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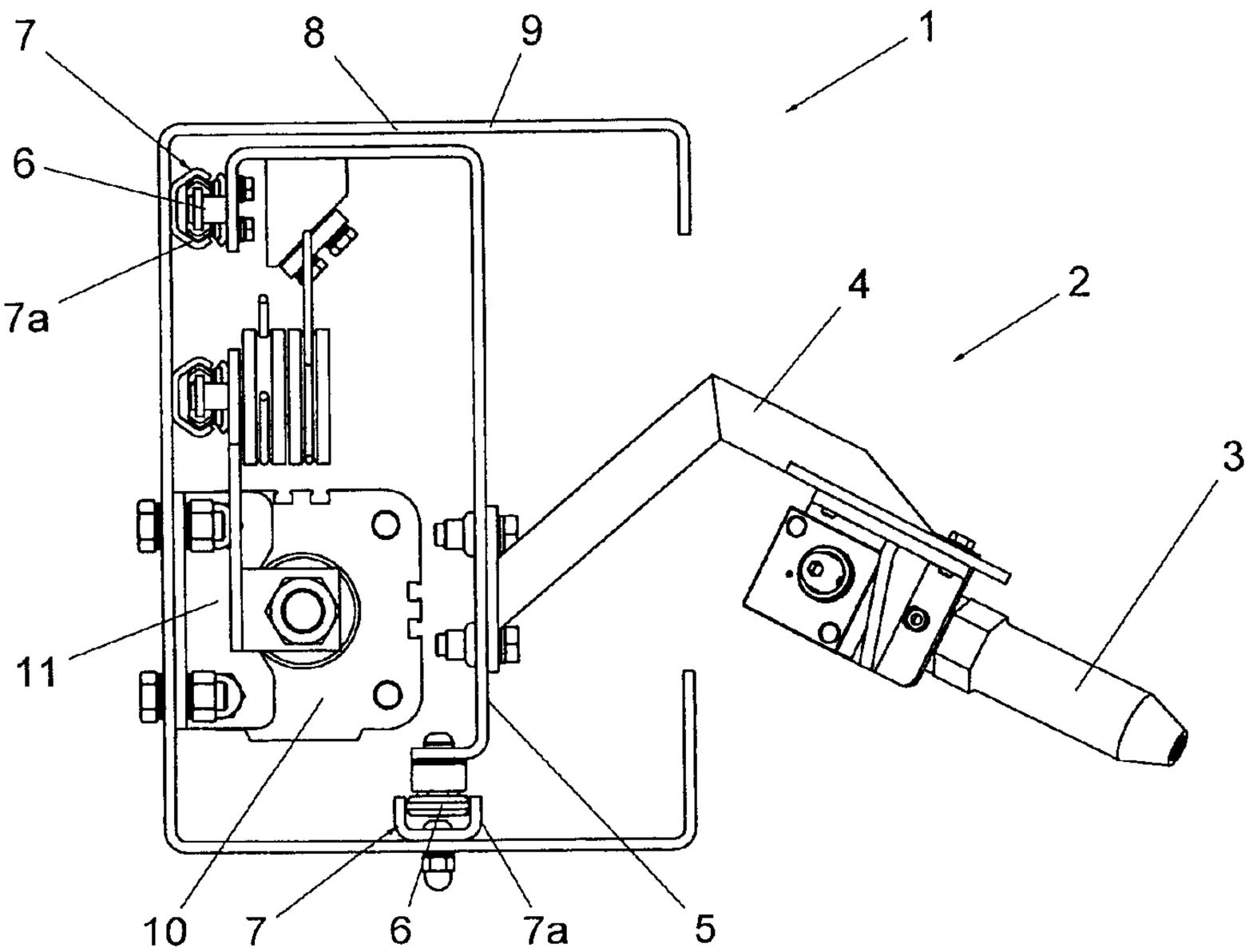
(54) Titre : DECOUPEUR POUR UNE NAPPE FIBREUSE EN MOUVEMENT
(54) Title: SLITTER FOR A RUNNING FIBROUS WEB



