(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 730 686 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
28.10.2020 Bulletin 2020/44

(51) Int Cl.:
D06C 5/00 *(2006.01)* ***D06B 11/00*** *(2006.01)*
D06C 23/02 *(2006.01)* ***D06M 10/00*** *(2006.01)*

(21) Application number: **19382319.2**

(22) Date of filing: **26.04.2019**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(71) Applicant: **Motocono, S.A.**
08226 Terrassa (ES)

(72) Inventor: **MARTÍ COMERMA, Carlos**
08225 Terrassa (ES)

(74) Representative: **Sugrañes Patentes y Marcas**
Calle Provenza 304
08008 Barcelona (ES)

(54) **MANNEQUIN, MACHINE AND SYSTEM FOR THE LASER MARKING OF TROUSERS**

(57) The invention relates to a mannequin (1) for supporting a pair of trousers whereon a laser marking is performed, comprising two leg structures (2) to be housed on the inside of the trouser legs. Each structure is defined by a respective imaginary longitudinal axis (20) wherein the respective trouser leg extends, an upper area (21), a lower area (22), a front plane (23), a rear plane (24), an inner side (25) and an outer side (26) whereon the outer edge is arranged, which goes from the waist to the lower end of the trouser leg. The separation distance between the inner side and the outer side is variable by means of a respective tensing mechanism (3), each structure being able to adopt and go from a non-operative loosened position (A) to a maximum tensed end position (B) in order to perform the marking. The leg structures (2) are coupled in an articulated manner to a main rotation axis (5) around which they are able to rotate, parallel to the direction of the dimension of the rise of the pair of trousers or collinear with said direction, the front planes (23) of the two leg structures (2) being able to form between each other at least two angles greater and/or less than 180°.

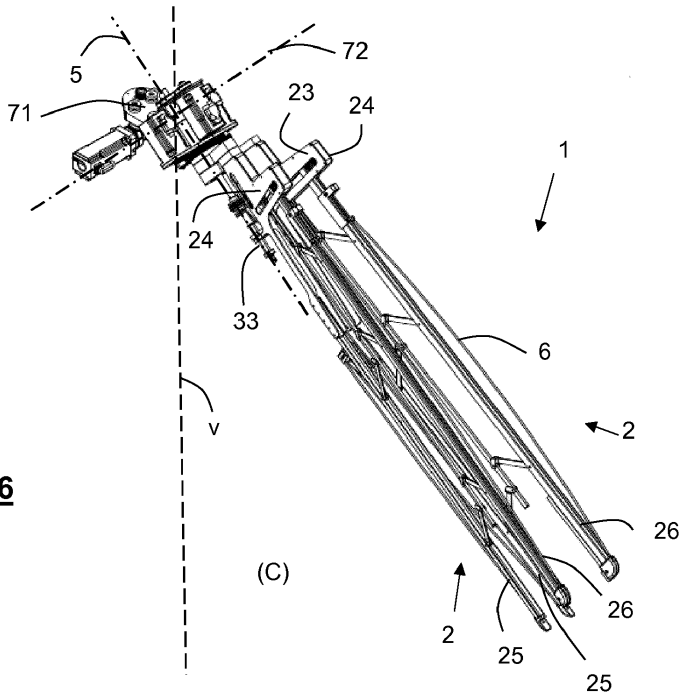


Fig. 16

EP 3 730 686 A1

Description

Technical field of the invention

[0001] The present invention relates to a mannequin as a support structure for a pair of trousers whereon laser marking operations are carried out in order to give the article a worn appearance in located areas.

[0002] The invention also relates to an assembly made up of said mannequin and a movement cart, as well as a machine for loading and exposing trousers to the action of a marking laser. The machine comprises at least two sets of a mannequin and a cart and distinguishing therein a loading area of the garment on a mannequin arranged in said area and a marking area wherein the surface of the pair of trousers loaded on another mannequin is exposed oriented towards an apparatus emitting a laser beam in order to be marked.

[0003] Finally, the invention also envisages a system made up of the cited machine for loading and exposing trousers to the actions of a marking laser.

Background of the invention

[0004] Jean trousers, also called jeans, with a worn appearance are already commonly included in the clothing in most closets. This worn appearance is given by the contrast of certain decoloured marks arranged in specific areas of the surface of the pair of trousers. The marking of said areas is performed by a laser treatment, wherein an apparatus emitting at least one laser beam reproduces a worn pattern on the surfaces of the pair of trousers (front, rear, rise area of the pair of trousers, etc.). The laser beam directed towards the surface to be treated is transformed into a local heating point which causes the evaporation of the inks of the fabric of the area focused on and successively the spot of the laser starts to trace the design of the worn pattern.

[0005] During the laser marking operation, it is essential for the surface of the pair of trousers to stay stretched or tensed, without wrinkles, in order to ensure a result in accordance with what is desired.

[0006] At first, machines which were used for marking consisted of a work table with a flat horizontal support surface whereon the flattened pair of trousers was arranged manually, and whereon an arm was arranged which projected the laser beam downwards on the areas of the pair of trousers oriented upwards. Specifically, in order to minimise the wrinkles in the area to be treated, one of the trouser legs was arranged on the work table, with the rise area of the pair of trousers resting on an edge of the table and the other trouser leg hanging from said edge. Then, for the other half of the pair of trousers, the pair of trousers was taken and the other trouser leg rested on the work table. In order to mark the areas exposed on the other face of the pair of trousers, it had to be flipped over on the flat support surface and proceed in the same manner with the two trouser legs. In order to mark other areas, such as that of the rise of the pair of trousers, the pair of trousers could be arranged resting and folded along it, with the two trouser legs on top of each other resting on the table. Nevertheless, in this type of machine the fabric of the area of the pair of trousers to be marked was not sufficiently tensed and the wrinkles caused deviations in the marking and therefore, flaws in the trousers, without mentioning that the results of the marking in the rise area were difficult due to the wrinkles present in said area and the impossibility of tensing said area, specifically where the two trouser legs are joined. Patent document WO03/029545, in Fig. 1, describes this type of first machines for marking provided with horizontal work tables whereon the trousers rested, and in particular, it underscores the poor results obtained in the marking of the rise area of the pair of trousers, shown in Fig. 2.

[0007] In order to solve these drawbacks, mannequins with open legs were developed whereon the trousers are mounted and said mannequins are exposed to the effects of the laser beam, moving them from one side to the other and being able to turn them around for the marking of the front and rear surfaces. These mannequins make up the current machines for laser marking, wherein a loading area of the pair of trousers on the mannequin is distinguished, and a laser-marking area, normally opposite from the loading area, wherein the pair of trousers placed on the mannequin is exposed in the different areas thereof to the effects of the laser beam emitted by a laser-emitting apparatus oriented towards the exposure area.

[0008] There are machines for laser marking of trousers wherein the loading station and the marking station are each provided with a mannequin and said mannequins are arranged on a common rotating arm each one occupying an opposite end, such that when it rotates, the mannequin whereon the pair of trousers to be marked has been loaded rotates and goes from the loading station to the marking one, and the mannequin wearing the pair of trousers whereon the marking has been performed in the marking station goes to the loading station, wherein the pair of trousers will be taken off the mannequin by an operator who will soon have a new pair of trousers to mark. Patent document WO03/029545 shows in figure 3 thereof a machine similar to the one described.

[0009] This type of machine has the drawback that once a pair of trousers has been loaded on the mannequin of the loading station, this already-loaded mannequin cannot go to the marking station until the entire laser treatment of the pair of trousers on the mannequin of the marking station has completely ended, which is when the rotating arm will rotate and the two mannequins will trade positions.

[0010] The mannequins for supporting a pair of trousers, commonly known in the sector as trouser holders, reproduce the geometry of the legs from the ankles to the waist in a position with open legs. Each mannequin comprises two leg structures securely joined to each other suitable to be housed inside the trouser legs of the trousers to be marked, wherein each leg structure is de-

fined by a respective imaginary longitudinal axis wherein the respective trouser leg extends, an upper portion whereon the portion encompassing the rise of the pair of trousers (from the joining of the trouser legs to the waist of the pair of trousers) is arranged, a lower portion, in correspondence with the ankle area of the pair of trousers, through which the pair of trousers is introduced on the mannequin, a front portion whereon the front portion of the trouser leg is arranged, a rear portion whereon the rear portion of the trouser leg is arranged, an inner lateral segment whereon the inner edge is arranged which starts from the joining of the trouser legs to the lower end of the respective trouser leg, and an outer lateral segment, opposite from the inner one, whereon the outer edge is arranged which starts from the waist to the lower end of the trouser leg. Each mannequin is attached to a tensing mechanism by which the surface of the pair of trousers covering it goes from a loosened state to a maximum tensed state wherein the surface of the pair of trousers is extended and without wrinkles, prepared to receive the laser marking.

[0011] Some of these mannequins comprise inflatable portions for tensing the portions of the pair of trousers to be marked, like the ones described in the publication of patent application WO03/029545, referring to a method of laser tracing spots on the surface of articles of clothing and a system to carry it out, and in the publication of patent ES2640831-B2.

[0012] Patent document WO03/029545 describes a machine provided with two inflatable mannequins with the arrangement of a common rotating arm mentioned previously. Each mannequin comprises a frame or guide that bears grip means and adjustment means suitable for arranging the garment in the position that it takes when it is worn. The grip means comprise a pair of hangers shaped as an L contour and arranged opposite to each other which move away from each other in order to grip the pair of trousers by the waist. With respect to the adjustment means, these comprise a pair of air chambers connected to compressed air feeding means suitable for inflating them, and a pair of rods, each one arranged on one side of the mannequin, which rotate with respect to a corresponding hanger to which they are articulated by the effects of operation actuators.

[0013] The air chambers are connected through respective sleeves to the compressed air feeding means connected to a plant's compressed air distribution network. Each air chamber is placed outside of a supporting tubular element respectively and inside of a modular tubular structure which is characterized by a number of mutually coaxial tubular sleeves and arranged one after the other. These can be moved according to the two longitudinal axes wherein each tubular element extends in order to determine the areas wherein the air chambers are free so that, properly inflated, they can expand freely, creating inflated areas which make it so the fabric placed over it is tensed and extends without wrinkles. By inflating said chambers, the lateral rods are inclined with the lower ends thereof on the outside having just tensed the pair of trousers. Despite the fact that the rise area of the pair of trousers extends with the inflating of the chambers, it is difficult to frontally position the joining area between the trouser legs, since no matter how much the mannequin rotates, the inflating of the legs hides a portion of this area and the laser cannot act on some of the points.

[0014] In document ES2640831-B2, the mannequins comprise two leg structures symmetrical to each other which extend according to a respective longitudinal direction, wherein each leg structure has a front portion corresponding to the front portion of the trousers, a rear portion, and an inflatable balloon arranged in the rear portion thereof. Each inflatable balloon in turn comprises an upper edge, a lower edge, an inner lateral segment with an inner edge, close to the other leg structure, and an outer lateral segment with an outer edge, opposite from the inner lateral segment, wherein said inflatable balloon has a longitudinal axis which passes through the geometric centre thereof and is parallel to the longitudinal axis of the corresponding leg structure.

[0015] Apart from the inflatable balloon, each leg structure comprises a flat front face and a flat rear face and a hollow space between both of them wherein an outer rod and an inner rod are housed, wherein the lower ends of said outer and inner rods are joined to a mechanism for unfolding the rods. The unfolding mechanism comprises, for each leg structure, a movable guide along the leg structure, two unfolding arms, each one with a free end joined in an articulated manner to said movable guide and a free end, and a support arranged below said movable guide. The movable guide is suitable for moving between an unfolded position, wherein it is closer to the support, and a folded position, wherein it is further away from the support. Furthermore, the unfolding mechanism also comprises two connecting rods, each of which has an end joined in an articulated manner to an intermediate point of the corresponding unfolding arm and the other end joined to the support, wherein, both in the folded position and in the unfolded position, the free end of each unfolding arm is below the end joined to the movable guide, such that, when they are unfolded, both unfolding arms have an upside-down V shape. Thus, the surface of the pair of trousers whereon the marking is to be performed is tensed by the inflatable balloon and by the free ends of the connecting rods when the arms are unfolded.

[0016] With respect to the marking of the rise area of the pair of trousers, said document ES2640831-B2 envisages in the mannequin an adjustment system for the rise of the pair of trousers, comprising a height adjustment bar which extends from the top downwards between the space existing between the two leg structures and a cross guide, arranged on the lower end of the adjustment bar, which has two longitudinal through holes each of which houses on the inside thereof one of the inner rods of one of the leg structures.

[0017] In the mannequins used until now there is still the difficulty of suitably exposing the rise area of the pair

of trousers oriented towards the laser beam for the marking thereof, since especially the joining area between the trouser legs stays partially hidden by the considerable volume adopted by the trouser legs when the balloons or air chambers provided therein are inflated.

[0018] Another drawback which comes with the marking on this type of mannequins is that the operator must bend over each time he/she loads a pair of trousers on the mannequin in order to make it pass the space of the waist and subsequently the two trouser legs through the lower end of the two leg structures of the mannequin and manually slide the pair of trousers upwards, the operator getting up in order to fasten it to the gripping means which are provided in the upper portion of the mannequin. Once the pair of trousers is gripped from the top, the tensing is executed and the operator revises the front and rear surfaces of the trouser legs, stretching the pair of trousers by hand until there are no more wrinkles in the areas to be marked. Likewise, once the pair of trousers has been marked in the areas planned according to the design pattern, the pair of trousers is then loosened and the operator must pull the pair of trousers downwards by hand and bend over again in order to take it off the two leg structures. These operations entail, apart from considerable time due to the manual operations, unsuitable positions for the operator which with time can create joint and back pain.

