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(54) Automated apparatus for the hooking and unhooking of the central rod of a basket for a dyeing plant for the lifting of said basket.

(57) An automated apparatus (1) for the hooking and release that is unhooking of the end (with mushroom head (7,9) of the central rod (5) of a "basket" (3) containing textile material, to be lifted and transferred into a dyeing tank, comprises: a casing (13) with means (23) anchored thereto for the lifting and the lowering of the apparatus; a pair of opposite jaws (30) to engage, on a closing position, the mushroom head (9) for the hooking and the lifting, and to guide, on the opening position, the head entry into the apparatus (1); means (29,31,33) able to signal the positioning of said head beyond said jaws (30); means (49) to cause the jaws rotation from the opening to the closing position; and means (51,53) for signalling the occurred closing for the lifting and the occurred opening for the release; the apparatus displaments and the jaws opening and closing being controlled by a programmer (100).

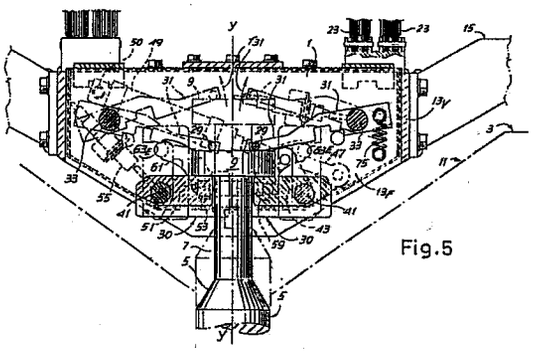

Fig.5

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Description

"AUTOMATED APPARATUS FOR THE HOOKING AND UNHOOKING OF THE CENTRAL ROD OF A BASKET FOR A DYEING PLANT FOR THE LIFTING OF SAID BASKET"

The invention relates to an automated apparatus for the hooking and unhooking, that is release of the end of the central rod of a special container or "basket" containing textile material (like reels of textile rove), said basket being lifted to be placed in a tank for a dyeing plant, or to be withdrawn therefrom after the material is dyed.

According to the invention, an automated apparatus for the hooking and release of the central rod end of a "basket" containing textile material to be lifted and transferred into a dyeing tank, said end having a shank with an overhanging mushroom head, comprises in combination: a casing to which means are anchored for the lifting and the lowering of the apparatus; a pair of opposite jaws articulated at and inside the casing, able to engage, in a closing position, the edge of the mushroom head which projects from the shank, for the hooking and the lifting, and to guide, in the opening position, the entry in vertical direction of the head into the apparatus, as well as means for signalling the just occurred entry of said head beyond said jaws for the consensus to the closing thereof; as well as means to cause the jaws rotation from the opening position to the closing position, with associated means for signalling the just occurred closing for the lifting and the just occurred opening for the release of the basket; the lifting, lowering and displacements of the apparatus, as well as the means for the closing and opening of the jaws being co-ordinated and controlled by a programming member to which the signals of the just occurred head introduction and of the just occurred jaws closing and opening are fed.

The casing of the apparatus is pivotally secured to lifting members and to guide members.

The invention will be better understood by following the description and the attached drawing, which shows a practical non limitative exemplification of the same invention. In the drawing:

Fig. 1 shows diagrammatically a plant for the lifting of "baskets" for the dyeing of textile material provided with the apparatus according to the invention;

Fig. 2 shows diagrammatically a view on line II-II of Fig. 1;

Fig. 3 shows diagrammatically a plan view of said apparatus;

Figs. 4 and 5 show section views on lines IV-IV and V-V of Fig. 3;

Fig. 6 shows a view of a jaw of the apparatus, in closing position, and

Figs. 7 and 8 show respective views on lines VII-VII and VIII-VIII of Fig. 6.

As illustrated in the attached drawing, the apparatus 1 according to the invention is provided for the lifting, in a fully automated manner, of dyeing "baskets" 3, each having a central rod 5, with a shank 7 and a head 9, in order to be lifted by two jaws which seize the head 9. Substantially, the basket 3 is symmetrical and lacking in side holds, and therefore the lifting thereof is provided by seizing said central rod 7, 9. The outline of the basket - which appears as a revolution solid - has a recess that is a free space 11 in the center of its top part, from which recess, shaped approximately like an obtuse angle, the shank 7 with the head 9 projects upwards, said shank and head being anyway inside said outline. Accordingly, the apparatus 1 exhibits transversally a corresponding configuration consisting of an isosceles trapezoid with its minor base in lower position, with a superimposed rectangle, which configuration allows said apparatus to be lowered as much as possible into the recess 11 to "seize" the head 9. Said apparatus comprises thus a substantially prismatic casing 13 (the prism base being the described irregular polygon formed by the isosceles trapezoid with the major base in common with the superimposed rectangle), on the vertical sides 13V of which casing, shaped wings 15 are fixed for the connection of the apparatus with telescopic rods 17, 18 sliding within tubular guides 19; the tubular guides 19 are long enough to guide the lowering of the apparatus until it reaches the top of the basket to be lifted. The coupling of wings 15 with the rods length 18 is obtained by bushes 16. A pair of connecting spiral springs 21 allows limited angular displacements of said length 18 - which is not guided - of rods, and thus limited inclinations of the apparatus 1 so that the head 9 of shank 7 of the basket 3 is able to penetrate inside the casing 13 even in case of faulty centering of the apparatus relative to the basket. The lowering and the lifting of the apparatus 1 are achieved by means of a pair of chains 23, secured to the casing 13, simultaneously operated by a cylinder-piston system 25 (Fig. 2) mounted on a carriage 26, which carriage is able to move on their wheels 27 in the two directions of arrow f26 (Fig. 1) along rails 28 for the apparatus movements - according to a determined alignment - in order to pick up or lay down a basket.

