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(71) Applicant: **Motocono, S.A.**

08226 Terrassa (ES)

(72) Inventor: **MARTÍ COMERMA, Carlos**

08225 Terrassa (ES)

(74) Representative: **Sugrañes, S.L.P.**

Calle Provenza 304

08008 Barcelona (ES)

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

(57) The invention is a mannequin (1) for supporting a pair of trousers whereon a laser marking is performed, comprising two leg structures (2) to be housed inside the trouser legs. Each structure has a respective longitudinal axis (20, upper (21) and lower (22) areas, front (23) and rear (24) planes, an inner side (25) and outer side (26). The separation between the inner and outer sides varies due to the tensing mechanism (3) in order to go from a non-operative loosened position (A) to a maximum tensed end position (B) in order to perform the marking. Each leg structure is coupled to a respective main rotation axis (5) around which it is able to rotate by means of a respective articulation (51) comprised by the mannequin (1) for each leg structure (2). The main rotation axis (5) is parallel to the direction of the dimension of the rise of the pair of trousers or collinear with it. The front planes (23) can form at least two angles greater and/or less than 180° when they rotate around the respective main rotation axes (5) thereof.

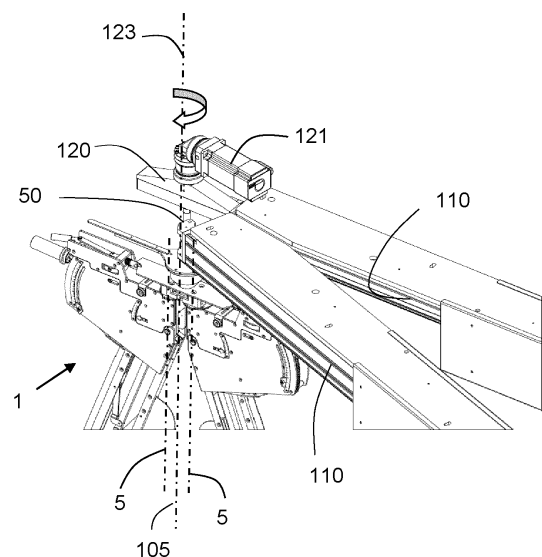


Fig. 16

EP 4 141 157 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 localised 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 actions of a marking laser. The machine comprises at least two assemblies of a mannequin and a cart and distinguishing therein a loading area for the article 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 were used for marking which 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 machine 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 on the mannequin of the marking station has been marked with laser, this already-loaded mannequin cannot go to the loading station to unload it and load another one until loading the pair of trousers on the other mannequin has ended, which is when the rotating arm will rotate and the two mannequins will trade positions. This represents downtime in loading and marking cycles wherein the marking time is rather short (for example, when the marking patterns of the model of trouser are less complex than others).

[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 defined by a respective imaginary longitudinal axis wherein the respective trouser leg extends, an upper portion (the one closest to the waist of the pair of trousers which is below), 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 the 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 provided with gripping means and adjustment means suitable for placing the article in the position it takes when used. The gripping means comprise a pair of L-shaped hangers opposite from 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 feed 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 operating 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 characterised 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, when 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 they load 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, being able to shorten the time necessary for loading. Likewise, it would be desirable to reduce the downtime between the time for loading a pair of trousers onto a mannequin, the marking time and the unloading time. Another objective would be being able to achieve a better flattening of the different existing models of trouser, the dimensions and designs of which vary, since in addition to the sizes, there are trousers with different shapes on the lateral edges or seams thereof, trousers with trouser legs which form a larger or smaller angle between them, trousers with a high or low rise, etc.

Description of the invention

[0020] With the object of providing a solution to the proposed drawbacks, it is disclosed 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 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, 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 of the trouser leg 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 of the trouser leg 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 each of the two leg structures is coupled to a respective main rotation axis around which the leg structure is able to rotate by means of a respective articulation comprised by the mannequin for each leg structure, the main rotation axis of each leg structure 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 when they rotate around the respective main rotation axes thereof.

[0024] According to the preferred embodiment, the main rotation axis of each leg structure is an axis parallel to the direction of the dimension of the rise of the pair of trousers. According to another non-preferred alternative embodiment, the main rotation axis of each leg structure can be one same common axis which is parallel to or collinear with said direction of the dimension of the rise of the pair of trousers. In the preferred embodiment, much larger rotation positions can be adopted, from 0° to 360° .

[0025] 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.

[0026] The rotation or turning of a leg structure can be performed independently from the rotation of the other leg structure, although preferred configurations are also possible wherein they rotate in a dependent manner, in unison.

[0027] It is reminded 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 waist.

[0028] 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 being able to load the trousers to be marked in a manner which is comfortable for an operator, introducing them folded along the line of the rise of the pair of trousers when the angle between the front planes is an acute angle. In addition to the foregoing, adopting positions with different angles enables 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.

[0029] 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 to the respective main rotation axis around which the leg structure can rotate by means of a respective articulation.

[0030] According to another characteristic of this preferred embodiment, each support is attached to corresponding first transmission means through which a rotation is provided for each leg structure around the respective main rotation axis, such that each of the front planes of the two leg structures is able to rotate (dependently or independently) around the respective main rotation axis and adopt different positions wherein the two front planes form between each other a plurality of angles comprised between 0° and 360°.

[0031] 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, the inner side comprises a straight inner bar which extends in a direction parallel to that of the imaginary longitudinal axis, the outer side comprises a straight outer bar parallel to the inner bar, and for each leg structure an intermediate bar is arranged which is parallel to and between the respective inner bar and outer bar. The tensing mechanism comprises actuation means to provide the movement of the outer bar and the intermediate bar with respect to the inner bar, increasing the

separation distance between them when going from the non-operative loosened position (A) to the maximum tensed end position (B), and decreasing the separation distance between them when going from the maximum tensed end position (B) to the non-operative loosened position (A). Furthermore, each support comprises on the inside thereof a guide for the movement of the corresponding outer bar of the outer side according to a trajectory perpendicular to the longitudinal direction wherein the outer bar extends.

[0032] According to another characteristic of the preferred embodiment of the invention, the intermediate bar is joined to the inner bar of the inner side and to the outer bar of the outer side of the same leg structure thereof by means of at least two connecting rods articulated on the two ends thereof (preferably two connecting rods parallel to each other between the inner bar and the intermediate bar, and two connecting rods parallel to each other between the outer bar and the intermediate bar). The outer side and the intermediate bar of each leg structure are arranged such that they are movable with respect to the inner bar of the inner side moving away from the inner side or moving towards the inner side when going from the non-operative loosened position to the maximum tensed end position, and vice versa.

[0033] 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 articulated manner to the main rotation axis, it is foreseen that the inner side comprises a plate with an inner profile which defines an outline simulating the shape had by the inner lateral edge of the trouser leg which goes from the joining of the trouser legs to the lower end of the respective trouser leg when the trouser leg is flattened with the front portion thereof and the rear portion thereof on top of each other, and/or that the outer side of each leg structure comprises a plate with an outer profile which defines an outline simulating the shape had by the outer lateral edge of the trouser leg which goes from the waist to the lower end of the respective trouser leg when the trouser leg is flattened with the front portion thereof and the rear portion thereof on top of each other. On the mannequin, the plates with inner and outer profiles, or most of them, are contained in a plane parallel to the front and rear planes of the respective leg structures thereof, the plate with an outer profile of each leg structure 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 is in the maximum tensed end position (B).

[0034] According to another characteristic of the mannequin object of the invention, the plate with an inner profile and the plate with an outer profile have a thickness, measured in the direction perpendicular to the front plane of the leg structure, comprised between 0.5 and 6 mm, the thickness thereof being able to vary in different areas of the plates, the thickness being lesser in the segment

of the plate closer to the ends able to come into contact with the edges of the trouser legs. The plate with an inner profile has a width which varies along the inner side, being wider in the area of the outline simulating the shape had by the inner lateral edge of the trouser leg at the joining point of the trouser legs, and narrower at the upper and lower ends.

[0035] Furthermore, in an advantageous manner, preferably on the plate with an inner profile, on the edge which defines the outline, a rise appendix is arranged, provided with a vertex at the free end thereof (the end opposite from the plate with an inner profile), the appendix being oriented according to an appendix plane which can be parallel, perpendicular or which forms a certain oblique angle with the plate with an inner profile of the respective leg structure. The rise appendix can be securely joined to the plate with an inner profile, for example by welding, or be configured like a fold of the plate with an inner profile, or according to another embodiment it can be arranged on the plate in a detachable manner, i.e., it is removable, joined by screws or by any other detachable joining means to assemble it and disassemble it from the plate according to the trouser design.

[0036] According to another characteristic of the mannequin object of the invention, in each leg structure, the inner side comprises a straight inner bar which extends in a direction parallel to that of the imaginary longitudinal axis and the outer side comprises a straight outer bar parallel to the inner bar, and the plate with an inner profile is detachably joined to the inner bar and the plate with an outer profile is detachably joined to the outer bar, the plates with inner and outer profiles being able to be disassembled from the respective inner and outer bars and be replaced by other plates with inner and outer profiles in accordance with another trouser design. According to another particular embodiment, the plates with inner or outer profiles can be detachably joined to the respective bars thereof by means of a single pivotable point so that they can pivot with respect to the bars and apply more pressure on the sides of the trouser leg on one side than on the other. The pivotable joint is likewise a detachable joint in order to be able to disassemble the plates with profiles and substitute them with others according to the design of the pair of trousers.

[0037] This configuration described previously wherein the outer and inner sides comprise respective outer and inner bars and respective plates with outer and inner profiles detachably joined to the bars can be applied to any mannequin configuration for supporting a pair of trousers whereon a laser marking is performed, which comprises two leg structures suitable to be housed inside the trouser legs of the trousers to be marked, wherein each leg structure is defined by a respective imaginary longitudinal axis wherein the respective trouser leg can extend, an upper area, a lower area, a front plane whereon the front portion of the trouser leg can be 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 of the trouser leg can be 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 of the trouser leg can be arranged which goes from the waist to the lower end of the trouser leg, wherein the separation distance between the inner side and the outer side of each leg structure is variable by means of a respective tensing mechanism, wherein each leg structure can 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 and the outer side, the front and rear portions of the trouser leg arranged on the leg structure staying extended to the maximum in order to perform the laser marking on any of the portions. Thus, it is not necessary or essential for the described configuration of the outer and inner sides (comprising respective plates with outer and inner profiles) that each of the leg structures be coupled in an articulated manner to a respective main rotation axis around which it is able to rotate by means of a respective articulation, the main rotation axis of each leg structure 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 of the two leg structures being able to form between each other at least two angles larger and/or smaller than 180° when they rotate around the respective main rotation axes thereof. If the mannequin comprises the two articulated leg structures able to rotate around the respective main rotation axes thereof, it will be more advantageous because when the pair of trousers is loaded onto the mannequin, there will be no problems since it will not interfere with the plates with inner profiles if the mannequin is folded with the rotated leg structures practically on top of each other or forming an acute angle between the front planes thereof. If the mannequin does not have this capacity to rotate the leg structures thereof, then the inner sides will be configured to momentarily promote completely or partially hiding the plates of the inner profiles towards the inside of the inner bars without the plates of the inner profiles protruding excessively in order to enable separation between the plates of the inner profiles of both leg structures which enables the pair of trousers to pass.

[0038] According to another characteristic of the mannequin object of the invention according to a preferred embodiment, the support of each leg structure whereon the inner side and the outer side are supported comprises a first semisupport whereon the inner side and the outer side are supported, and a second semisupport by which the leg structure is joined in an articulated manner to a respective articulation by which the leg structure is able to rotate around the respective main rotation axis. The first semisupport and the second semisupport are joined in an articulated manner to each other, the first one with the ability to rotate with respect to the second one around an articulation for angular adjustment between the trouser legs with the ability to rotate around an angular ad-

justment axis, said angular adjustment axis being an axis perpendicular to the front plane or perpendicular to the plane wherein the inner side and the outer side of the leg structure are contained. The first semisupport and the second semisupport are configured articulated to each other by the articulation for angular adjustment such that when the first semisupport is rotated with respect to the second semisupport, the inner side of the leg structure varies the angle it forms with respect to the direction wherein the main rotation axis extends, which is parallel to the direction of the dimension of the rise of the pair of trousers or collinear with said direction, the mannequin being able to vary the angle the inner sides of the two leg structures form between each other in accordance with the trouser design.

[0039] According to another additional characteristic of this preferred embodiment of the mannequin of the invention, in each leg structure, the first semisupport supports the inner and outer bars of the inner and outer sides, respectively, the first semisupport and the second semisupport being configured as articulated to each other such that when the first one rotates with respect to the second one, the inner bar of the leg structure varies the angle it forms with respect to the direction wherein the main rotation axis extends, which is parallel to the direction of the dimension of the rise of the pair of trousers or collinear with said direction, the mannequin being able to vary the angle the inner bars of the two leg structures form between each other.

[0040] According to another characteristic of this preferred embodiment of the mannequin of the invention, the first semisupport and the second semisupport of each leg structure are made up of respective bodies, each provided with a front plate and a rear plate, parallel to the front plane and to the rear plane of the leg structure, said plates being provided with holes, pivots and slots in order to carry out the rotation of the first semisupport with respect to the second semisupport, each leg structure comprising an angle regulation mechanism to vary the angle formed by the inner sides of the two leg structures with each other or the angle formed by the inner bars of the inner sides of the two leg structures with each other, and locking means for that angle. In this manner, the mannequin is able to be adapted to the model of trouser to be marked and thereby adjusting it to the angle it has between the trouser legs.

[0041] Preferably, the angle regulation mechanism comprises a spindle arranged coupled in a fixed manner in the second semisupport with respect to which the spindle moves in a direction towards the first semisupport, provided with a head able to be rotated manually in order to advance the spindle, wherein the end of the spindle is introduced into the first semisupport. The angle regulation mechanism further comprises a nut crossed through by the spindle, said nut being provided with a pivot arranged in a direction parallel to the angular adjustment axis, and the pivot in turn being arranged inside at least one slot made in one of the front or rear plates of the first

semisupport. All of this is arranged such that when the spindle is rotated, the nut moves with respect to the second semisupport and the pivot thereof exerts a pushing force inside the slot of the first semisupport, making the slot and the plate wherein it is located rotate with respect to the second semisupport around the angular adjustment axis.

[0042] Preferably, the locking means for the angle between the first semisupport and the second semisupport comprise an angle locking bolt which is parallel to the direction of the angular adjustment axis, provided at one end with a head and at the other with a tightening nut or wing nut, the angle locking bolt making up part of the second semisupport and a slot in the shape of a circular arch provided in a plate integrally joined to the first semisupport. The slot is crossed through by the angle locking bolt, the head staying on one side of the slot, and the tightening nut or wing nut on the other side of the slot and protruding out of one of the front or rear plates of the second semisupport. When the locking nut or wing nut is tightened, it is tightened against the plate, the head of the locking bolt is tightened against the slot and the rotation between the first semisupport and the second semisupport is immobilised.

