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(54) **Box nozzle for ladles and the like, with lateral pressure springs**

Mit lateralen Andruckfedern ausgestatteter Schieberverschluss für metallurgische Gefässe

Fermeture coulissante pour récipients de coulée, pourvue de ressorts de pression latérale

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Description**FIELD OF THE INVENTION**

The object of the present invention is a box nozzle with lateral pressure springs, for ladles.

BACKGROUND OF THE INVENTION

Box nozzles have been used for several years for discharging ladle, tundishes and the like, stagewise, if desired.

Their use has gradually spread to ladles of increasing size and their standard of reliability has grown in parallel with the improvement in quality of the refractories available on the market.

Box nozzles, of course, consist basically of a pair of refractory plates, one fixed, the other movable, each with an orifice: relative movement of these two plates permits regulation of the size of the opening through which the liquid steel leaves the ladle.

Said pair of refractory plates is associated with a first refractory coupling positioned beneath the sliding plate and moving with it, and a second refractory coupling, positioned above the fixed refractory plate, inserted in the thickness of the refractory lining of the ladle, plus a third refractory coupling that surrounds it.

These refractory parts are inserted in a support and movement device which generally includes:

- a metal levelling plate positioned beneath the bottom of the ladle and equipped with an appropriate opening for inserting and extracting the second fixed refractory coupling;
- a fixed upper metal plate, suitably connected by bolts to the bottom of the ladle to which said levelling plate belongs;
- a fixed lower metal plate, referred to as "the cover" for short, which must be detachable to permit maintenance of the mechanism and refractory parts of the box nozzle; said cover or fixed lower metal plate is generally connected to the fixed upper metal plate by means of hinged bolts;
- a sliding metal frame referred to henceforth as "the slide" for short, which runs between the fixed upper metal plate and the fixed lower metal plate or cover;
- guides positioned between the fixed lower metal plate, or cover, and the sliding metal frame, or slide.

The aforesaid metal plates have a large central opening, of course.

The two refractory plates with orifices are suitably anchored, the fixed one to the lower face of the fixed upper metal plate, and the moving one to the upper face of the slide.

STATE OF THE ART

To ensure a good seal for the liquid metal it is evident, of course, that the mutually sliding contact faces of the fixed and movable refractory plates must be pressed evenly against one another.

French Patent Publication 2,247,302 refers to a box nozzle comprising a first fixed refractory plate, provided with a through orifice, and a second movable refractory plate, also with a through orifice, inserted in a metallic slide pivoting around a pin, to permit opening and closing of a passage, consisting in the through orifices, for liquid metal. The slide rests on springs, to urge said movable refractory plate against said fixed refractory plate; the pin, however, allows the slide, and hence the moving refractory plate, to move only about the axis of the pin itself.

It is equally evident that the required pressure must be provided by appropriate interaction of the connecting means between the fixed upper metal plate and the fixed lower metal plate or cover.

Moreover, said means of connection must be such as to ensure precise, rapid and safe control by the operators.

It should be added that perfect contact between the counterposed faces of the fixed and movable refractory plates must be assured despite any possible defects in coplanarity between the smoothed faces of the refractory plates, responsible for ensuring the seal, and the opposite faces, generally metal clad, whose function is to provide support and which rest respectively on the lower face of the fixed upper metal plate and the upper face of the sliding metal plate, or slide.

To obtain such a perfect contact between counterposed faces of respectively fixed and movable refractory plates, US Patent 4,660,749 utilizes a slide resting on a set of fully preloaded springs. During the mounting operation of the box nozzle, a bracket is rotated around a hinged joint to bring said refractory plates into mutual contact, and then a nut, opposed to said hinged joint, is tightened. However, at the beginning of the tightening operation, the fixed and movable refractory plates contact each other only at the edges thereof closest to the hinged joint; the forces created by tightening of said nut are concentrated at said edges, thereby causing cracking or otherwise damaging thereof.

As the size of box nozzle increases, it becomes more and more difficult to achieve the above conditions simply and safely, guaranteeing good reliability.

DESCRIPTION OF THE INVENTION

The aim of the present invention is to overcome this difficulty. According to the invention an intermediate frame, which tilts on two perpendicular axes lying in the plane of movement of the slide, is inserted between the slide and the cover. Inclination of said tilting frame is achieved by means of two rows of springs supported by

the cover and parallel to the long sides thereof.

The long sides of the intermediate tilting frame rest on the two rows of springs.

The slide on which is mounted the sliding refractory plate runs in guides on top of the tilting frame.

Hence the tilting frame can always keep the two counterposed faces of the fixed and movable refractory plates in perfect contact with one another.

According to the invention, to simplify assembly of the box nozzle, the means of connection between the cover and the fixed upper refractory plate consist of bolts that are hinged at one end. Said bolts are tightened until the faces of said cover and said fixed upper metal plate are completely flush: hence the bolt-tightening operations call for no particular control by means of torque spanners, for example. However, the tightening operation is done last.

When reassembling the box nozzle with the cover in the open position, spring assemblies, which protrude from the upper face of said cover, are inserted on the bottom of the cover through threaded holes.

The tilting frame is rested on the protruding ends of the spring assemblies and the moving slide is rested on top of this. Two pairs of counterposed guide strips are placed between the tilting frame and slide. The edges of the slide are then pushed towards the cover by means of a pair of counter-strips that are fixed to the cover by screws. Tightening the screws results in an initial compression of the spring assemblies, urging the ensemble of tilting frame, slide and related refractory plate and nozzle against protruding strips of the cover; the ensemble is thus firmly kept in position, to prevent movable parts such as the slide from accidentally falling, and to avoid an excessive initial pressure between the refractory plates.

Subsequently, the cover which is now equipped with springs, tilting frame and slide, is turned over against the fixed upper metal plate and is pressed against it by fully tightening the hinged bolts which connect the cover to the fixed upper plate. During this tightening the spring assemblies receive a second and definitive compression which ensures that the counterposed faces of the fixed and movable refractory plates are urged elastically against one another.

Such definitive compression causes the slide to be detached from said protruding strips, thus permitting the tilting frame to find its proper position and the fixed and movable refractory plates to be in perfect contact.

According to the invention, provision is also made for suitable catches which ensure correct tightening of the aforesaid hinged bolts, as is explained in detail ahead.

The essential characteristics of the invention are summarized and schematized in the claims; the objects and advantages of the invention are also made clear by the following description concerning the embodiment selected purely by way of example, with particular reference to the accompanying drawings, in which:

- Fig.1 is an exploded view of the component parts of the box nozzle as per the invention;
- Fig.2 is a longitudinal view of the box nozzle, half sectionalized, with the nozzle in the open position, namely with the orifices of the fixed and movable plates lined up; the term "longitudinal" used in this context means the direction parallel to the direction of movement of the sliding refractory plate;
- Fig.3 is a half cross-section of the box nozzle;
- Fig.4 illustrates a detail of the preceding figure at larger scale;
- Fig.5 (right half) illustrates a section on the V-V plane of Fig.3, while Fig.5 (left half) illustrates a section on the VA-VA plane of Fig.3: the V-V plane coincides with the plane on which lies the lower face of the levelling plate; plane VA-VA coincides with the separation and contact plane of the fixed and movable refractory plates;
- Fig.6 (upper half) provides a bird's-eye view of the fixed upper plate, while Fig.6 (lower half) provides a worm's-eye view thereof;
- Fig.7 is a cross-section through the fixed upper plate along VII-VII of Fig.6;
- Fig.8 is a longitudinal section of the same plate along VIII-VIII of Fig.6;
- Fig.9 (upper half) provides a worm's-eye view of the fixed lower plate, namely the cover, while Fig.9 (lower half) provides a bird's-eye view thereof;
- Fig.10 is a cross-section of the cover along X-X of Fig.9;
- Fig.11 is a longitudinal section of the cover along XI-XI of Fig.9;
- Fig.12 (upper half) provides a bird's-eye view of the tilting frame, while Fig.9 (lower half) provides a worm's-eye view thereof;
- Fig.13 is a cross-section of the tilting frame along XIII-XIII of Fig.12;
- Fig.14 is a longitudinal section of the tilting frame along XIV-XIV of Fig.12;
- Fig.15 (upper half) provides a bird's-eye view of the slide, while Fig.15 (lower half) provides a worm's-eye view thereof;
- Fig.16 is a cross-section of the slide along XVI-XVI of Fig.15;
- Fig.17 is a longitudinal section along XVII-XVII of Fig.15.

