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(54) MACHINE AND METHOD TO PROCESS BARS MADE OF ALUMINIUM, LIGHT ALLOYS, PVC OR THE LIKE

(57) Method and machine for processing bars (2) of aluminium, light alloys, PVC or the like, according to which the bars (2) are fed along an elongated base (3) and through at least one processing station (14) to process and/or cut the bars (2) by means of two feeding devices (21, 29) simultaneously provided in the machine to operate in an alternative manner to one other.

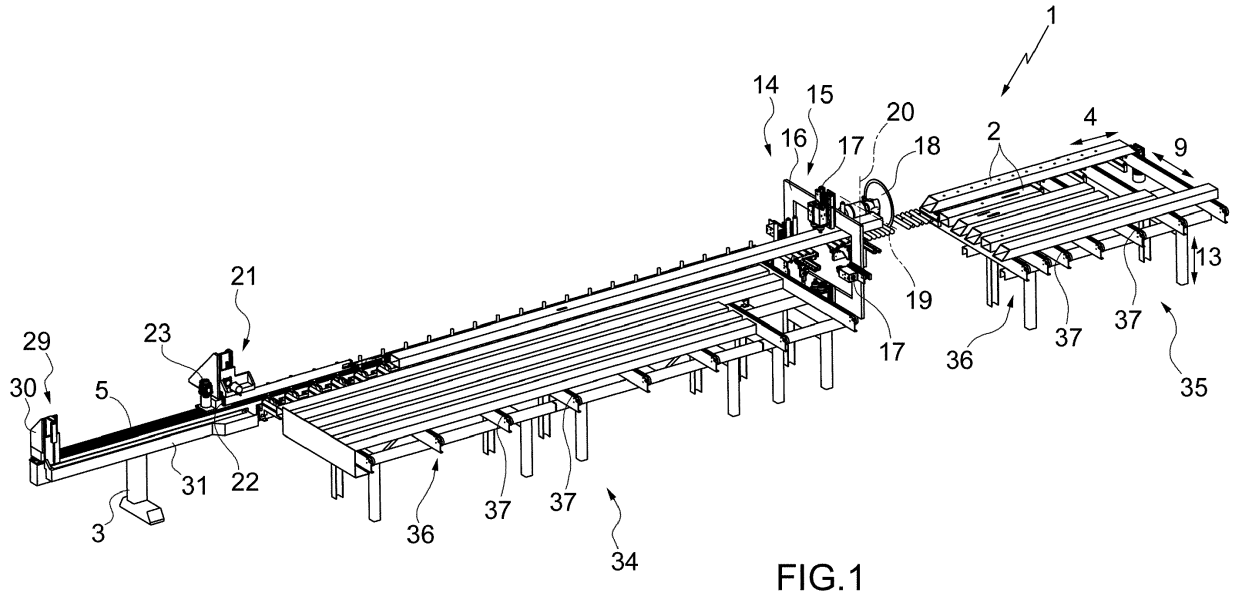

FIG.1

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Description

[0001] The present invention relates to a machine to process bars made of aluminium, light alloys, PVC or the like.

[0002] In the field of processing bars made of aluminium, light alloys, PVC or the like it is known to provide a machine comprising an elongated base extending in a given first direction; a first roller support device having a plurality of lower rollers mounted to define a lower support surface for at least one bar and so as to rotate around respective first horizontal rotation axes parallel to each other; and a second roller support device having a plurality of side rollers mounted so as to define a lateral support plane for the bar and so as to rotate around respective second vertical rotation axes parallel to each other.

[0003] The machine further comprises at least one processing station arranged along the base to process and/or cut the bar; and a feeding device to move the bar along the base, and through the processing station in the first direction.

[0004] The machine also has a loading station to load the bars to be processed onto the feeding device; and an unloading station to remove the bars that have just been processed from said feeding device.

[0005] Generally, the feeding device comprises a horizontal slide coupled in a sliding manner to a longitudinal guide member of the base, and an elongated clamp, which extends in the first direction, is coupled to the horizontal slide to move in a second and in a third direction orthogonal to each other and to the first direction, is rotatably coupled to the horizontal slide to rotate around a rotation axis parallel to the first direction, and supports, at its free end, a pair of jaws movable between a clamping position and a release position of at least one bar.

