Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2480731 A1 2005/04/02

(21) 2 480 731

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(22) Date de dépôt/Filing Date: 2004/09/07

(41) Mise à la disp. pub./Open to Public Insp.: 2005/04/02

(30) Priorité/Priority: 2003/10/02 (2003-344676) JP

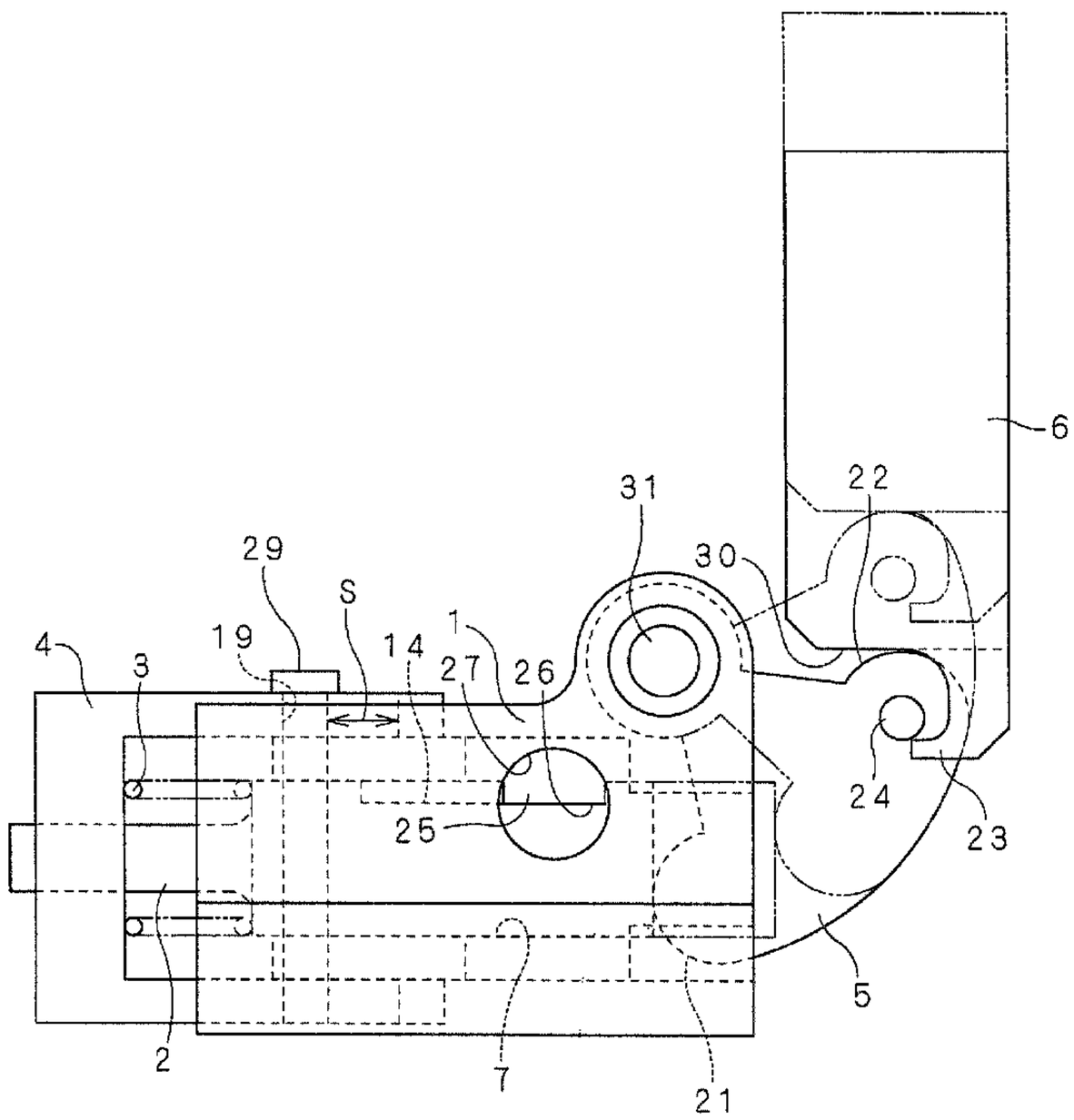
(51) Cl.Int.^{7}/Int.Cl.^{7} B21D 28/34, B21D 45/02

(71) Demandeur/Applicant:
UMIX CO., LTD., JP

(72) Inventeur/Inventor:
KITAMURA, NORITOSHI, JP

(74) Agent: MARKS & CLERK

(54) Titre : CAME DE POINCON DE DECOUPE
(54) Title: PIERCE CAM



(57) Abrégé/Abstract:
The invention provides a pierce cam comprising a pierce punch, a body which is detachably provided with the pierce punch, a stripper which is inward fitted to a leading end portion of the pierce punch and is energized by a coil spring, a rotatable arm which is swingably provided in the body and is brought into contact with a rear end surface of the pierce punch, and a driver which transfers a descending force of a press machine to the rotatable arm, and hooks and ascends the rotatable arm at the time of moving upward. The pierce cam is compact, can save space, can be easily mounted, can reduce costs and can be mounted even on a sloped surface. In addition, a pierce punch and required accessories can be ordered in a single order.

ABSTRACT OF THE DISCLOSURE

The invention provides a pierce cam comprising a pierce punch, a body which is detachably provided with the pierce punch, a stripper which is inward fitted to a leading end portion of the pierce punch and is energized by a coil spring, a rotatable arm which is swingably provided in the body and is brought into contact with a rear end surface of the pierce punch, and a driver which transfers a descending force of a press machine to the rotatable arm, and hooks and ascends the rotatable arm at the time of moving upward. The pierce cam is compact, can save space, can be easily mounted, can reduce costs and can be mounted even on a sloped surface. In addition, a pierce punch and required accessories can be ordered in a single order.

PIERCE CAM

BACKGROUND OF THE INVENTION

The present invention relates to a pierce cam, and more particularly to a standardized pierce cam.

A conventional pierce cam is shown in Fig. 16 and comprises a pierce punch 101, a punch plate 102 which holds the pierce punch 101, a stripper 103 which presses a work W before piercing by the pierce punch 101 and takes away the pierce punch 101 from the work W after piercing, a rubber cushion 104 (a coil spring can also be used) which presses against the stripper 103, a passive cam 105 which has the punch plate 102 mounted thereto and which moves backward and forward toward the work W, an actuating cam 106 which moves the passive cam 105 forward, a base plate block 107 on which the passive cam 105 slides, and which serves as a heel when the actuating cam 106 drives the passive cam 105, and a coil spring 108 which returns the passive cam 105.

The passive cam 105, the actuating cam 106 and the base plate block 107 are made of cast metal, require a significant amount of space and are expensive.

As mentioned above, the conventional pierce cam is large-scale, requires a lot of space, is expensive, and is hard to mount on a sloped surface.

Further, since the pierce punch 101, the passive cam 105, the actuating cam 106 and the base plate block 107 are generally ordered from different makers, it is impossible to obtain the parts in a single order. The conventional pierce is also inconvenient with respect to production control.

Taking the matters mentioned above into consideration, the present invention, provides a pierce cam comprising a pierce punch, a body which is detachably provided with the pierce punch, a stripper which is inward fitted to a leading end portion of the pierce punch and is energized (biased) by a coil spring, a rotating arm which is swingably provided in the body and is brought into contact with a rear end surface of the pierce punch, and a driver for transferring a force of a press machine to the rotatable arm, and which hooks and rotates the rotatable arm when returning to a starting position.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front elevational view of a pierce cam in accordance with a specific embodiment of the present invention;

Fig. 2 is a plan view excluding a driver;

Fig. 3 is a front elevational view of a body;

Fig. 4 is a side elevational view of the body;

Fig. 5 is a plan view of the body;

Fig. 6 is a front elevational view of a pierce punch;

Fig. 7 is a side elevational view of the pierce punch;

Fig. 8 is a plan view of the pierce punch;

Fig. 9 is a front elevational view of a stripper;

Fig. 10 is a plan view of the stripper;

Fig. 11 is a front elevational view of a rotatable arm;

Fig. 12 is a front elevational view of a slide pin;

Fig. 13 is a plan view of the slide pin;

Fig. 14 is a front elevational view of the present pierce cam in a state in which the driver is moved upward;

Fig. 15 is a front elevational view of a state in which the present pierce cam is mounted to a slope surface; and

Fig. 16 is a vertical cross sectional view of a conventional pierce cam.