(57) Abrégé/Abstract:
The invention relates to a slitter (1) for a running fibrous web having a positioning apparatus (18) which is assisted by drawing means for at least one cutting device (2), preferably a cutting blade or a high-pressure water-jet cutting head. So as to design the slitter (1) in such a way that it can be actuated simply and takes up a small amount of space laterally next to the running fibrous web, in order to realize at least one movement direction of the cutting device (2), the positioning apparatus (18) which is assisted by drawing means has at least one fixed deflection roller (13, 13v, 13r) and at least one floating deflection roller (14, 14v, 14r, 15, 15v, 15r) for the drawing means (12, 12v, 12v', 12r, 12r').

Abstract

The invention relates to a slitter (1) for a running fibrous web having a positioning apparatus (18) which is assisted by drawing means for at least one cutting device (2), preferably a cutting blade or a high-pressure water-jet cutting head. So as to design the slitter (1) in such a way that it can be actuated simply and takes up a small amount of space laterally next to the running fibrous web, in order to realize at least one movement direction of the cutting device (2), the positioning apparatus (18) which is assisted by drawing means has at least one fixed deflection roller (13, 13v, 13r) and at least one floating deflection roller (14, 14v, 14r, 15, 15v, 15r) for the drawing means (12, 12v, 12v', 12r, 12r').

Slitter for a running fibrous web

The invention relates to a slitter for a running fibrous web having a positioning apparatus which is assisted by drawing means for at least one cutting device, preferably a cutting blade or a high-pressure water-jet cutting head.

Apparatuses of this type are known from the very different fields in the production or treatment of fibrous webs, in particular paper or cardboard webs, to which reference is made in the following text. The following are to be mentioned:

a) slitting a running web into part webs for separate winding up, for example to form dispatch reels which are intended for the printing industry,

b) edge trimming to fix a desired format width and optionally to cut off side regions which do not correspond to the quality requirements which are met in the central region of the web, and

c) cutting strips which are used for a transfer operation to a following treatment machine, whereas the rest of the fibrous web is moved into a reject container, the transfer strip being cut to the original fibrous web width after successful transfer.

EP 0433583 is an example for a positioning apparatus which is assisted by drawing means. This embodiment has been built multiple times by the applicant. Numerous knives can be moved and set via a toothed belt, by being coupled to the belt as required. However, the control outlay is quite considerable and, in particular, no longer cost-effective if it is intended that the cutting device can move to only two or three fixed positions.

The invention aims in this direction, however. The desire is therefore to make it possible for the tasks of the abovementioned slitting examples according to items b) and c) to be achieved by way of the invention.

In the prior art, for example, an actuating cylinder which is arranged laterally next to the paper or cardboard making machine is used for this purpose. Said actuating cylinder is defined by its stops in the cutting position and merely has to be capable of being loaded with compressed air in two directions. If, however, the intention is not to sever a transfer strip at the edge of the fibrous web, but rather, for example, to cut out a 20 cm wide strip a metre away from the edge, the stroke of the cylinder already has to be very large, which leads to the cylinder reaching undesirably far into the maintenance space next to the paper or cardboard making machine. If an actuating motor, for example having a belt drive for the cutting device, is used instead, a comparatively high control outlay is to be made again.

The invention is therefore based on the object of providing a slitter for a running fibrous web, which slitter can be actuated simply and takes up a small amount of space laterally next to the running fibrous web.

The slitter of the invention achieves this object by, in order to realize at least one movement direction of the cutting device, the positioning apparatus which is assisted by drawing means having at least one fixed deflection roller and at least one floating deflection roller for the drawing means.

