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(54) **Hydraulic pressure regulator device, typically for ceramic moulds with a mobile bottom die and a counter-die.**

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Description

This invention relates to a hydraulic press with a hydraulic pressure regulator device for hydraulic circuits of ceramic presses equipped with forming moulds with a mobile bottom die and a counter-die. As is well known, in many industrial sectors and in particular in the hydraulic equipment field there is often the need, starting with the same pressurized hydraulic fluid source, to control at least one apparatus, called hereinafter the secondary apparatus, with a certain delay relative to another apparatus, called hereinafter the main apparatus. In such situations there is also the problem of having to regulate the duration of said delay between the operation of said secondary apparatus and that of said main apparatus, said duration depending on a multiplicity of factors, which will not be listed as they are strictly related to specific requirements of the respective industrial sector. Said problems arise for example in the manufacture of ceramic tiles, and more specifically in the hydraulically controlled ceramic presses with which forming moulds comprising a mobile bottom die and a counter-die are associated, in which at least part of the component elements of the mould are hydraulically controlled. A ceramic mould of this type, to which the invention particularly but not exclusively refers, is described in Italian patent publication № 1.234.778 filed in the name of the present applicant, to which reference should be made for further details. Said document describes a mould in which a vertically mobile horizontal bottom die provided with one or more cavities for loading the soft clay, and an overlying counter-die provided with cavities aligned with the cavity or cavities in the bottom die are arranged in mutual combination. The bottom die cavities are closed by hydraulically controlled punches which form the laying face of the tiles, whereas the cavities of the counter-die are closed upperly by punches which form the exposed face of the tiles. In addition said upper punches are arranged to move independently of the counter-die so as to occupy two opposing positions, namely a withdrawn (or raised) position and an advanced (or lowered) position, in the second of which they extract the tiles from the cavities in the counter-die. The upper punches are lowered (according to the aforesaid document) by at least one first hydraulic chamber which is connected to the hydraulic circuit of the press via a valve, whereas said upper punches are raised, after said first chamber has been discharged via said valve, by the clay which is in a compacted state in the cavities of the counter-die. Said upper punches are maintained in their raised position by a second hydraulic chamber which is permanently connected to a pressurized hydraulic reservoir, in which the pressure is maintained by an inert gas atmosphere.

Lastly it should be noted that said independent movement of the upper punches relative to said counter-die enables the soft clay to be transferred (during pressing) from the lower to the upper cavities, with the result that the tiles are practically completely formed within said upper cavities, from which they are extracted as stated by lowering the rearwardly situated upper punches.

Notwithstanding the numerous advantages of a mould of this type (see the initially cited document in this regard), its use has brought to light certain problems which are attributable to the manner in which the raising and lowering of the upper punches is achieved. More specifically, as the rearward movement of the upper punches is achieved by the thrust of the clay transferred into the upper cavities against only the resistance due to the pressure drop in the hydraulic fluid of said first chamber which is directly discharged to the reservoir, the clay is compacted in an excessively rapid manner, with the result that the finer clay particles do not have time to discharge together with the air leaving the clay during the pressing stage. This has emerged from tests carried out, in that as said air (with said very fine particles in suspension) sweeps most of the exposed surface of the tile by virtue of this latter being practically completely formed within the counter-die, an excessive quantity of particularly fine powder appears on said exposed surface of the tile (on termination of the pressing). As is well known to the expert of the art, said fine powder hinders proper adhesion of the glaze, particularly when the thickness of this latter is very small as is often the case with modern ceramic tile glazing methods. The problems arising from this are obvious. In addition the presence of this fine powder results in poor appearance for those ceramic tiles such as of fine porcelainized sandstone which do not undergo glazing. In this respect the fine powder diminishes that particular "velvet" appearance of such materials. There is therefore a felt need to be able to graduate or brake or time the rearward movement of the upper punches in accordance with the characteristic parameters in play, such as the rate of operation of the press and the characteristics of the clay being worked, to enable practically all the finer clay particles to discharge together with the air from the clay. However, the various attempts made up to the present time in this sense have not as yet resulted in a positive or satisfactory solution.

A further problem which arises in such known moulds is that the expulsion of the formed tiles from the counter-die (and their simultaneous deposition on the temporarily raised lower punches) must take place at a level as close as possible to that of the raised lower punches, otherwise an excessive distance of fall can result in tile breakage, in particular with large formats. There is therefore a need to be able to select on the basis of specific working parameters the moment in which the upper punches re-

ceive the command for expelling the tile from the counter-die. These problems have also not found an adequate solution. The main object of the present invention is to provide a hydraulic device able to satisfy said requirements with complete elimination of the aforesaid problems, within the context of a rational, reliable and low-cost construction.

