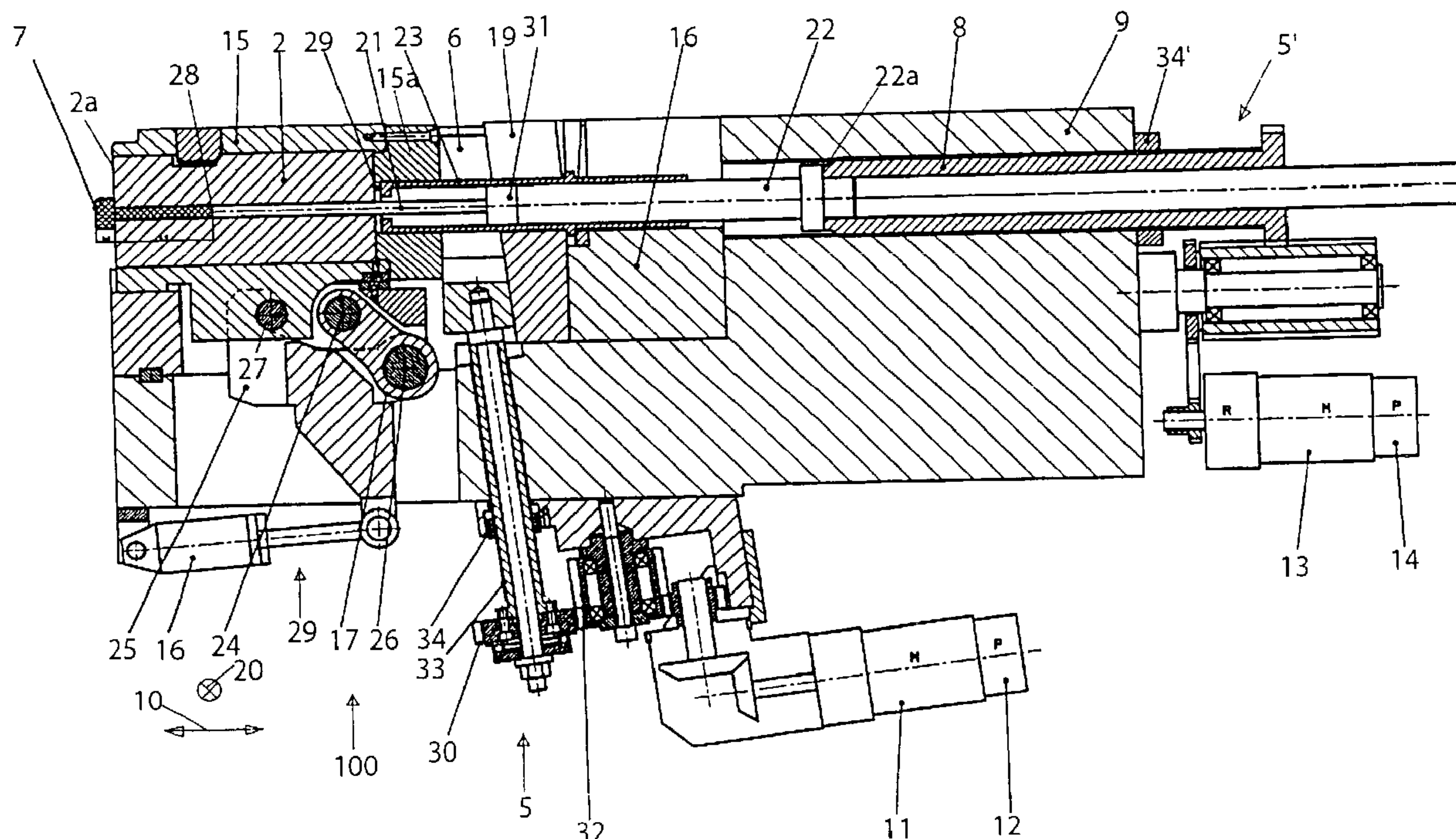




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(54) Titre : PRESSE A FORGER DOTEES D'UN DISPOSITIF DE REGLAGE SITUE COTE MATRICE
(54) Title: FORGING PRESS COMPRISING AN ADJUSTING DEVICE ON THE MATRIX SIDE THEREOF



(57) **Abrégé/Abstract:**

The invention relates to a forging press in which the tool positions can be quickly and easily adjusted in relation to each other, in spite of low structural cost, and especially due to good accessibility and low fault liability. Said press comprises a support side (100) which is fixed during the deformation process and comprises a matrix (2); an impact side (101) comprising a slide (3) which can move in the longitudinal direction during the deformation process and which comprises a plunger (1); and a first adjustment device (5) which is arranged on the support side of the forging press and is used to adjust the distance of the closing height.

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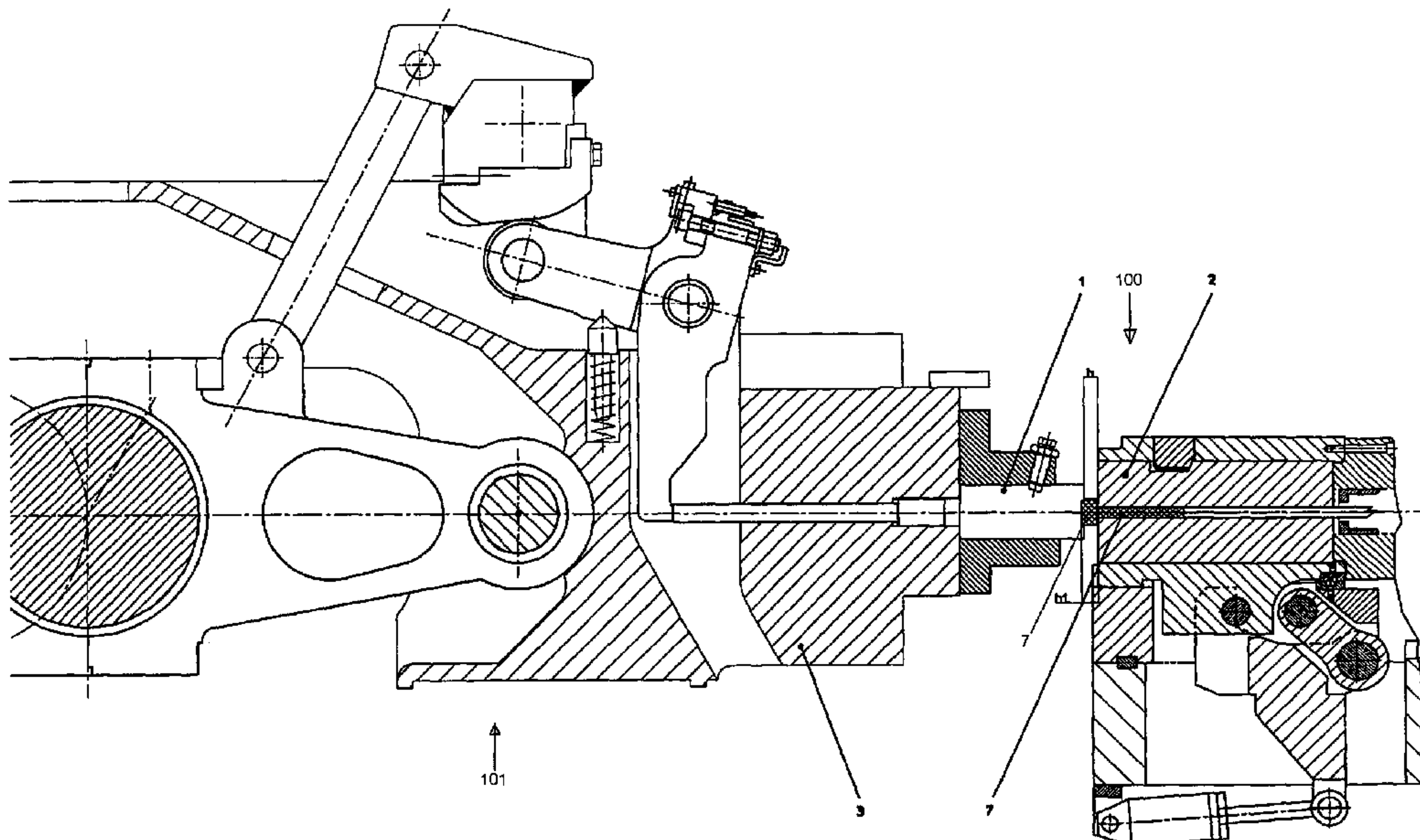
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[Fortsetzung auf der nächsten Seite]