[0006] The machines for processing bars of aluminium, light alloys, PVC or the like of the known type described above present some drawbacks mainly deriving from the fact that the presence of only one feeding device results in relatively restricted flexibility and versatility, allows only bars having certain shapes to be fed, and does not allow more than one bar at a time to be fed simultaneously.

[0007] The object of the present invention is to provide a machine to process bars made of aluminium, light alloys, PVC or the like which is free of the drawbacks described above and which is simple and inexpensive to implement.

[0008] According to the present invention, there is provided a machine to process bars made of aluminium, light alloys, PVC or the like as claimed in the claims from 1 to 16.

[0009] The present invention relates, furthermore, to a method to process bars made of aluminium, light alloys, PVC or the like.

[0010] According to the present invention, there is provided a method to process bars made of aluminium, light alloys, PVC or the like as claimed in the claims from 17 to 19.

[0011] The present invention will now be described with reference to the accompanying drawings, which illustrate a non-limiting embodiment thereof, in which:

Figure 1 is a schematic perspective view, with parts removed for clarity, of a preferred embodiment of the machine to process bars made of aluminium, light alloys, PVC or the like according to the present invention; and

Figures 2 and 3 show two schematic views in perspective, with parts removed for clarity, of a detail of the machine in figure 1 shown in two different operating positions.

[0012] With reference to Figures 1, 2, and 3, reference numeral 1 globally denotes a machine to process bars 2 made of aluminium, light alloys, PVC or the like, which have an elongated shape and a cross section at least partially hollow.

[0013] The machine 1 comprises an elongated base 3, which extends in a horizontal direction 4, has a portal shape, and is provided with a longitudinal guide member 5 parallel to the direction 4.

[0014] The machine 1 further comprises a first roller support device 6 having a plurality of lower rollers 7 mounted so as to rotate around respective rotation axes 8 substantially parallel to each other and to a horizontal direction 9 transversal to the direction 4. The rollers 7 define a lower support surface P1 for at least one bar 2.

[0015] Each roller 7 of at least part of the rollers 7 is movable between an operating position, in which the roller 7 is coplanar to the surface P1, and a rest position, in which the roller 7 extends under the surface P1.

[0016] The machine 1 further has a second roller support device 10 comprising a plurality of side rollers 11 mounted so as to rotate around respective rotation axes 12 substantially parallel to each other and to a vertical direction 13 perpendicular to the directions 4 and 9. The rollers 11 define a lateral support surface P2 for at least one bar 2.

[0017] Each roller 11 of at least part of the rollers 11 is movable between an operating position, in which the roller 11 projects above the surface P1, and a rest position, in which the roller 11 extends outside the surface P2 and/or under the surface P1.

[0018] The machine 1 further has a processing station 14, which is arranged along the base 3, and is provided with an operating unit 15 to perform the processing of the bars 2.

[0019] The unit 15 comprises an annular frame 16, which extends around the roller support devices 6, 10, supports a plurality of operating heads 17 movable in the directions 9 and/or 13, and also supports a cutting blade 18 moving in the directions 4 and/or 9 and/or 13 and/or around a rotation axis 19 parallel to the direction 9 and/or around a rotation axis 20 parallel to the direction 13.

[0020] The machine 1 further comprises a first feeding device 21 to move the bars 2 along the surface P1 in the direction 4.

[0021] The device 21 comprises a first horizontal slide 22 coupled in a sliding manner to the member 5 to perform, under the thrust of an operating device 23 of the known type, rectilinear movements along the member 5 in the direction 4; a second horizontal slide 24 coupled in a sliding manner to the horizontal slide 22 to perform, with respect to the horizontal slide 22, rectilinear movements in the direction 9; and a vertical slide 25 coupled in a sliding manner to the horizontal slide 24 to perform, with respect to the horizontal slide 24, rectilinear movements in the direction 13.

[0022] The vertical slide 25 has the shape of an elongated arm, extends in the direction 4 and supports a gripping member 26, which is coupled in a rotary manner to the vertical slide 25 to rotate, with respect to the vertical slide 25, around a rotation axis 27 parallel to the direction 4, and comprises two jaws 28 movable between a clamping position and a release position of the bars 2.

