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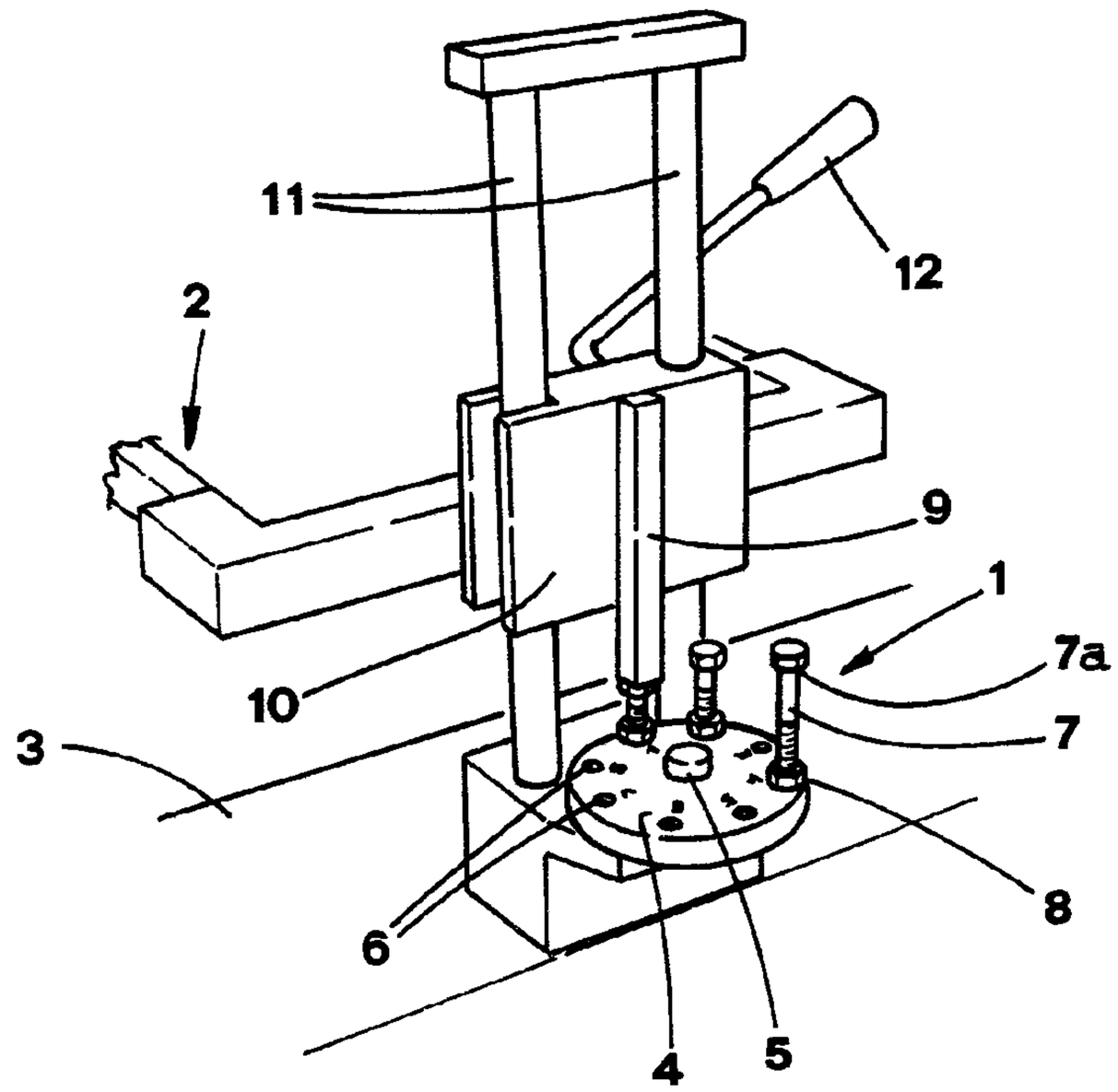
(54) Title: METHOD AND DEVICE FOR ADJUSTING THE POSITION OF A MOVABLE MEMBER WITH RESPECT TO A STATIONARY DATUM POINT



(57) Abrégé/Abstract:
A method for adjusting the position of a movable member with respect to a stationary datum surface provides for fastening a plurality of stop stems to the datum surface. Each stem is different in length from the others. A sliding support carries the movable member whose position is to be adjusted, and is mounted on a guide perpendicular to the datum surface. The sliding support is to be moved until it goes in abutment on a selected stem so as to take a position in which a predetermined distance is set between the movable member and the datum surface.

ABSTRACT OF THE DISCLOSURE

A method for adjusting the position of a movable member with respect to a stationary datum surface provides for fastening a plurality of stop stems to the datum surface. Each stem is different in length from the others. A sliding support carries the movable member whose position is to be adjusted, and is mounted on a guide perpendicular to the datum surface. The sliding support is to be moved until it goes in abutment on a selected stem so as to take a position in which a predetermined distance is set between the movable member and the datum surface.

METHOD AND DEVICE FOR ADJUSTING THE POSITION OF A MOVABLE MEMBER WITH RESPECT TO A STATIONARY DATUM POINT

FIELD OF THE INVENTION

The present invention relates to a device used for adjusting the position of movable working members with respect to stationary datum surfaces.

BACKGROUND OF THE INVENTION

It is known that the need to locate a movable working member to different operating positions is present in many technical fields, and particularly in the construction of automatic machines.

For instance, and as a mere example, this need is evident when the position of a restraining member must be adjusted in accordance with a different dimension of an article to be restrained, for instance upon a guide along which the article is being transported to be packed.

This is one of the main problems faced by users of automatic packaging equipment, and is generally referred to as the change-over operation. Change-over usually involves substitution and adjustment of parts which are to be adapted to match the new size of the products to be handled.

At present, this problem is generally solved in an empiric way, by releasing locking means of the movable working member, and then moving the working member to the desired position where it is locked again.

