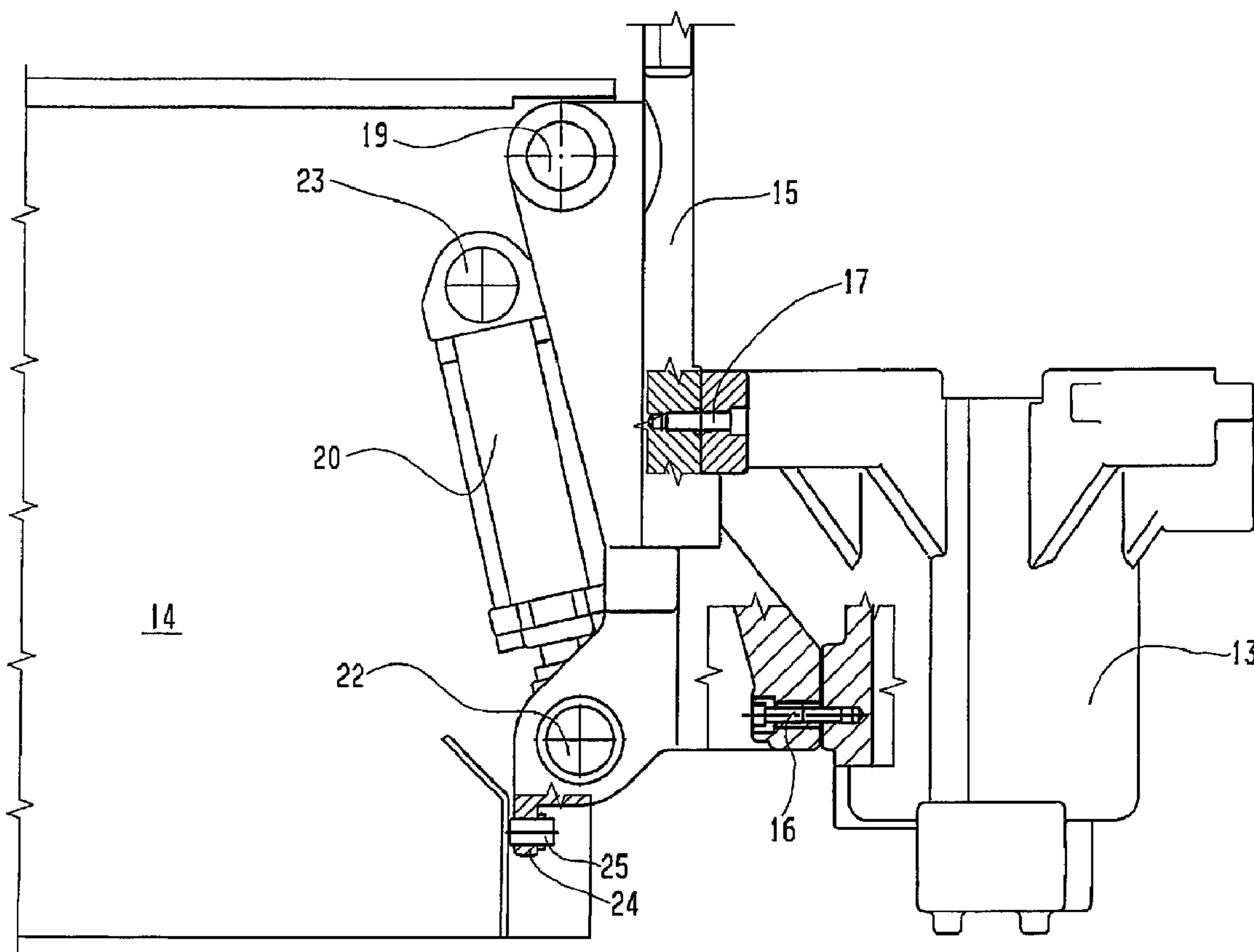




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(54) Titre : UNITE DE FERMETURE DE MOULE CONCUE POUR UNE MACHINE DE MOULAGE PAR INJECTION
 SERVANT A FACONNER DES MATERIAUX PLASTIQUES
 (54) Title: MOULD CLOSING DEVICE FOR AN INJECTION MOULDING MACHINE FOR PROCESSING PLASTICS
 MATERIALS



(57) Abrégé/Abstract:

Disclosed is a mold-closing device for an injection molding machine used for processing plastic materials, in which the mold supports accommodating an injection mold therebetween and a support element (13) for a mold-closing mechanism (C) are

(57) **Abrégé(suite)/Abstract(continued):**

mounted on the machine base (14). In order to be able to precisely align the mold supports, the first mold support is also mounted on the machine base (14) so as to be movable in the closing direction, the support element (13) is mounted on the machine base (14) or a part thereof via a stationary bearing, and a positioning mechanism (16) is provided for adjusting the angle between the support element (13) and the machine base (14).

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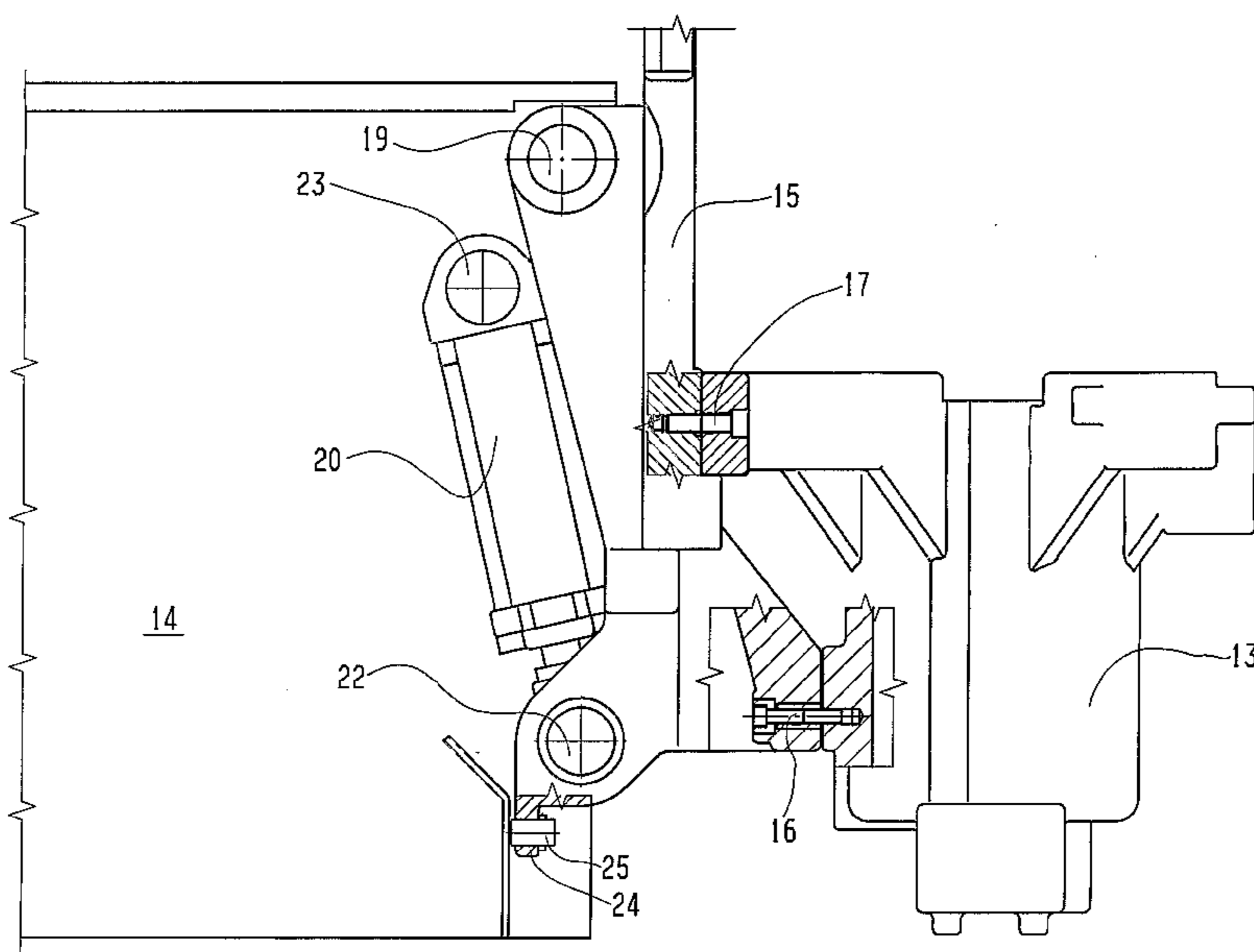
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[Fortsetzung auf der nächsten Seite]