[0043] According to another preferred characteristic, for any embodiment described previously, the mannequin object of the invention comprises, above the upper areas of the leg structures, a cylindrical or prismatic apical axial body which extends in a direction parallel to the direction of the main rotation axes of the leg structures, the apical axial body being arranged equidistant from the two leg structures and integrally joined to a body supporting the articulations by which each leg structure can rotate around the respective main rotation axis thereof, all of this configured such that when the leg structures rotate around the respective main rotation axes thereof, they move with respect to the apical axial body.

[0044] According to a second aspect of the invention, it discloses an assembly made up of a mannequin and a movement cart, characterised in that the mannequin is a mannequin like the one described in the previous paragraph (the one comprising the cylindrical or prismatic apical axial body), and in that the transportation cart is provided with movement motor means for the autonomous movement of the transportation cart along a guided trajectory. The transportation cart can be coupled to the mannequin for the joint transportation thereof along a guided trajectory, wherein said coupling to the mannequin is configured to enable access to the apical axial body from the outside of the movement cart and to enable the rotation of the mannequin independently from the transportation cart around a vertical rotation axis of the mannequin which coincides with the imaginary axial axis of the apical axial body of the mannequin when the apical axial body is arranged in a vertical position.

[0045] According to a particular embodiment of the assembly object of the invention made up of the mannequin and the transportation cart, the transportation cart is

joined in an articulated manner to the mannequin through a loading rotation axis which is horizontal and perpendicular to the direction of the imaginary axial axis of the apical axial body of the mannequin, the mannequin being able to rotate around said loading rotation axis and able to adopt a special loading position (C) for trousers. In this special loading position (C), the front planes or the rear planes of the two leg structures of the mannequin are arranged forming an acute angle or arranged on top of each other, and said front planes or the rear planes being contained in non-vertical planes, and the imaginary axial axis of the apical axial body of the mannequin forms an acute angle with respect to the vertical direction, being able in said special loading position (C) to load onto the mannequin a pair of trousers folded on itself along the line defining the rise thereof. In fact, this same special loading position (C) is also useful for the unloading of the pair of trousers from the mannequin. Although it is possible to load a pair of trousers onto the mannequin by only placing the mannequin in a position with the front planes thereof at an acute angle, having rotated the leg structures around the respective main rotation axes thereof parallel to the rise axis, loading the trousers folded around the rise, without needing to adopt the mentioned special loading position (C), what is achieved with the special loading position (C) provides greater comfort, because the lower end of the mannequin is lifted with respect to the floor and the mannequin is rotated with respect to the vertical plane and thus the operator can introduce the pair of trousers onto the mannequin without needing to bend over as much.

[0046] This configuration by which the mannequins can adopt the special loading position (C) is very comfortable for the operator, since the trousers can be loaded onto 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° or less), 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 whence 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.

[0047] 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 with the front planes forming an acute angle (preferably around 20° or with the planes completely on top of each other), and in an even more comfortable manner, the mannequin or the mannequins in the loading area can adopt the special loading position (C), said front planes being inclined at an acute angle 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.

[0048] According to a third aspect of the invention, it is disclosed 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 at least one mannequin is performed, and a marking area wherein the pair of trousers loaded onto the mannequin coming from the loading area is exposed to the external effects of a laser for the marking thereof. In the machine object of the invention, the mannequin or mannequins make up a mannequin and transportation cart assembly in accordance with the assembly described above. Furthermore, in the machine of the invention the transportation cart is movable through movement motor means along at least one guided trajectory for the transportation of the mannequin from the loading area to the marking area, and from the marking area to the loading area.

[0049] According to a preferred embodiment of the machine of the invention, the machine comprises more than one loading area separated from each other, and respective guided trajectories for the transportation which converge at one same marking area, wherein the machine comprises at least one mannequin and cart assembly for each loading area.

[0050] According to another characteristic of the preferred embodiment of the machine object of the invention, the guided trajectories for the transportation are trajectories arranged radially with respect to the marking area located on one side or on both sides of the marking area, the marking area facing a laser device. For each loading area there can be one operator loading trousers in order to improve productivity.

[0051] According to another characteristic of the preferred embodiment of the machine object of the invention, the loading area comprises a motorised rotating positioning device with the ability to rotate around a vertical positioning axis, located after, but separated from, the guided trajectories for transportation by which the mannequins are led by the transportation carts from the loading areas to the end of the guided trajectories for transportation. The positioning device comprises a positioning rail with a straight trajectory able to be aligned, when rotated with respect to the vertical positioning axis, with any of the guided trajectories for transportation in order

to receive in the marking area the mannequin led by the transportation cart, and it further comprises connection means able to connect to the apical axial body of the mannequin received in the positioning rail and cause the rotation of the mannequin around the imaginary axial axis of the apical axial body of the mannequin, when said imaginary axis is parallel to the vertical direction.

[0052] According to another additional characteristic of the machine object of the invention, the machine comprises a control device for detecting the presence of persons in any of the loading area or areas, configured to send a warning signal to the movement motor means of the transportation carts by which the advance speed of the transportation carts is controlled and varied in the guided trajectories for transportation, even being able to detect the advance thereof in any of the directions from the loading area or areas to the marking area and vice versa.

[0053] Although it will not result in being so advantageous, it is worth mentioning that the arrangement of the elements of the only marking area and of the loading areas forming the described machine can operate with any mannequin which does not need to have the ability to rotate the leg structures thereof around the respective main rotation axes thereof, since the marking is mainly done with the front planes of the leg structures arranged at 180°. It is enough for the mannequin to have, above the upper areas of the leg structures, a vertical cylindrical or prismatic apical axial body on the upper end thereof and centred between the two leg structures.

[0054] According to a fourth aspect of the invention, it is disclosed a system for the laser marking of trousers comprising at least one machine like the one described in previous paragraphs, according to the invention 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 or areas of the machine.

[0055] 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 pushing projection 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 pushing projection 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 pushing projection 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).

[0056] 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 pushing projection 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.

[0057] The pushing projection 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 pushing projection 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 pushing projection means can slide from the bottom upwards until they reach the joining area of the 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 pushing projection 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.

[0058] 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 special 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 special 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 pushing projection 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.

[0059] Alternatively or additionally, the pushing projection means can be provided with gripping elements such as for example clamps or hooking means, which grip or hook the waist 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 waist 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

[0060] 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 preferred embodiment and a second embodiment of the mannequin, of a mannequin and movement cart assembly, embodiments of the machine for loading and exposing the trousers to a laser for the marking thereof, and embodiments of 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 front view of the mannequin object of the invention according to a preferred embodiment in a maximum tensed end position (B) with the front planes of the leg structures forming 180°;

Fig. 2 is a view of the mannequin of Fig. 1 in a maximum tensed end position (B) with the front planes of the leg structures forming 180°, but wherein furthermore the first semisupport has rotated with respect to the second semisupport around the rotation axis of the articulation for angular adjustment for an improved adaptation to the angle it has between the legs of the pair of trousers to be loaded and marked on the mannequin;

Fig. 3 is a detail view of the angle regulation mechanism of the mannequin of Fig. 1, but in an intermediate tensing position;

Fig. 4 is a detail view of the angle regulation mechanism of the mannequin shown in Fig. 3 in the position of Fig. 2, wherein the first semisupport has rotated with respect to the second semisupport;

Fig. 5 is an expanded view of a particular embodiment of the flat rise appendix alternative to the one appearing in the mannequin of Fig. 1;

Figs. 6 and 7 are perspective views of the mannequin of Fig. 1 in a non-operative loosened position but wherein the leg structures have rotated around the respective main rotation axes thereof, the front planes thereof forming an oblique angle, schemati-

cally showing in Fig. 6 the planes wherein the front and rear planes of the leg structures are contained; Figs. 8 to 10 are different views of the mannequin of Fig. 6 wherein the leg structures have rotated around the respective main rotation axes thereof until they are on top of the front planes thereof, adopting a folded position favourable for performing the loading of a pair of trousers onto the mannequin by introducing the pair of trousers from the bottom folded around the rise thereof;

Fig. 11 is a detail view of the locking means of the angle between the first semisupport and the second semisupport of the mannequin;

Fig. 12 is a schematic view of a mannequin and transportation cart assembly, wherein the mannequin is the one of the second embodiment of the mannequin object of the invention, and wherein the mannequin is in a special loading position (C) after having rotated around the loading rotation axis by which it is articulated to the transportation cart;

Fig. 13 is a view of an embodiment of a machine for loading and exposing trousers to a laser for the marking thereof, object of the invention, wherein the mannequin of the loading area is in the position shown in Fig. 12;

Figs. 14 and 15 are two preferred embodiments of the machine for loading and exposing trousers to a laser for the marking thereof, object of the invention; Figs. 16 and 17 are two detail views of the converging ends of the guided trajectories for transportation and the positioning device of the machine of Fig. 14;

Fig. 18 is a perspective view showing a partial cross section of the positioning device of the machine of Fig. 15;

Fig. 19 is a perspective view of the converging ends of the guided trajectories for transportation and the positioning device of the machine of Fig. 15;

Fig. 20 is a cross-sectional view of the positioning device of the machine of Fig. 14;

Fig. 21 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, according to an embodiment of the invention different from the previous ones, 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; and

Fig. 22 is a perspective view of the auxiliary device for loading and/or unloading shown in Fig. 21 and of a portion of the loading station of the machine shown in Fig. 21.

Detailed description of the drawings

[0061] Figs. 1, 2 and 6 to 10 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.

[0062] The mannequin 1 comprises two leg structures 2 suitable to be housed on the inside of the 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 Figs. 1 and 6) wherein the respective trouser leg of the pair of trousers to be assembled on the mannequin extends, an upper area 21 (which is closer to and above the waist of the pair of trousers), 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, lateral edge which goes from the waist to the lower end of the trouser leg.

[0063] Each inner side 25 comprises a straight inner bar 25a which extends in a direction parallel to that of the imaginary longitudinal axis 20, and moreover, each outer side 26 comprises a straight outer bar 26a parallel to the inner bar 25a. Furthermore, for each leg structure 2 there is an intermediate bar 34 arranged parallel to and between the respective inner bar 25a and outer bar 26a. The inner bars 25a and the outer bars 26a are formed by bars or profiles having 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.

[0064] 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 Figs. 6 to 10, to a maximum tensed end position B, shown in Figs. 1 and 2, 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, 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. 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.

[0065] According to the represented embodiment of the mannequin 1 in Figs. 1, 2 and 6 to 10, the inner side 25 comprises a plate with an inner profile 25b which defines an outline simulating the shape had by the inner lateral edge of the trouser leg which goes from the joining point of the trouser legs to the lower end of the respective trouser leg when the trouser leg is flattened with the front portion thereof and the rear portion thereof on top of each other. Moreover, the outer side 26 comprises a plate with an outer profile 26b which defines an outline simulating the shape had by the outer lateral edge of the trouser leg which goes from the waist to the lower end of the respective trouser leg when the trouser leg is flattened with the front portion thereof and the rear portion thereof on top of each other. The plates with inner 25b and outer 26b profiles, or most of them, are contained in a plane parallel to the front 23 and rear 24 planes of the respective leg structures 2 thereof. The plate with an outer profile 26b of each leg structure 2 is intended to come into contact with at least one portion of the outer lateral edge (or with all 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, shown in Figs. 1 and 2.

[0066] The plate with an inner profile 25b and the plate with an outer profile 26b have a thickness, measured in the direction perpendicular to the front plane 23 of the leg structure 2, comprised between 0.5 and 6 mm (around 1.5 mm in many of the plates). Nevertheless, in a plate with a profile, the thickness, instead of being constant, can vary in different areas of the plate, the thickness being lesser in the segment of the plate closer to the ends able to come into contact with the edges of the trouser legs. Preferably, they are made of metal, and more preferably, aluminium. It can be seen how the plate with an inner profile 25b has a width which varies along the inner side 25, being wider in the area of the outline simulating the shape had by the inner lateral edge of the trouser leg at the joining point of the trouser legs, and narrower at the upper and lower ends.

[0067] It can be clearly seen in Figs. 1 and 2 that in the plate with an inner profile 25b, on the edge defining the outline, a rise appendix 9 is arranged indicated to stretch the area of the rise of the pair of trousers and so that no wrinkles are left, so that this area can be marked well with the laser. The rise appendix 9 has a vertex at the free end thereof (the one opposite from the end by which it is joined or coupled to the plate with an inner profile 25b). The rise appendix 9 can be oriented, according to the design or model of the pair of trousers to be marked, according to an appendix plane which is parallel, perpendicular or which forms a certain oblique angle with the plate with an inner profile 25b of the respective leg structure 2, according to the model of trouser to be loaded and marked. In Figs. 1 and 2, the rise appendix 9 forms an oblique angle although it is close to 90°. Fig. 5 partially shows leg structures 2 with other embodiment of plates

with inner 25b and outer 26b profiles, being able to show in detail the arrangement of the rise appendix 9 with respect to the plane wherein most of the plate with an inner profile 25b is contained.

[0068] The plates with an inner profile 25b are detachably joined (for example, by a joint screwed at one or more points, by a joint pivotable at one point) to the respective inner bars 25a, and the same thing occurs with the plates with an outer profile 26b, which can be detachably joined to the outer bars 26a, thereby being able to disassemble the plates with inner 25b and outer 26b profiles from the respective inner 25a and outer 26a bars, and be replaced by other plates with inner 25b and outer 26b profiles in accordance with another trouser design with a different shape of the lateral edges of the trouser legs. Thus, the plates with inner and outer profiles 25b and 26b can be changed, for example, by screwing them and unscrewing them from the inner and outer bars 25a and 26a, according to the model and size of the trousers to be marked.

[0069] Fig. 11 also shows 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 waist 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 plate with an outer profile 26b comes just after the lower end of the stop 30, since normally it starts from the waist 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 plate with an outer profile 26b reaches the area of the edge of the outermost side of the pair of trousers.

[0070] The mannequin 1 stands out in that the two leg structures 2 are coupled in an articulated manner to a respective main rotation axis 5 around which each leg structure 2 is able to rotate by means of a respective articulation 51 comprised by the mannequin 1 for each leg structure, the main rotation axis 5 being an axis parallel with the direction of the dimension 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 waist. Each leg structure 2 is able to rotate independently from the other leg structure 2, meaning, the rotation of one leg structure 2 does not have to influence the magnitude of rotation of the other leg structure 2, although in the preferred embodiment shown, the two leg structures 2 rotate the same magnitude of rotation and in the same direction of rotation.

[0071] Figs. 1 and 2, 6 and 7, and 8 to 10 show the mannequin 1 in different positions wherein the two leg structures 2 have rotated around the respective main rotation axes 5 thereof (a vertical axis in the positions shown), for which reason the front planes 23 form between each other angles larger and smaller than 180°,

for example, 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). Angles can even be formed that are practically 0° and 360° when the two leg structures 2 are practically on top of each other (Figs. 8 to 10).

