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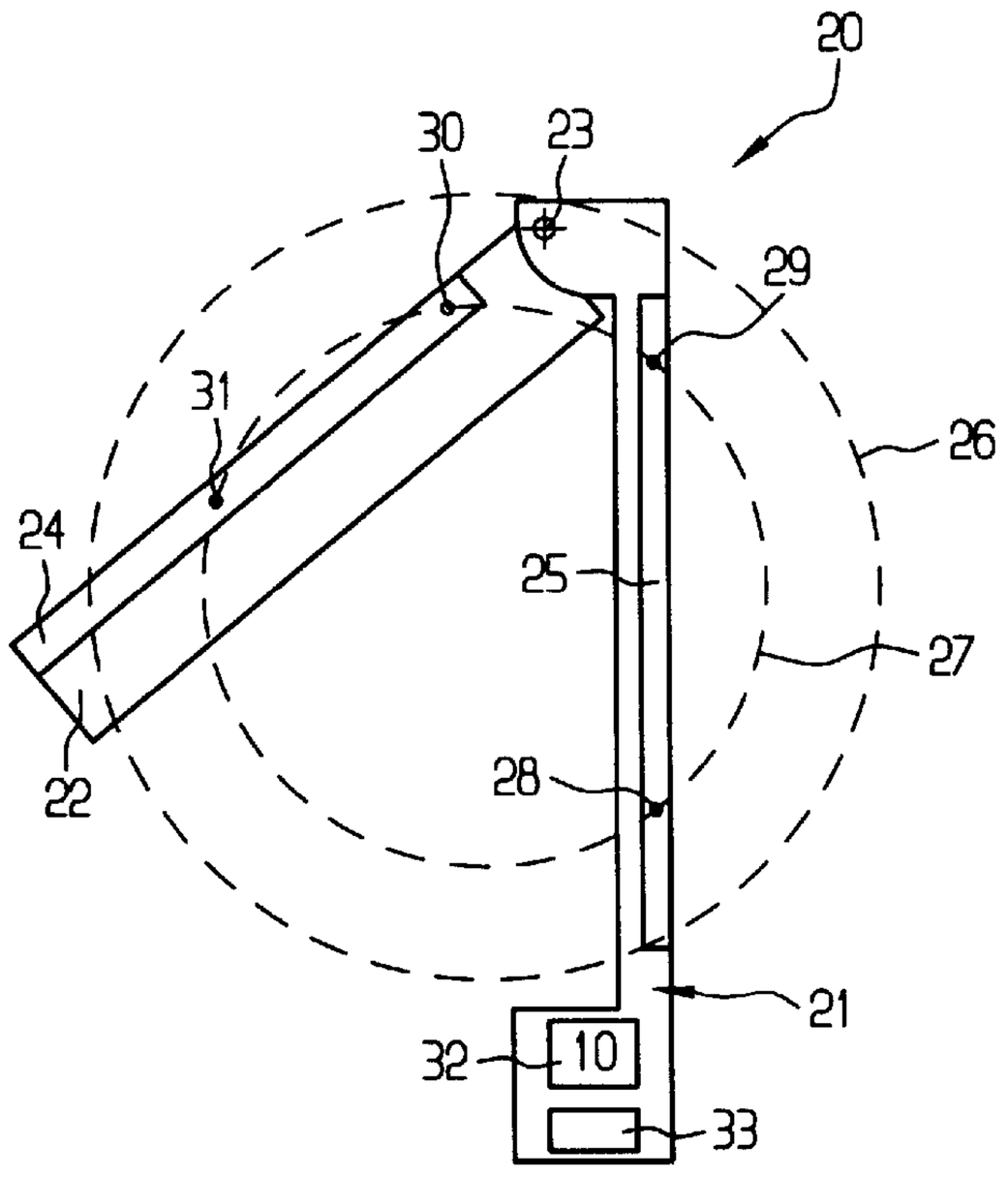
(12) (19) (CA) **Demande-Application**

(21) (A1) **2,312,868**
(86) 1998/12/16
(87) 1999/06/24

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(51) Int.Cl.[6] G01G 21/28
(30) 1997/12/16 (297 22 105.1) DE

(54) **BALANCE PORTATIVE**
(54) **PORTABLE SCALE**



(57) L'invention concerne une balance (20) présentant deux dispositifs de mesure de force (21, 22) pouvant être soumis à un poids, indépendamment l'un de l'autre, et un dispositif d'affichage (32) indiquant la somme des poids. Ces dispositifs de mesure de force (21, 22) sont reliés l'un à l'autre de sorte qu'un dispositif de mesure de force (21) peut tourner par rapport à l'autre dispositif de mesure de force (22). Cette conception permet de replier les dispositifs de mesure de force (21, 22) et par conséquent de faciliter le transport de cette balance. Trois détecteurs (34, 35, 36) sont prévus au niveau des dispositifs de mesure de force (21, 22).