(54) **Title:** MOLD-CLOSING DEVICE FOR AN INJECTION MOLDING MACHINE USED FOR PROCESSING PLASTIC MATERIALS(54) **Bezeichnung:** FORMSCHLIESSEINHEIT FÜR EINE SPRITZGIESSMASCHINE ZUR VERARBEITUNG VON KUNSTSTOFFEN(57) **Abstract:** Disclosed is a mold-closing device for an injection molding machine used for processing plastic materials, in which the mold supports accommodating an injection mold therebetween and a support element (13) for a mold-closing mechanism (C) are mounted on the machine base (14). In order to be able to precisely align the mold supports, the first mold support is also mounted on the machine base (14) so as to be movable in the closing direction, the support element (13) is mounted on the machine base (14) or a part thereof via a stationary bearing, and a positioning mechanism (16) is provided for adjusting the angle between the support element (13) and the machine base (14).

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— *mit internationalem Recherchenbericht*

(57) Zusammenfassung: Bei einer Formschliesseinheit für eine Spritzgiessmaschine zur Verarbeitung von Kunststoffen sind die eine Spritzgiessform zwischen sich aufnehmenden Formträger und ein Abstützelement (13) für einen Formschliessmechanismus C auf den Maschinenfuss (14) gelagert. Dadurch, dass auch der erste Formträger in Schliessrichtung beweglich am Maschinenfuss (14) und das Abstützelement (13) über eine stationäre Lagerung am Maschinenfuss oder einem Teil davon gelagert ist, und dadurch, dass ein Steilmechanismus (16) zur Einstellung des Winkels zwischen Abstützelement (13) und Maschinenfuss (14) vorgesehen ist, wird eine genaue Ausrichtung der Formträger ermöglicht.

**Mould closing device for an injection moulding machine for processing
plastics materials**

Description

5 Reference to related applications

The present application claims the priority from German Patent Application 103 09 906.9, filed on 25.02.2003, the disclosure content of which is hereby expressly also made the object of the present application.

Field of the invention

10

The invention relates to a mould closing unit for an injection moulding machine for processing of plastics materials and other plasticisable substances such as ceramic or pulverent substances.

15 State of the art

The conventional design of a plastics material injection moulding machine is made known in EP 1 121 237 B1 or DE 21 33 540 A. In the case of this type of injection moulding machine, a stationary mould carrier is provided and it is fixedly secured
20 to the machine base. A closing mechanism supported on a supporting member moves a movable mould carrier towards this stationary mould carrier and away from this stationary mould carrier in a cyclical manner and thereby closes the injection mould accommodated between the mould carriers. On the injection moulding side, an injection moulding unit abuts against the stationary mould
25 carrier in order to inject plasticisable material into the mould cavity through an opening of the stationary mould carrier. The angular alignment and also the longitudinal alignment of the machine on the machine base are oriented on the stationary mould carrier. When the closing pressure is built up, the braces interconnecting the mould carriers are forcibly extended. This brace extension
30 leads to a displacement of the supporting member in horizontal direction.

In principle, during injection moulding, a precise mould closure is significant to the quality of the parts produced. In this regard, care must be taken to ensure that the mould carriers are disposed parallel to each other and not at an angle one to the other. The necessary angular perfection can certainly be realised with known injection moulding machines, however in existing systems distortions can arise to the parallelogram formed between supporting member, stationary mould carrier and movable mould carrier. These problems occur more especially when the mould closing unit is transferred into a vertical disposition. In this case, the fixed plate can tip due to the base securement and consequently a parallelogram is created. This makes it difficult to adjust the parallelity of the mould carriers and at the same time also makes it difficult to maintain the concentricity of the two centring bores in the mould carriers.

Summary of the invention

Proceeding from this state of the art, the object of the present invention is to create a mould closing unit, which enables precise alignment of the mould carriers one relative to the other.

In accordance with the invention, there is provided a mould closing unit for an injection moulding machine for processing plastics materials and other plasticisable substances said mould closing unit comprising a first mould carrier, an additional movable mould carrier displaceable relative to the first mould carrier, at least one multi-part injection mould receivable between the first mould carrier and the additional, movable mould carrier, parts of the at least one multi-part injection mould being detachably secured to the mould carriers, a supporting member for a mould closing mechanism for a cyclical opening and closing of the injection mould and for displacement of the additional, movable mould carrier towards the first mould carrier and away from the said first mould carrier in closing direction of the injection mould, a machine base comprising at least one part, the first mould carrier, the additional, movable mould carrier and the supporting member being mounted on said machine base; wherein the first mould carrier is mounted on the machine base so as to be displaceable in the closing direction and the supporting member is mounted on the machine base via a stationary bearing arrangement; and wherein an adjusting mechanism is

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provided for adjusting an angle between the supporting element and the machine base.

The supporting member now becomes the fixed point within the system, which means that even the mould carrier, which up to now has been stationary, is displaceably
5 mounted relative to the machine base. At the same time, the support plate can be secured and adjusted at preferably three points on the machine frame or a part thereof. The angularity of the supporting member can be adjusted by means of the adjusting mechanism. The effect of the brace extension on the "stationary" mould carrier is such that it is displaced in a cyclical manner. However, as the injection moulding unit is
10 fixedly connected to this mould carrier, this does not result in any reference problems with regard to the injection moulding unit.