It is well known that the time required for size change-over and time for production change-over are in fact rather different from each other. The reason of this difference can be found in the necessity of fine tuning the adjustment of these movable working members, which requires a considerable number of manual operations carried out after initial positioning of the working members.

Specifically, the procedure requires an operator to first move each working member, such as a guiding plate or a flap folding cam, or a magazine support, to the new position that should match the new container size.

Obviously, this proceeding is unsatisfactory as far as both productivity and precision are concerned.

Releasing and re-locking each movable working member requires a long working time, because of the necessity of finding a correct operating position with reference to the stationary datum surfaces.

The working members are never reset to the same position after the change back to a series of articles having the same shape and size are processed, because the accuracy of these positions rely on the operator's experience and ability.

To avoid incorrect positioning, a package is typically set-up at each movable working member, step by step, in order to check the position. According to the result, the position of each working member is adjusted again to accommodate slight displacements. This operation is carried out as many times as it is required to obtain perfect operation of the working members.

Recently, a number of actuating means have been used, which are connected to a central unit and designed for automatic displacement of the movable working member.

When the size of the articles being processed is changed, then a program is run which gives the machine preset instructions so as to adjust the position of the movable working member with reference to a stationary datum surface, by means of the actuating means just described.

It is clear that such a solution is rather expensive not only for fitting the device with the plural actuating means on the machine, but also for maintenance.

The device requires special fittings and a proper interface device set between the central unit and the actuating means, and these require very specialized personnel for maintenance.

Notwithstanding the complexity of this assembly, relocation of the movable working member is never as precise as it should be, because the actuating means are not able to make the movable working member take the exact old position again after they have been released and moved due to a size change over.

Accordingly, the above mentioned solution requires:

extensive electronic equipment with relatively high cost and problems of maintenance;

complex design of the machine to integrate these devices;

highly skilled operators;

long time for size change-over due to the fact that automatic adjustments must be carried out only after all replacements have been performed, for safety reasons, and fine tuning is not completely eliminated.

When manufacturers have attempted to make quick change-over by relying on actuated devices, they found that this solution is still time consuming, requires technological back-up and, in most cases such systems are rather expensive, in that they require skilled or experienced operators to manage the need of addressing instructions to the controllers.

Furthermore, to eliminate fine tuning requires additional check devices, to be sure that the operative members have been properly set.

SUMMARY OF THE INVENTION

The object of the present invention is to provide a method that allows for a quick and precise adjustment of the movable member position with respect to a stationary datum point, without employing specialized personnel or requiring the help of sophisticated devices or apparatuses.

Another object of the invention is to provide a device that is simple, quick in working and with a low production cost, also considering the result obtained by using it.

What above is obtained by means of a method for adjusting the position of a movable working member with respect to a stationary datum point, said method including:

connecting a plurality of stop means to a datum surface, said stop means having different length;

moving a sliding support, said sliding support carrying the movable member whose position is to be adjusted and being mounted on guiding means perpendicular to said datum surface, to a position in which it is in abutment on one of said stop means; and

blocking said sliding support in this position, so that a predetermined distance is set between said movable member and said datum surface.

The above mentioned method is carried out by means of a device for adjusting the position of a movable working member with respect to a stationary datum point, said device including:

a plurality of stop means connected to a datum surface, these stop means being different in length from one each other;

a sliding support that supports a movable member whose position is to be adjusted, said sliding support being mounted on guiding means which are perpendicular to said datum surface, so that when said sliding support is in abutment on said stop means, and blocked therein, a predetermined distance is set between said movable means and said datum surface.

According to an aspect of the present invention there is provided a method for adjusting the position of at least one movable working member with respect to a stationary datum surface, in a packaging machine, the method comprising providing the packaging machine having the at least one working member and a device for adjusting the position of the working member during a change-over operation, for adjusting the working member to accommodate a package of a particular size with respect to the stationary datum surface, providing the device with a plurality of selectable stop means, connected to the stationary datum surface, the stop means being different in length from one another, the length corresponding to a position of the working member necessary for working the package of a particular size, providing the device with a sliding support for supporting the working member whose position is to be

adjusted, the sliding support being mounted on guide means which are adjacent to the stationary datum surface, placing the sliding support in abutment with a selective stop means to maintain a predetermined distance between the working member and the stationary datum surface and fixing the sliding support in this position until the next changeover operation so that the predetermined distance is maintained between the working member and the datum surface.

BRIEF DESCRIPTION OF THE DRAWINGS

The characteristic features of the invention are highlighted in the following description, with particular reference to the drawings attached hereto, which show various embodiments of the device that incorporates the subject method, and in particular:

- Fig. 1 shows a perspective view of a first embodiment of the adjustment device that is the subject of the present invention;
- Fig. 2 shows a schematic side view of a movable working member whose position can be adjusted by means of the subject device;
- Figs. 3, 4, 5, 6 and 7 are respectively perspective views of further embodiments of the subject device.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to Figs. 1 and 2, reference numeral 1 indicates the device that allows to adjust the position of a movable working member 2 with respect to a stationary datum surface 3.

The adjustment device 1 comprises a rotary disk plate 4 that can rotate upon an axis perpendicular to the datum surface 3.

The disk plate 4 features a plurality of peripheral equispaced recesses 6 which are aimed to receive and hold a series of stop means 7 having different length.

These stop means 7 include threaded stems having different length which are blocked to the disk plate 4 by respective nuts 8.

A sliding support 10 is slidingly set on vertical guides 11, which includes a pair of uprights, and equipped with conventional locking means which can be tightened and released through a lever 12. The sliding support 10 also features a prominence 9.

The head 7a of a selected stem 7 is located in the path of the prominence 9 of the sliding support 10, so as to strike the prominence and stop the sliding support, thus setting the position of the working member 2 that is fastened thereto.