Referring in particular to Fig.1, 10 indicates the fixed upper metal plate that is attached to the bottom of the ladle. Drilled hinge-pieces 11 and 12 are fixed to the longitudinal side of said plate. Hinged to these via pins are bolts 13 and catches 14.

By means of nuts 15 of bolts 13 fixed upper plate 10 supports a lower metal plate 20, which is also fixed when the box nozzle is in operation but can be detached from the fixed upper plate for nozzle maintenance operations.

Said fixed lower plate, known as the cover, is actu-

ally formed of a robust quadrangular frame with variously-shaped internal longitudinal flanges 21 in each of which are two large threaded holes 22, and external longitudinal flanges 23. The external flanges have notches 24 and 25 to permit the passage of bolts 13 and catches 14.

Spring assemblies 40 are inserted in holes 22. The assemblies protrude from the upper face of cover 20 and provide elastic support for tilting frame 50 complete with seats 51 for the upper ends of the spring assemblies.

Tilting frame 50 is complete with a large central opening 52 (see Figs. 5 and 12) which is roughly rectangular in shape. On the upper face of the long sides there are guide strips 53 for slide 60 that also has a central opening 61, which is circular in shape, on the upper face of which there is a sliding refractory plate 70.

Fixed refractory plate 30 is mounted against the lower face 16 of the fixed upper plate. Fixed upper refractory coupling 31 rests against said fixed refractory plate.

To complete the parts illustrated in Fig. 1 there is the small plate 80 which is attached to the upper face of a heat shield 81, connected to a ferrule 82 which surrounds and protects refractory coupling 71 that is attached to sliding plate 70.

Additionally, there are guide strips 62, fixed to the long sides of slide 60, destined to run on guide strips 53 attached to tilting frame 50. A third pair of strips 63 is fixed to the upper face of the long sides of cover 20 and, together with guide strips 53, ensures heightwise restriction of the movement of slide 60 which is moved by connecting shaft 83.

The function of the structural elements described by reference to Fig. 1 is better understood by reference to Figs 2 to 5.

The third fixed refractory coupling 32, which surrounds coupling 31 and rests against the upper surface of levelling plate 33, is visible in Fig. 2.

Coupling 32, in turn, is surrounded by the inner refractory lining 35 of the ladle. Fig. 2 also illustrates the metal cladding 36 of fixed plate 30, as well as the metal claddings 72 and 73 of sliding refractory plate 70 and sliding coupling 71.

It should be observed that nuts 15 of bolts 13 are tightened up to the external flange 23 of cover 10: this eliminates the need for the use of torque spanners, thus simplifying assembly.

It should also be noted that catch 14 does not support flange 23 when nuts 15 are tightened, since its function is to indicate to the operator that nuts 15 have been completely tightened: if this is not the case it is not possible to tilt the catch to the position illustrated in Fig. 2.

Catch 14 also provide a guarantee against accidental opening of bolts 13.

Fig. 3 shows magnets 18 inserted in corresponding cavities of catches 14 and which act on the sides of

cover 20 preventing the catches from turning outwards. It also illustrates the way spring assembly 40 supports tilting frame 50 on which slide 60 moves along guide strips 53 and 62.

Fig. 4 illustrates in greater detail the Belleville washers 41 of assembly 40: the springs are inserted on flanged bush 42 which, in turn, is inserted on pin 43 that has a retaining ring 44 at one end while the other is screwed to a cap 45 whose outer cylindrical surface is threaded and screwed in ring 46 that is also threaded externally.

The purpose of ring 46 is solely to create a wear thread on cover 20 and so, from the functional aspect, it can be considered to form an integral part of cover 20 in whose threaded holes 22 it is screwed by means of its external thread. Spring assembly 41, formed of parts 41, 42, 43, 44 and 45, is screwed in hole 22, already equipped with ring 46, until it comes up against the outer flange of cap 45.

The spring assembly 40 can be fitted up with cover 20 in the open position illustrated in Fig. 1 and, after this has been done, flanged bushes 42 rest against retaining rings 44 protruding from the inner face of cover 20.

In a second stage tilting frame 50 is rested against the ends 42 of spring assemblies 40. Subsequently slide 60 is rested on the frame.

In this position, clearance 120 (Fig. 4) is nil owing to the thrust of the springs.

When the cover is closed, initially the counterposed faces of the two refractory plates 30 and 70 are brought into contact; subsequent tightening of bolts 13 causes further compression of springs 40 until clearance 120 is created (Fig. 4).

Fig. 4 also clearly illustrates conduit 47 which carries cold air to springs 41 via minor passages 48.

Figs 6, 7 and 8 show the structural details of fixed upper metal plate 10 with recess 111 on its upper surface to receive the base of the third fixed refractory coupling 32, inserted into the ladle, as visible in Figs 3 and 4.

The entire fixed upper metal plate 10 is pierced by a circular hole 112 which - as can be seen from Figs 2 and 3 - serves for the passage of the lower end of fixed refractory coupling 31 which can be extracted from below, from the outside of the ladle.

The lower face of fixed upper metal plate 10 also has elongated recess 113 for housing fixed upper refractory plate 30.

On the bottom of recess 112 are grooves 114 to facilitate correct positioning of fixed upper refractory plate 30 which, as already mentioned, is metal clad on the top and the sides. The same metal cladding is also utilized to retain refractory plate 30 in recess 113 by means of cylindrical magnets housed in blind holes 118.

Provision is also made on the long flanks of upper metal plate 10 for centering and positioning recesses 115 and 116 for fixed hinge-pieces 11 and 12 which are attached to said metal plate by screws that, for simplic-

ity, are indicated in Fig.6 only by the symmetry axis.

Holes 117 in fixed upper metal plate 10 serve to fix it to ladle-bottom levelling plate 33 via screws.

The structural details in Figs 9 to 11, referring to cover 20, have already been described by reference to the preceding figures.

The structural details of the tilting frame 50 illustrated in Figs 12 to 14 have also been referred to above. However, it should be mentioned that holes 150 are used to fix guide strips 53 for slide 60.

With reference to Figs 15 to 17, concerning slide 60, attention is drawn to circular hole 161 which runs right through the thickness of the slide and serves to house the end of sliding refractory coupling 71.

There is also an elongated recess 162 on the upper face of slide 60 to house sliding refractory plate 70 which, as already mentioned, is metal clad on the lower face and sides so as to permit the use of cylindrical magnets housed in circular holes 163 on the bottom of recess 162.

One end of slide 60 has threaded holes 164 for connecting to control shaft 83.