In particular embodiments, a three-point supporting of the supporting member is produced and this enables precise adjustment. This is effective in particular when the mould closing unit has to be transferred into a vertical position or is in this position permanently. Through
15 the three-point supporting of the supporting member, the supporting member is retained at an angle relative to the machine base or to a pivotable bearing element in such a manner that no parallelogram is created. The entire weight of the injection mould and the mould carriers is supported rathermore centrally via the braces on the supporting member. Consequently, optimum parallelity and centricity is guaranteed in this position also.

20

Further advantages are produced from the following description.

Brief description of the Figures

25 The invention is described in more detail below by way of the Figures. In which:

Figure 1 is a three-dimensional view of a plastics material injection moulding machine including mould closing unit and injection moulding unit,

Figure 2 is a representation as in Figure 1 with the mould closing unit pivoted into vertical position,

30 Figure 3 is a three-dimensional view of the machine base with supporting member,

Figure 4 is a representation as in Figure 3 with the supporting member pivoted into vertical position,

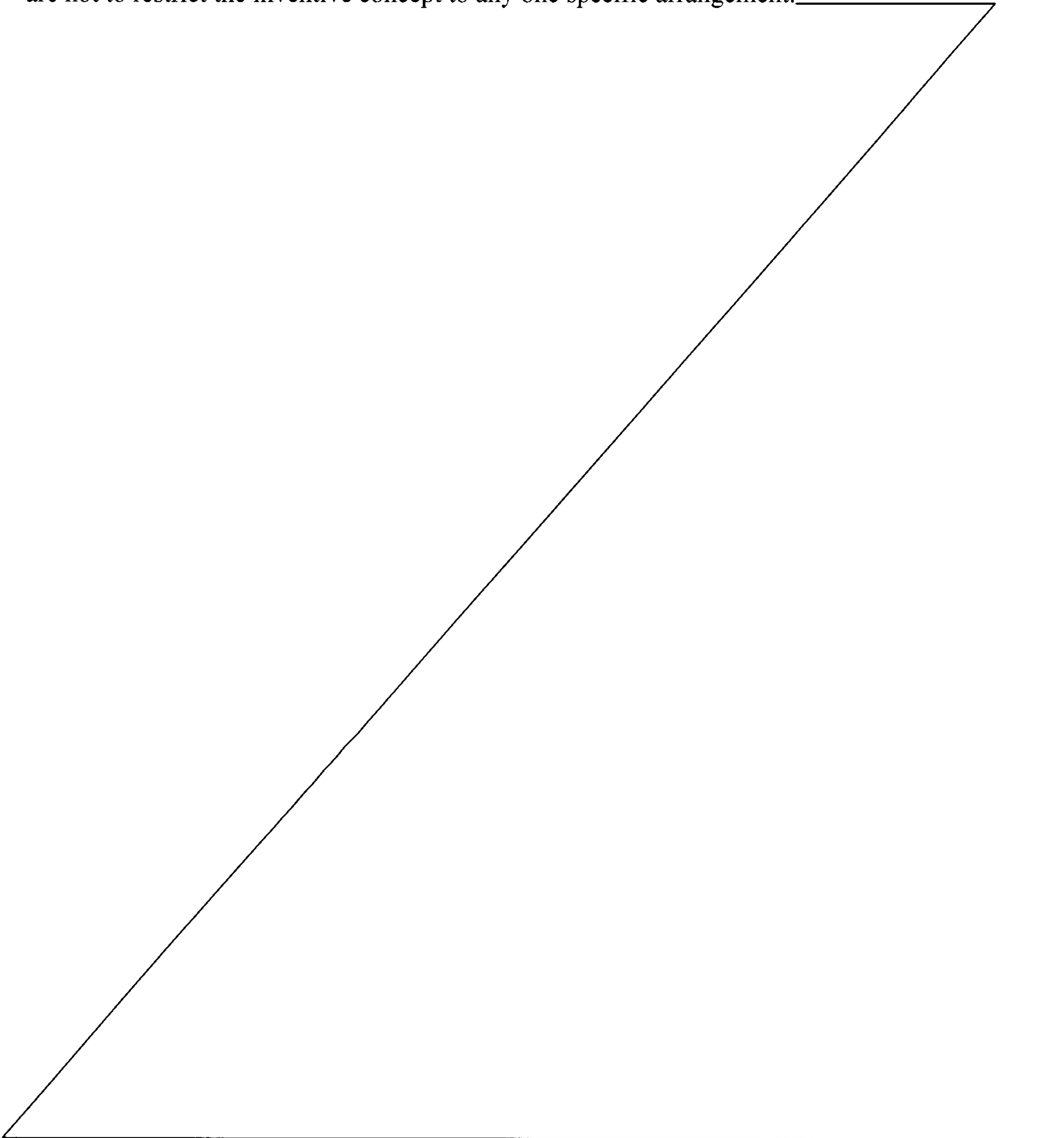
Figures 5,6 are side views of the representation in Figures 3 and 4,

- 3a -

Figure 7 is an enlarged, partial cut cutout from Figure 6, and
Figure 8 is a top view of the machine base with the mould closing unit removed.

5 Detailed description of preferred embodiments

The invention is now described in more detail as an example with reference to the enclosed drawings. However, the exemplified embodiments are only examples, which are not to restrict the inventive concept to any one specific arrangement.



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Figures 1 and 2 show an injection moulding machine for processing plastics materials and other plasticisable substances such as ceramic or pulverent substances using a mould closing unit F and an injection moulding unit S. In Figure 2 the mould closing unit that is horizontally disposed in Figure 1 is pivoted into a vertical position.

5 The pivoting mechanism 20 necessary to accomplish this will be looked at in detail at a later point.

The injection moulding machine has a first mould carrier 10, on which the injection moulding unit S is preferably secured. In addition, an additional movable mould carrier 11 is provided which is displaceable relative to the first mould carrier 10 by means of a mould closing mechanism C. Between the mould carriers 10, 11 is provided a mould clamping area, in which at least one multiple-part injection mould is receivable between the mould carriers, the parts of the injection mould 12 being detachably secured to the mould carriers 10, 11. A supporting member 13 is provided

15 for the mould closing mechanism C. The mould closing mechanism C is for the cyclical opening and closing of the injection mould 12 with the displacement of the additional movable mould carrier 11 towards the first mould carrier 10 and away from this first mould carrier 10 in the closing direction s-s of the injection mould 12.

20 Mould closing unit F and injection moulding unit S are disposed on a machine base 14 and, where applicable, on a part of the machine base. The first mould carrier 10, the additional movable mould carrier 11 and the supporting member 13, in particular, are mounted on the machine base. Force transferring elements, which are provided in the form of braces 18 in the embodiment, absorb the forces occurring between the

25 first mould carrier 10 and the supporting member 13 when the mould is closed and when the plasticisable substances are injected into the injection mould 12. A U-shaped force transferring element, which allows free access to the mould clamping area, can be provided in place of the braces 18.