In the example shown herein the working member 2 includes a bar 13 that has the task of restraining articles 14 which are moving along a feed line under the action of holding means 15, e.g. in a cartoning machine or the like.

When the size of the articles 14 undergoing operation is changed, the bar 13 must be moved to a position corresponding to the height of the articles, as indicated by the arrow A in Fig. 2.

To do this, after having released the sliding support 10 by acting on the lever 12, the sliding support 10 must by raised up and the disk plate 4 must be rotated until the desired stem 7 is located right under the prominence 9.

Advantegeously, the disk plate 4 is equipped with elastic click means designed for the definition of the various positions

thereof.

The sliding support 10 is then lowered so that the prominence 9 goes to rest on the head 7a of the selected stem 7 under the action of gravity.

The sliding support 10 is locked again in this last working position. Adjustment of the position of the movable working member 4 is therefore very quick and easy.

In particular the device allows for univocally individuating the desired postion for the working member, by means of the abutment of the prominence 9 on the respective stem 7.

Moreover, it is possible to change in an almost continuous way, within a predetermined range, the distance of the movable working member 2 from the datum surface 3, by providing a suitable series of stems 7.

A different embodiment of the adjustment device is shown in Fig. 3, where the guides 11 are replaced with a plate 16 arranged vertical on the datum surface 3.

The plate 16 features a slot 17 and a slide moves on the plate. The slide can be fixed to the plate by means of a screw that passes through the slot.

An arm 19 extends horizontally from one side of the slide and passes beside a side of the plate 16. The arm 19 goes in abutment on the head 7a of a selected stem 7 borne by the disk plate 4.

Fig. 4 shows a further embodiment of the subject device in which a plate 16, similar to the plate previously described, has a longitudinal slot 17.

In this case the sliding support 10 has a pin 20 axially protruding from the screw 18, so as to result perpendicular to the slot 17. The pin 20 goes in abutment on the head of a selected stem 7.

The plate 16 guides an horizontal tab 21 that is made integral with the sliding support 10 and that forms the movable

member 2 whose position is to be adjusted.

The embodiment shown in Fig. 5 includes a base 22 that is In this case the disk plate 4 rotates upon a horizontal axis. After that the disk plate 4 has been rotated up to the desired position, the head 7a of the selected stem 7 results to be in the path of a wing 23 that extends vertically from a bar 24 made integral with the movable member 2.

A horizontal plate 25 extending from the bar 24 features a longitudinal slot 26, and locking means 27, that can be tightened or released by a lever 28, and that pass through the slot 26.

The position of the movable member 2 can be adjusted by moving it horizontally until the wing 23 strikes the head of the selected stem 7, thus fixing the position of the movable member 2 as illustrated hereinafter.

In the example shown in Fig. 6, the stems 7, which are different in length form one another, are supported by a further sliding support 29 that can slide and is guided with respect to the datum surface 3. The stems 7 are fixed to the sliding support 29 by respective nuts 8.

In this case, after unlocking the sliding support 10 that carries the movable member 2, the further sliding support 29 is displaced until the prominence 9 is lined up with the selected stem 7.

Advantageously, the further sliding support 29 is equipped with elastic click means designed to individuate a series of position to be selected.

As already described the sliding support 10 is moved until it goes in abutment on the head 7a of the stem 7 under the action of gravity, and then locked therein.

The last example shown in Fig. 7, comprises one stem 7 only, this stem being fitted to the sliding support 29 and replaceable with other stems having different length.

With this embodiment the position of the movable

member 2 can be adjusted by fitting a stem 7 with the desired length to the sliding support 29. Alternatively, the stem 7 can be removably fitted in a recess made in the datum surface 3.

The method and the device described herein allow for adjusting the position of a movable working member with respect to a datum surface, in a quick and precise way, without the need of sophisticated mechanisms or machines. The adjustment operation is easily carried out without the need of specialized personnel, because of the extreme semplicity that forms the basis of the method.

To make the adjustment operation easier, the stems 7, having differnt lengths, may be painted with different colours or bearing proper numbers, so that each stem can be immediately recognized. The adjustment obtained in this way is extremely precise, and does not depend on the experience and/or skillfulness of the operator.

As a matter of fact, the stop means described above form something like a "mechanical memory" that always ensures a correct positioning. In particular these stop means enable the positioning of movable working members in the same positions for articles having the same size which undergo operations before and after other articles having different size.

If, after that the size of the articles has been changed, a stem 7 must be used for articles having the size of previous articles, then it is possible adantageously to set a nut 76 immediately under the head 7a of the stems, this nut being coloured and the colour being connected to a particular size (the nut is illustrated with dashed line in Fig. 7).

In this way the stem 7 is not changed in case that changing the article size does not require to displace the movable member to a different position, and this happens because the operator can see different colours applied to the nut 7b, each colour corresponding to a predetermined article size.

It is obvious that what has been described above is only illustrative, therefore all possible constructive variants are within the protection of the innovation as claimed in the following.

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

1. A method for adjusting the position of at least one movable working member with respect to a stationary datum surface, in a packaging machine, the method comprising:

providing the packaging machine having the at least one working member and a device for adjusting the position of the working member during a change-over operation, for adjusting the working member to accommodate a package of a particular size with respect to the stationary datum surface,

providing the device with a plurality of selectable stop means, connected to the stationary datum surface, the stop means being different in length from one another, the length corresponding to a position of the working member necessary for working the package of a particular size;

providing the device with a sliding support for supporting the working member whose position is to be adjusted, the sliding support being mounted on guide means which are adjacent to the stationary datum surface;

placing the sliding support in abutment with a selective stop means to maintain a predetermined distance between the working member and the stationary datum surface and fixing the sliding support in this position until the next changeover operation so that the predetermined distance is maintained between the working member and the datum surface.

