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(54) DEVICE FOR MOVING A MOVABLE PART OF A LAST FOR FOOTWEAR

(57) Device (1) adapted to move a movable part (2M) of a last (2) for footwear, whereby said movable part (2M) is articulated to a fixed part (2F) by means of a hinge (20) adapted to guide its movement along an arch-shaped trajectory, said fixed part (2F) is secured to an upright (3), so that the last (2) is arranged with the sole facing upwards, and whereby the last (2), by means of the device (1), can assume a configuration for inserting the upper (K), in which the movable part (2M) is offset upwards with respect to the fixed part (2F), and a working configuration (W) in which the same fixed (2F) and movable (2M) parts are aligned. The device (1) further comprises a connecting rod (10), interposed between a stem (4) of a vertically operated linear actuator, and a head (12) made integral with said movable part (2M); whereby the connecting rod (10) is induced to oscillate to connect the rectilinear actuation of the linear actuator with the arc movement of the set of the head (12) and the movable part (2M), and whereby the device (1) further includes a protective casing (5) formed by several elements (1), to cover the dynamically variable space which remains between the upright (3) and the connecting rod (10), or between the upright (3) and the head (12), so as to avoid injuries to the fingers of the operator.

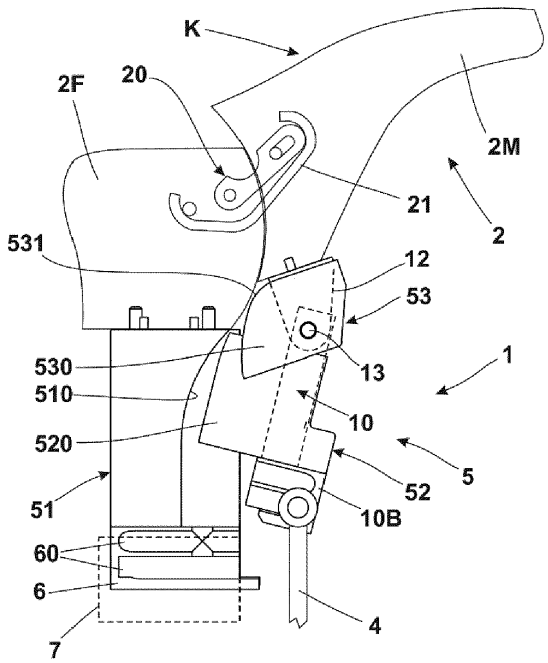

FIG. 8

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Description

TECHNICAL FIELD

[0001] The present invention relates to the technical field of equipment for footwear manufacturers.

[0002] For the production of footwear, lasts are frequently used, on which uppers are fitted to carry out different steps of the production cycle, well known to those skilled in the art.

[0003] For example, the aforesaid lasts are made of resin, by means of guided cutters based on 3D mathematical models, so that they have the right anatomy, correctly scaled based on the numbering to be obtained.

[0004] The most common lasts are in a single piece, but lasts are also known which are in two pieces jointed together, where one relates to the area of the heel and the other the sole and the toe.

The articulation between the two pieces allows them to be offset according to a longitudinal plane to the same last, to facilitate the insertion or extraction step of the upper, in particular when working with shorter or taller boot models, or in any case uppers which due to their shape may be more difficult to fit on a monoblock-type last.

BACKGROUND ART

[0005] In order for certain processes to be performed, the lasts are mounted on the machinery with the sole facing upwards, so that the insertion of the upper occurs with movement from the top downwards.

[0006] The fixed part of the last is secured at the top of an upright, more or less high as a function of the footwear models to be processed, while the movable part is moved upwards, during said insertion of the upper, and then lowered, to return aligned with the fixed part, and allow the upper to assume its normal configuration.

[0007] Usually, the movement of the movable part of the last is mechanized by means of pneumatic actuators, which act with the interposition of a lever kinematic mechanism capable of converting the rectilinear translations of the actuators into the correct movement of the movable part, in accordance with the trajectory given by its articulation geometry.

[0008] The aforesaid kinematic mechanism is located adjacent and close to the aforementioned upright, in front or behind it, depending on whether the movable part of the last is the front or the rear.

[0009] In the solutions of the prior art, said kinematic mechanism performs a succession of horizontal and vertical translations, with excursions which can be excessive, as allowed by the shaft of a boot fitted on the last.