30 Figure 8 in particular shows that the first mould carrier 10 is also mounted on the machine base or on a part thereof so as to be displaceable in the closing direction s-s. Consequently, both mould carriers are mounted so as to be displaceable in closing direction. The supporting member 13, contrary to this, is secured via a stationary

- 5 -

bearing arrangement at the bearing points 17 on the machine base 14 or on a part thereof, such as, for example, on the bearing element 15. In addition, an adjusting mechanism 16 (Figure 7) is provided for adjusting the angle between the supporting member 13 and the machine base 14 or the part of the machine base. According to
5 Figures 7 and 8, the stationary bearing arrangement of the supporting member 13 on the machine base 14 or a part thereof is spaced from the adjusting mechanism 16 in the closing direction s-s. The stationary bearing arrangement of the supporting member 13 is effected at the bearing points 17, which are disposed on both sides of a central line m-m and the connecting line therebetween is at right angles to the clos-
10 ing direction s-s. The two bearing points 17 and the adjusting mechanism 16 as the third point consequently form a three-point bearing arrangement, which allows precise adjustment of the supporting member relative to the machine base. The supporting member is preferably produced from one piece, as is known from former patent application DE 102 09 921. According to the solution there, the supporting
15 member itself is also one-piece and compact such that a high level of dimensional accuracy of the supporting surfaces is produced. In principle, however, the adjusting mechanism 16 can also engage another part of the mould closing unit F, which is preferably fixedly connected to the supporting member.

20 Consequently, the three-point bearing arrangement firstly guarantees that, via the bearing points 17, a disposition at right angles to the central line of the injection moulding machine is guaranteed, whilst via the third point, that is to say via the adjusting mechanism 16, the angularity of the plate is adjustable. The compact supporting member at the same time produces a wide support base, which also meets
25 the demands for vertical operation. The supporting member is stable in itself and no parallelogram is created as the entire weight of injection mould and mould carriers is supported centrally via the four braces 18 relative to the supporting member. Consequently, optimum parallelity and centricity is guaranteed.

30 According to Figure 7, the adjusting mechanism 16 is in the form of a vertical adjusting means for a part of the supporting member 13 spaced from the stationary bearing arrangement. Where applicable, this part can, however, also be an other part of the mould closing unit connected to the supporting member. Figures 2, 4, 6 and 7 show

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the disposition of the mould closing unit in the vertical position. In principle, it is also possible to provide a stationary disposition of the supporting member without a pivoting mechanism, however, in the exemplified embodiments the mould closing unit, but at least the supporting member 13, is mounted on a part of the machine base 14, a
5 pivotable bearing element 15. When pivoting, this bearing element 15 enables a transferring at least of the mould closing unit F from a horizontal position of the closing directing s-s into a vertical position. During this pivoting movement, the injection mould unit S can also be pivoted at the same time – as is shown in the embodiment in Figure 2 – if it is secured to the first mould carrier 10, however, in principle injection
10 tion into the separating plane can also be accomplished.

Figures 3 to 7 show the pivoting mechanism 20. The bearing element 15 is rotationally displaceable relative to the machine base at the pivotal axis 19. The pivoting mechanism 20 is mounted at the pivotal axes 22, 23 on the supporting member 13
15 and on the machine base, such that when the pivoting mechanism 20 is actuated, as is represented in Figures 5 and 6, the transfer from the horizontal position into the vertical position is effected. The supporting member 13 has brace receiving means 21 and at its rear end also bearing means 24, which come to rest on a bearing face of the machine base 14 during the transfer into the vertical displacement. According
20 to Figure 7, adjustment elements 25 can be provided on the bearing faces 24 in order to adjust the system. Figure 7 shows the securement at the bearing points 17 as well as the adjusting mechanism 16 for the supporting member 13.

According to Figure 8, bearing members 26 are provided for the first mould carrier 10
25 as well as a guiding for the additional, movable mould carrier 11. These are disposed in the exemplified embodiment on a turntable as bearing element 15. In principle, however, it is possible to only use the rear part of the bearing element 15, which bears the actual supporting member 13, as the mould carriers are guided directly onto corresponding surfaces of the machine base 14. In the case of a vertical
30 disposition, the supporting is effected anyway via the braces on the supporting member such that further guiding of the mould carriers is not necessary.

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It is obvious that this description can be subject to the most varied modifications, changes and adaptations which range in the region of equivalents to the attached claims.

List of references

10	First mould carrier
11	Additional, movable mould carrier
12	Injection mould
13	Supporting member
14	Machine base
15	Bearing element
16	Adjusting mechanism
17	Bearing point
18	Brace
19	Pivotal axis
20	Pivoting mechanism
21	Brace receiving means
22, 23	Coupling means for 20
24	Bearing means
25	Adjusting element
26	Bearing arrangement for 10
27	Guiding means for 11
C	Mould closing mechanism
F	Mould closing unit
S	Injection moulding unit
m-m	Central line
s-s	Closing direction

Claims

1. Mould closing unit for an injection moulding machine for processing plastics materials and other plasticisable substances said mould closing unit comprising
 - a first mould carrier,
 - an additional movable mould carrier displaceable relative to the first mould carrier,
 - at least one multi-part injection mould receivable between the first mould carrier and the additional, movable mould carrier, parts of the at least one multi-part injection mould being detachably secured to the mould carriers,
 - a supporting member for a mould closing mechanism for a cyclical opening and closing of the injection mould and for displacement of the additional, movable mould carrier towards the first mould carrier and away from the said first mould carrier in closing direction of the injection mould,
 - a machine base comprising at least one part, the first mould carrier, the additional, movable mould carrier and the supporting member being mounted on said machine base;

wherein the first mould carrier is mounted on the machine base so as to be displaceable in the closing direction and the supporting member is mounted on the machine base via a stationary bearing arrangement; and

wherein an adjusting mechanism is provided for adjusting an angle between the supporting element and the machine base.
2. Mould closing unit according to claim 1, wherein the first mould carrier, the additional, movable mould carrier and the supporting element are mounted on different parts of the machine base.

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3. Mould closing unit according to claim 1 or 2, wherein the stationary bearing arrangement of the supporting member on the machine base is spaced from the adjusting mechanism in the closing direction.
4. Mould closing unit according to any one of claims 1 to 3, wherein the stationary bearing arrangement of the supporting member is effected at at least two bearing points which are disposed on both sides of a central line of the mould closing unit and a connecting line therebetween is at right angles to the closing direction.
5. Mould closing unit according to claim 4, wherein the two bearing points of the stationary bearing arrangement of the supporting member and the bearing arrangement of the supporting member form a three-point bearing arrangement via the adjusting mechanism, which is the third point.
6. Mould closing unit according to any one of claims 1 to 5, wherein a parallelity of the mould carriers is adjustable by the adjusting mechanism through the connection between the supporting member and the mould carriers by means of force transferring elements.
7. Mould closing unit according to claim 6, wherein the force transferring elements are braces.
8. Mould closing unit according to any one of claims 1 to 6, wherein the adjusting mechanism is a vertical adjusting means for a part of the supporting member that is spaced from the stationary bearing arrangement or for a part of the mould closing unit that is connected to the supporting member.
9. Mould closing unit according to any one of claims 1 to 8, wherein when a nozzle of an injection moulding unit is applied to the first mould carrier, the first mould carrier is a relative neutral point for the injection moulding unit.