EMBODIMENT

A detailed description of the present invention will be given below on the basis of a specific embodiment shown in the accompanying drawings.

Fig. 1 is a front elevational view of a pierce cam in accordance with a specific embodiment of the present invention, and Fig. 2 is a plan view excluding a driver.

A pierce punch 2 is detachably provided in a body 1, a stripper 4 energized by a coil spring 3 is slidably provided in the body 1, a rotatable arm 5 is swingably pivoted to the body 1, a lower portion of the rotatable arm 5 is brought into contact with a rear end surface of the pierce punch 2, and a driver 6 provided in a trailing manner in an upper die transfers a downward moving force of a press machine to the rotatable arm 5, and hooks the rotatable arm 5 at the time of moving upward.

Details of the body 1 is shown in Figs. 3 to 5. Fig. 3 is a front elevational view of the body 1, Fig. 4 is a side elevational view of the same and Fig. 5 is a plan view of the same.

A guiding hole 7 for attaching and detaching the pierce punch 2 is provided in the body 1.

A long hole 10, for mounting a stripper 4 which serves to press the work before piercing and take away the pierce punch 2 from the work after piercing, is provided in the body 1.

A bracket portion 11 provided with the rotatable arm 5 is provided in an upper portion of a rear end of the body 1, and a mounting hole 12 is provided in the bracket portion 11.

In this case, reference numeral 32 denotes a mounting hole for mounting to a lower die main body.

Details of the pierce punch 2 is shown in Figs. 6 to 8. Fig. 6 is a front elevational view of the pierce punch 2, Fig. 7 is a side elevational view of the same and Fig. 8 is a plan view of the same.

The pierce punch 2 is structured such that a shaft portion 13 is formed into a circular shape so as to be attached to the guiding hole 7 of the body 1, and a flat surface 14 is formed in an intermediate portion of the shaft portion 13. Further, a positioning hole 15 is pierced in a front end portion of the shaft portion 13.

A seat portion 28 of the coil spring 3 is formed in a front end surface of the shaft portion 13 in accordance with a cutting operation.

Details of the stripper 4 is shown in Figs. 9 and 10. Fig. 9 is a front elevational view of the stripper 4 and Fig. 10 is a plan view of the same.

The stripper 4 is constituted by a copper casted product, and is formed in a C-shaped cross section. An inner surface of a hole 17, to which a hole forming portion 16 of the pierce punch 2 is fitted, is impregnated with graphite such that the hole forming portion 16 of the pierce punch 2 can smoothly move.

A stroke length hole 19 for determining a stroke of the stripper 4 is pierced in both side walls 18 of the stripper 4.

Details of the rotatable arm 5 is shown in Fig. 11. The rotatable arm 5 comprises a fan-shaped plate-like body,

and a hole 20 is provided in the body 21 as the axis of rotation. One end portion is formed in a circular arc contact portion 21 which is brought into contact with the rear end surface of the pierce punch 2, and another end portion is formed in a circular arc contact portion 22 which is brought into contact with the driver 6, respectively. Further, a pin 24 with which a hook 23 of the driver 6 is caught at a time of moving upward is provided in another end portion so as to protrude on both sides of the plate-like body.

A slide pin 25 is shown in Figs. 12 and 13. Fig. 12 is a front elevational view of the slide pin 25, and Fig. 13 is a plan view of the same. The slide pin is used for attaching and detaching the pierce punch 2 to and from the body 1, and is formed by cutting a cylindrical body in half and slightly cutting both sides of a flat surface 26.

The present pierce cam is assembled as follows.

The pierce cam is assembled by inserting the pierce punch 2 to the guiding hole 7 of the body 1, by bringing the rear end surface thereof into contact with the stopper surface 9, by bringing the flat surface 26 of the slide pin 25 into contact with the flat surface 14 of the pierce punch 2 so as to be in communication with an attaching and detaching hole 27 of the body 1, and by fixing the pierce punch 2. In the case that it is necessary to replace the pierce punch 2 due to a nicked edge or the like, the slide pin 25 is taken out, the pierce pin 2 is replaced by a new pierce punch 2, and the slide pin 25 is inserted and fixed.

The slide pin 25 serves to prevent rotation of the pierce punch 2 in the situation where the hole forming portion of the pierce punch 2 is other than a circular shape, for example, a rectangular shape, a hexagonal shape and the like.

Next, the coil spring 3 is seated on a seat portion 28 of the pierce punch 2, the hole forming portion 16 of the pierce punch 2 is fitted to the hole 17 of the stripper 4, and a stopper pin 29 is fitted to the stroke length hole 19 in the side wall 18 of the stripper 14 and the long hole 10 of the body 1. Since the stripper 4 is energized by the coil spring 3, the stripper 4 moves forward by a stroke S.

The rotatable arm 5 is pivoted by a pin 31 while the hole 20 thereof is brought into line with the mounting hole 12 in the bracket 11 of the body 11, the circular arc contact portion 21 thereof is brought into contact with the rear end surface of the pierce punch 2, and the pierce punch 2 and the rotatable arm 5 are pin connected (not shown) by a link.

A lower end surface 30 of the driver 6 firmly fixed to the upper die is brought into contact with the circular arc contact portion 22 of the rotatable arm 5, the rotatable arm 5 is rotated by the downward movement of the driver 6, and the circular arc contact portion 21 presses the rear end surface of the pierce punch 2 so as to push out the pierce punch 2 forward against an energizing force of the coil spring 3.

After the piercing process by the pierce punch 2, the upper die moves upward, the hook 23 of the driver 6 catches the pin 24 of the rotatable arm 5, rotates the rotatable arm 5 rearward and slides the flat surface 14 of the pierce punch 2 along the flat surface 26 of the slide pin 25, and the pierce punch 2 is returned to its starting position.

Fig. 14 shows a state in which the driver 6 is moved upward. The present pierce cam can be easily mounted even in the case that the mounting surface is even a slope surface 33 as shown in Fig. 15.

The piercing process by the present pierce cam can be easily applied to a structure having a hole diameter of 15 to 35 mm.

The present pierce cam can be utilized for piercing a thin plate formed product, or can be utilized for piercing a plastic product or the like.

Since the present invention provides the pierce cam comprising the pierce punch, the body which is detachably provided with the pierce punch, the stripper which is inward fitted to the leading end portion of the pierce punch and is energized by the coil spring, the rotatable arm which is swingably provided in the body and is brought into contact with the rear end surface of the pierce punch, and the driver which transfers the descending force of the press machine to the rotating arm, and hooks and ascends the rotating arm at the time of moving upward, as mentioned above, it is possible to make the structure compact, space saving, easily mountable, particularly to a sloped surface, lower in cost and comprising parts that can be ordered in a single order.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A pierce cam comprising:

a pierce punch;

a body which is detachably provided with the pierce punch;

a stripper which is fitted to a leading end portion of the pierce punch and is biased by a coil spring;

a rotatable arm which is swingably provided in the body and is brought into contact with a rear end surface of the pierce punch; and

a driver for transferring a force of a press machine to the rotatable arm, and which hooks and rotates the rotatable arm when returning to a starting position.