[0023] The machine 1 is further provided with a second feeding device 29 to move the bars 2 along the surface P1 in the direction 4.

[0024] The device 29 comprises a horizontal slide 30 coupled in a sliding manner to the member 5 to perform, under the thrust of an operating device (not shown) independent of the device 23, rectilinear movements along the member 5 in the direction 4; and a vertical slide 31 coupled in a sliding manner to the horizontal slide 30 to perform, with respect to the horizontal slide 30, rectilinear movements in the direction 13.

[0025] The vertical slide 31 has the shape of an elongated arm, extends in the direction 4, and is movable in the direction 13 between a raised operating position (figures 2 and 3), in which the vertical slide 31 is arranged on the inside of a feeding path of the bars 2 along the surface P1, and a lowered rest position (not shown), in which the vertical slide 31 is arranged on the outside of the feeding path of the bars 2 along the surface P1.

[0026] The vertical slide 31 comprises a substantially parallelepiped box-shaped containment body 32 which is open in the direction 13, and has a length, measured parallel to direction 4, greater than the length of the vertical slide 25 and the gripping member 26 also measured parallel to the direction 4.

[0027] The body 32 is configured to receive and to house within it the vertical slide 25 and the member 26 as a result of a movement of the vertical slide 31 into its raised operating position.

[0028] According to a variant not shown, the body 32 is eliminated and the vertical slides 25, 31 are alternately moved between respective operating positions, in which the vertical slides 25, 31 are arranged on the inside of the feeding path of the bars 2 along the surface P1, and respective rest positions, in which the vertical slides 25, 31 are arranged on the outside of the feeding path of the bars 2 along the surface P1.

[0029] The vertical slide 31 is provided, at a free end thereof, with a gripping member 33 of the same or different type as the gripping member 26.

[0030] The member 33 may therefore have a gripping element for feeding the bars 2 both ways in the direction 4 or a thrust element for feeding the bars 2 only one way in the direction 4.

[0031] In connection with the above, it should be specified that:

- the members 26, 33 are configured so as to engage the bars 2 exclusively at a free end thereof; and
- the vertical slide 31 has a length, measured parallel to the direction 4, greater than the length of the vertical slide 25, also measured parallel to the direction 4.

[0032] According to a variant not shown, the operating device (not shown) of the horizontal slide 30 is eliminated and replaced with a coupling device movable between a coupling position, in which the horizontal slide 30 is coupled to the horizontal slide 22 to be moved along the base 3 by the operating device 23, and a release position, in which the device 29 is released from the device 21 and parked at one end of the member 5.

[0033] The elongated shape of the vertical slides 25, 31 enables said vertical slides 25, 31 to move through the frame 16.

[0034] The machine 1 is further provided with a loading station 34 to load the bars 2 to be processed onto the device 21 and/or the device 29 and an unloading station 35 to remove the bars 2 that have just been processed from the device 21 and/or the device 29.

[0035] Each station 34, 35 comprises a belt conveyor 36 which faces the roller support device 6 in the direction 9, and comprises, in turn, a plurality of conveyor belts 37 parallel to each other and to the direction 9.

[0036] The presence of two feeding devices 21, 29 makes it possible:

- to grip the same bar 2 with both devices 21, 29;
- to simultaneously grip two bars 2 placed side by side;
- to grip different types of bars 2; and
- to feed each bar 2 through the processing station 14 by means of only one of the two devices 21, 29.

[0037] Furthermore, the movement of the rollers 7, 11 in the relative rest positions allows the devices 21, 29 to advance along the roller support devices 6, 10 regardless of the configuration and the position of the gripping members 26, 33.

[0038] According to a variant not shown, the base 3 has two longitudinal guide members engaged in a sliding manner one by the horizontal slide 22 of the device 21 and the other by the horizontal slide 30 of the device 29.