2. The method of claim 1, further comprising providing a rotatable member, the stop means arranged along the circumference of the rotatable member which has an axis of rotation perpendicular to the stationary datum surface, and, selecting a stop means by rotating the rotatable member such that the selected stop means is placed into a position in alignment with the sliding support for abutment therewith.

3. The method as claimed in claim 2, wherein the rotatable member comprises a disk plate, the disk plate having a plurality of recesses for fitting said stop means therein.

4. The method according to any one of claims 1 to 3, wherein the stop means comprise threaded stems, each stem being threadably set to be different in length from the others and each stem having a related nut for blocking thereof.

5. The method according to any one of claims 1 to 4, wherein the guide means comprise a pair of uprights, and further comprising moving the sliding support along the pair of uprights.

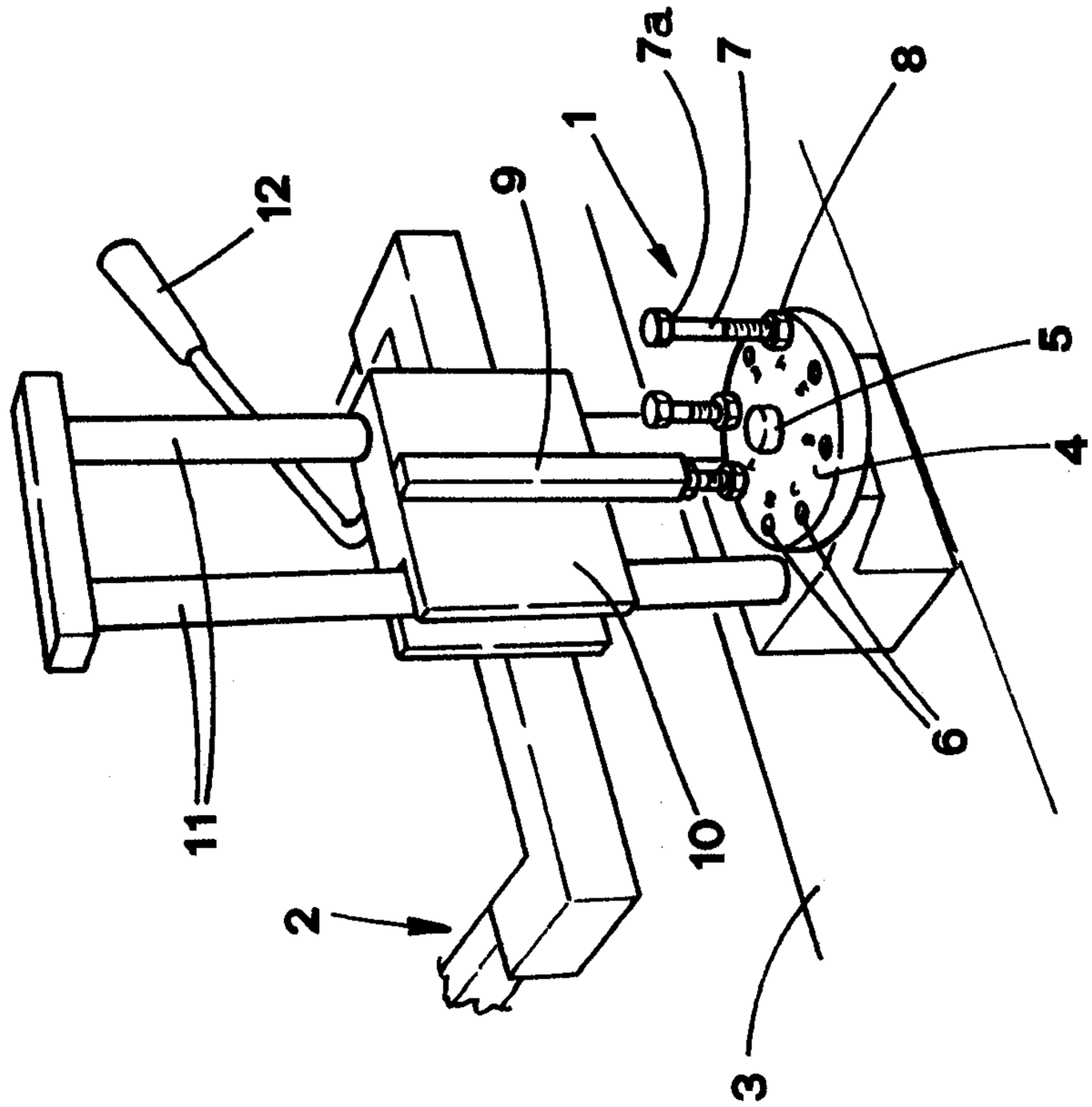


FIG.1

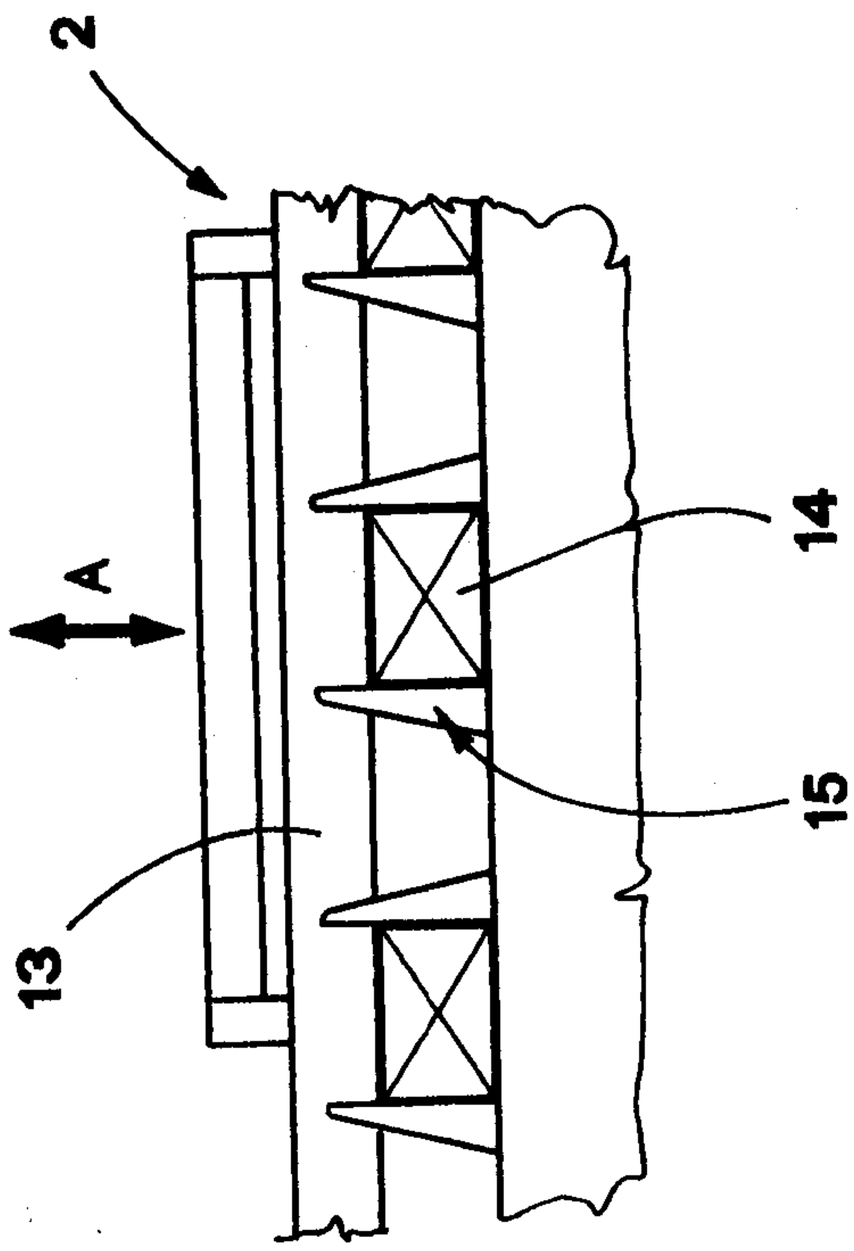


FIG.2

FIG. 3

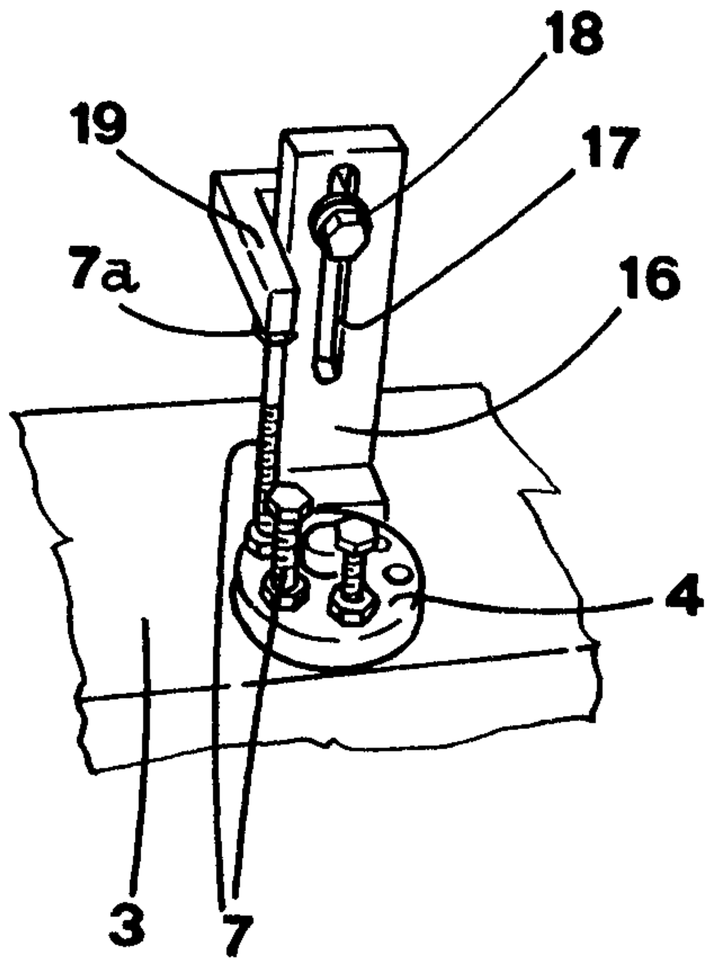
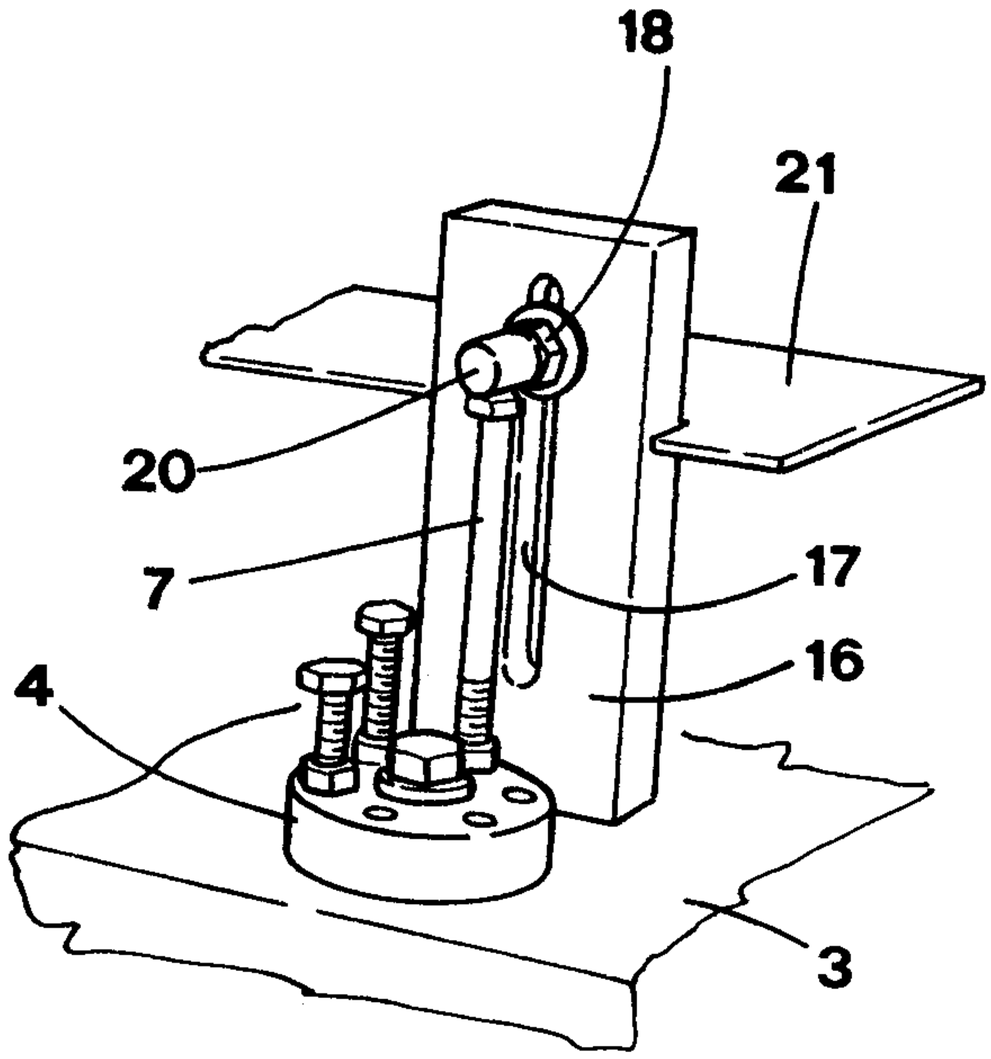