(57) The invention relates to a scale (20) having two force meter devices (21, 22) which independently of each other can be subjected to a weight and a display device (32) for indicating the sum of the weights. The force meter devices (21, 22) are connected to each other in such a way that the one force meter device (21) can rotate in relation to the other force meter device (22). This design allows for the force meter devices (21, 22) to be folded up and thus makes the scale easy to transport. The invention provides for three sensors (34, 35, 36) at the level of the force meter devices (21, 22).

ABSTRACT

The invention relates to a scale (20) having two force meter devices (21, 22) which independently of each other can be subjected to a weight and a display device (32) for indicating the sum of the weights. The force meter devices (21, 22) are connected to each other in such a way that the one force meter device (21) can rotate in relation to the other force meter device (22). This design allows for the force meter devices (21, 22) to be folded up and thus makes the scale easy to transport. The invention provides for three sensors (34, 35, 36) at the level of the force meter devices (21, 22).

Description

PORTABLE SCALES

The invention relates to scales comprising an electric force transducer for measuring a force due to weight and an indicating device for indicating the force due to weight.

Electric scales are often used in offices and in kitchens. The force transducer is situated in a region between a support frame and what is referred to as a weighing pan or a seat for a weighing pan of this kind. When the weighing pan is loaded with an article, a force due to weight can be measured by means of the force transducer if the base frame is placed on a flat surface.

One disadvantage of known scales is that they often project out to a considerable extent. Scales of this kind therefore cannot be taken along when travelling as they take up a lot of space.

The known scales are also limited in terms of design. They often have a base frame in the form of a housing with a square or round base surface. A movable weighing-pan support is mounted thereon, with a force transducer extending between the base frame and the weighing-pan support.

GB-A-2 184 852 describes scales comprising a pair of components of essentially identical design and shape. Each component has a platform, a base and a plate which can be deformed by the load to be weighed and is provided with at least one strain gauge. The components are hinged together by means of devices allowing for movement between an unfolded position and a folded position.

FR-A-2 700 849 describes a device comprising a plurality of modules which are pivotably coupled together so that they can assume the geometric shape of a hinged support. Each module is provided with at least one measuring sensor, and a measuring function can be obtained by the measuring sensors in combination.

US-A-5 414 225 describes a portable weighing device comprising two laterally offset, electrically connected and rigidly aligned weighing modules. The scales shown there allow for convenient weighing of disabled persons in a wheelchair supported by two front wheels and two main wheels.

The scales known from the aforesaid documents of the prior art once again have the disadvantage that they project out to a considerable extent.

The aim of the invention is therefore to provide scales which are easy to transport and take up only a little space.

This problem is solved according to the invention by the subject matter of the independent claim. Advantageous developments will be clear from the dependent claims.

The problem is solved according to the invention by two force transducers which can each be acted upon independently of one another by a force due to weight, the force transducers being connected together in such a manner that one force transducer is movable relative to the other. The force transducers can be rotated and/or displaced in translation relative to one another.

According to the basic concept of the invention, both the basic housing and the weighing-pan support of the known scales are superfluous. If two or more independent force transducers are used, these then advantageously take over the function of stable support of the goods to be weighed on a base surface.

The term force transducer as used in the sense of the invention therefore refers to a device which rests on a contact surface and measures a force due to weight departing from an article supported on the device and acting on the contact surface.

This results in the advantage that the force transducers or their supporting arms can be collapsed if no measurements are being carried out, thus making the scales easy to transport in the collapsed state. According to the invention, the axis of rotation can extend substantially perpendicularly to the directions of the principal extent of the supporting arms. The supporting arms can thus be hinged like the arms of an angle.

The force transducers can then constitute at least three bearing points for an article, the force due to weight of which is to be measured. The article to be measured stands stable on these at least three bearing points, thereby giving a reliable measuring result. The stability of the scales according to the invention can be increased by providing safety cams in the region of the supporting arms, these additionally supporting the scales if they tilt about the contact points of the force transducers.

The scales according to the invention also advantageously have a reset button for aligning the scales in an initial state and/or for switching on the scales. The scales can be brought into a defined initial state in which they are adjusted to zero prior to a weighing process by means of a reset button of this kind. The weight of varying articles can thus also be determined in a known manner, e.g. a plate placed on the scales, from which food is removed. The weight of each individual item of food removed can be precisely determined in this manner if the scales are always "zeroed" prior to the removal of parts of the food.

In one particular embodiment, the scales are so flat that, as the food on a plate increases, they can be arranged in the region below the plate without coming into the immediate vicinity of the eater. E.g. force sensors made of pressure-sensitive foil inserted into foil-like force arms can be used to this end. Scales which are easy to transport and are relatively inconspicuous in use can be produced in this manner.

Alternatively, almost point force sensors can also be provided in contact points of the scales. When using piezoelectric actuators, this results in scales with high measuring accuracy.

The scales can also have an evaluation unit with a substance data base. Measuring results can then be converted directly into desired variables, e.g. volume or energy content.

Coupling to external computers is furthermore provided for, e.g. in order to feed measuring results to the computers or to maintain data provided in the scales.