(54) Title: FORGING PRESS COMPRISING AN ADJUSTING DEVICE ON THE MATRIX SIDE THEREOF

(54) Bezeichnung: SCHMIEDEPRESSE MIT STELVORRICHTUNG AUF MATRIZENSEITE



(57) **Abstract:** The invention relates to a forging press in which the tool positions can be quickly and easily adjusted in relation to each other, in spite of low structural cost, and especially due to good accessibility and low fault liability. Said press comprises a support side (100) which is fixed during the deformation process and comprises a matrix (2); an impact side (101) comprising a slide (3) which can move in the longitudinal direction during the deformation process and which comprises a plunger (1); and a first adjustment device (5) which is arranged on the support side of the forging press and is used to adjust the distance of the closing height.

[Fortsetzung auf der nächsten Seite]



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Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

(57) Zusammenfassung: Schmiedepresse, bei der die Justierung der Werkzeugpositionen zueinander schnell und einfach durchführbar ist trotz geringem baulichen Aufwandes, insbesondere aufgrund guter Zugänglichkeit, und speziell mit einer geringen Störanfälligkeit, mit einer im Umformbetrieb feststehenden Abstützseite (100), die eine Matrize (2) umfasst, einer Aufschlagseite (101), die einen im Umformbetrieb in Längsrichtung beweglichen Schlitten (3) mit einem Stempel (1) umfasst und einer ersten Stellvorrichtung (5) zum Einstellen des Schliesshöhen-Abstandes, wobei die erste Stellvorrichtung auf der Abstützseite der Schmiedepresse angeordnet ist.

FORGING PRESS COMPRISING AN ADJUSTING DEVICE ON
THE MATRIX SIDE THEREOF

I Field of use

The invention concerns improvements in the adjustment of tools of forging presses.

II Technical background

In forging presses, in particular horizontal transfer presses, a workpiece is put into the desired shape by a shaping operation, by a
10 procedure whereby the workpiece is so firmly pressed between a fixed die and a movable ram or punch that the desired shaping effect takes place.

In such an arrangement, in operation of the machine, the ram or punch is not generally moved to a position in which it bears against the die, but is only moved to a so-called closing height spacing which is naturally crucial in terms of the result of the shaping procedure.

By virtue of fluctuations in the dimensions of the blank, thermally induced expansion of the machine as a result of on-going operation thereof and so forth, that closing height spacing must be settable, that is to say subsequently adjustable.

20 As the closing height spacing is a spacing which is measured in the longitudinal direction, that is to say in the direction of the pressing stroke movement, that effect was hitherto achieved by providing a setting device on the side of the movable ram or punch, that is to say on the impact side of the machine. The setting device pushes a setting wedge member in the wedge direction, transversely with respect to the longitudinal direction, to a greater or lesser distance between the movable ram or punch and the remainder of the movable carriage carrying the ram or punch.

30 In that way, the stroke movement, which is always identical, in regard to the drive of the carriage, is not altered, on the side of the ram or punch, in terms of the stroke distance, but it is in fact altered in terms of the longitudinal position at the two motion-reversal points, and that also means that the closing height spacing relative to the stationary die is altered.

A structure of that kind is described for example in DE 197 22 229 A1, wherein the setting device is driven by motor means.

A disadvantage however is that the entire setting device is disposed in the moved part of the machine, the impact side, and not in the stationary support side. That is a disadvantage by virtue of the high acceleration forces involved (about 300 stroke per minute) while in addition there is also the disadvantage that for repair operations, not only is it necessary for the machine to be stopped, but under some circumstances it is also necessary for the complete carriage to be dismantled, which gives rise to major losses in production.

10 US patent No 4 170 051 describes an adjusting device for a hydraulic or mechanical stamping ram, wherein the setting device for the closing height spacing is on the support side.

A setting device disposed on the support side, using a wedge member, is also described in US No 4 137 748 for the case of a forging press.

III Statement of the invention

a) Technical object

20 Therefore the object of the present invention is to provide a forging press in which adjustment of the tool positions relative to each other can be quickly and easily carried out, in spite of involving a low level of structural complication and expenditure, in particular by virtue of good accessibility, and especially with a low degree of susceptibility to trouble.

b) Attainment of the object.

According to the present invention, there is provided a forging press comprising

- a support side which is stationary in the shaping procedure and which includes a die,
- an impact side which includes a carriage with a punch, the carriage being movable in the longitudinal direction in the shaping procedure, and
- a first setting device for setting the closing height spacing (h),
- 30 - an abutment for the rearward end of the workpiece, and

- a second setting device for adjustment of the longitudinal position of the abutment with respect to the front abutment surface of the die, wherein
- the first setting device is arranged on the support side of the forging press,

characterised in that

the coupling of the first and second setting devices is such that a change in the closing height spacing (h) by means of the first setting device automatically causes consequential adjustment of the abutment by means of the second setting device so that the spacing between the front abutment surface of the die and the abutment remains unchanged.

By virtue of the fact that the setting device is disposed not on the impact side but on the support side of the machine, it is exposed to considerably lower levels of loading during operation of the machine and accordingly has to be maintained or replaced less frequently.

This structure is suitable in particular for horizontal transfer presses in which therefore the longitudinal direction of the machine, the stroke direction, is arranged horizontally, and which are integrated into a transfer line so that the workpieces are transported transversely with respect to the longitudinal direction of the individual machine from one processing station to the next, by means of a transfer device.

In this respect, in particular transportation can be effected from a forging position to the next one, possibly within the same machine, but into a different tool, if the machine includes a plurality of tools, that is to say dies and punches, in mutually juxtaposed relationship.

This arrangement is also particularly suitable for forging presses in which operation is not effected with endless material, for example wire material, but rather the blanks are inserted individually prior to each shaping operation into the machine, that is to say into the stationary die, which in generally is also effected automatically by means of a transfer device.