Fig.1

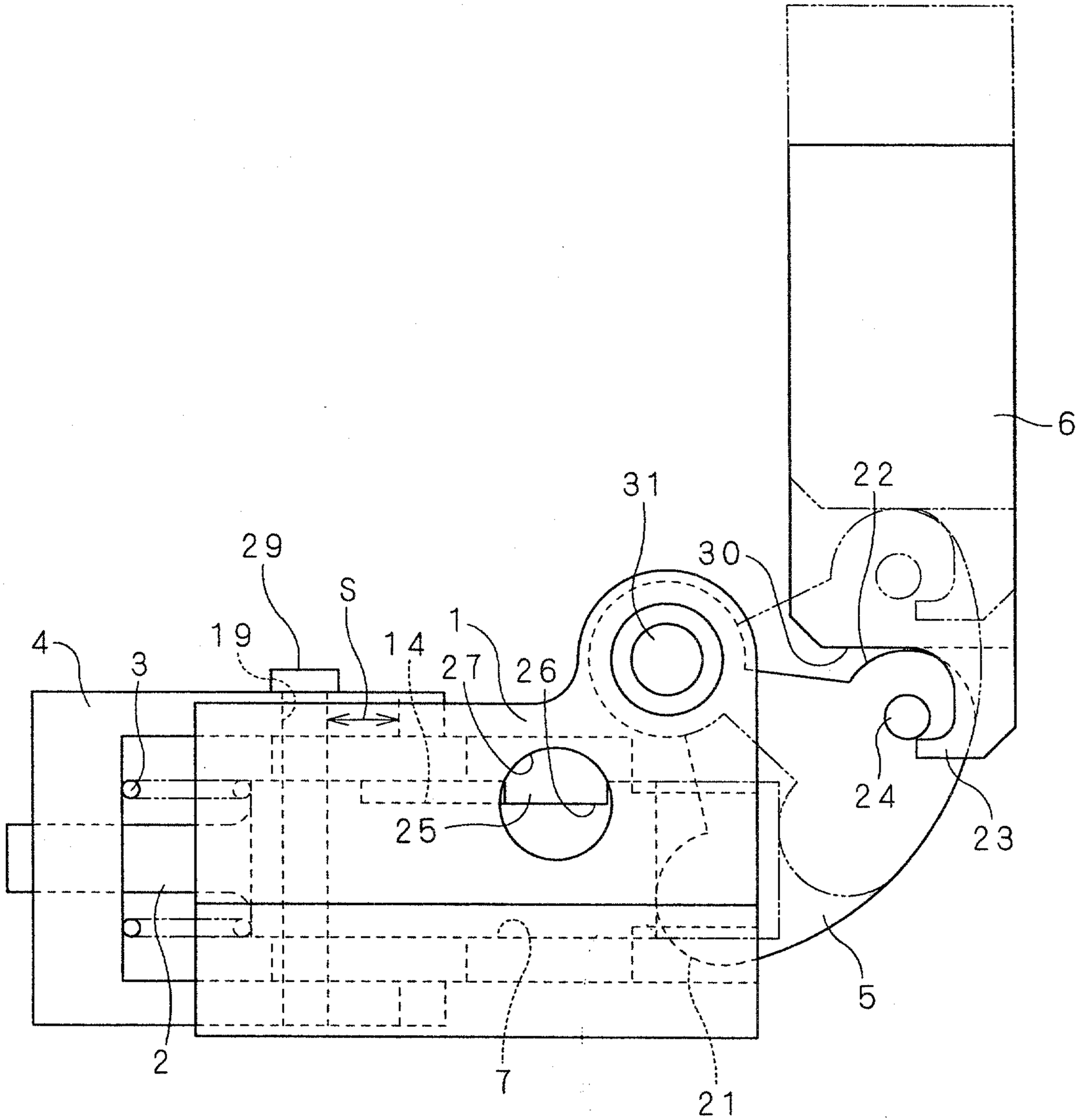


Fig. 2

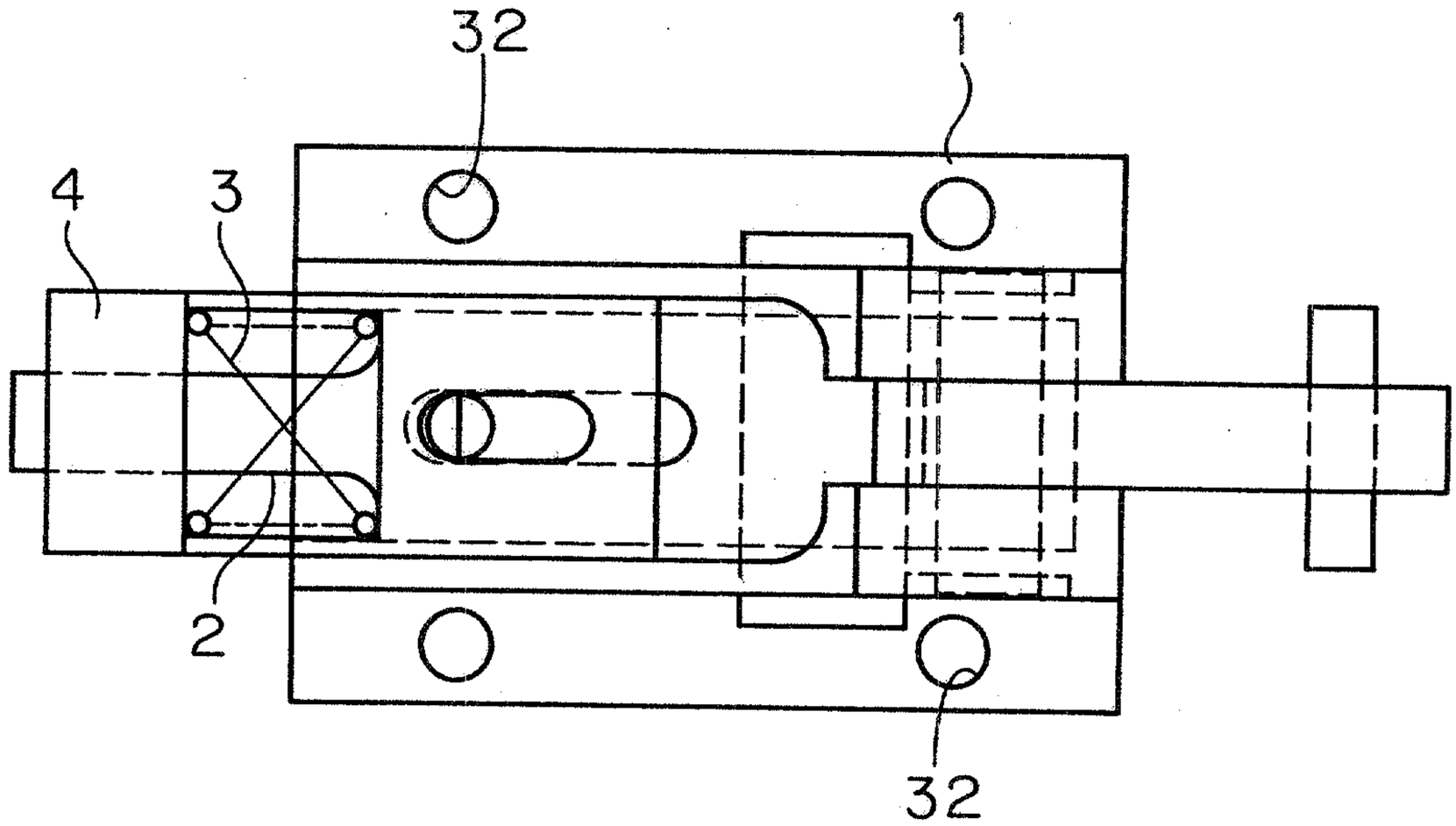


Fig. 3

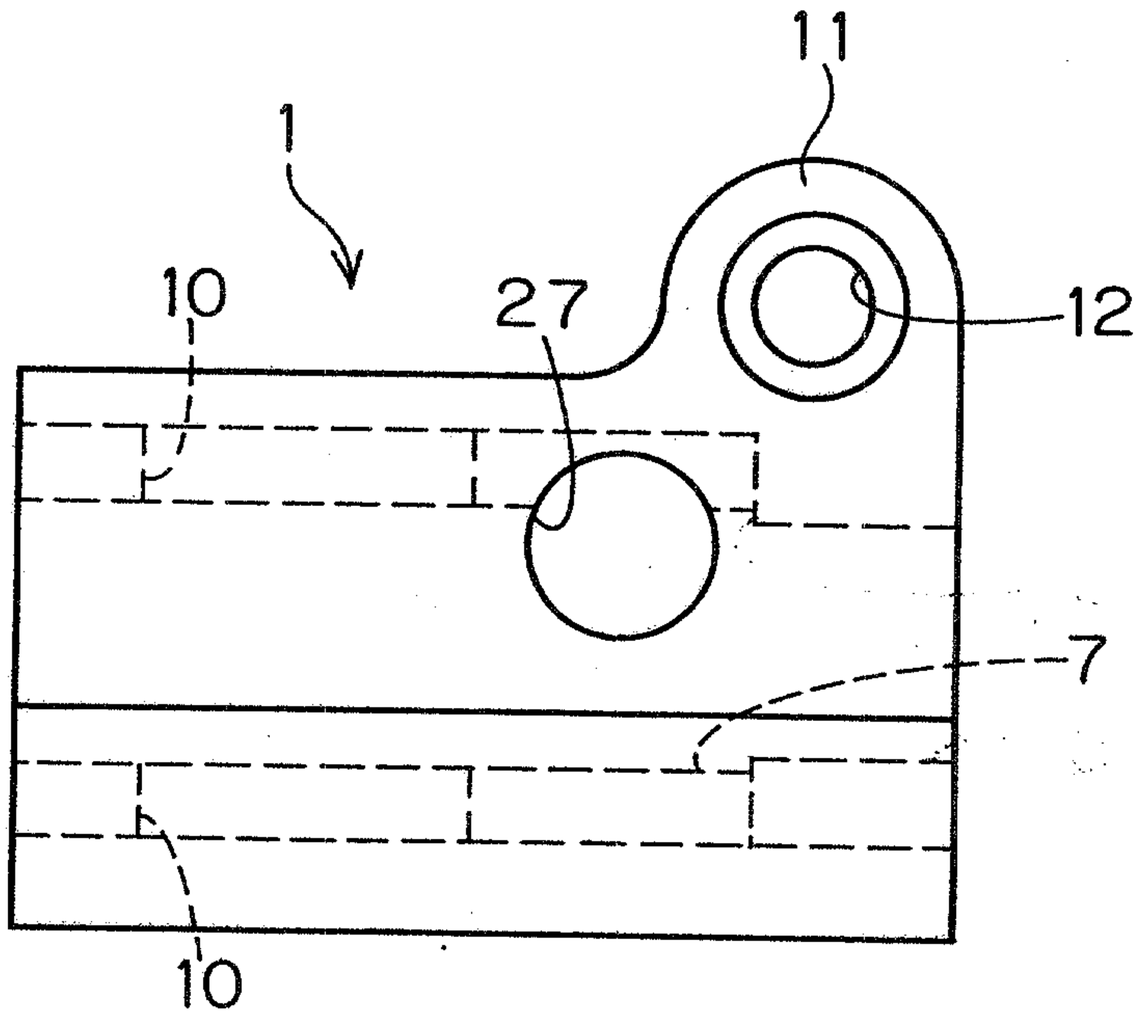