According to the invention the proposed device is particularly suitable for ceramic moulds of the initially described type, and comprises two intercommunicating chambers of which one is connected to the hydraulic circuit which drives the lower punches relative to the bottom die, and the other is connected to at least one hydraulic chamber which drives the upper punches relative to the counter-die, the first of said two chambers housing an elastically loaded valve arranged to close or not close the connection between the two chambers, and the second of said two chambers housing the active end of a slidable push rod sensitive to the pressure in said first chamber via a conduit which connects said first chamber to the seat of said push rod. By virtue of said means, during the raising of the mould counter-die said first chamber is pressurized by the hydraulic fluid from said lower punch operating circuit, and the same fluid, via said conduit, causes the push rod to advance and thus the valve to open, with consequent passage of said fluid into the hydraulic chamber for operating the upper punches. In contrast, during the lowering of the counter-die the pressurized hydraulic fluid from said chamber for operating the upper punches causes the push rod to withdraw so that it discharges through the passage port existing between said two chambers and established by said valve, after which this latter closes.

The characteristics and the constructional and operational advantages of the invention will be apparent from the detailed description given hereinafter with reference to the accompanying figures, which illustrate a particular preferred embodiment thereof by way of non-limiting example.

Figure 1 is an axial section through the invention, with parts cut away to better illustrate parts which would otherwise be hidden.

Figure 2 shows part of the section on the line II-II of Figure 1, to a reduced scale.

Figure 3 is a partial sectional view of a ceramic mould equipped with the invention and arranged on a hydraulic press.

Firstly it should be noted that the specific application of the invention to a forming mould (comprising a mobile bottom die and a counter-die) arranged on a hydraulic ceramic press must in no way be considered a limiting factor. In this respect, the invention is well suited for all those hydraulic applications in which the initially stated requirements have to be satisfied. This will be apparent hereinafter.

From the accompanying Figures 1 and 2 it can be seen that the device, indicated overall by 1, comprises an elongate outer shell or casing 100 through which a longitudinal hole with different cross-sections passes and is closed by two end plugs 10 and 11 respectively. Starting from the plug 10 which is that shown to the left in Figure 1, said longitudinal hole houses a pin 2 for adjusting the loading of a facing helical thrust spring 3; a cup-shaped passage valve 4 mounted on said spring 3; a push rod 5 for opening said valve 4; a piston 6 for controlling said push rod 5; and a counteracting spring 7 which is mounted slackly on the rod 5 and rests at its ends against said casing 100 and against said piston 6. The distance between the facing ends of the piston 6 and the plug 11 and thus the loading of the spring 7 can be adjusted by a screw 12 screwed into said plug 11. Correspondingly the operating position of the pin 2 and thus the loading of the spring 3 can be adjusted by the adjustment screw 13 screwed into the plug 10.

As can be seen in Figures 1 and 2, between said valve 4 and the casing 100 there is an annular chamber 122 into which two conduits 33 (Figure 2) and 121 (Figure 1) open, the valve 4 being provided with a channel 40 for connecting said chamber 122 to the rear housing of the spring 3.

The conduit 33 (see Figure 3) is connected to a conduit 66 the purpose of which is specified hereinafter, while the conduit 121 terminates at the plug 11 (Figure 1).

Into the conduit 121 there are connected a flow regulator valve 44 and a non-return valve 55, these latter being connected in parallel as can be seen in Figure 1. That end of the valve 4 which faces the rod 5 has a conical sealing surface 42 with which there corresponds on the casing 100 a valve seat 41 through which the active end of the rod 5 can pass, as described hereinafter.

At this point it should be noted that when the valve 4 is in its closed state (Figures 1, 2) the rod 5 is slightly spaced from it. In addition the rod 5 is provided with a shoulder 50 acting as a rear travel stop, and is slidingly mounted in a sealed manner in a bush 14 which is sealedly fixed in the casing 100. As can be seen, between said shoulder 50 and said valve 4 there is an annular chamber 22 (Figures 1, 2) from which there extends a conduit 88 the purpose of which is stated hereinafter.

In Figure 2 the reference numeral 43 indicates a passage hole for the removal/recovery of possible seepages. Finally, from Figure 1 it can be seen that the plug 11 comprises a right-angled conduit 16, of which the radial part opens into an annular chamber 15 between said plug 11 and said casing 100, the longitudinal part allowing free passage of said screw 12 and opening in front of said piston 6.