[0019] It would be desirable to provide a mannequin and a machine for loading and exposing a mannequin to a laser beam which would overcome the mentioned drawbacks, ensuring a precise reproduction on the pair of trousers of the pattern of wear marks in any area of the pair of trousers, including the joining area of the two trouser legs starting from which the rise of a pair of trousers is defined as the distance between said area and the waist, and that the loading of the pair of trousers onto the mannequin implies less physical effort for the operators.

Description of the invention

[0020] With the object of providing a solution to the proposed drawbacks, it discloses a mannequin for supporting a pair of trousers whereon a laser marking is performed, known in the sector as a trouser holder. The mannequin comprises two leg structures suitable to be housed on the inside of the trouser legs of the trousers to be marked.

[0021] Each leg structure is defined by a respective imaginary longitudinal axis wherein the respective trouser leg extends, an upper area whereon the portion encompassing the rise of the pair of trousers is arranged, a lower area, a front plane whereon the front portion of the trouser leg is arranged, a rear plane, opposite from the front plane, whereon the rear portion of the trouser leg is arranged, an inner side whereon the inner lateral edge is arranged, which goes from the joining of the trouser legs to the lower end of the respective trouser leg, and an outer side, opposite from the inner side, whereon the outer lateral edge is arranged, which goes from the waist to the lower end of the trouser leg.

[0022] The separation distance between the inner side and the outer side of each leg structure is variable by means of a tensing mechanism by which each leg structure can adopt and go from a non-operative loosened position to a maximum tensed end position by increasing the separation distance between the inner side and the outer side. In the maximum tensed end position, the front and rear portions of the trouser leg arranged on the leg structure are extended to the maximum, practically without wrinkles, in order to thus perform the laser marking on any of the portions to be marked.

[0023] Essentially, the mannequin object of the invention is characterised in that the two leg structures are coupled in an articulated manner to a main rotation axis around which they are able to rotate, the main rotation axis being an axis parallel to the direction of the dimension of the rise of the pair of trousers or collinear with said direction. In accordance with said articulated coupling, the front planes of the two leg structures can form a plurality of angles between them, at least two angles larger and/or smaller than 180°, apart from obviously being able to also form 180°. It is worth mentioning that since the front planes are opposite from the rear planes, when the two front planes of the leg structures rotate around the main rotation axis in order to adopt a position wherein they form an angle between them, the respective rear planes will form the angle resulting from subtracting from 360° the angle formed by the front planes.

[0024] By going from the non-operative loosened position to the maximum tensed end position, the distance between the inner side and the outer side of each leg structure has increased until it reaches a value which practically corresponds to the dimension of the width of the trouser leg in each segment, this width being understood as the one resulting from measuring one trouser leg from the lateral inner edge to the lateral outer edge with the pair of trousers flattened and stretched.

[0025] Preferably, the rotation or turning of a leg structure is performed independently from the rotation of the other leg structure, although configurations are also possible wherein they rotate in a dependent manner.

[0026] It is recalled that the rise of the pair of trousers is understood as the distance from the joining of the trouser legs of a pair of trousers to the waistband.

[0027] The capacity of the mannequin adopting different positions wherein the front planes of the leg structures thereof form, apart from 180°, larger and smaller angles, contributes to a better exposure to the laser of the fabric of the portions of the pair of trousers to be marked, since apart from the very maximum tensing of the maximum tensed end position, the surface to be marked can be oriented perpendicularly to the laser beam without hidden areas.

[0028] According to another characteristic of a preferred embodiment of the invention, each leg structure

comprises in the upper area thereof a support wherein the inner side and the outer side are supported, and through which the leg structure is coupled in an articulated manner to the main rotation axis.

[0029] According to another characteristic of this preferred embodiment, each support is attached to corresponding first transmission means in turn coupled to corresponding first motor means through which an independent rotation is provided for each leg structure around the main rotation axis, such that the front planes of the two leg structures are able to rotate independently around the main rotation axis and adopt different positions wherein the two front planes form between each other a plurality of angles comprised between 5° and 355°. Preferably, the two front planes can be arranged forming between each other angles comprised between 10° and 350°, and more preferably between 20° and 340°.

[0030] Preferably, the first motor means are made up of a servomotor, which favours a greater control of the torque applied. Alternatively, the first motor means can also be made up of stepper motors.

[0031] According to another advantageous embodiment of the invention, each leg structure has a respective adjustment device for the rise of the pair of trousers made up of a rise rod, contained in a plane comprised between the front plane and the rear plane of the leg structure, wherein the inner side and the outer side of the leg structure are also comprised. The lower end of the rise rod is joined to the lower end of the inner side and the upper end thereof is arranged in a rise point located at a certain separation distance with respect to the inner side in the direction opposite from where the outer side is found, calculated so that it corresponds with the joining point of the legs of the pair of trousers to be marked. Each size and model of trousers will have said joining point of the legs defined, the distance of which to the waistband defines the rise of a pair of trousers.

[0032] According to another characteristic of said embodiment, the upper end of the rise rod is removably joined to a projection which protrudes at a distance with respect to the inner side of the leg structure in an intermediate area of said side, the distance with which the projection protrudes being an adjustable distance according to the dimensions of the pair of trousers to be marked.

[0033] Preferably, the projection is made up of two parts joined telescopically, a fixed part which protrudes from the inner side and a part slidable along the inside of the fixed one and partially removable therefrom towards the outside, meaning, in the direction opposite from the one of the inner side. The upper end of the rise rod is joined to the end of the slidable part for which reason it will be located closer to or farther from the inner side of the leg structure according to how much the slidable part has been removed from the fixed part.

[0034] According to another characteristic of the mannequin of the invention and starting from the embodiment wherein it is envisaged that each leg structure comprises the aforementioned support wherein the inner side and the outer side are supported, and through which the leg structure is coupled in an articulated manner to the main rotation axis, it is foreseen that the tensing mechanism comprises second motor means and second transmission means coupled to an element movable linearly along the direction or a direction parallel to that of the main rotation axis, in one or the other direction according to the direction of rotation of the second motor means. The linearly movable element is arranged at the height of the supports of the leg structures with respect to which it is movable and it has a free end located above the joining of the trouser legs. The tensing mechanism further comprises, for each leg structure, an intermediate bar arranged parallel to and between the respective inner and outer sides, and due to the effects of the linear movement of the linearly movable element, it increases the separation distance of the intermediate bar with respect to the inner and outer sides when going from the non-operative loosened position to the maximum tensed end position, and decreases the separation distance when going from the maximum tensed end position to the non-operative loosened position.

[0035] According to another characteristic of the preferred embodiment of the invention, the intermediate bar is joined to the inner and outer sides of the same leg structure thereof by means of at least two connecting rods articulated on the two ends thereof and parallel to each other. The outer side and the intermediate bar of each leg structure are arranged such that they are movable with respect to the inner side moving away from or towards the inner side when going from the non-operative loosened position to the maximum tensed end position, and vice versa, when the free end of the linearly movable element is moved respectively, downwards, in the direction moving closer to the joining point of the trouser legs, or upwards, in the direction moving away from the joining point of the trouser legs.

[0036] According to another characteristic of the preferred embodiment of the mannequin, the tensing mechanism further comprises, for each leg structure, a cam partially housed in a respective support (the support located in the upper area) and with respect to which the cam is movable in a direction parallel to that of the movement of the linearly movable element, since the cam is integrally joined on one of the ends thereof to said linearly movable element and guided according to said direction inside the support. To do so, the cam is provided with a curved profile for the guided movement of the intermediate bar during the change thereof from the non-operative loosened position to the maximum tensed end position, and vice versa.

[0037] According to another characteristic of the invention, applied to an embodiment wherein each leg structure comprises in the upper area thereof a support wherein the inner side and the outer side are supported, and through which the leg structure is coupled in an articu-

lated manner to the main rotation axis, it is foreseen that the inner side and the outer side of each leg structure are made up of profiles or bars the length of which extends in a manner parallel to the longitudinal direction of a corresponding trouser leg, and wherein each support comprises on the inside thereof a guide for the movement of the corresponding outer side according to a trajectory perpendicular to the longitudinal direction wherein the outer side extends.

[0038] According to another characteristic applicable to any embodiment of the mannequin object of the invention, the outer side of each leg structure is provided with an outer flexible rod of which at least one portion is intended to come into contact with at least one portion of the outer lateral edge of the trouser leg of the pair of trousers when the leg structure is in the maximum tensed end position B. In the change to the maximum tensed end position B, the flexible rod, which is arranged in the side opposite from that of the inner side, will come into contact in some segment with the outer lateral edge of the leg of the pair of trousers and since it is flexible the form thereof will vary so that at least one portion protrudes more than another and fills the space inside the trouser leg until the outer lateral edge is tensed more (which would come to be the lateral seam of a trouser leg of the pair of trousers, which according to the model and size, can make the trouser leg wider in the hip portion than in the segment below the knee).

[0039] According to a second aspect of the invention, it discloses an assembly made up of a mannequin in accordance with any of the embodiments described previously and a movement cart provided with third motor means for the autonomous movement of the cart, the cart being joined in an articulated manner to the mannequin through a horizontal load rotation axis and perpendicular to the direction of the main rotation axis around which the mannequin is able to rotate and can adopt a trouser-loading position C. In this loading position C, the front planes or the rear planes of the two leg structures of the mannequin are arranged forming an acute angle and are contained in non-vertical planes, and the main rotation axis of the mannequin forms an acute angle with respect to the vertical direction, being able in said loading position C to load on the mannequin a pair of trousers folded on itself along the line defining the rise thereof. In fact, this same loading position C is also useful for the unloading of the pair of trousers from the mannequin.

[0040] According to a third aspect of the invention, it discloses a machine for loading and exposing trousers to a laser for the marking thereof, comprising a loading area, wherein the loading of a pair of trousers onto a mannequin is performed, and a marking area wherein the pair of trousers loaded on another mannequin is exposed to the external action of a laser for the marking thereof. In the machine object of the invention, the mannequin of the loading area and the mannequin of the marking area are two mannequins, each of which makes up a mannequin and cart assembly according to the assembly described in the previous paragraph. Furthermore, in the machine of the invention the carts are movable through the third motor means thereof along a guided trajectory for the transportation of the mannequins from the loading area to the marking area, and from the marking area to the loading area.

[0041] This configuration by which the mannequins can adopt the loading position C is very comfortable for the operator, since the trousers can be loaded on a mannequin folded around the rise of the pair of trousers, with the trouser legs almost or practically on top of each other (which we do when folding a pair of trousers lengthwise, around the axis of symmetry of the pair of trousers), by being able to arrange the front planes of the two leg structures of a mannequin by forming an acute angle (or an obtuse angle, depending on whether the pair of trousers is folded with the front trouser legs on the inside or on the outside), according to the capacity thereof to rotate around the main rotation axis. Furthermore, by being able to rotate the mannequin around the horizontal axis perpendicular to the main rotation axis and by being maintained with the main rotation axis thereof forming an acute angle (preferably around 45°), the mannequin can be arranged with the front and rear planes of the leg structures thereof in inclined planes, not vertical ones (understanding as a vertical plane the one perpendicular to the support base of the marking machine) and the lower ends of the leg structures, from where the mannequin is dressed with the pair of trousers, are thus higher and are further forwards than the rest of the mannequin, for which reason the operator loading the mannequin does not have to bend over in order to introduce the pair of trousers.

[0042] In summary, the operator does not have to load the pair of trousers in the habitual position thereof, with the waist extended (the front planes forming 180°) and bending over in order to pass underneath the pair of trousers, but rather the mannequin can be arranged in the loading position C thereof with the front planes forming an acute angle (preferably around 20°) and said planes being inclined with respect to the vertical plane, being able to load the pair of trousers folded along and from a height comfortable for arranging the lower portion of the mannequin at the height of their hands when the operator is standing.

[0043] According to a fourth aspect of the invention, it discloses a system for the laser marking of trousers comprising at least one machine like the one described previously and, furthermore, at least one auxiliary device for the automatic loading and/or unloading of trousers to be loaded and/or unloaded onto a mannequin located in the loading area of the machine.

[0044] The auxiliary system for the loading and/or unloading comprises a support base fixed on a surface such as a floor, a plurality of waiting supports, each of which in turn comprises a pair of oblong waiting profiles, wherein the waiting profiles of one same pair are parallel to each other, separated by a certain distance and they

have a length such that they receive the insertion of the two legs of a pair of trousers in a folded position around the rise line of the pair of trousers. The waiting supports are arranged inclined and cantilevered, with the upper ends free and with the lower ends thereof coupled to movement means by which the waiting supports are movable with respect to the support base and in a guided manner according to a trajectory. The auxiliary device for loading and/or unloading also comprises an introducing arm made up of an inclined guide rail, fixed with respect to the support base and arranged above and facing one of the waiting supports of the plurality of supports. The length of the guide rail is such that it protrudes above the cited waiting support, the upper end thereof being located at the same level or a higher level wherein the upper areas of the leg structures of a mannequin located in the loading area of the machine are located. The introducing arm is provided with projecting pushing means slidable along the guide rail and which protrude with respect to the guide rail towards the waiting support which it is facing at a distance such that the projecting pushing means are able to push a pair of trousers arranged folded over the waiting support and move it along the guide rail to the upper end thereof for the loading of the pair of trousers onto the mannequin. In exchange, if the auxiliary device is used for the unloading of marked trousers, the projecting pushing means push the marked and folded pair of trousers located on the mannequin and slide it downwards removing it from the mannequin and inserting it along the waiting support (free from the pair of trousers).

[0045] Preferably, the auxiliary device for loading and/or unloading is an automatic device, wherein each waiting support is able to be arranged in a point of the trajectory which follows in the movement thereof underneath the introducing arm, point wherein the inclination of said waiting support is parallel to the inclination of the introducing arm, and wherein the projecting pushing means of the introducing arm protrude from the guide rail in the separation space between the two waiting profiles of the waiting support located underneath.

