrusion head 3 comprises, in a per se known manner, an extrusion die 4 and a container 5 which faces the die 4 on the side directed towards the presser element 2 and is axially crossed by a passage 6. The container 5 can be moved away from the die 4 in a per se known manner so as to allow the passage, between the extrusion die 4 and the container 5, of a blade 7 for cutting the tailing 9a at the end of the extrusion step, as will become apparent hereinafter.

The presser element 2 has, at its end directed towards the extrusion head 3, a presser mandrel 8 which, by means of the movement of the presser element 2, can be inserted into the passage 6 so as to transfer into said passage 6 a billet 9 of material to be extruded and so as to then extrude it through the die 4.

According to the invention, a seat 10 for accommodating the presser mandrel 8 is formed in the presser element 2, starting from its end directed towards the extrusion head 3; said mandrel can move by command with respect to the presser element in order to be at least partially accommodated inside the presser element 2 during the spacing of the presser element from the extrusion head 3.

More particularly, the presser element 2 substantially comprises the main piston 11 of a hydraulic cylinder 12 which is arranged coaxially to the passage 6. The piston 11 is slidingly accommodated in a sliding chamber 13 formed coaxially inside the body of the cylinder 12 and protrudes from said chamber with a longitudinal end on the side directed towards the extrusion head 3. The back end of the sliding chamber 13, i.e. the side of said chamber lying opposite with respect to the extrusion head 3, is connected to an opening 14 through which the pressurized liquid that moves the piston 11 along the sliding chamber towards the extrusion head 3 is introduced into the chamber 13. The return of the cylinder 11 inside the sliding chamber 13 is obtained by means of at least one auxiliary double-action hydraulic cylinder 15 whose body is connected to the body of the cylinder 12; said hydraulic cylinder is arranged so that its axis is parallel to the axis 12a of the cylinder 12. The auxiliary cylinder 15 internally accommodates a piston 16 which has a stem 17 protruding from the end of the cylinder 15 which is directed towards the extrusion head 3 and is connected to an end block 18 of the piston 11.

Advantageously, the presser mandrel 8 is mounted on a support 19 which is shaped like a

piston of a double-action hydraulic cylinder. More particularly, the seat 10 that slidingly and loosely accommodates the support 19 is formed coaxially inside the end block 18 and the remaining part of the piston 11.

A protrusion 30 extends from the bottom of the seat 10, is rigidly coupled to the piston 11, and is arranged coaxially to said piston. Said protrusion 30 has, at its free end, a cylindrical expansion 31 which slidingly couples to a cylindrical chamber 32 formed coaxially inside the support 19 starting from its end that lies opposite to the presser mandrel 8. In practice, the support 19 forms the piston of a hydraulic actuator provided with an internal cylinder, wherein said internal cylinder is constituted by the protrusion 30. The cylindrical expansion 31 divides the cylindrical chamber 32 into two half-chambers which can be selectively connected to the delivery or the discharge of a hydraulic circuit through ducts 33 and 34 which run inside the piston 11 so as to cause the sliding of the support 19 along the seat 10.

Conveniently, there are means for locking the translatory motion of the support 19 with respect to the main piston 11. Said locking means are constituted by wedges 20 which are slidingly supported by the end block 18 of the piston 11 and can move by command transversely with respect to the axis 12a for example by means of double-action hydraulic cylinders 21. Seats 22 are formed in the support 19 and are aligned with the wedges 20 when the presser mandrel 8 is in the position in which it is fully extracted from the piston 11, so that the actuation of the wedges 20 towards the axis 12a moves said wedges to engage within the seats 22, locking the axial translatory motion of the support 19 and thus of the presser mandrel 8 with respect to the piston 11.

The operation of the press according to the invention is as follows.

Initially, the main piston 11 is fully retracted inside the body of the hydraulic cylinder 12, and likewise the support 19 is fully retracted inside the main piston 11. In this condition, the presser mandrel 8 lies substantially completely inside the piston 11 so that between the end block 18 of the piston 11 and the container 5 there is a space that allows to place a billet 9 to be extruded so that it is axially aligned with the piston 11 and with the container 5 (figure 1). At this point the support 19 is actuated in the direction of the extrusion head, so that the presser mandrel 8 pushes the billet 9 of material to be extruded into the passage 6 inside the container 5 (figure 2). Once the insertion of the billet 9 inside the passage 6 has ended, the seats 22 are aligned with the wedges 20 which, by actuating the hydraulic cylinders 21, are made to engage the seats 22, locking the support 19 with

respect to the piston 11. The container 5 is then moved into contact with the extrusion die 4 (figure 3), while the hydraulic cylinder 12 is actuated, moving the piston 11 towards the extrusion head 3 and extruding the billet 9 through the extrusion die 4 (figure 4).