The apparatus 1 must operate in a fully automated manner, according to a predetermined working program that can be stored in a suitable programmer generally indicated by 100 in Fig. 2; in order to cooperate with the programmer, the apparatus is characteristically provided with interlocking and consensus means able to avoid any incorrect handling that would make the operation unreliable. In particular limit-switches are used in the form of proximity switches, more exactly, with the lowering of the apparatus 1 into the recess 11 the head 9 penetrates within a lower cleft, that is opening, of the casing 13, which is located between the edges of the head walls 13V and the cross walls 13F of same casing, by going through the inside of two jaws being mirror-like equal and opposite to each other, shaped with suitable cavities, which jaws are shown in their vertical opening position in Figs. 7 and 8 and in short dashes line in Fig. 4. By penetrating between the lifted jaws 30 the head 9 causes the lifting of

pegs 29 projecting inwardly from the respective ends of shaped levers 31 which, as a consequence, rotate in the direction of arrows f31 thus causing the rotation of shafts 33 which are solid with bushes 35 located beyond the front wall 13F of the casing. The levers 31, when there is no lifting of pegs 29 by the head 9, are kept in lowered position by respective counteracting springs 75. The bushes 35 have radial short rods 37 which, because of said rotation, influence limit switches 39 that deliver an electrical signal communicating to the programming member 100 that the apparatus is correctly placed in lowered position wherein the basket head 9 can be "seized". Following this signal, the cylinder-piston system 25 stops and the lowering of the apparatus does not go on. The cylinder-piston system has usually a limit switch (not shown) mounted thereon, which provides a further signal indicating that the apparatus lowering - which is also programmed - has been completed. The programmer thus receives a first signal and a confirmation signal, after the reception of which signals - constituting a double safety means -it gives consent for the closing of the jaws 30. Each jaw 30 is predisposed for rotating solid with a shaft 41 on which, externally of the walls 13F of the casing, a crank 43 is keyed on one side, and a bush 45 is keyed on the opposite side. At the end of crank 43, the rod 49A of a cylinder-piston system 49 is articulated through a ball joint 47. The cylinder-piston system 49 can oscillate inasmuch as the end of the cylinder on the opposite side of the rod 49A is articulated at 50. Because of the above mentioned consent for the closing of jaws 30, the cylinder-piston system 49,49 is driven so that the rod 49A moves back inside the cylinder and drives into rotation the corresponding crank 43 towards the center of the apparatus, that is, towards the Y-Y axis. As a consequence, each jaw 30 rotates until it finds itself, so to say, "knocked down" - and coplanar with the other jaw - in the closing position of Fig. 5, also shown in short dashes line in Fig. 3, in which position its back is below the projection of head 9. A short rod 51 projects radially from each bush 45 and, on the end of rotation of the corresponding jaw, influences a limit switch 53 which delivers an electrical signal of "closed jaws" to the programmer. Prior to the start of the jaws closing motion, the rod 51 found itself to influenece a limit switch 55, which had delivered and was maintaining - until that moment -a signal of open jaws for the consent of the apparatus lowering. Each jaw 30 has two stout laterally projecting cylindrical studs 59 blocked by pins 56 within dead holes 57. The studs 59, upon the rotation of each jaw from the upright position (open jaws) to the "knocked down" position (jaws closed), slide along curved slots or buttonholes 61 - having arc-like development - formed on each of the walls 13F of casing 13. The slots 61 have, at their ends, seats 63E and 63A for correctly accomodating the studs 59 therein at the ends of their run. When the jaws 30 are in the knocked-down position, the side studs 59 of each of them rest within the seats 63A which, when the apparatus 1 moves upwardly to lift the basket, perform the function of supporting the weight of said basket, which is thus discharged on the walls 13F. The jaws 30, substantially of parallelepiped form, are variously shaped and have an almost cylindrical front cavity 65 (oriented towards the Y-Y axis) which extends downwardly with an invitation frustum conical or flared portion 67. When the apparatus 1 moves down onto a basket 3, the head 9 is guided, upon its entry inside the apparatus, by said portions 67 of frustum conical surface. On top the jaws 30 have a recess 69 intended to "surround" the shank 7 when they find themselves in knocked down, that is, closing position. The recess 69 is arc-shaped and has bends or fillets 69R of opposite curvature. In their lower part each of jaws 30 have a through hole 60 for the passage of the shaft 41 dowelled in 62 and supported by bushings or the like housed within holes of both the opposite walls 13F. The back 73 of jaws 30 is flat to provide a correct support for head 9.