Though the invention is based on what has been described and illustrated above, many modifications and variations may be made in its embodiment, as per the following claims:

Claims

1. Box nozzle for ladles and the like, of the type including (i) a fixed upper metal plate (10) attached to the bottom of the ladle and bearing hinged (ii) a lower metal plate (20), referred to as the cover, which can be pivoted between an open position, at about right angle from the upper plate (10), and a closed position, parallel and close to the upper plate (10), and maintained in the closed position by bolts (13) and nuts (15) and releasable from the upper plate (10) for maintenance of the box nozzle; (iii) a third metal plate (60), referred to as the slide, placed between the upper plate (10) and the cover (20) and sliding within the latter, driven by driving means (83); (iv) a first refractory plate (30) having a through orifice and being held in a fixed position within the upper plate (10); (v) a second refractory plate (70) having a through orifice and being held in a fixed position within said slide (60) and sliding with the latter within the cover (20); said second refractory plate (70) being put in contact with the first refractory plate (30) when the cover (20) is held against the upper plate (10) in the closed position, so that in such closed position the slide (60) is slidably suspended on a set of spring assemblies (40) and is free to move, urged by each of said springs, to cope with any misalignment between the refractory plates (30) and (70), the

only connection between the slide (60) and the upper fixed plate (10) being through sliding contact between the refractory plate (70), inserted in the slide (60), and the refractory plate (30) inserted in upper fixed plate (10), characterized in that guide strips (63) are fixed to the upper face of the long sides of the cover (20) and protrude therefrom towards the slide (60), said strips (63) being in contact and cooperating with the edges of the slide (60) and with the spring assemblies (40) screwed to the lower face of the cover (20) to keep the slide (60), the tilting frame (50) and the refractory parts (70, 71) in place when the box nozzle is opened about the hinges (11, 12), and detaching from said edges only when the nuts (15) are tightened, thus creating a clearance (120) and permitting free movement of the slide (60) and of the tilting frame (50).

2. Box nozzle according to claim 1, characterized in that pairs of guide strips (53, 62) are connected to counterposed long sides of the slide (60) and of the tilting frame (50).
3. Box nozzle according to any one of the preceding claims, characterized in that said springs assemblies (40) consist each of an assembly of Belleville washers (41) inserted on a pin (43) between a flanged bush (42) and a threaded cap (45); wherein each of said threaded cap (45) is screwed into a treaded hole (22) of the cover (20), a number of said threaded holes (22) being aligned along long sides of the tilting frame (50) on which rest each of said flanged bushes (42).
4. Box nozzle according to any one of the above claims, characterized in that on the long sides of said cover (20) there are conduits (47) conveying pressurized air to cool said spring assemblies (40).
5. Box nozzle according to any one of above claims, characterized in that upper face of the fixed refractory plate (30) and lower face of the refractory plate (70) as well as lateral sides of both plates are all metal clad, and in that a coupling (71), also in refractory material, placed beneath said sliding refractory plate (70), is also metal clad and moreover protected by a ferule (82) providing support for a heat shield (81).
6. Box nozzle according to any one of the above claims, characterized in that the cover (20) is safely held in its fully closed position by a swivelling catch (14) maintained in contact with cover (20) by magnets (18), the insertion of said catch (14) into a slot (25) indicating the correct tightening of nuts (15) on bolts (13).

Patentansprüche

1. Schieberverschluß für metallurgische Gefäße (Gießpfannen) und dgl. des Typs, der umfaßt

- (i) eine feststehende obere Metallplatte (10), die am Boden (an der Unterseite) des metallurgischen Gefäßes (der Gießpfanne) befestigt ist und die schwenkbar trägt 5
- (ii) eine untere Metallplatte (20), hier als Abdeckung bezeichnet, die zwischen einer offenen Position unter einem etwa rechten Winkel zu der oberen Platte (10) und einer geschlossenen Position parallel zu und nahe bei der oberen Platte (10) drehbar (schwenkbar) ist und in der geschlossenen Position durch Bolzen (13) und Schraubenmutter (15) festgehalten wird und für die Wartung des Schieberverschlusses von der oberen Platte (10) abnehmbar ist; 10 15 20
- (iii) eine dritte Metallplatte (60), hier als Schieber bezeichnet, die zwischen der oberen Platte (10) und der Abdeckung (20) und innerhalb der letzteren verschiebbar (gleitend), angetrieben durch eine Antriebseinrichtung (83), angeordnet ist; 25
- (iv) eine erste feuerfeste Platte (30), die ein durchgehendes Loch aufweist und in einer festen Position innerhalb der oberen Platte (10) festgehalten wird; 30
- (v) eine zweite feuerfeste Platte (70), die ein durchgehendes Loch aufweist und in einer festen Position innerhalb des Schiebers (60) und gleitend (verschiebbar) mit dem letzteren innerhalb der Abdeckung (20) festgehalten wird; 35
- wobei die zweite feuerfeste Platte (70) mit der ersten feuerfesten Platte (30) in Kontakt gebracht wird, wenn die Abdeckung (20) in der geschlossenen Position gegen die obere Platte (10) gedrückt wird, so daß in dieser geschlossenen Position der Schieber (60) gleitend herunterhängt auf eine Gruppe von Federanordnungen (40) und frei beweglich ist, wobei jede der genannten Federn dafür sorgt, daß die feuerfesten Platten (30) und (70) miteinander fluchten, wobei die einzige Verbindung zwischen dem Schieber (60) und der oberen feststehenden Platte (10) besteht durch den Gleitkontakt zwischen der feuerfesten Platte (70), die in den Schieber (60) eingeschoben ist, und der feuerfesten Platte (30), die in die obere feststehende Platte (10) eingeschoben ist, dadurch gekennzeichnet, daß an der oberen Oberfläche der Längsseiten der Abdeckung (20) Führungsschienen (63) befestigt sind und daraus in Richtung auf den Schieber (60) herausragen, wobei die genannten Schie-

nen (63) in Kontakt und in Kooperation stehen mit den Kanten des Schiebers (60) und mit den Federanordnungen (40), die in die untere Oberfläche der Abdeckung (20) eingeschraubt sind, um den Schieber (60), den Kipprahmen (50) und die feuerfesten Teile (70, 71) an Ort und Stelle festzuhalten, wenn der Schieberverschluß um die Gelenke (11, 12) herum geöffnet wird, und die von den genannten Kanten nur entfernt werden, wenn die Schraubenmutter (15) festgezogen sind, wodurch ein Spielraum (120) geschaffen und die freie Bewegung des Schiebers (60) und des Kipprahmens (50) ermöglicht werden.

2. Schieberverschluß nach Anspruch 1, dadurch gekennzeichnet, daß Paare von Führungsschienen (53, 62) mit den einander gegenüberliegenden Längsseiten des Schiebers (60) und des Kipprahmens (50) in Verbindung stehen.
3. Schieberverschluß nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Federanordnungen (40) jeweils aus einer Ansammlung von Beleville-Ringen (41) bestehen, die auf einen Stift (43) zwischen einer Flanschbuchse (42) und einer mit Gewinde versehenen Kappe (45) aufgesteckt sind, wobei jede mit einem Gewinde versehene Kappe (45) in ein mit Gewinde versehenes Loch (22) der Abdeckung (20) eingeschraubt ist, wobei eine Reihe dieser mit Gewinde versehenen Löcher (22) entlang der Längsseiten des Kipprahmens (50) ausgerichtet sind, auf dem jede der Flanschbuchsen (42) aufliegt.
4. Schieberverschluß nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß auf den Längsseiten der Abdeckung (20) Rohrleitungen (47) vorgesehen sind, in denen Druckluft transportiert wird, um die Federanordnungen (40) zu kühlen.
5. Schieberverschluß nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die obere Oberfläche der feststehenden feuerfesten Platte (30) und die untere Oberfläche der feuerfesten Platte (70) sowie die Seitenflächen beider Platten alle eine Metallplattierung aufweisen und daß eine Kupplung (71), ebenfalls aus feuerfestem Material, die unterhalb der verschiebbaren (gleitenden) feuerfesten Platte (70) angeordnet ist, ebenfalls metallplattiert ist und darüber hinaus durch einen Eisenring (82) geschützt ist, der als Träger für einen Wärmeschild (81) dient.
6. Schieberverschluß nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Abdeckung (20) in ihrer vollständig geschlossenen

Position zuverlässig festgehalten wird durch ein schwenkbares Scharnier (14), das mittels Magneten (80) mit der Abdeckung (20) in Kontakt gehalten wird, wobei das Einführen des genannten Scharniers (14) in einen Schlitz (25) das korrekte Festziehen der Schraubenmutter (15) auf den Bolzen (13) anzeigt.