[0010] This causes malfunctions and/or causes abnormal stresses on the shaft itself.

[0011] The movable parts forming said kinematic mechanism are also intended to remain visible and accessible in the absence of an upper on the last, during the insertion thereof or when the upper is of the low type.

[0012] It follows that such movable members are dangerously accessible by the operator's fingers and therefore there is a serious risk of injury, which is certainly not allowed by the harmonised standards related to machinery safety.

Clearly, this lack of conformity does not depend on the fact of processing boots rather than footwear with low uppers.

SUMMARY OF THE INVENTION

[0013] The object of the present invention is therefore to propose a device for moving a movable part of a last for footwear which is capable of overcoming the drawbacks complained of with the solutions of the prior art, in particular using a single linear actuator with vertical movement and a kinematic mechanism which has dimensions and excursions outwards which are as small as possible, so as to be able to act even inside narrow shafts.

[0014] Another object of the invention relates to the desire to make the kinematic mechanism absolutely safe against the risk of injury in any operating condition, even when it remains visible and accessible, in order to meet the requirements of current regulations.

[0015] A further object of the invention is to obtain a device which can be better integrated with the adjacent upright, as regards the regularity of the last and the maximum dimensions in width, to facilitate the insertion and extraction operations in particular of high boots.

[0016] Yet another object of the invention is to provide a device equipped with constructive expedients which facilitate and speed up its assembly and disassembly on and from machinery load-bearing structures in general.

[0017] These and other objects are fully achieved by means of a device for moving a movable part of a last for footwear, in which said movable part corresponds to the areas of the sole and toe, and is articulated to a fixed rear part by means of a hinge suitable for guiding its movement, which is substantially arch shaped, in a longitudinal plane to the last itself, with the latter intended to be arranged with the sole facing upwards, by means of an upright to which said fixed rear part is secured, and with said device adapted to actuate said movable part to switch the configuration of the aforementioned last from a configuration for inserting the upper, in which said movable part is offset upwards with respect to the fixed rear part, to a working configuration in which the same fixed and movable parts are aligned, to arrange an upper fitted on the last in a standard position.

The aforesaid device comprises: a connecting rod, arranged almost vertically in front of and close to said upright and articulated below to the stem of a vertically operated linear actuator; a head made integral with said movable part of the last and hingedly constrained to the upper part of said connecting rod, with the latter included for slightly oscillating in said longitudinal plane of the last, during said switching of the configuration of the latter, as

a consequence of the rectilinear actuation received by said linear actuator and of said arc movement of the set of the head and movable part.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The features of the invention will become apparent from the following description of a preferred embodiment of the device for moving a movable part of a last for footwear of the object, in accordance with what is proposed in the claims and with the aid of the attached drawings, in which:

- Fig. 1 illustrates a side view of a preferred embodiment of the device in question;
- Fig. 2 illustrates a top plan view of Fig. 1;
- Fig. 3 illustrates a cross-section obtained according to plane III-III of Fig. 1;
- Fig. 4 illustrates a longitudinal section of the device of Fig. 1, to better highlight its interior;
- Fig. 5 illustrates an axonometric view of the device of Fig. 1;
- Fig. 6 illustrates an exploded view of the device of Figs. 1 and 5;
- Figs. 7 and 8 illustrate the device associated with a last for footwear, in the two characteristic configurations of the latter controlled by the device itself.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0019] In the figures listed above, the reference number 1 indicates the movement device object of the present invention, as a whole.

[0020] The device 1 is provided for moving a movable part 2M of a last 2 for footwear, also comprising a fixed part 2F.

[0021] By way of non-limiting example, a last 2 was considered in which said movable part 2M corresponds to the areas of the sole and toe, and is articulated to the fixed part 2F, corresponding to the area of the heel, by means of a hinge 20.

[0022] The hinge 20, in a manner known per se, is of the type in which an arm 21 is included for the adjustment of the setup, and is designed to guide the movement of the movable part 2M with a substantially arch-shaped trajectory, in a longitudinal plane of the same last 2.

[0023] In the figures, in accordance with what has already been said in the introduction, the last 2 is arranged with the sole facing upwards, by means of an upright 3 to which said fixed rear part 2F is secured.