When the apparatus 1 has carried a basket filled with reels of textile material to be dyed above a dyeing tank or cell, the chains 23 are driven into a downwards movement by the cylinder-piston system 25 until they complete a programmed run, so that the head 9 - which had been resting down on the back 73 of jaws 30 - raises up again inside the apparatus 1 pushing upwards again pegs 29 and thus putting into rotation levers 31. Also bushes 35 rotate again and, therefore, the rods 37 influence the limit switches 39 which deliver a signal which, this time, is of consent (in such a way being interpreted by the programmer) to the opening of jaws 30. Owing to the action of cyllnderpiston systems 49, 49A - which make the cranks 43 rotate moving away from the Y-Y axis - jaws 30 are brought back into the upright, that is, opening position, and also each shaft 41 is made to rotate. Each bush 45 is also made to rotate thereby the rods 51 move away from limit switches 53 and influence instead the limit switches 55 for the emission of an "open jaws" signal. Following this signal, the apparatus can lift again so that the head 9 can slip out guided by the concavities 65 of the jaws to go out from the lower cleft or opening of the apparatus 1. The pegs 29 and the levers 31, called back by springs 75, comes back into the lowered position and the apparatus is therefore predisposed again for a further operation for hooking and lifting a basket.

It is apparent from the foregoing description that -once the necessary information about the positions of the baskets to be withdrawn and the final positions in which they have to be placed and, when necessary, the opposite information is supplied to the programmer -the apparatus according to the invention is able to provide, in a self-contained manner, for all the movements necessary to withdraw the filled baskets and to place them into the respective dyeing tanks and, subsequently, to withdraw them from the tanks and place them again at locations where they are emptied by taking the dyed material out of them and are once again filled with material to be dyed.

Figs. 1 and 2 show the carriage 26 (and then the apparatus 1) being possibly moved only in the two directions of arrow f26. It is apparent, however, that the rails 28 - on which the wheels 27 move - are able,

in turn, to be supported by a further carriage (a bridge crane, for example) being movable into the two directions orthogonal to the direction indicated by arrow f26.

It is understood that the drawing shows only an exemplification given merely as a practical demonstration of the invention, as this may vary in forms and dispositions without, nevertheless, departing from the scope of the idea on which the same invention is based.

Claims

1. An automated apparatus for the hooking and unhooking, that is release of the end of the central rod (5) of a special container of "basket" (3) containing textile material to be lifted and transferred into a tank for a dyeing plant, said end having a shank (7) with an overhanging mushroom head (9), characterized in that it comprises in combination: a structure or casing (13) with means (23) anchored thereto for the lifting and the lowering of the apparatus (1); a pair of opposite jaws (30) articulated at and inside the casing (13), able to engage, on a closing position, the lower edge of the mushroom head (9) which projects from the shank (7), for the hooking and the lifting, and to guide, on the opening position, the entry in vertical direction of the head (9) into the apparatus, as well as means (29,31) for signalling the just occurred entry of said head (9) beyond said jaws (30) for the consensus to the closing thereof; and also means (49,43) to cause the rotation of jaws (30) from the opening position to the closing position, with associated means (53,55) to signal the just occurred closing for the lifting and the just occurred opening for the release of the basket; a programming member (100) to control the displacements of the apparatus, as well as the means for the closing and opening of the jaws, to said programming member being fed the signals of the occurred head introduction and the occurred jaws closing and opening.

2. Apparatus according to claim 1, characterized in that the casing (13) is pivotally secured to the lifting members (23) and to guide members (17,18,19).

3. Apparatus according to claim 2, characterized in that the guide members are rods (18,17) sliding within vertical guide tubes (19)fixed to a mobile carriage (26) on which the means (25) for actuating the lifting members (23) are supported.

4. Apparatus according to claim 3, characterized in that, a lower length (18) of said rods is fixed to the casing (13) and is connected to the guided portions (17) thereof through spiral springs (21) able to allow limited deviations of said lower length.

5. Apparatus according to claim 1, characterized in that the transverse walls of the casing (13) and the appendixes (15) for the coupling to the guide members (18,17,19) have a shaping corresponding to the shaping (11) of the upper part of the basket, in their lower part.

6. Apparatus according to claim 1, characterized in that the means able to signal the just occurred introduction of the head beyond the jaws (30) comprise levers (31) carried by shafts (33) articulated to the casing and carrying appendixes (29), the rotation of said lever (31), caused by the thrust of the head (9) against the appendixes (29) giving rise to an electrical signal of consent to the closing of the jaws (30).