Therefore, an apparatus is formed which is similar to a block and tackle and permits a great step-up ratio. However, the power step-up ratio is not used in this

case, as is customary in blocks and tackles, but rather the travel step-up ratio. A short travel of a drive unit makes it possible for the cutting device to move to the desired cutting or parked position. Here, the entire device is of very small overall size to the side of the paper web, even if the travel of the cutting element is great. A short stroke of the drawing means brings about a relatively long movement travel of the cutting device. Cables, flat belts and V-belts and, in particular, toothed belts are suitable, on account of slip-free force transmission, as suitable drawing means.

Knives are suitable as cutting devices. However, after they have been moved into the working (= cutting) position, they still have to be set in the direction of the web. A high-pressure water-jet cutting device is therefore preferably used in this invention. On account of the space-saving embodiment of the positioning device, it is possible without problems to allow the web to run over a cutting table and to catch the water jet in suitable discharge pipes, as is known from EP0870583 B1, for example.

Since the drawing means cannot also be used as a rule as pressure means, it is advantageous if, in order to realize two movement directions of the cutting device, the positioning apparatus which is assisted by drawing means has in each case at least one fixed deflection roller and at least one floating deflection roller for the drawing means. Since these two units are arranged with in each case at least one fixed and one floating deflection roller in parallel next to one another, they do not take up any additional space. As an alternative, however, it is also conceivable to realize one of the movement directions via a spring element.

It has been shown in tests that, in order to realize two movement directions of the cutting device, the

positioning apparatus which is assisted by drawing means has a fixed deflection roller and two floating deflection rollers for the drawing means. In an embodiment of this type, a satisfactory compromise is found which firstly permits a quadruple travel step-up ratio and secondly uses sufficiently little installation space. If only one movement direction is covered by the positioning apparatus, the opposite movement can be carried out by a spring element again.

In order to secure functionality, it is advantageously ensured that the positioning apparatus which is assisted by drawing means has at least one linear drive. In turn, a linear drive which is formed by a cylinder/piston unit is preferably selected by said linear drives. The movement direction of the linear drive can be arranged in a space-saving manner parallel to the movement direction of the cutting element. The slitter is of very small overall design if the linear drive is actually arranged parallel to the movement path of the cutting element.

If, for example, the width of the strip to be cut off varies, it is advantageous if, in addition to the parked position, two different working (= cutting) positions can be assumed. This is achieved without great outlay on control and regulating technology by the cylinder/piston unit being of multiple-stage configuration, in particular as a three-position cylinder.

It is advantageously ensured if the linear drive is designed in such a way that it acts on a holder, to which at least one floating deflection roller for the drawing means is attached. In this way, the actuating travel of the drive acts precisely on the floating deflection roller, around which the drawing means is wrapped. A step-up ratio with regard to the travel

which can be four times or even greater there results at the cutting element, to which one drawing-means end is fastened which is either the same drawing means or a further drawing means (as in the case of a power block and tackle or a differential block and tackle).

A guide is preferably provided on a crossmember for the cutting device or for a carriage which carries said cutting device. The guide ensures that the spacing from the running fibrous web is secured during the movement.

The crossmember is particularly configured here as a box. This prevents dust or dirt being able to pass onto the guide, and the cutting head is protected largely against tearing fibrous webs.

The linear drive is advantageously integrated into the box. The entire slitter then forms a largely (apart from the passage of the cutting element) closed and compact structural unit. It can be fastened as one unit rapidly to any location of the paper or cardboard making machine. In the event of a possible failure of the cleaning apparatus (for example, clogging of the water-jet nozzle), a complete unit can be exchanged quickly, with the result that production down times do not occur in the paper or cardboard making machine.

In the following text, the invention will be explained using exemplary embodiments with reference to the drawings, in which:

Figure 1 shows a sectioned illustration of a slitter according to the invention with a crossmember, and

Figure 2, Figure 3 and Figure 4 show the positioning device of the slitter according to the invention with three different positions of the cutting device without a crossmember.

