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(54) Press frame module

(57) A press frame module for a press comprises a front plate (4) and a rear plate (6), each having a rectangular plate opening (8) with opposing first and second sides (8a and 8b) and opposing third and forth sides (8c and 8d). Spacer elements (16) are arranged between the plates (4, 6), such that the plates are parallely arranged with aligned plate openings (8) between which a press chamber is formed. A press platen (26), which is arranged in a xy-plane, is displaceable in the press chamber along the first and second opening sides (8a and 8b) in a z direction beween a stationary lower platen (24) and a stationary upper platen (28). Press forces are transferred via the upper and lower stationary platens to the front and rear plates (4 and 6) and the spacer elements (16). A cage structure comprises the spacer elements in form of connecting bars (16), connecting the front and rear plates (4 and 6), and guide rails (34), attached to the first and second side openings (8a and 8b) for guiding the displaceable press platen. Stability is essentially maintained in a yz-plane by the connecting bars (16), in a xy-plane by platens (24, 26, 28) and in a xz-plane by the guide rails (34), wherein x, y and z are coordinates of a three dimensional Cartesian coordinate system.

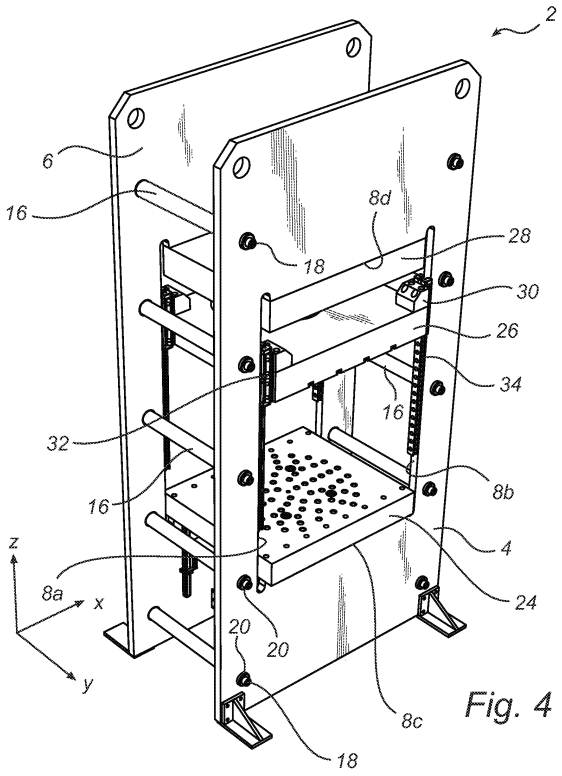

Fig. 4

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Description

Field of the invention

[0001] The present invention relates to a press frame module for a press comprising a front plate and a rear plate, each having a rectangular plate opening with opposing first and second sides and opposing third and forth sides, wherein spacer elements are arranged between the plates, such that the plates are parallely arranged with aligned plate openings, between which a press chamber is formed, wherein a press platen, which is arranged in a xy-plane, is displaceable in the press chamber along the first and second opening sides in a z direction beween a stationary lower platen and a stationary upper platen, wherein press forces are transferred via the upper and lower stationary platens to the front and rear plates and the spacer elements.

Background of the invention

[0002] There are many different constructions of press frames structures for presses. When manufacturing presses welding is often an undesirable operation as it affects the metallic properties and demands special post treatment. This makes assembly at the site of use difficult and requires transport of the often voluminous presses in an assembled form.

[0003] US 5 027 638 describes a force-resisting structure for a conventionally built press frame. This solid structure is unwelded and comprises metal plates connected and maintained in alignment by a pair of side plates. The plates are connected together with bolts, but the bolts do not participate in resisting the main structural loads. The purpose with this structure is to achieve a structure, where all parts are assembled by means of bolts without welding. This structure is a complex construction with many different parts, such as upper and lower plates with intermediate wedges for transferring forces to load carrying parts. Further it does not allow side feeding of objects to be pressed.

Summary of the invention

[0004] An object of the present invention is to provide a press frame module which is easy and cost effective to produce and mount, and which provides for exactly guided and controlled movements of a press platen. A further object is to achieve a versatile press frame which allows front feeding and side feeding. An additional object is to provide a press frame which is easy to reconstruct and manufacture in different dimensions and for different power sources. Another object of the present invention is to provide a method for manufacturing said press, said method distinguishes itself by being quite simple and yet versatile.