Fig. 4

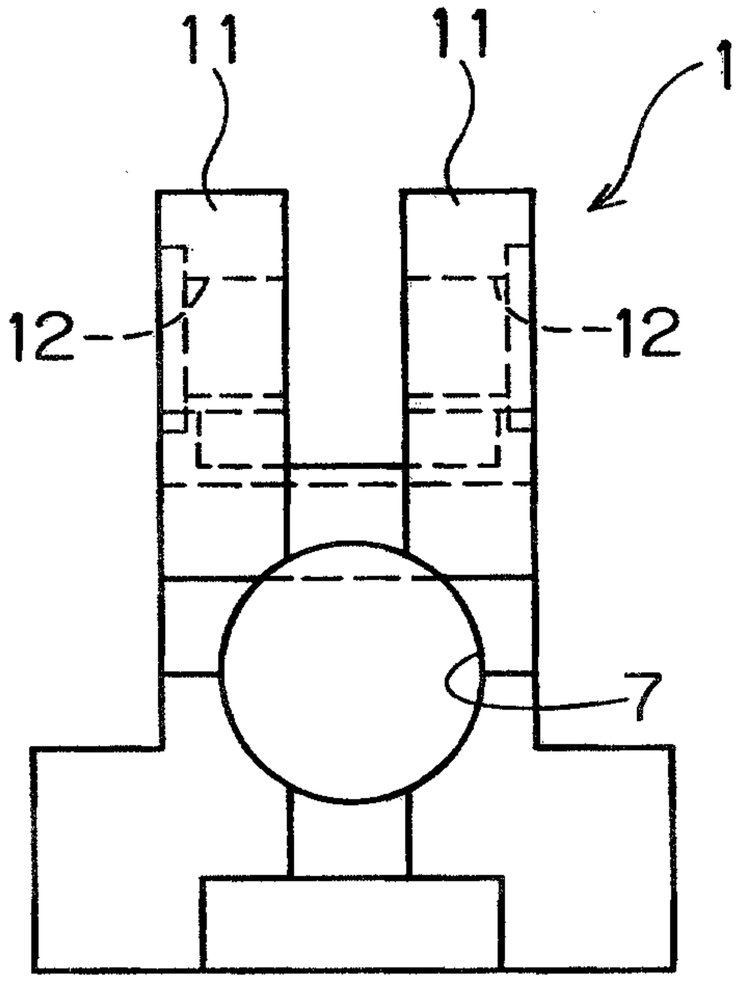


Fig. 5

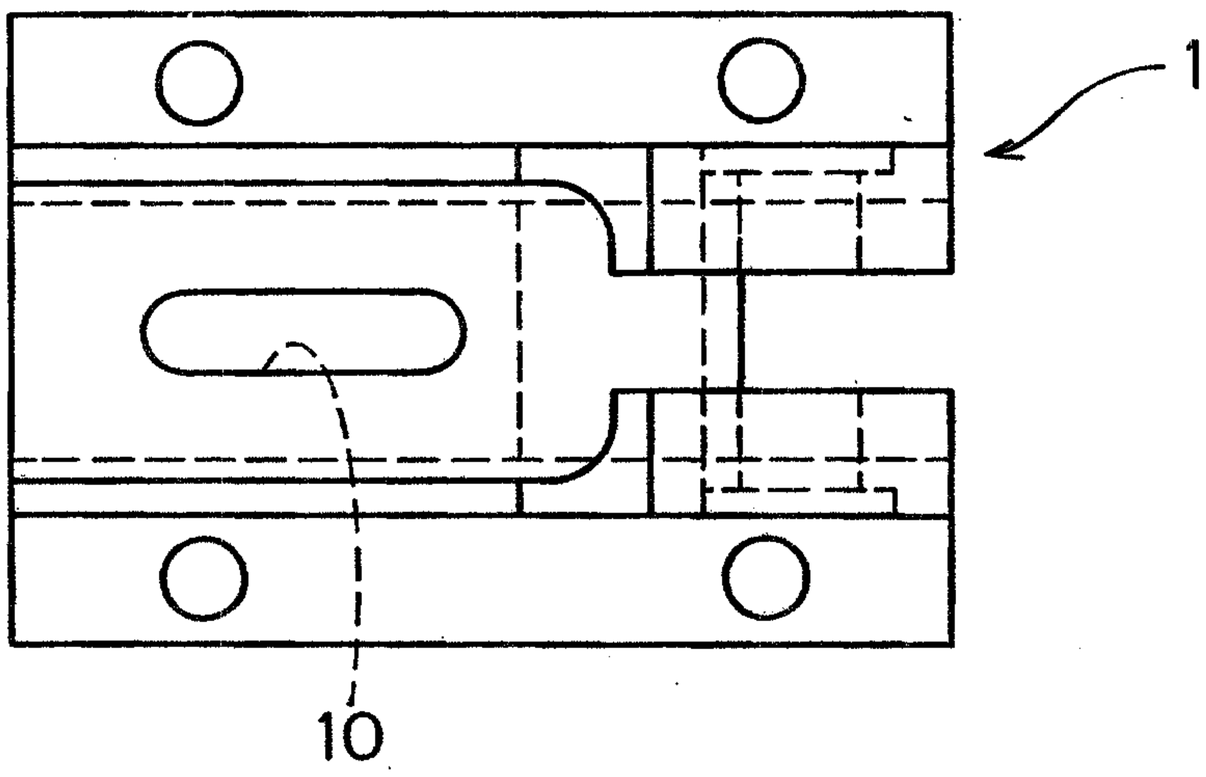


Fig. 6

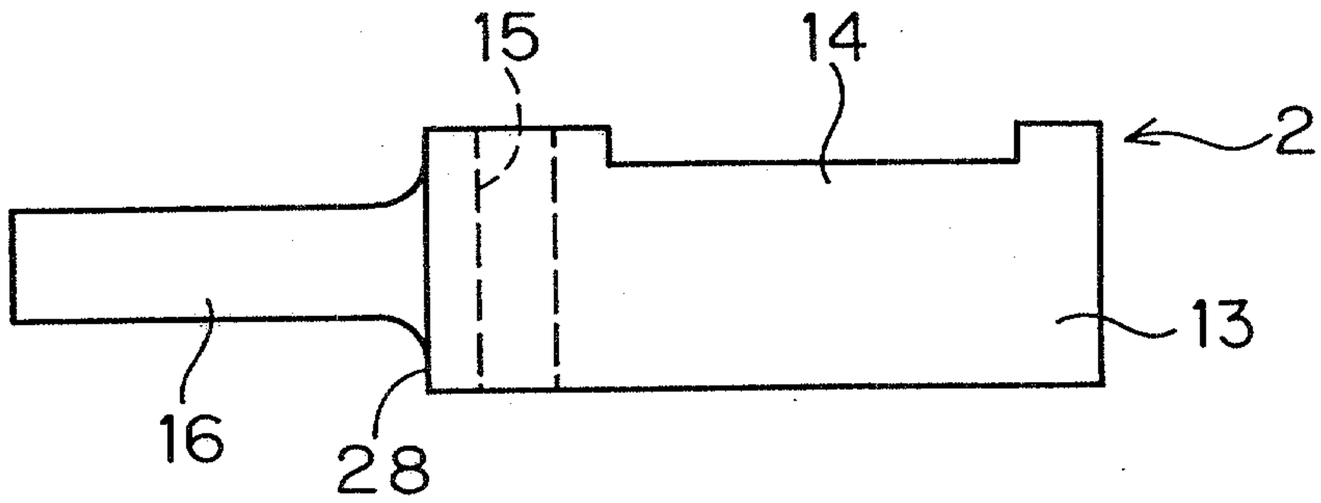