[0072] This ability to rotate each leg structure 2 with respect to the main rotation axis 5 thereof 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, although most times the laser marking is done when the angle is 180°. This ability to rotate is also particularly advantageous for adopting the position like the one shown in Figs. 8 to 10, since it is a position which enables the pair of trousers to be assembled onto the mannequin by introducing it folded in half (folded along the axis that would mark the rise of the pair of trousers), and thus it is no longer necessary for the operators to need to have the pair of trousers extended with their hands. Once the pair of trousers has been introduced from the bottom, the operator, manually or by means of the actuation of one or two motors, will have the mannequin 1 in a position wherein the front planes 23 form an angle between them of 180° and will then be able to activate the tensing of the trouser legs by means of the tensing mechanism 3 by which the separation distance between the inner side 25 and the outer side 26 increases in order to go from a non-operative loosened position A to the maximum tensed end position B of Fig. 1.

[0073] In order to perform the rotation of each leg structure 2 around the respective main rotation axis 5 thereof, each leg structure 2 comprises in the upper area 21 thereof a support 27 attached to transmission means 29 through which the rotation is imparted to the leg structure 2. The transmission means can in turn be coupled to motor means 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.

[0074] The motor means of each leg structure, if they are had due to not being manual, can be formed by a servomotor 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 can be formed by straps and/or gears and thereby be the ones responsible for transmitting the torque generated by the servomotors to 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 leg of the pair of trousers to be marked, without the other trouser leg interfering or creating hidden areas which impede the

projected marking.

[0075] Nevertheless, according to the preferred embodiment, the two leg structures 2 rotate at the same time and the same angle, and the rotation can be imparted manually, without needing motor means. The transmission means of Fig. 4 makes the two supports 27 rotate at the same time and symmetrically with respect to the apical axial body 50 located in the upper end of the mannequin 1 when the user applies a force on one of the two supports 27. The representations of the mannequin 1 show the arrangement, above the upper areas 21 of the leg structures 2, of the cylindrical apical axial body 50 (it can also be prismatic) which extends in a direction parallel to the direction of the main rotation axes 5 of the leg structures 2. The apical axial body 50 is arranged equidistant from the two leg structures 2 and is integrally joined to a body supporting the articulations 51 by which each leg structure 2 can rotate around the respective main rotation axis 5 thereof. All of this is configured such that when the leg structures 2 rotate around the respective main rotation axes 5 thereof, they move with respect to the apical axial body 50.

[0076] Returning to the tensing mechanism 3 by which the mannequin 1 goes from position A to position B, said tensing mechanism 3 comprises actuation means shown in the partial cross sections of Figs. 3, 4 and 11 formed by the following elements: a lever handle 40 so that the operator moves it downwards in order to start the tensing, the connecting rod 41 which rotates around shaft 46 when the lever 40 is pressed, the part 42 in an upside-down L provided with teeth on the lower arched end thereof which meshes with a pinion integral with the wheel 43 which when it rotates in the clockwise direction makes the wheel 43 rotate in the anti-clockwise direction and the guide 44 is moved towards the outside, dragging the outer side 26 and at the same time the intermediate bar 34 linked by the joining element 45. Thus, these actuation means impart the movement of the outer bar 26a and the intermediate bar 34 with respect to the inner bar 25a, increasing the separation distance between them when going from the non-operative loosened position A to the maximum tensed end position B, and decreasing the separation distance when going from the maximum tensed end position B to the non-operative loosened position A when the lever 40 is pushed upwards. Each support 27, which supports the inner bar 25a, the outer bar 26a and the intermediate bar 34 of each leg structure 2, preferably comprises on the inside thereof a guide for the movement of the corresponding outer bar 26a of the outer side 26 in accordance with a trajectory perpendicular to the longitudinal direction wherein the outer bar 26a extends.

[0077] 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 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. 1, the intermediate bar 34 is slightly thinner than the inner 25a and outer 26a bars. Advantageously, said inner 25a and outer 26a bars can 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.

[0078] Figs. 1 and 2 show how each intermediate bar 34 is joined to the inner 25 and outer 26 sides respectively by means of two connecting rods 35 articulated on the two ends thereof and parallel to each other, and by means of two connecting rods 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 from the inner side or moving towards the inner side 25 when going from the non-operative loosened position A to the maximum tensed end position B, and vice versa.

[0079] Figs. 1 to 4 show that the support 27 of each leg structure 2 wherein the inner side 25 and the outer side 26 are supported, comprises a first semisupport 81 wherein the inner side 25 and the outer side 26 are supported, and a second semisupport 82 by which the leg structure 2 is joined in an articulated manner to a respective articulation 51 by which the leg structure 2 is able to rotate around the respective main rotation axis 5. The first semisupport 81 and the second semisupport 82 are joined in an articulated manner to each other, the first one with the ability to rotate with respect to the second one around an articulation for angular adjustment 80 between the trouser legs (there are trouser legs which form between each other an angle that is more open or more closed according to the model and size of trousers) with the ability to rotate around an angular adjustment axis. The angular adjustment axis is an axis perpendicular to the front plane 23 or perpendicular to the plane wherein the inner side 25 and the outer side 26 of the leg structure 2 are contained. The first semisupport 81 and the second semisupport 82 are configured articulated to each other by the articulation for angular adjustment 80 such that when the first one rotates with respect to the second one, the inner side 25 of the leg structure 2 varies the angle it forms with respect to the direction wherein the main rotation axis 5 extends which is parallel to the dimension of the rise of the pair of trousers or collinear with said direction. Thus, the mannequin 1 can vary the angle formed by the inner sides 25 of the two leg structures 2 with each other, as can be compared in Figs. 1 and 2, in order to adjust the mannequin 1 to the model of trouser.

[0080] The first semisupport 81 and the second semisupport 82 of each leg structure 2 are formed by respective bodies each provided with a front plate and a rear plate, parallel to the front plane 23 and to the rear plane 24 of the leg structure 2, said plates being provided with holes, pivots and slots in order to carry out the rotation

of the first semisupport 81 with respect to the second semisupport 82. Each leg structure 2 comprises an angle regulation mechanism to vary the angle formed by the inner sides 25 of the two leg structures 2 with each other or the angle formed by the inner bars 25a of the inner sides 25 of the two leg structures 2 with each other, and locking means 88 for the angle between the first semisupport 81 and the second semisupport 82.

[0081] The angle regulation mechanism comprises a spindle 84 arranged coupled in a fixed manner in the second semisupport 82 with respect to which it moves in a direction towards the first semisupport 81, provided with a head 83 able to be rotated manually in order to advance or withdraw the spindle 84, wherein the end of the spindle 84 is introduced into the first semisupport 81. The mechanism also comprises a nut 85 crossed through by the spindle 84, said nut 85 being provided with a pivot 86 arranged in a direction parallel to the angular adjustment axis. The pivot 86 is in turn arranged inside at least one slot 87 made in one of the front or rear plates of the first semisupport 81. All of this is arranged such that when the spindle 84 is rotated in an advance direction, the nut 85 moves with respect to the second semisupport 82 and the pivot 86 thereof exerts a pushing force inside the slot 87 of the first semisupport 81, making the slot 87 and the plate wherein it is located rotate with respect to the second semisupport 82 around the angular adjustment axis.

[0082] The locking means 88 for the angle (see Fig. 11) between the first semisupport 81 and the second semisupport 82 comprise an angle locking bolt 89b which is parallel to the direction of the angular adjustment axis, provided at one end with a head and at the other with a tightening nut or wing nut, the angle locking bolt 89b making up part of the second semisupport 82, and a slot in the shape of a circular arch provided in a plate 89a integrally joined to the first semisupport 81. The slot is crossed through by the angle locking bolt 89, the head staying on one side of the slot and the tightening nut or wing nut on the other side of the slot and protruding out of one of the front or rear plates of the second semisupport 82. When the locking nut or wing nut is tightened, it is tightened against the plate 89a, the head of the angle locking bolt 89a is tightened against the slot and the rotation between the first semisupport 81 and the second semisupport 82 is immobilised.

[0083] Figs. 12 and 13 show an assembly formed by a mannequin 1 (another embodiment in these figures, although it could be the embodiment of Fig. 1) and a transportation cart 71 (see also the cart 71 of Figs. 18 and 20). The transportation cart 71 is provided with movement motor means 74 (preferably, the cart 71 is actuated by means of electrical actuators) for the autonomous movement of the transportation cart 71 along a guided trajectory. The transportation cart 71 can be coupled to the mannequin 1 for the joint transportation thereof along a guided trajectory, wherein said coupling to the mannequin 1 is configured to enable access to the apical axial body 50 from the outside of the movement cart 71 and

to enable the rotation of the mannequin 1 independently from the cart 71 around a vertical rotation axis of the mannequin 105 which coincides with the imaginary axial axis of the apical axial body 50 of the mannequin 1 when the apical axial body 50 is arranged in a vertical position.

[0084] According to the embodiment of the assembly shown in Figs. 12 and 13, the transportation cart 71 is joined in an articulated manner to the mannequin 1 through a loading rotation axis 72 which is horizontal and perpendicular to the direction of the imaginary axial axis of the apical axial body 50 of the mannequin 1, the mannequin 1 being able to rotate around said loading rotation axis 72 and able to adopt a special loading position C for trousers. In this special loading position C, 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 or arranged on top of each other, are contained in non-vertical planes and the imaginary axial axis of the apical axial body 50 of the mannequin 1 forms an acute angle with respect to the vertical direction, being able in said special loading position C to load onto the mannequin 1 a pair of trousers folded on itself along the line defining the rise thereof.

[0085] Figs. 14 and 15 show a machine 10 for loading and exposing trousers to a laser for the marking thereof, comprising more than one loading area 11 wherein the loading of a pair of trousers onto a mannequin 1 is performed, and a marking area 12 wherein the pair of trousers loaded onto the mannequin 1 coming from one of the loading areas 11 is exposed to the external effects of a laser for the marking thereof. Said figures also schematically show a transmitter apparatus 100 of at least one laser beam directed towards the marking area 12 of the machine. The mannequin 1 of the loading area 11 and of the marking area 12 is a mannequin 1 which makes up part of a mannequin 1 and transportation cart 71 assembly described previously, in other words, with a mannequin 1 like the one of Fig. 1 and wherein the transportation cart 71 is movable through the movement motor means 74 along at least one guided trajectory for transportation 110 of the mannequin 1 from a loading area 11 to the marking area 12 and from the marking area 12 to the loading area 11. In these embodiments of the machine, it is not necessary for the mannequin 1 to be able to rotate with respect to the cart 71 around a loading rotation axis 72 like the one shown in Figs. 12 and 13, since the loading of the folded pair of trousers can be performed by arranging the mannequin in the folded position of Figs. 8 to 10.

[0086] Thus, Figs. 14 and 15 show that the machine 10 for loading and exposing trousers to a laser for the marking thereof comprises more than one loading area 11, two loading areas 11 in Fig. 14 and four loading areas 11 in Fig. 15, separated from each other, and respective guided trajectories for transportation 110 which converge in one same marking area 12, wherein the machine 10 comprises at least one mannequin 1 and cart 71 assembly for each loading area 11. The guided trajectories for

transportation 110 are trajectories arranged radially with respect to the marking area 12 located on one side (Fig. 14) or on both sides (Fig. 15) of the marking area 12, the marking area 12 facing a laser transmitter apparatus 100.

[0087] Thus, in the machine 10 of Fig. 14, wherein there are two loading areas 11 and two guided trajectories for transportation 110 converging towards a single marking area 12, two operators can work in order to increase productivity, and in the machine 10 of Fig. 15 with four loading areas 11, four operators can work.

[0088] According to other embodiments not shown, in the machines 10 of Figs. 14 and 15 another transmitter apparatus 100 of at least one laser beam can be arranged opposite from the other apparatus on the other side of the marking area 12, in order to mark at the same time the opposite side of the pair of trousers which is being marked by the first transmitter apparatus 100.

[0089] Figs. 16 to 20 show that the marking area 12 comprises a motorised (see motor 121) rotating positioning device 120 with the ability to rotate around a vertical positioning axis 123, located after, but separated from, the guided trajectories for transportation 110 by which the mannequins 1 are led by the transportation carts 71 from the loading areas 11 to the end of the guided trajectories for transportation 110. The positioning device 120 comprises a positioning rail 122 with a straight trajectory able to be aligned, when rotated with respect to the vertical positioning axis 123, with any of the guided trajectories for transportation 110 in order to receive in the marking area 12 the mannequin 1 led by the transportation cart 71. The positioning device 120 comprises connection means 124 (see Figs. 18 and 20) able to connect to the apical axial body 50 of the mannequin 1 received in the positioning rail 122 and cause the rotation of the mannequin 1 around the imaginary axial axis of the apical axial body 50 of the mannequin 1, when said imaginary axis is parallel to the vertical direction.

[0090] Although it is not shown in the figures, the machine 10 comprises a control device for detecting the presence of persons in any of the loading area or areas 11, configured to send a warning signal to the movement motor means 74 of the transportation carts 71 by which the advance speed of the transportation carts 71 is controlled and varied in the guided trajectories for transportation 110, even being able to detect the advance thereof in any of the directions from the loading area or areas 11 to the marking area 12 and vice versa.

[0091] Thus, if an operator is close to a loading area 11 or the corresponding guided trajectory for transportation 110 thereof, the mannequin 1 which is already loaded will be transported slowly by the transportation cart 71 to the marking area 12, or for the case in which the pair of trousers loaded onto a mannequin 1 has already been marked and is transported from the marking area 12 to one of the loading areas 11 and the presence of an operator is detected, the mannequin 1 will also be transported slowly. Otherwise, when in the vicinity of a loading area 11 or of the guided trajectory for transportation 110

thereof, the presence of a person is not detected, the mannequins 1 loaded with trousers will be transported quickly to the marking area 12, and the same thing will occur when the pair of trousers has already been marked and needs to be transported to one of the loading areas 11 in order to unload it.

[0092] In the machines 10, the pairs of trousers loaded onto the mannequins 1 stay perfectly flat and enable a marking as if it were made on a table, with the difference that on this occasion the pair of trousers is in a vertical plane. The guided trajectories for transportation 110 and the trajectory within the loading area defined by the positioning rail 122 with a straight trajectory are only aligned when the loaded mannequin must go to the marking area 12 or must leave the marking area 12 in order to unload the pair of trousers; the rest of the time, during the marking, they stay unaligned. Furthermore, as seen in the figures, the positioning device 120 is independent from the loading areas 11 and from the guided trajectories for transportation 110 in order to prevent the transmission of vibrations. Results carried out by a machine 10 like those of Figs. 14 and 15 have demonstrated that they are able to achieve the transfer of the mannequin 1 in 1.3 seconds from the loading area 11 to the marking area 12, in comparison to the 3.5 seconds of other conventional machines.