Preferably, the position of the front end face which is towards the punch, the so-called abutment face, is determined in the longitudinal direction by means of the setting device, insofar as the die block in which the die is fixed and which is supported indirectly with respect to the main body of the machine is spaced therefrom to a greater or lesser extent. The spacing is preferably altered by inserting a wedge in the wedging direction and transversely with respect to the longitudinal direction, the stroke direction, to a greater or lesser extent; that wedge is preferably supported on a similarly opposite co-operating surface, of the same steepness or gradient, of a counterpart wedge member.

Preferably, for operation of the machine, the die block together with the die is already biased in the longitudinal direction to bear firmly against the wedge and thus involve as little play as possible with respect to the main body.

Preferably, for displacement of the wedge, that biasing action which is mostly afforded by way of a lever mechanism and a hydraulic cylinder has to be at least partially released, so that the displacement force does not have to become too high.

Adjustment is preferably effected by a motor arrangement, by means of a screwthreaded spindle which extends in the direction of displacement of the wedge and which preferably – particularly in the case of horizontal transfer presses – is in operative engagement from the underside while the workpiece feed is effected from the top side.

Preferably, in order to prevent adjustment from occurring of its own accord, the screwthreaded spindle passes inter alia through a hydraulically clampable nut which is left in the clamped condition during the forging operation of the machine, in order to fix the screwthreaded spindle.

At first glance, a disadvantage with such an arrangement in which the first setting device is disposed on the support side, namely behind the die, is the fact that varying the longitudinal position of the front abutment surface of the die also varies the spacing between that front abutment

surface and the rear abutment for the workpiece, which abutment is afforded by a member adjusted in the main body of the machine and projects from the rear into the die.

10 In the case of the workpiece to be produced, that alteration also causes a variation in the shank length L_1 which is not altered by the shaping procedure, for example if the screw head is to be shaped on the blank from portions of round material which is cut to length, by virtue of being fitted into the die and by virtue of projecting beyond the front abutment surface thereof, by means of the movable ram or punch, as then the spacing between the front abutment surface and the rear abutment is altered to the shank length of the later screw on which then the screwthread is formed by rolling or pressing.

20 It is possible to obviate that disadvantage in that the rear abutment is not only adjustable with respect to the main body, which is in any case necessary for conversion from one workpiece to another, but its second setting device is coupled to the first setting device in such a way that, when adjusting the closing height spacing, by means of the first setting device, the second setting device is similarly also automatically adjusted, so that the shank length, that is to say the spacing between the front abutment surface and the rear abutment, remains unchanged.

It will be appreciated that it is possible for the two setting devices also to be specifically adjusted separately, in particular the second setting device.

Preferably, in general, the second setting device also includes a screwthreaded spindle for the adjustment procedure, which can also be screwed in the main body, but this time in the longitudinal direction.

30 Coupling of the two setting devices is possible for example by virtue of the fact that the two screwthreaded spindles are respectively driven by way of an electric motor, for example a servo motor, and can be actuated by means of a common control or two individual, operationally interconnected controls.

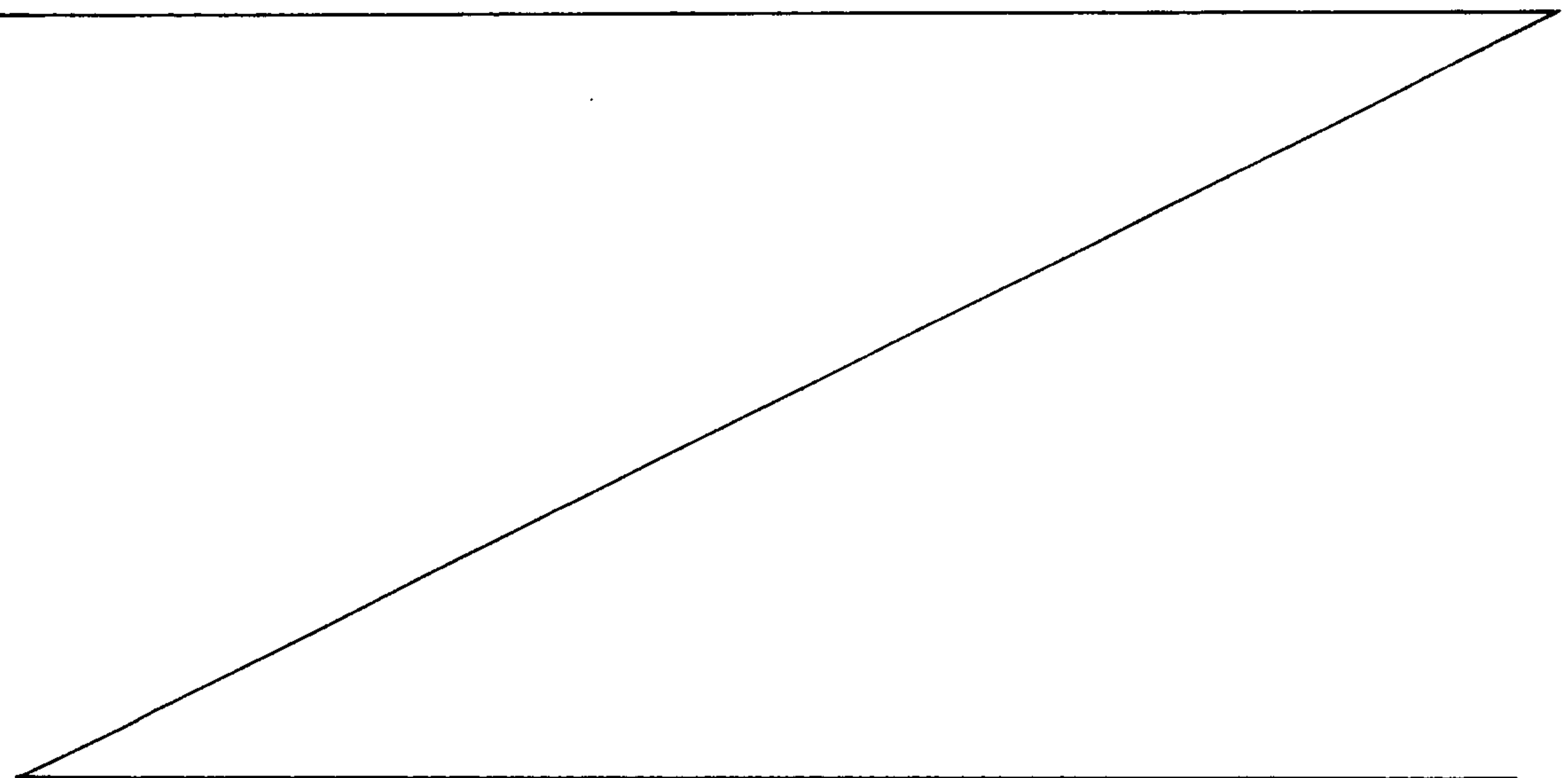
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It will be appreciated that purely mechanical coupling of the two setting devices, in particular the screwthreaded spindles thereof, is also possible, insofar as one and the same motor or also a hand drive adjusts the two screwthreaded spindles in the correct relationship relative to each other. In this case also, there must be a decoupling option in the form of a coupling arrangement so that one of the two setting devices, in particular the second setting device, can also be adjusted separately.