Revendications

1. Fermeture coulissante pour poches de coulée et analogues, du type comprenant :

- (i) une plaque métallique supérieure fixe (10) attachée à la base de la poche et portant de façon articulée
- (ii) une plaque métallique inférieure (20), appelée couvercle, qu'on peut faire pivoter entre une position ouverte, sensiblement perpendiculaire à la plaque supérieure (10), et une position fermée, parallèle à la plaque supérieure (10) et proche de celle-ci, et qui est maintenue dans la position fermée par des vis (13) et des écrous (15) et est séparable de la plaque supérieure (10) pour l'entretien de la fermeture coulissante ;
- (iii) une troisième plaque métallique (60), appelée opercule, placée entre la plaque supérieure (10) et le couvercle (20) et qui coulisse à l'intérieur de ce dernier, entraînée par des moyens d'entraînement (83) ;
- (iv) une première plaque réfractaire (30) ayant un orifice traversant et maintenue dans une position fixe à l'intérieur de la plaque supérieure (10) ;
- (v) une deuxième plaque réfractaire (70) ayant un orifice traversant et maintenue dans une position fixe à l'intérieur dudit opercule (60) et qui coulisse avec ce dernier à l'intérieur du couvercle (20) ; ladite deuxième plaque réfractaire (70) étant placée en contact avec la première plaque réfractaire (30) quand le couvercle (20) est maintenu dans la position fermée contre la plaque supérieure (10) de sorte que, dans cette position fermée, l'opercule (60) est suspendu de façon coulissante sur un ensemble de dispositifs à ressort (40) et est libre de se déplacer, sollicité par chacun desdits ressorts, de manière à s'adapter à tout défaut d'alignement entre les plaques réfractaires (30) et (70), la seule liaison entre l'opercule (60) et la plaque fixe supérieure (10) étant par l'intermédiaire du contact glissant entre la plaque réfractaire (70) insérée dans l'opercule (60) et la plaque réfractaire (30) insérée dans la plaque fixe supérieure (10) ; caractérisée en ce que des bandes de guidage (63) sont fixées à la face supérieure des grands côtés du cou-

vercle (20) et font saillie à partir de cette face vers l'opercule (60), lesdites bandes (63) étant en contact et coopérant avec les bords de l'opercule (60) et avec les dispositifs à ressort (40) vissés dans la face inférieure du couvercle (20) de façon à maintenir l'opercule (60), le cadre basculant (50) et les parties réfractaires (70,71) en place lorsqu'on ouvre la fermeture coulissante autour des charnières (11,12), et les dites bandes s'éloignant desdits bords seulement lorsque les écrous (15) sont serrés, de façon à créer un jeu (120) et à permettre un mouvement libre de l'opercule (60) et du cadre basculant (50).

- 2. Fermeture coulissante suivant la revendication 1, caractérisée en ce que des paires de bandes de guidage (53,62) sont connectées aux grands côtés en opposition de l'opercule (60) et du cadre basculant (50).
- 3. Fermeture coulissante suivant une quelconque des revendications précédentes, caractérisée en ce que lesdits dispositifs à ressort (40) consistent chacun en un ensemble de rondelles Belleville (41) insérées sur une tige (43) entre un manchon épaulé (42) et un bouchon fileté (45), chaque dit bouchon fileté (45) étant vissé dans un trou taraudé (22) du couvercle (20), et une pluralité dedits trous taraudés (22) étant alignés le long des grands côtés du cadre basculant (50) sur lequel s'appuie chacun desdits manchons épaulés (42).
- 4. Fermeture coulissante suivant une quelconque des revendications précédentes, caractérisée en ce que, sur les grands côtés dudit couvercle (20), il est prévu des conduits (47) d'amenée d'air sous pression pour refroidir lesdits dispositifs à ressort (40).
- 5. Fermeture coulissante suivant une quelconque des revendications précédentes, caractérisée en ce que la face supérieure de la plaque réfractaire fixe (30) et la face inférieure de la plaque réfractaire (70) ainsi que les faces latérales des deux plaques sont toutes revêtues de métal, et en ce qu'un raccord (71), également en matière réfractaire, placé sous ladite plaque réfractaire coulissante (70), est également revêtu de métal et en outre protégé par un embout (82) servant de support à un écran thermique (81).
- 6. Fermeture coulissante suivant une quelconque des revendications précédentes, caractérisée en ce que le couvercle (20) est maintenu de façon sûre dans sa position entièrement fermée par un verrou pivotant (14) maintenu en contact avec le couvercle (20) par des aimants (18), l'insertion dudit verrou (14) dans une fente (25) indiquant le serrage cor-

rect des écrous (15) sur les vis (13).