Finally, the annular chamber 15 is connected to said conduit 121 (see Figure 1), the reference numeral 99 indicating an interchangeable travel-limiting disc

lying between the piston 6 and the spring 7.

With reference to Figure 3, this shows part of a usual ceramic press of the type comprising a vertically mobile bottom die and a counter-die, and which will be described in terms only of its essential parts, reference to the initially mentioned document being suggested for further details.

Said Figure 3 shows a pressing plate 17 intended to be placed on the bed (not shown) of a usual hydraulic ceramic press, a platform 18 fixed to said plate 17, a plate 19 provided above the platform 18 and driven vertically by cylinder-piston units (not shown) connected via the conduit 66 to the hydraulic circuit of said press, and a series of punches 20 for forming the laying face of the tiles and which are fixed to said plate 19.

The punches 20 are slidingly received in corresponding cavities 21 for loading the soft clay 23, these latter being formed in a bottom die 24. In the usual manner, the bottom die 24 is mounted to slide relative to the platform 18 on underlying cylindrical bars 25, on these latter there being mounted respective compressed springs 26 arranged to keep the bottom die 24 completely raised. It should be noted that the vertical travel of the bottom die 24 can be achieved by convenient hydraulic cylinder-piston units. Again with reference to Figure 3, above the bottom die 24 there is provided a counter-die 240 comprising cavities 210 in which respective punches 200 are slidingly mounted for forming the exposed face of the tiles. The punches 200 are fixed to an overlying plate 190 which is secured to the mobile cross-member 27 of the press. In addition the counter-die 240 is fixed to said cross-member via an interposed series of robust cylindrical bars 28, on these latter there being slidingly mounted said plate 190 by way of a corresponding number of annular pistons 29. Finally, between each piston 29 and said mobile cross-member 27 there are provided an upper hydraulic chamber 280 connected to the conduit 88 and a lower chamber 281 for collecting any seepage.

During a complete pressing cycle the device of the invention operates as follows. At the beginning of the cycle the mould is in the configuration shown in Figure 3 with the plate 190 separated from the cross-member, and the device of the invention is in the configuration shown in Figure 1 with the conduit 88 under pressure and the conduit 33 connected to discharge. When the soft clay 23 has been loaded into the cavities 21 the cross-member 27 is lowered to rest against the bottom die 24, which in its turn is lowered. The situation is such that the punches 20 approach the punches 200, with simultaneous transfer of the clay 523 from the cavities 21 to the cavities 210, it being pressed both from below and from above. During the lowering of the cross-member 27, which terminates when the upper perimetral edge of the punch 20 is nearly coplanar with the lower edge 201 (shown by dashed conduits in Figure 3) of the flared mouth of the cavity 21, the rearward movement of the punch 200 is delayed, or in other words braked or timed, as stated hereinafter. Basically, when the clay 23 penetrates into the cavity 210 and the punch 200 moves rearwards, the oil present in the conduit 88 is pushed into the chamber 22, to thus cause the valve 4 to open against the thrust of the spring 3. Consequently, the oil passes from the chamber 22 into the chamber 122 (Figure 1) from which it discharges to the reservoir through the conduit 33 (Figures 2, 3). At this point it should be noted that the opening of the valve 4 can be adjusted as required using the adjustment screw 13, by which a choice can be made of the resistance offered by the upper punch 200 to the thrust of the clay 23 as it is transferred, and thus the duration of the total rearward stroke of said upper punch 200, ie until the plate 190 rests against the cross-member 27. Because of this delay or braking or timing of the rearward travel of the upper punch 200 compared with its virtually free travel in the known art, the deaeration period of the clay 23 can be considerably increased, with the result that statistically all the finer particles contained in the clay 23 leave the cavity 210. Thus the exposed surface of the tile is virtually free of very fine powdery material, so that the subsequent application and adhesion of the glaze presents no problems, or alternatively the exposed surface of tiles which are not to undergo glazing, such as those in porcelainized fine ceramic sandstone, have a virtually complete "velvet" appearance which is characteristic of such unglazed materials.