Two embodiments of the invention will now be described in more detail with reference to the accompanying drawings, in which:

Figures 1 to 3 are three-way views of a first set of scales according to the invention in the collapsed state;

Figure 4 shows the scales of Figures 1 to 3 in the unfolded stated, ready for operation;

Figure 5 shows the scales of Figure 4 with a plate placed thereon;

Figures 6 and 7 show another set of scales according to the invention, and

Figures 8 and 9 show another set of scales according to the invention.

Figures 1 to 3 are three-way views showing a set of scales 1.

The scales 1 are composed of a base 2 and two supporting arms 3 and 4 rotatably mounted on the base 2. The supporting arms 3, 4 are pivotably secured to the base 2 by means of pivot axes 5, 6 extending perpendicularly to the direction of the extent of the supporting arms 3, 4. Figure 4 shows the scales 1 with supporting arms 3, 4 pivoted away from the base 2.

Strip-shaped force transducers 7, 8 and 9 are provided on the top surface of the supporting arms 3, 4 and of the base 2. The force transducers 7, 8 and 9 can be in the form of, e.g. a pressure foil or deformation-measuring devices, in which mechanical deformation is converted into a corresponding electric signal.

An electric evaluation circuit not shown here is provided in the interior of the base 2, adds up the forces measured by the force transducer 7, 8 and 9 and indicates the result on a display 10 provided on the base 2. A reset button 11 is mounted on the base 2 for resetting the state of the scales.

As will be seen most clearly in Figures 1 to 3, the scales 1 take up only a little space in the collapsed state, i.e. when the supporting arms 3, 4 are pivoted against the base 2.

Figure 5 shows the scales 1 of Figures 1 to 4 in a state in which they are loaded by a plate 12 shown here by means of broken lines. As will be seen particularly clearly from this view, a base ring 13 of the plate 12 loads the force transducers 7, 8 and 9 at contact points 14, 15 and 16. The contact forces measured there are added together and indicated on the display 10.

As will furthermore be particularly clear from this view, the plate 12 stands stable on the three contact points 14, 15 and 16 so that cutting and eating is also possible on the plate 12. The base 2 projects only a little beyond the edge 12 of the plate, as a result of which it is only accessible to the user of the plate 12. The presence of the scales 1 under the plate 12 is almost invisible to onlookers.

Figure 6 shows another set of scales 20 with a base 21 and only one single pivot arm 22 which is pivotable relative to the base 21 by means of a pivot axis 23 extending substantially perpendicularly to the direction of the extent of the base 21 or the pivot arm 22. Respective line force transducers 24 and 25 are provided in the region of the pivot arm 22 and the base 21.

Figure 7 shows the scales 20 of Figure 6 in the ready-to-use state with a plate 26 placed thereon, resting on the force transducers 24 and 25 by means of a base ring 27. It thus contacts them at contact points 28, 29, 30 and 31.

The weight measured by the force transducers 24 and 25 is indicated on a display 32 provided at an end of the pivot arm 22 remote from the pivot axis 23. A reset button 33 serves to actuate the scales 20.

In a variant of the scales 20 according to the invention not shown here, the weight measured by the force transducers 24 and 25 is indicated on a display 32 provided in the region of the end of the pivot arm 22 situated at the axis of rotation 23.

Figures 8 and 9 show another set of scales 20 similar in design to the scales 20 of Figures 6 and 7. Identical components have been designated by the same reference numerals.

The scales 20 have force-measuring supports 34, 35 and 36 which take over the function of the force transducers 24 and 25 of the scales 20 of Figures 6 and 7. One force-measuring support 34 is mounted in the region of the pivot axis 23, while the other two force-measuring supports 35 and 36 are mounted at the end of the base 21 or at the end of the pivot arm 22, as will be seen most clearly in Figure 8.

In a variant of the scales 20 according to the invention not shown here, the weight measured by the force transducers 24 and 25 is indicated on a display 32 provided in the region of the end of the pivot arm 22 situated at the axis of rotation 23.

Figure 9 shows the scales 20 of Figure 8 in the ready-to-use state with a plate 26 placed thereon, resting on the force transducers 24 and 25 by means of a base ring 27. It thus contacts them at contact points 28, 29, 30 and 31.

The sum of the forces due to weight determined by the force-measuring supports 34, 35 and 36 is indicated on the display 32.

LEGEND

1 scales
2 base
3 supporting arm
4 supporting arm
5 pivot axis
6 pivot axis
7 force transducer
8 force transducer
9 force transducer
10 display
11 reset button
12 plate
13 base ring
14 contact point
15 contact point
16 contact point
20 scales
21 base
22 pivot arm
23 pivot axis
24 force transducer
25 force transducer
26 plate
27 base ring
28 contact point
29 contact point
30 contact point
31 contact point
32 display
33 reset button
34 force-measuring support
35 force-measuring support
36 force-measuring support

CLAIMS

1. Scales comprising an electric force transducer for measuring a force due to weight acting on a contact surface for the scales as a result of an article placed on the scales situated in the ready-to-use state and an indicating device (10; 32) for indicating the force due to weight, characterised by at least two force transducers (21, 22; 2, 3, 4) which can each be acted upon independently of one another by a force due to weight and are connected together in such a manner that one force transducer (21; 2) is movable relative to the other (22; 3, 4) in such a manner that it is rotatable about at least one axis of rotation (23; 5), the axis of rotation (23; 5) extending substantially perpendicularly to the contact surface in the ready-to-use state of the scales.