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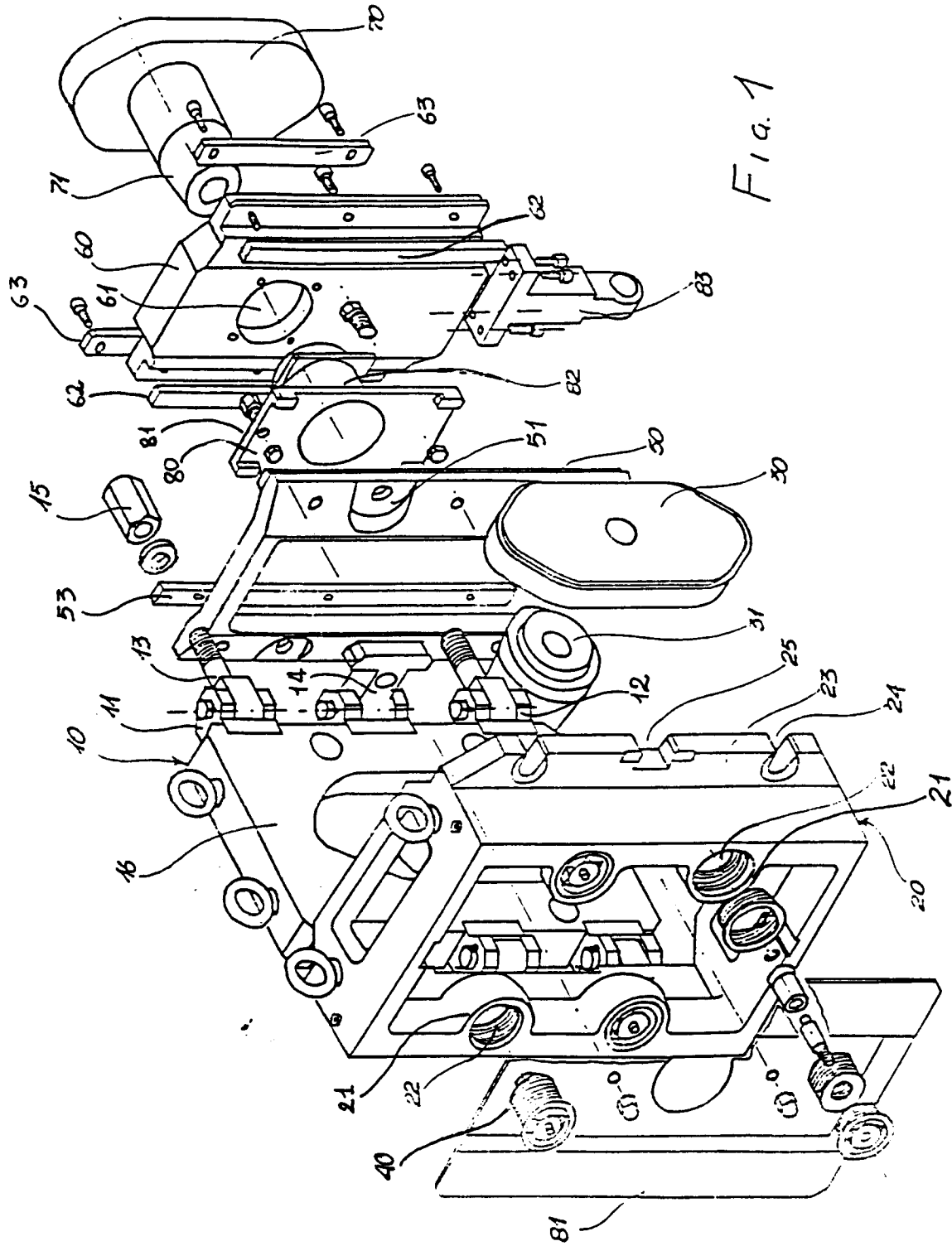
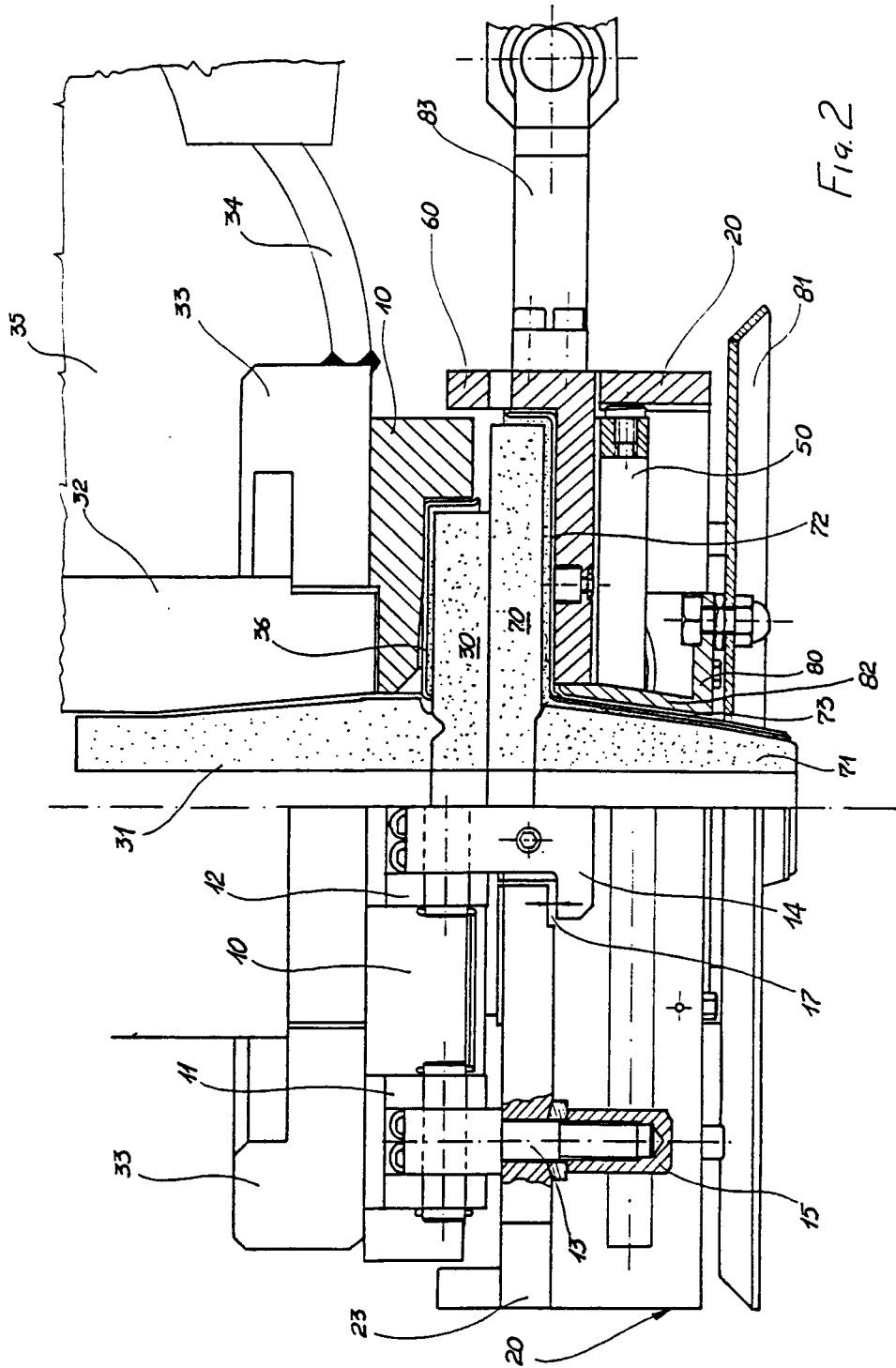