[0093] Fig. 21 shows 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. 22). Said figures also show a transmitter apparatus 100 of at least one laser beam directed towards the marking area 12 of the machine 10. In the embodiment of the machine 10 shown in Fig. 21 and in Fig. 14, there are basically two areas, a loading area 11, wherein the loading of a pair of trousers onto a mannequin 1 is carried out, 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 can be able (although it is not the preferred embodiment) to rotate independently of the other leg structure 2 around the main rotation axis 5 thereof 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 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. If at a certain moment the marking of the rear portion of one of the trouser legs must be performed, the mannequin 1 will once cause the rotation of the two leg structures 2 thereof 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 shown in Fig. 21, 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.

[0094] In the machine 10 of Fig. 21, the mannequins 1 are assembled in respective motorised transportation carts 71 (see also the motor means 74 formed by a motor, reducer and pinion in Fig. 13) movable along zippers 70 and guides or rails, for transporting the mannequins 1 from the loading area 11 to the marking area 12, and vice versa. The mannequins 1 shown in Fig. 13 are mounted in an articulated manner on the transportation carts 71 in accordance with a horizontal loading rotation axis 72, perpendicular to the main rotation axis 5 (in this case common to the two leg structures 2), around which the mannequins 1 can rotate or tilt. Thus, the mannequins 1 are able to adopt a special loading position C wherein the trousers can be loaded onto 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 special 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 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 transportation cart 71, to follow said cam profile designed so that the main rotation axis 5 rotates around the loading 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.

[0095] Due to this configuration able to rotate around the loading rotation axis 72, the mannequins 1 can adopt a special loading position C which is very comfortable for the operator, wherein the trousers can be loaded onto 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 loading 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 whence 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.

[0096] In this manner, the operator does not have to load the pair of trousers in the habitual position thereof, with the waist extended and bending over in order to pass underneath the pair of trousers, but rather the mannequin 1 can be arranged in the special loading position C thereof, 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.

[0097] 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.

[0098] Figs. 21 and 22 show that facing the loading area 11 of the machine 10 an auxiliary device is arranged for loading and/or unloading 90 able to automatically perform the loading of a pair of trousers folded lengthwise over the mannequin 1 arranged in the special loading position C.

[0099] 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 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.

[0100] 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 pushing projection 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 pushing projection 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.

[0101] Figs. 21 and 22 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 pushing projection 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.

[0102] 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 pushing projection 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 transportation cart 71 thereof is activated, and passes along the cam profile located in an area of the rail, 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.

[0103] Alternatively or additionally, the pushing projection means 92 can be provided with gripping elements such as for example clamps, which grip the waist 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.

[0104] 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 sup-

ports 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 taken advantage of, 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.

[0105] 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 roundabout-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 pushing projection 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.

[0106] Finally, apart from the distribution shown in Figs. 21 and 22, 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.

[0107] 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 attached to 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 another empty auxiliary device for load-

ing and/or unloading 90, in an unloading area (not shown in the drawings) wherein the mannequins 1 in the special loading position C, which is the same position adopted by the mannequins in the unloading position, are once again within reach of the pushing projection 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 can be performed, comprising two leg structures (2) suitable to be housed on the inside of the legs of the trousers to be marked, wherein each leg structure (2) is defined by a respective imaginary longitudinal axis (20) wherein the respective trouser leg can be extended, an upper area (21), a lower area (22), a front plane (23) whereon the front portion of the trouser leg can be arranged, a rear plane (24), opposite from the front plane (23), whereon the rear portion of the trouser leg can be arranged, an inner side (25) whereon the inner lateral edge of the trouser leg can be 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 trouser leg can be 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), such that the front and rear portions of the trouser leg when arranged on the leg structure (2) stay extended to the maximum in order to be able to perform the laser marking on any of the portions, **characterised in that** each of the leg structures (2) is coupled to a respective main rotation axis (5) around which it is able to rotate by means of a respective articulation (51) comprised by the mannequin (1) for each leg structure (2), the main rotation axis (5) of each leg structure (2) being an axis parallel to the direction of the dimension of the rise of the pair of trousers or collinear with said direction, the articulations enabling the front planes (23) of the two leg structures (2) to form between each other at least two angles greater and/or less than 180° when rotating around the respective main rotation axes (5) thereof.
2. The mannequin (1) according to claim 1, **characterised in that** 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 to the respective main rotation axis (5) around which the leg structure (2) can rotate by means of a respective articulation (51).

3. The mannequin (1) according to claim 2, **characterised in that** each support (27) is linked to corresponding first transmission means (29) through which a rotation is provided for each leg structure (2) around the respective main rotation axis (5), such that the front planes (23) of the two leg structures (2) are able to rotate 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 0° and 360°.
4. The mannequin (1) according to any one of claims 1 to 3, **characterised in that** 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) comprising a straight inner bar (25a) which extends in a direction parallel to that of the imaginary longitudinal axis (20), the outer side (26) comprising a straight outer bar (26a) parallel to the inner bar (25a), and comprising for each leg structure (2) an intermediate bar (34) arranged parallel to and between the respective inner bar (25a) and outer bar (26a), and **in that** the tensing mechanism (3) comprises actuation means (40, 41, 42, 43, 44, 45, 46) to provide the movement of the outer bar (26a) and the intermediate bar (34) with respect to the inner bar (25a), increasing the separation distance between them when going from the non-operative loosened position (A) to the maximum tensed end position (B), and decreasing the separation distance between them when going from the maximum tensed end position (B) to the non-operative loosened position (A), and wherein each support (27) comprises on the inside thereof a guide for the movement of the corresponding outer bar (26a) of the outer side (26) in accordance with a trajectory perpendicular to the longitudinal direction wherein the outer bar (26a) extends.
5. The mannequin (1) according to claim 4, **characterised in that** the intermediate bar (34) is joined to the inner bar (25a) of the inner side (25) and to the outer bar (26a) of the outer side (26) by means of at least two connecting rods (35, 36) articulated on the two ends thereof, wherein the outer bar (26a) of 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 bar (25a) of the inner side (25) moving away from the inner side 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.

6. The mannequin (1) according to any one of claims 1 to 5, **characterised in that** 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) comprising a plate with an inner profile (25b) which defines an outline simulating the shape had by the inner lateral edge of the trouser leg which goes from the joint of the trouser legs to the lower end of the respective trouser leg when the trouser leg is flattened with the front portion thereof and the rear portion thereof on top of each other, and/or the outer side (26) comprising a plate with an outer profile (26b) which defines an outline simulating the shape had by the outer lateral edge of the trouser leg which goes from the waist to the lower end of the respective trouser leg when the trouser leg is flattened with the front portion thereof and the rear portion thereof on top of each other, the plates with inner (25b) and outer (26b) profiles, or most of them, being contained in a plane parallel to the front (23) and rear (24) planes of the respective leg structures (2) thereof, the plate with an outer profile (26b) of each leg structure (2) being 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).
7. The mannequin (1) according to claim 6, **characterised in that** the plate with an inner profile (25b) and/or the plate with an outer profile (26b) have a thickness, measured in the direction perpendicular to the front plane (23) of the leg structure (2), comprised between 0.5 and 6 mm, the thickness thereof being able to vary in different areas of the plates, the thickness being lesser in the segment of the plate closer to the ends able to come into contact with the edges of the trouser legs.
8. The mannequin (1) according to claim 6 or 7, **characterised in that** the plate with an inner profile (25b) has a width which varies along the inner side (25), being wider in the area of the outline simulating the shape had by the inner lateral edge of the trouser leg at the joining point of the trouser legs, and narrower at the upper and lower ends.
9. The mannequin (1) according to claim 8, **characterised in that** on the plate with an inner profile (25b), on the edge which defines the outline, a rise appendix (9) is arranged, provided with a vertex at the free end thereof, the appendix being oriented according to an appendix plane which is parallel, perpendicular or which forms a certain oblique angle with the plate

with an inner profile (25b) of the respective leg structure (2).

10. The mannequin (1) according to any one of claims 6 to 9, **characterised in that** in each leg structure (2) the inner side (25) comprises a straight inner bar (25a) which extends in a direction parallel to that of the imaginary longitudinal axis (20), and the outer side (26) comprises a straight outer bar (26a) parallel to the inner bar (25a), and **in that** the plate with an inner profile (25b) is detachably joined to the inner bar (25a) and the plate with an outer profile (26b) is detachably joined to the outer bar (26a), the plates with inner and outer profiles (25b, 26b) being able to be disassembled from the respective inner and outer bars (25a, 26a) and be replaced by other plates with inner and outer profiles (25b, 26b) in accordance with another trouser design.
11. The mannequin (1) according to any one of the preceding claims, **characterised in that** the support (27) of each leg structure (2) wherein the inner side (25) and the outer side (26) are supported comprises a first semisupport (81) wherein the inner side (25) and the outer side (26) are supported, and a second semisupport (82) by which the leg structure (2) is joined in an articulated manner to a respective articulation (51) by which the leg structure (2) is able to rotate around the respective main rotation axis (5), the first semisupport (81) and the second semisupport (82) being joined in an articulated manner to each other the first one with the ability to rotate with respect to the second one around an articulation for angular adjustment (80) between the trouser legs with the ability to rotate around an angular adjustment axis, said angular adjustment axis being an axis perpendicular to the front plane (23) or perpendicular to the plane wherein the inner side (25) and the outer side (26) of the leg structure (2) are contained, the first semisupport (81) and the second semisupport (82) being configured articulated to each other by the articulation for angular adjustment (80) such that when the first one rotates with respect to the second one, the inner side (25) of the leg structure (2) varies the angle it forms with respect to the direction wherein the main rotation axis (5) extends which is parallel to the dimension of the rise of the pair of trousers or collinear with said direction, the mannequin (1) being able to vary the angle formed by the inner sides (25) of the two leg structures (2) with each other in accordance with the trouser design.
12. The mannequin (1) according to claims 10 and 11, **characterised in that** in each leg structure (2), the first semisupport (81) supports the inner and outer bars (25a, 26a) of the inner (25) and outer (26) sides, respectively, the first semisupport (81) and the sec-

ond semisupport (82) being configured as articulated to each other such that when the first one rotates with respect to the second one, the inner bar (25a) of the leg structure (2) varies the angle it forms with respect to the direction wherein the main rotation axis (5) extends which is parallel to the direction of the dimension of the rise of the pair of trousers or collinear with said direction, the mannequin (1) being able to vary the angle the inner bars (25a) of the two leg structures (2) form between each other.

13. The mannequin (1) according to claim 11 or 12, **characterised in that** the first semisupport (81) and the second semisupport (82) of each one leg structure (2) are made up of respective bodies, each provided with a front plate and a rear plate, parallel to the front plane (23) and to the rear plane (24) of the leg structure, said plates being provided with holes, pivots and slots in order to carry out the rotation of the first semisupport (81) with respect to the second semisupport (82), and **in that** each leg structure (2) comprises an angle regulation mechanism to vary the angle formed by the inner sides (25) of the two leg structures (2) with each other or the angle formed by the inner bars (25a) of the inner sides (25) of the two leg structures (2) with each other, and locking means (88) for the angle between the first semisupport (81) and the second semisupport (82).

14. The mannequin (1) according to claim 13, **characterised in that** the angle regulation mechanism comprises a spindle (84) arranged coupled in a fixed manner in the second semisupport (82) with respect to which it moves in a direction towards the first semisupport (81), provided with a head (83) able to be rotated manually in order to advance the spindle, wherein the end of the spindle (84) is introduced into the first semisupport (81), a nut (85) crossed through by the spindle (84), said nut (85) being provided with a pivot (86) arranged in a direction parallel to the angular adjustment axis, the pivot (86) being in turn arranged inside at least one slot (87) made in one of the front or rear plates of the first semisupport (81), arranged such that when the spindle (84) is rotated, the nut (85) moves with respect to the second semisupport (82) and the pivot (86) thereof exerts a pushing force inside the slot (87) of the first semisupport (82), making the slot (87) and the plate wherein it is located rotate with respect to the second semisupport (82) around the angular adjustment axis.

15. The mannequin (1) according to claim 13 or 14, **characterised in that** the locking means (88) for the angle between the first semisupport (81) and the second semisupport (82) comprise an angle locking bolt (89b) which is parallel to the direction of the angular adjustment axis, provided at one end with a head and at the other with a tightening nut or wing nut, the

angle locking bolt (89b) making up part of the second semisupport (82), and a slot in the shape of a circular arch provided in a plate (89a) integrally joined to the first semisupport (81), the slot being crossed through by the angle locking bolt (89), the head staying on one side of the slot and the tightening nut or wing nut on the other side of the slot and protruding out of one of the front or rear plates of the second semisupport (82), such that when the locking nut or wing nut is tightened, it is tightened against the plate, the head of the locking bolt (89a) is tightened against the slot and the rotation between the first semisupport (81) and the second semisupport (82) is immobilised.

16. The mannequin (1) according to any one of the preceding claims, **characterised in that**, above the upper areas (21) of the leg structures (2), it comprises a cylindrical or prismatic apical axial body (50) which extends in a direction parallel to the direction of the main rotation axes (5) of the leg structures (2), the apical axial body (50) being arranged equidistant from the two leg structures (2) and integrally joined to a body supporting the articulations (51) by which each leg structure (2) can rotate around the respective main rotation axis (5) thereof, all of this configured such that when the leg structures (2) rotate around the respective main rotation axes (5) thereof, they move with respect to the apical axial body (50).

17. An assembly formed by a mannequin (1) and a transportation cart (71), **characterised in that** the mannequin (1) is a mannequin according to claim 16, **in that** the transportation cart (71) is provided with movement motor means (74) for the autonomous movement of the transportation cart (71) along a guided trajectory, and **in that** the transportation cart (71) is able to be coupled to the mannequin (1) for the joint transportation thereof along a guided trajectory, wherein said coupling to the mannequin (1) is configured to enable access to the apical axial body (50) from the outside of the movement cart (71) and to enable the rotation of the mannequin (1) independently from the cart (71) around a vertical rotation axis of the mannequin (105) which coincides with the imaginary axial axis of the apical axial body (50) of the mannequin (1) when the apical axial body (50) is arranged in a vertical position.

18. The assembly formed by a mannequin (1) and a transportation cart (71) according to claim 17, **characterised in that** the transportation cart (71) is joined in an articulated manner to the mannequin (1) through a loading rotation axis (72) which is horizontal and perpendicular to the direction of the imaginary axial axis of the apical axial body (50) of the mannequin (1), the mannequin (1) being able to rotate around said loading rotation axis (72) and able to

adopt a special loading position (C) for trousers 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 or arranged on top of each other, and are contained in non-vertical planes and wherein the imaginary axial axis of the apical axial body (50) of the mannequin (1) forms an acute angle with respect to the vertical direction, being able in said special loading position (C) to load onto the mannequin (1) a pair of trousers folded on itself along the direction of the rise thereof.