Fig. 7

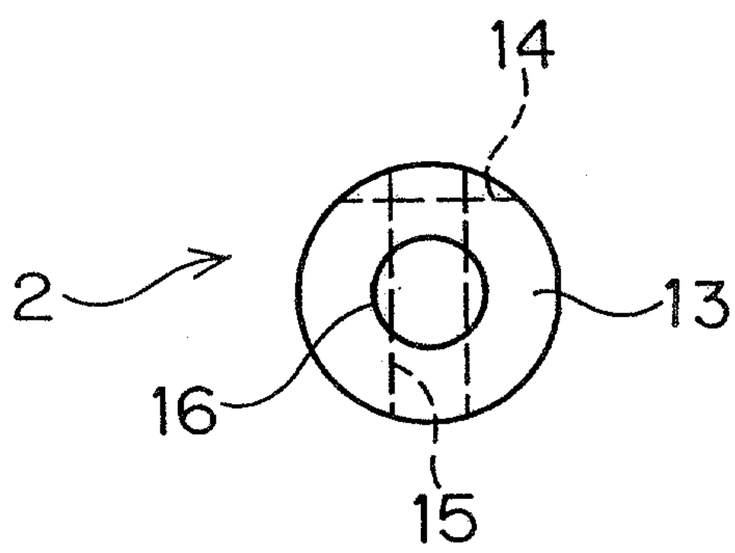


Fig. 8

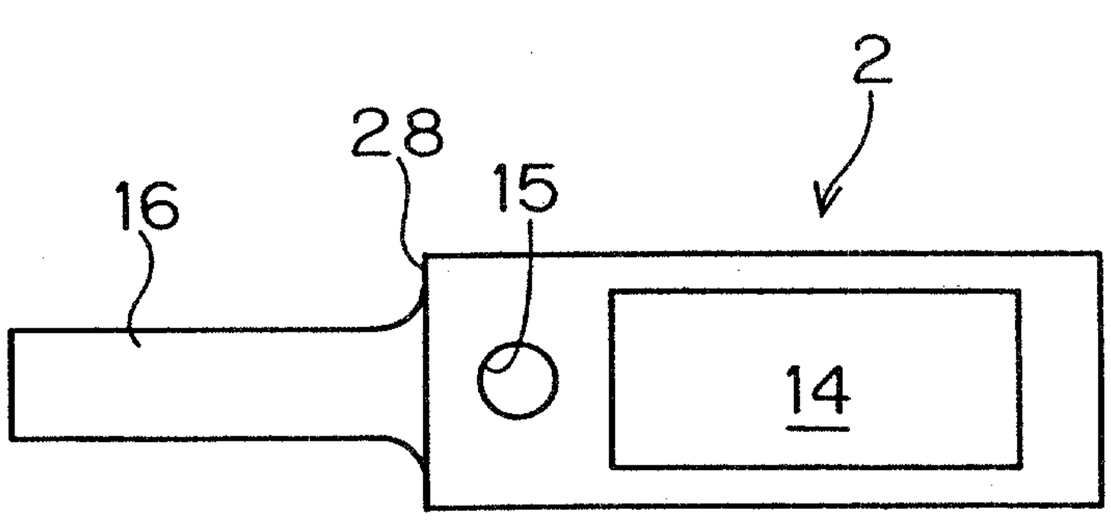


Fig. 9

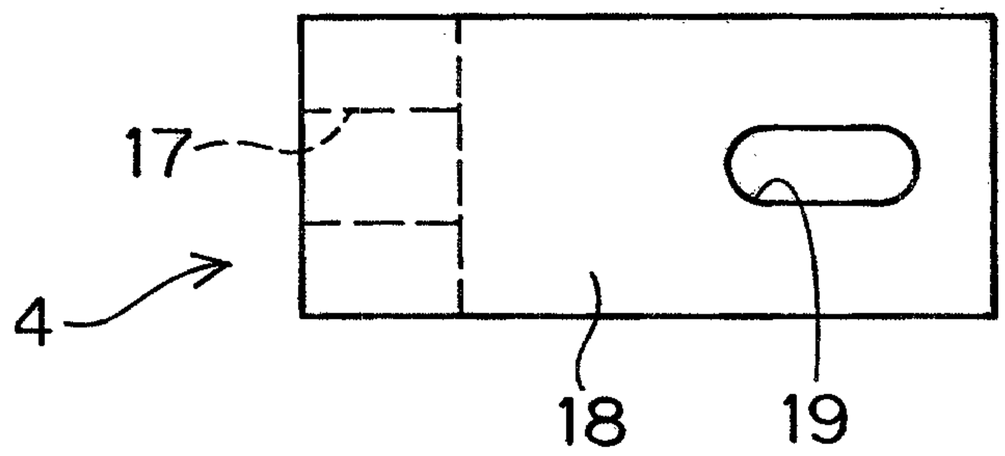


Fig. 10