Fig. 1



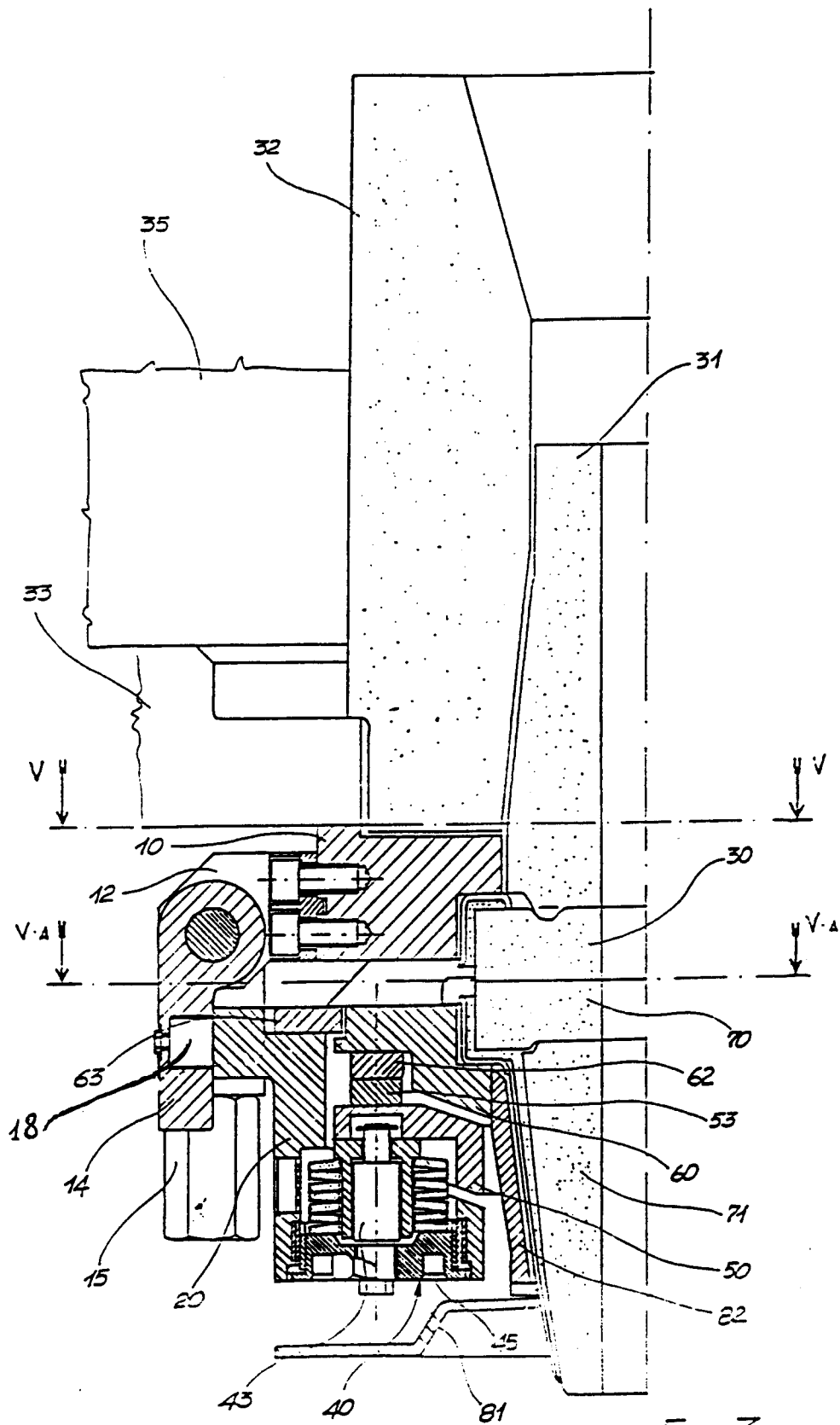


Fig. 3

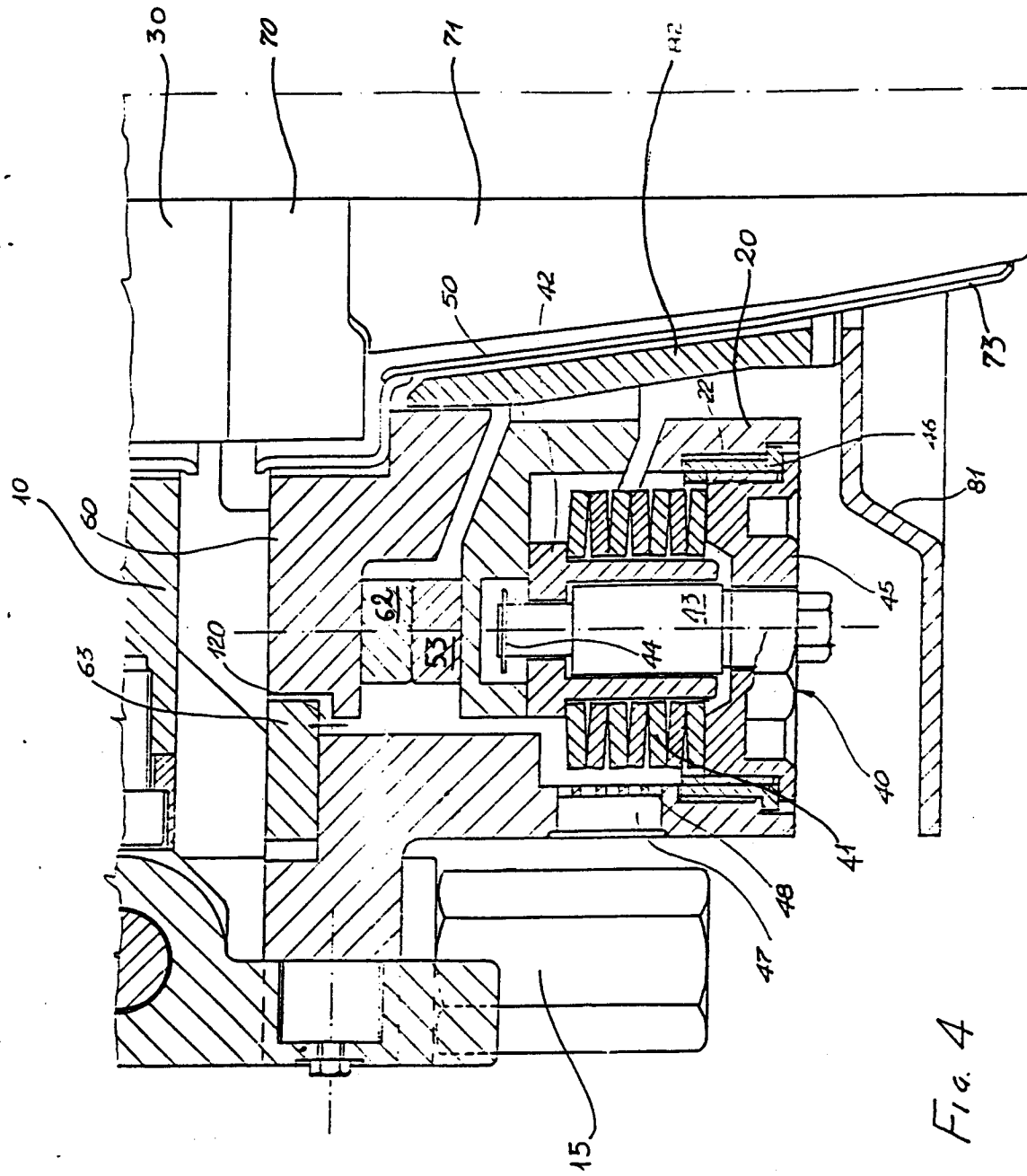
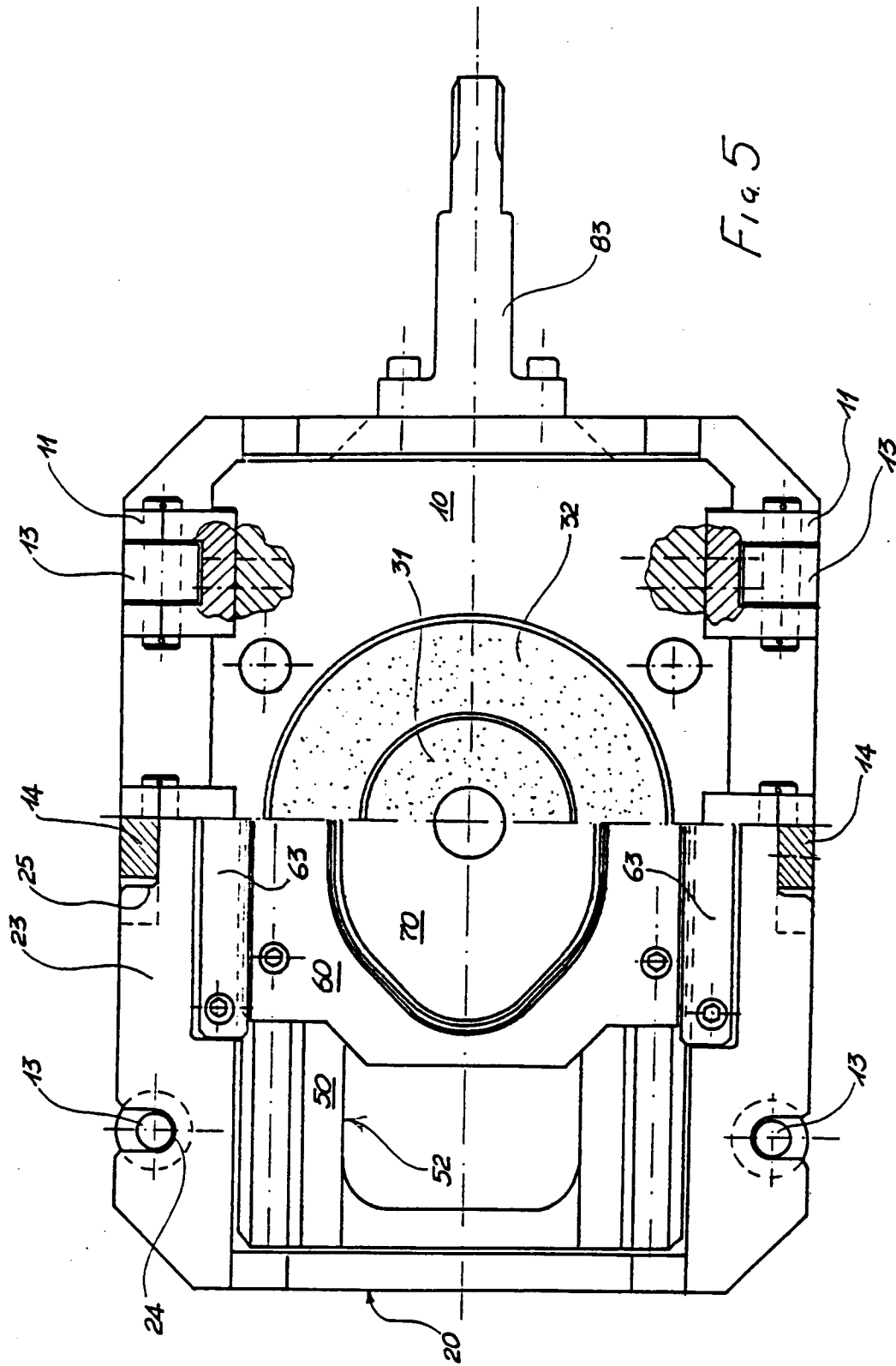