19. 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 onto the mannequin coming from the loading area (11) is exposed to the external effects of a laser for the marking thereof, **characterised in that** the mannequin of the loading area (11) and of the marking area (12) is a mannequin (1) which makes up a mannequin (1) and cart (71) assembly according to claim 17 or 18, wherein the transportation cart (71) is movable through the movement motor means (74) thereof along a guided trajectory for the transportation (110) of the mannequin (1) from the loading area (11) to the marking area (12) and from the marking area (12) to the loading area (11).
20. The machine (10) for loading and exposing trousers to a laser for the marking thereof according to claim 19, **characterised in that** it comprises more than one loading area (11) separated from each other, and respective guided trajectories for transportation (110) which converge in one same marking area (12), wherein the machine (10) comprises at least one mannequin (1) and cart (71) assembly for each loading area.
21. The machine (10) for loading and exposing trousers to a laser for the marking thereof according to claim 20, **characterised in that** the guided trajectories for transportation (110) are trajectories arranged radially with respect to the marking area (12) located on one side or on both sides of the marking area (12), the marking area (12) facing a laser device.
22. The machine (10) for loading and exposing trousers to a laser for the marking thereof according to claim 20 or 21, **characterised in that** the marking area (12) comprises a motorised rotating positioning device (120) with the ability to rotate around a vertical positioning axis (123), located after, but separated from, the guided trajectories for transportation (110) by which the mannequins are led by the transportation carts (71) from the loading areas (11) to the end of the guided trajectories for transportation (110),

wherein the positioning device (120) comprises a positioning rail (122) with a straight trajectory able to be aligned, when rotated with respect to the vertical positioning axis (123), with any of the guided trajectories for transportation (110) in order to receive in the marking area (12) the mannequin (1) led by the transportation cart (71), and the positioning device (120) comprising connection means (124) able to connect to the apical axial body (50) of the mannequin (1) received in the positioning rail (122) and cause the rotation of the mannequin (1) around the imaginary axial axis of the apical axial body (50) of the mannequin (1), when said imaginary axis is parallel to the vertical direction.

23. The machine (10) for loading and exposing trousers to a laser for the marking thereof according to any one of claims 19 to 22, **characterised in that** it comprises a control device for detecting the presence of persons in any of the loading area or areas (11), configured to send a warning signal to the movement motor means (74) of the transportation carts (71) by which the advance speed of the transportation carts (71) is controlled and varied in the guided trajectories for transportation (110), even being able to detect the advance thereof in any of the directions from the loading area or areas (11) to the marking area (12) and vice versa.

24. 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 any one of claims 19 to 23, and at least one auxiliary device for loading and/or unloading (90) trousers onto a mannequin (1) located in the loading area (11) or in each of the loading areas (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 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 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 a or the loading area (11) of the machine (10) are located, wherein the introducing arm (91) is provided with pushing projection 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 pushing projection means (92) are able to push a pair of trousers arranged folded over the waiting support (9') and move it along the guide rail.

25. The system for the laser marking of trousers according to claim 24, 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 pushing projection 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.
26. A mannequin (1) for supporting a pair of trousers whereon a laser marking can be performed, comprising two leg structures (2) suitable to be housed on the inside the legs of the trousers to be marked, wherein each leg structure (2) is defined by a respective imaginary longitudinal axis (20) wherein the respective trouser leg can be extended, an upper area (21), a lower area (22), a front plane (23) whereon the front portion of the trouser leg can be arranged, a rear plane (24), opposite from the front plane (23), whereon the rear portion of the trouser leg can be arranged, an inner side (25) whereon the inner lateral edge of the trouser leg can be 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 trouser leg can be 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), such that the front and rear portions of the trouser leg when arranged on the leg structure (2) stay extended to the maximum in order to be able to perform the laser marking on any of the portions, **characterised in that** in each leg structure (2) the inner side (25) comprises a straight inner bar (25a) which extends in a

direction parallel to that of the imaginary longitudinal axis (20), and a plate with an inner profile (25b) which defines an outline simulating the shape had by the inner lateral edge of the trouser leg which goes from the joining of the trouser legs to the lower end of the respective trouser leg when the trouser leg is flattened with the front portion thereof and the rear portion thereof on top of each other, and the outer side (26) comprises a straight outer bar (26a) parallel to the inner bar (25a), and a plate with an outer profile (26b) which defines an outline simulating the shape had by the outer lateral edge of the trouser leg which goes from the waist to the lower end of the respective trouser leg when the trouser leg is flattened with the front portion thereof and the rear portion thereof on top of each other, the plates with inner (25b) and outer (26b) profiles, or most of them, being contained in a plane parallel to the front (23) and rear (24) planes of the respective leg structures (2) thereof, the plate with an outer profile (26b) of each leg structure (2) being 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), and **in that** the plate with an inner profile (25b) is detachably joined to the inner bar (25a) and the plate with an outer profile (26b) is detachably joined to the outer bar (26a), the plates with inner and outer profiles (25b, 26b) being able to be disassembled from the respective inner and outer bars (25a, 26a) and be replaced by other plates with inner and outer profiles (25b, 26b) in accordance with another trouser design.

27. The mannequin (1) according to claim 26, **characterised in that** the plate with an inner profile (25b) and/or the plate with an outer profile (26b) have a thickness, measured in the direction perpendicular to the front plane (23) of the leg structure (2), comprised between 0.5 and 6 mm, the thickness thereof being able to vary in different areas of the plates, the thickness being lesser in the segment of the plate closer to the ends able to come into contact with the edges of the trouser legs.
28. The mannequin (1) according to claim 6 or 7, **characterised in that** the plate with an inner profile (25b) has a width which varies along the inner side (25), being wider in the area of the outline simulating the shape had by the inner lateral edge of the trouser leg at the joining point of the trouser legs, and narrower at the upper and lower ends.
29. The mannequin (1) according to claim 8, **characterised in that** the plate with an inner profile (25b), on the edge which defines the outline, a rise appendix (9) is arranged, provided with a vertex at the free end thereof, the rise appendix (9) being oriented accord-

ing to an appendix plane which can be parallel, perpendicular or which forms a certain oblique angle with the plate with an inner profile (25b) of the respective leg structure (2).

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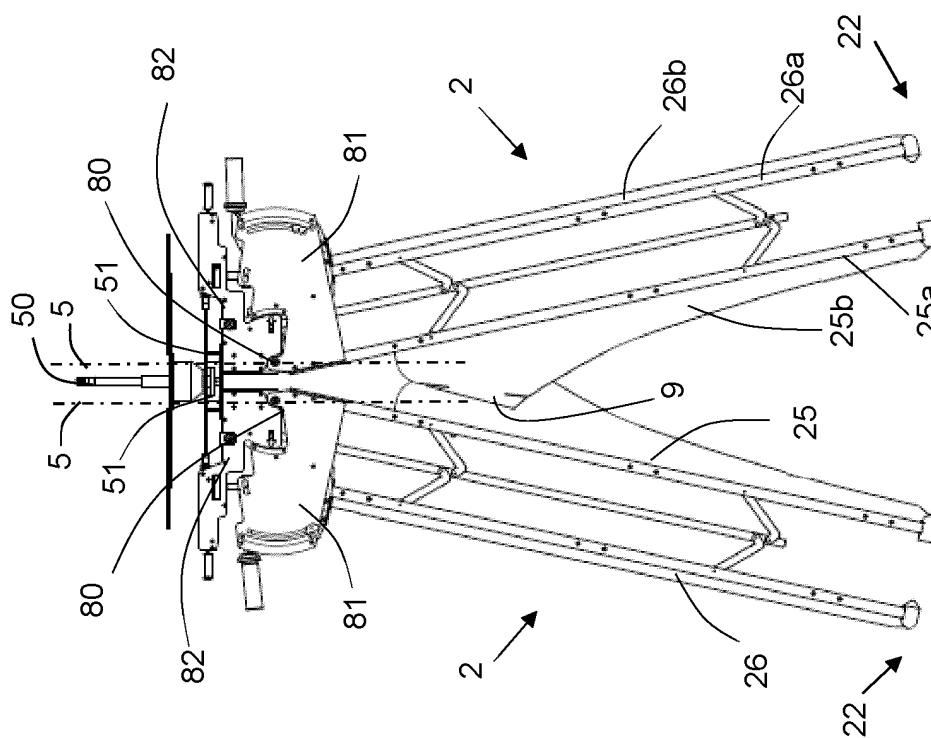