2. Scales according to claim 1, characterised by three force transducers (2, 3, 4) which can each be acted upon independently of one another by a force due to weight and are connected together in such a manner that at least one force transducer (2) is movable relative to the other force transducers (3, 4).

3. Scales according to at least one of the preceding claims, characterised in that the force transducers are arranged in the region of supporting arms (21, 22; 2, 3, 4) movable relative to one another.

4. Scales according to claim 3, characterised in that the supporting arms (21, 22; 2, 3, 4) are rotatable relative to one another about at least one axis of rotation (23; 5) extending substantially perpendicularly to the direction of the principal extent of the supporting arms (21, 22; 2, 3, 4).

5. Scales according to claim 3 or claim 4, characterised in that the supporting arms (21, 22; 2, 3, 4) are collapsible.

6. Scales according to one of the preceding claims, characterised by a reset button for aligning the scales in an initial state and/or for switching on the scales.

7. Scales according to one of the preceding claims, characterised by line force transducers (7, 8, 9).

8. Scales according to one of the preceding claims, characterised by essentially point force transducers (34, 35, 36).

FIG 1

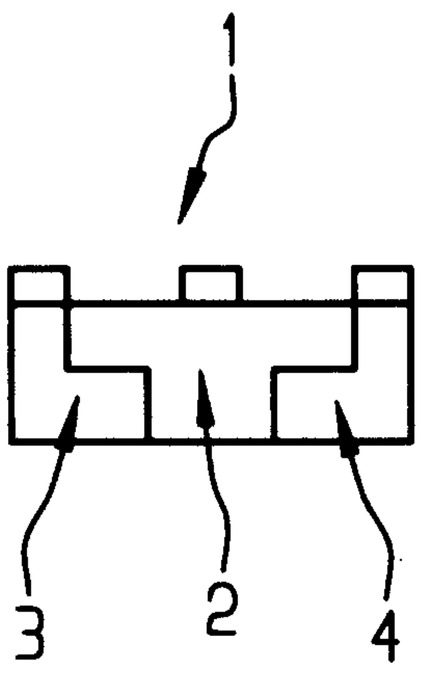


FIG 2

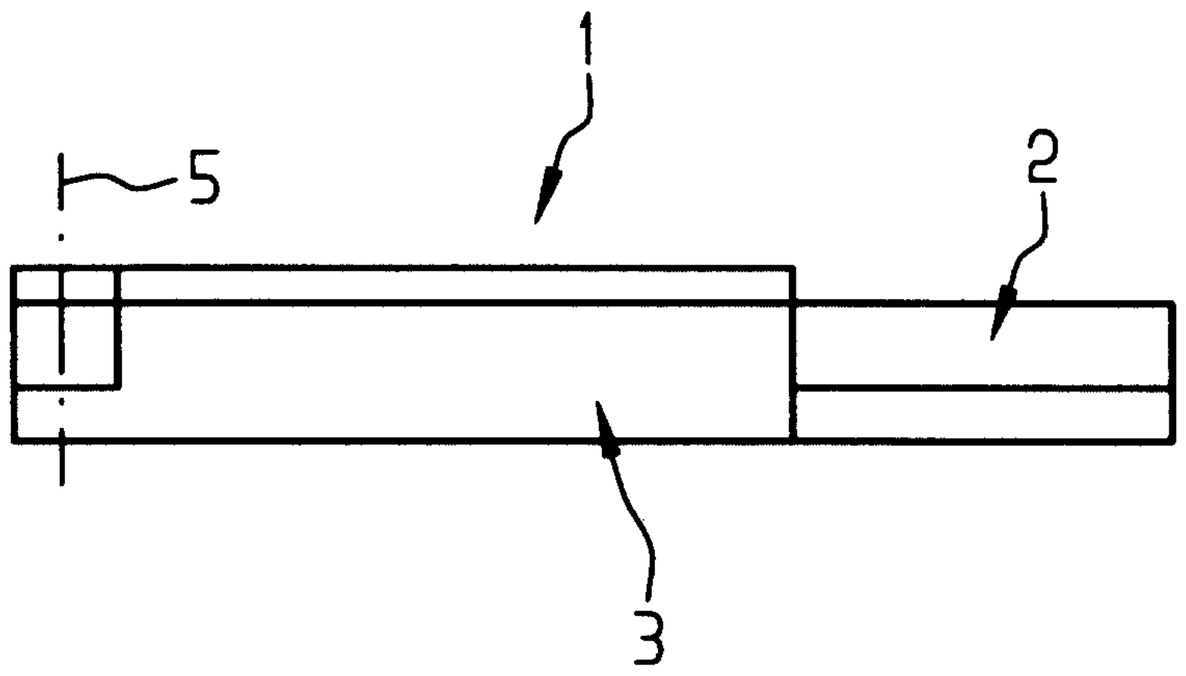
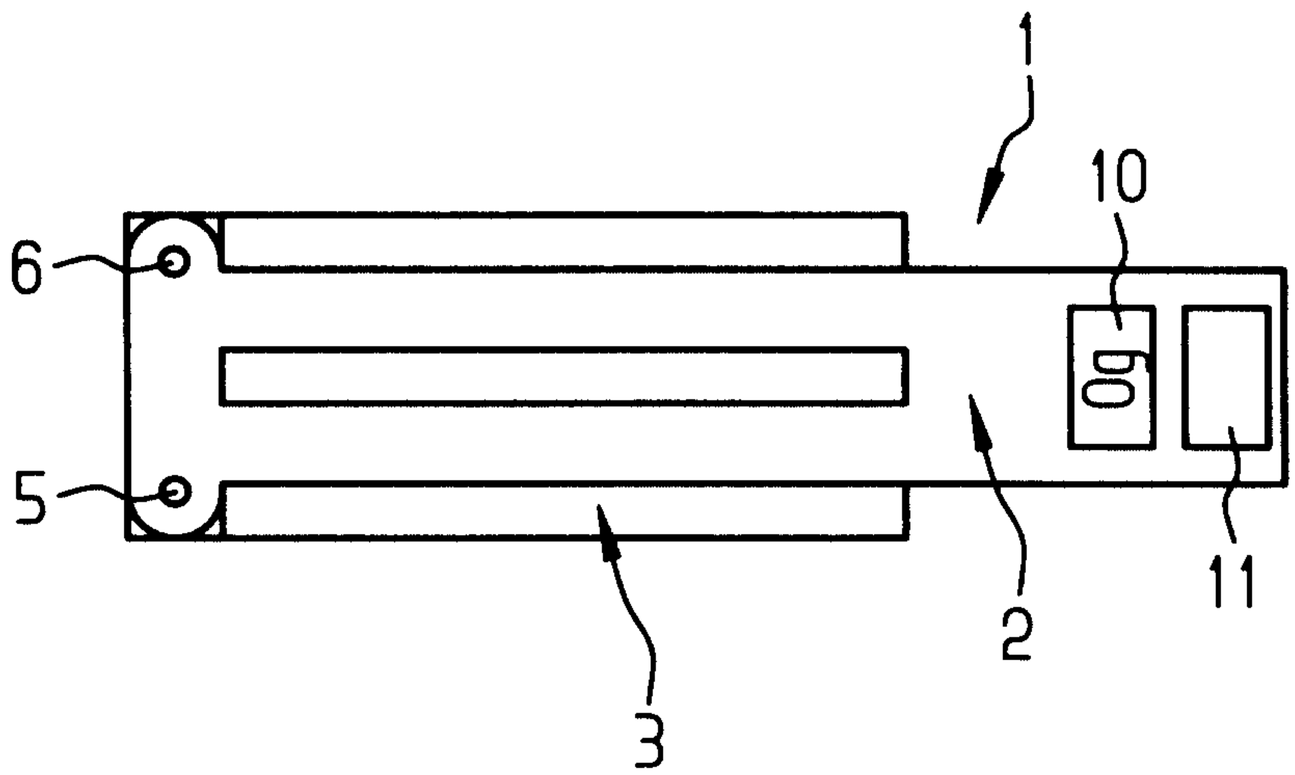