10 A further problem is represented by the transfer device which generally grips the workpiece by means of grippers immediately in front of the front end of the front abutment surface of the die and further transports it to the next processing station. By virtue of the variation in that front abutment surface, it would also be possible to vary the relative position thereof (spacing s) with respect to the transfer device.

That problem can be resolved if the transfer device is mounted on the main body, but is either displaceable and is moved by means of a setting device, in particular directly by means of the second setting device, for displacement of the abutment, or it is fixed, at a suitably large spacing s .

20 The clamping device for clamping and releasing the die block can also be provided with a further clamping device for clamping and releasing



the transfer device relative to the main body, or it additionally clamps or releases same with respect to the die block.

c) Embodiments

5 An embodiment in accordance with the invention is described in greater detail hereinafter by way of example with reference to the drawings in which:

Figure 1 is a view showing the principle of a structure in accordance with the state of the art, viewing transversely to the stroke direction of the machine,

10 Figures 2a and 2b are views in the same direction showing a structure according to the invention,

Figure 3 is a side view of a workpiece by way of example,

Figures 4a and 4b show the transfer device, viewed in the stroke direction of the machine, and

15 Figure 5 shows the transfer device of Figure 4, viewed transversely with respect to the stroke direction.

Figure 1 shows a forging press in accordance with the state of the art, in which a workpiece 7 is shaped by pressing between a die 2 and a movable ram or punch 1.

20 In this case, the die 2 is accommodated in the fixed portion of the machine, being the support side 100. In contrast, the punch 1 is a component of the carriage 3 which is driven movably in the stroke direction of the press, being the longitudinal direction 10, on the impact side 101 of the machine.

25 In this arrangement, the carriage 3 is driven with an oscillating movement by way of a lever mechanism in the longitudinal direction 10 – as illustrated in the left-hand part of Figure 1, in which respect, in regard to the configuration of the workpiece, in this case a screw head, the important consideration is the closing height spacing h , that is to say the
30 spacing of the punch 1 at the reversal point of its movement in the longitudinal direction 10 from the die 2, that is to say from the front abutment surface 2a thereof.

For that purpose, in this known structure, a wedge 6 is introduced transversely with respect to the longitudinal direction 10 between the punch 1 and the body of the carriage 3, in which respect still further components which are of invariable length can also be arranged between
5 the wedge 6 and the punch 1.

With the stroke of the driver mechanism of the carriage 3 always being the same, the closing height spacing h and thus in this case the head height h_1 of the screw head to be produced can be varied by the wedge 6 being inserted in the transverse direction to a greater or lesser
10 extent and fixed in position, which is also effected by means of the setting bolt 4 which also extends in the direction of insertion of the wedge.

With this structure, the setting device 5 which includes the wedge 6 is disposed on the carriage 3, that is to say the part of the forging press which oscillates at high frequency; particularly in the case of a motor-
15 driven setting device, that is to say with a motor drive for the wedge 6, that arrangement means that the drive is subjected to high levels of loading.

Figures 2a and 2b therefore show the same view of a structure according to the invention of a forging press. Figure 2a primarily shows
20 the impact side 101 and Figure 2b primarily shows the support side 100 of the forging press, between which the workpiece shown separately in Figure 3 is to be disposed. The workpiece is a screw blank with a head, whose shank length is to be L_1 and whose head height in the same direction, namely in the longitudinal direction of the screw and also the
25 machine, is to be h_1 .

The support side 100 of the machine as shown in Figure 2a differs from the known structure shown in Figure 1 only in that the carriage 3 no longer includes a setting device for the variation in the longitudinal position of the ram or punch 1 with respect to the carriage 3, but the
30 punch 1 is accommodated and fixed directly in a punch block which is moved with the carriage 3.

Figure 2b shows the support side 100 of the forging press separately, with the workpiece 7 inserted and already shaped, that is to say after the shaping procedure has been carried out. In this case, the workpiece 7 is accommodated with its shank in a suitable bore in the die 2. The rearward free end of the shank is supported against a drive pin 21 which projects from the rear side into the bore in the die 2, as far as a predetermined position, and in that case forms an abutment 28 for the rear end of the workpiece 7.

The front free end of the blank is acted upon by the punch 1 which is not visible in Figure 2b, that is to say from the left as viewing Figure 2a, and, when that happens, it is deformed in such a way that the head of the blank is widened and pressed against the front end face, being the abutment surface 2a of the die 2.

The die 2 is accommodated in a die block 15 which is closed on the rearward side by a block cover 15a which is screwed thereon and which also has a through opening aligned with the bore in the die 2. The entire die block 15 including the block cover 15a is supported indirectly with respect to the main body 9 disposed therebehind, more specifically, by way of a support plate 16 which thus, in contrast to the main body 9, is replaceable, as a wearing member. Arranged between the support plate 16 and the die block 15 is the setting device 5 for adjustment of the longitudinal position of the die 2, that is to say the front abutment surface 2a thereof, with respect to the main body 9.

The setting device 5 comprises a wedge 6 whose wedge shape extends in the insertion direction which is transverse with respect to the longitudinal direction 10 and thus the stroke direction of the machine, so that the transverse position of the wedge 6 by virtue of its wedge action, determines the longitudinal position of the component which is supported against the wedge, inter alia the die 2 and therewith also the front abutment surface 2a thereof.

The wedge 6 is supported in turn with a wedge surface which is disposed inclinedly with respect to the radial plane, against a similarly

oppositely directed, fixedly positioned co-operating counterpart wedge portion 19 which is supported with its rear side against the support plate 16. A through opening extends in aligned relationship through the wedge 6, the counterpart wedge portion 19 and the support plate 16 – like the
5 main body 9 – in order to permit the feed of the ejection pin 21 which not only represents the abutment for the workpiece in the shaping procedure but which is then also intended to eject the workpiece.

Adjustment of the wedge 6 is effected by way of a screwthreaded spindle 33 which is screwed through a screwthreaded bore in the main
10 body 9 and which is supported with its head rotatably but axially fixedly in the wedge 6 and which can displace same therefore in the displacement direction.

The rear end of the screwthreaded spindle 33 projects downwardly out of the main body 9 and is there driven by a servo motor 11 by way of
15 a gear 30 non-rotatably connected to the screwthreaded spindle 33, and by way of a plurality of gears arranged therebetween. In that arrangement, meshing with the gear 30 is a further gear 32 whose axis of rotation is parallel to that of the screwthreaded spindle 33 and whose axial extent is as great as the displacement range of the screwthreaded
20 spindle 33 so that the gear 30 always meshes with the gear 32, in spite of the longitudinal screwing movement.

By virtue of arranging bevel gears in the drive line, the motor is disposed at a right angle to the screwthreaded spindle 33 and is therefore positioned closely beneath the lower end of the main body 9 so that the
25 height thereof is not unnecessarily increased.

Connected to the servo motor 11 is a position sensor 12 which, continuously or at regular time intervals or also only on demand, determines the axial position of the screwthreaded spindle 33, on the basis of a known starting position and on the basis of counting the
30 revolutions or angular changes which have taken place in the meantime, of the servo motor 11.