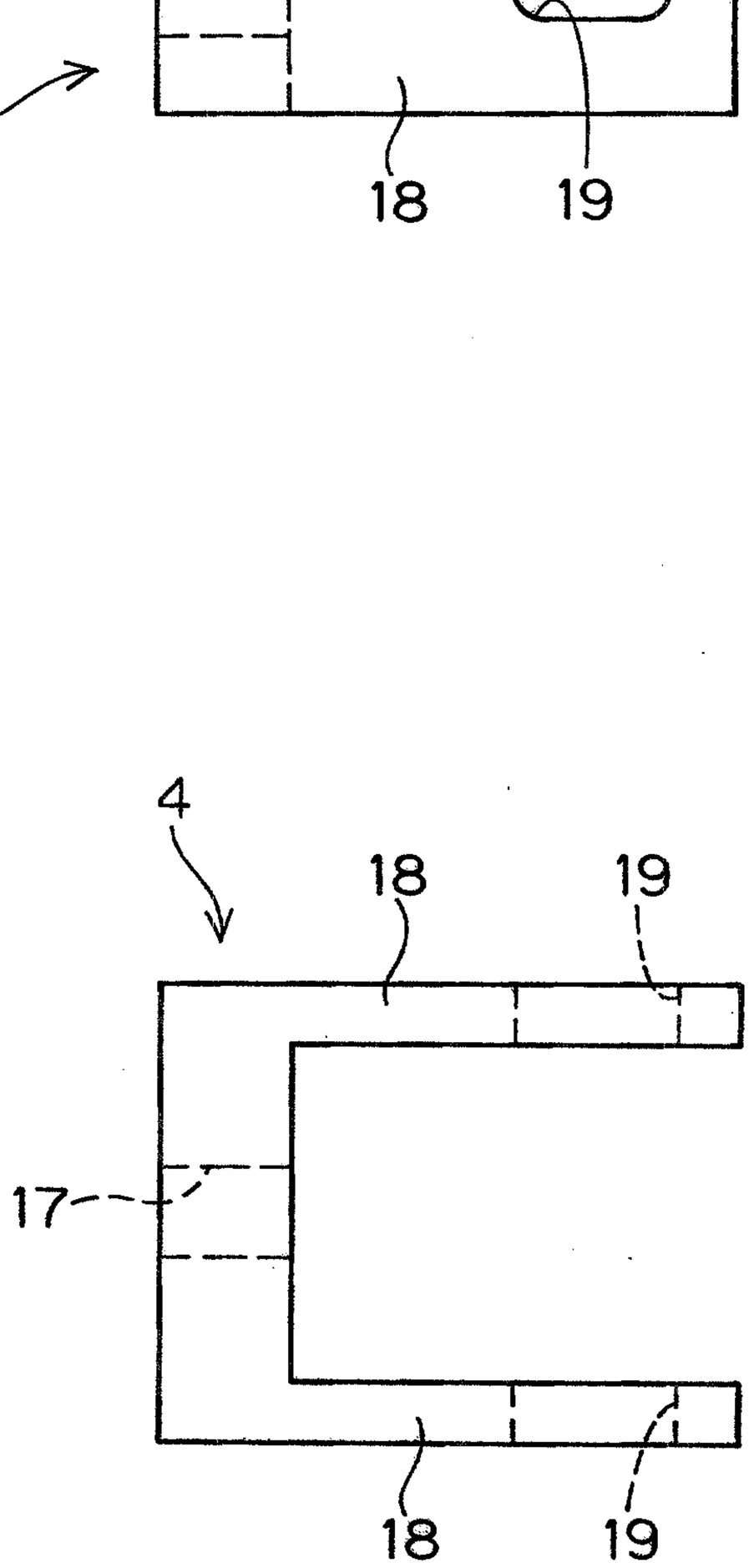


Fig. 11

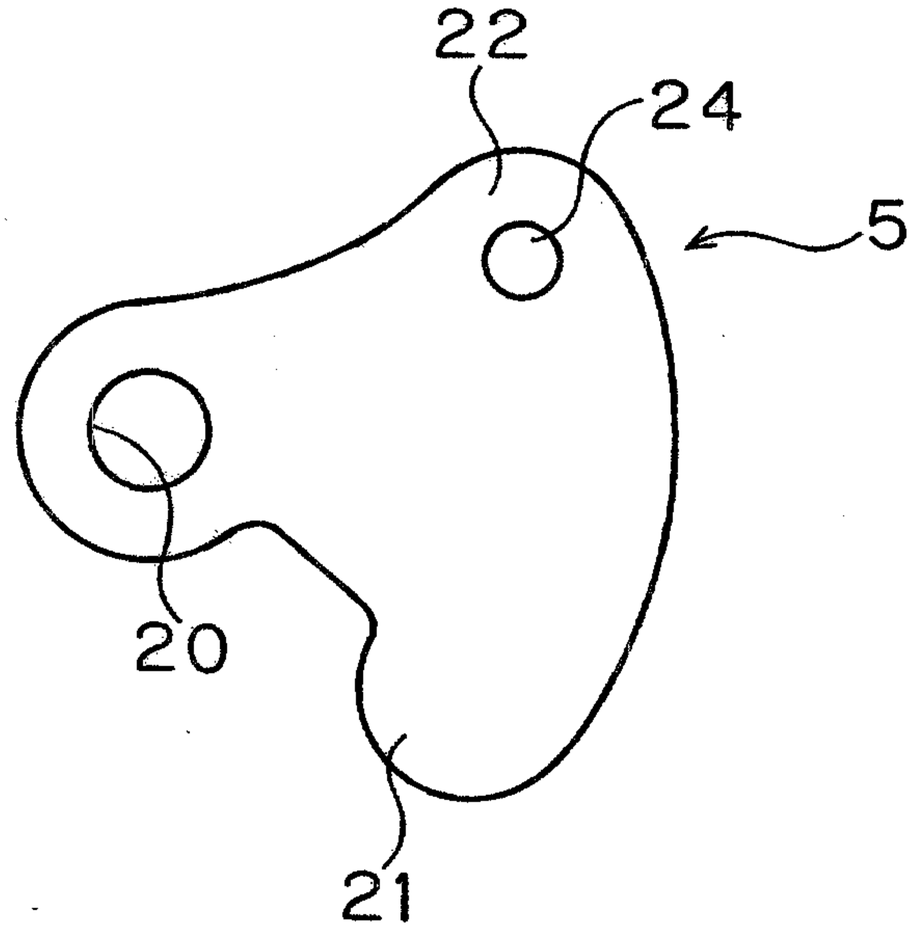


Fig. 12

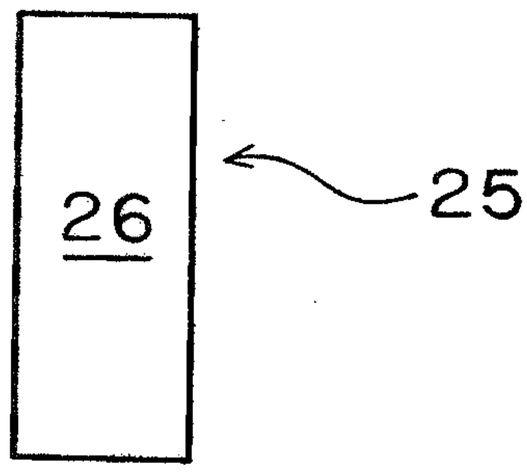