On termination of the pressing stage the valve 4 (Figure 1, 2) is closed and the counter-die 240 is raised followed by the bottom die 24, together with the tiles contained in the cavities 210. The punches 20 are also simultaneously raised under the control of said cylinder-piston units, which are fed with pressurized hydraulic fluid through the conduit 66 (see Figure 3). The same hydraulic fluid passes through the conduit 33 to reach the chamber 122, to then enter the conduit 121 and pass through the valve 44 to reach the conduit 16 (see Figure 1). This causes the piston 6 to advance against the thrust of the spring 7, said piston 6 causing the rod 5 to advance after a small free movement defined by the gap between the disc 99 and the rod 5. Finally this latter, after a small amount of free travel, as is apparent from Figures 1 and 2, causes the valve 4 to open, with consequent passage of oil from the chamber 122 to the chamber 22 (see Figure 2) and from this latter to the chamber 280 (see Figure 3) via the conduit 88 (see Figures 2, 3). Basically, the punches 200 descend while the cross-member 27 rises, and the tiles are deposited on the currently raised underlying punches 20. At this point it should be noted that the downward travel (for extraction of the formed tiles) of the upper punches 200 can be selected as desired by adjusting the ad-

justment screw 12 and the valve 4 (see Figure 1). This is to cause the punches 200 to move (downwards) as soon as the two following conditions are satisfied, the first being that the counter-die 240 (during raising) is practically at the point in which it is about to lose contact with the bottom die 24, and the second being that the lower punches 20 are completely raised. This virtually eliminates any risk of breakage of the formed tiles (particularly if of large format), as their extraction from the cavities 210 occurs when the bottom die 24 and counter-die 240 are very close together. When the cross-member 27 has been completely raised and the formed tile has been discharged (in known manner) from the mould, the conduits 33 and 66 are connected to discharge. Consequently the valve 4 moves into its closed position shown in Figure 1, with withdrawal of the rod 5, and the spring 7 urges the piston 6 against the screw 12. At the same time the oil located between said piston 6 and plug 11 enters the conduit 121 (see Figure 1) and passes through the valve 55 to penetrate into the chamber 122, from which it discharges to the reservoir via the conduit 33 (Figure 2). Finally, when the valve 4 is completely closed (Figures 1, 2) the valve 55 also closes, with simultaneous trapping of the hydraulic fluid (oil) which is present in the chamber 280 (Figure 3), in the conduit 88 (Figures 1, 2, 3), in the chamber 22 (Figures 1, 2) and in part of the conduit 121 leading from the plug 11 to the valves 44 and 55. Starting from this moment the operating cycle of the device in question is repeated identically, ie in response to a complete pressing cycle.

The merits and advantages of the are apparent from the aforegoing description and an examination of the accompanying figures.

The invention is not limited to the single embodiment as illustrated and described, but includes all technical equivalents of the aforesaid means and their combinations, provided they are implemented within the context of the following claims.

Claims

1. A hydraulic press with a hydraulic pressure regulator device, typically for ceramic moulds which are mounted on said hydraulic press, said press comprising a vertically mobile bottom die (24) provided with at least one cavity (21) for loading the soft clay (23), and on overlying vertically mobile counter-die (240) comprising at least one cavity (210) aligned with the preceding cavity (21), said cavities (21; 210) being closed at their rear by respective punches (20, 200) for forming the laying and exposed faces of the tiles respectively, said punches (20, 200) being connected to the hydraulic circuit of said press in such a manner as to be driven independently of the corresponding bottom die (24) and counter-die (240), characterised in that the device comprises two intercommunicating chambers (122, 22) with a valve (4) therebetween, the first chamber (122) being connected to the hydraulic circuit (66) for driving the lower punches (20) relative to the bottom die (24), and the second chamber being connected to at least one hydraulic chamber (280) for driving the upper punches (200) relative to the counter-die (240), said valve (4) being elastically urged towards a forward slidable push rod (5, 6) the seat of which is connected to said first chamber (122) such that when this latter is put under pressure by the hydraulic fluid from said circuit (66) the push rod (5, 6) causes the valve (4) to open with similtaneous fluid entry into said hydraulic chamber (280), whereas when the upper punches (200) move rearwards during the pressing stage, said valve (4) closes after fluid discharge from said hydraulic chamber (280).

2. A hydraulic press with a device as claimed in claim 1, characterised in that said push rod (5, 6) comprises:
   - a slidable rod (5) mounted in a fluid-tight manner in the casing (100) of the device (1), on the same side as said second chamber (22),
   - a rearwardly situated piston (6) which is slidingly mounted in said casing and is slightly spaced apart from said rod (5) when the conduit (121) which connects said first chamber (122) to the seat of said piston (6) is connected to discharge,
   - a compressed spring (7) lying between said casing (100) and piston (6), and
   - a front shoulder (50) acting as a rearward movement stop, provided on the front end of said rod (5).

3. A hydraulic press with a device as claimed in the preceding claims, characterised in that a flow regulator valve (44) for the fluid directed towards said piston (6) and a non-return valve (55) for the passage of fluid directed towards said first chamber (122) are connected in parallel into said conduit (121).