Once extrusion has ended, the piston 11 and, simultaneously, the support 19 are actuated in the opposite direction (figure 5), after disengaging the wedges 20 from the seats 22, so that while the piston 11 retracts inside the body of the cylinder 12 the support 19 also retracts inside the piston 11. In this manner, the stroke required by the main piston to restore the space between the end block 18 and the container 5 is significantly reduced, said space being necessary for positioning a new billet of material 9 to be extruded, and the downtimes of the operating cycle of the press are consequently reduced considerably. While the piston 11 and the support 9 are being retracted, the container 5 is spaced from the extrusion die 4 and the blade 7 cuts the residual tailing 9a.

At this point the extrusion cycle resumes as already described.

In practice it has been observed that the press according to the invention fully achieves the intended aim, since, by reducing the stroke of the presser element, a significant reduction in the downtimes of the cycle of the press is achieved, consequently obtaining an increase in its productivity.

The press thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the same inventive concept; all the details may furthermore be replaced with other technically equivalent elements.

In practice, the materials employed, as well as the dimensions, may be any according to the requirements and the state of the art.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Press (1) for extruding nonferrous alloys, comprising a presser element (2) having, at one of its ends, a presser mandrel (8) which faces an extrusion head (3), said presser element being movable by command towards or away from said extrusion head to extrude, through said extrusion head, a billet (9) of material which is interposed between said presser mandrel and

said extrusion head, characterized in that a seat (10) for accommodating said presser mandrel is provided in said presser element starting from its end directed towards said extrusion head, and in that said presser mandrel can move with respect to said presser element to be at least partially accommodated inside said presser element during the movement of said presser element away from said extrusion head.

2. Press according to claim 1, characterized in that said presser element comprises the main piston (11) of a hydraulic cylinder (12), said main piston being slideable by command along its axis (12a) and facing, with one of its ends, said extrusion head; said accommodation seat (10) being formed inside said main piston starting from said end which is directed towards the extrusion head.

3. Press according to one or more of the preceding claims, characterized in that said presser mandrel is mounted on a support (19) slideable by command in said accommodation seat along a direction which is substantially parallel to the sliding direction of said main piston with respect to the body of said hydraulic cylinder.

4. Press according to one or more of the preceding claims, characterized in that said support is shaped like the piston of a hydraulic cylinder of the type with an internal cylinder, wherein said internal cylinder is constituted by a protrusion (30) that extends from the bottom of said seat and slidingly couples inside a cylindrical chamber (32) formed in said support, said cylindrical chamber being divided into two half-chambers by a cylindrical expansion (31) of said protrusion, said two half-chambers being selectively connectable to a source of pressurized fluid or to a discharge for the movement of said support in said sliding seat with respect to said main piston.

5. Press according to one or more of the preceding claims, characterized in that it comprises locking means (20-22) that can be activated by command for locking the translatory motion of said support with respect to said main piston.

6. Press according to one or more of the preceding claims, characterized in that said locking means are constituted by wedges (20) which are slideably supported by said piston along a direction transverse with respect to the axis of said main piston and can move by command from an active position, in which they engage

in seats (22) formed in the outer skirt of said support, to an inactive position, in which they are disengaged from said seats, or vice versa.

7. Press according to one or more of the preceding claims, characterized in that said main piston and said support are mutually coaxial. 5
8. Press according to one or more of the preceding claims, characterized in that it comprises at least one auxiliary hydraulic cylinder (15) which acts by command on said main piston to move it away from said extrusion head. 10
9. Press for extruding nonferrous alloys, comprising one or more of the technical features herein described and/or illustrated. 15