The ejector pin 21 serves to support the workpiece 7 during the forging procedure, that is to say also for ejection of the workpiece 7 thereafter. The ejector pin 21 is inserted from the rear into the corresponding through bore in the die 2, which generally corresponds to the diameter of the workpiece 7 which is to be introduced into the die 2 from the other side.

It must be possible to precisely adjust the ejector pin 21, in particular in its retracted position in which its front end serves as an abutment 28 for the workpiece 7 to be introduced. That position is shown in Figure 2b. In a position of the ejector pin 21 which is not shown in Figure 2 but which is displaced towards the left in relation thereto, the ejector pin 21 can be moved forwardly to such an extent that its front end reaches or approximately reaches the front abutment surface 2 of the die.

For that purpose, at its rear end the ejector pin 21 is provided with a cylindrically enlarged head 31 which is guided in the longitudinal direction 10 in a corresponding pin bush 23 which also passes through the block cover 15a. A machine pin 22 presses from the rear against the head 31. The machine pin 22 is also guided with its front end in the interior of the pin bush 23 and is supported in its rearward region with a shoulder at the front end of a screwthreaded bush 8. In the operative position of the forging press, that is to say in the retracted position of the ejector pin 21 and also the machine pin 22, it bears with its rearward shoulder 22a against the screwthreaded bush 8. For ejection of the workpiece 7, those two are pushed forwardly in the longitudinal direction by means of an ejector which is guided in the interior of the screwthreaded bush 8 and which acts on the machine pin 22 from its rear, in the longitudinal direction.

The screwthreaded bush 8 can be screwed in the longitudinal direction by means of its male screwthread in a corresponding female screwthread in the main body 9. The screwable screwthreaded bush 8, by way of which the abutment position of the ejector pin 21 is set, is a component of the second setting device 5'. The drive for the

screwthreaded bush 8 is again effected – as in the case of the first setting device 5 for adjusting the position of the wedge 6 – by way of gears and a servo motor 13 as well as an associated position sensor 14 arranged behind the rearward end of the main body 9. No bevel gears are
5 incorporated in the drive line as there is no need for the drive line to be turned through 90°.

The die block 15 including its block cover 15a is pressed by way of a clamping device 29 for the forging operation in the longitudinal direction and against the wedge 6 supported against the main body 9, and
10 transversely in relation thereto against corresponding abutment surfaces on the main body 9, so as to afford an always defined position for the die 2 in the forging operation. For that purpose, a hydraulic piston 18 pulls on a lever on which there is eccentrically fixed a further lever 17 which is supported rotatably on the one hand about an axis 24 of the die block 15
15 and on the other hand about a pin 26 of the first lever, and the first lever is additionally fixed pivotably about a block pin 27 on the die block 15. All pivot axes extend transversely with respect to the longitudinal direction 10 and are oriented in mutually parallel relationship. By means of the clamping device 29, the die block 15, as described above, is clamped
20 against the main body 9 and the wedge 6 respectively, and that clamping device is only released to adjust the wedge 6.

Figure 5 – viewing in a similar direction to Figures 1 or 2 – shows a transfer device 42 which is arranged above the main body and above the workpiece 7 which is not shown in Figure 5. The ejector pin 21 is shown
25 in Figure 5 its advanced position, being the ejection position.

The transfer device serves to grip the workpiece by means of two grippers 40, 41 which are arranged pivotably on the transfer device 42 and which together form a tongs arrangement, and to transport the workpiece away, for example to a next processing station disposed
30 therebeside, and/or to insert a fresh blank.

For that purpose, the transfer device 42 is displaceable above the main body 9 in the transverse direction and preferably includes – as the

view in Figure 4a shows, with the grippers in the open condition, viewing in the longitudinal direction – at least two or even more pairs of grippers, in order to be able to carry out the unloading and loading operations simultaneously.

5 As Figure 4b shows, the grippers 40, 41 are of such a length that with their free ends they can hold the workpiece 7 between them, but in the opened condition, the grippers 40, 41 pivot about their pivot axes arranged above the workpiece and in particular above the main body 9, with the extent of the pivotal movement being such that the free ends of
10 the grippers 40, 41 do not extend down towards the die 2 beyond the highest point, namely a tangent 20' extending horizontally in the transverse direction.

By virtue of that arrangement, it is possible for the transfer device 42 to be displaced transversely, with the grippers 40, 41 in the opened
15 condition, without the grippers 40, 41 becoming caught up on the die 2 or on the punch 1 which has still approached the die 2.

As considered in the longitudinal direction, the grippers 40, 41 – as can best be seen from Figure 5 – are positioned immediately in front of the front end of the die 2, that is to say in front of the front abutment
20 surface 2a thereof.

The spacing s between the front end face 2a of the die 2 and the grippers must in that respect be so adjusted that, upon adjustment of the die 2 by means of the wedge, no collision with the grippers takes place.

One possible option provides that the second setting device 5' displaces not only the ejector pin 21 but also the transfer device 42 in the
25 longitudinal direction.

A further possible option provides that a third setting device (not shown) is provided for the transfer device 42, similarly to the second setting device 5' and operative in the same direction.

LIST OF REFERENCES		29	clamping device
1	punch	30	gear
2	die	35	31 head
2a	front abutment surface	32	gear
5	3 carriage	33	screwthreaded spindle
4	bolt	34	hydraulic nut
5, 5'	setting device	40	gripper
6	wedge	40	41 gripper
7	workpiece	42	transfer device
10	8 (screwthreaded) bush	L1	shank length
9	main body	h1	head height
10	longitudinal direction	h	closing height spacing
11	servo motor	45	
12	position sensor		
15	13 servo motor		
14	position sensor		
15	die block		
15a	block cover		
16	support plate		
20	17 lever		
18	hydraulic cylinder		
19	counterpart wedge portion		
20	transverse direction		
21	ejector pin		
25	22 machine pin		
23	pin bush		
24	axis		
25	lever		
26	pin		
30	27 block pin		
28	abutment		

CLAIMS

1. A forging press comprising

- a support side (100) which is stationary in the shaping procedure and which includes a die (2),

- an impact side (101) which includes a carriage (3) with a punch (1), the carriage being movable in the longitudinal direction (10) in the shaping procedure, and

10 - a first setting device (5) for setting the closing height spacing (h),

- an abutment for the rearward end of the workpiece (7), and

- a second setting device (5') for adjustment of the longitudinal position of the abutment (28) with respect to the front abutment surface (2a) of the die (2), wherein

- the first setting device (5) is arranged on the support side (100) of the forging press,

characterised in that

the coupling of the first and second setting devices (5, 5') is such that a change in the closing height spacing (h) by means of the first setting device (5) automatically causes consequential adjustment of the abutment (28) by means of the second setting device (5') so that the spacing between the front abutment surface (2a) of the die (2) and the abutment (28) remains unchanged.

2. A forging press according to claim 1 characterised in that the first setting device (5) is arranged between the rear side of the die (2), which is remote from the impact side (101), and the main body (9) of the forging press.

3. A forging press according to claim 1 or 2, characterised in that the support device includes at least one wedge (6) which is displaceable transversely with respect to the longitudinal direction (10) and which is wedge-shaped in that direction of view and which in

30

particular is displaceable on a co-operating counterpart wedge portion (19) which is similarly oppositely wedge-shaped in the same direction of view and which is stationary with respect to the main body (9).