[0046] The projecting pushing means slidable along the guide rail protrude with respect to the guide rail towards the waiting support, which it is facing, a distance such that the projecting pushing means are able to push the pair of trousers arranged folded over the waiting support and move it along the guide rail to the upper end thereof. The projecting pushing means can slide from the bottom upwards until they reach the joining area of the trouser legs of the pair of trousers folded over the waiting support facing it. As they slide towards the upper end of the introducing arm, the projecting pushing means drag the pair of trousers upwards, since it is pushed upwards by the joining area of the trouser legs, and they will carry it all the way up.

[0047] In order to make use of the auxiliary device for loading and/or unloading as an automatic loader, the first thing is to arrange a waiting support wherein a folded pair of trousers is supported and that this waiting support is facing the introducing arm. A mannequin free of a pair of trousers must also be placed, in the loading position C, meaning, with the front planes of the leg structures forming an acute angle (preferably around 20°) in order to receive a folded pair of trousers and also activate the suitable means for arranging the mannequin in the loading position C, with said front planes in non-vertical planes, and specifically with the same inclination that the introducing arm has. The two lower areas of the leg structures of the mannequin will be arranged after the respective waiting profiles which make up the waiting support, aligned with them. The projecting pushing means will start the ascension thereof and will push the folded pair of trousers carrying it upwards by the joining area of the trouser legs. As the pair of trousers is dragged upwards, it will start to leave the waiting support and will enter the leg structures of the mannequin until the mannequin is dressed.

[0048] Alternatively or additionally, the projecting pushing means can be provided with gripping elements such as for example clamps or hooking means, which grip or hook the waistband of the pair of trousers or a portion thereof (for example a belt loop) and in this manner, by sliding along the introducing arm, they carry the pair of trousers introducing it onto the mannequin and once it is loaded, with the waistband of the pair of trousers placed around the upper portion of the outer sides, there they release the pair of trousers from the clamping, gripping or hooking.

Brief description of the drawings

[0049] As a complement to the description provided herein, and for the purpose of helping to make the characteristics of the invention more readily understandable, this specification is accompanied by a set of drawings which, by way of illustration and not limitation, represent a first and a second preferred embodiment of the mannequin, of the mannequin and movement cart assembly, of the machine for loading and exposing the trousers to a laser for the marking thereof, and the system comprising said machine and an auxiliary device for loading and/or unloading, all of these objects of the invention, wherein:

Fig. 1 is a perspective view of the system object of the invention for the laser marking of trousers comprising an auxiliary device for loading and/or unloading trousers, and a machine for loading and exposing trousers to a laser for the marking thereof, when performing an automatic loading onto the mannequin object of the invention which is in the loading area of the machine, also being represented in the figure a transmitter apparatus of at least one laser beam oriented towards the marking area of the machine for the purpose of better understanding;

Fig. 2 shows another perspective view of the system of the invention and of the transmitter apparatus

shown in Fig. 1;

Fig. 3 is a perspective view of the auxiliary device for loading and/or unloading shown in Fig. 1 and of a portion of the loading station of the machine object of the invention;

Figs. 4 and 5 are plan views from below and from the side of the machine for loading and exposing trousers to a laser for the marking thereof, object of the invention, shown in the system of Fig. 1 and wherein the mannequin of the loading area is in the loading position;

Figs. 6 to 8 show the mannequin object of the invention in three different positions, from the non-operative loosened position A of Fig. 6, to the maximum tensed end position B of Fig. 8 and an intermediate tensing position I shown in Fig. 7;

Figs. 9 to 11 are respective detailed views of the upper portion of Figs. 6 to 8 wherein the operation of the tensing mechanism of the mannequin are shown;

Figs. 12 and 13 are two elevation and plan views of the mannequin object of the invention in a first folded position around the main rotation axis wherein the front planes of the leg structures of the mannequin form an acute angle;

Figs. 14 and 15 are two elevation and plan views of the mannequin object of the invention in another folded position wherein the rear planes of the leg structures of the mannequin form an acute angle;

Figs. 16 and 17 are two perspective views of the mannequin and cart assembly which is object of the invention, wherein the mannequin is in a loading position C;

Fig. 18 is an elevation view of the mannequin in a maximum tensed end position B wherein the adjustment device for the rise is in an extended position;

Fig. 19 is an expanded view of the rise device of Fig. 18;

Fig. 20 is a view of the detail of the projection of the rise device in a maximum extended position;

Figs. 21 and 22 are expanded views of the rise device and of the projection in a retracted position; and

Fig. 23 is a view similar to that of Fig. 18 wherein it shows a second preferred embodiment of the mannequin object of the invention which, unlike the first embodiment shown in the preceding figures, has two profile plates simulating the shape of the lateral edges of the trousers coupled to the inner and outer sides of the leg structures of the mannequin.

Detailed description of the drawings

[0050] Figs. 6 to 8 and 12 to 18 show a mannequin 1 for supporting a pair of trousers (not shown) whereon a laser marking is performed in order to give certain areas thereof marks in order to give the pair of trousers a worn appearance.

[0051] The mannequin 1 comprises two leg structures 2 suitable to be housed on the inside of the trouser legs of the trousers to be marked, which are commonly called semi-trouser holders. Each leg structure 2 is defined by a respective imaginary longitudinal axis 20 (see Fig. 6) wherein the respective trouser leg extends, an upper area 21 whereon the portion encompassing the rise of the pair of trousers is arranged, a lower area 22, a front plane 23 whereon the front portion of the trouser leg is arranged, a rear plane 24 whereon the rear portion of the trouser leg is arranged, an inner side 25 whereon the inner lateral edge of the pair of trousers is arranged, which goes from the joining of the trouser legs to the lower end of the respective trouser leg, and an outer side 26, opposite from the inner side 25, whereon the outer lateral edge of the pair of trousers is arranged, said lateral edge being the one which goes from the waistband to the lower end of the trouser leg.

[0052] According to the embodiment shown of the mannequin 1, the inner side 25 and the outer side 26 of one same leg structure 2 are made up of bars or profiles parallel to the longitudinal axis 20. On each outer side 26, a flexible rod 6 is provided which is able to bend in order to push in at least one of the segments thereof on the outer lateral edge of the trouser leg of the pair of trousers. The trouser legs of the trousers usually do not have the same width along the length thereof, since normally in the hip area they are wider, and it is in these areas wherein the flexible rod 6 will protrude more from the profile of the outer side 26 in order to reach the outer lateral edge of the trouser leg arranged on the leg structure 2. Moreover, on each inner side 25 a rise rod 40 is provided, coplanar with the inner side 25 and the outer side 26 of the corresponding leg structure 2, the lower end 41 of which is joined in an articulated manner to the lower end of the inner side 25 and the upper end 42 thereof is arranged in a rise point located at a certain separation distance with respect to the inner side 25, in the opposite direction wherein the outer side 26 of the same leg structure 2 is found. Said distance is calculated so that it coincides with the joining point of the trouser legs of the pair of trousers which make up the rise of the pair of trousers. The rise device 4 of each leg structure 2 of the mannequin 1 will be discussed in detail later on according to Figs. 18 to 22.

[0053] The inner sides 25 and the outer sides 26 are made up of profiles or bars which have a front face and a rear face. The front faces of the inner 25 and outer 26 sides of a leg structure 2 are the ones which are taken into account in order to determine the front plane 23 of said leg structure 2, and the rear faces, opposite from the front ones, are the ones which determine the rear plane 24. The distance between the front plane 23 and the rear plane 24 translates into the thickness of the profiles or bars making up the inner 25 and outer 26 sides.

[0054] The mannequin 1 comprises a tensing mechanism 3 due to which the separation distance between the inner side 25 and the outer side 26 of each leg structure 2 is variable, such that each leg structure 2 can adopt

and go from a non-operative loosened position A, shown in Fig. 6, to a maximum tensed end position B, shown in Fig. 8, wherein the separation distance between the inner side 25 and the outer side 26 of each leg structure 2 increases until it reaches the value corresponding to the dimension of the total width of the trouser leg (with the contribution of the flexible rod 6 and of the rise rod 40), the front and rear portions of the trouser leg arranged on the leg structure 2 staying extended to the maximum in order to perform the laser marking on any of the portions. Fig. 7 shows an intermediate tensing position I between the cited positions A and B. The tensing mechanism 3 does not comprise any chamber or inflatable balloon, but rather the pair of trousers on the mannequin 1 resembles, in the maximum tensed end position, how the pair of trousers would be if it were arranged flattened and stretched.

[0055] Figs. 6 to 8 also show that each outer side 26 is provided in an area close to the upper end thereof with a stop 30 in an upside-down L shape wherein the waistband of the pair of trousers is placed. In the maximum tensed end position B, the pair of trousers will be completely tensed. It also shows that the flexible rod 6 comes just after the lower end of the stop 30, since normally it starts from the waistband downwards when the trousers have an increase in the width thereof in order to make room for the hips. Each model of trouser and size varies the hip and leg width thereof along the length thereof, hence the flexible rod 6 is flexible in order to reach the area of the edge of the outermost side of the pair of trousers.

[0056] The mannequin 1 stands out in that the two leg structures 2 are coupled in an articulated manner to a main rotation axis 5 around which they are able to rotate, the main rotation axis 5 being a parallel axis collinear with the direction of the dimension of the rise of the pair of trousers. In accordance with other embodiments not shown, the main rotation axis 5, instead of being exactly collinear can be parallel to the direction of the dimension of the rise of the pair of trousers, there being a small distance between said axis and the direction of the rise of the pair of trousers. It is recalled that rise of the pair of trousers is understood as the distance from the joining of the trouser legs (a point located underneath what corresponds to the fly of the pair of trousers if it has one) of a pair of trousers to the waistband. Each leg structure 2 is able to rotate independently from the other leg structure 2, that is to say, the rotation of one leg structure 2 does not have to influence the magnitude of rotation of the other leg structure 2.

[0057] Figs. 12 to 17 show the mannequin 1 in different positions wherein the two leg structures 2 have rotated around the main rotation axis 5, for which reason the front planes 23 form between each other an angle comprised between 10° and 350°, and therefore, the two rear planes 24, opposite from the front planes 23, form between each other different angles comprised between 350° and 10° (the difference from subtracting from 360° the angle formed by the front planes 23). According to the preferred embodiment, the components of the mannequin 1 have been arranged so that the two front planes 23 can form between each other a multitude of angles comprised between 20° and 340° (see for example Fig. 13 wherein the front planes 23 form an angle larger than 270° and the rear planes 24 form an acute angle a).

[0058] This ability to rotate with respect to the main rotation axis 5 enables the mannequin 1 to adopt multiple positions wherein to suitably expose practically any area of the pair of trousers to the effects of the laser, without there being portions of the mannequin 1 which are hidden or impede the laser beam from reaching the desired area. The positions shown in the pairs of Figs. 12-13 and 14-15 are worth noting, indicated for performing the marking of the lower area of the rise of the pair of trousers, wherein the trouser legs are joined.

[0059] In order to perform the rotation of each leg structure 2 around the main rotation axis 5, each leg structure 2 comprises in the upper area 21 thereof a support 27 attached to corresponding first transmission means 29 in turn coupled to corresponding first motor means 28 through which the independent rotation of each leg structure 2 is imparted. Each support 27 comprises two opposite main faces parallel respectively to the front plane 23 and the rear plane 24 defined in each leg structure. Figs. 6 to 11 show the supports 27 without the front face in order to see the mechanisms which house on the inside thereof, the connections or couplings with the motor means and transmission means.

[0060] Precisely, according to the preferred embodiment of the mannequin 1 shown in the drawings, each support 27 is provided with an upper extension 8 which surrounds the main rotation axis 5 and through which each leg structure 2 has the ability to rotate with respect to said axis in order to adopt the multiple angular positions necessary to ensure a suitable exposure of the areas of the pair of trousers to the laser beam for the marking thereof.

[0061] The first motor means 28 of each leg structure 2 are made up of a servomotor, shown in Figs. 1 to 11, for adjusting with precision the desired angle between the two front planes 23 (and therefore the angle between the two rear planes 24) and for a better control of the torque applied. The transmission means 29 formed by belts and/or gears are the ones responsible for transmitting the torque generated by the servomotors to the respective extensions 8 of the supports 27 so that they are arranged forming between each other the optimal angles for the best exposure to the laser of the portion of a trouser leg of the pair of trousers to be marked, without the other trouser leg interfering or creating hidden areas which impede the projected marking.

[0062] As introduced previously, each leg structure 2 has a respective adjustment device 4 for the rise of the pair of trousers made up of a rise rod 40, coplanar with the inner side 25 and the outer side 26 of the leg structure 2, the lower end 41 of which is joined in an articulated manner to the lower end of the inner side 25 and the

upper end 42 thereof is arranged in a rise point located at a certain separation distance with respect to the inner side 25 in the opposite direction wherein the outer side 26 is found, calculated so that it coincides with the joining point of the trouser legs of the pair of trousers to be marked.

[0063] Figs. 18 to 22 show in detail that the upper end 42 of the rise rod 40 is immovably joined to a projection 43 which protrudes at a distance with respect to the inner side 25 of the leg structure 2 in an intermediate area of said side, the distance with which the projection 43 protrudes being an adjustable distance according to the dimensions of the pair of trousers to be marked. Advantageously, the projection 43 is made up of two parts 43a and 43b joined telescopically, a fixed part 43a which protrudes from the inner side 25 and a part 43b slidable along the inside 44 of the fixed part 43a and partially removable therefrom towards the outside, meaning, in the direction opposite from the one of the inner side 25. The upper end 42 of the rise rod 40 is joined to the end of the slidable part 43b for which reason it will be located closer to or farther from the inner side 25 of the leg structure 2 according to how much the slidable part 43b has been removed from the fixed part 43a.