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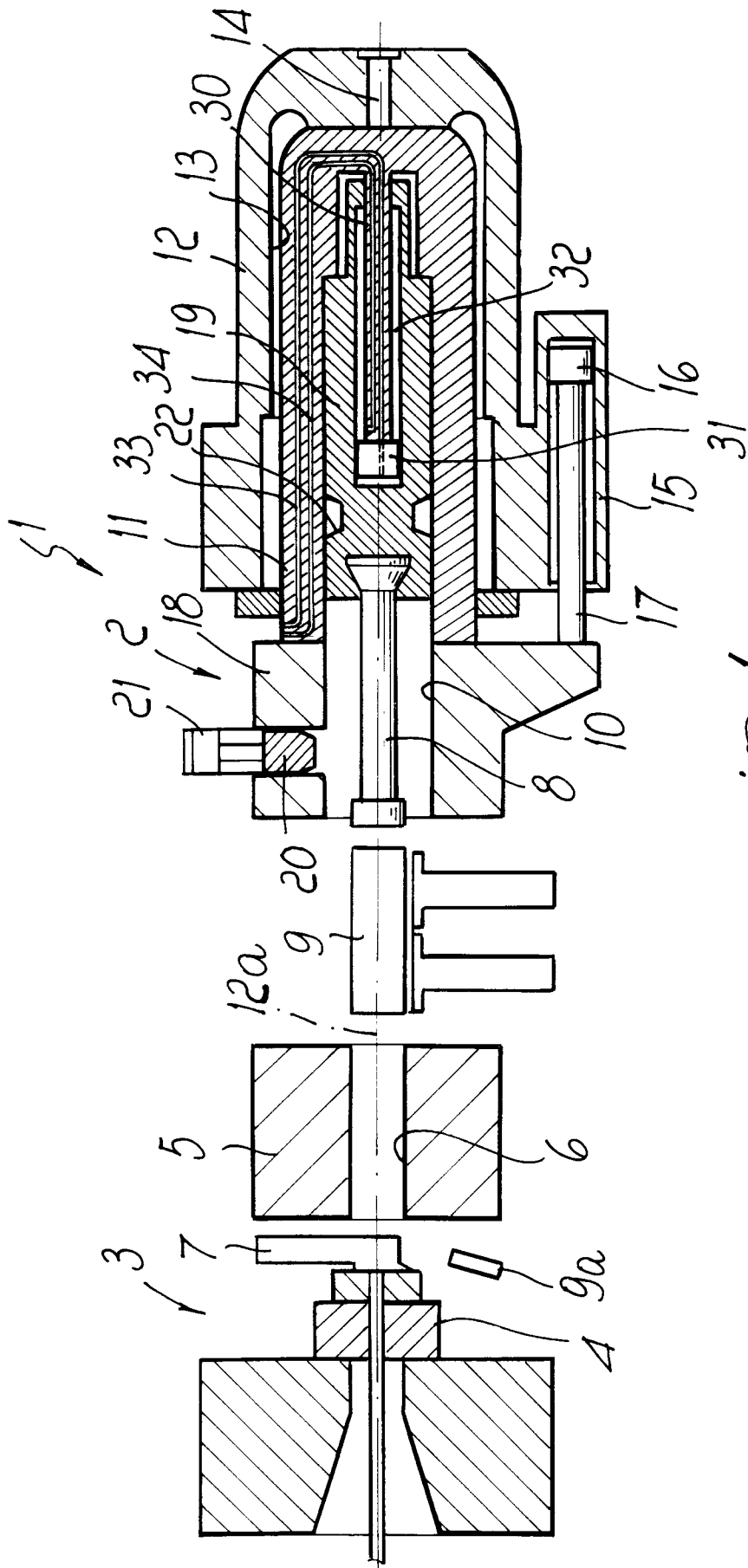
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