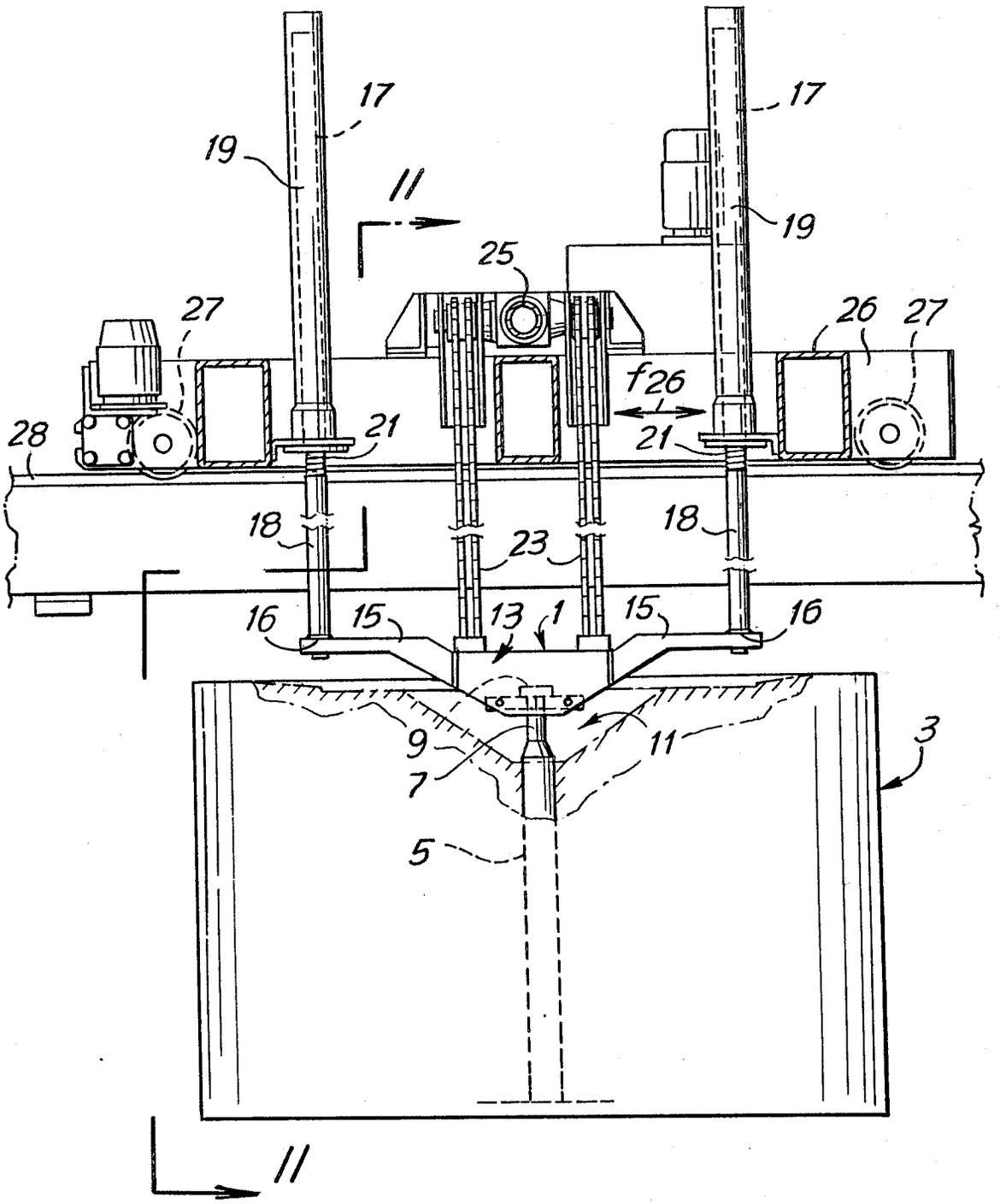
7. Apparatus according to claim 1, characterized in that the jaws (30) are made up of more or less parallelepiped blocks which have concavities (65,67) to allow the passage of the head (9) when they are in opening position and recesses (69) for surrounding the shank (7) of the head (9) in their closing position; the projecting edge of the head (9) resting on supporting surfaces of the face opposite to said first concavity (65,67) upon the lifting.

8. Apparatus according to claim 7, characterized in that the jaws (30) are horizontally hinged on shafts (41) and carry pegs (59) to transmit the load to the casing walls (13F), said pegs (59) sliding within arc-shaped slots or buttonholes (61) formed on the casing walls (13F), these slots (61) having end seats (63A) for the support of pegs (59) with the jaws (30) in closing position.

9. Apparatus according to claim 1, characterized in that the rotation of the jaws (30) is obtained by respective cylinder-piston systems (49,49A) located outside the casing (13) and apt to determine the rotation of the shafts (41) with which the jaws (30) are articulated and solid.

10. Apparatus according to claim 1, characterized in that the rotation of the jaws (30) causes, respectively in the closing and opening positions, the action on respective proximity limit switches (53,55) for the emission of signals apt to indicate to the programming member (100) the respective condition of the jaws (30) for the consent to the lifting or to the lowering of the apparatus (1).