[0064] Alternatively to the mannequin 1 shown in Fig. 18, Fig. 23 shows a second embodiment of the mannequin object of the invention which does not comprise the adjustment device 4 for the rise described previously. In the mannequin 1 of Fig. 23, the inner sides 25 are provided with corresponding inner panels 45 joined to the straight profiles or bars making up the inner sides 25. These inner panels 45 are preferably plates manufactured out of aluminium and with a thickness of about 6 mm, the profile of which (opposite from the side by which they are removably joined to the bars of the inner sides 25) simulates the shape of the inner lateral edge of the trousers. It can be seen how the profile of each inner panel 45 is configured as a projection, which without a doubt favours the marking of the pair of trousers in the joining areas of the trouser legs of the pair of trousers. Furthermore, it is also seen that instead of the flexible rods 6, the outer sides 26 are also provided with corresponding outer panels 61, the outer profile of which simulates the profile of the lateral edge of the trousers. The inner 45 and outer 61 panels are immovably joined to the straight profiles or bars making up the inner 25 and outer 26 sides so that they can be changed, for example, by screwing them in or unscrewing them from the bars, depending on the model and size of the trousers to be marked.

[0065] Returning to the tensing mechanism 3 by which the mannequin 1 goes from the position A to the position B, said tensing mechanism 3 comprises second motor means 31 (preferably a servomotor for each leg structure 2) and second transmission means 32 coupled to a linearly movable element 33 (such as a ball screw joined to an extension bar, as a prolongation of the screw or if the screw is not long enough) along the direction or a direction parallel to that of the main rotation axis 5, in one or the other direction according to the direction of rotation of the second motor means 31. The linearly movable element 33 is arranged at the height of the supports 27 of the leg structures 2 with respect to which it is movable and has a lower free end 33b (see Figs. 10 and 14) located at a level higher than that of the joining of the trouser legs, opposite from the upper end 33a (see Figs. 9 to 11) by which it is coupled to the second transmission means 32. The second transmission means 32 can be made up of a belt and a pair of pulleys which cause the rotation of a ball screw in order to transform the rotational movement into a linear movement by the effects of the ball screw (the end thereof 33a can be seen in the upper portion of Figs. 9 to 11). As mentioned, this screw can have a bar fixed on one end as a prolongation, both parts forming the linearly movable element 33.

[0066] The tensing mechanism 3 further comprises, for each leg structure 2, an intermediate bar 34 arranged parallel between the respective inner 25 and outer 26 sides, and practically coplanar with them, and that due to the effects of the linear movement of the linearly movable element 33, it increases the separation distance with respect to the inner 25 and outer 26 sides when going from the non-operative loosened position A to the maximum tensed end position B, and decreases the separation distance when going from the maximum tensed end position B to the non-operative loosened position A. In fact, preferably and as seen in Fig. 12, the intermediate bar 34 is slightly thinner than the bars or the profiles from which the inner side 25 and the outer side 26 are made. Advantageously, said profiles have a respective inner space made which enables the intermediate bar 34 to be housed on the inside thereof when the leg structure 2 is in the non-operative loosened position A.

[0067] Each intermediate bar 34 is joined to the inner 25 and outer 26 sides by means of at least two connecting rods 35 and 36 articulated on the two ends thereof and parallel to each other. The outer side 26 and the intermediate bar 34 of each leg structure 2 are arranged such that they are movable with respect to the inner side 25, moving away or towards the inner side 25 when going from the non-operative loosened position A to the maximum tensed end position B, and vice versa, when the free end of the linearly movable element 33 is moved respectively, downwards, in the direction moving closer to the joining point of the trouser legs, or upwards, in the direction moving away from the joining point of the trouser legs.

[0068] Figs. 9 to 11 especially show that the tensing mechanism 3 further comprises, for each leg structure 2, a cam 37 partially housed in a respective support 27 and with respect to which the cam 37 is movable in a direction parallel to that of the movement of the linearly movable element 33, since the cam 37 is integrally joined on one of the ends thereof to said linearly movable element 33 and guided according to said direction inside the support 27. The cam 37 is provided with a curved

profile 38 (configured as a slit or hole) for the guided movement of the upper end of the intermediate bar 34 (provided with a bearing or small wheel) during the change thereof from the non-operative loosened position A to the maximum tensed end position B, and vice versa.

[0069] It is also seen, in particular in Figs. 9 to 11, that each support 27 comprises on the inside thereof a guide for the movement of the corresponding outer side 26 according to a trajectory perpendicular to the longitudinal direction wherein the outer side 26 extends. It can be seen how the upper end of the outer side 26 is moved by being coupled to a pair of bearings which slide along an oblong slit slightly inclined in the upwards direction towards the ends of the supports 27 farthest from the linearly movable element 33.

[0070] Figs. 1 and 2 show a system made up of a machine 10 for loading and exposing trousers to a laser for the marking thereof, and an auxiliary device for the automatic loading and/or unloading 90 of trousers (further shown in Fig. 3). Said figures also show a transmitter apparatus 100 of at least one laser beam directed towards the marking area 12 of the machine 10.

[0071] As seen in Figs. 4 and 5, the machine 10 is basically divided into two areas, a loading area 11, wherein the loading of a trouser onto a mannequin 1 is performed, and a marking area 12, on the side opposite from the loading area 11. In the marking area 12, wherein the mannequin 1 which is already in the maximum tensed end position B, acquired in the loading area 11 once the pair of trousers was placed, adopts different positions in order to expose certain areas of the trousers which must be marked with the laser. As explained previously, the mannequin 1 is able to not only rotate around itself, for example around the main rotation axis 5, but that each leg structure 2 is able to rotate independently of the other leg structure 2 around said main rotation axis 5 and thus adopt positions which enable it, for example, to make a trouser leg covering the front plane 23 of one of the leg structures 2 to face the laser, in order to receive the laser treatment, while the other trouser leg covering the front plane 23 of the other leg structure 2 stays behind forming a certain angle, staying out of reach of the laser, as shown in Fig. 13. If at a certain moment the marking of the rear portion of one of the trouser legs must be performed, the mannequin 1 will undergo the rotation of the two leg structures 2 thereof again in order to orient the rear plane 24 covering said rear portion towards the transmitter apparatus 100, being exposed to the laser beam which is projected. For time-saving reasons, the machine 10, instead of having one single mannequin 1 which is moved from the loading area 11 to the marking area 12, comprises at least two mannequins 1, one in each area, because while the loading of one pair of trousers onto a mannequin 1 is performed, another previously-loaded mannequin 1 can be in the marking area 12 receiving the laser treatment in the pair of trousers it carries. Once the laser treatment on the pair of trousers has ended, the mannequin 1 of the marking area 12 returns to the loading area 11 wherein the pair of trousers already having the desired worn appearance will be removed and a new pair of trousers will then be loaded.

[0072] In the machine 10 the mannequins 1 are mounted in respective motorized carts 71 (see the third motor means 74 formed by a motor, reducer and pinion in Figs. 4 and 5) movable along racks 70 and guides or rails 75, for transporting the mannequins 1 from the loading area 11 to the marking area 12, and vice versa. The mannequins 1 are mounted in an articulated manner on the carts 71 in accordance with a horizontal load rotation axis 72 (see Figs. 16 and 17), perpendicular to the main rotation axis 5, around which the mannequins 1 can rotate or tilt. Thus, the mannequins 1 are able to adopt a loading position C wherein the trousers can be loaded on the mannequins 1, the front planes 23 of the two leg structures 2 of a mannequin 1 being arranged forming an acute angle, for example about 20°, and said front planes 23 being contained in a non-vertical plane with respect to the support base of the machine 1 (it is implied that the machine 1 rests on the horizontal plane of the floor or pavement whereon it sits). The fact that a mannequin 1 can adopt the loading position C described can be given, for example, by a cam with a certain profile (not shown in the drawings), joined to a certain segment of the guide or rail 75 of the loading area 11, which forces the mannequin 1 as it moves, and through projecting bearings which make up the mannequin 1 located close to and underneath the cart 71, to follow said cam profile designed so that the main rotation axis 5 rotates around the loadable rotation axis 72 forming an acute angle with the vertical direction v, between 35° and 55°, preferably 45° and maintains said formation in that segment.

[0073] Due to this configuration able to rotate around the load rotation axis 72, the mannequins 1 can adopt a loading position C which is very comfortable for the operator, wherein the trousers can be loaded on a mannequin 1 folded around the rise of the pair of trousers, with the trouser legs almost or practically on top of each other (which we do when folding a pair of trousers lengthwise, around the axis of symmetry of the pair of trousers), by being able to arrange the front planes 23 of the two leg structures 2 of a mannequin by forming a small acute angle of about 20° for example, according to the capacity thereof to rotate around the main rotation axis 5. Furthermore, by the mannequin 1 being able to tilt around the load rotation axis 72, horizontal and perpendicular to the main rotation axis 5 of the mannequin 1, the mannequin 1 can be arranged with the front 23 and rear 24 planes of the leg structures 2 thereof in inclined planes, not vertical ones and the lower ends of the leg structures 2 from where the mannequin 1 is dressed with the pair of trousers, are higher and are further forwards than the rest of the mannequin 1, for which reason the operator loading the mannequin 1 does not have to bend over in order to introduce the pair of trousers.

[0074] In this manner, the operator does not have to load the pair of trousers in the habitual position thereof,

with the waistband extended and bending over in order to pass underneath the pair of trousers, but rather the mannequin 1 can be arranged in the loading position C thereof, shown in Figs. 4, 5, 16 and 17, with the front planes 23 forming an acute angle and in a position wherein said planes are inclined with respect to the vertical plane v, being able to load the pair of trousers folded along and from a height comfortable for arranging the lower portion of the mannequin 1 at the height of their hands when the operator is standing.

[0075] It is also envisaged that in the marking area 12, descending forced ventilation means (not shown in the drawings) are provided for the extraction through the lower portion of the machine 10 of the gases originating from the laser heating the inks of the pair of trousers during the marking.

[0076] Figs. 1 to 3 show that facing the loading area 11 of the machine 10 an auxiliary device for loading and/or unloading 90 is arranged, which is able to automatically perform the loading of a pair of trousers folded lengthwise over the mannequin 1 arranged in the loading position C.

[0077] The auxiliary device for loading and/or unloading 90 comprises a plurality of waiting supports 9, 9', made up of pairs of oblong waiting profiles 9a and 9b, arranged radially and inclined in a descending direction towards the centre, as if they were the petals of a flower. The waiting profiles 9a and 9b of one same pair are parallel to each other, are separated by a short distance and have a length such that they receive the insertion of the two trouser legs of a pair of trousers in the position folded around the rise line of the pair of trousers. By way of example, a waiting support 9 or 9' can be configured as a U-shaped fork, the arms of which are the waiting profiles 9a and 9b. Precisely the short distance separating the waiting profiles 9a and 9b is so that there is a space to place the two inner faces of the trouser legs which stay facing each other when the pair of trousers is folded.

[0078] The auxiliary device for loading and/or unloading 90 also comprises an introducing arm 91 made up of an inclined guide rail facing one of the waiting supports 9' of the plurality of supports 9. The introducing arm 91 is arranged above said waiting support 9', the length of the guide rail being such that it protrudes above the cited waiting support 9', the upper end thereof being located at the same level or a higher level wherein the upper areas 21 of the leg structures 2 of the mannequin 1 located in the loading area 11 are located. The introducing arm 91 is provided with projecting pushing means 92 slidable along the guide rail and which protrude, with respect to the guide rail towards the waiting support 9', a distance such that the projecting pushing means 92 are able to push a pair of trousers arranged folded over the waiting support 9' and move it along the guide rail to the upper end thereof.

[0079] Figs. 1 to 3 likewise show that the auxiliary device for loading and/or unloading 90 trousers shown comprises rotating means by which the plurality of waiting supports 9, 9' are able to rotate with respect to a vertical central axis 94 aligned with the centre of the radial arrangement thereof, coaxial with the cylindrical casing 93 to which the introducing arm 91 is joined. The projecting pushing means 92 of the introducing arm 91 protrude from the guide rail in the separation space between the two waiting profiles of the waiting support 9' it is facing.

[0080] In order to make use of the auxiliary device for loading and/or unloading 90 to automatically load a pair of trousers on the mannequin 1, the first thing is to arrange a waiting support 9' wherein a folded pair of trousers is supported and that this waiting support 9' is facing the introducing arm 91. A mannequin 1 free of trousers must also be placed, in the loading position C in order to receive a folded pair of trousers activating the suitable means, arranging the front planes 23 of the leg structures 2 in non-vertical planes, and specifically, with the same inclination of the introducing arm 91. The two lower areas 22 of the leg structures 2 of the mannequin 1 will be arranged after the respective waiting profiles 9a and 9b which make up the waiting support 9', aligned with them. The projecting pushing means 92 will start the ascension thereof and will push the folded pair of trousers carrying it upwards by the joining area of the trouser legs. As the pair of trousers is dragged upwards, the pair of trousers will start to leave the waiting support 9' and will enter the leg structures 2 of the mannequin 1 until the mannequin 1 of the loading area 11 is dressed. Afterwards, when the transfer of the mannequin 1 together with the cart 71 thereof is activated, and passes along the cam profile located in an area of the rail 75, the lower areas 22 of the leg structures 2 will lower bit by bit and the mannequin 1 will be arranged with the front planes 23 in vertical planes and will be transported to the marking area 12.

[0081] Alternatively or additionally, the projecting pushing means 92 can be provided with gripping elements such as for example clamps, which grip the waistband of the pair of trousers by two segments and in this manner by sliding along the introducing arm carry the pair of trousers to the upper areas 21 of the leg structures and once there they release it so that the pair of trousers goes to the maximum tensed end position B.