Claims

1. A machine to process bars (2) made of aluminium, light alloys, PVC or the like, said machine comprising an elongated base (3) extending in a direction (4); at least one processing station (14) to process and/or cut the bars (2); and a first feeding device (21) to feed the bars (2) along the base (3) and through the processing station (14) in the direction (4); a second feeding device (29) to feed the bars (2) along the base (3) and through the processing station (14) in the direction (4); said first and second feeding devices (21, 29) being simultaneously provided in the machine so as to operate as an alternative to one another; and **characterized in that** each feeding device (21, 29) comprises an elongated arm (25, 31) extending in the direction (4) and a feeding member (26, 33) provided on a free end of the elongated arm (25, 31) and configured to engage the bars (2) at a free end thereof.

2. A machine according to claim 1, wherein the elongated arms (25, 31) of the two feeding devices (21, 29) have respective lengths different from each other.

3. A machine according to claim 1 or 2, wherein at least one of the two feeding devices (21, 29) is movable between an operating position, in which the feeding device (21, 29) is arranged on the inside of a feeding path to be followed by the bars (2) along the base (3), and a rest position, in which the feeding device (21, 29) is arranged on the outside of the feeding path to be followed by the bars (2) along the base (3).

4. A machine according to claim 3, wherein the second feeding device (29) comprises a support frame (32) configured to house internally at least part of the first feeding device (21) following a movement of the second feeding device (29) in its operating position.

5. A machine according to claim 4, wherein the support frame (32) has the shape of a box-like containment body.

6. A machine according to any of the previous claims, wherein at least one feeding device (21, 29) comprises a clamping member (26), which is movable between a clamping position and a release position for at least one bar (2) and is designed to feed the bars (2) in both ways of the first direction (4).

7. A machine according to claim 6, wherein at least one clamping member (26) is mounted so as to rotate around a rotation axis (27) that is parallel to the direction (4).

8. A machine according to any of the previous claims, wherein at least one feeding device (21, 29) comprises a pusher member, which is designed to feed the bars (2) in one single way of the direction (4).

9. A machine according to any of the previous claims and comprising, furthermore, a longitudinal guide member (5), which extends in the direction (4) and is engaged in a sliding manner by the first feeding device (21) and by the second feeding device (29).

10. A machine according to any of the claims from 1 to 8 and comprising, furthermore, two longitudinal guide members, which extend in the first direction (4) and are engaged in a sliding manner one by the first feeding device (21) and the other one by the second feeding device (29).

11. A machine according to any of the previous claims and comprising, furthermore, a first roller support device (6), which is provided with a plurality of first rollers (7), which are mounted so as to rotate around respective first rotation axes (8) that are parallel to one another and transverse to the direction (4), and define a lower support surface (P1) for the bars (2).

12. A machine according to claim 11, wherein each first roller (7) of at least part of the first rollers (7) is movable between an operating position, in which the first roller (7) is coplanar to the lower support surface (P1), and a rest position, in which the first roller (7) is arranged under the lower support surface (P1), so as to allow at least one of said first and second feeding devices (21, 29) to be fed in the direction (4).

13. A machine according to claim 11 or 12 and comprising, furthermore, a second roller support device (10), which is provided with a plurality of second rollers (11), which are mounted so as to rotate around respective second rotation axes (12) that are parallel to one another and perpendicular to said lower support surface (P1), and define a lateral support surface (P2) for the bars (2).

14. A machine according to claim 13, wherein each second roller (11) of at least part of the second rollers (11) is movable between an operating position, in which the second roller (11) projects above the lower support surface (P1), and a rest position, in which the second roller (11) extends on the outside of a feeding path to be followed by said first and second feeding devices (21, 29) in the direction (4).

15. A machine according to any of the previous claims and comprising, furthermore, for each feeding device (21, 29), a respective operating unit, which is independent of the operating unit of the other feeding device (21, 29).

16. A machine according to any of the claims from 1 to 14 and comprising, furthermore, an operating unit (23) to move the first feeding device (21) in the direction (4) and a coupling unit to couple the second feeding device (29) to the first feeding device (21) and move the second feeding device (29) in the direction under the thrust of the operating unit (23).

17. A method to process bars (2) made of aluminium, light alloys, PVC or the like in a machine comprising an elongated base (3) extending in a direction (4); at least one processing station (14) to process and/or cut the bars (2); and a first feeding device (21) to feed the bars (2) along the base (3) and through the processing station (14) in the direction (4); and a second feeding device (29) to feed the bars (2) along the base (3) and through the processing station (14) in the direction (4); said first and second feeding devices (21, 29) being simultaneously provided in the machine;
the method being **characterized in that** it comprises the step of:

feeding each bar (2) through the processing station (14) by means of only one of the two feeding devices (21, 29).