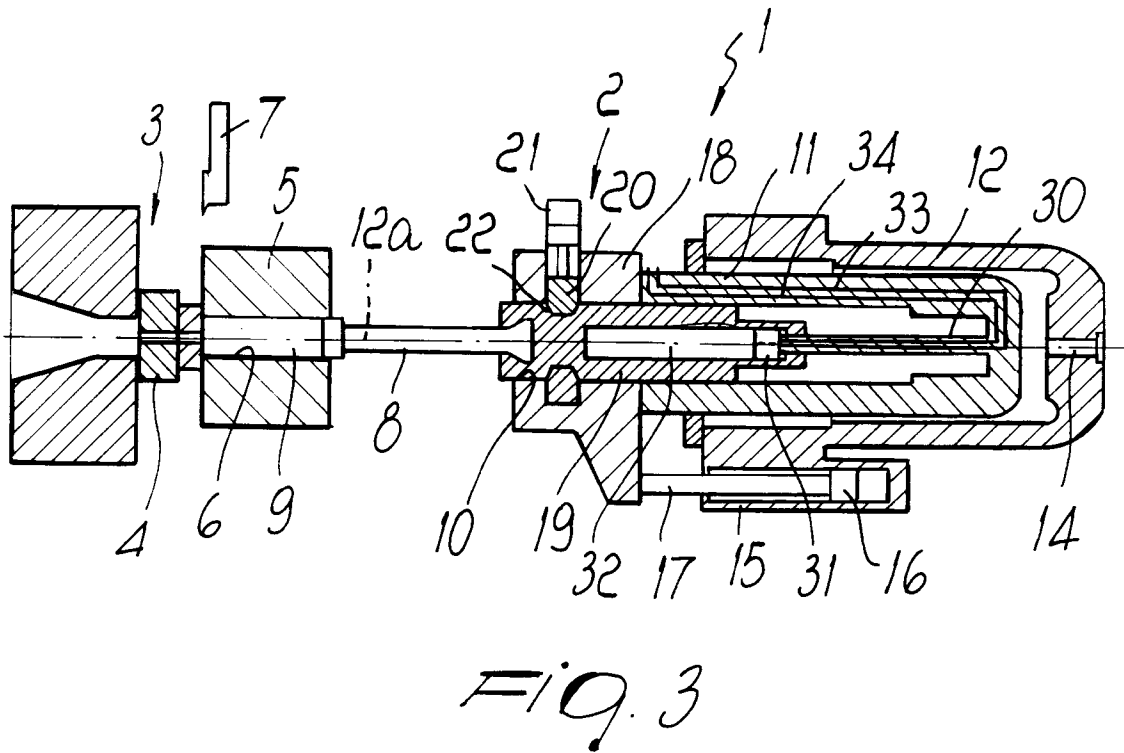
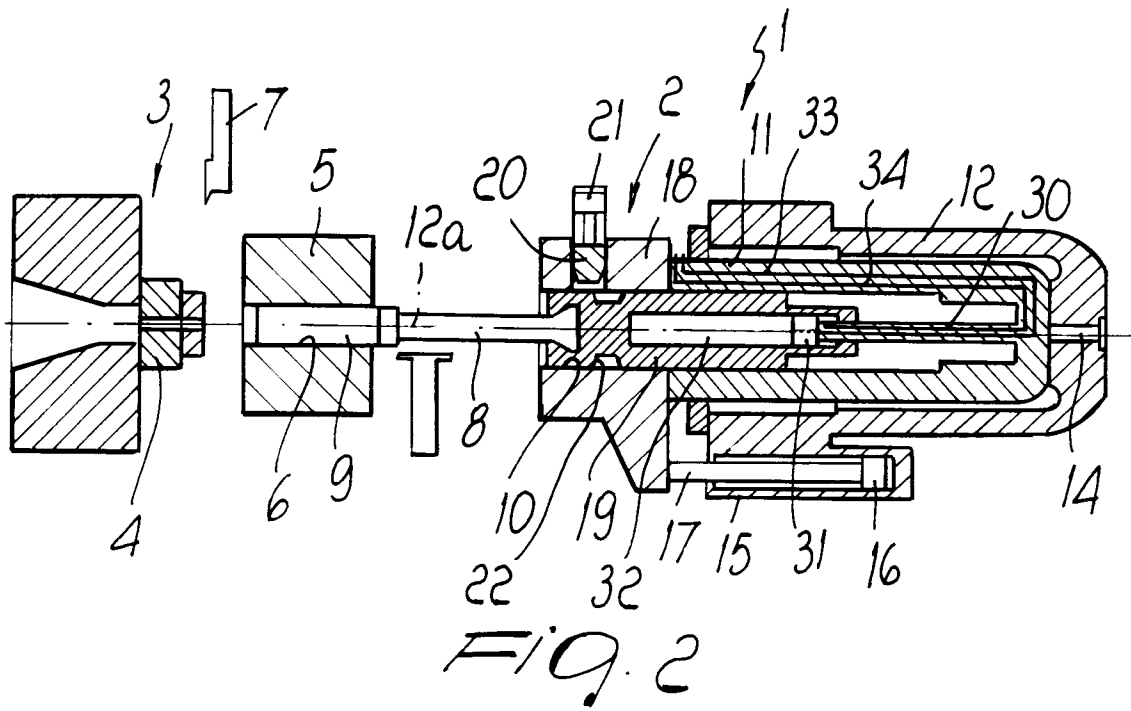
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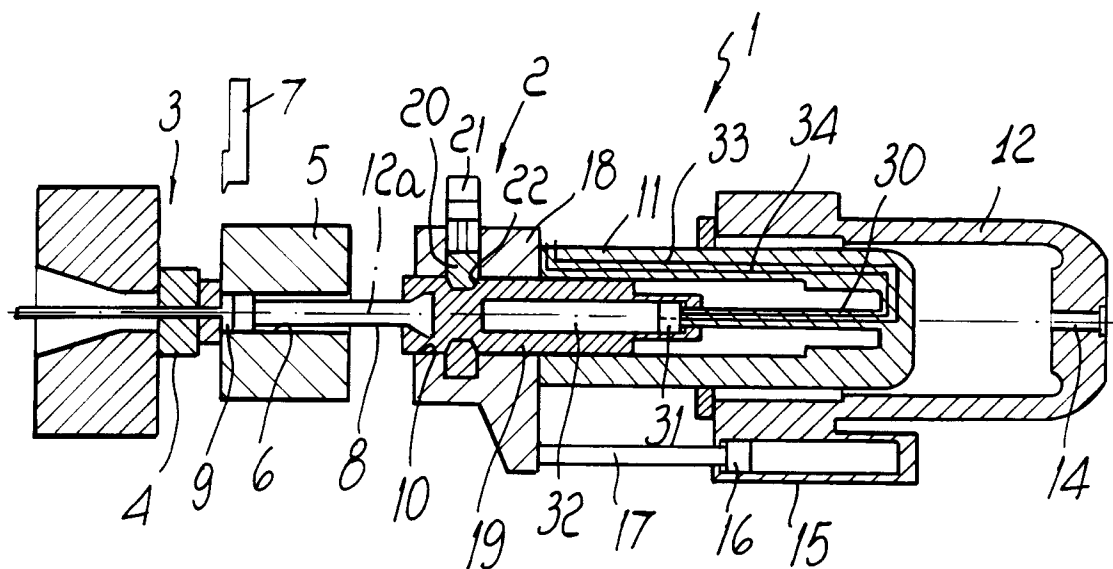