[0082] It is also envisaged that the already-marked trousers can be unloaded in the same auxiliary device for loading and/or unloading 90 in the free waiting supports 9. An operator can be monitoring the automatic loading and also assisting the unloading of the trousers in the waiting supports 9. In this manner the auxiliary device for loading and/or unloading 90 is made the most of it, the yield of the operator operating the automatic loading is optimised so that they also take care of the unloading, and the plant floor is optimised using a single auxiliary device for loading and/or unloading 90 also as an unloader. Another option would be to unload the marked trousers in a second auxiliary device for loading and/or unloading 90 exclusively dedicated to receiving marked trousers.

[0083] Alternatively to the flower configuration of the

auxiliary device for loading and/or unloading 90 of the drawings, according to other embodiments the waiting supports 9 could adopt a carousel-type configuration or more fanciful shapes but which likewise enable the different work steps or stations to be established: the manual loading of the trousers in the auxiliary device for loading and/or unloading 90, the automatic loading of the trousers from the auxiliary device for loading and/or unloading 90 to the mannequin 1 and vice versa, and the unloading of the already-marked trousers, manually or automatically, from the auxiliary device for automatic loading and/or unloading 90. Thus, the waiting supports 9 and 9' are arranged inclined and cantilevered, they have the upper ends thereof free and the lower ends thereof are coupled to movement means by which the waiting supports 9, 9' are movable with respect to the support base and in a guided manner according to a trajectory which can have any shape, while it goes underneath the introducing arm 91. In the movement thereof along said trajectory, a moment will arrive in which each of the waiting supports 9 goes underneath the introducing arm 91, becoming the waiting support 9' upon reaching that point of the trajectory. In that point the inclination of said waiting support 9' will be arranged parallel to the inclination of the introducing arm 91 and the projecting pushing means 92 will protrude from the guide rail in the separation space between the two waiting profiles of the waiting support 9' located beneath it.

[0084] Finally, apart from the distribution shown in Figs. 1 and 2, it envisages arranging two automatic auxiliary devices for unloading and/or unloading 90 trousers in a plant, two machines 10 arranged side by side for loading and exposing trousers to a laser for the marking thereof and a single laser transmitter apparatus 100 for the marking thereof. In this manner the laser transmitter apparatus 100 works with a higher yield since it is the most expensive element of the three, for which reason it is suggested that it be stopped as little time as possible.

[0085] Thus, it is clear that the auxiliary devices for loading and/or unloading 90 can be used not only for loading trousers but also for unloading. A machine 10 can be combined with an auxiliary device for loading and/or unloading 90 full of folded trousers in the waiting supports 9, from which the mannequins 1 of the loading area 11 are loaded, and with another empty auxiliary device for loading and/or unloading 90, in an unloading area (not shown in the drawings) wherein the mannequins 1 in the loading position C, which is the same position adopted by the mannequins in the unloading position, are once again within reach of the projecting pushing means 92 which hook or grip the marked trousers and start to place them in the waiting supports 9.

Claims

1. A mannequin (1) for supporting a pair of trousers whereon a laser marking is performed, comprising two leg structures (2) suitable to be housed on the inside of the trouser legs to be marked, wherein each leg structure (2) is defined by a respective imaginary longitudinal axis (20) wherein the respective trouser leg extends, an upper area (21) whereon the portion encompassing the rise of the pair of trousers is arranged, a lower area (22), a front plane (23) whereon the front portion of the trouser leg is arranged, a rear plane (24), opposite from the front plane (23), whereon the rear portion of the trouser leg is arranged, an inner side (25) whereon the inner lateral edge is arranged, which goes from the joining of the trouser legs to the lower end of the respective trouser leg, and an outer side (26), opposite from the inner side (25), whereon the outer lateral edge is arranged, which goes from the waist to the lower end of the trouser leg, wherein the separation distance between the inner side (25) and the outer side (26) of each leg structure (2) is variable by means of a respective tensing mechanism (3), each leg structure (2) being able to adopt and go from a non-operative loosened position (A) to a maximum tensed end position (B) by increasing the separation distance between the inner side (25) and the outer side (26), the front and rear portions of the trouser leg arranged on the leg structure (2) staying extended to the maximum in order to perform the laser marking on any of the portions, **characterised in that** the leg structures (2) are coupled in an articulated manner to a main rotation axis (5) around which they are able to rotate, the main rotation axis (5) being an axis parallel to the direction of the dimension of the rise of the pair of trousers or collinear with said direction, the front planes (23) of the two leg structures (2) being able to form between each other at least two angles greater and/or less than 180°.

2. The mannequin according to claim 1, wherein each leg structure (2) comprises in the upper area (21) thereof a support (27) wherein the inner side (25) and the outer side (26) are supported, and through which the leg structure (2) is coupled in an articulated manner to the main rotation axis (5).

3. The mannequin (1) according to claim 2, wherein each support (27) is linked to corresponding first transmission means (29) in turn coupled to corresponding first motor means (28) through which an independent rotation is provided for each leg structure (2) around the main rotation axis (5), such that the front planes (23) of the two leg structures (2) are able to rotate independently around the main rotation axis (5) and adopt different positions wherein the two front planes (23) form between each other a plurality of angles comprised between 5° and 355°.

4. The mannequin (1) according to claim 3, wherein the first motor means (28) are made up of a servomotor

or a stepper motor.

5. The mannequin (1) according to any one of the preceding claims, wherein each leg structure (2) has a respective adjustment device (4) for the rise of the pair of trousers made up of a rise rod (40) contained in a plane comprised between the front plane (23) and the rear plane (24) of the leg structure (2), wherein the inner side (25) and the outer side (26) of the leg structure (2) are also comprised, and wherein the lower end (41) of the rise rod (40) is joined to the lower end of the inner side (25) and the upper end (42) of the rise rod is arranged in a rise point located at a certain separation distance with respect to the inner side (25) in the opposite direction in which the outer side (26) is found, calculated so that it corresponds with the joining point of the trouser legs of the pair of trousers to be marked.

6. The mannequin (1) according to claim 5, wherein the upper end (42) of the rise rod (40) is removably joined to a projection (43) which protrudes at a distance with respect to the inner side (25) of the leg structure (2) in an intermediate area of said side, the distance with which the projection (43) protrudes being an adjustable distance according to the dimensions of the pair of trousers to be marked.

7. The mannequin (1) according to any one of claims 1 to 6, wherein each leg structure (2) comprises in the upper area (21) thereof a support (27) wherein the inner side (25) and the outer side (26) are supported, and through which the leg structure (2) is coupled in an articulated manner to the main rotation axis (5), and wherein the tensing mechanism (3) comprises second motor means (31) and second transmission means (32) coupled to a linearly movable element (33) along the direction or a direction parallel to that of the main rotation axis (5), in one or the other direction according to the direction of rotation of the second motor means (31), the linearly movable element (33) being arranged at the height of the supports (27) of the leg structures (2) with respect to which it is movable and the linearly movable element (33) having a free end located above the joining of the trouser legs, the tensing mechanism (3) further comprising, for each leg structure (2), an intermediate bar (34) arranged parallel to and between the respective inner (25) and outer (26) sides, and which due to the effects of the linear movement of the linearly movable element (33), it increases the separation distance with respect to the inner (25) and outer (26) sides when going from the non-operative loosened position (A) to the maximum tensed end position (B), and decreases the separation distance when going from the maximum tensed end position (B) to the non-operative loosened position (A).

8. The mannequin (1) according to claim 7, wherein the intermediate bar (34) is joined to the inner (25) and outer (26) sides by means of at least two connecting rods (35, 36) articulated on the two ends thereof and parallel to each other, wherein the outer side (26) and the intermediate bar (34) of each leg structure (2) are arranged such that they are movable with respect to the inner side (25), moving away or towards the inner side (25) when going from the non-operative loosened position (A) to the maximum tensed end position (B), and vice versa, when the free end of the linearly movable element (33) is moved respectively, downwards, in the direction moving closer to the joining point of the trouser legs, or upwards, in the direction moving away from the joining point of the trouser legs.

9. The mannequin (1) according to claim 8, wherein the tensing mechanism (3) further comprises, for each leg structure (2), a cam (37) partially housed in a respective support (27) and with respect to which the cam (37) is movable in a direction parallel to that of the movement of the linearly movable element (33), since the cam (37) is integrally joined on one of the ends thereof to said linearly movable element (33) and guided according to said direction inside the support (27), the cam (37) being provided with a curved profile (38) for the guided movement of the intermediate bar (34) during the change thereof from the non-operative loosened position (A) to the maximum tensed end position (B) and vice versa.

10. The mannequin (1) according to any one of claims 1 to 9, wherein each leg structure (2) comprises in the upper area (21) thereof a support (27) wherein the inner side (25) and the outer side (26) are supported, and through which the leg structure (2) is coupled in an articulated manner to the main rotation axis (5), the inner side (25) and the outer side (26) being made up of profiles or bars the length of which extends in a manner parallel to the longitudinal direction of a corresponding trouser leg, and wherein each support (27) comprises on the inside thereof a guide for the movement of the corresponding outer side (26) according to a trajectory perpendicular to the longitudinal direction wherein the outer side (26) extends.

11. The mannequin (1) according to any one of the preceding claims, wherein the outer side (26) of each leg structure (2) is provided with an outer flexible rod (6) of which at least one portion is intended to come into contact with at least one portion of the outer lateral edge of the leg of the pair of trousers when the leg structure (2) is in the maximum tensed end position (B).

12. An assembly made up of a mannequin (1) according

to any of the preceding claims and a movement cart (71) provided with third motor means (74) for the autonomous movement of the cart (71), the cart (71) being joined in an articulated manner to the mannequin (1) through a horizontal load rotation axis (72) and perpendicular to the direction of the main rotation axis (5) around which the mannequin (1) is able to rotate and can adopt a trouser-loading position (C) wherein the front planes (23) or the rear planes (24) of the two leg structures (2) of the mannequin (1) are arranged forming an acute angle and are contained in non-vertical planes, and wherein the main rotation axis (5) of the mannequin forms an acute angle with respect to the vertical direction, being able in said loading position (C) to load on the mannequin (1) a pair of trousers folded on itself along the direction of the rise thereof.

13. A machine (10) for loading and exposing trousers to a laser for the marking thereof, comprising a loading area (11), wherein the loading of a pair of trousers onto a mannequin is performed, and a marking area (12) wherein the pair of trousers loaded on another mannequin is exposed to the external action of a laser for the marking thereof, **characterised in that** the mannequin of the loading area (11) and the mannequin of the marking area (12) are two mannequins (1) each of which is part of a mannequin (1) and cart (71) assembly according to claim 12, wherein the carts (71) are movable through the third motor means (74) thereof along a guided trajectory for the transportation of the mannequins (1) from the loading area (11) to the marking area (12) and from the marking area (12) to the loading area (11).

14. A system for the laser marking of trousers comprising at least one machine (10) for loading and exposing trousers to a laser for the marking thereof according to claim 13, and at least one auxiliary device for loading and/or unloading (90) trousers onto a mannequin (1) located in the loading area (11) of the machine (10), wherein the auxiliary device for loading and/or unloading (90) comprises a support base fixed on a surface such as a floor, a plurality of waiting supports (9,9'), each of which in turn comprises a pair of oblong waiting profiles (9a, 9b), wherein the waiting profiles (9a, 9b) of one same pair are parallel to each other, separated by a certain distance and they have a length such that they receive the insertion of the two trouser legs of a pair of trousers in a folded position around the rise line of the pair of trousers, the waiting supports (9, 9') being arranged inclined and cantilevered, with the upper ends thereof free and with the lower ends thereof coupled to a movement means by which the waiting supports (9, 9') are movable with respect to the support base and in a guided manner according to a trajectory, and an introducing arm (91) made up of an inclined guide rail, fixed with respect to the support base and arranged above and facing one of the waiting supports (9') of the plurality of supports (9), the length of the guide rail being such that it protrudes above the cited waiting support (9') the upper end thereof being located at the same level or higher wherein the upper areas (21) of the leg structures (2) of a mannequin (1) located in the loading area (11) of the machine (10) are located, wherein the introducing arm (91) is provided with projecting pushing means (92) slidable along the guide rail and which protrude with respect to the guide rail towards the waiting support (9'), which it is facing at a distance such that the projecting pushing means (92) are able to push a pair of trousers arranged folded over the waiting support (9') and move it along the guide rail.

15. The system for the laser marking of trousers according to claim 14, wherein the auxiliary device for loading and/or unloading (90) trousers is an automatic device, wherein each waiting support (9) is able to be arranged in a point of the trajectory which follows in the movement thereof underneath the introducing arm (91), point wherein the inclination of said waiting support (9') is parallel to the inclination of the introducing arm (91), and wherein the projecting pushing means (92) of the introducing arm (91) protrude from the guide rail in the separation space between the two waiting profiles (9a, 9b) of the waiting support (9') located underneath.