Fig. 1 shows the slitter 1 according to the invention in cross section. The slitter 1 is provided with a cutting device 2 which is formed in this exemplary embodiment substantially by a high-pressure water-jet nozzle 3. The water jet which emerges from said high-pressure water-jet nozzle 3 is capable of cutting a running fibrous web (not shown), preferably a paper or cardboard web. As an alternative, however, an optionally rotating knife or any other form of cutting device can also be used here.

The cutting device 2 is connected to a carriage 5 via a cutting-device holder 4. The carriage 5 can be moved in a guide 7 (into the sheet plane in Figure 1). To this end, said carriage 5 is provided with running rollers 6 which run in rails 7a. Said rails 7a are fastened to a crossmember 8 which is advantageously configured in the form of an almost closed box 9. As a result, the guide 7 is largely protected against dust deposits.

A linear drive 10, in particular a cylinder/piston unit 10a, which is connected to the crossmember 8 via a holder 11 serves as drive for the carriage 5. It is also accommodated within the box 9 in a protected manner. The cylinder/piston unit 10a exerts a force on a drawing means 12 which in turn acts on the carriage. Here, the drawing means wraps around at least one fixed deflection roller 13 and one floating deflection roller 14. In the concrete case, the drawing means is accordingly connected like a block and tackle, in particular like a power block and tackle or a differential block and tackle.

The positioning device 18 of the cutting device 2 and its method of operation are clarified in Figures 2 to 4. Here, for the sake of clarity, the cutting device 2 itself and the crossmember 8 are not shown in the drawing. Figure 2 shows the carriage 5 for the cutting

device 2 in a first cutting position A and Figure 4 shows the carriage in its parked position P. As a result of the fact that the cylinder/piston unit 10a in the exemplary embodiment has three positions, there is an additional second cutting position B which is shown in Figure 3.

There is one fixed deflection roller 13v, 13r and two floating deflection rollers 14v, 14r, 15v, 15r for each movement direction of the carriage 5. Here, the indices v and r are intended to indicate the movement direction, for which the respective deflection roller is significant. v indicates the movement direction to the first cutting position A and r indicates the movement direction to the parked position P. For each movement direction, two drawing means 12 are also provided which bear the reference numerals 12v, 12v' and 12r, 12r' analogously to the deflection rollers 13, 14.

The piston 17 of the cylinder/piston unit 10a acts via a connecting plate 16 directly on two floating deflecting rollers 15v, 15r which are fastened to the latter. Depending on the movement direction of the piston 17, one of the drawing means 12v' or 12r' is subjected to a tensile load. As the piston moves, the spacing changes between the floating deflection rollers 14v, 14r and 15v, 15r, the carriage moving with a travel step-up ratio of 4:1, which carriage is connected to the second drawing means 12v, 12r which wraps around the respective second floating deflection roller 14v, 14r.

The entire arrangement of the slitter 1 according to the invention including the positioning device 18 is of extraordinarily compact overall design and can be accommodated comfortably in the available installation space, without protruding too far laterally next to the

paper or cardboard making machine. No outlay is to be made on control technology to position the cutting device 2 at the desired location, apart from a compressed-air supply which can be switched on and off via the compressed-air connections 19.

The embodiments shown can be deviated from in many regards, without departing from the basic concept of the invention. In particular, the number and diameter of fixed and floating deflection rollers (13, 14, 15) can vary and can be adapted to the required conditions. A spring element can also be used instead of one of the drawing means 12. Not only cables but also, for example, V-belts or toothed belts can be used as drawing means.