FIG 3



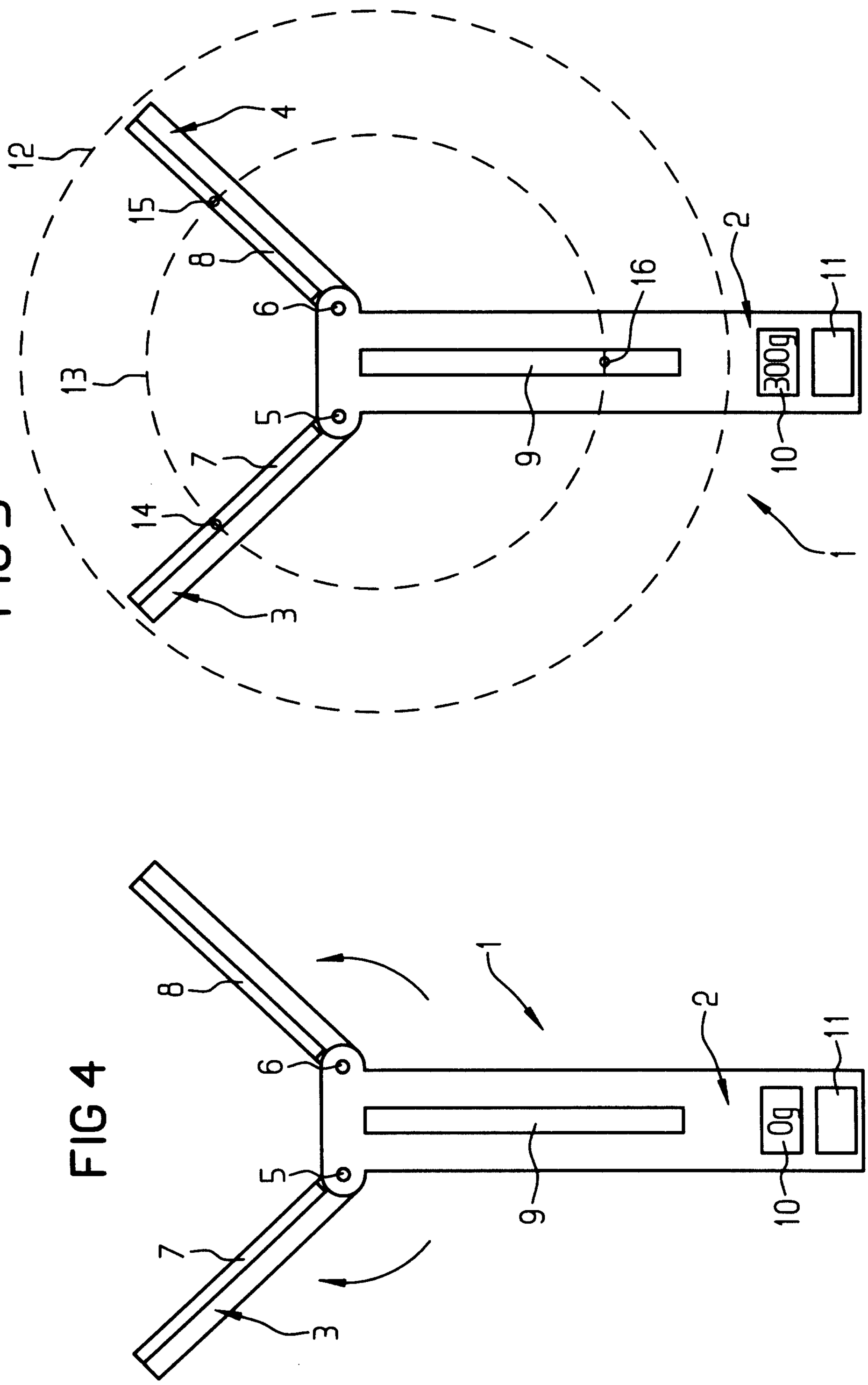


FIG 5

FIG 4

FIG 6

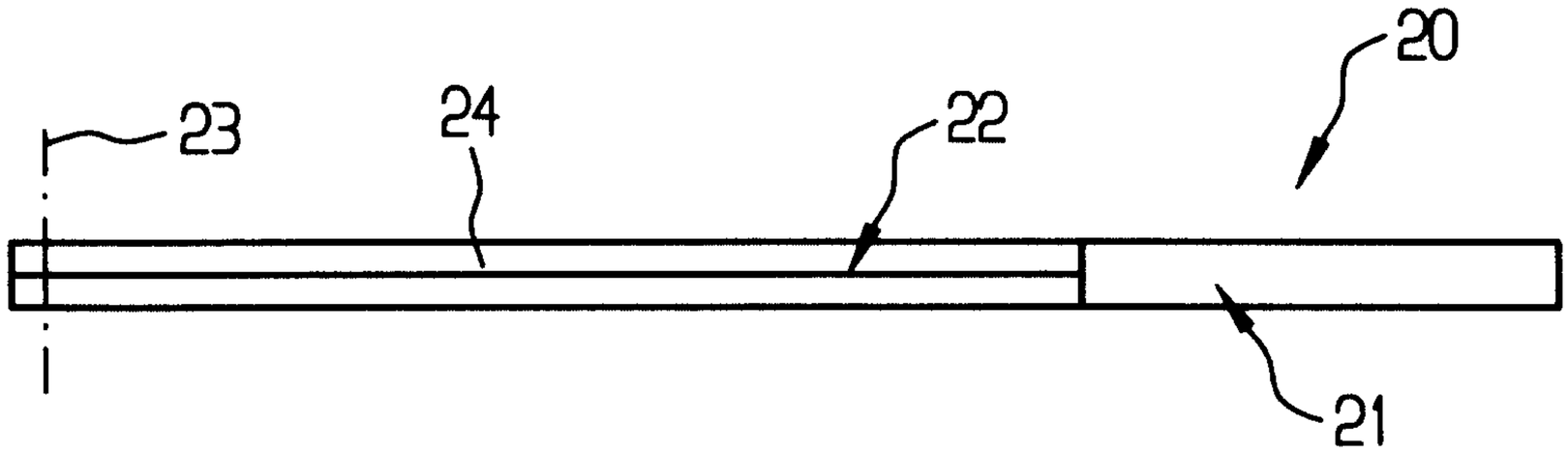


FIG 7