10. Mould closing unit according to any one of claims 1 to 9, wherein the at least one part of the machine base is a bearing element, which is pivotable relative to the machine base and which, when pivoted, allows a transferring of at least the mould closing unit from a horizontal position of the closing direction into a vertical position of the closing direction.
11. Mould closing unit according to claim 10, wherein, when pivoted, the injection moulding unit secured to the first mould carrier is also pivotable at the same time.

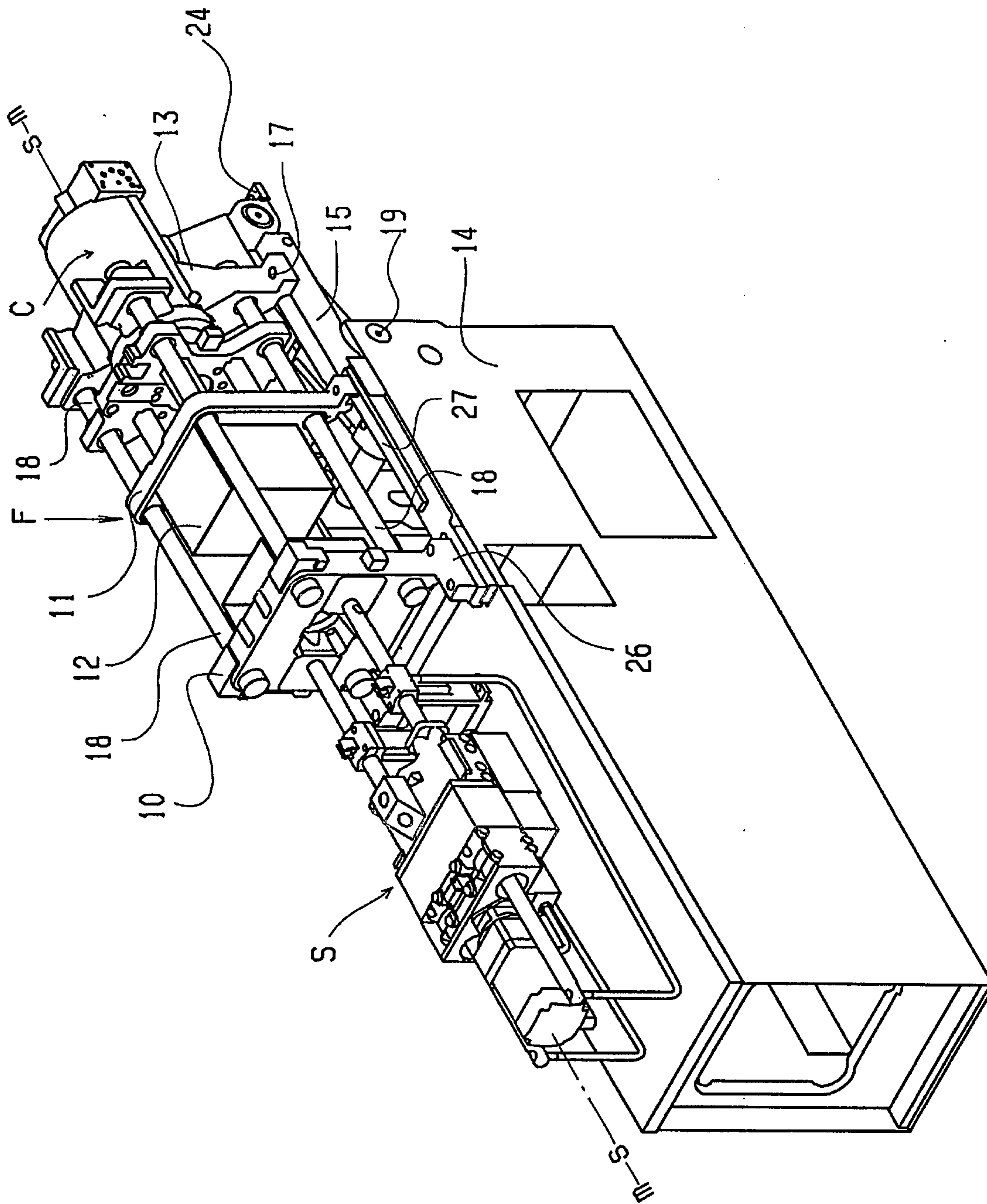


FIG. 1

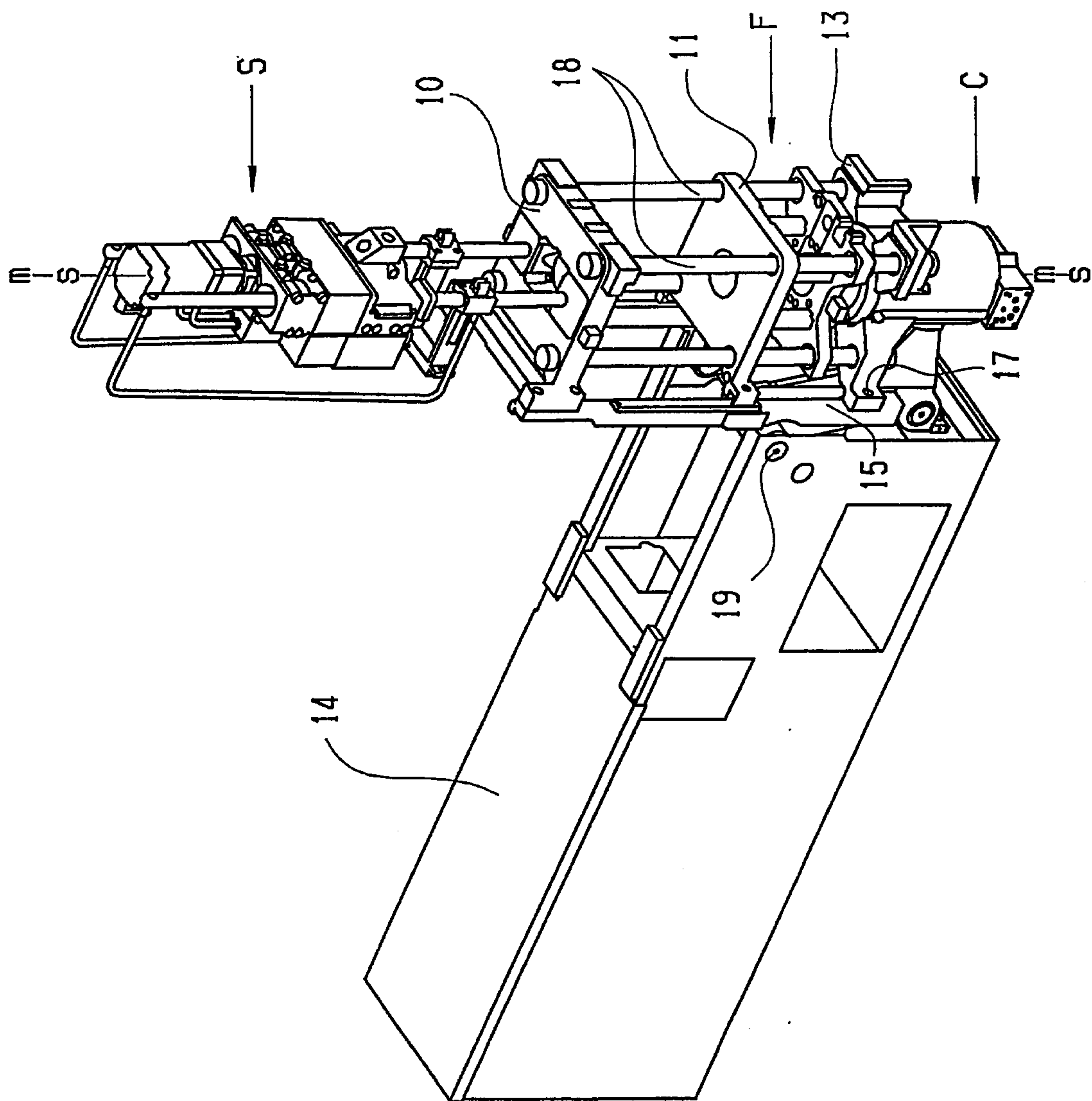


FIG. 2

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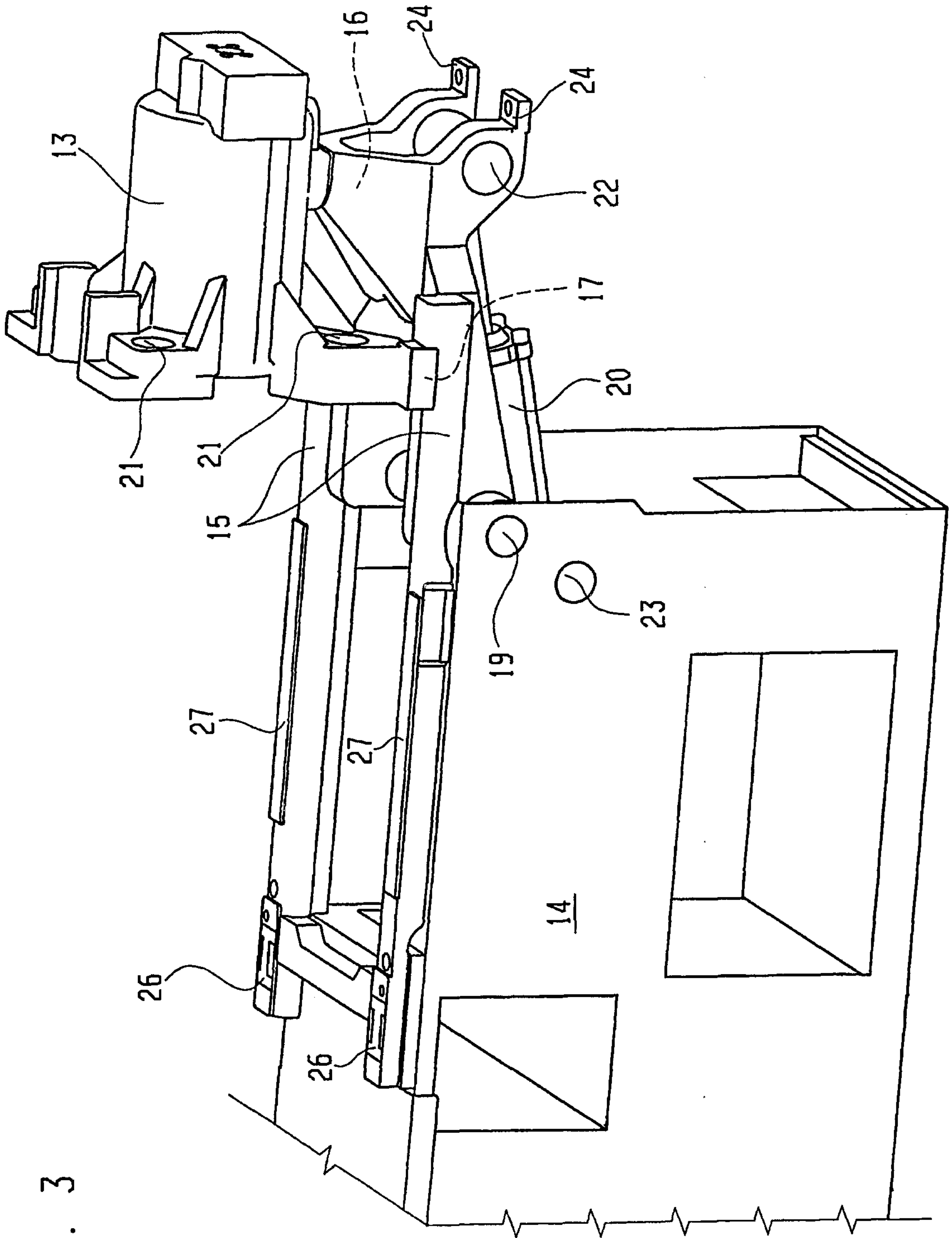