18. A method according to claim 17 and comprising, furthermore, the step of:

moving at least one of the two feeding devices (21, 29) between an operating position, in which the feeding device (21, 29) is arranged on the inside of a feeding path of the bars (2) along the base (3), and a rest position, in which the feeding device (21, 29) is arranged on the outside of the feeding path to be followed by the bars (2) along the base (3).

19. A method according to claim 18, wherein the second feeding device (29) is configured to house internally at least part of the first feeding device (21) following a movement of the second feeding device (29) in its operating position.

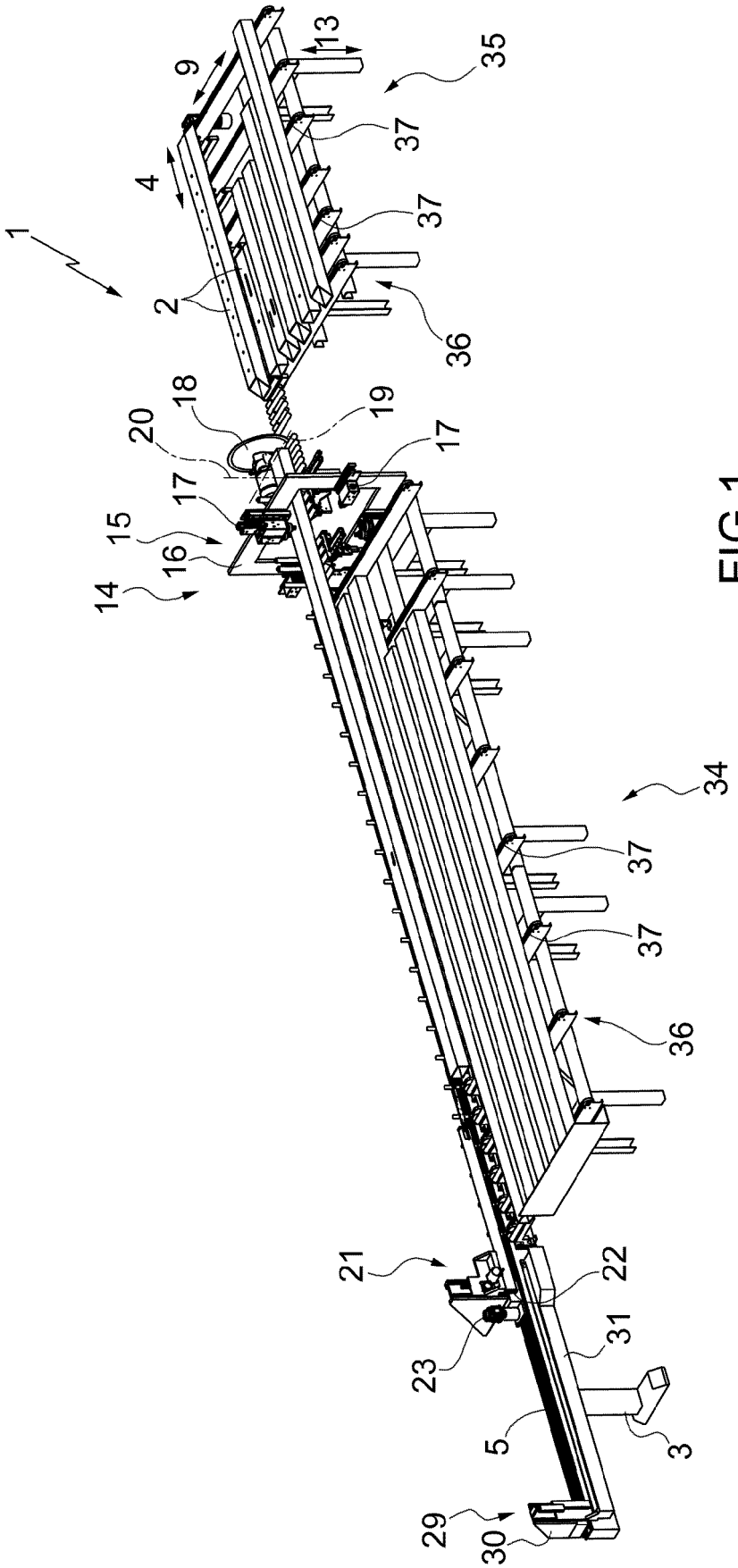
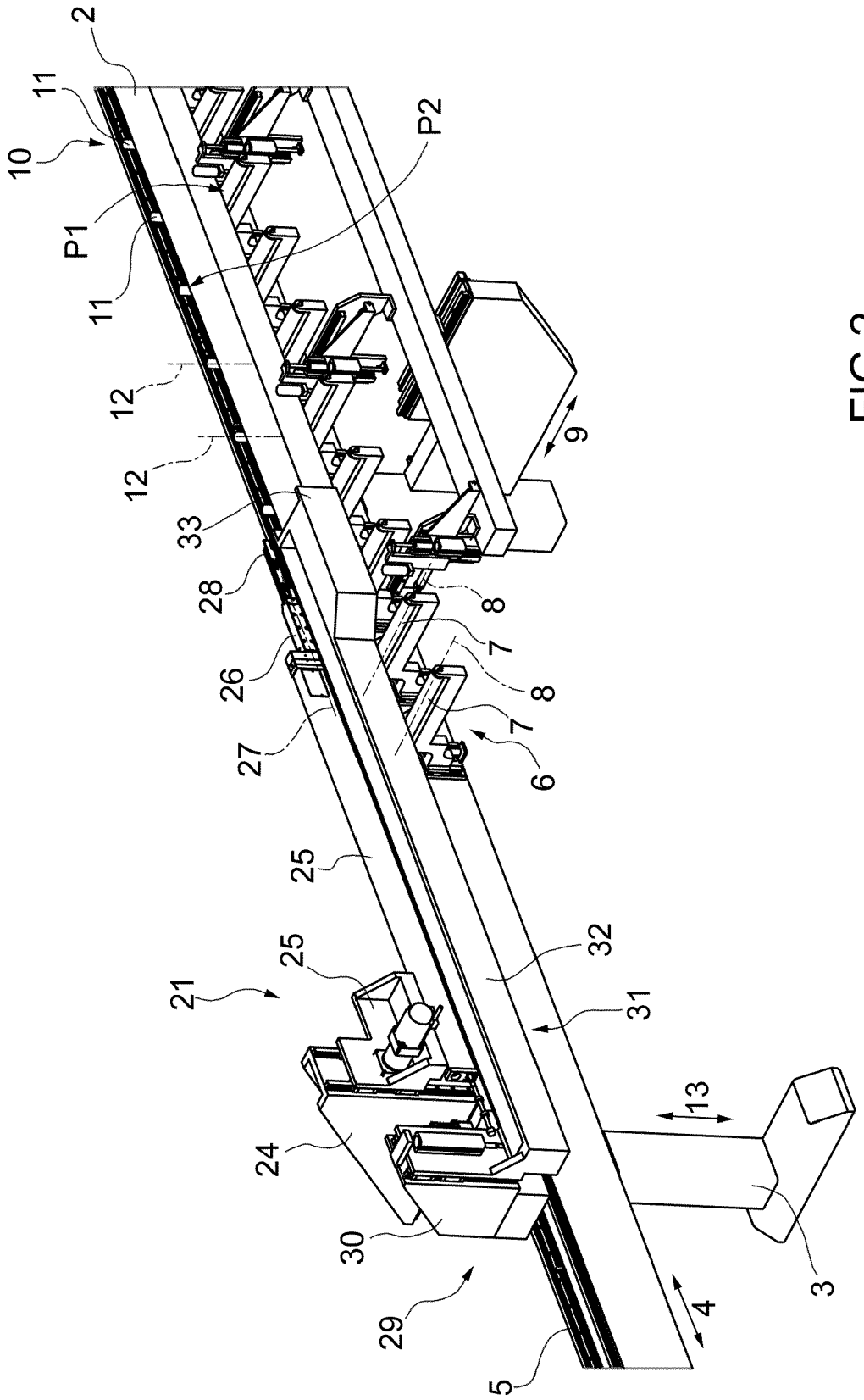