[0005] These objects are achieved as regards the press frame module by means of a press frame module of the above mentioned kind which is characterized by a cage structure comprising the spacer elements in form of connecting bars, connecting the front and rear plates, and guide rails, attached to the first and second side openings for guiding the displaceable press platen, such that stability is essentially maintained in a yz-plane by the connecting bars, in a xy-plane by platens and in a xz-plane by the guide rails, wherein x, y and z are coordinates of a three dimensional Cartesian coordinate system.

[0006] It proves that the connecting bars i combination with the press platens and the guide rails provide for a suffient stability in a press frame.

[0007] Each spacer element comprises several connecting bars, wherein the front and the rear plate have aligned pairs of bores, wherein the two ends of each bar is received in a pair of bores and attached to the plates.

[0008] Preferably each connecting bar is a solid circular bar with a larger diameter center part and smaller diameter ends, wherein each bore has a diameter of essentially the same diameter as the smaller diameter ends for receiving each end with a tight fit, and wherein each bore, on the surface facing the opposite plate, has a surrounding circular recess forming a plane surface for receiving a connecting bar in a right-angled fashion.

[0009] Hence each bar is easily machined and preferably attached by means of screws, though it is also possible to use a key or cotter.

[0010] With all bores machined exactly the same and with identical connecting bars this construction provides for a simple assembly with exactly spaced apart plates. The recesses further improves the stability of the press frame module.

[0011] These objects are achieved as regards the method for manufacturing a press frame by a) forming an essentially rectangular opening with opposing first and second sides and opposing third and forth sides in a front plate, b) drilling several bores in the front plate along each longside, c) performing the steps according to a) and b) on a rear plate such that the opening and bores in the front plate are aligned with the opening and bores in the rear plate, d) providing a solid circular bar having a predetermined length for preparing a connecting bar for each pair of aligned bores in the front and the rear plates, wherein each connecting bar has smaller diameter ends for insertion with a tight fit in respective bores, e) inserting each bar in respecive bores such that the plates are parallelly arranged, f) attaching each bar to respective plate, g) attaching a lower stationary platen to the third side openings and an upper stationary platen to the forth side openings, h) providing each plate with a pair of parallely arranged and opposing guide rails, and i) clamping a platen for displacement along the guide rails.

[0012] This method provides for achieving a frame structure which to a great extent facilitates manufacturing of the separate parts as well mounting of said parts as the frame structure comprises few different structural el-

ements without need of welding. The method enables facilitate prefabrication and post assembly at site which in turn reduces transport costs.

[0013] Further objects and features of the present invention will be apparent from the description and the claims.

Brief description of the drawings

[0014] The invention will now be described in more detail with reference to the appended drawings in which:

Fig. 1 is a perspective view showing a press with a press frame module according the invention.

Fig. 2 is a perspective cross section along III-III in Fig. 1.

Fig. 3 is a cross section in an enlarged scale showing a connecting bar inserted in a plate.

Fig. 4 is a perspective view of a press frame module according the invention.

Fig. 5 is a front view of a rear plate in the press frame shown in Fig. 1.

Description of preferred embodiments

[0015] A press frame module 2 according the invention comprises a front plate 4 and a rear plate 6, each having a rectangular plate opening 8 with opposing first and second sides 8a, 8b and opposing third and forth sides 8c, 8d. Spacer elements 16 are arranged along the longsides of and between the plates 4, 6, such that they are parallely arranged with aligned plate openings 8, between which a press chamber is formed. A press platen 26 is displaceable in the press chamber along the first and second opening sides 8a, 8b.

[0016] The press chamber is delimited in z direction by a stationary lower platen 24 and a stationary upper platen 28, between which the displaceable press platen 26 is displaceable. Press forces are transferred via the upper and lower stationary platens to the front and rear plates 4, 6 and the connecting bars 16. Hence a cage structure is formed comprising the spacer elements in form of connecting bars 16, connecting the front and rear plates 4, 6, and guide rails 34, attached to the first and second side openings 8a and 8b for guiding the displaceable press platen.

[0017] The cage structure resists bending and shearing forces on the frame arising when pressing. This structure comprises the spacer elements in form of connecting bars 16 for maintaining stability in a yz-plane, the displaceable press platen 26 for maintaining stability in a xy-plane and guide rails 34 for guiding the displaceable press platen and preventing the first and second opening sides from bending. X, y and z are coordinates of a three dimensional Cartesian coordinate system as is shown in Figs. 1, 2 and 4.