FIG. 3

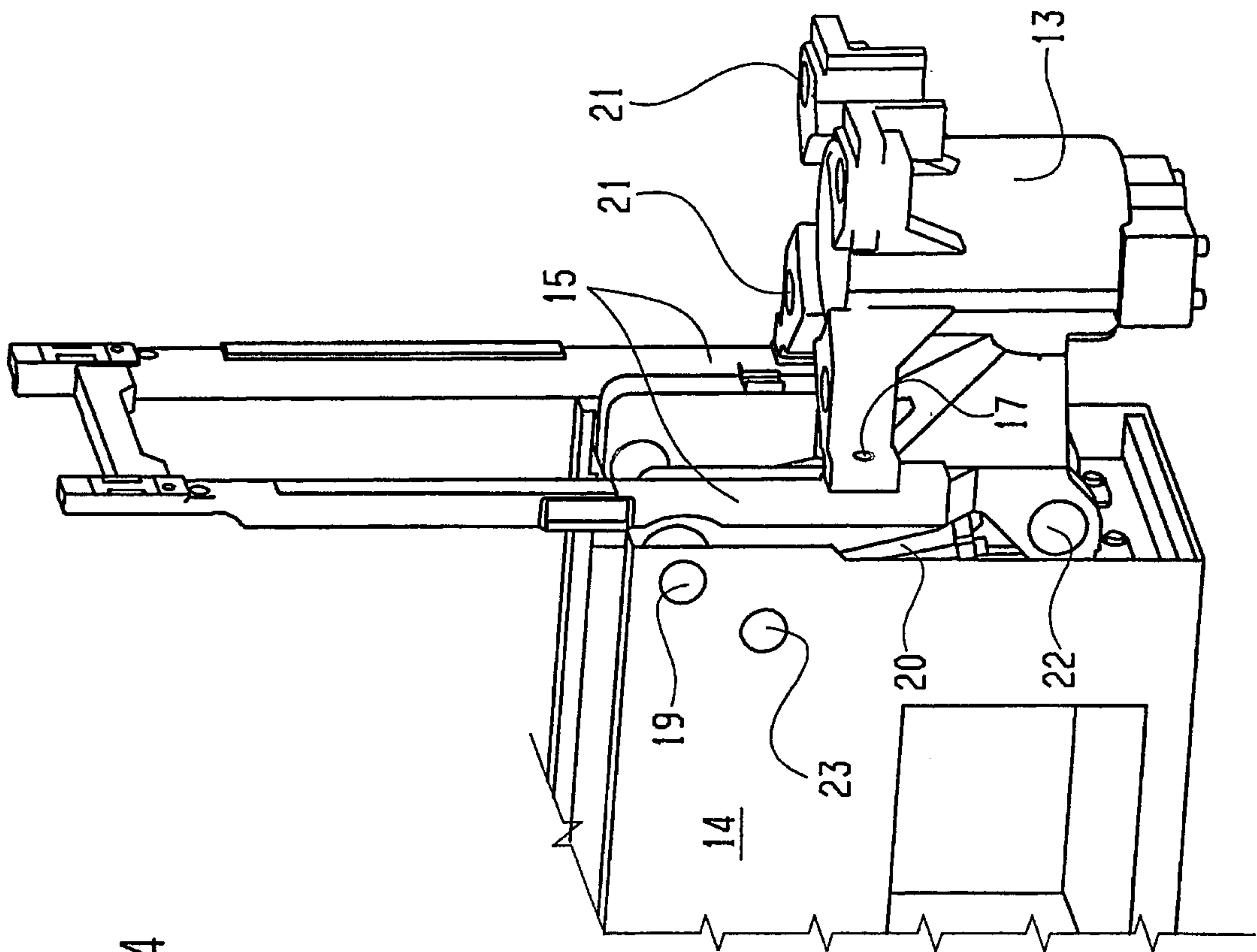


FIG. 4

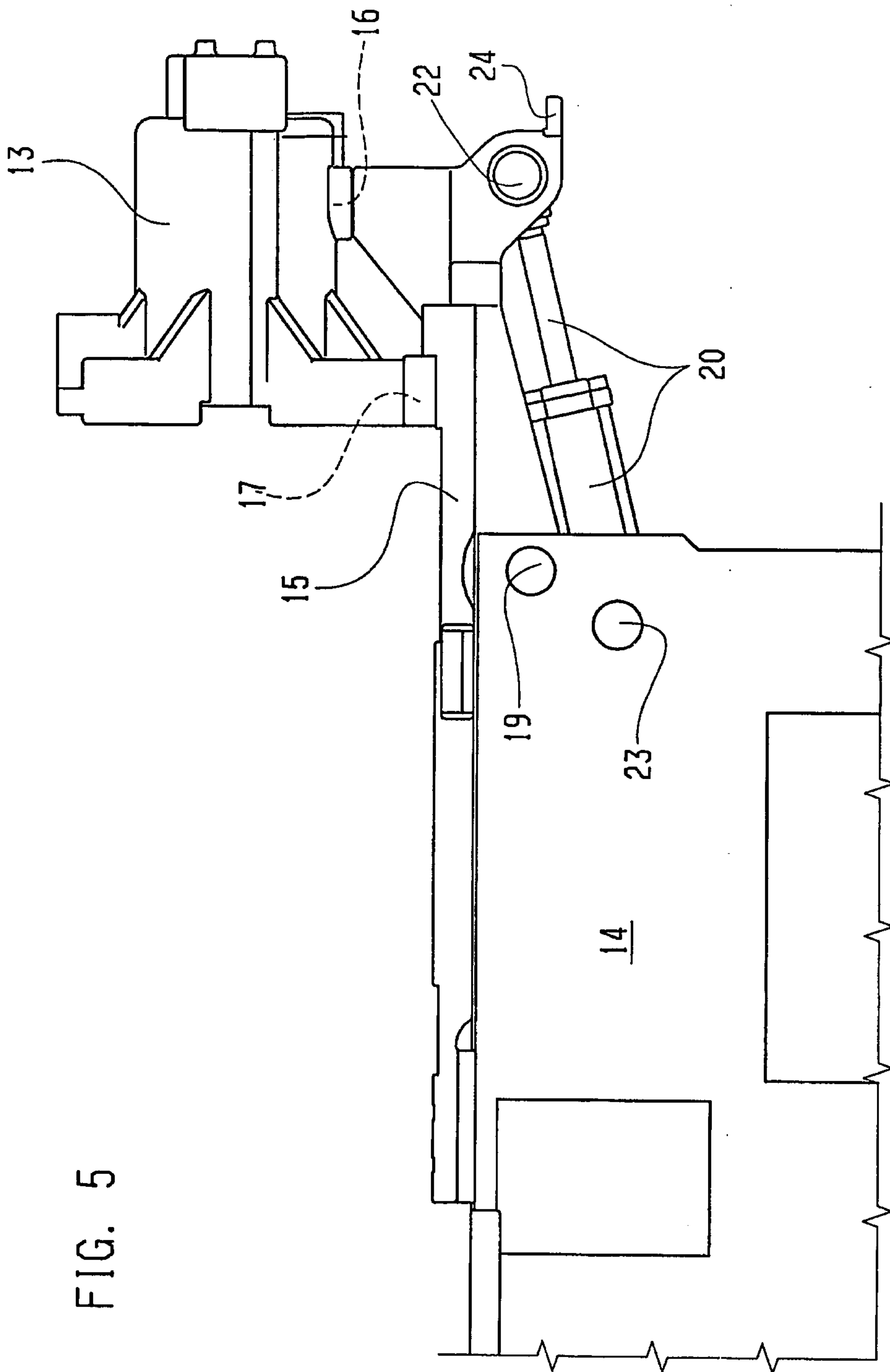


FIG. 5