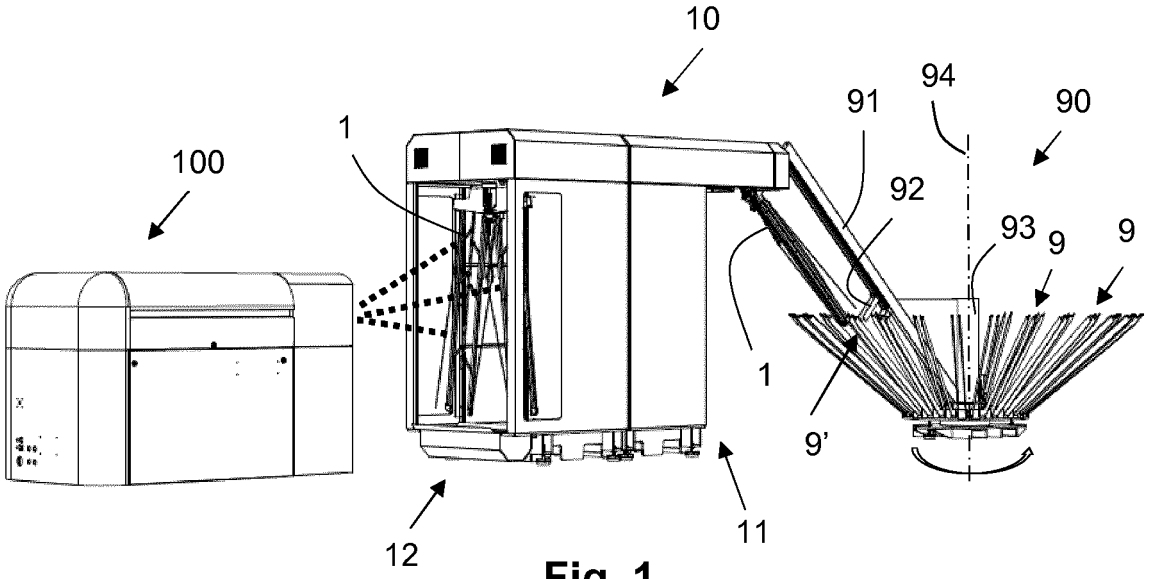

10
94
91
90
1
100
92
93
9
9
1
9'
12
11

Fig. 1

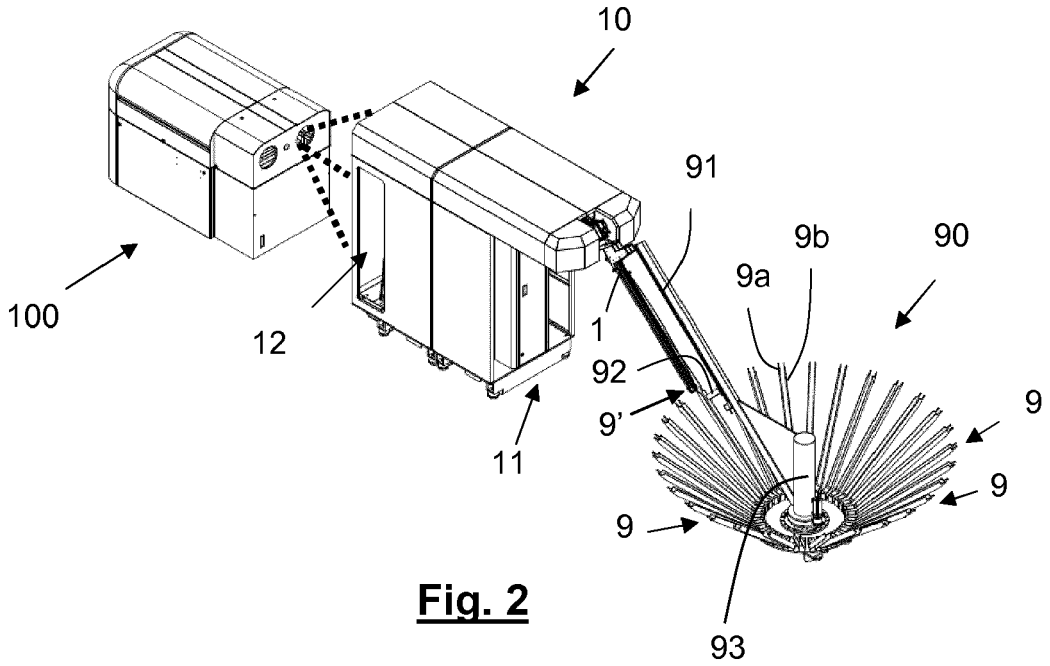

10
91
9b
90
9a
100
12
1
92
9'
9
11
9
9
93

Fig. 2

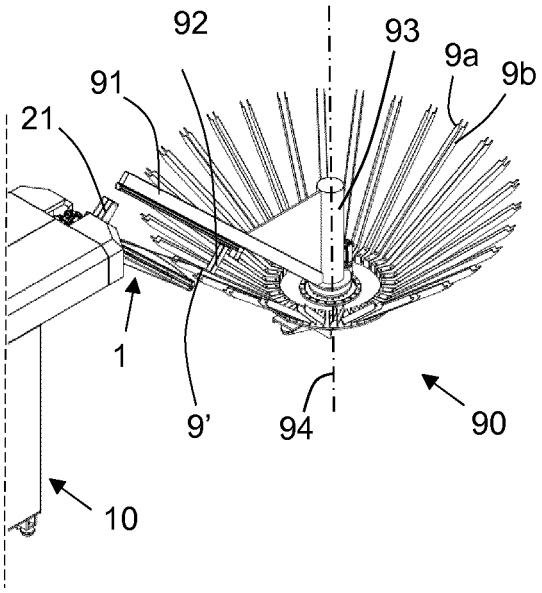


Fig. 3

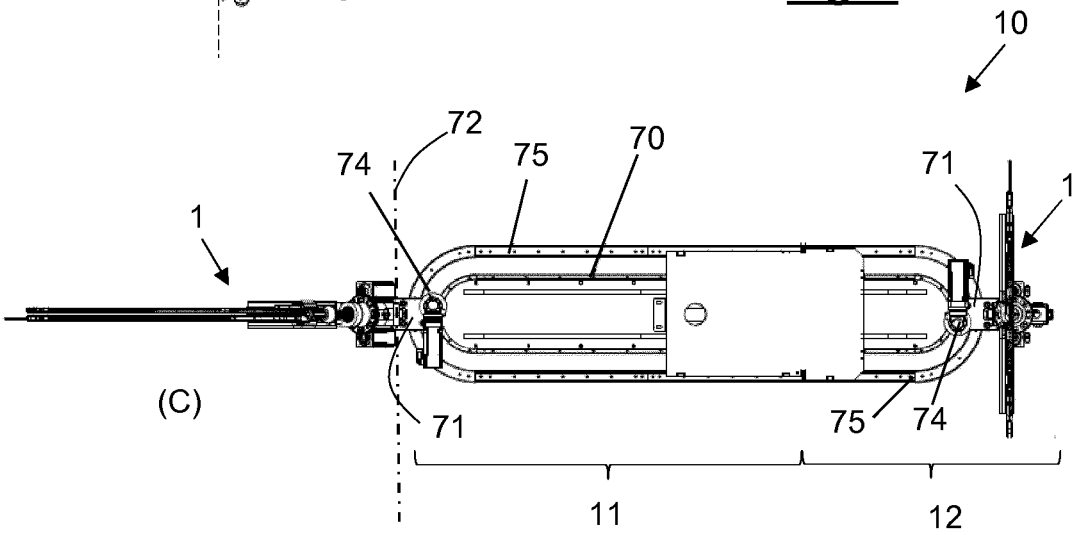


Fig. 4

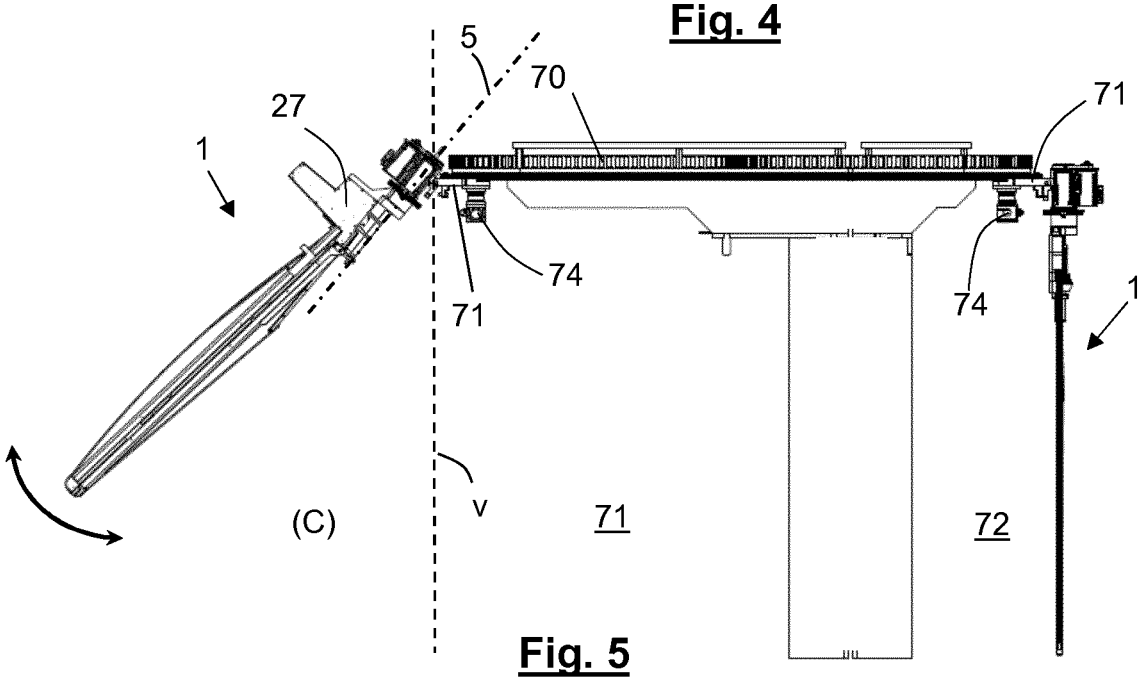


Fig. 5

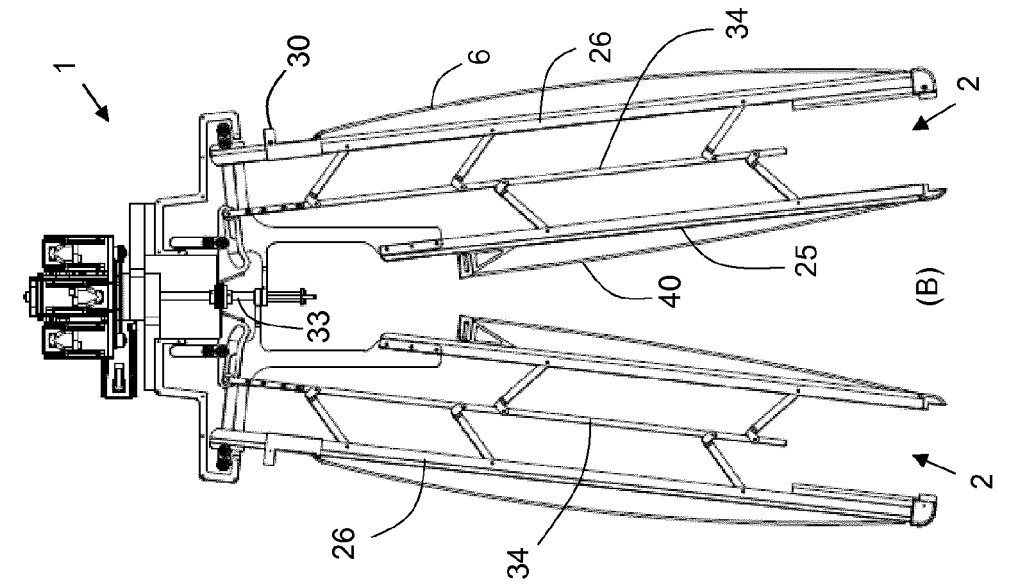


Fig. 8

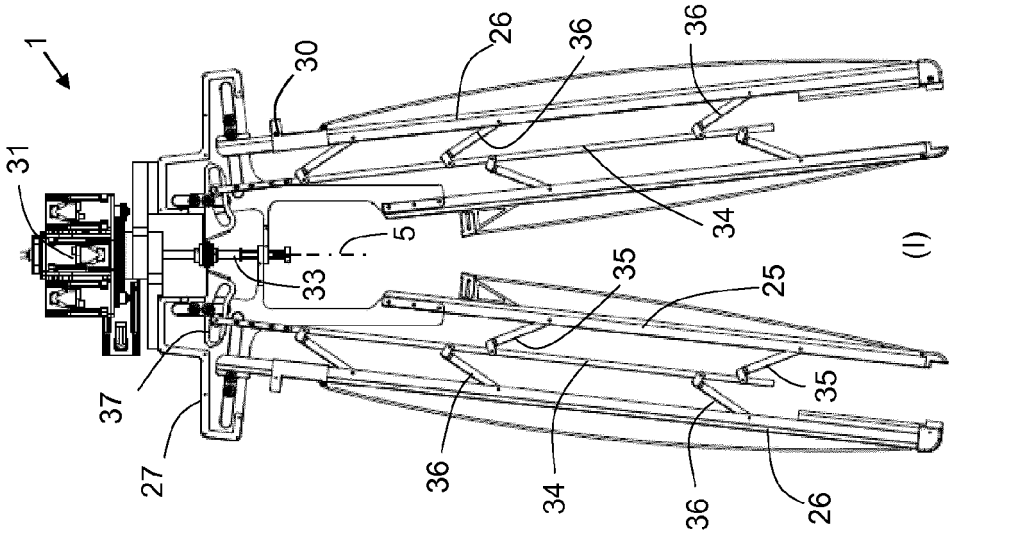


Fig. 7

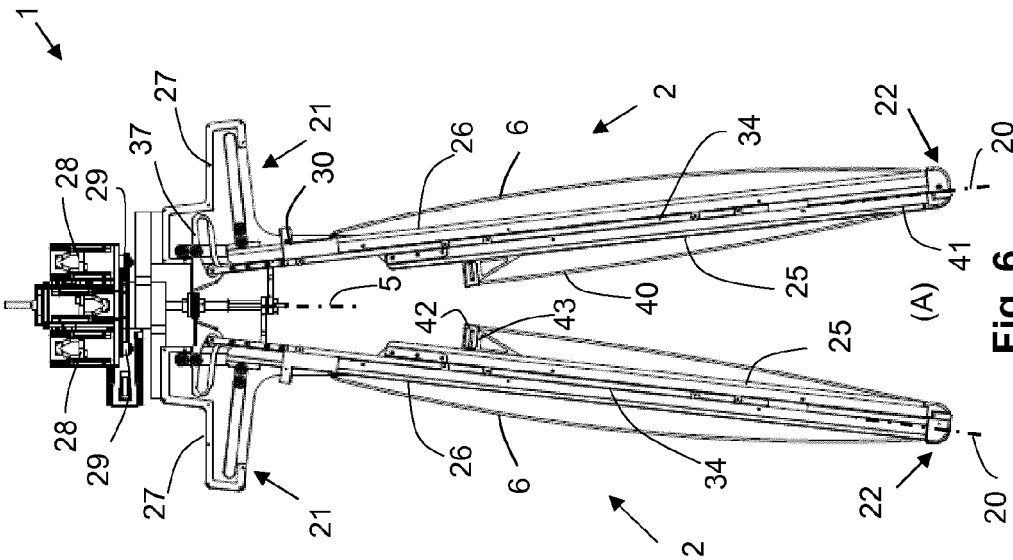
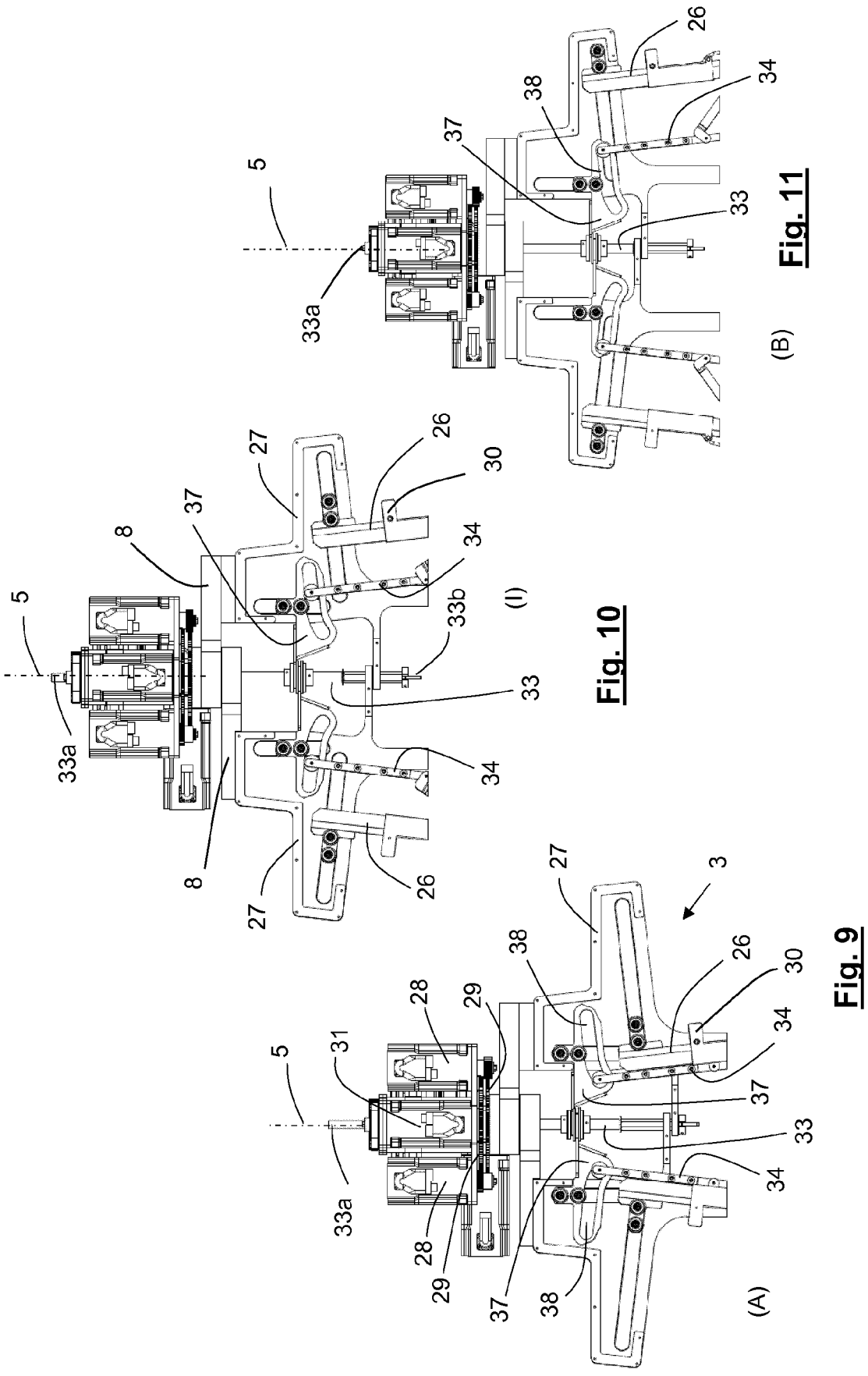


Fig. 6


5
33a
26
34
38
37
33
(B)
Fig. 11
5
33a
8
37
27
26
30
34
33b
33
(I)
Fig. 10
5
31
28
29
27
3
38
26
30
34
37
33
(A)
Fig. 9