[0018] In the embodiment shown in the drawings each plate has two parallel rows of bores 12, with five bores per row. The bores 12 are arranged along the longside of the plates. Each bore 12 is on the surface to be facing the other plate provided with a surrounding circular guide recess 14 for receiving a connecting bar 16, as is most clearly shown in Figs. 4 and 5 and as will be explained below. The number of the bores depends on the size of the press. All bores 12 have the same diameter and all recesses 14 have the same diameter and depth. The front plate 4 and the rear plate 6 are identical as regards the size and position of openings and bores. All bore surfaces are finished to achieve a smooth surface impeding formation of cracks.

[0019] The spacer elements comprises ten solid circular connecting bars 16 having a predetermined length. These bars are acting as spacers between the front and the rear plate 4, 6 as well as means for connecting the plates together.

[0020] All bars have a center part 16b with a larger diameter D_2 and end parts 16a with a smaller diameter D_1. The length of the center part 16b is exactly the same for all bars in order to constitue spacers between the front plate 4 and the rear plate 6. Further the smaller diameter end 16a of all bars have the same diameter.

[0021] All the connecting bars 16 are connected to the plates in the same way. The smaller diameter ends 16a of a connecting bar 16 are inserted with a tight fit in a pair of aligned bores 12 in the front and the rear plates 4 and 6. When a smaller diameter end 16a of a bar is inserted in a bore, an end surface of the larger diameter center part 16b of said bar is abutting a recess bottom surface surrounding said bore. The recess bottom surface forms a plane surface for receiving the connecting bar 16 in a right-angled fashion. The circular recess 14 has a slightly larger diameter than the larger diameter center part 16b.

[0022] With this construction the plates will be parallely arranged at a exact fixed distance from each other with the bars in a right angle in relation to the plates. Each connecting bar 16 is attached to respective plate by means of a screw 18 with a washer 20 fastened in a corresponding threaded hole in the smaller diameter end 16a. There is a clearance 22 between the washer 20 and the plate 4 enabling the plate to be properly biased against the connecting bar 16. This construction further provides for a stable, yet easily assembled attachment between connecting bars and plates.

[0023] The displaceable press platen 26 is displaceable along four roller guide rails 34, with two guide rails on each plate, attached to the first and second side opening 8a, 8b in each opening 8, respectively. Each rail 34 is carrying a carriage 32 able to glide along the rail. Each carriage 32 is in turn attached to a support block 30 at the upper corner of the platen 26 and to a vertical surface of said platen.

[0024] Thanks to the roller guide rails 34 the movement of the displaceable platen 26 is achieved with a high precision.

[0025] The lower platen 24 is a press table protruding into each opening 8 at the third openings sides 8c forming

a bottom surface of the press chamber. The press table is attached by means of screws 56 to axles which in turn are attached to an anvil table, which could be affected by an anvil cylinder and by means of screws along the third openings sides 8c.

[0026] The upper platen 28 is fixed in essentially the same way and protruding into each opening 8 at the forth openings sides 4d forming a top surface of the press chamber. The upper platen 28 is carrying two main cylinders 38 and an additional cylinder 36 of which only a part are visible in Fig. 2. The cylinders are acting on and carrying the displaceable platen 26.

[0027] The additional cylinder is an optional cylinder which could be used for ejection, for example. The cylinders are in communication with a highpressure pump via the fluid power conduits 54.

[0028] As seen in Fig. 1 outer cover plates 42 are arranged between the front and the rear plate 4, 6 outside the connecting bars 12 for preventing unintentional access to the press chamber and for protection in case of bursting conduits.

[0029] Further, inner cover plates 44 are arranged between the front and the rear plate 4, 6 inside the connecting bars 16. A door 40 is arranged below the cover plate 42 for allowing access to the press chamber and other interior parts of the press in case of maintenance.

[0030] The press 1 in Fig. 1 is adapted for front feeding but with modified cover plates 42, 44 and door 40 it is easily adapted for side feeding.

[0031] The press frame module according the invention is to be used for a press, such as the press shown in Fig. 1. This press is a hydraulic press 1, though the press frame module 2 could be used for other types of presses, such as mechanical or eccentrical presses. The press 1 in Fig. 1 is provided with an operator display 48, an electric cabinet 46 and an inspection balcony 50. Further is shown motor parts 52 and the fluid power conduits 54.