4. A forging press according to any one of claims 1 to 3, characterised in that both setting devices (5, 5') are driven by motor means respectively.

5. A forging press according to claim 4, characterised in that both motors are actuated by a common control device.

6. A forging press according to claim 4 or 5, characterised in that the
10 motor means are electro servo motors (11, 13) which each includes a respective position sensor (12, 14).

7. A forging press according to any one of the claims 1 to 6, characterised in that both setting devices (5, 5') are respectively adjusted by way of a screwthreaded spindle extending in the setting direction.

8. A forging press according to any one of claims 1 to 7, characterised in that support side (100) of the forging press includes a clamping device (29) for fixedly clamping the entire die block (15) carrying the die (2) against the front side of the wedge (6) and thus against the main body (9).

9. A forging press according to claim 8, characterised in that the
20 clamping device (29) is coupled to the first setting device (5) so that prior to displacement of the first setting device (5) the clamping device (29) is released,

10. A forging press according to any one of claims 1 to 9, characterised in that the screwthreaded spindle (33) of the first setting device (5) runs in a hydraulically clampable nut (34) which is clamped during operation of the forging press in order to prevent the setting device (5) being adjusted of its own accord.

11. A forging press according to any one of claims 1 to 10, characterised in that the forging press includes a transfer device (42) with grippers (40, 41) for gripping the workpiece (7) and transporting said work piece (7) to and away from the press in the transverse direction (20) with respect to the longitudinal direction (10).

12. A forging press according to claim 11, characterised in that in the opened condition the grippers (40, 41) are outside the parts of the forging press which are in the pressing position and in particular they are outside the punch (1) which is in the pressing position.

10 13. A forging press according to claim 11 or 12, characterised in that in the opened position the grippers (40, 41) of the transfer device (42) are disposed completely radially outside the tangent (20') which extends in the direction of displacement of the transfer device (42) and which is applied to the periphery of the punch (1) and they are disposed in the longitudinal direction (10) immediately in front of the front abutment surface (2a') of the die (2).

14. A forging press according to any one of claims 11 to 13, characterised in that the transfer device (42) with the grippers (40, 41) is displaceable exclusively in the direction of the tangent (20') towards and away from the longitudinal axis.