4. A hydraulic press with a device as claimed in claim 1, characterised in that rearwardly situated means (13) for adjusting the corresponding thrust spring (3) are associated with said valve (4).

5. A hydraulic press with a device as claimed in claims 1 and 2, characterised in that with said piston (6) there are associated means (12) for adjusting the loading of said compressed spring (7),

and a bearing disc (99) which is positioned between said spring (7) and said piston and is interchangeable in order to select the required stroke of the piston (6) with respect to the rod (5).

6. A ceramic mould with a mobile bottom die and a counter-die, characterised by comprising at least one device (1) as claimed in claims 1 to 5, for the purpose of delaying the rearward movement of the upper punches (200) during the pressing stages and for the purpose of regulating the advancement of said upper punches during the raising of the counter-die (240).

Patentansprüche

1. Hydraulische Presse mit einem hydraulischen Druckreguliergerät, insbesondere für Keramikformen, die auf der hydraulischen Presse angebracht sind, wobei die Presse einen vertikal beweglichen unteren Pressenstempel (24) aufweist, der mit mindestens einem Hohlraum (21) zur Beschickung mit weichem Lehm (23) versehen ist, und einem darüberlie- genden, vertikal beweglichen Gegenstempel (240), der mindestens einen weiteren Hohlraum (210) aufweist, welcher axial zu dem erwähnten Hohlraum (21) ausgerichtet ist, wobei die Hohlräume (21,210) auf ihren Rückseiten von entsprechenden Stanzungen (20,200) verschlossen werden, welche die Unterseiten und Außenseiten der jeweiligen Teile formen, wobei die Stanzungen (20,200) so mit dem Hydraulikkreis der Presse verbunden sind, daß sie unabhängig von dem korrespondierenden unteren Pressenstempel (24) und dem Gegenstempel (240) bewegt werden können,
dadurch gekennzeichnet, daß
das Gerät zwei miteinander verbundene Kammern (122,22) mit einem Ventil (4) dazwischen enthält, wobei die erste Kammer (122) mit dem Hydraulikkreis (66) zum Antrieb der unteren Stanzung (20) relativ zum unteren Pressenstempel (24) verbunden ist, und die zweite Kammer mit mindestens einer Hydraulikkammer (280) zum Antrieb der oberen Stanzung (200) relativ zum Gegenstempel (240) verbunden ist, wobei das Ventil (4) elastisch auf eine vorwärts verschiebbare Schubstange (5,6) wirkt, deren Sitz dergestalt mit der ersten Kammer (122) verbunden ist, daß, wenn die letztere mit Druck durch die Hydraulikflüssigkeit vom Hydraulikkreis (66) beaufschlagt wird, die Schubstange (5,6) das Ventil (4) zum Öffnen bringt, wobei gleichzeitig Flüssigkeit in die Hydraulikkammer (280) eindringt, während, wenn die oberen Stanzungen (200) sich während des Preßvorganges rückwärts bewegen, das Ventil (4) wieder schließt, nachdem die Flussigkeit aus der Hydraulikkammer (280) entwichen ist.

2. Hydraulische Presse mit einem Gerät nach Anspruch 1,
dadurch gekennzeichnet, daß
die Schubstange (5,6) enthält:
   - eine verschiebbare Stange (5), welche in einer gegen die Flüssigkeit abdichtenden Art und Weise im Gehäuse (100) des Geräts (1) angebracht ist, auf derselben Seite wie die zweite Kammer (22),
   - einen sich auf der Rückseite befindlichen Kolben (6), der verschiebbar in dem Gehäuse angeordnet ist, und der sich in Längsrichtung von der Stange (5) wegbewegt, wenn die Leitung (121), die die erste Kammer (122) mit dem Sitz des Kolbens (6) verbindet, zum Entleeren geöffnet wird,
   - eine zusammengedrückte Feder (7), die zwischen dem Gehäuse (100) und dem Kolben (6) angeordnet ist, und
   - einen vorderen Bund (50), der als Anschlag bei der Rückwärtsbewegung dient und am vorderen Ende der Stange (5) angebracht ist.

3. Hydraulische Presse mit einem Gerät nach den vorhergehenden Ansprüchen,
dadurch gekennzeichnet, daß
ein einstellbares Drosselventil (44) für die zum Kolben (6) strömende Flüssigkeit und ein Rückschlagventil (55) für den Durchfluß der zur ersten Kammer (122) fließenden Flüssigkeit vorhanden ist, wobei beide Ventile parallel zueinander in der Leitung (121) angeordnet sind.