[0032] The method for manufacturing a press frame module for a press comprises first forming the front and the rear plate essentially identical, wherein each plate is provided with an essentially rectangular opening with opposing first and second sides and opposing third and forth sides in a front plate and a rear plate, and perforated with several bores along each longside. Then the spacer elements are formed by cutting a solid circular bar at a predetermined length for preparing a connecting bar for each pair of aligned bores in the front and the rear plates. Each connecting bar is turned to obtain smaller diameter ends for insertion with a tight fit in respective bores. Each bar is inserted in respecive bores such that the plates are parallelly arranged and attached respective plate. Stationary upper and lower platens are attached to the forth and the third side openings, respectively. Further each plate is provided with a pair of parallelly arranged and opposing guide rails, and a displaceable press platen is clamped along the guide rails.

[0033] As the press frame module contains few structural parts it is extremely cost effective to manufacture and simple to assemble. No post treatment is needed.

[0034] The press frame module according the invention is also simple to customize depending on the customer's need. The front and rear plates and the connecting bars easily are adapted to different sizes of press tables and press tools without cumbersome reconstruction and machine adjustments at manufacturing of the separate module parts. Depending on the chosen size of press frame the plates are machined as regarding dimension, size of plate opening, number and dimension of bores and the connecting bars are machined as regarding length and diameters.

Claims

1. Press frame module for a press comprising
a front plate (4) and a rear plate (6), each having a rectangular plate opening (8) with opposing first and second sides (8a and 8b) and opposing third and forth sides (8c and 8d), wherein spacer elements (16) are arranged between the plates (4, 6), such that the plates are parallelly arranged with aligned plate openings (8), between which a press chamber is formed, wherein a press platen (26), which is arranged in a xy-plane, is displaceable in the press chamber along the first and second opening sides (8a and 8b) in a z direction beween a stationary lower platen (24) and a stationary upper platen (28), wherein press forces are transferred via the upper and lower stationary platens to the front and rear plates (4 and 6) and the spacer elements (16),
characterized by a cage structure comprising the spacer elements in form of connecting bars (16), connecting the front and rear plates (4 and 6), and guide rails (34), attached to the first and second side openings (8a and 8b) for guiding the displaceable press platen,
such that stability is essentially maintained in a yz-plane by the connecting bars (16), in a xy-plane by platens (24, 26, 28) and in a xz-plane by the guide rails (34), wherein x, y and z are coordinates of a three dimensional Cartesian coordinate system.

2. Press frame module according to claim 1, wherein the front and the rear plates (4 and 6) have aligned pairs of bores (12), wherein the two ends (16a) of each bar is received in a pair of bores (12) and attached to the plates (4, 6).

3. Press frame module according to claim 2, wherein each connecting bar (16) is a solid circular bar with a larger diameter center part (16b) and smaller diameter ends (16a), wherein each bore (12) has a diameter of essentially the same diameter as the smaller diameter ends (16a) for receiving each end with a tight fit, and wherein each bore (12), on the

surface facing the opposite plate, has a surrounding circular recess (14) forming a plane surface for receiving a connecting bar (16) in a right-angled fashion.

4. Method for manufacturing press frame module for a press comprising the steps of

a) forming an essentially rectangular opening (8) with opposing first and second sides (8a and 8b) and opposing third and forth sides (8c and 8d) in a front plate (4),
b) drilling several bores (12) in the front plate along each plate longside,
c) performing the steps according to a) and b) on a rear plate (6) such that the opening (8) and bores (12) in the front plate (4) are aligned with the opening (8) and bores (12) in the rear plate,
d) providing a solid circular bar (12) having a predetermined length for preparing a connecting bar for each pair of aligned bores (12) in the front and the rear plates (4 and 6), wherein each connecting bar has smaller diameter ends (16a) for insertion with a tight fit in respective bores (12),
e) inserting each bar (12) in respecive bores such that the plates are parallelly arranged,
f) attaching each bar (12) to respective plate (4, 6),
g) attaching a lower stationary platen (24) to the third side openings (8c) and an upper stationary platen 28) to the forth side openings (8a)
h) providing each plate (4, 6) with a pair of parallely arranged and opposing guide rails (34), and
i) clamping a platen (26) for displacement along the guide rails (34).