Fig. 2

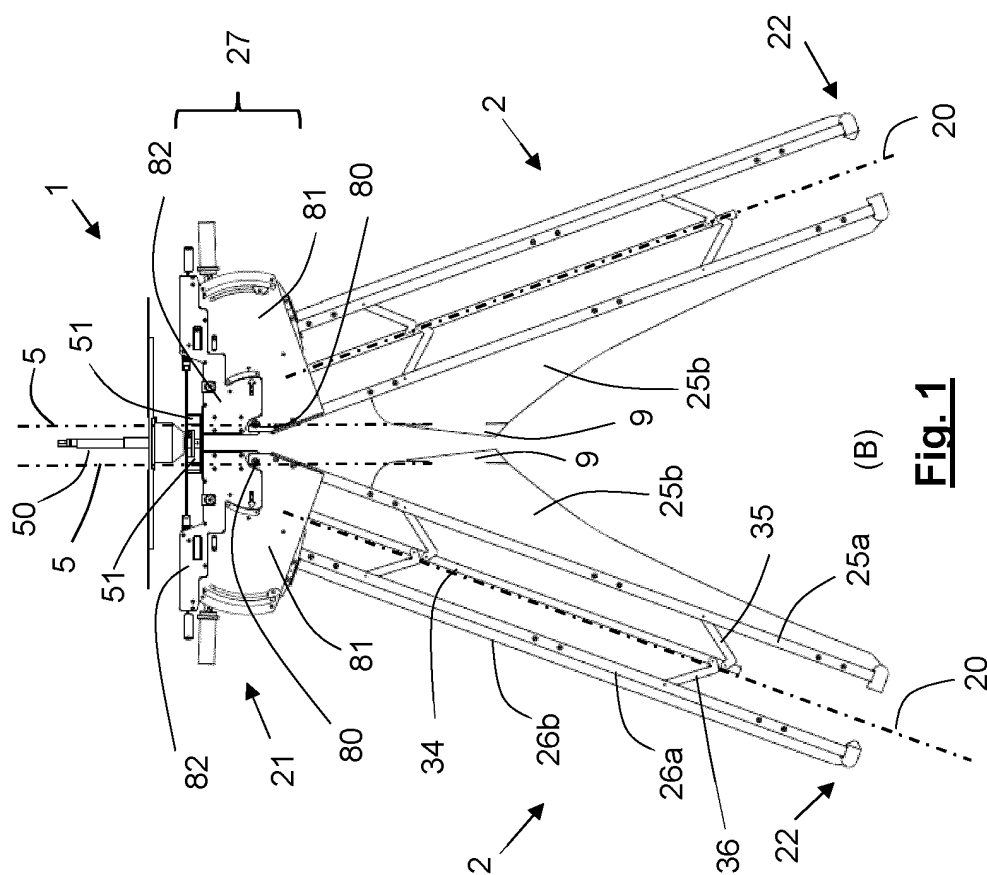


Fig. 1

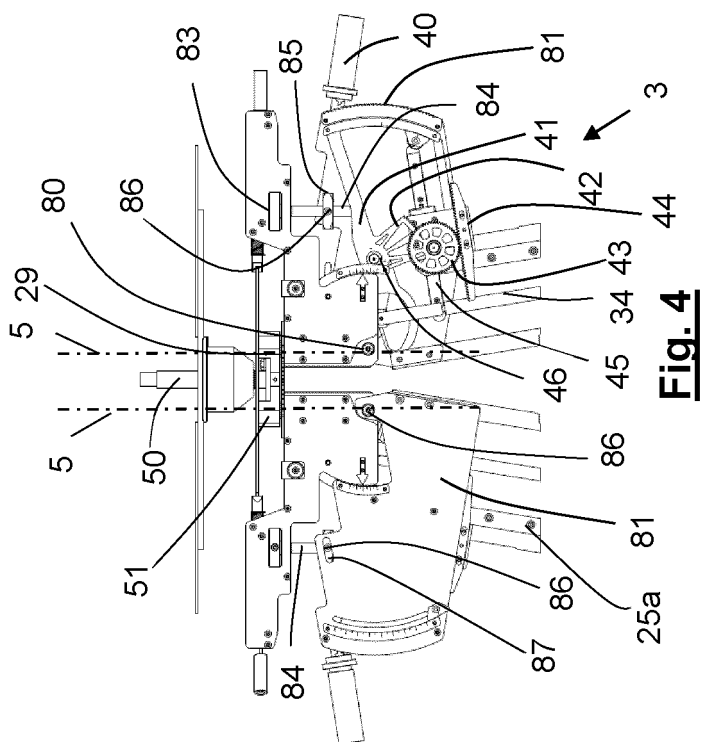


Fig. 4

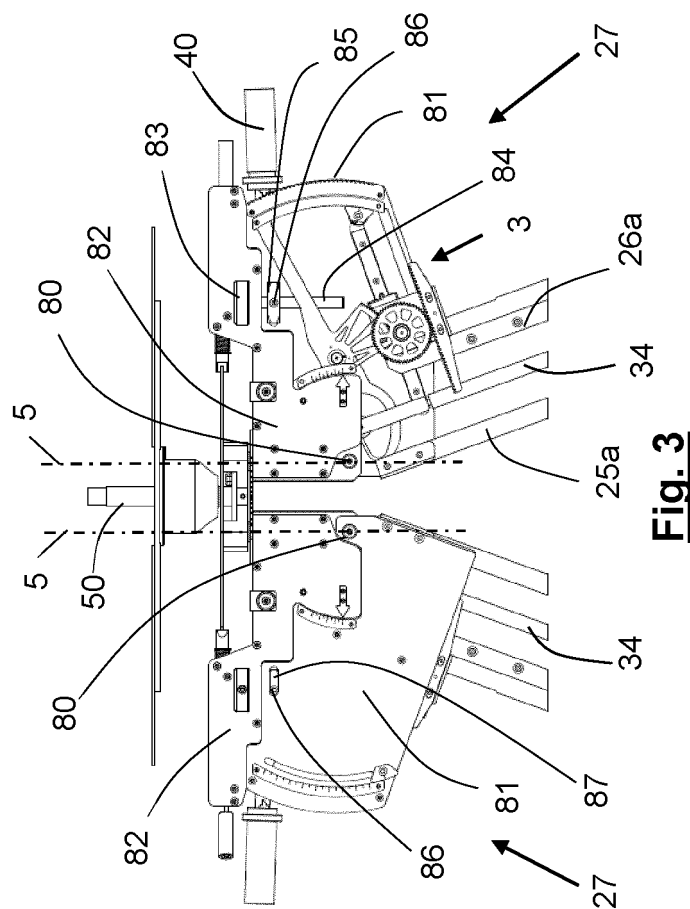


Fig. 3

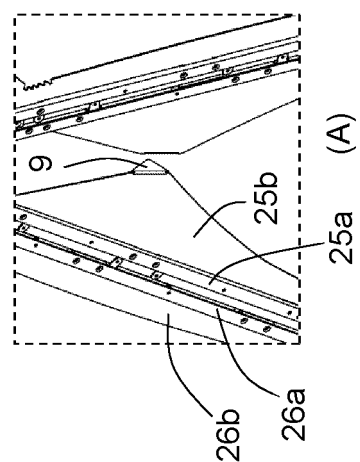


Fig. 5

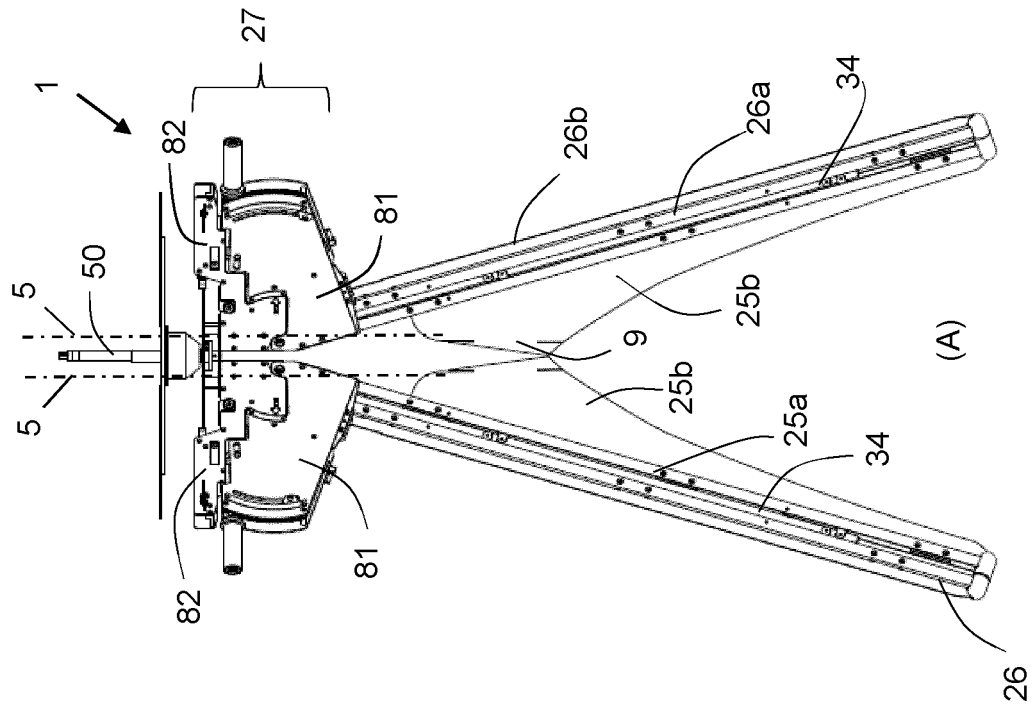


Fig. 7

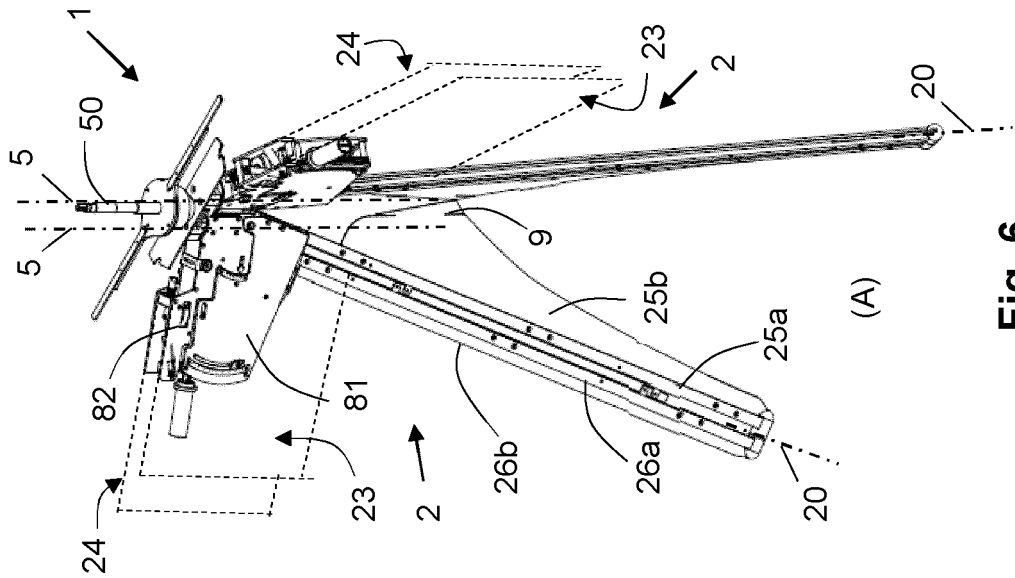


Fig. 6

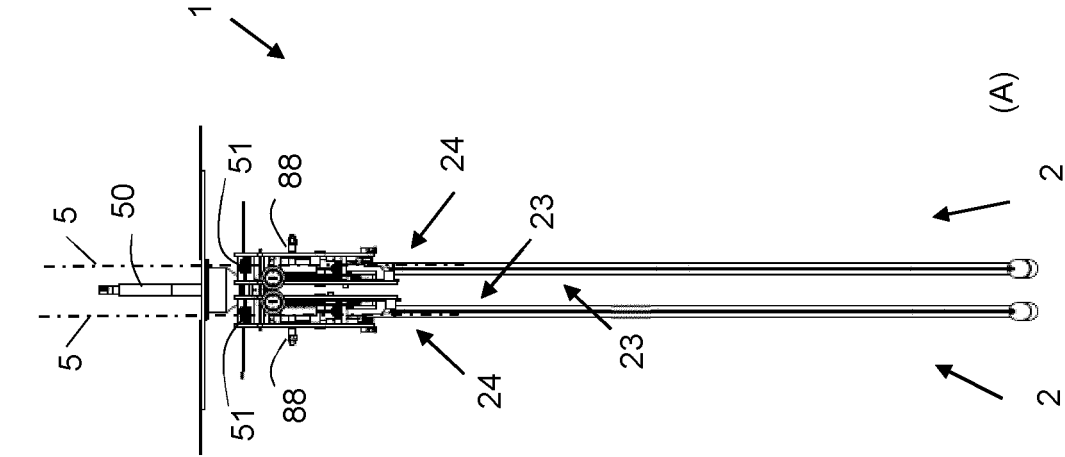


Fig. 10

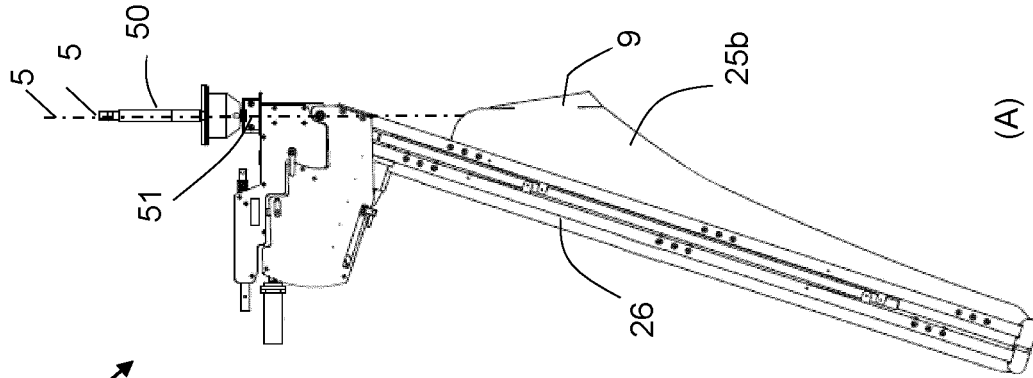


Fig. 9

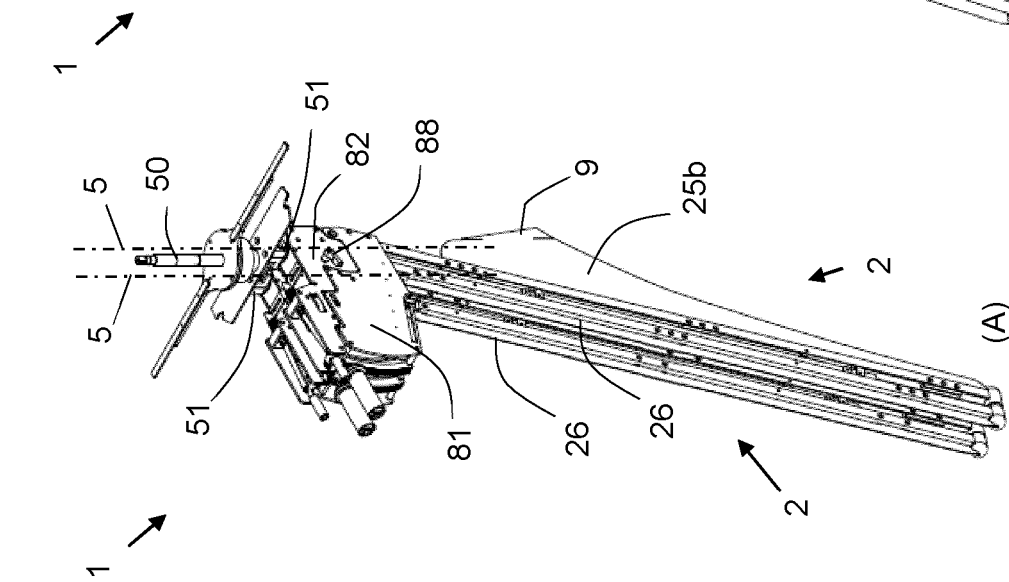
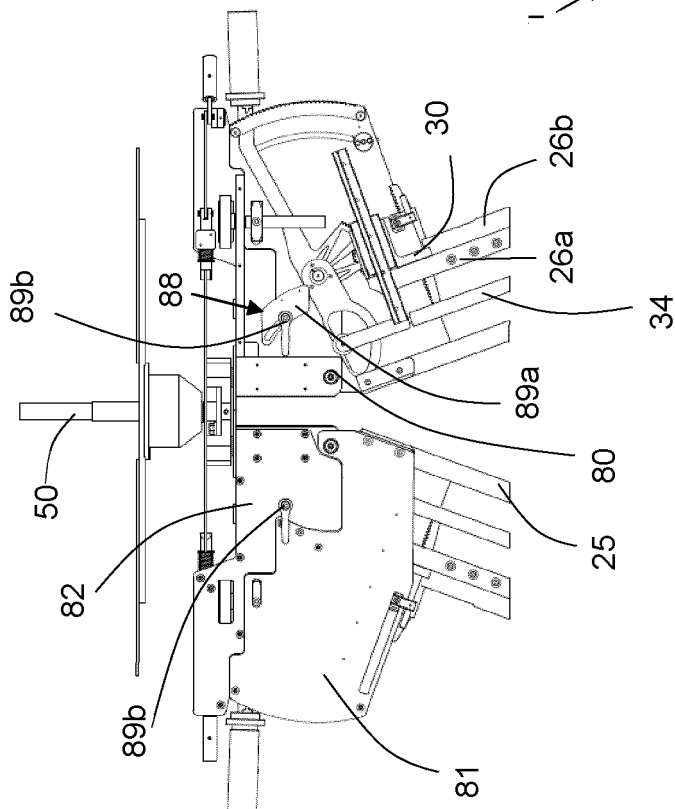
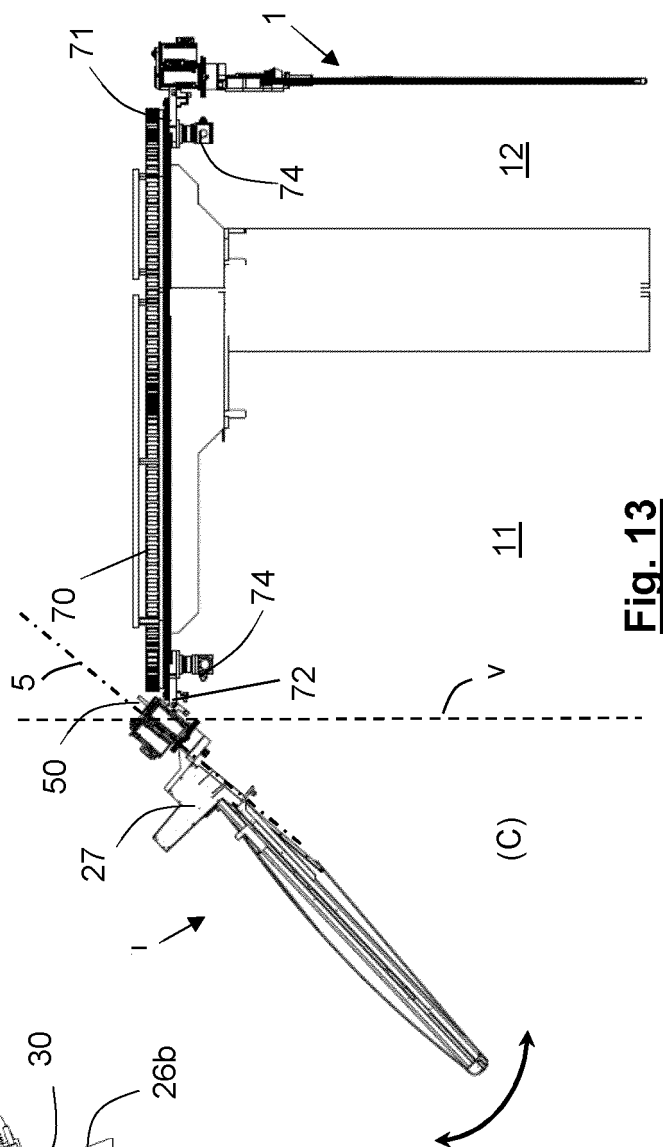
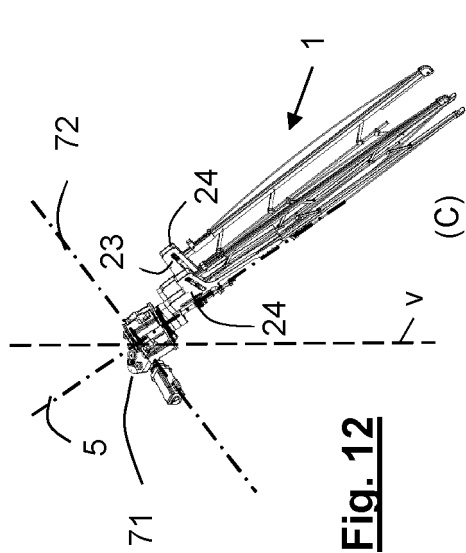