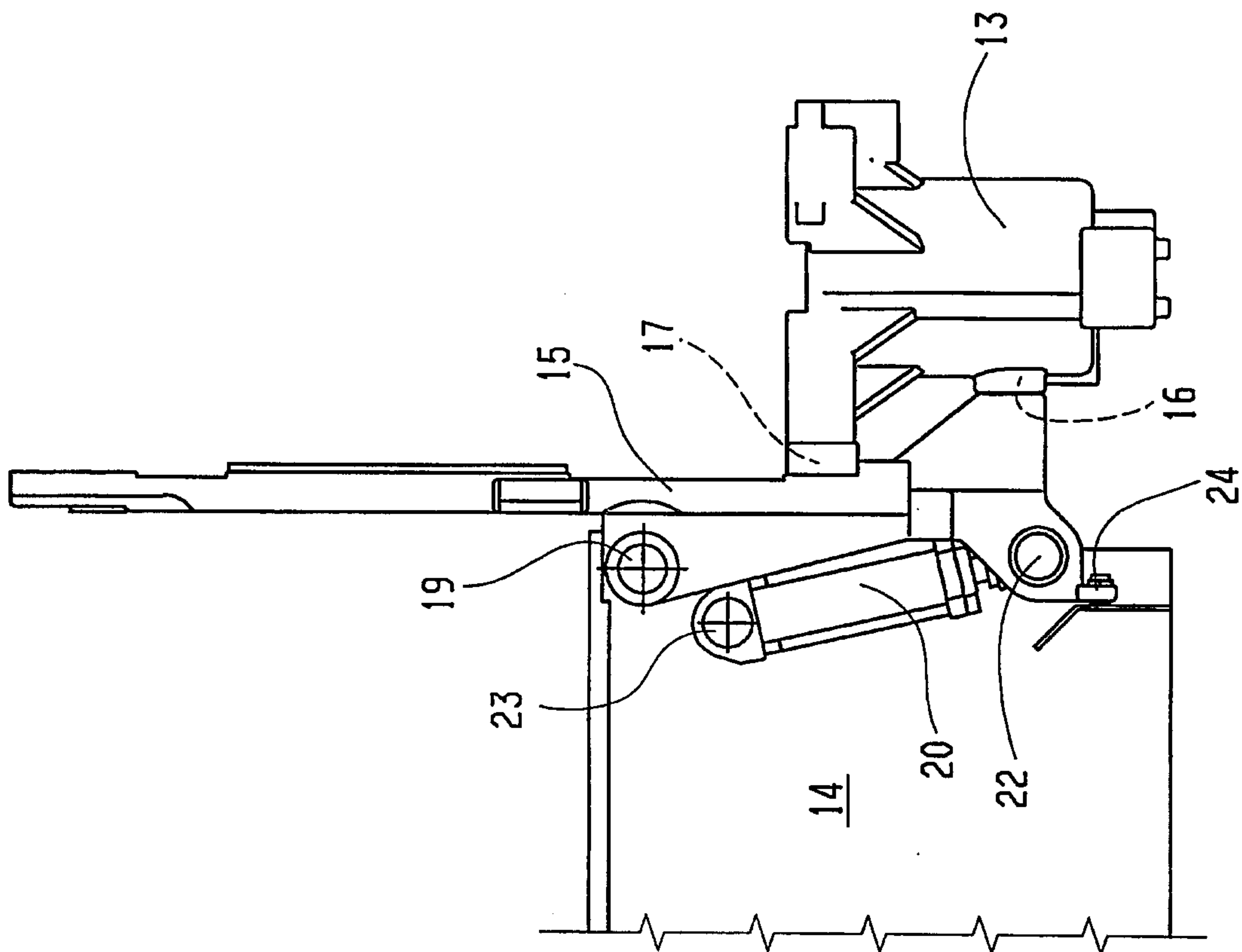


FIG. 6

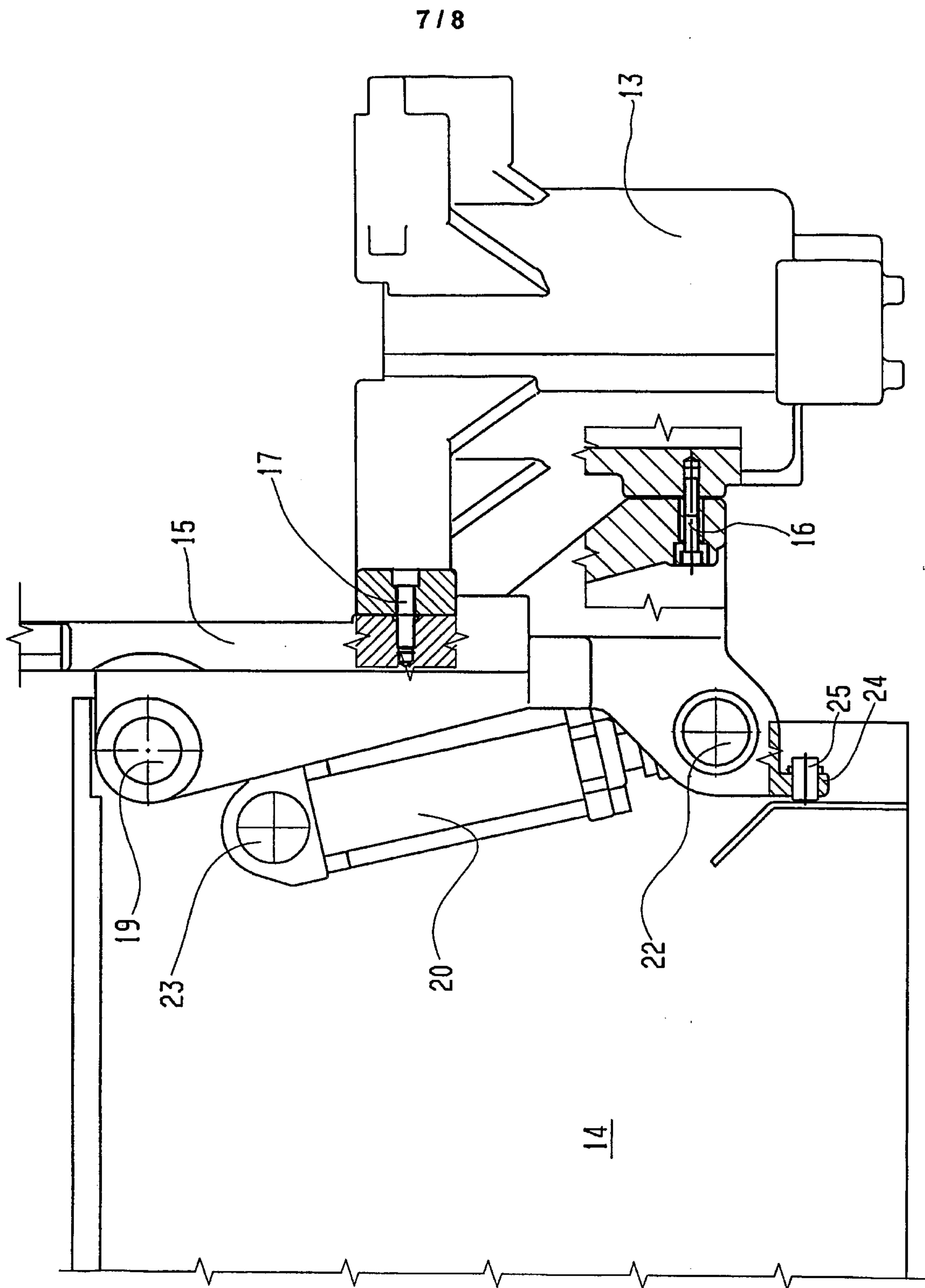


FIG. 7

FIG. 8