Fig.1



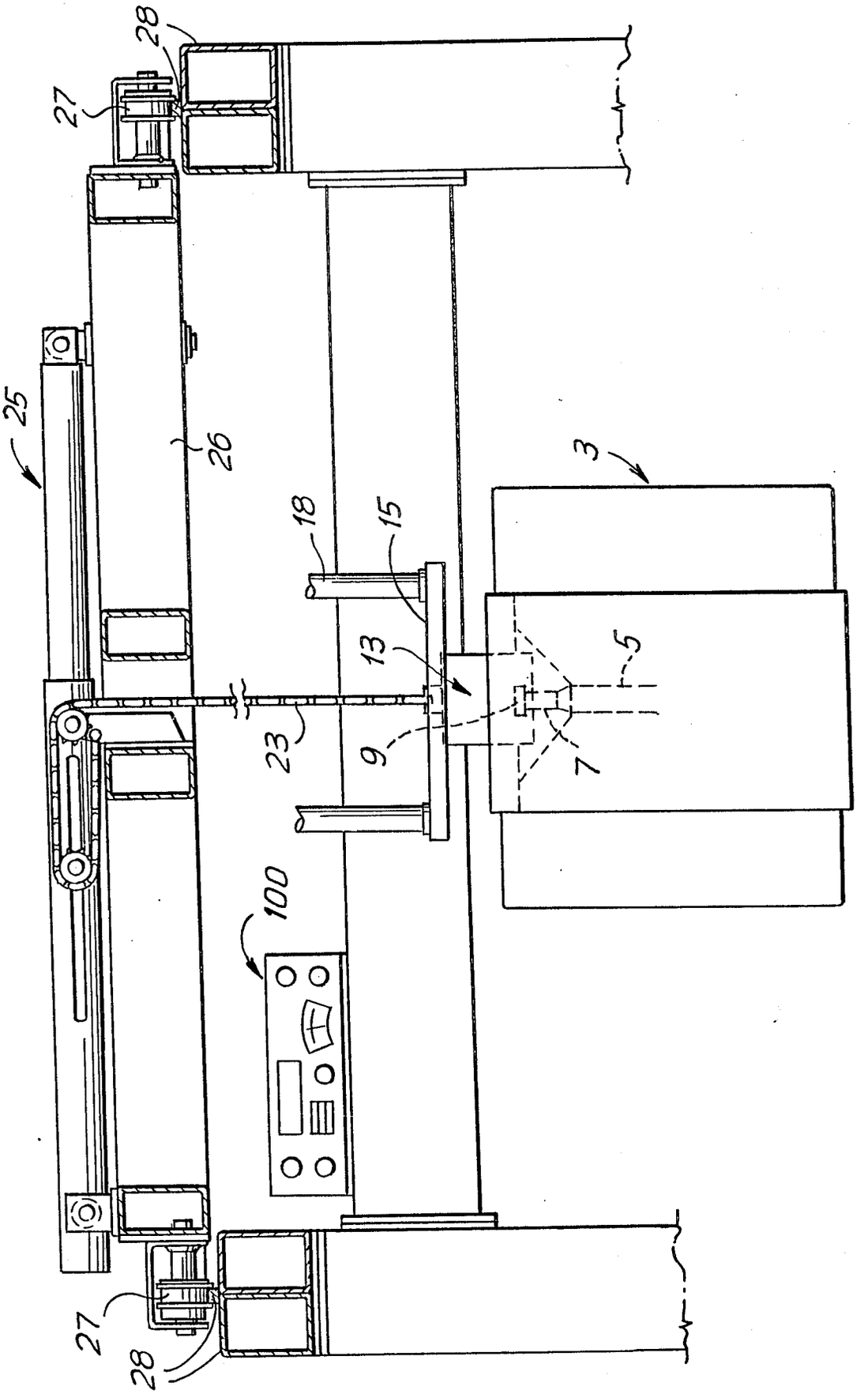
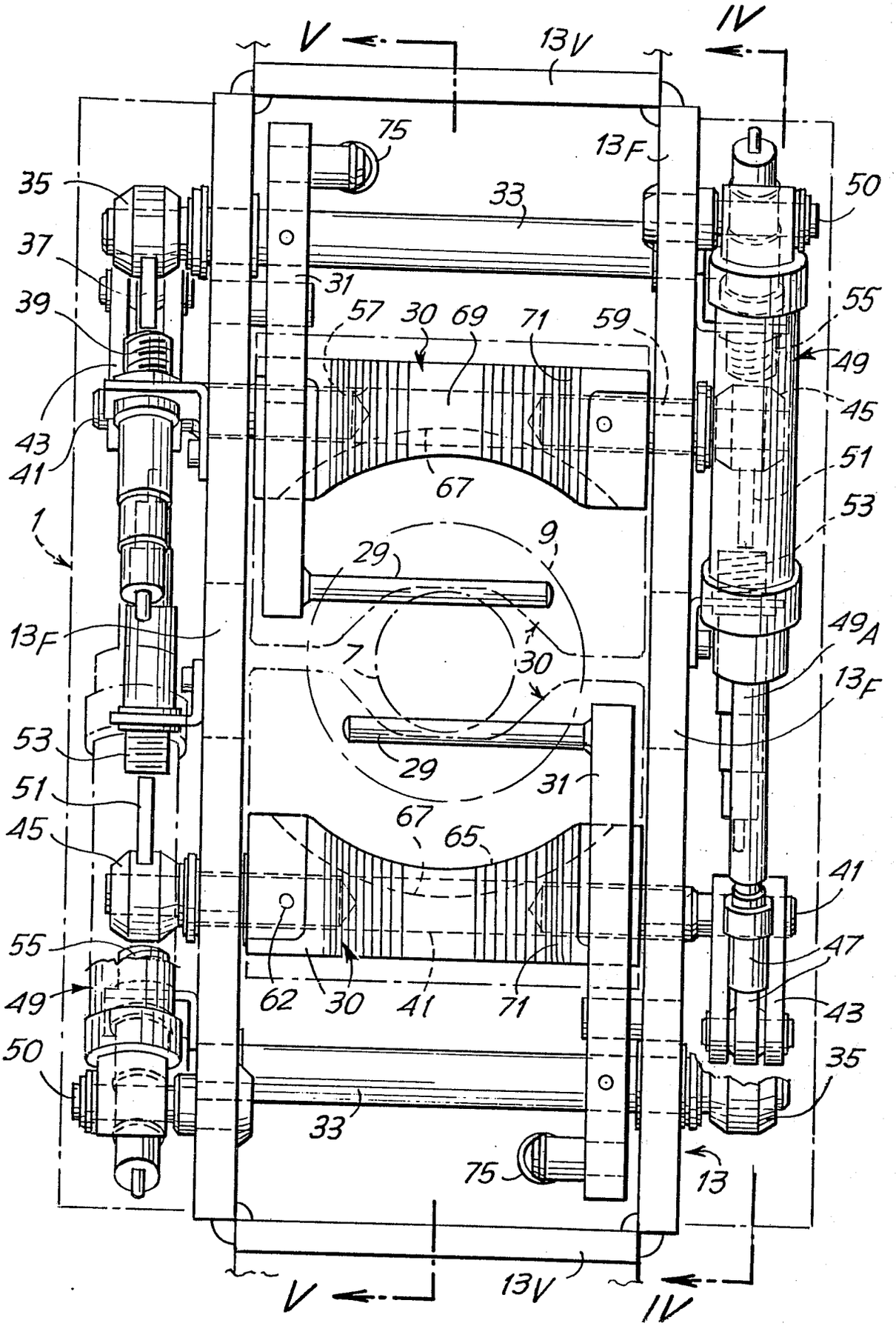