[0024] The device 1, described below, is adapted to actuate the movable part 2M to switch the configuration of the last 2 from a configuration for inserting an upper K in which said movable part 2M is offset upwards with respect to the fixed rear part 2F (Fig. 8), to a working configuration W in which the same fixed 2F and movable 2M parts are aligned (Fig. 7), to arrange an upper (not shown) fitted on the last in a standard position.

[0025] The device 1, according to the invention, comprises a connecting rod 10, arranged almost vertically in front of and close to said upright 3 and articulated below, at a first fulcrum 11, to the stem 4 of a vertically operated linear actuator (not illustrated, as known).

[0026] The coupling between the first fulcrum 11 and said stem 4 can be permanent or can be inserted/disconnected by means of automatic gripping devices, as better specified below.

[0027] A head 12 is made integral with the movable part 2M of the last 2, the latter also being hingedly constrained, at a second fulcrum 13, to the upper part of the connecting rod 10.

[0028] During the switching of the last 2 from the insertion configuration of the upper K to the working configuration W, and vice versa, the connecting rod 10 is induced to slightly oscillate in said longitudinal plane of the last 2 as a consequence of the rectilinear actuation received by said linear actuator and the arc movement of the set of the head 12 and movable part 2M (see in particular Figs. 7 and 8).

[0029] The device 1 is advantageously provided with a protective casing 5, intended to cover at least the space interposed between the upright 3 and the connecting rod 10, or between the same upright 3 and head 12, dynamically variable from a minimum to a maximum as a consequence of the aforementioned oscillations of said connecting rod 10 and head 12.

[0030] In the preferred constructive solution illustrated, the protective casing 5 comprises:

a first sheath 51, provided to cover the upright 3;
a second sheath 52, fitted on and integral with the connecting rod 10, developed in height up to below the aforementioned second fulcrum 13 and provided with side shoulders 520 extended horizontally to partially surmount said first sheath 51, in contact with the latter;
a cover 53, placed to cover said head 12, constrained as well to the aforementioned second fulcrum 13 of the connecting rod 10 and provided with side wings 530 extended horizontally to partially surmount said first sheath 51 and with the possibility of surmounting the second sheath 52 as well, as a consequence of the positions dynamically assumed by the same connecting rod 10 and head 12 for the action of the aforementioned linear actuator (see again Figs. 7 and 8).

[0031] Advantageously, the first sheath 51 is laterally provided with recesses 510 intended to house the aforementioned side shoulders 520 of the second sheath 52 and said side wings 530 of the cover 53, so that the same shoulders 520 and side wings 530 do not protrude from the maximum width of the same first sheath 51 (see Figs. 1, 2, 3, 5).

[0032] The side wings 530 of the cover 53 have the free ends 531 suitably shaped in an arc of a circle, so as to reduce their horizontal length in the upper part by a

sufficient quantity to prevent interference between the same cover 53 and the fixed part 2F of the last 2, as a consequence of the positions dynamically assumed by the set of the head 12 and the movable part 2M of the last 2 upon action of the aforementioned linear actuator.

[0033] The described first and second sheath 51, 52, as well as the cover 53 are preferably made of synthetic material capable of withstanding the temperatures of the oven in which the last passes (about 90°).

[0034] To obtain geometrically and dimensionally precise shapes as well as perfectly polished surfaces, it is possible to use a modern 3D printer or conventional injection moulds, depending on the number of specimens to be produced.

[0035] Fig. 4 shows screw members which stabilize the couplings between the protective casing elements 5 and the respective members to which they are associated, which are not described in detail as they are intuitively understood,

[0036] The device 1 can further include a base 6, made integral with the lower part of the aforementioned upright 3 and laterally shaped with horizontal grooves 60, intended to be engaged by jaws of a rapid fastening member 7, schematically illustrated with dashed lines in Figs. 7 and 8.

[0037] Said rapid fastening member 7 can be associated with a bearing structure, generally understood and not illustrated, for example of a machine or other mechanical member.

[0038] In the presence of said base 6, the connecting rod 10 is advantageously formed by a lower block 10B from which a rod 10a extends upwards.

[0039] The lower block 10B, in which said first fulcrum 11 is located, has the same cross-section as that of said base 6, of which it constitutes an extension in practice, such that in said working configuration W of the last 2 the base 6 and the lower block 10B are seamlessly aligned and mutually approached.