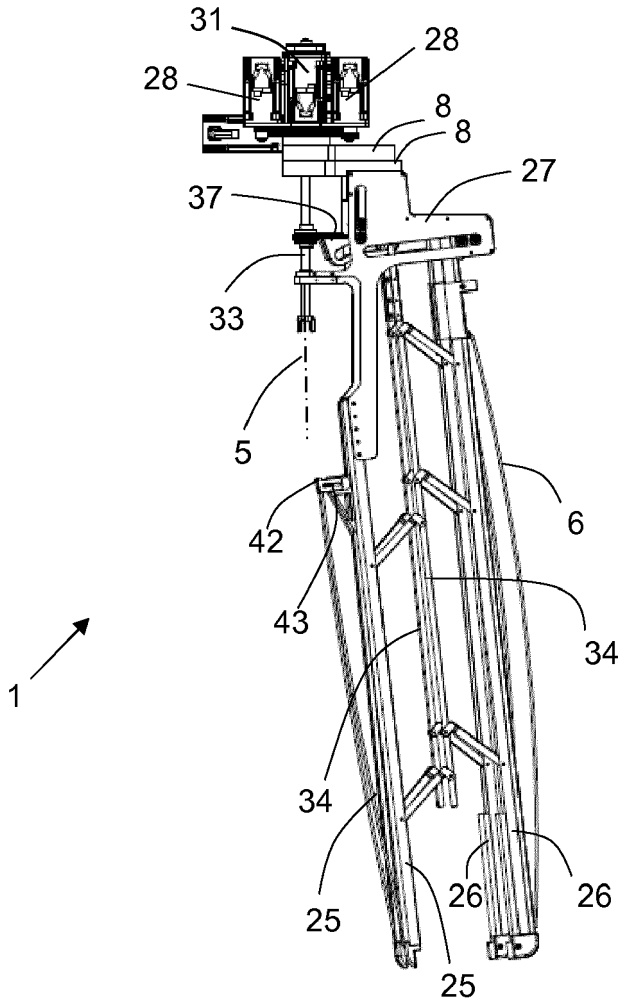

31
28
28
8
8
27
37
33
5
42
43
6
34
34
1
25
26
26
25

Fig. 12

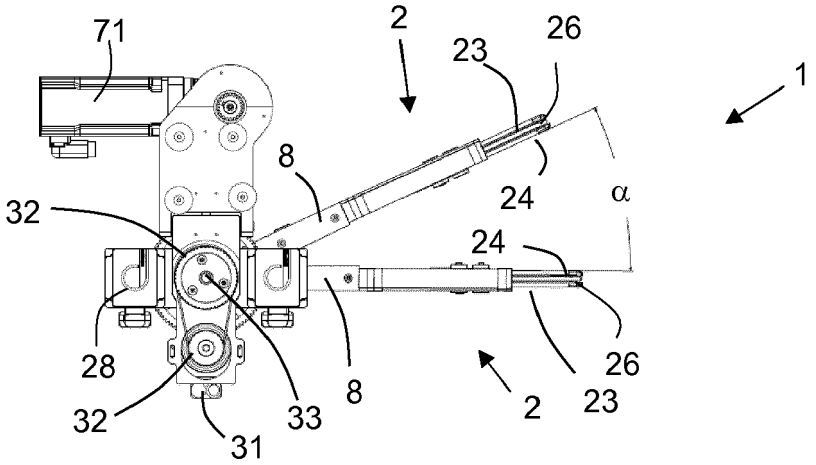

71
2
23
26
1
8
24
α
32
24
28
8
26
32
33
2
23
31

Fig. 13

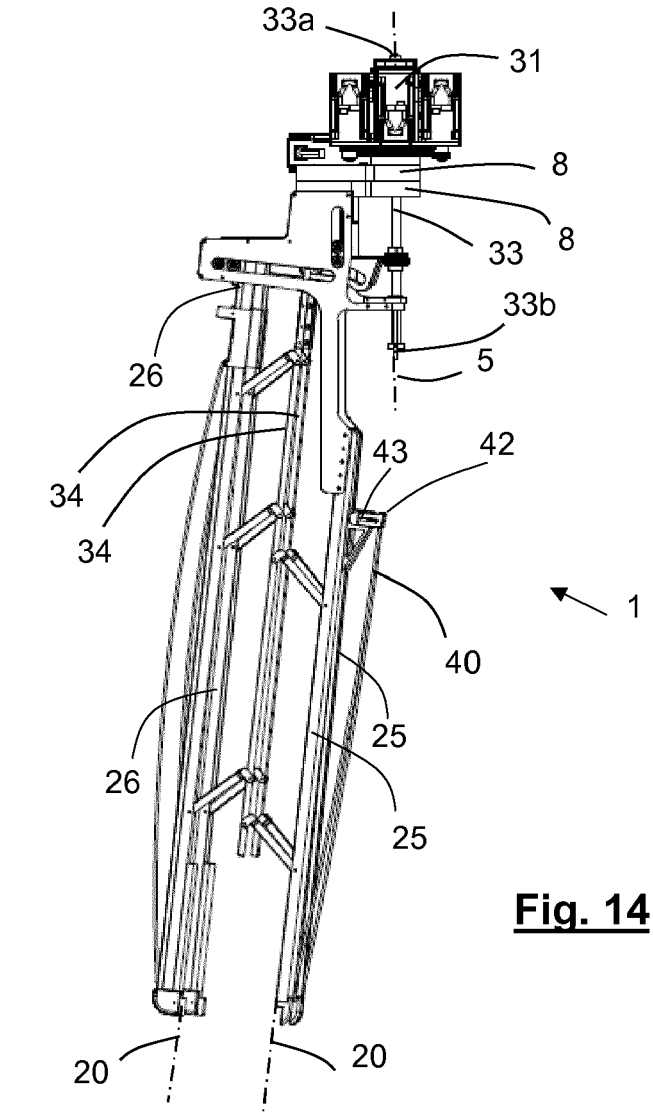

33a
31
8
8
33
33b
5
26
34
34
43
42
1
40
25
26
25
20
20

Fig. 14

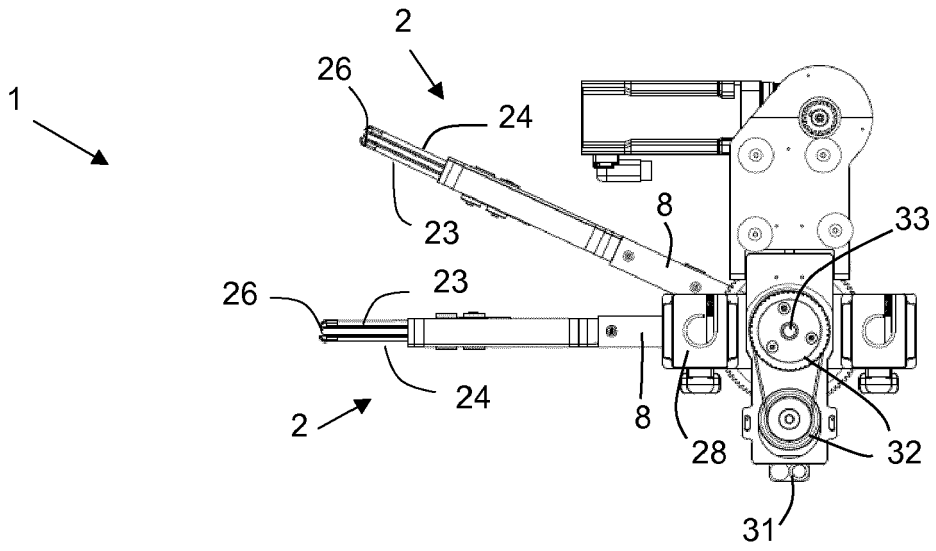

2
26
1
24
23
8
33
26
23
24
2
8
28
32
31

Fig. 15

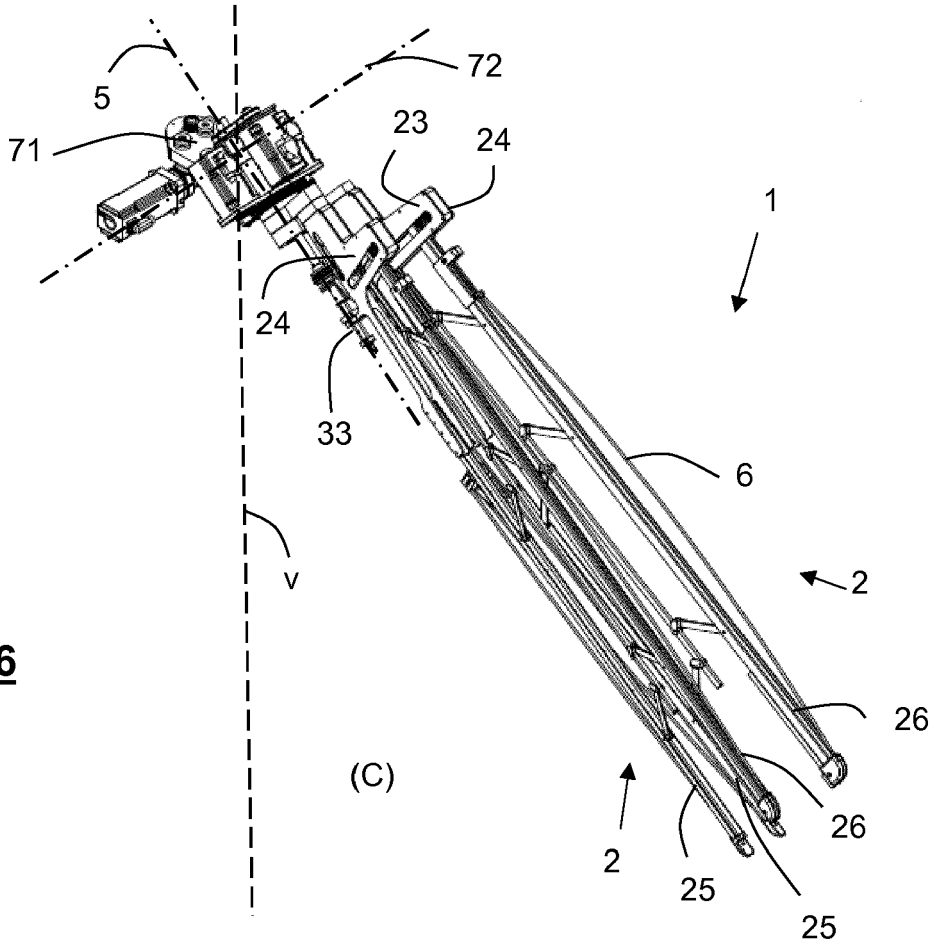

5
72
71
23
24
1
24
33
6
v
2
26
(C)
2
26
25
25

Fig. 16

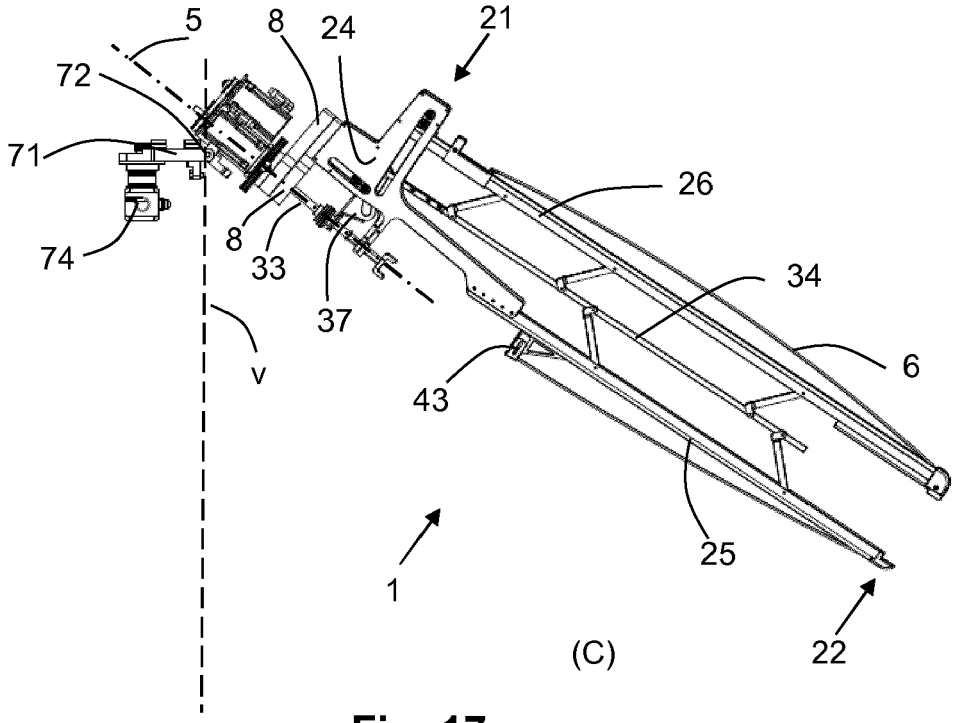

5
8
24
21
72
71
26
74
8
33
34
37
6
v
43
25
1
(C)
22

Fig. 17

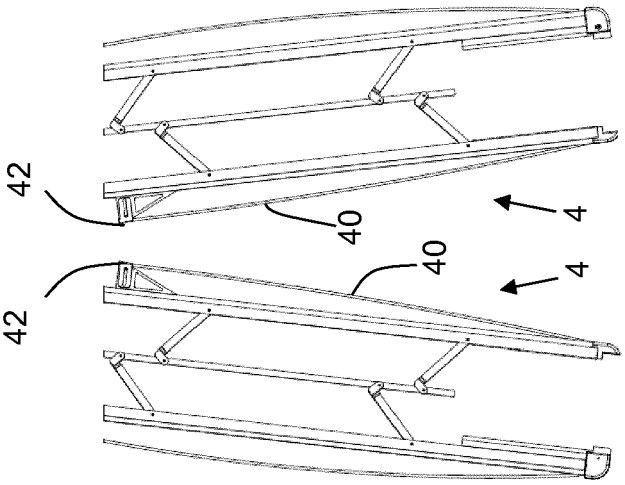


Fig. 21

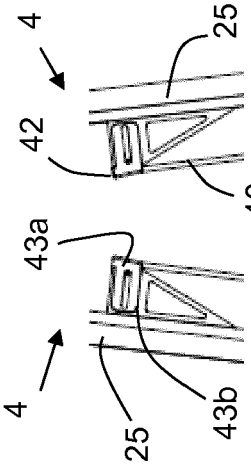


Fig. 22

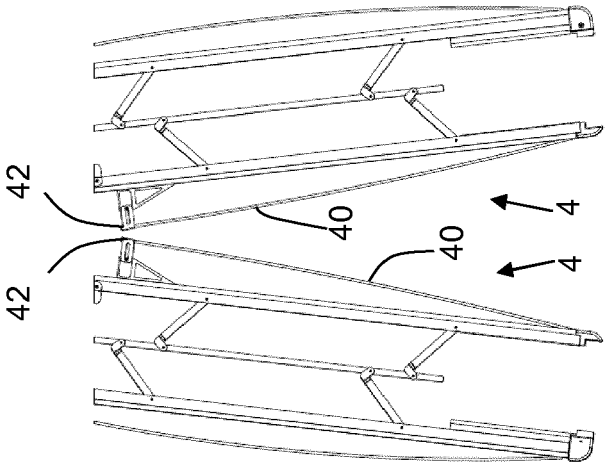


Fig. 19

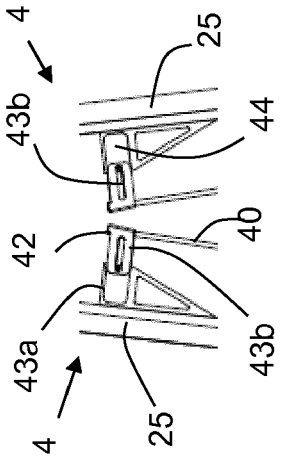


Fig. 20

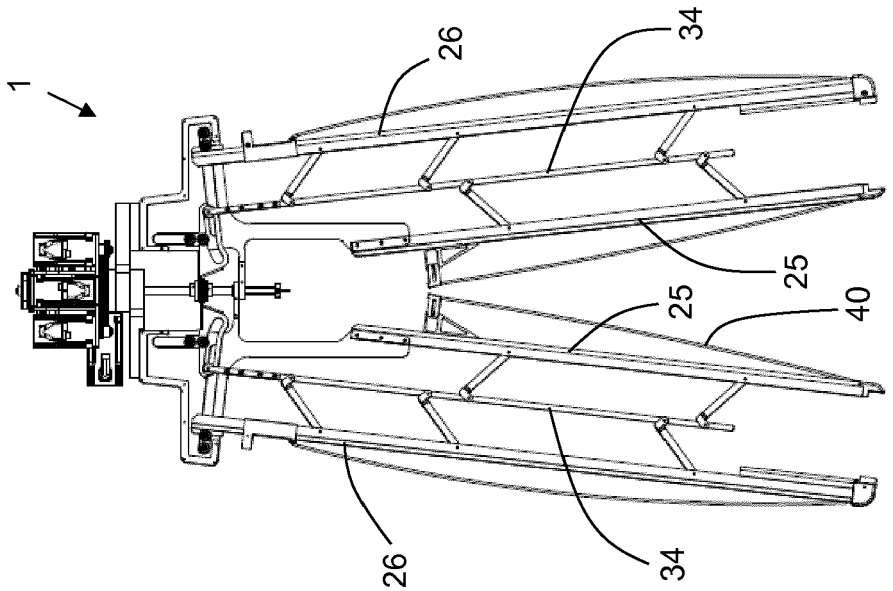


Fig. 18

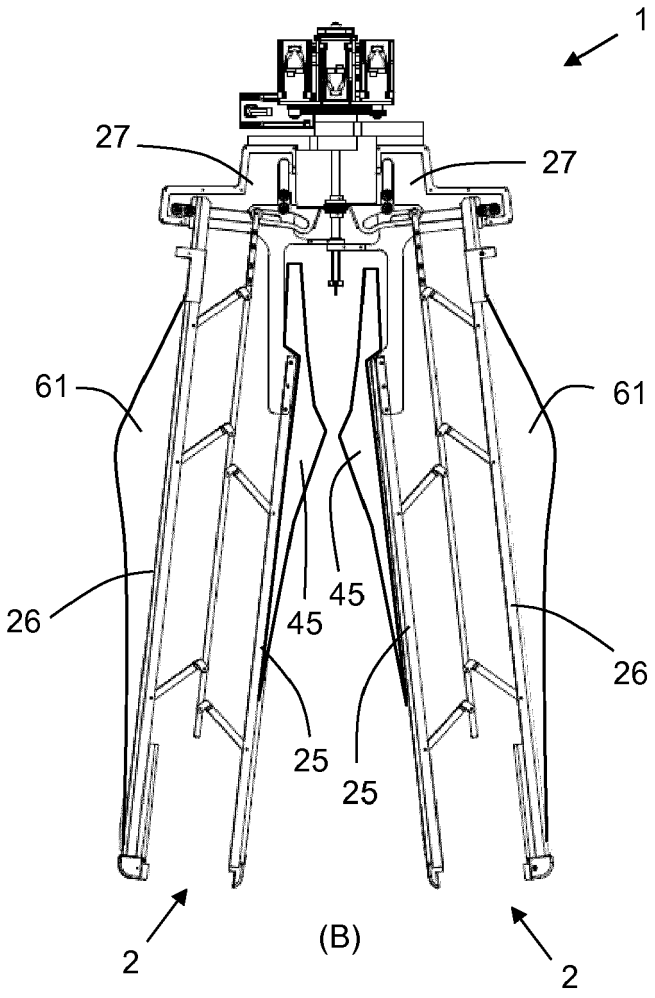


Fig. 23

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 19 38 2319

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	ES 2 640 831 B2 (JEANOLOGIA S L [ES]) 7 March 2018 (2018-03-07) * page 7, lines 20-22; figures 2-4,42,43 *	1	INV. D06C5/00 D06B11/00 D06C23/02 D06M10/00
A	DE 41 31 804 A1 (KREMPEL AUGUST SOEHNE [DE]) 1 April 1993 (1993-04-01) * column 3, lines 54-64; claims 1,4-7; figures *	1	
A	EP 1 650 337 A1 (OMI MECCANICHE IND S A S [IT]) 26 April 2006 (2006-04-26) * claim 1; figure *	12	