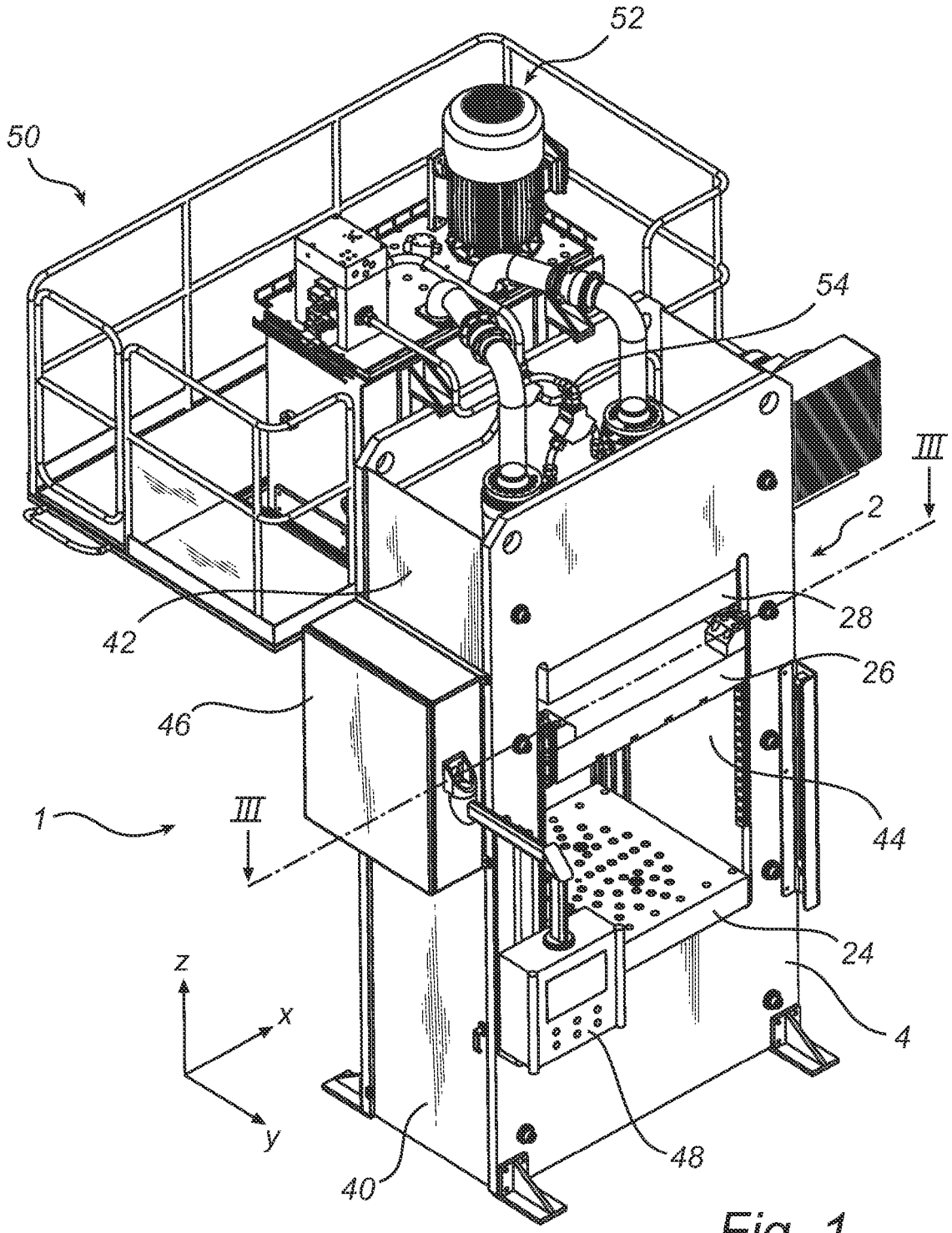

Fig. 1

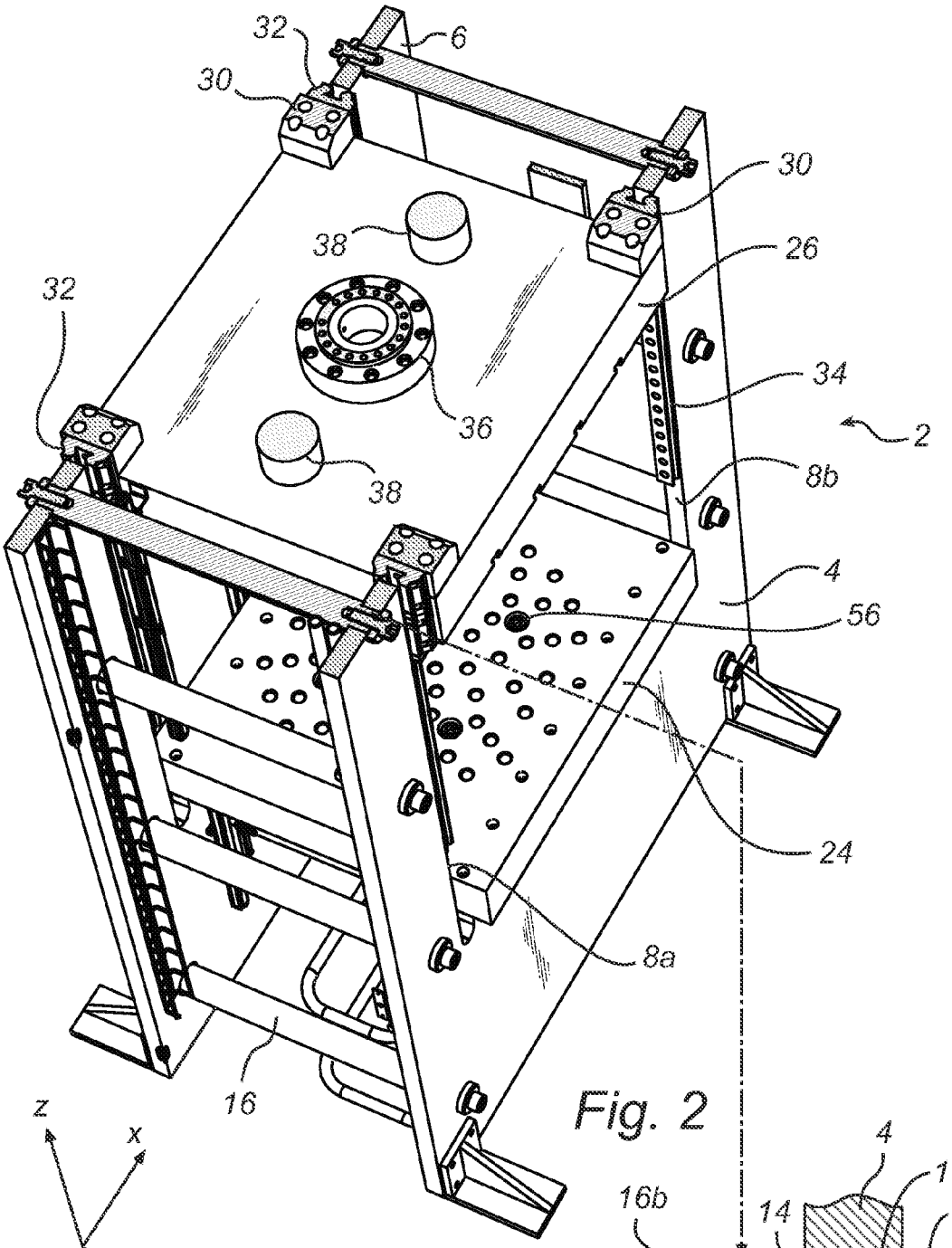
32
6
30
30
38
26
32
34
36
2
38
8b
4
56
24
8a
16
z
x
y