Fig. 8



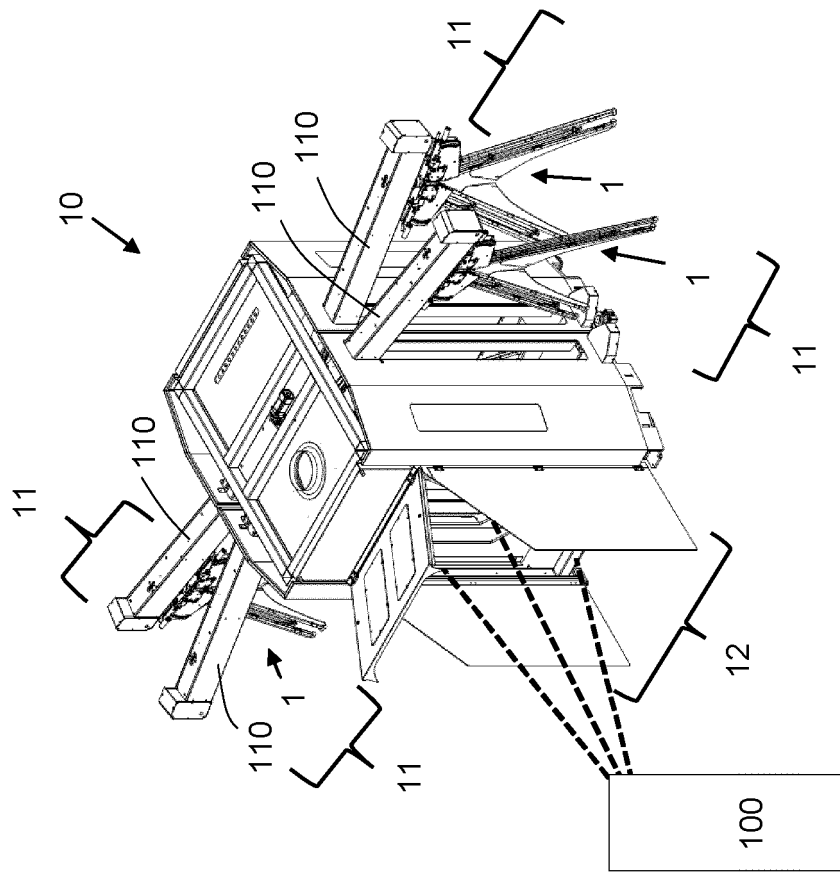


Fig. 15

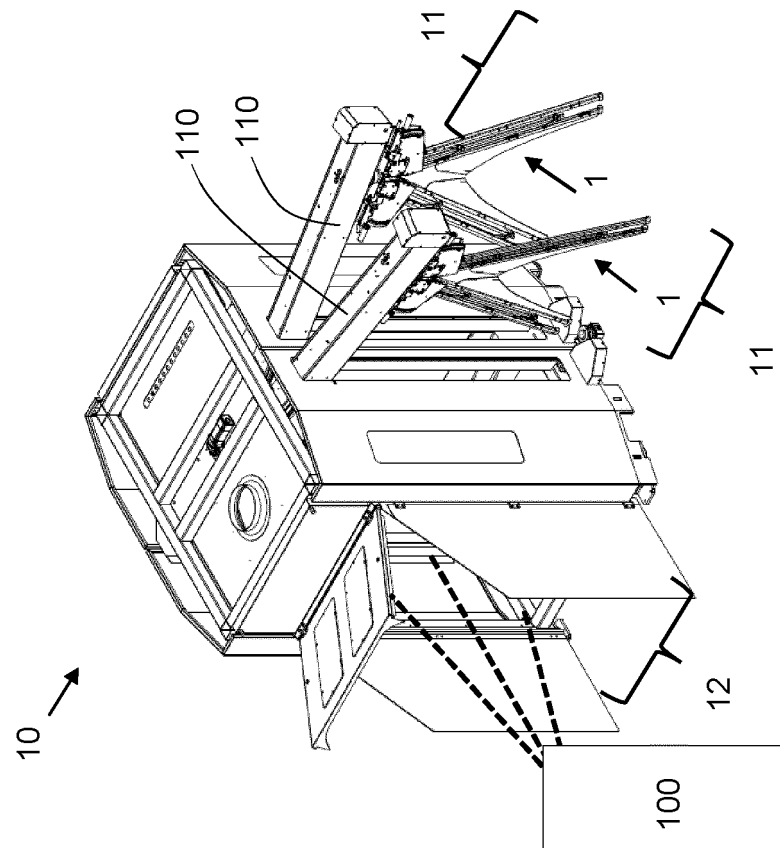


Fig. 14

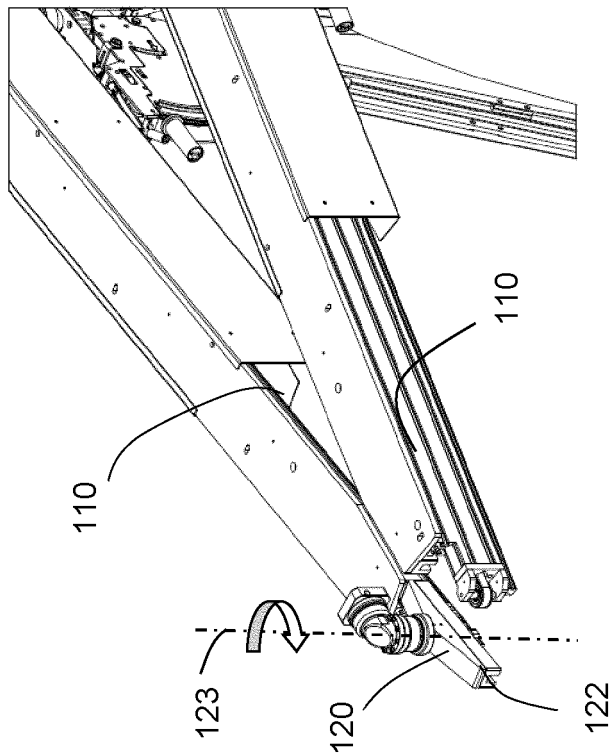


Fig. 17

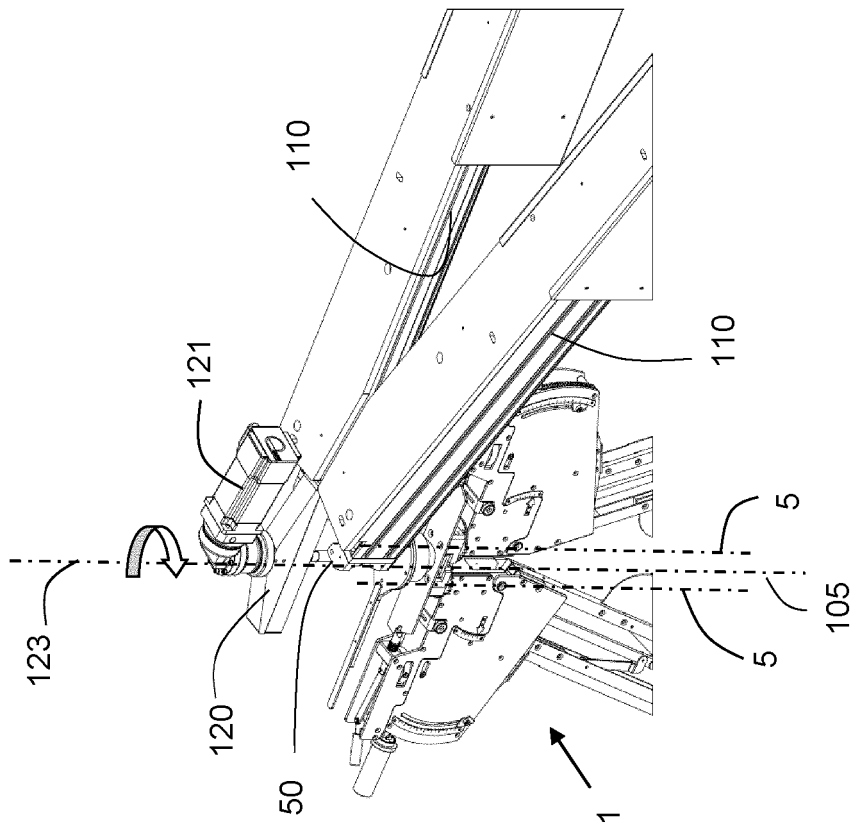


Fig. 16

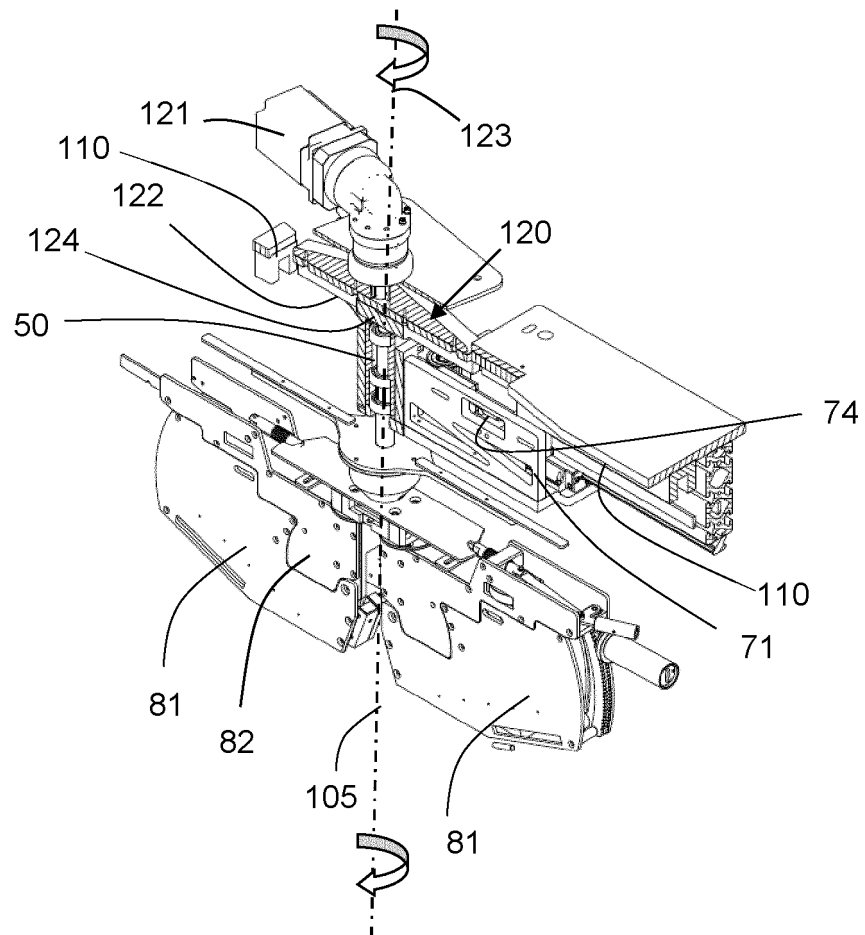


Fig. 18

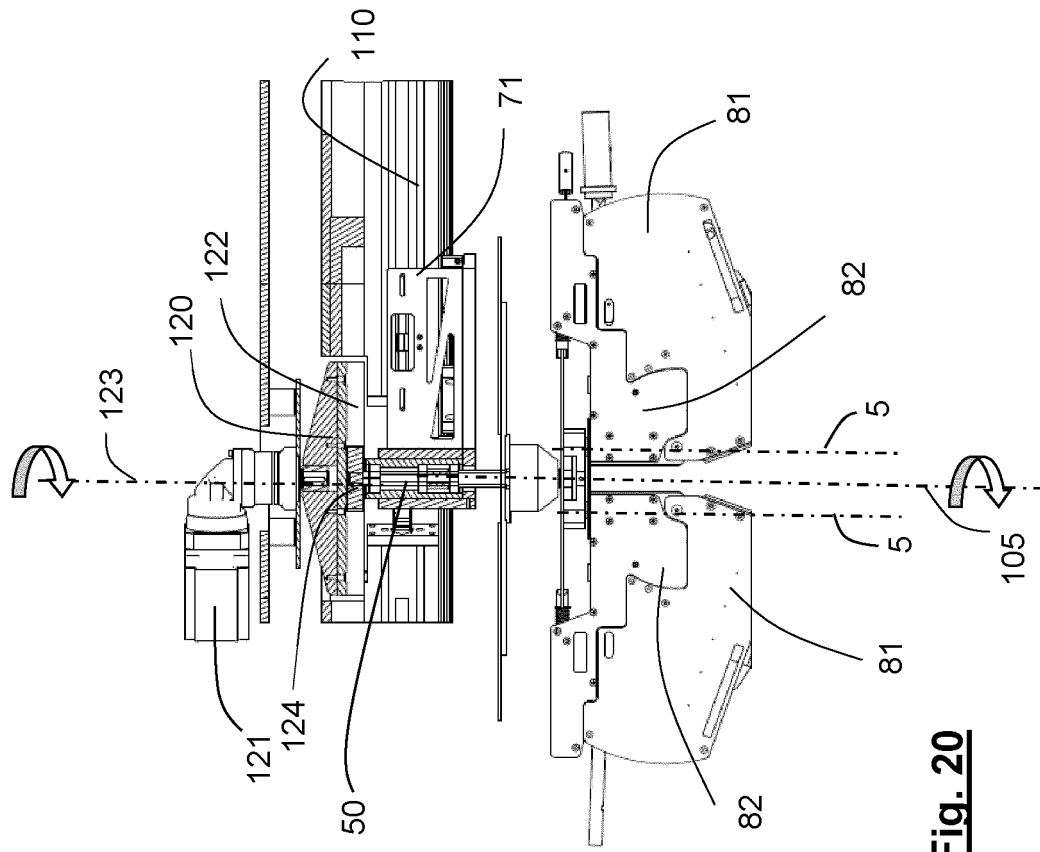


Fig. 19

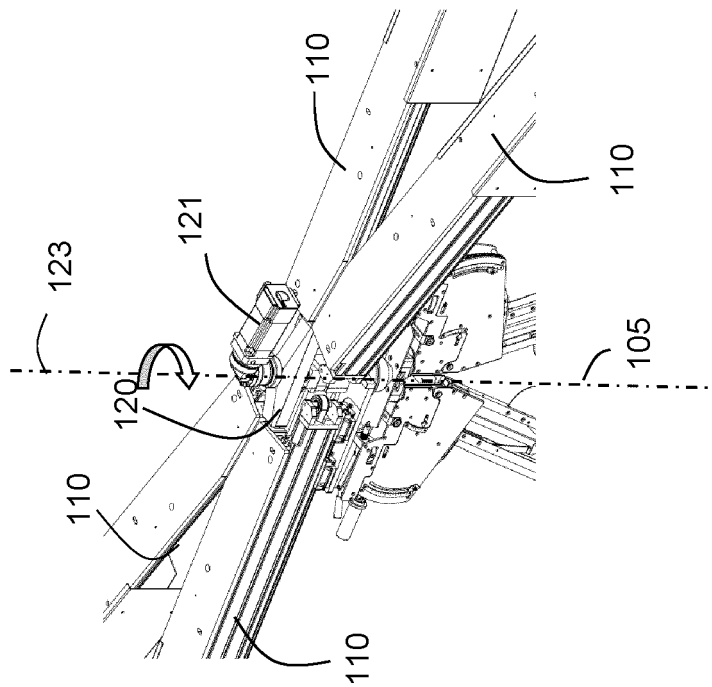
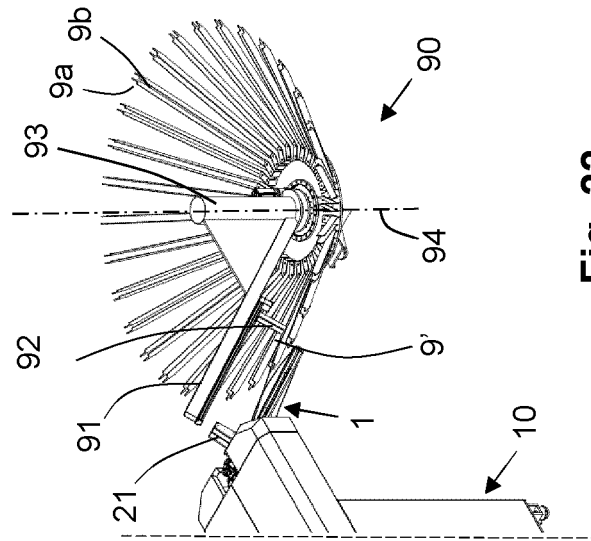
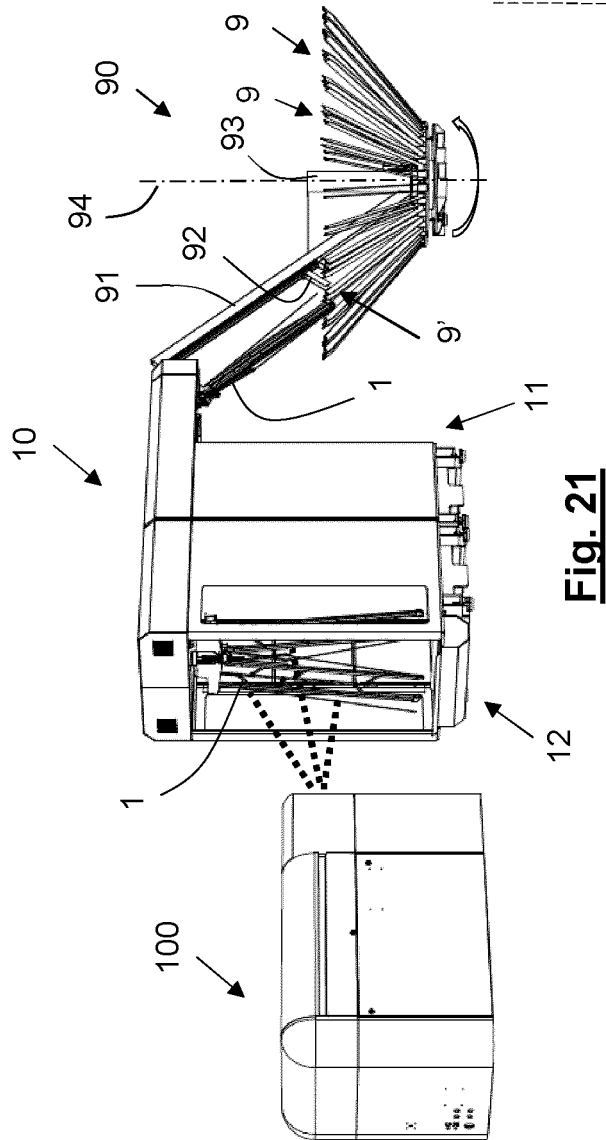


Fig. 20



INFORME DE BÚSQUEDA INTERNACIONAL

Solicitud internacional N°

PCT/ES2020/070262

5	A. CLASIFICACIÓN DEL OBJETO DE LA SOLICITUD INV. D06C5/00 D06B11/00 D06C23/02 D06M10/00 ADD. De acuerdo con la Clasificación Internacional de Patentes (CIP) o según la clasificación nacional y CIP.																			
10	B. SECTORES COMPRENDIDOS POR LA BÚSQUEDA Documentación mínima buscada (sistema de clasificación seguido de los símbolos de clasificación) D06B D06C D06Q D06M A44C A41H Otra documentación consultada, además de la documentación mínima, en la medida en que tales documentos formen parte de los sectores comprendidos por la búsqueda																			
15	Bases de datos electrónicas consultadas durante la búsqueda internacional (nombre de la base de datos y, si es posible, términos de búsqueda utilizados) EP0-Internal, WPI Data																			
20	C. DOCUMENTOS CONSIDERADOS RELEVANTES																			
25	<table border="1"> <thead> <tr> <th>Categoría*</th> <th>Documentos citados, con indicación, si procede, de las partes relevantes</th> <th>Relevante para las reivindicaciones N°</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>ES 2 640 831 B2 (JEANOLOGIA S L [ES]) 7 de marzo de 2018 (07.03.2018) Citado en la solicitud página 7, líneas 20-22; figuras 2-4, 42,43 página 11, líneas 4-30</td> <td>26</td> </tr> <tr> <td>A</td> <td>----- DE 41 31 804 A1 (KREMPEL AUGUST SOEHNE [DE] 1° de abril de 1993 (01.04.1993) columna 3, líneas 54-64; reivindicaciones 1, 4-7; figuras</td> <td>1</td> </tr> <tr> <td>Y</td> <td>----- DE 41 31 804 A1 (KREMPEL AUGUST SOEHNE [DE] 1° de abril de 1993 (01.04.1993) columna 3, líneas 54-64; reivindicaciones 1, 4-7; figuras</td> <td>1-10,16</td> </tr> <tr> <td>A</td> <td>----- EP 1 650 337 A1 (OMI MECCANICHE IND S A S [IT] 26 de abril de 2006 (26.04.2006) reivindicación 1; figura</td> <td>12</td> </tr> <tr> <td></td> <td>----- -/-</td> <td></td> </tr> </tbody> </table>	Categoría*	Documentos citados, con indicación, si procede, de las partes relevantes	Relevante para las reivindicaciones N°	Y	ES 2 640 831 B2 (JEANOLOGIA S L [ES]) 7 de marzo de 2018 (07.03.2018) Citado en la solicitud página 7, líneas 20-22; figuras 2-4, 42,43 página 11, líneas 4-30	26	A	----- DE 41 31 804 A1 (KREMPEL AUGUST SOEHNE [DE] 1° de abril de 1993 (01.04.1993) columna 3, líneas 54-64; reivindicaciones 1, 4-7; figuras	1	Y	----- DE 41 31 804 A1 (KREMPEL AUGUST SOEHNE [DE] 1° de abril de 1993 (01.04.1993) columna 3, líneas 54-64; reivindicaciones 1, 4-7; figuras	1-10,16	A	----- EP 1 650 337 A1 (OMI MECCANICHE IND S A S [IT] 26 de abril de 2006 (26.04.2006) reivindicación 1; figura	12		----- -/-		
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35	☒ En la continuación del Recuadro C se relacionan otros documentos ☒ Los documentos de familias de patentes se indican en el Anexo																			
40	<table border="1"> <tr> <td>* Categorías especiales de documentos citados:</td> <td>"T" documento ulterior publicado con posterioridad a la fecha de presentación internacional o de prioridad que no pertenece al estado de la técnica pertinente pero que se cita por permitir la comprensión del principio o teoría que constituye la base de la invención.</td> </tr> <tr> <td>"A" documento que define el estado general de la técnica no considerado como particularmente relevante.</td> <td>"X" documento particularmente relevante; la invención reivindicada no puede considerarse nueva o que implique una actividad inventiva por referencia al documento aisladamente considerado.</td> </tr> <tr> <td>"E" solicitud de patente o patente anterior pero publicada en la fecha de presentación internacional o en fecha posterior.</td> <td>"Y" documento particularmente relevante; la invención reivindicada no puede considerarse que implique una actividad inventiva cuando el documento se asocia a otro u otros documentos de la misma naturaleza, cuya combinación resulta evidente para un experto en la materia.</td> </tr> <tr> <td>"L" documento que puede plantear dudas sobre una reivindicación de prioridad o que se cita para determinar la fecha de publicación de otra cita o por una razón especial (como la indicada).</td> <td>"&" documento que forma parte de la misma familia de patentes.</td> </tr> <tr> <td>"O" documento que se refiere a una divulgación oral, a una utilización, a una exposición o a cualquier otro medio.</td> <td></td> </tr> <tr> <td>"P" documento publicado antes de la fecha de presentación internacional pero con posterioridad a la fecha de prioridad reivindicada.</td> <td></td> </tr> </table>		* Categorías especiales de documentos citados:	"T" documento ulterior publicado con posterioridad a la fecha de presentación internacional o de prioridad que no pertenece al estado de la técnica pertinente pero que se cita por permitir la comprensión del principio o teoría que constituye la base de la invención.	"A" documento que define el estado general de la técnica no considerado como particularmente relevante.	"X" documento particularmente relevante; la invención reivindicada no puede considerarse nueva o que implique una actividad inventiva por referencia al documento aisladamente considerado.	"E" solicitud de patente o patente anterior pero publicada en la fecha de presentación internacional o en fecha posterior.	"Y" documento particularmente relevante; la invención reivindicada no puede considerarse que implique una actividad inventiva cuando el documento se asocia a otro u otros documentos de la misma naturaleza, cuya combinación resulta evidente para un experto en la materia.	"L" documento que puede plantear dudas sobre una reivindicación de prioridad o que se cita para determinar la fecha de publicación de otra cita o por una razón especial (como la indicada).	"&" documento que forma parte de la misma familia de patentes.	"O" documento que se refiere a una divulgación oral, a una utilización, a una exposición o a cualquier otro medio.		"P" documento publicado antes de la fecha de presentación internacional pero con posterioridad a la fecha de prioridad reivindicada.							