4. Hydraulische Presse mit einem Gerät nach Anspruch 1,
dadurch gekennzeichnet, daß
die rückwärtig angeordneten Einrichtungen (13), die zur Justierung der entsprechenden Druckfeder (3) dienen, mit dem Ventil (4) zusammenarbeiten.

5. Hydraulische Presse mit einem Gerät nach Anspruch 1 und 2,
dadurch gekennzeichnet, daß
Einrichtungen (12) mit dem Kolben (6) zusammenarbeiten, mit denen sich die Vorspannung der zusammengedrückten Feder (7) voreinstellen läßt, und eine Druckscheibe (99) vorhanden ist, die sich zwischen der Feder (7) und dem Kolben (6) befindet und auswechselbar ist, um den benötigten Hub des Kolbens (6) bezüglich der Stange (5) auswählen zu können.

6. Keramikform mit einem beweglichen unteren

Prägestempel und einem Gegenstempel,
dadurch gekennzeichnet, daß
sie mindestens ein Gerät (1) nach den Ansprüchen 1 bis 5 enthält, um die Rückwärtsbewegung der unteren Stanzungen (200) während der Preßvorgänge zu verzögern und um die Weiterbewegung der oberen Stanzungen während des Abhebens des Gegenstempels (240) zu regeln.

Revendications

1. Presse hydraulique avec dispositif de réglage de la pression hydraulique, spéciale pour les matrices pour céramique à monter sur cette presse.
Cette presse est formée par une matrice inférieure se déplaçant dans le sens vertical (24) et possédant au moins une cavité (21) pour l'introduction de l'argile molle (23) et par une contre-matrice supérieure se déplacant dans le sens vertical (240) et formée d'au moins une cavité (210) en correspondance de la précédente (21); ces cavités (21, 210) sont closes dans leur partie supérieure par les emporte-pièce (20,200) qui forment, respectivement, la face de pose et la face visible du carreau: ces emporte-pièce (20,200) sont reliés au circuit hydraulique de la presse de façon à être actionnés indépendamment des matrices (24) et des contre-matrices (240) correspondantes; le dispositif est caractérisé par deux chambres intercommuniquantes (122, 22) par l'intermédiaire d'une soupape (4): la première chambre (122) est reliée au circuit hydraulique (66) pour l'actionnement des emporte-pièces inférieurs (20) de la matrice inférieure (24) alors que la deuxième chambre est reliée à au moins une chambre hydraulique (280) pour l'actionnement des emporte-pièce supérieurs (200) de la contre-matrice (240). La soupape (4) est élastiquement poussée dans la direction d'une tige de commande qui se déplace en avant (5,6) et dont le siège est relié à la première chambre citée ci-dessus (122) de façon à ce que, lorsque cette dernière est mise sous pression par le fluide hydraulique provenant du circuit (66), la tige de commande (5,6) provoque l'ouverture de la soupape (4) et l'entrée simultanée du fluide dans la chambre hydraulique (280). Lorsque les emporte-pièce supérieurs (200) se déplacent en arrière pendant la phase de pressage, la soupape (4) se ferme après avoir évacué le fluide de la chambre hydraulique (280).

2. Presse hydraulique avec dispositif semblable à celui indiqué dans la revendication 1, caractérisée par la tige de commande (5,6) qui comprend:
   - une tige coulissante (5) montée étanchément dans le corps (100) du dispositif (1), du même côté que la deuxième chambre (22).
   - un piston coulissant situé à l'arrière (6), monté dans le corps et légèrement éloignée de la tige ci-dessus (5) lorsque le tuyau (121) qui relie la première chambre (122) au siège du piston (6) est relié à l'évacuation.
   - un ressort de compression (7) placé entre le corps (100) et le piston (6), et
   - une butée avant (50) qui sert de fin de course de recul et est placée à l'extrémité avant de cette tige (5).

3. Presse hydraulique avec dispositif semblable aux revendiactions précédentes, caracterisée par une soupape servant au réglage du flux (44) du fluide allant vers le piston (6) et par une soupape de non retour (55) pour le passage du fluide allant vers la première chambre (122). Elles sont reliées en parallèle dans le circuit (121).

4. Presse hydraulique avec dispositif semblable à la revendication 1, caracterisée par l'association de la soupape (4) avec des dispositifs placés à l'arrière (13) pour le réglage du ressort de poussée (3) correspondant.