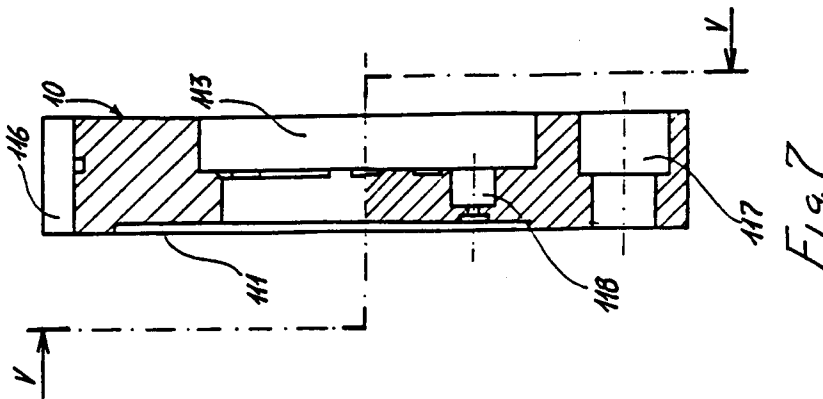
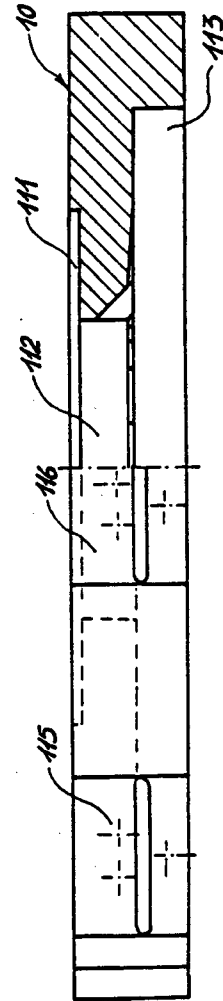
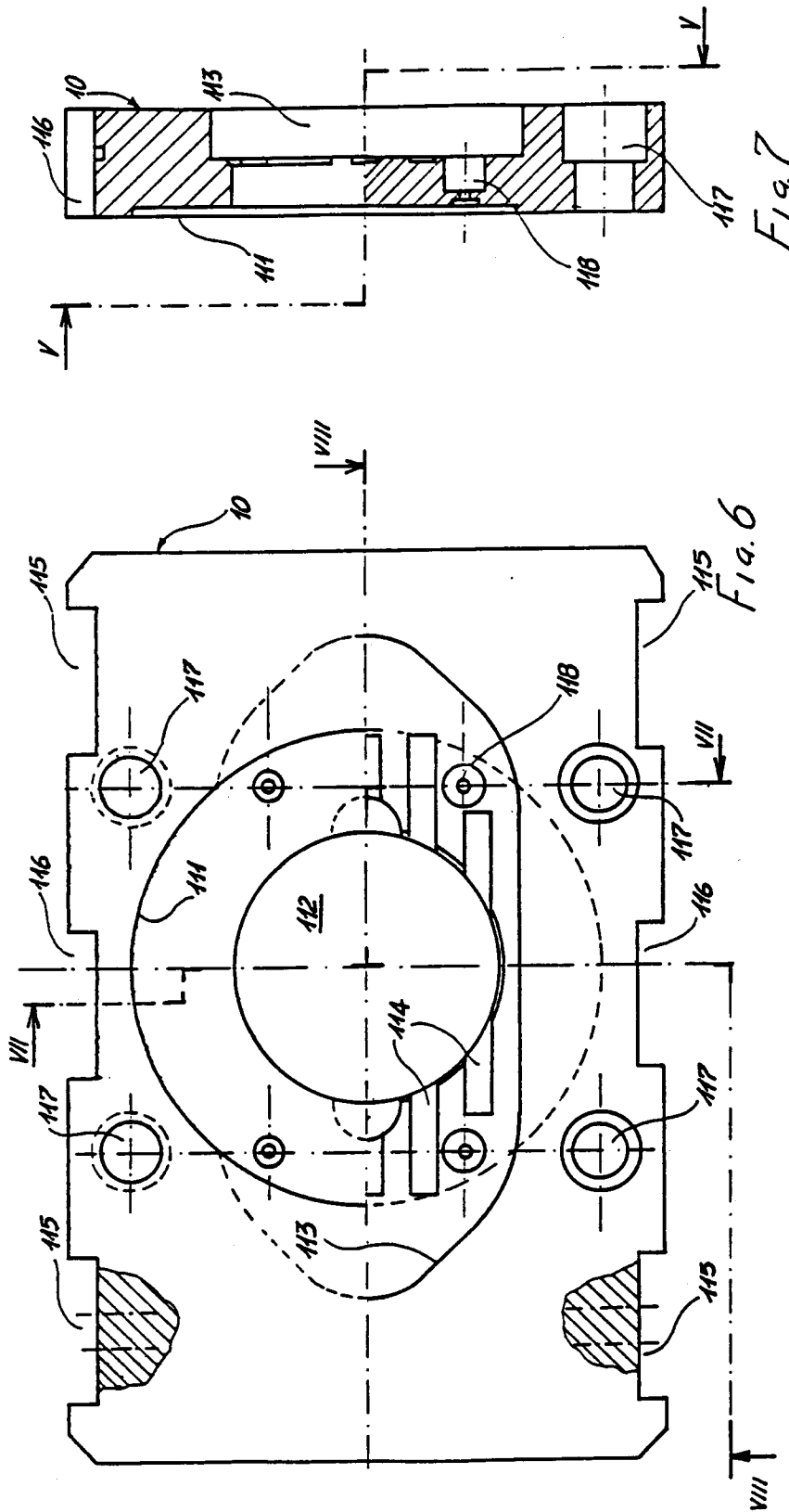
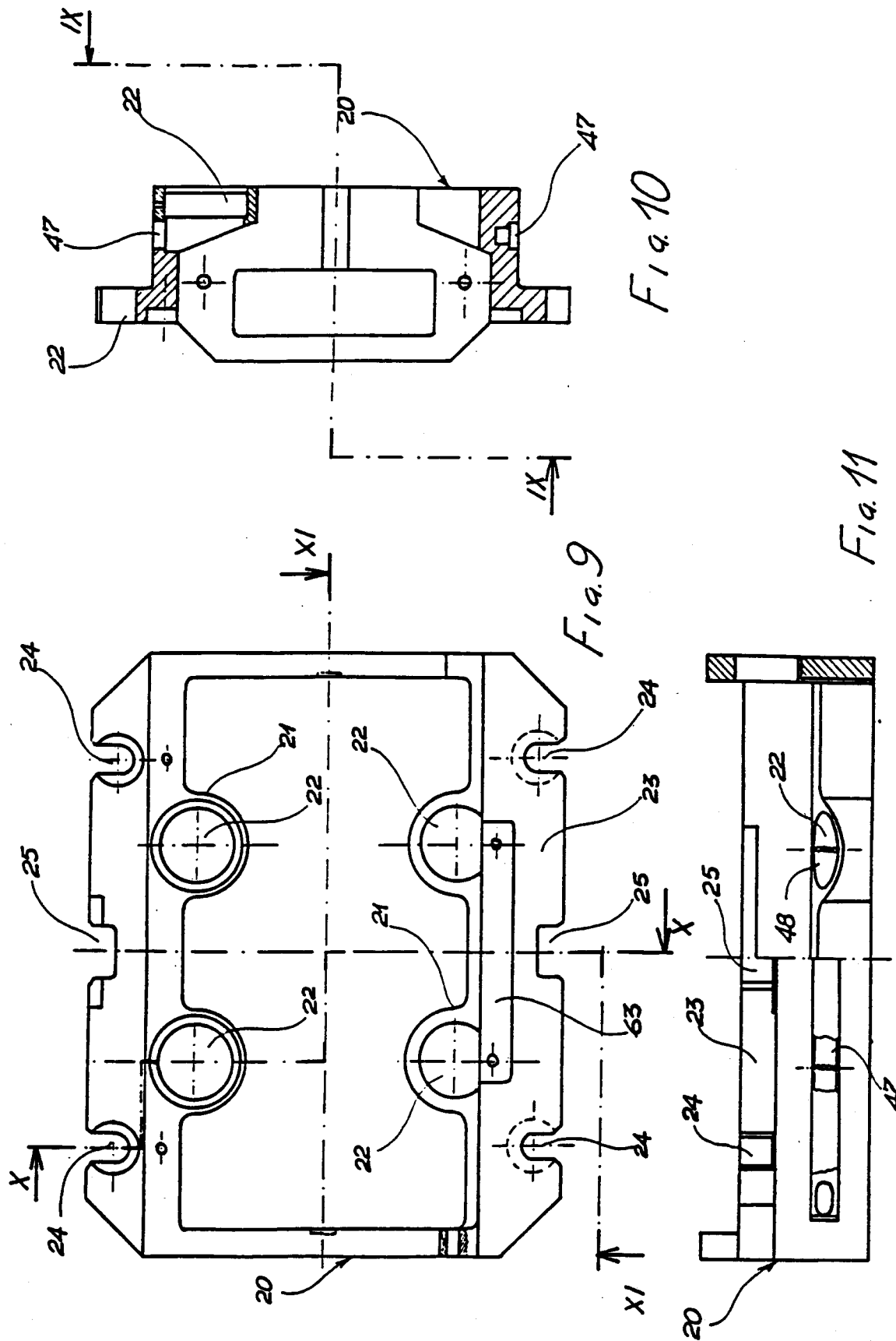