[0040] The rod 10a instead has a thinned section with respect to the lower block 10B in order to be able to insert into the respective second sheath 52, allowing the latter to have width dimensions not exceeding those of the same lower block 10B.

[0041] The presence of the base 6 and the lower block 10B are very useful if the last 2 and the device 1 are associated with a pallet (not shown), moved along a transport line of a machine, together with other pallets with respective lasts 2.

[0042] In such an application, the pallet is provided with the rapid fastening member 7, with which the base 6 and thus the fixed rear part 2F of a last 2 are secured; a suitable opening in a position below the aforementioned lower block 10B is obtained on the pallet platform.

[0043] When the pallet is stationary in a work station, a first stroke of a vertical actuator is operated whose stem 4 carries at the top a gripper (not shown), so as to lift the latter through said opening of the pallet up to the height of the lower block 10B.

[0044] By means of suitable power members, the gripper closes, engaging the lower block 10B at the aforementioned first fulcrum 11 of the connecting rod 10, thus leaving it the possibility of oscillating.

[0045] The same vertical actuator (or another in series with the first) imparts a second upwards stroke to the connecting rod 10, calibrated to obtain the movement of the movable part 2M of the last 2, as described above.

[0046] The pallet will certainly be equipped with special protective walls which rise to the sides of the opening to avoid operator access in the area where the parts described above move.

[0047] Before the pallet with the respective last 2 leaves said work station, it is obviously necessary to disengage the gripper from the lower block 10B and lower everything below the pallet itself.

[0048] From the foregoing description and the attached drawings, the peculiar features of the device proposed with the present invention emerge with extreme clarity, which allows to operate the movable part of the last using a single linear actuator with vertical movement and a kinematic mechanism which has reduced dimensions and excursions towards the outside, so as to be able to act even inside narrow shafts.

[0049] By virtue of the presence of the protective casing, equipped with original constructive expedients aimed at always covering any opening, the device becomes absolutely safe against the risk of injury, even when the kinematic mechanisms remain visible and can be accessed by the limbs of an operator.

[0050] This important prerogative allows to meet the requirements of current regulations and, consequently, provide a valid declaration of conformity to buyers.

[0051] It is important to note that the stylistic study of the sheaths and the cover forming the protective casing has allowed to obtain an aesthetically valuable last, also covering and integrating the adjacent upright, and free of roughness, to facilitate the insertion and extraction operations, in particular of high boots.

[0052] The presence of the optional base is advantageous to make it easy and quick to assemble and disassemble the device on and from machinery bearing structures in general.

It is understood, however, that the foregoing is of exemplary and non-limiting value, therefore any variations of detail which may become necessary for technical and/or functional reasons, are considered from now on to fall within the same protective scope defined by the following claims.

Claims

1. Device for moving a movable part of a last for footwear, in which said movable part (2M) corresponds to the areas of the sole and toe, and is articulated to a fixed rear part (2F) by means of a hinge (20) suitable for guiding its movement, which is substantially

arch shaped, in a longitudinal plane of the last (2) itself, with said last destined to be arranged with the plant facing upwards, by means of an upright (3) to which said fixed rear part (2F) is secured, and with said device (1) adapted to actuate said movable part (2M) to switch the configuration of the aforementioned last from a configuration for inserting the upper (K), in which said movable part (2M) is offset upwards with respect to the fixed rear part (2F), to a working configuration (W) in which the same fixed (2F) and mobile (2M) parts are aligned, to place an upper fitted on the last (2) in a standard position, said device (1) being **characterized in that** it comprises: a connecting rod (10), arranged almost vertically in front of and close to said upright (3) and articulated below at a first fulcrum (11) to the stem (4) of a vertically operated linear actuator; a head (12) made integral with said movable part (2M) of the last (2) and hinged, at a second fulcrum (13), to the upper part of said connecting rod (10), with the connecting rod (10) provided for slightly oscillating slightly in said longitudinal plane of the last (2), during said changeover of the configuration of the last, as a consequence of the rectilinear actuation received by said linear actuator and of said arc movement of the head (12) and mobile part (2M)

2. Device according to claim 1, **characterized in that** a protective casing (5) is provided to cover at least the space interposed between said upright (3) and connecting rod (10), or between said upright (3) and head (12), dynamically variable from a minimum to a maximum as a consequence of the aforementioned oscillations of said connecting rod (10).