Fig.2

Fig.3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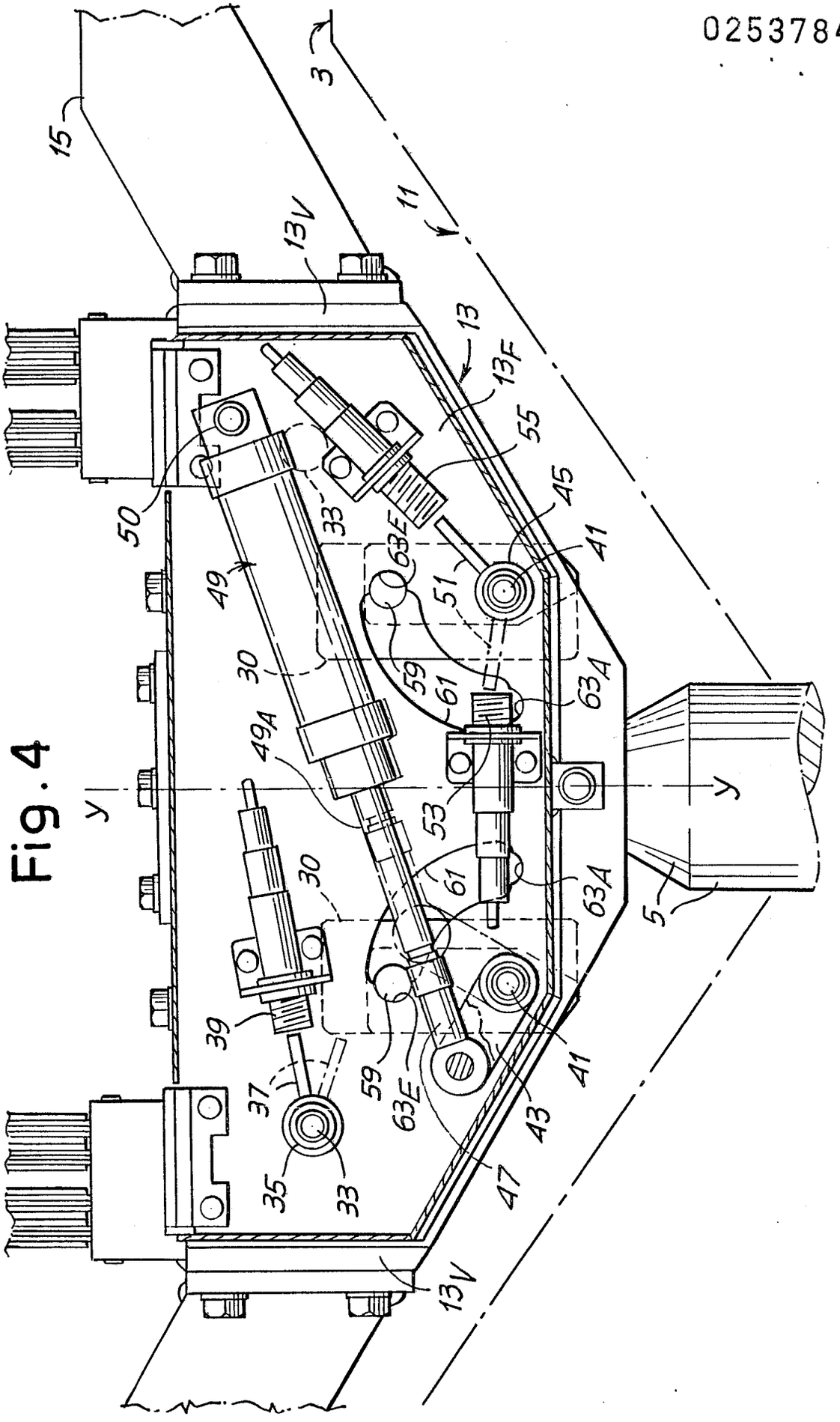
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Fig. 4