Fig. 13

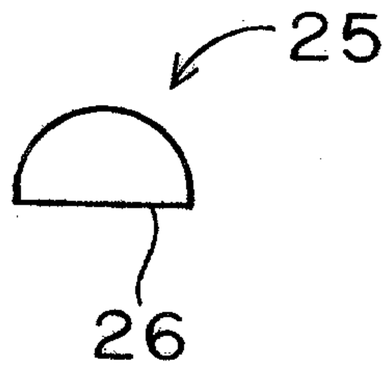


Fig. 14

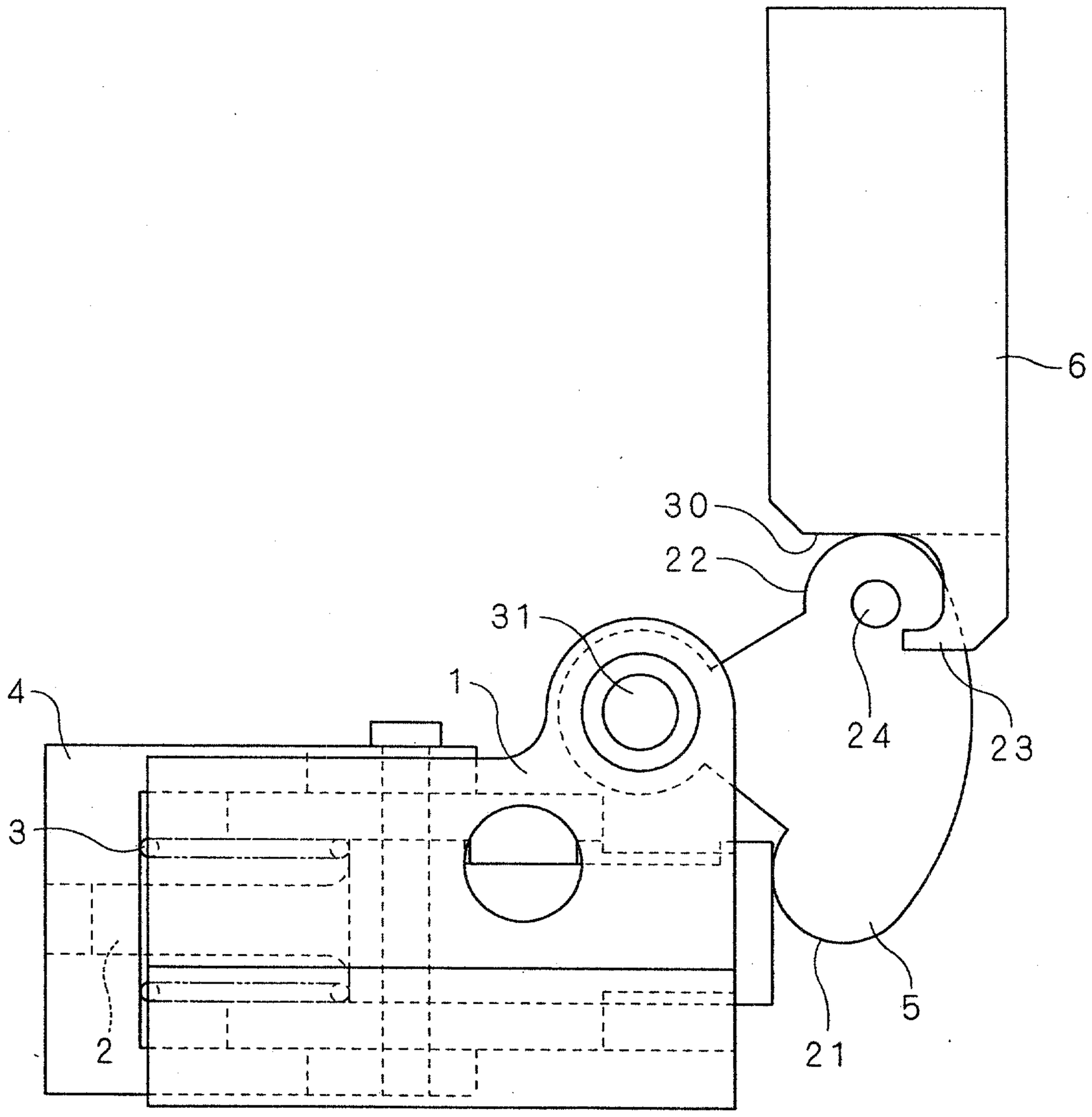


Fig. 15

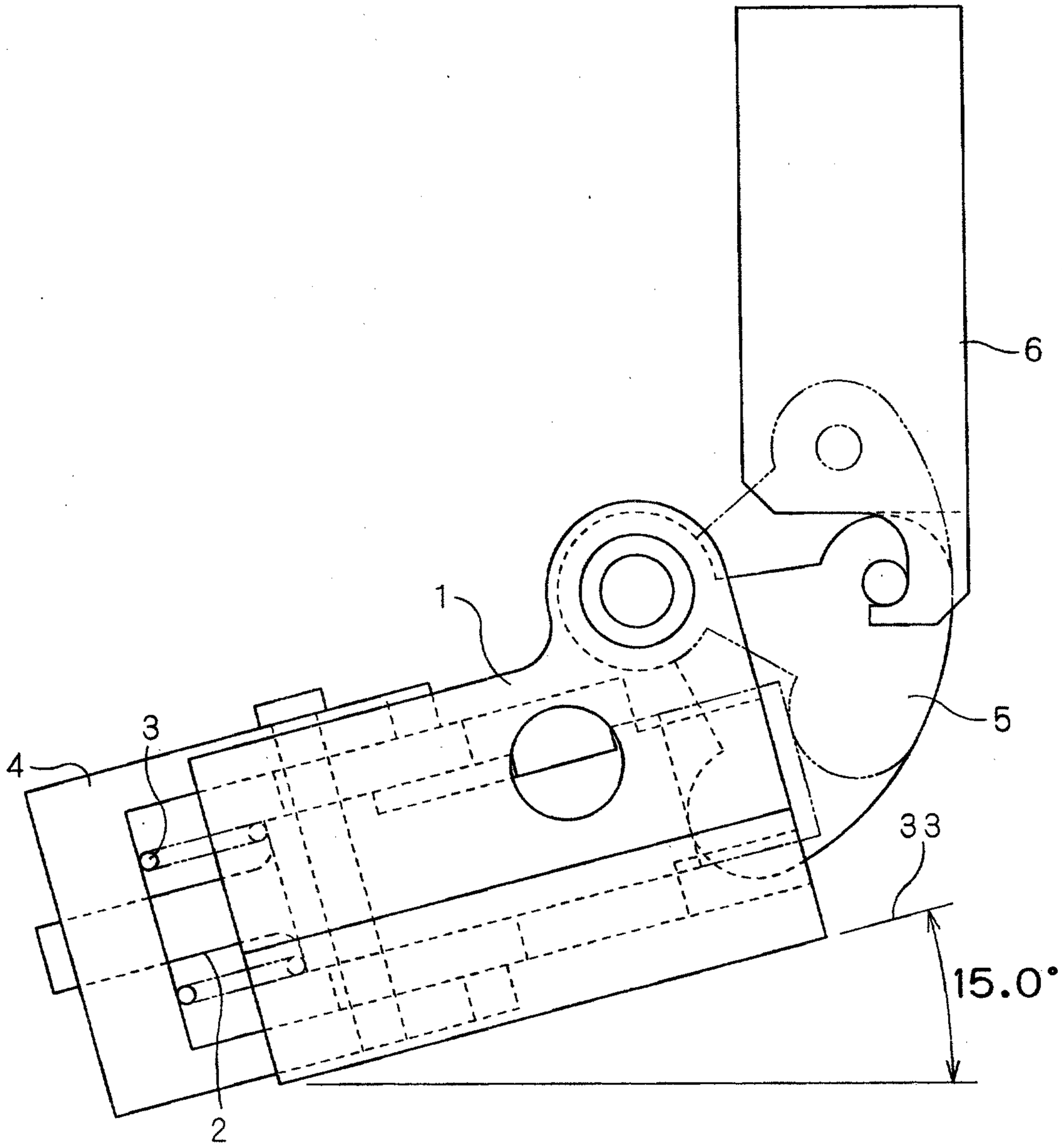