Fig. 2

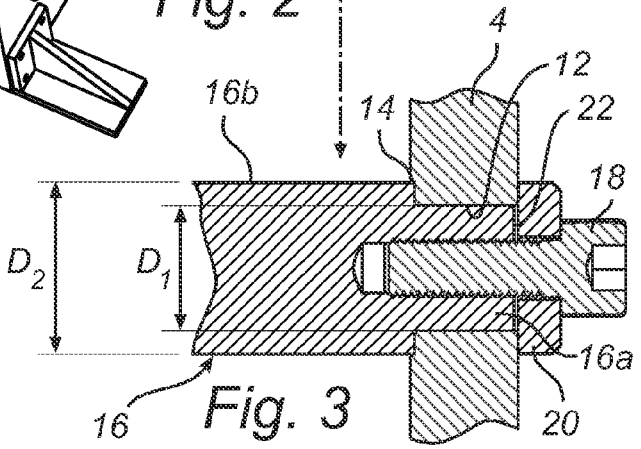
4
12
16b
14
22
18
D_2
D_1
16a
16
20

Fig. 3

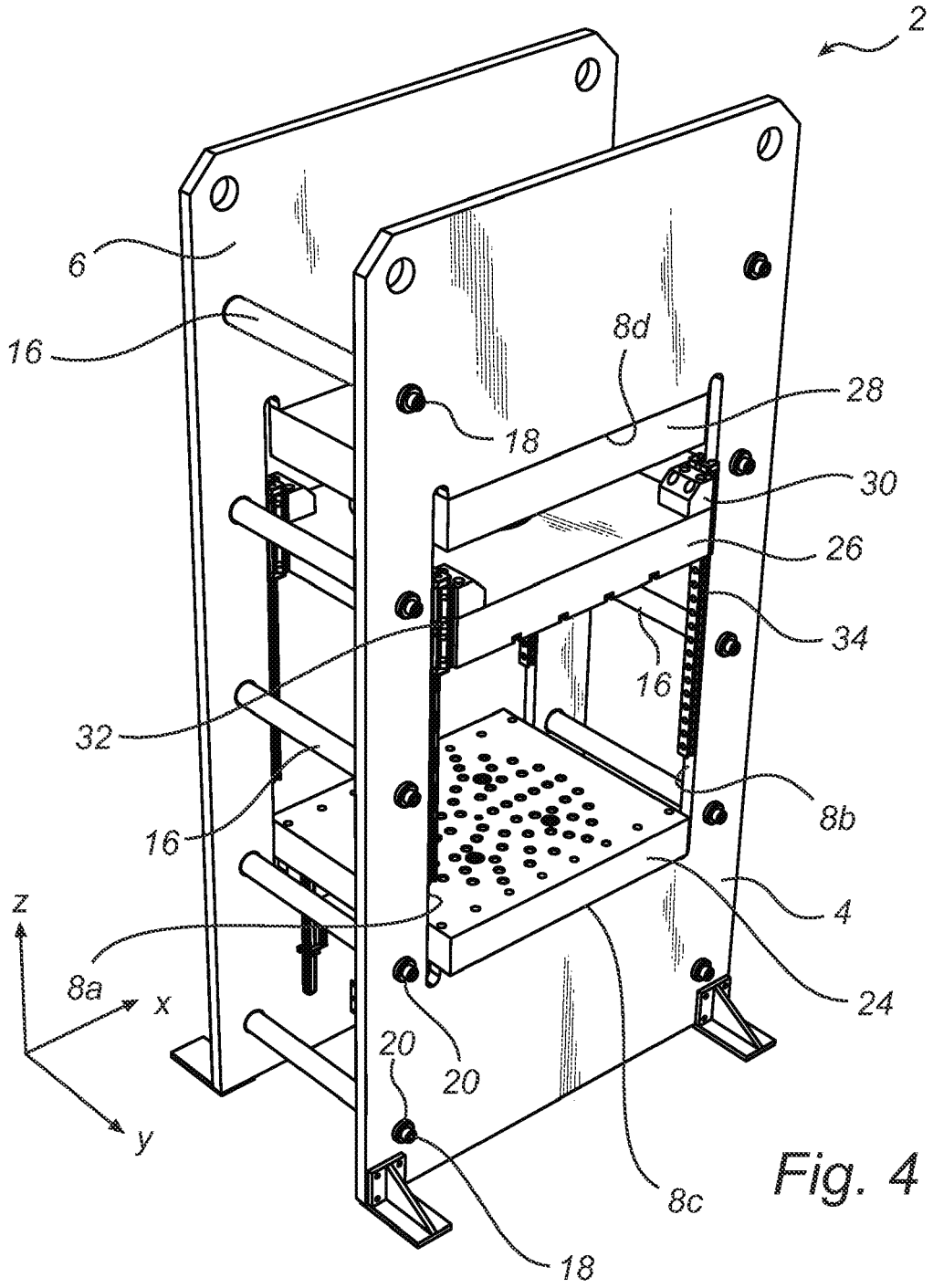

Fig. 4

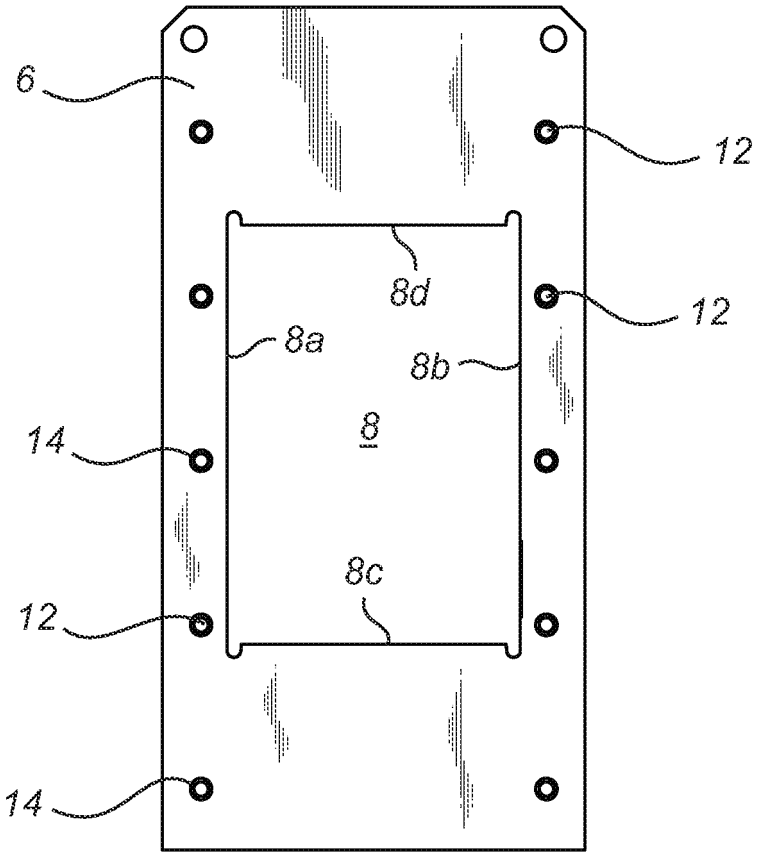

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 08 15 9699

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 11 267897 A (SENYO CO LTD) 5 October 1999 (1999-10-05) * abstract; figures 1-7 *	1-4	INV. B30B15/04
X Y	DE 196 07 257 A1 (HYDRAP PRESSEN MASCHINENBAU [DE]) 28 August 1997 (1997-08-28) * claims; figures *	1,2 3,4	
Y	DE 199 49 473 C1 (UTSCH JOACHIM [DE]) 5 October 2000 (2000-10-05) * claims 1-3; figures *	3,4	
X	DE 10 2004 032259 A1 (SIEMPELKAMP MASCH & ANLAGENBAU [DE]) 26 January 2006 (2006-01-26) * figures 2,10,11 *	1,2	
A	US 3 523 443 A (ALLEN HERBERT) 11 August 1970 (1970-08-11) * figures *	1-4	TECHNICAL FIELDS SEARCHED (IPC)
A	DE 17 52 352 A1 (SIEMPELKAMP EUGEN) 19 May 1971 (1971-05-19) * figures *	1-4	B30B
A	GB 2 235 410 A (DORSTENER MASCHF AG [DE]) 6 March 1991 (1991-03-06) * figures *	1,4	