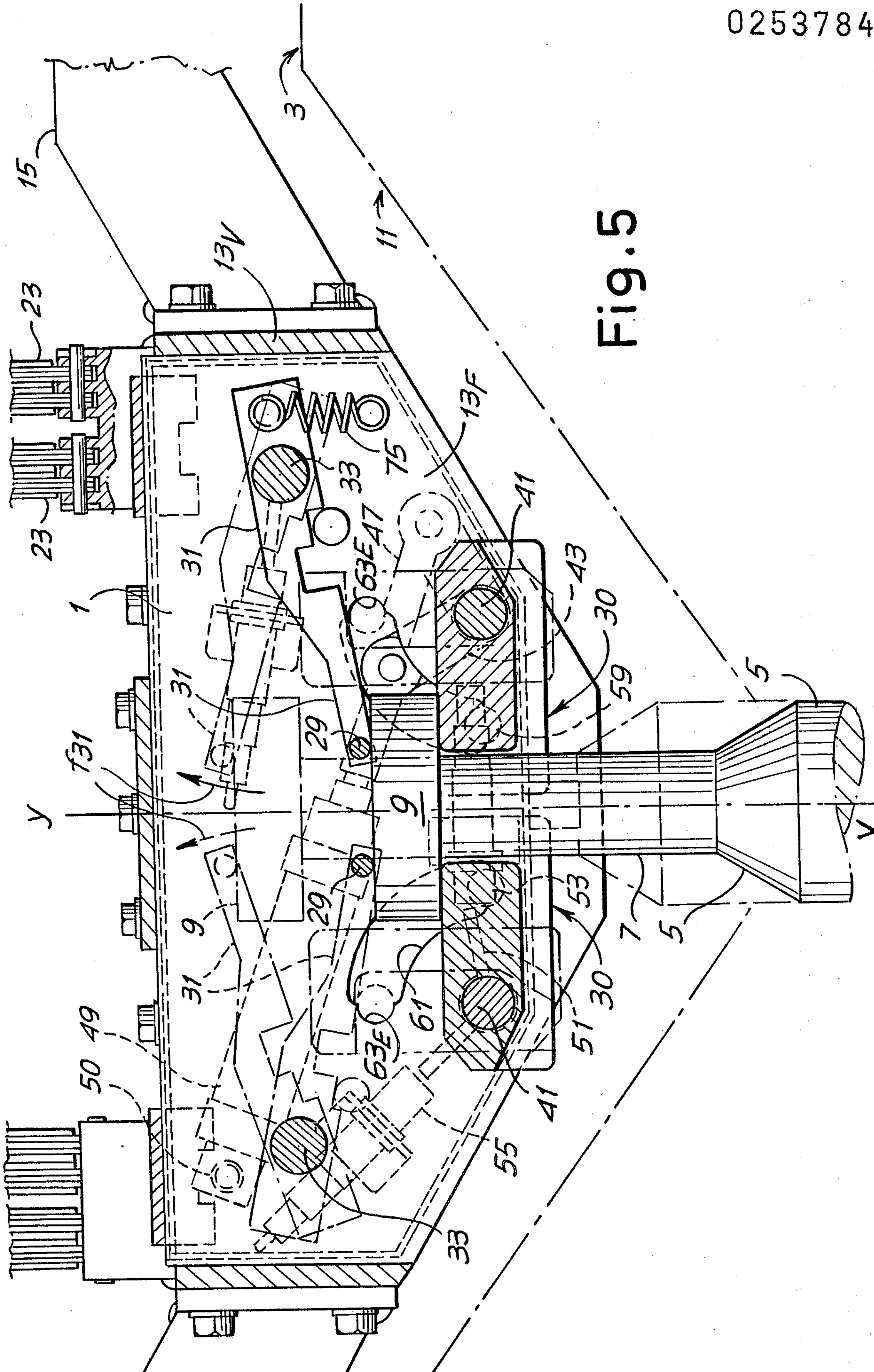
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Fig.5