List of Reference Numerals

1	Slitter
2	Cutting device
3	High-pressure water-jet nozzle
4	Cutting-device holder
5	Carriage
6	Running roller
7	Guide
7a	Rail
8	Crossmember
9	Box
10	Linear drive
10a	Cylinder/piston unit
11	Holder
12	Drawing means
12v, 12v'	Drawing means for the movement to the cutting position
12r, 12r'	Drawing means for the movement to the parked position
13, 13v, 13r	Fixed deflection roller
14, 14v, 14r	Floating deflection roller
15, 15v, 15r	Floating deflection roller
16	Connecting plate
17	Piston
18	Positioning device
19	Compressed-air connection

A	First cutting position
B	Second cutting position
P	Parked position

Patent Claims

1. Slitter for a running fibrous web having a positioning apparatus (18) which is assisted by drawing means for at least one cutting device (2), preferably a cutting blade or a high-pressure water-jet cutting head, characterized in that, in order to realize at least one movement direction of the cutting device (2), the positioning apparatus (18) which is assisted by drawing means has at least one fixed deflection roller (13, 13v, 13r) and at least one floating deflection roller (14, 14v, 14r, 15, 15v, 15r) for the drawing means (12, 12v, 12v', 12r, 12r').

2. Slitter according to Claim 1, characterized in that, in order to realize two movement directions of the cutting device (2), the positioning apparatus (18) which is assisted by drawing means has in each case at least one fixed deflection roller (13, 13v, 13r) and at least one floating deflection roller (14, 14v, 14r, 15, 15v, 15r) for the drawing means (12, 12v, 12v', 12r, 12r').

3. Slitter according to either of Claims 1 and 2, characterized in that, in order to realize at least one movement direction of the cutting device (2), the positioning apparatus (18) which is assisted by drawing means has a fixed deflection roller (13, 13v, 13r) and two floating deflection rollers (14, 14v, 14r, 15, 15v, 15r) for the drawing means (12, 12v, 12v', 12r, 12r').

4. Slitter according to one of Claims 1 to 3, characterized in that the positioning apparatus (18) which is assisted by drawing means has at least one linear drive (10).

5. Slitter according to Claim 4, characterized in that the linear drive (10) is formed by a cylinder/piston unit (10a).

6. Slitter according to Claim 5, characterized in that the cylinder/piston unit (10a) is of multiple-stage configuration, in particular as a three-position cylinder.

7. Slitter according to Claim 4, characterized in that the linear drive (10) is designed in such a way that it acts on a holder (11), to which at least one floating deflection roller (15v, 15r) for the drawing means (12, 12v, 12v', 12r, 12r') is attached rotatably.

8. Slitter according to one of Claims 1 to 7, characterized in that a guide (7) is provided on a crossmember (8) for the cutting device (2) or for a carriage (5) which carries said cutting device.