A	EP 0 916 461 A (SAMA S R L [IT] SYSTEM S P A [IT]) 19 May 1999 (1999-05-19) * abstract; figures *	1,4	
A,D	US 5 027 638 A (FRIESTAD ROLAND W [US]) 2 July 1991 (1991-07-02) * abstract; figures *	1,4	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 September 2008	Bélibel, Chérif

CATEGORY OF CITED DOCUMENTS

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17-09-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 11267897 A	05-10-1999	NONE	
DE 19607257 A1	28-08-1997	NONE	
DE 19949473 C1	05-10-2000	NONE	
DE 102004032259 A1	26-01-2006	CA 2511317 A1	03-01-2006
		US 2006021523 A1	02-02-2006
US 3523443 A	11-08-1970	DE 1627808 A1	30-09-1971
		FR 1544472 A	31-10-1968
		GB 1207687 A	07-10-1970
DE 1752352 A1	19-05-1971	NONE	
GB 2235410 A	06-03-1991	DE 3928533 A1	21-03-1991
		NL 9001679 A	18-03-1991
EP 0916461 A	19-05-1999	DE 69816942 D1	11-09-2003
		DE 69816942 T2	15-07-2004
		ES 2202719 T3	01-04-2004
		IT MO970207 A1	17-05-1999
US 5027638 A	02-07-1991	NONE	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 5027638 A **[0003]**