FIG.1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P1
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P2
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FIG.2

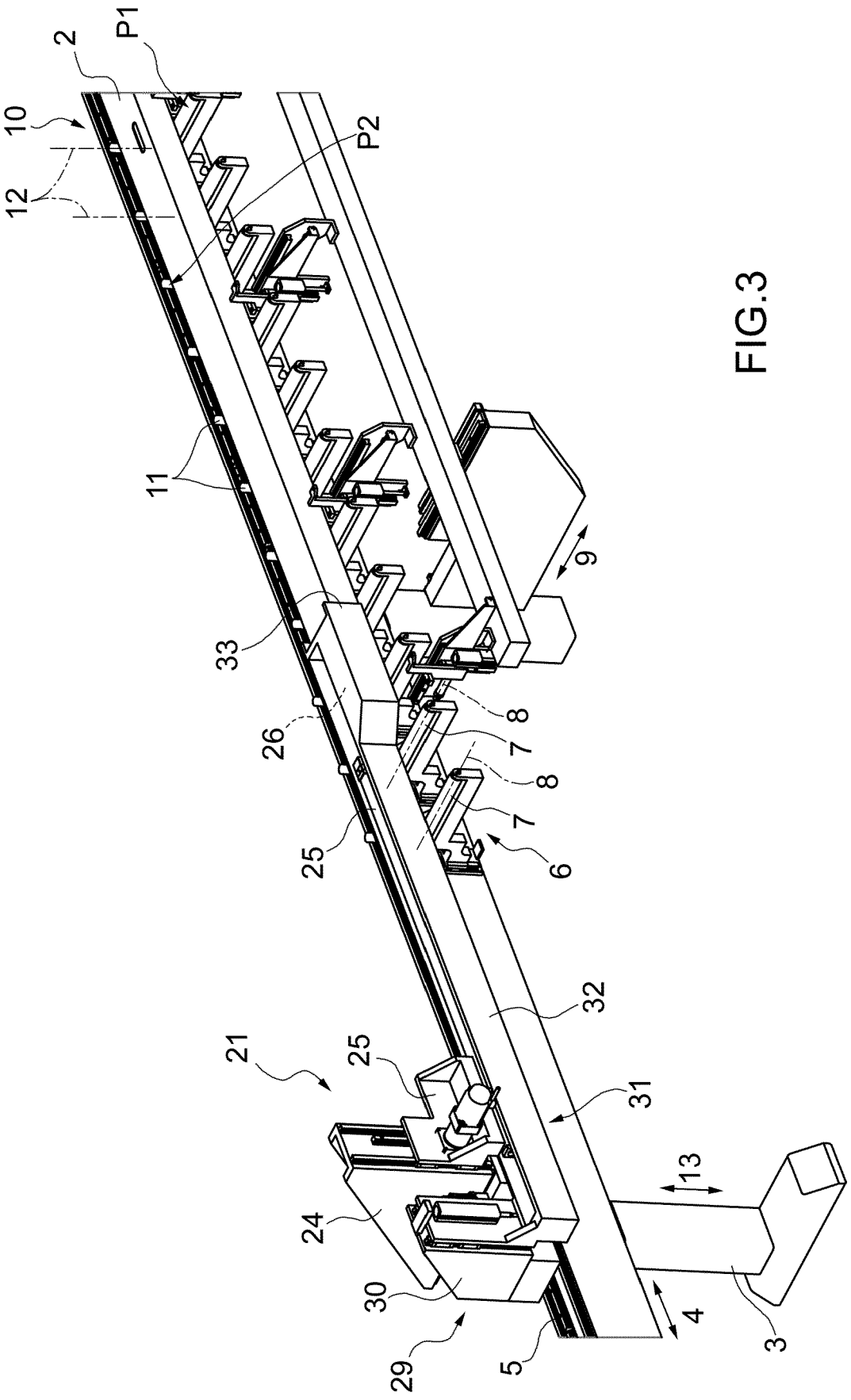

FIG.3

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EUROPEAN SEARCH REPORT

Application Number
EP 16 19 8288

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

B21D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	23 March 2017	Cano Palmero, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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