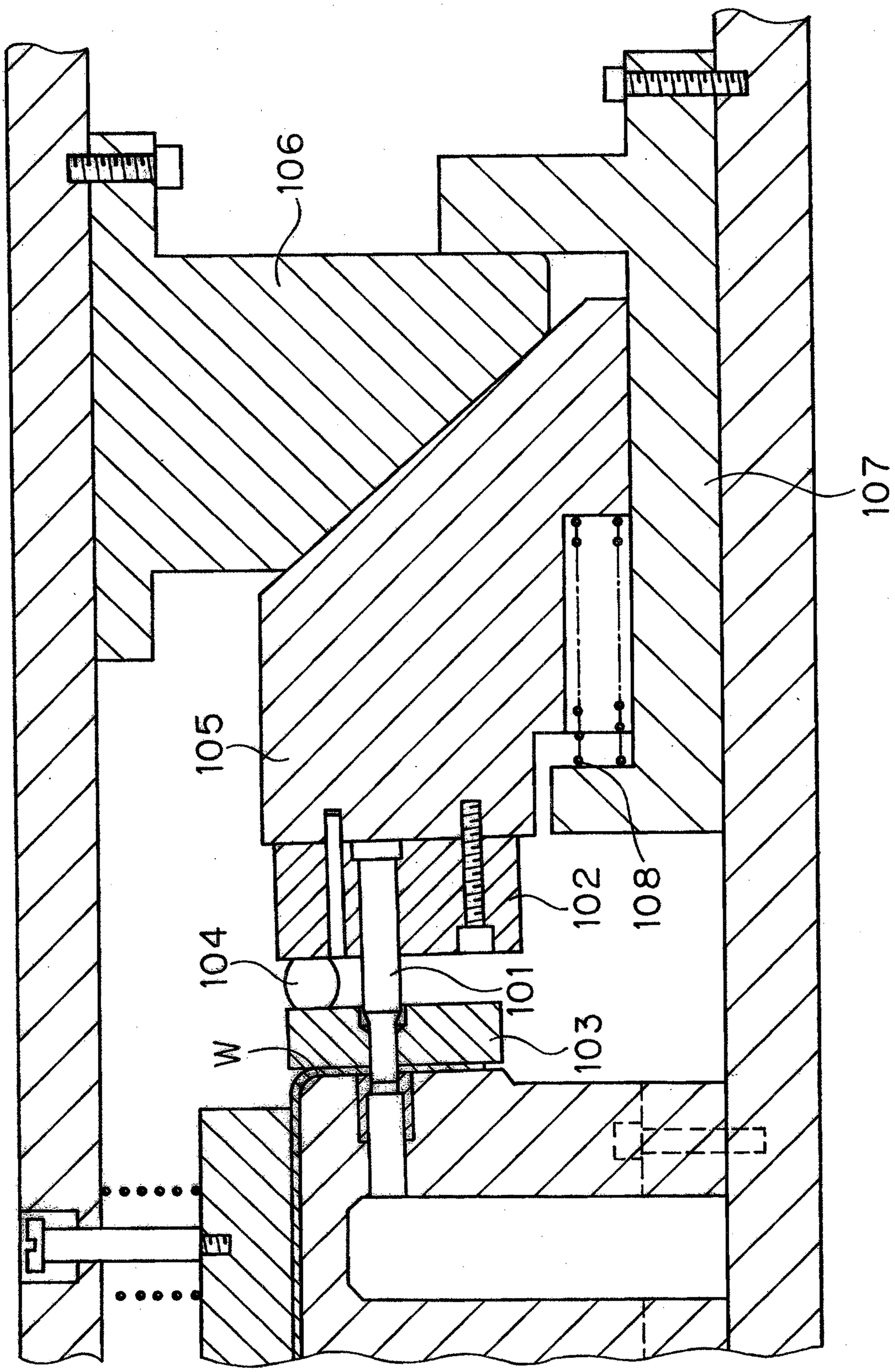
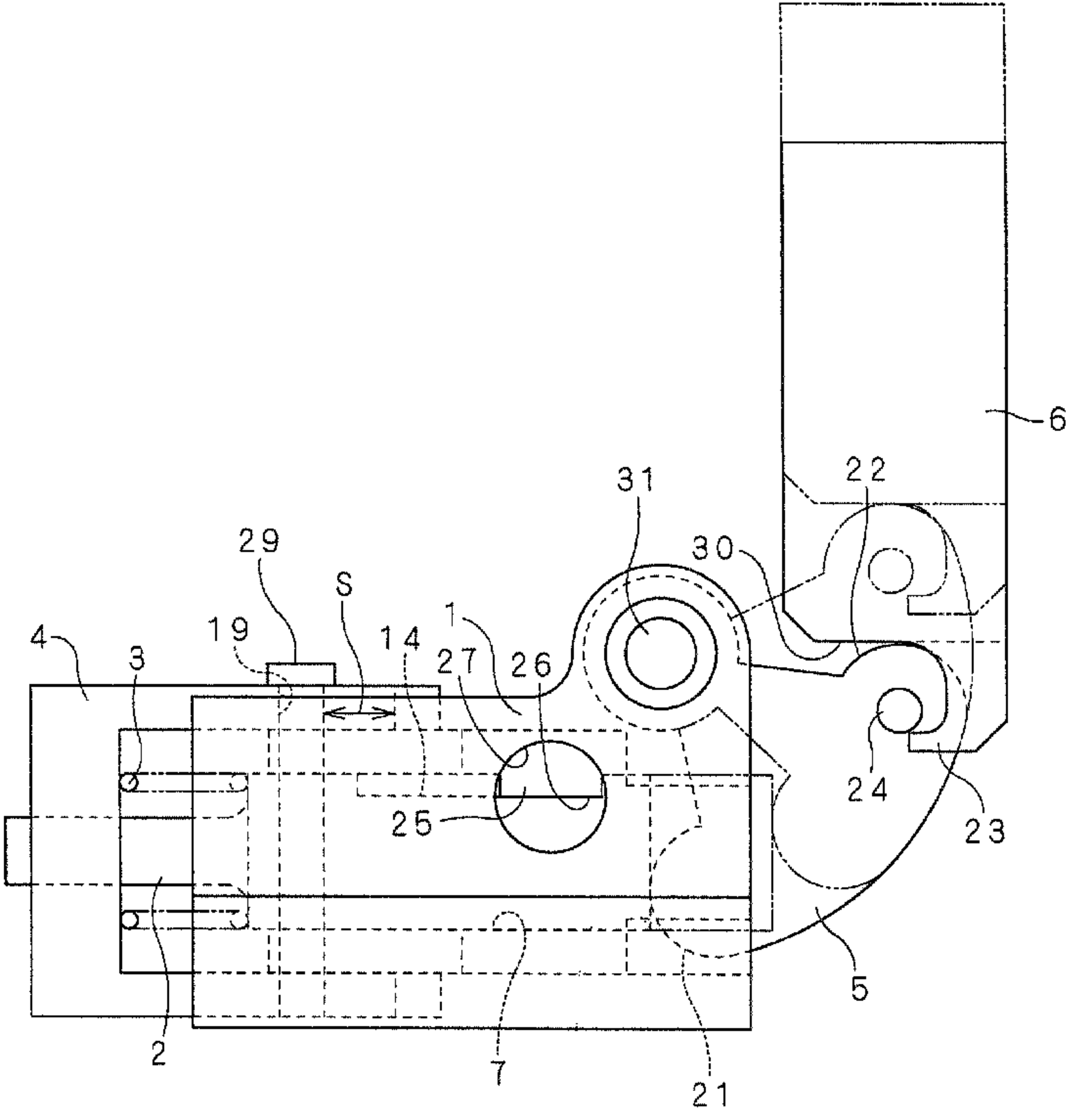


Fig. 16

PRIOR ART




6
22
31
29
30
S
1
19
14
4
3
27
26
24
25
23
5
2
7
21