9. Slitter according to Claim 8, characterized in that the crossmember (8) is configured as a box (9).

10. Slitter according to Claim 8, characterized in that the linear drive (10) is integrated into the box (9).

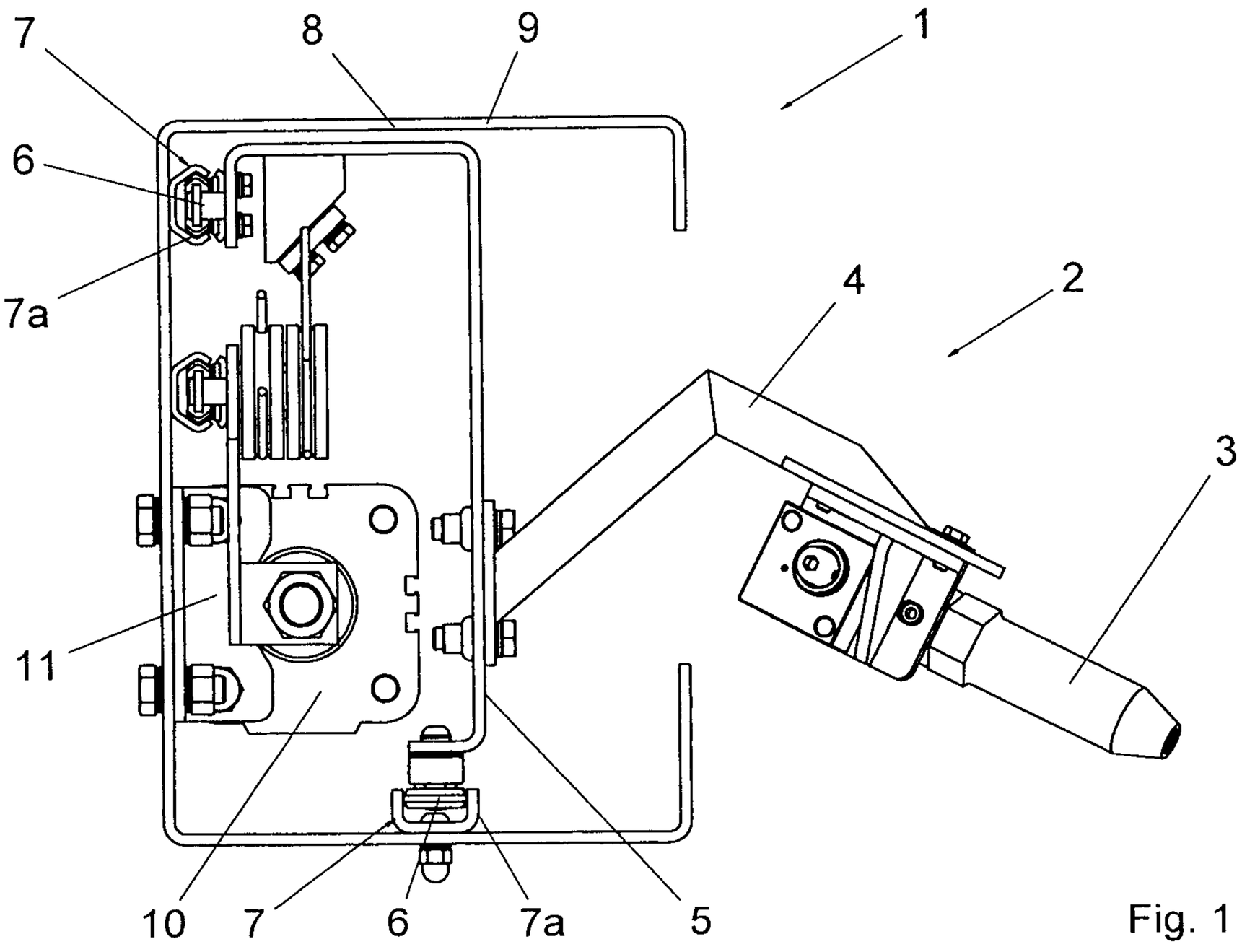


Fig. 1

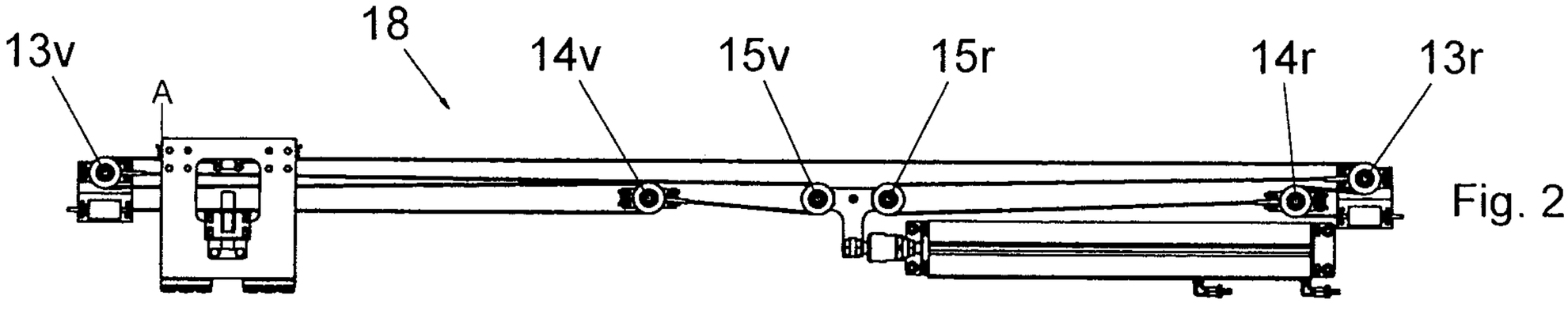


Fig. 2

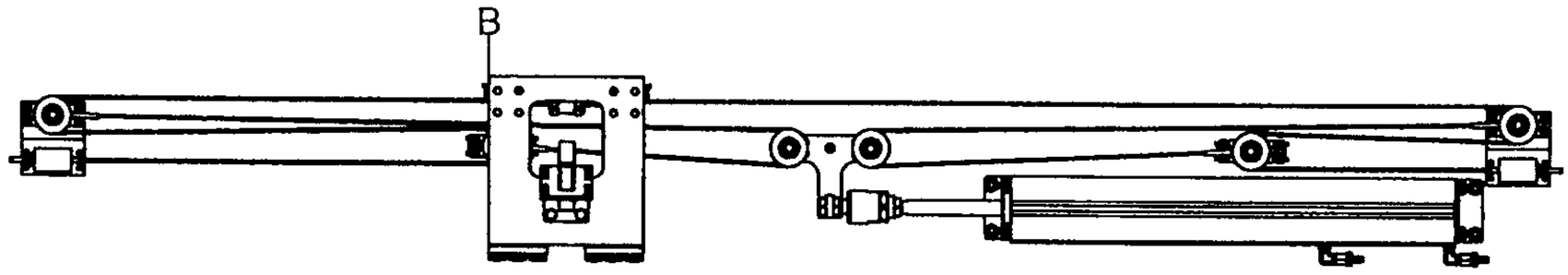