FIG. 4

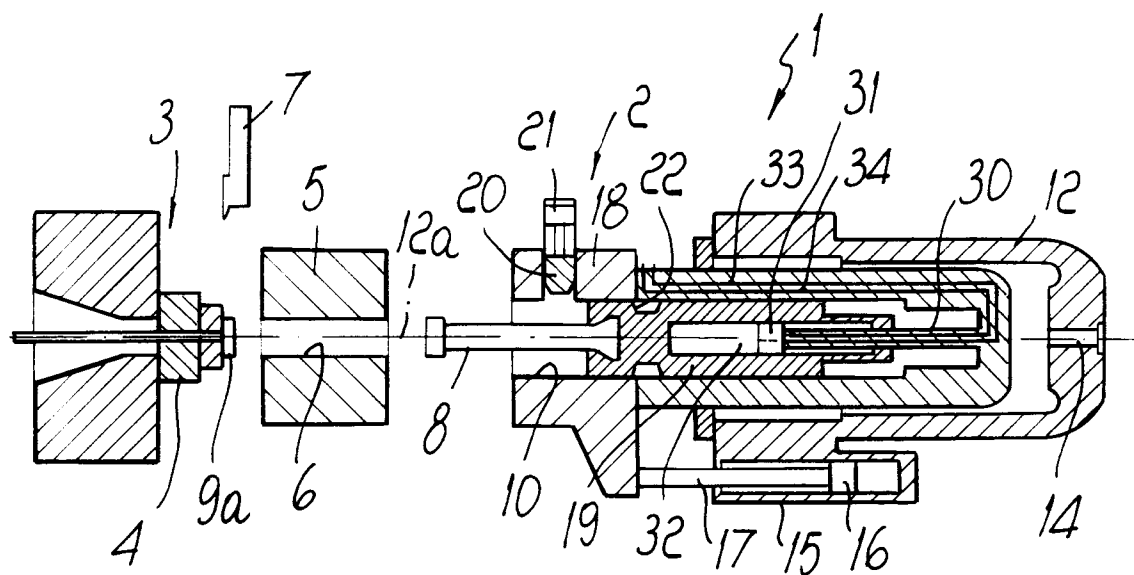


FIG. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 94 11 1820

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.6)
X	FR-A-2 154 971 (SECIM) * page 2, line 17 - page 3, line 15; figures * ---	1-7,9	B21C23/21
X	US-A-3 136 421 (HUTCH)	1-3,5-7, 9	
A	* the whole document * ---	4	
X	FR-A-1 534 237 (SCHLOEMANN AG)	1-3,5-7, 9	
A	* page 2, left column, paragraph 6 - right column, paragraph 1; figures * -----	4	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B21C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11 November 1994	Examiner Barrow, 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			