A	GB 262 893 A (PARAMOUNT HOSIERY FORM COMPANY; REGINALD JAMES WILLIAM BANNIST) 23 December 1926 (1926-12-23) * figure 1 *	5	
A	WO 95/10651 A1 (KREMPEL AUGUST SOEHNE [DE]; FROEHLICH ECKHARD [DE]) 20 April 1995 (1995-04-20) * page 32, lines 1-10; figures 12-15 *	1	TECHNICAL FIELDS SEARCHED (IPC) D06B D06C D06Q D06M A44C A41H
A	GB 2 297 333 A (CORTESE CARMELO ANGELO [IT]) 31 July 1996 (1996-07-31) * abstract; figures 1,5 *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	14 October 2019	Uhlig, Robert

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 38 2319

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-10-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
ES 2640831 B2	07-03-2018	CN 109310173 A	05-02-2019
		EP 3453271 A1	13-03-2019
		ES 2640831 A1	06-11-2017
		US 2019142092 A1	16-05-2019
		WO 2017191347 A1	09-11-2017
DE 4131804 A1	01-04-1993	DE 4131804 A1	01-04-1993
		EP 0538588 A1	28-04-1993
EP 1650337 A1	26-04-2006	NONE	
GB 262893 A	23-12-1926	NONE	
WO 9510651 A1	20-04-1995	AU 7855094 A	04-05-1995
		EP 0723610 A1	31-07-1996
		WO 9510651 A1	20-04-1995
GB 2297333 A	31-07-1996	GB 2297333 A	31-07-1996
		IT BO950023 A1	29-07-1996
		US 5630533 A	20-05-1997

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 03029545 A **[0006] [0008] [0011] [0012]**
- ES 2640831 B2 **[0011] [0014] [0016]**