FIG. 4



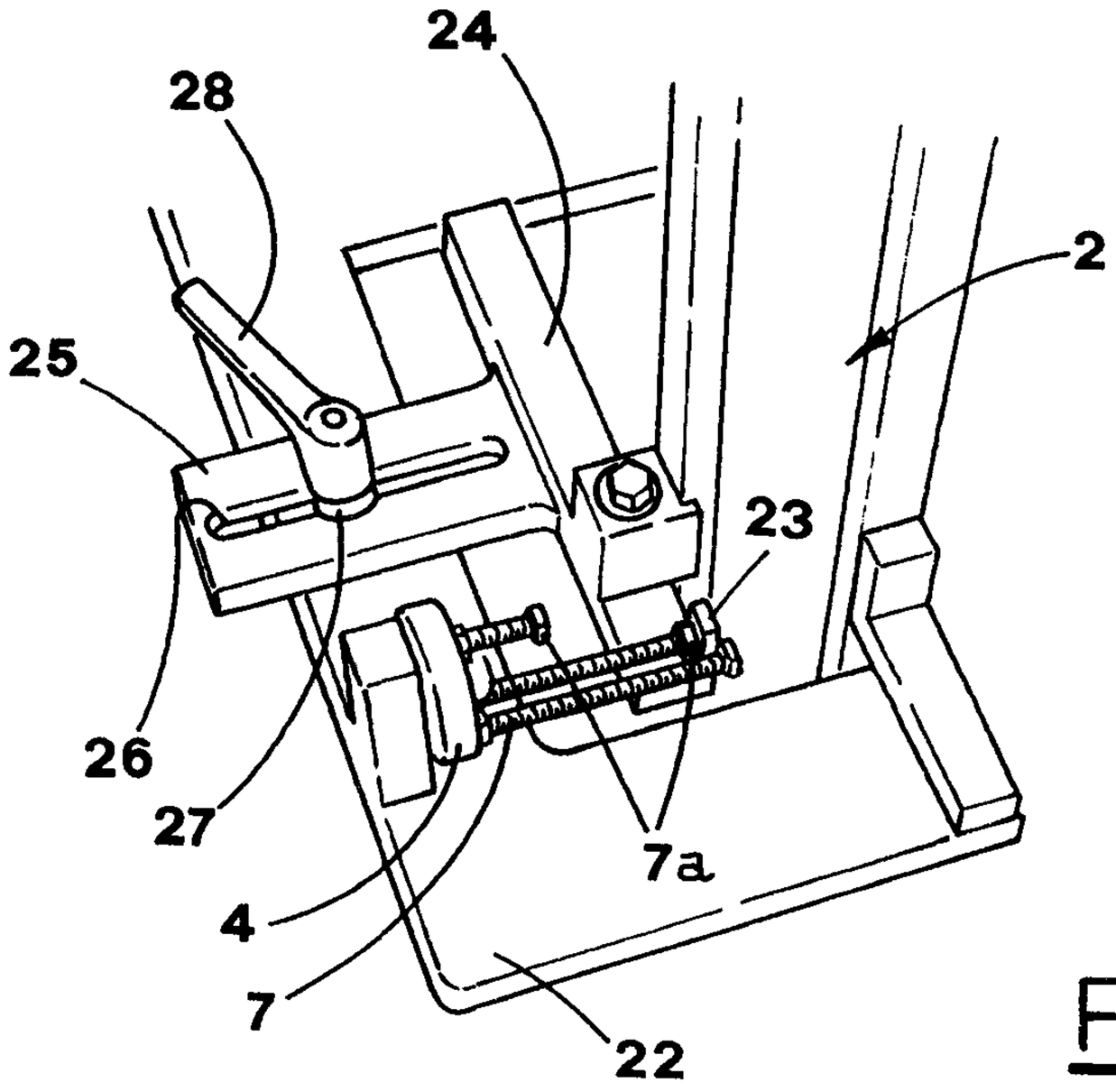


FIG. 5