FIG.1

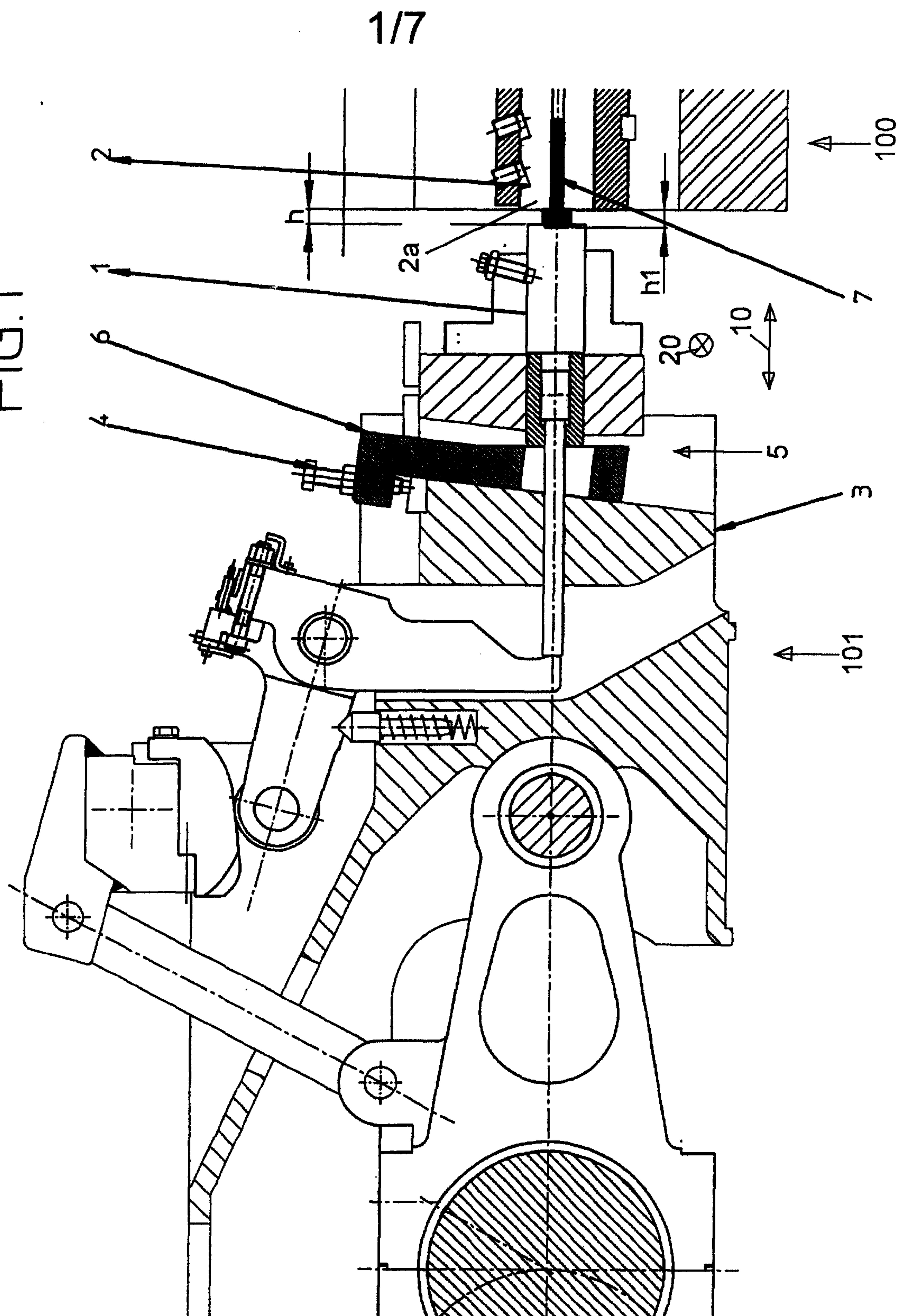


Fig. 2a

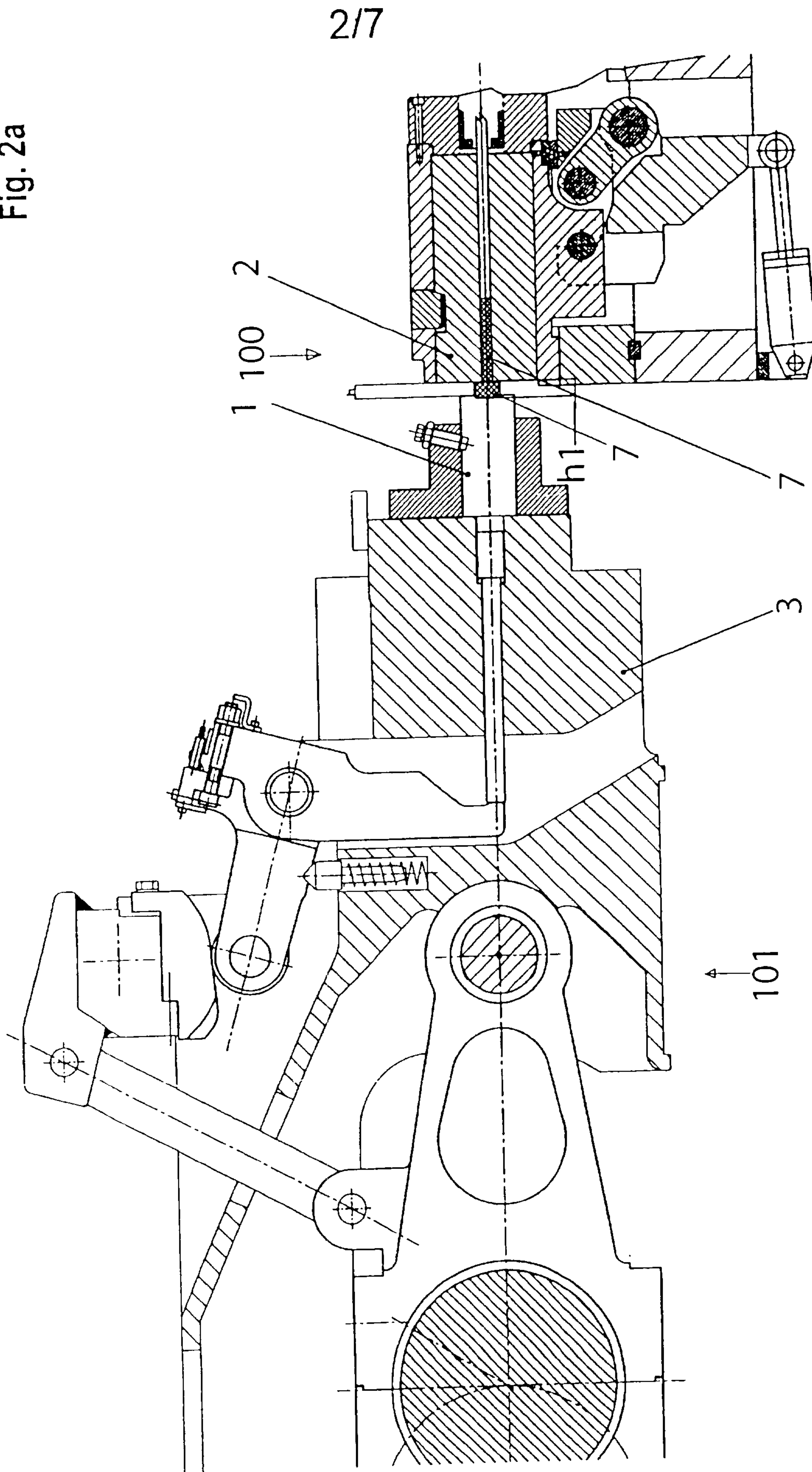
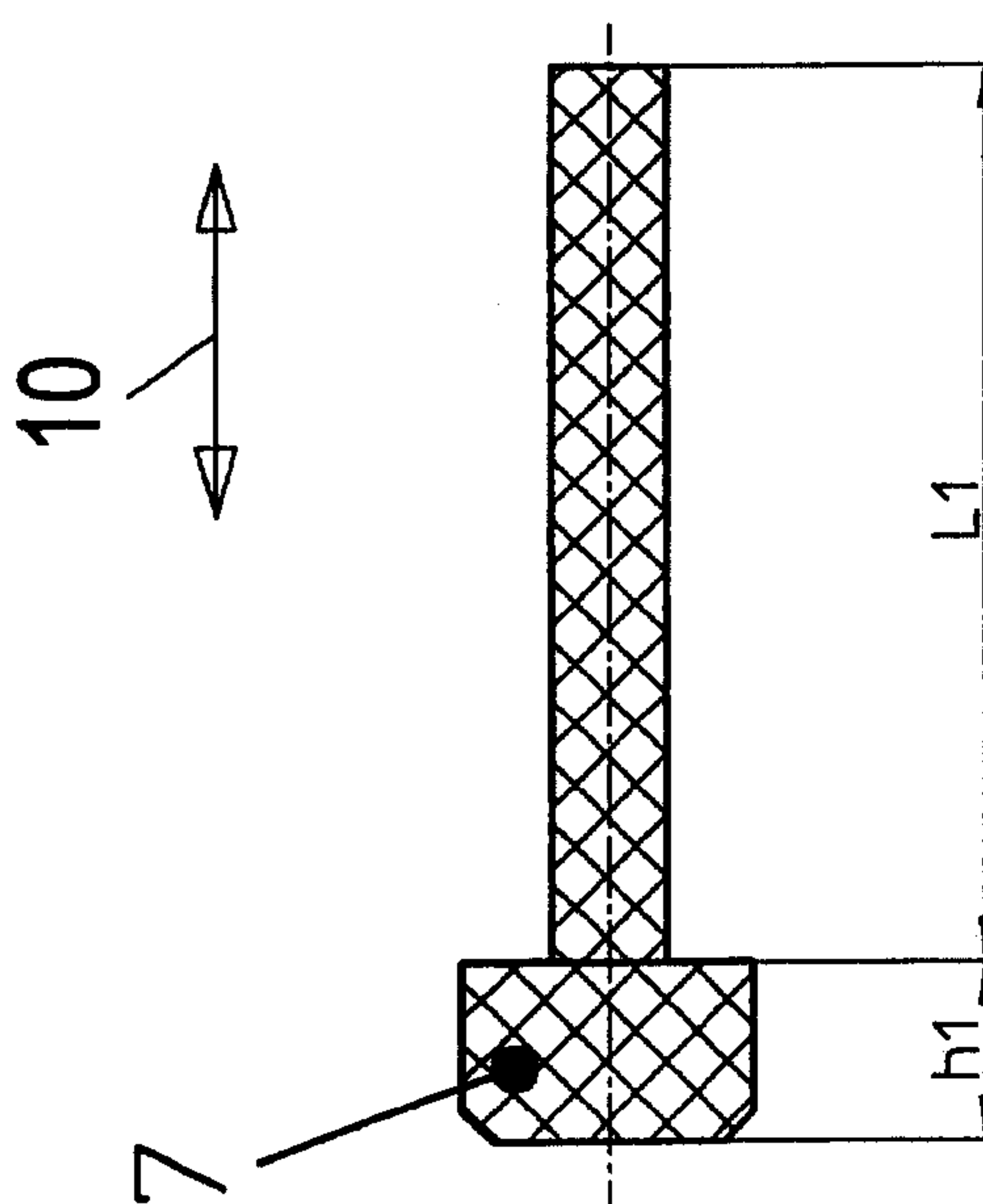
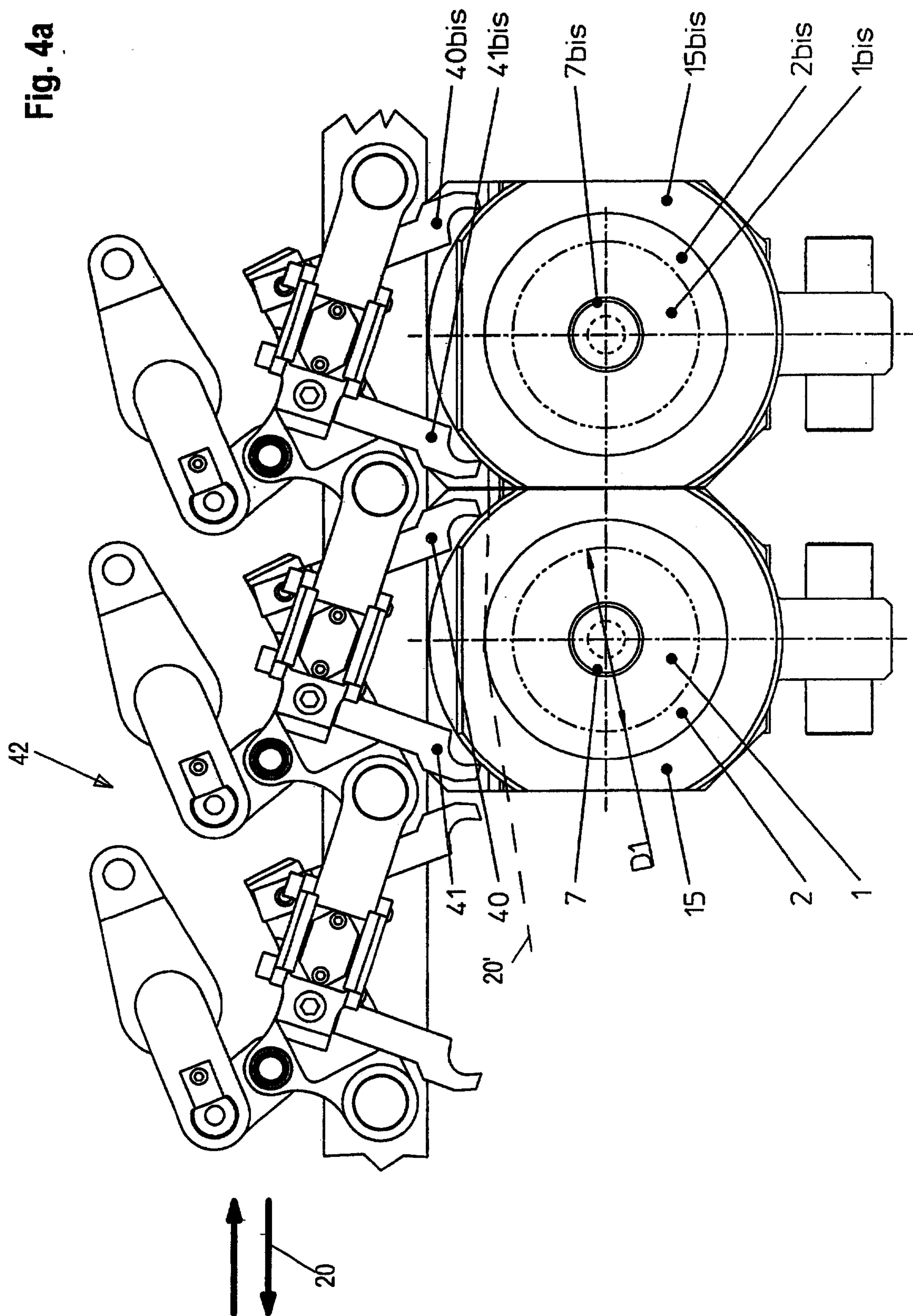