Fig.6

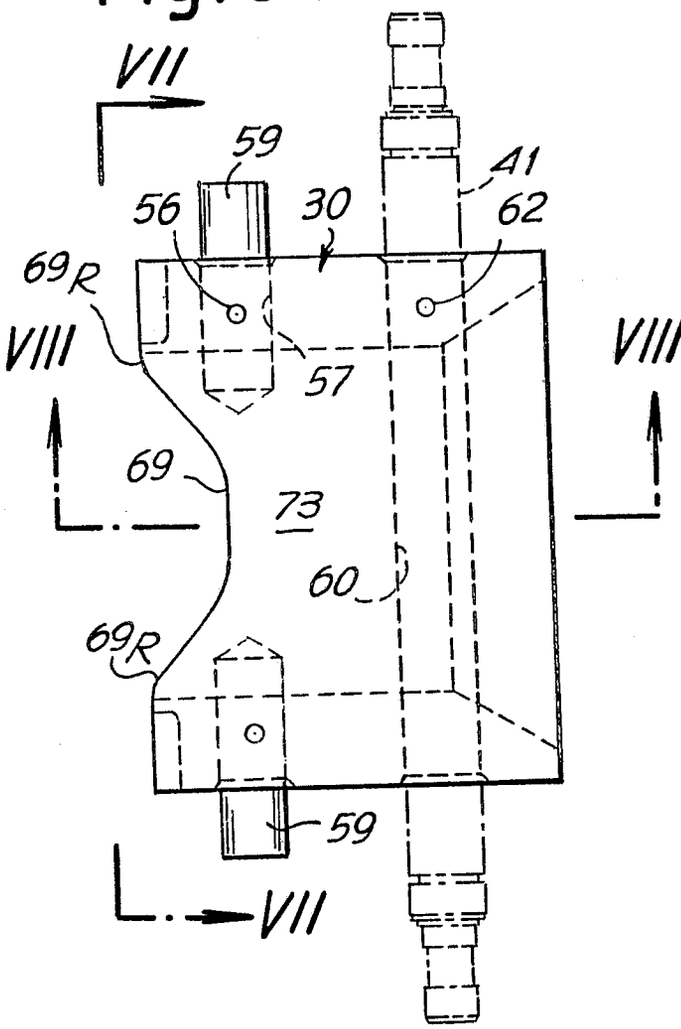


Fig.7

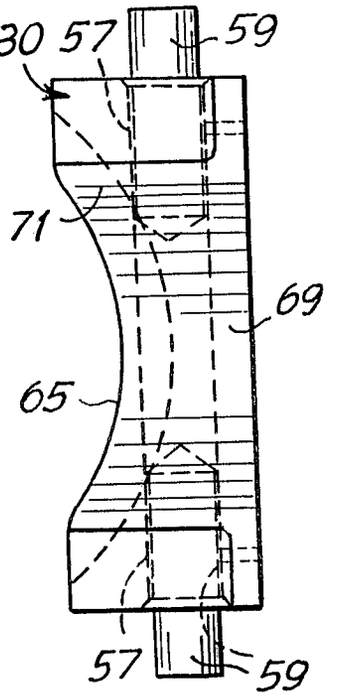
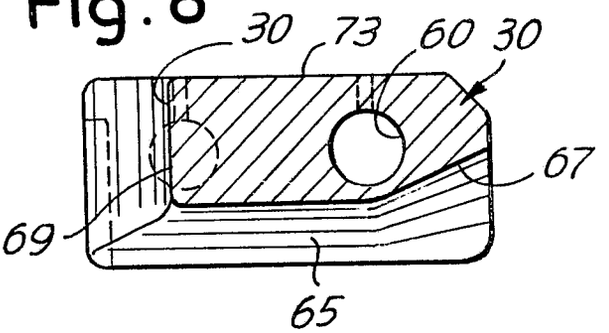


Fig.8



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EUROPEAN SEARCH REPORT

Application number

EP 87 83 0281

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	GB-A-2 023 679 (G. HUBERT)		D 06 B 5/14
A	FR-A-1 132 578 (MORY)		
A	DE-B-1 095 244 (W. KLATT)		
A	US-A-4 455 931 (GASTON COUNTY)		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

D 06 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	28-10-1987	PETIT J.P.

CATEGORY OF CITED DOCUMENTS

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