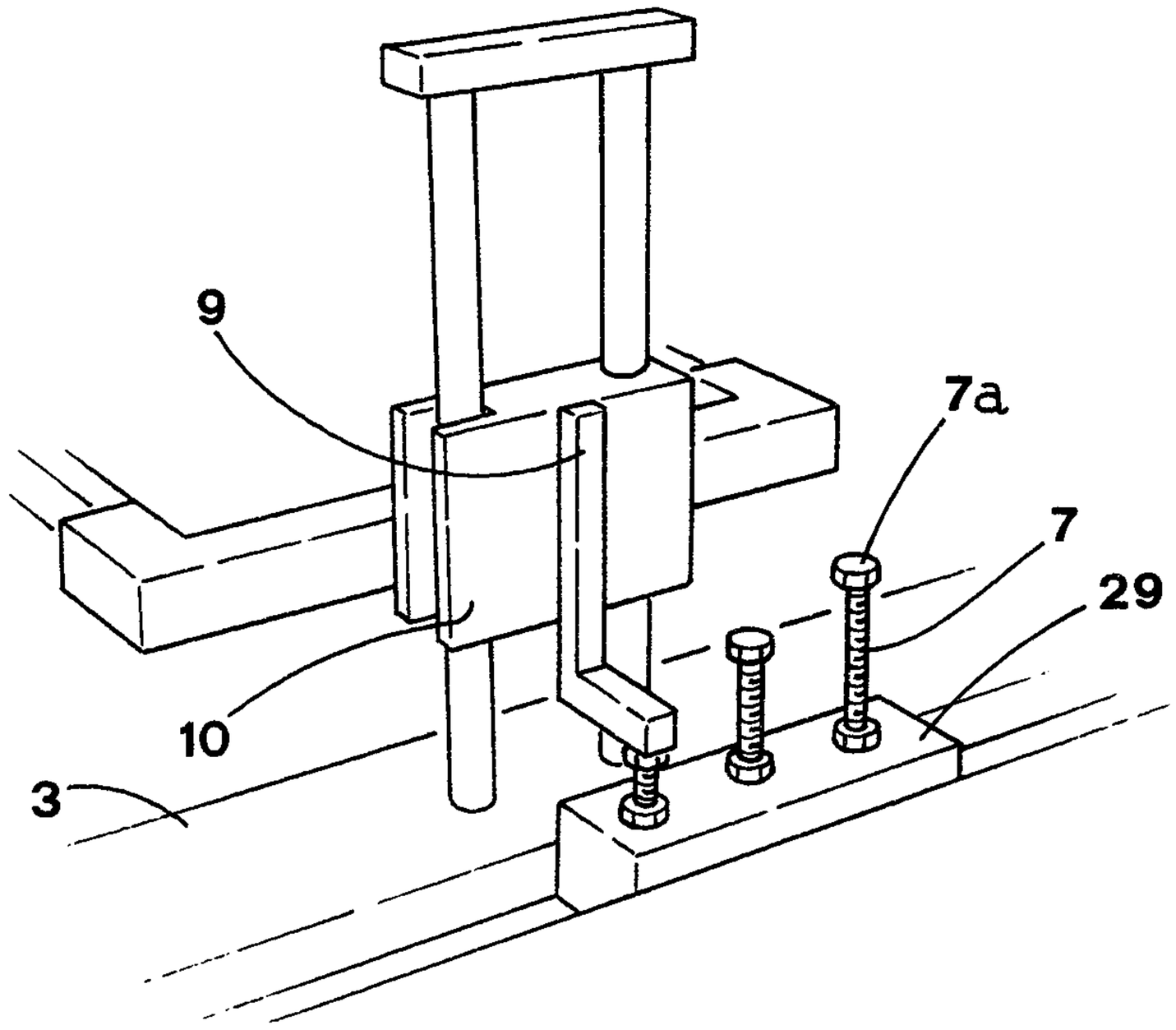
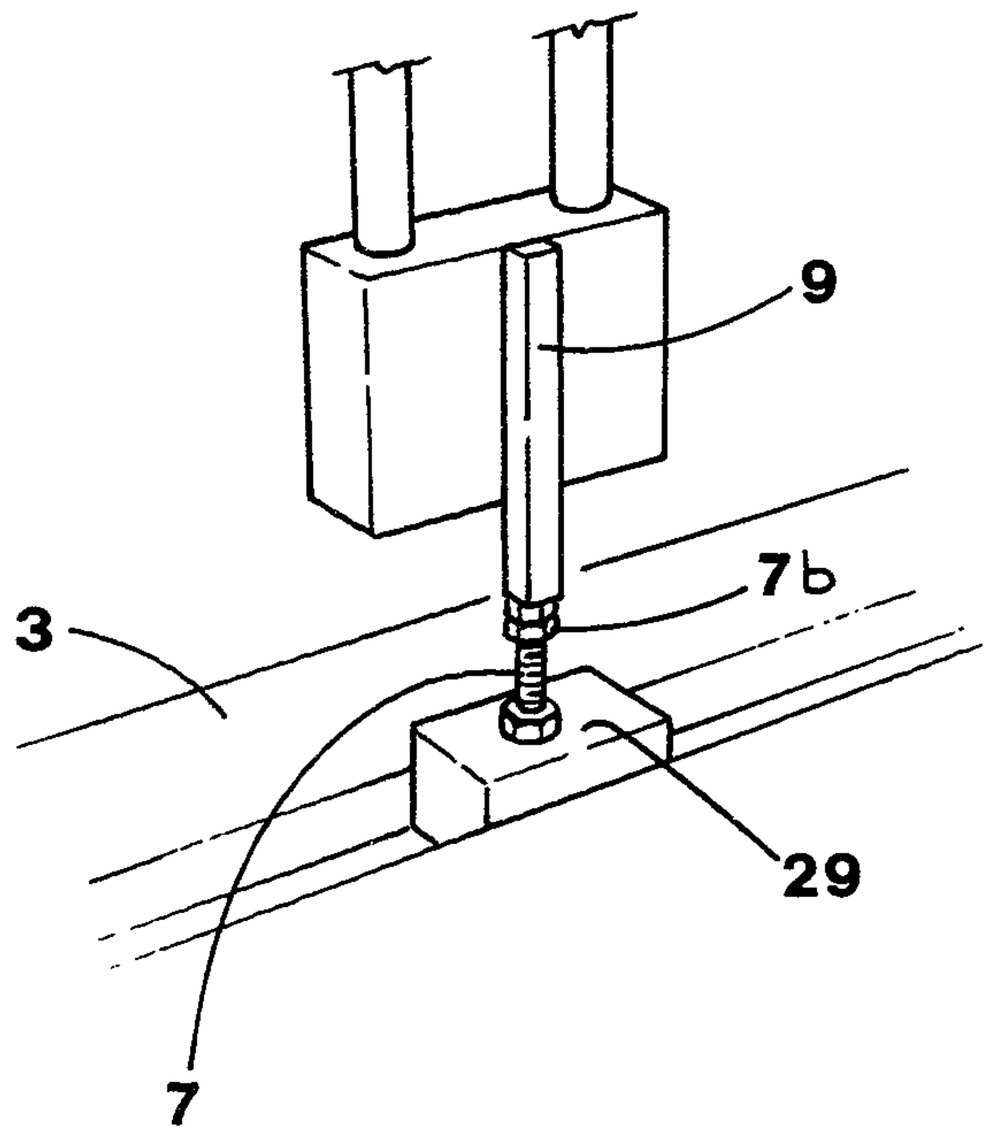