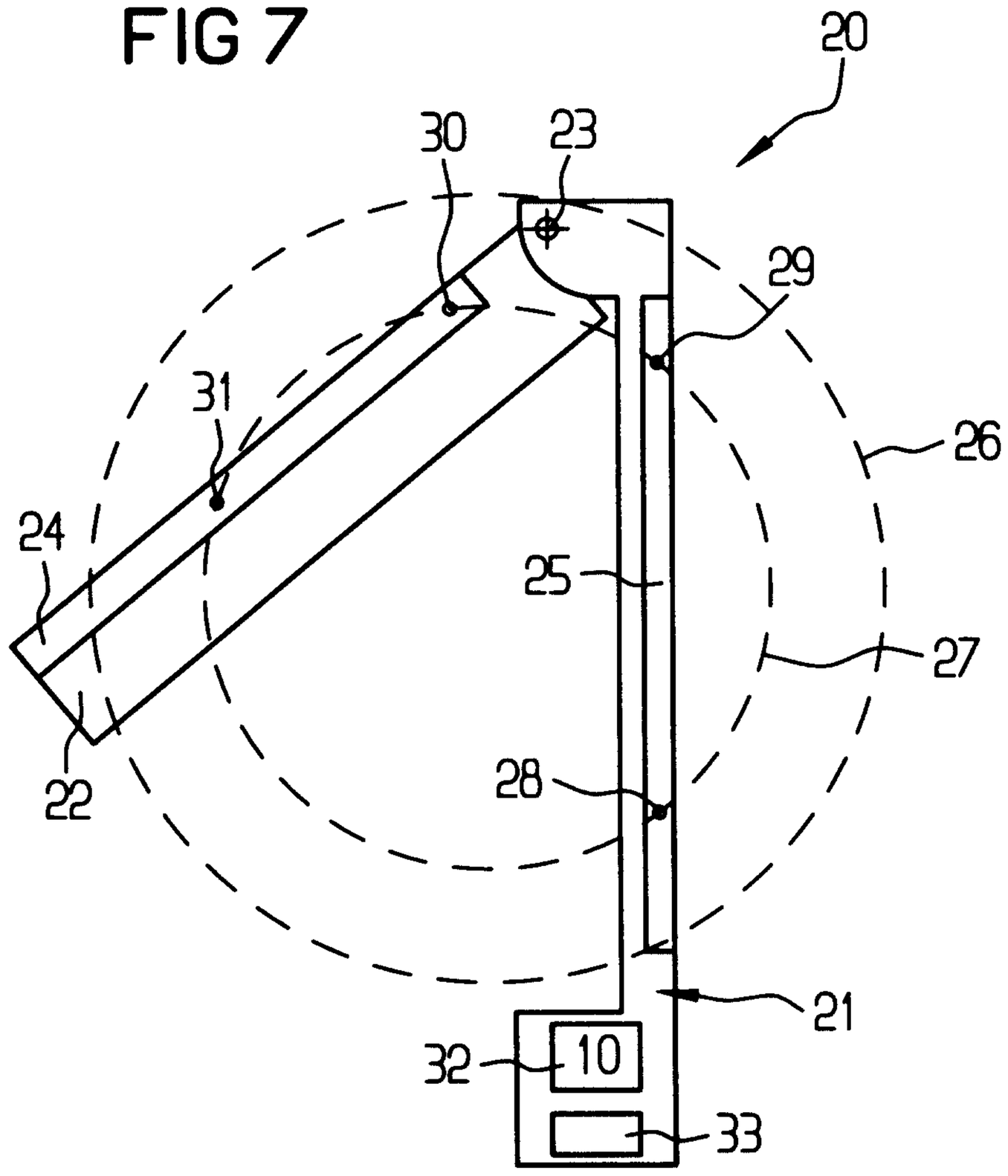


FIG 8

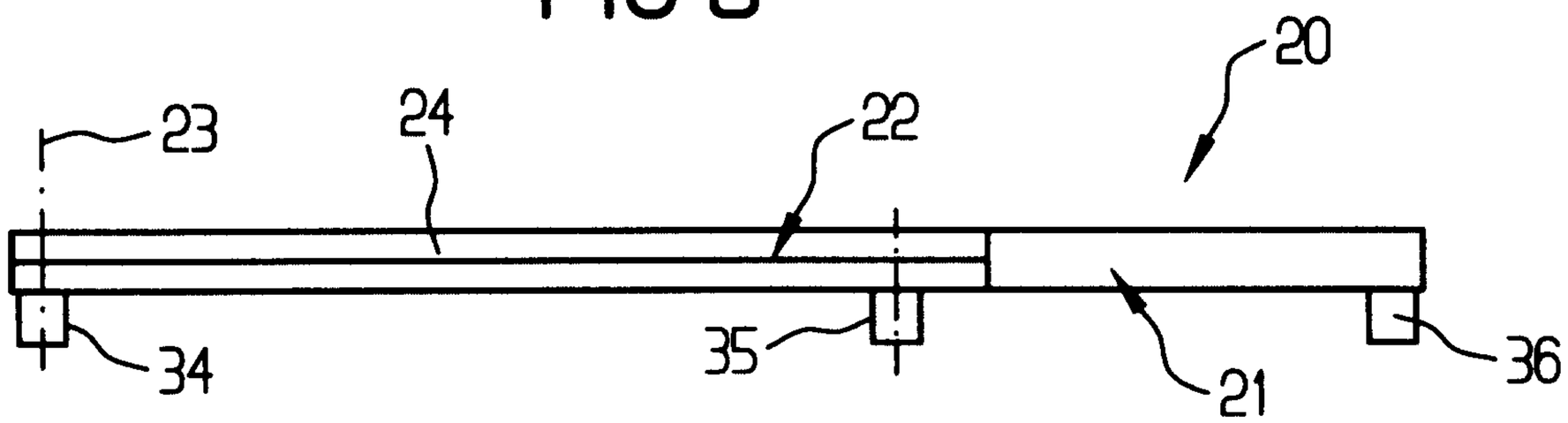
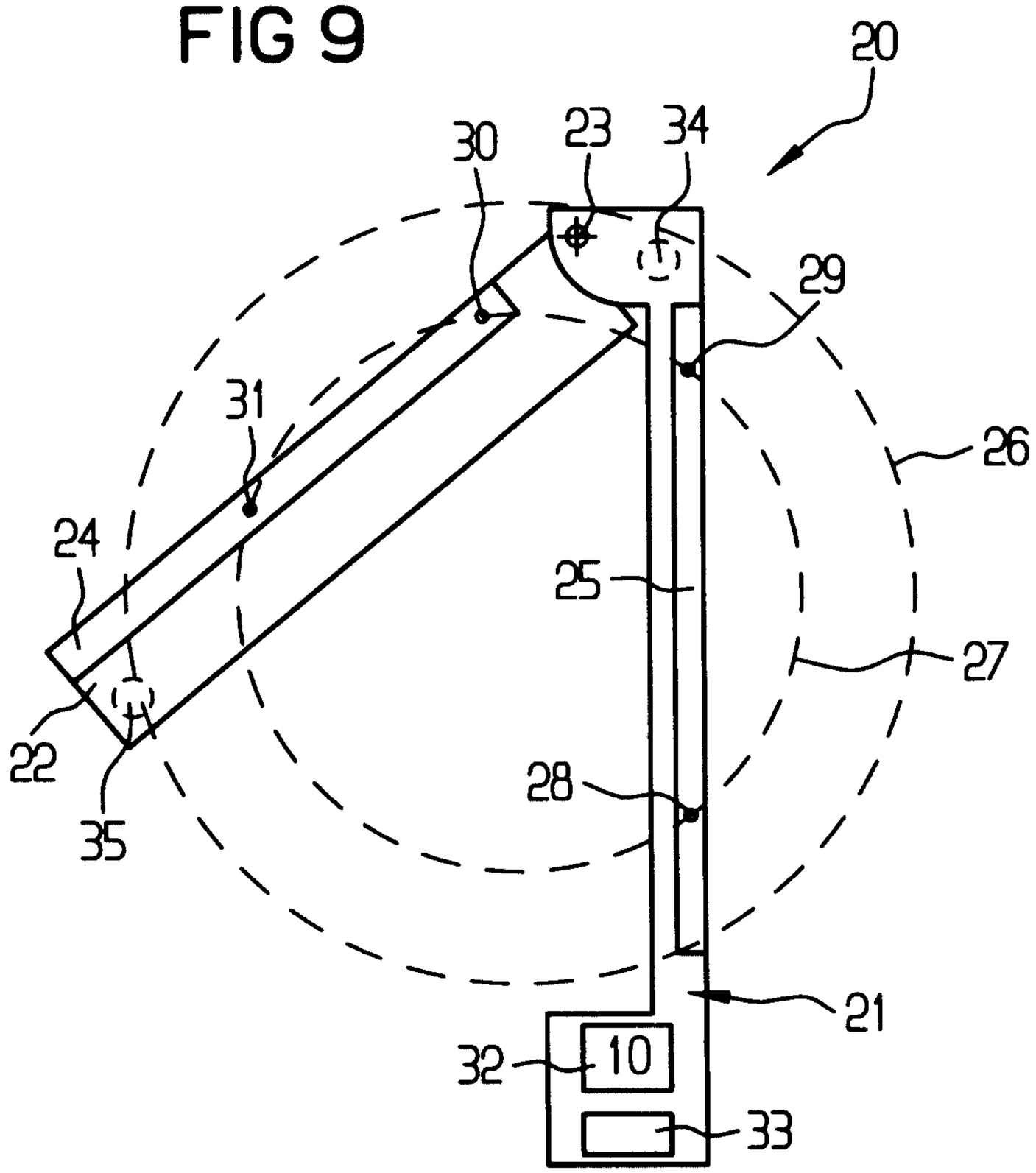

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FIG 9


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