Fig. 4







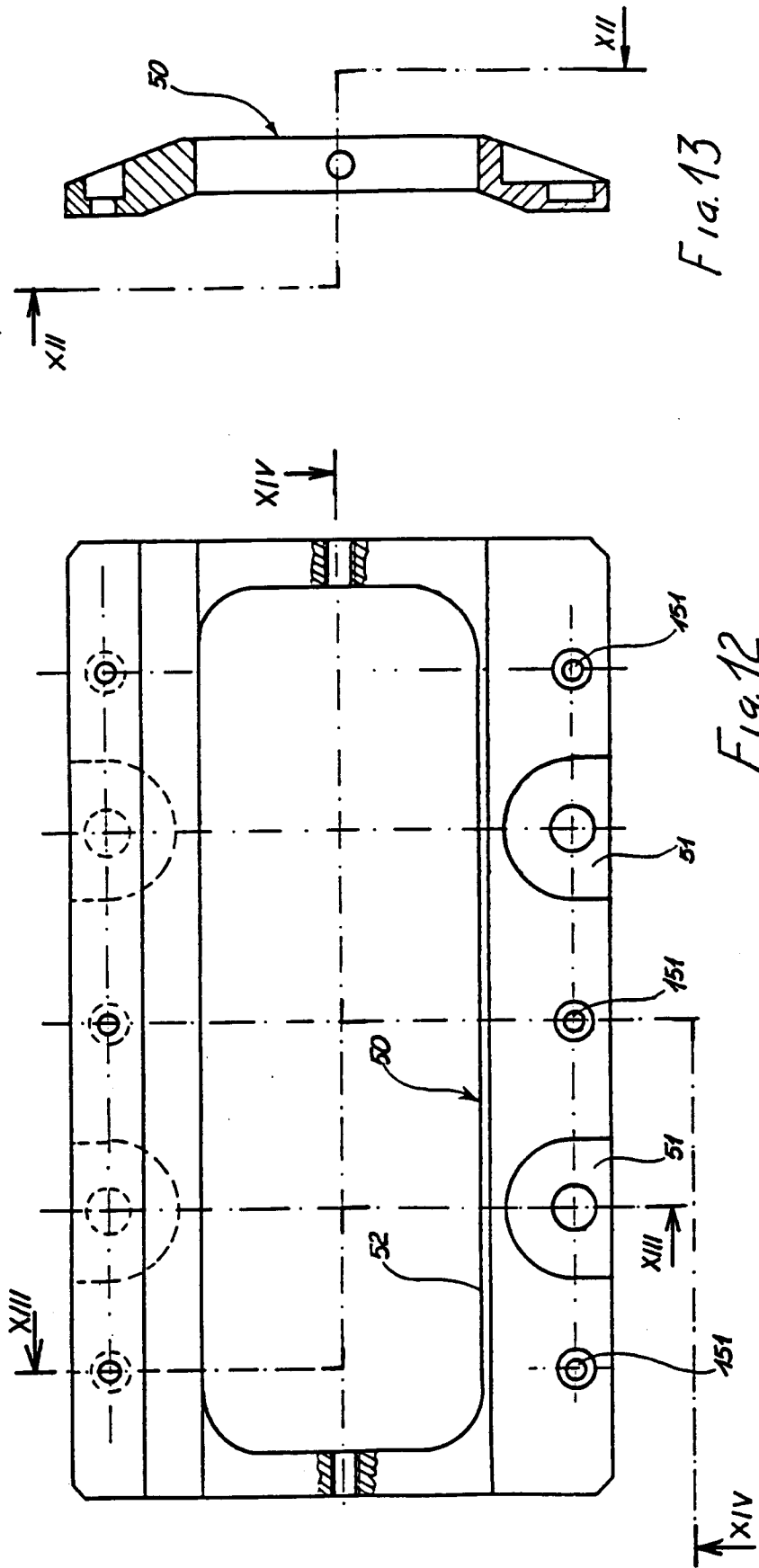


Fig. 13

Fig. 12

Fig. 14