5. Presse hydraulique avec dispositif conforme aux revendications 1 et 2, caracterisée par l'association avec le piston (6) de dispositifs (12) pour le réglage de la tension du ressort de compression (7) et d'un disque de support (99) placé entre le ressort (7) et le piston. Le disque est interchangeable de facon à sélectionner la course nécessaire au piston (6) en fonction de la tige (5)

6. Matrice pour céramique avec partie inférieure mobile et contre-matrice, caractérisée par la présence d'au moins un dispositif (1) conforme aux revendications de 1 à 5, servant a retarder le recul des emporte-pièce supérieurs (200) pendant les phases de pressage et à régler l'avancement des matrices supérieures pendant le relevage de la contre-matrice (240).

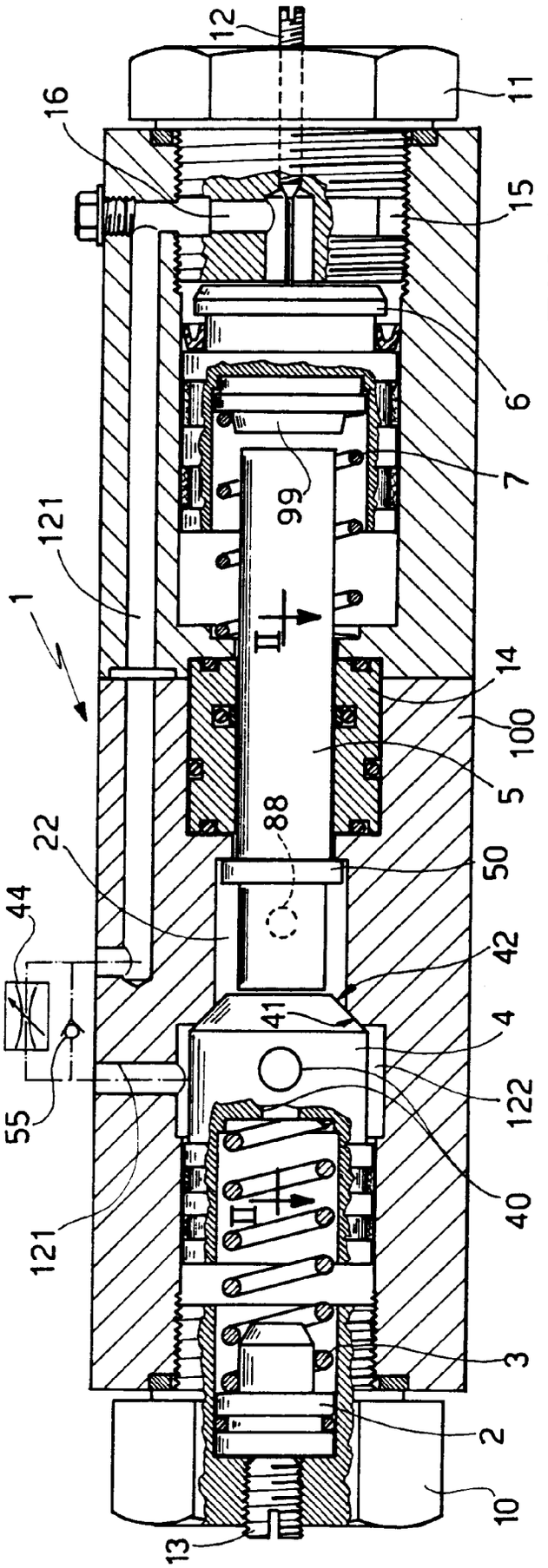

12
11
16
15
6
7
99
121
1
II
14
100
5
88
22
50
44
42
41
4
55
122
121
40
III
3
2
10
13

FIG.1

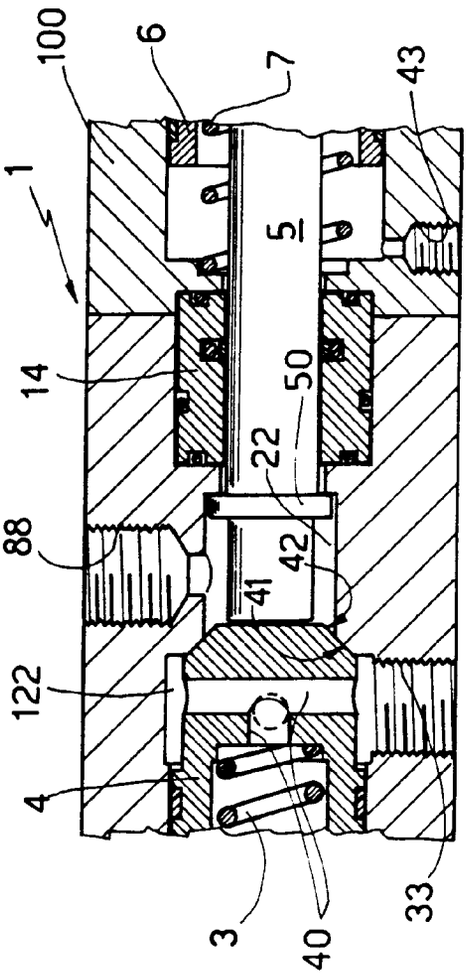

100
6
7
43
1
5
14
50
22
88
42
41
122
4
3
40
33

FIG.2

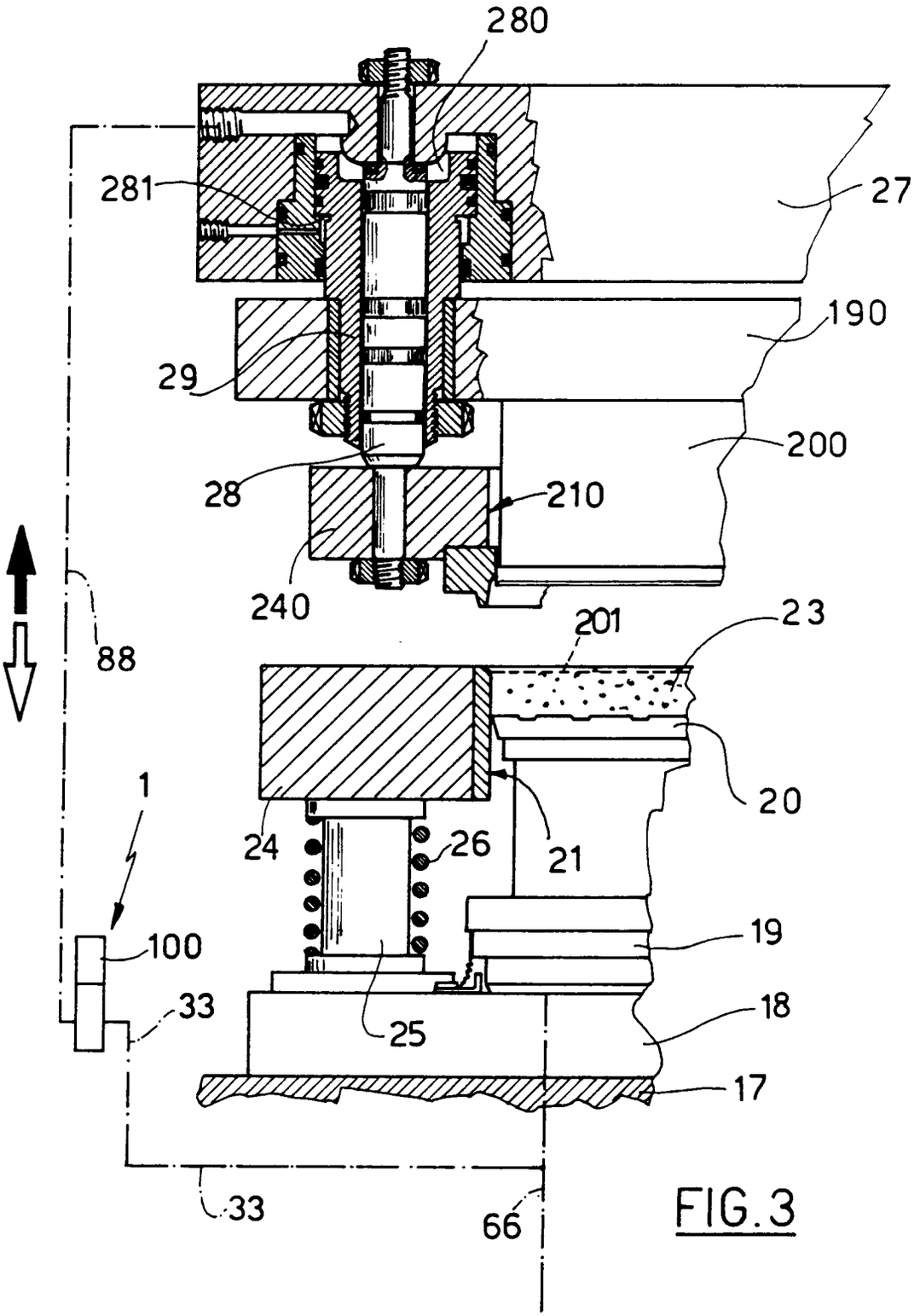

280
281
27
190
29
200
28
210
240
88
201
23
20
1
24
26
21
19
100
33
25
18
17
33
66

FIG.3