3. Device according to claim 2, **characterized in that** said protective casing (5) comprises: a first sheath (51), provided to cover said upright (3); a second sheath (52), fitted on said connecting rod (10) and integral with it, developed in height up to the aforementioned second upper fulcrum (13) and provided with side shoulders (520) extended horizontally to partially surmount said first sheath (51), in contact with the it; a cover (53), placed to cover said head (12), constrained as well to said second fulcrum (13) of the connecting rod (10) and provided with side wings (530) extended horizontally to partially surmount said first sheath (51) and able to surmount said second sheath (52) too, as a consequence of the positions dynamically assumed by the connecting rod (10) and head (12) due to the action of the aforementioned linear actuator.

4. Device according to claim 3, **characterized in that** said first sheath (51) is laterally provided with recesses (510) intended to house said side shoulders (520) of the second sheath (52) and said side wings (530) of the cover (53), so that the shoulders (520) and side wings (530) do not protrude from the maximum width of the first sheath (51).

5. Device according to claim 3, **characterized in that** said side wings (530) of the cover (53) have free ends (531) shaped in an arc of a circle, so as to reduce their horizontal length in the upper part by a sufficient quantity to prevent interference between the same cover (53) and said fixed part (2F) of the last (2), as a consequence of the positions assumed by the head (12) and the moving part (2M) assembly of the last (2) upon action of the aforementioned linear actuator.

6. Device according to claim 1, **characterized in that** a base (6) is provided, made integral with the lower part of said upright (3) and laterally shaped with horizontal grooves (60) intended to be engaged by jaws of a rapid fastening member (7), said rapid fastening member (7) being associated with a bearing structure, **in that** said connecting rod (10) is formed by a lower block (10B) from which a rod (10A) extends upwards, with said lower block (10B) having the same cross section of said base (6) and bearing the aforementioned first lower fulcrum (11) of the connecting rod (10), and with said rod (10A) having a thinned section with respect to the aforementioned lower block (10B) and bearing, at the upper end, said second fulcrum (13) of the connecting rod (10), and **in that** in said working configuration (W) of the last (2) said base (6) and said lower block (10B) are aligned and mutually approached.