Fig. 3

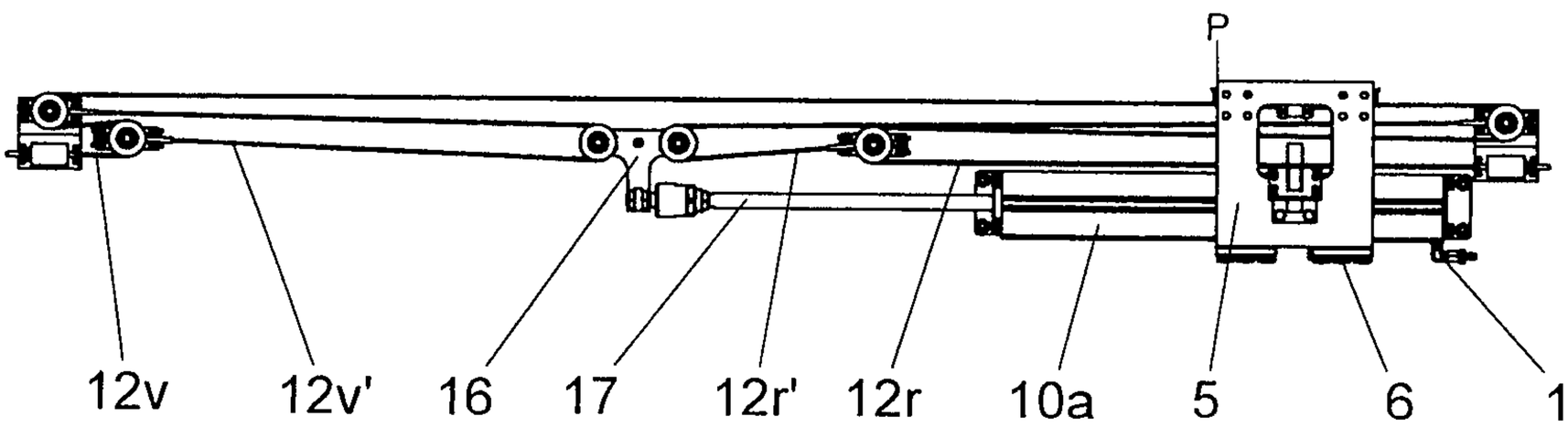
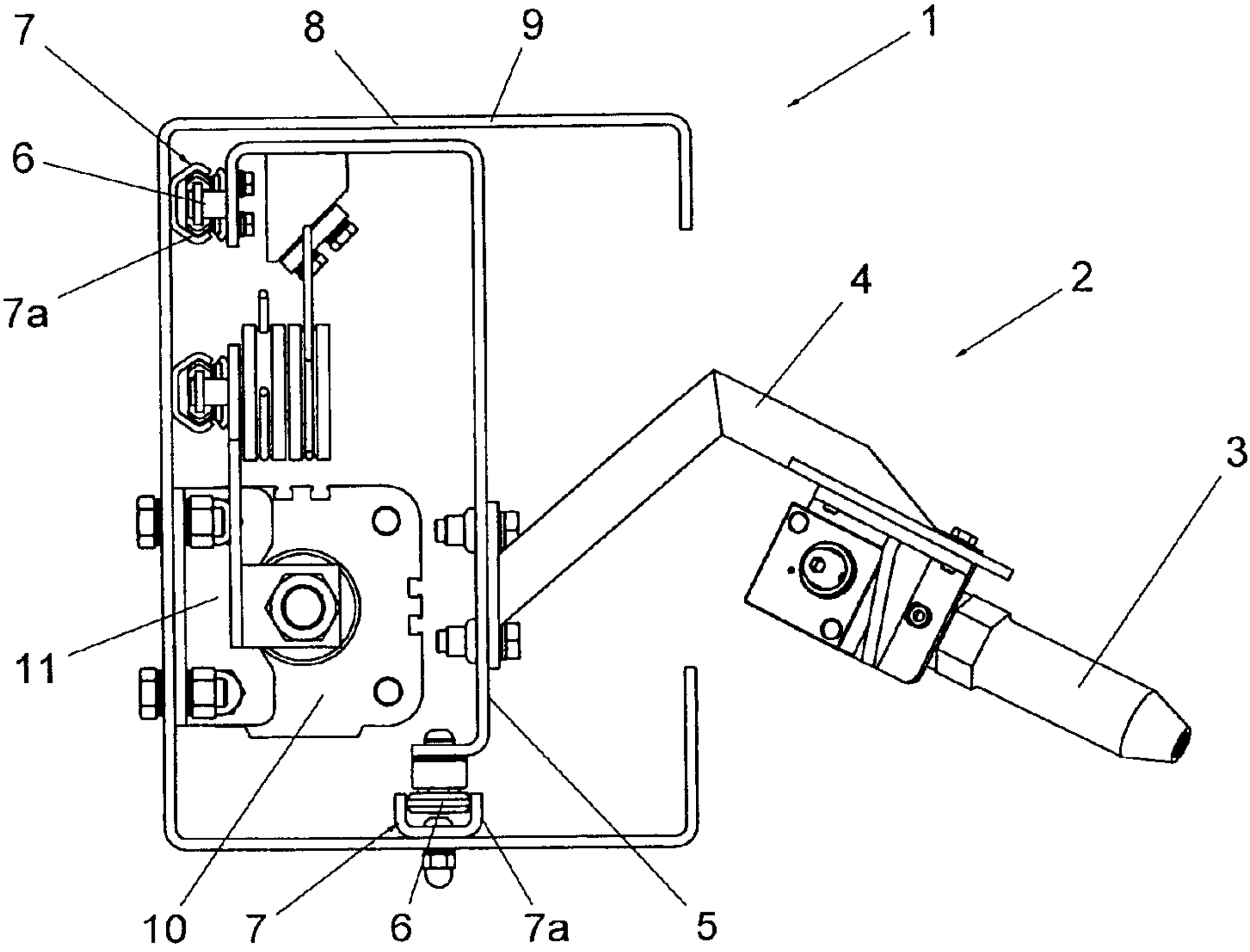


Fig. 4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