FIG. 6

FIG. 7



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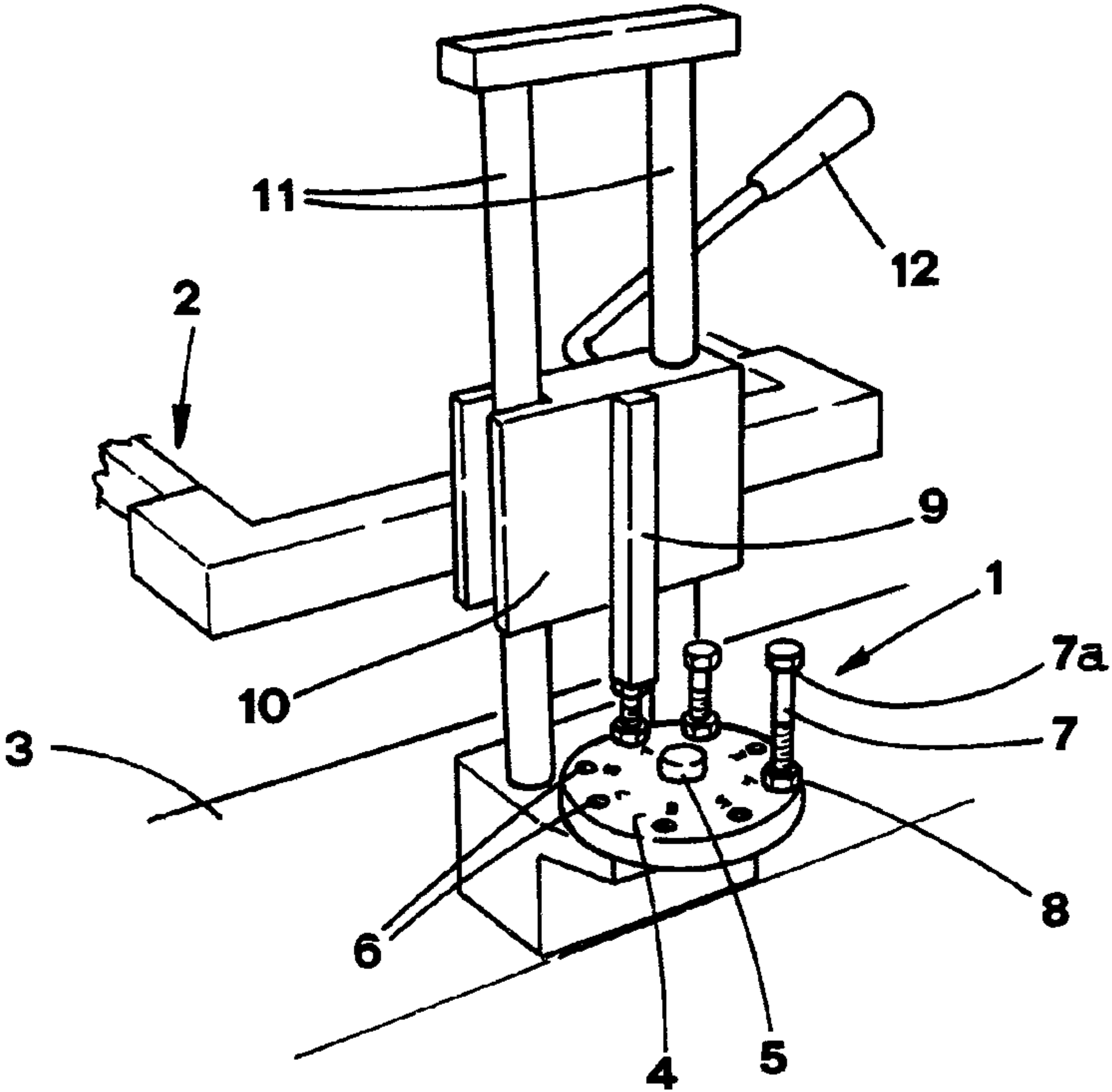
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