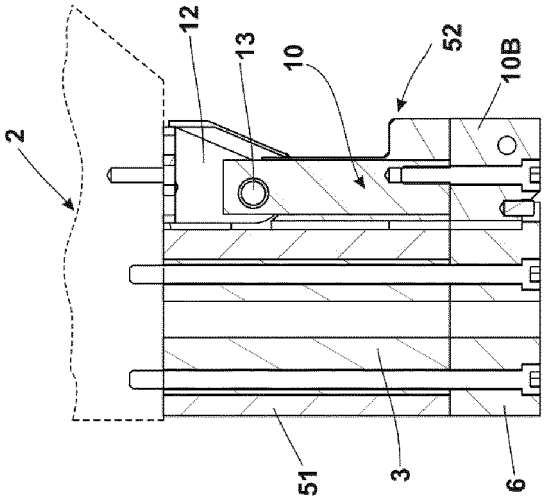


FIG. 4

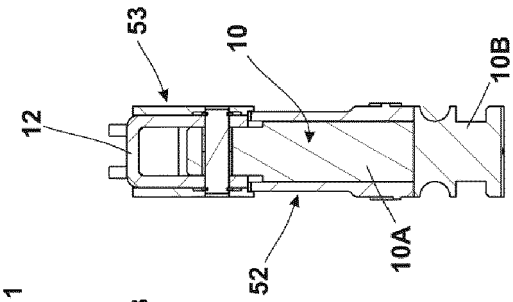


FIG. 3

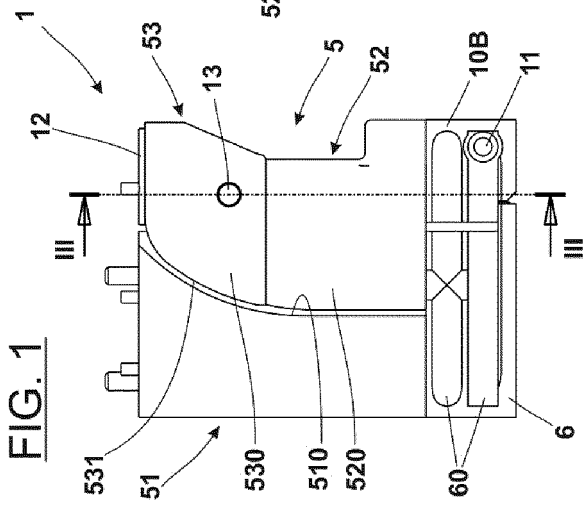


FIG. 1

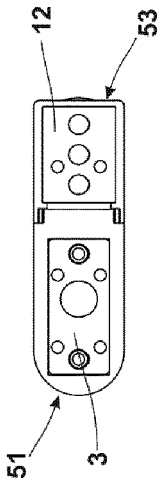


FIG. 2

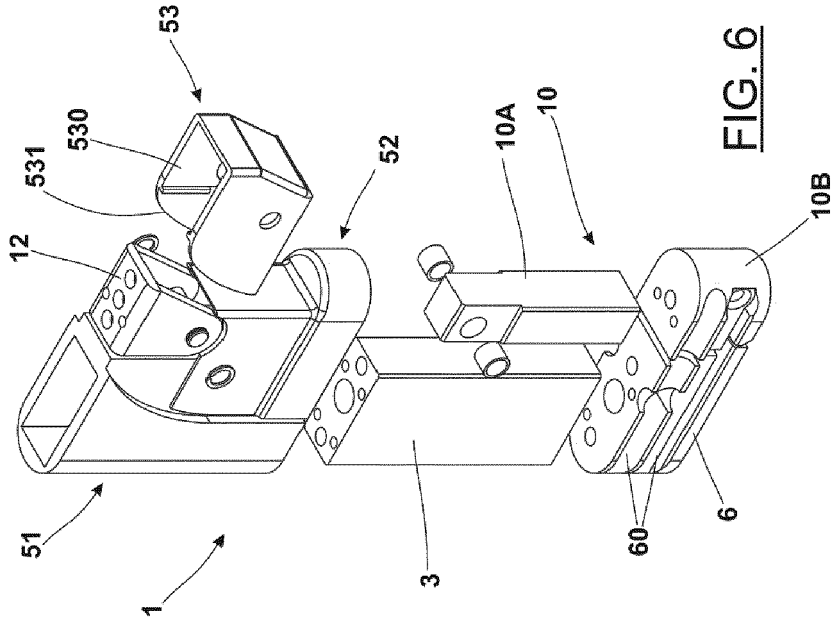

53
530
531
12
52
10A
10
10B
51
1
3
60
6

FIG. 6

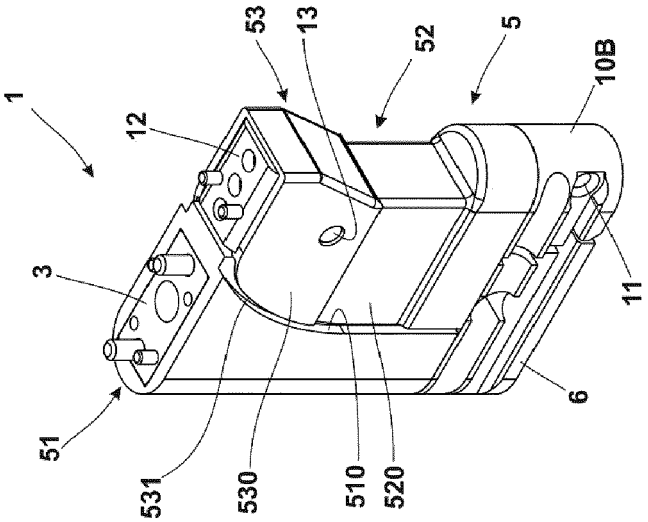

1
53
13
52
5
10B
12
3
11
51
531
530
510
520
6

FIG. 5

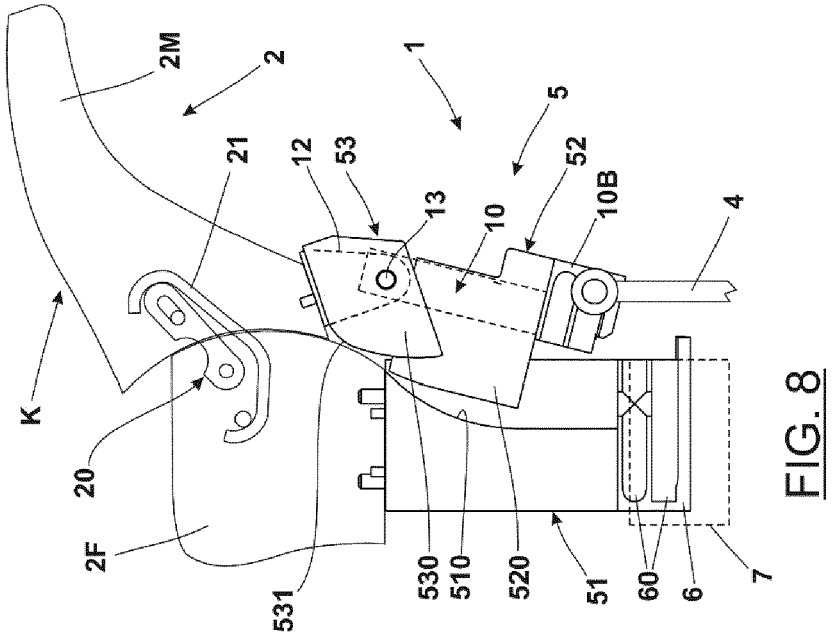
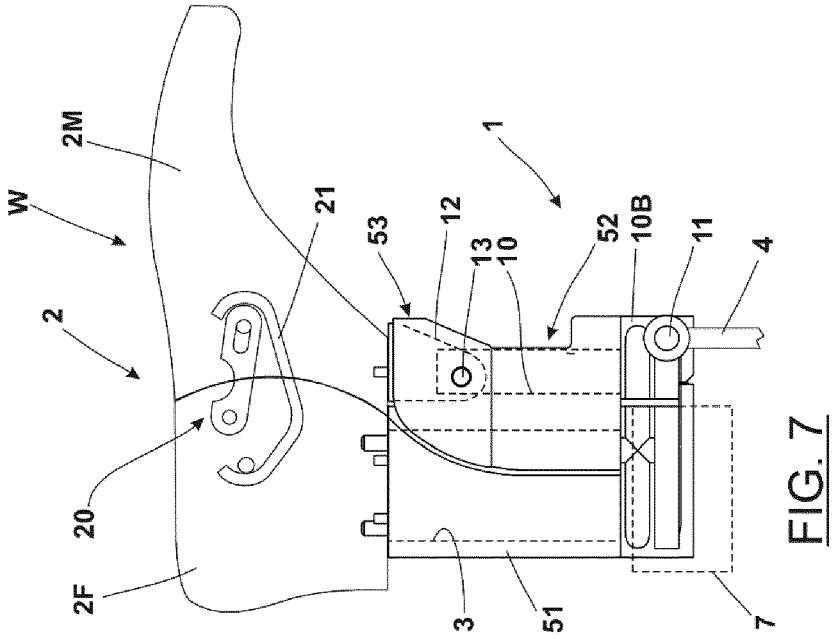

2M
2
1
5
21
12
53
52
10B
13
10
4
K
20
2F
531
530
510
520
51
60
6
7

FIG. 8


2M
1
W
21
53
12
52
10B
11
13
10
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3
51
7

FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 22 17 5599

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 2 467 237 A (SHERMAN ROY E ET AL) 12 April 1949 (1949-04-12)	1	INV. A43D3/02
A	* column 1, lines 1-32; column 2, line 33 - column 3, line 55; claims; figures *	2-6	
Y	DE 35 12 510 A1 (WIESER GMBH [DE]) 16 October 1986 (1986-10-16)	1	
A	* page 1, first paragraph; page 8, second paragraph - page 10, first paragraph; claims; figures *	2-6	
A	DE 40 10 458 A1 (ECCOLET SKO AS [DK]) 25 October 1990 (1990-10-25) * the whole document *	1-6	

TECHNICAL FIELDS SEARCHED (IPC)

A43D
B29D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 September 2022	Clivio, Eugenio

CATEGORY OF CITED DOCUMENTS

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27-09-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82