FIG. 3



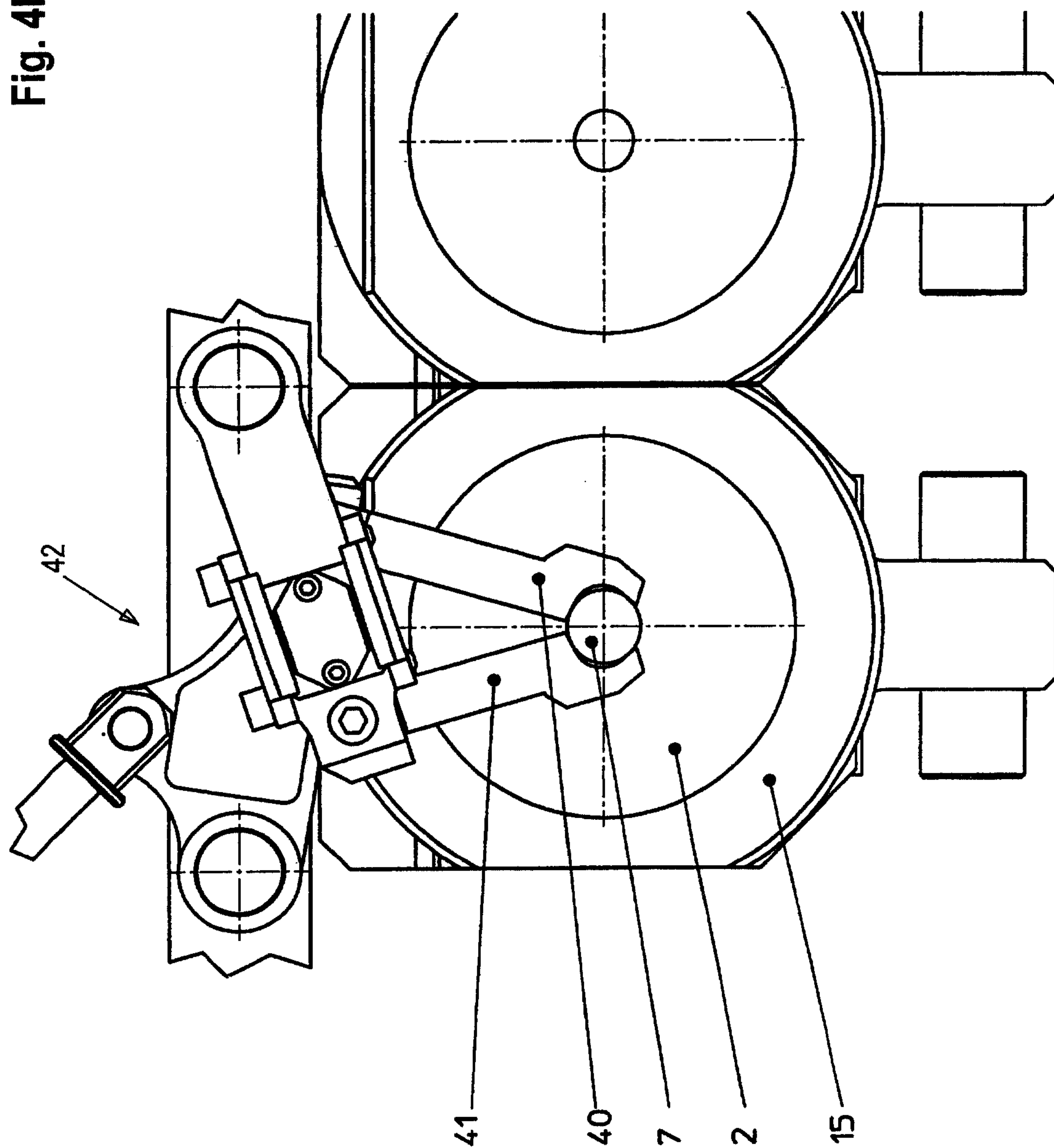
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Fig. 4a



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Fig. 4b



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