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INFORME DE BÚSQUEDA INTERNACIONAL

Solicitud internacional N°

PCT/ES2020/070262

Recuadro II	Observaciones cuando se estime que algunas reivindicaciones no pueden ser objeto de búsqueda (continuación del punto 2 de la primera hoja)
Este informe de búsqueda internacional no se ha realizado en relación a ciertas reivindicaciones según el Artículo 17.2)a) por los siguientes motivos:	
1. ☐	Las reivindicaciones N°s. se refieren a un objeto con respecto al cual esta Administración no está obligada a proceder a la búsqueda, a saber:
2. ☐	Las reivindicaciones N°s. se refieren a elementos de la solicitud internacional que no cumplen con los requisitos establecidos, de tal modo que no pueda efectuarse una búsqueda provechosa, concretamente:
3. ☐	Las reivindicaciones N°s. son reivindicaciones dependientes y no están redactadas de conformidad con los párrafos segundo y tercero de la Regla 6.4.a).
Recuadro III	Observaciones cuando falta unidad de invención (continuación del punto 3 de la primera hoja)
La Administración encargada de la búsqueda internacional ha detectado varias invenciones en la presente solicitud internacional, a saber:	
1. ☐	Dado que todas las tasas adicionales requeridas han sido satisfechas por el solicitante dentro del plazo, el presente informe de búsqueda de tipo internacional comprende todas las reivindicaciones que pueden ser objeto de búsqueda.
2. ☒	Dado que todas las reivindicaciones que pueden ser objeto de búsqueda podrían serlo sin realizar un esfuerzo que justifique tasas adicionales, esta Administración no requirió el pago de tasas adicionales.
3. ☐	Dado que tan sólo una parte de las tasas adicionales requeridas ha sido satisfecha dentro del plazo por el solicitante, el presente informe de búsqueda de tipo internacional comprende solamente aquellas reivindicaciones respecto de las cuales han sido satisfechas las tasas, concretamente las reivindicaciones N°s.:
4. ☐	Ninguna de las tasas adicionales requeridas ha sido satisfecha por el solicitante dentro de plazo. En consecuencia, el presente informe de búsqueda de tipo internacional se limita a la invención mencionada en primer término en las reivindicaciones, cubierta por las reivindicaciones N°s.:
Indicación en cuanto a la protesta	☐ Se acompañó a las tasas adicionales la protesta del solicitante y, en su caso, el pago de una tasa de protesta. ☐ Se acompañó a las tasas adicionales la protesta del solicitante, pero la tasa de protesta aplicable no se pagó en el plazo establecido en el requerimiento. ☐ El pago de las tasas adicionales no ha sido acompañado de ninguna protesta.

Formulario PCT/ISA/210 (continuación de la primera hoja (2)) (Enero 2015)

INFORME DE BÚSQUEDA INTERNACIONAL

Solicitud internacional N°

PCT/ES2020/070262

C (continuación). DOCUMENTOS CONSIDERADOS RELEVANTES		
Categoría*	Documentos citados, con indicación, si procede, de las partes relevantes	Relevante para las reivindicaciones N°
Y	GB 262 893 A (PARAMOUNT HOSIERY FORM COMPANY; REGINALD JAMES WILLIAM BANNIST) 23 de diciembre de 1926 (23.12.1926) figura 1	6-10, 26-29
A	----- WO 95/10651 A1 (KREMPEL AUGUST SOEHNE [DE]; FROEHLICH ECKHARD [DE]) 20 de abril de 1995 (20.04.1995) página 32, líneas 1-10; figuras 12-15	1
A	GB 2 297 333 A (CORTESE CARMELO ANGELO [IT]) 31 de julio de 1996 (31.07.1996) resumen; figuras 1,5	1
Y	----- WO 2014/120105 A1 (TAMER AKÇAY VE ORTAKLARI BİLİSİM SİSTEMLERİ KOLLEKTİF SİRKETİ [TR] ET) 7 de agosto de 2014 (07.08.2014) figura 2	1-10,16, 26-29
Y	----- Jeanologia: "Jeanologia LASER PRO GENERATION Technology: Flexi Pro and Twin Pro", , 27 de septiembre de 2017 (27.09.2017), página 1, XP054980719, Recuperado de Internet: URL:https://www.youtube.com/watch?v=pPKL_nrpRAQ [Recuperado el 23 de julio de 2020 (23.07.2020)] Indicación de tiempo 1:26 - 1:40 min	1,17-29
Y	----- US 2 219 373 A (PROSSER THOMAS W) 29 de octubre de 1940 (29.10.1940) página 1, líneas 7-24; figura 1 página 2, líneas 28-41, 63-70	6-10, 16-29
A	----- KR 2011 0042853 A (JUNG HONG KOOK [KR]; JANG TAE SU [KR]) 27 de abril de 2011 (27.04.2011) párrafo [0019]; figuras 2,3	1

Formulario PCT/ISA/210 (continuación de la segunda hoja) (Enero 2015)

EP 4 141 157 A1

INFORME DE BÚSQUEDA INTERNACIONAL

Información relativa a miembros de familias de patentes

Solicitud internacional N°

PCT/ES2020/070262

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	NINGUNA			
GB 262893	A	23-12-1926	NINGUNA			
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	B0950023	A1	29-07-1996
			US	5630533	A	20-05-1997
WO 2014120105	A1	07-08-2014	NINGUNA			
US 2219373	A	29-10-1940	NINGUNA			
KR 20110042853	A	27-04-2011	NINGUNA			

INFORME DE BÚSQUEDA INTERNACIONAL

Solicitud internacional N°

PCT/ES2020/070262

Recuadro III Observaciones cuando falta unidad de la invención (continuación del punto 3 de la primera hoja)

La Administración encargada de la búsqueda internacional ha detectado varias invenciones en la presente solicitud internacional, a saber:

1. Reivindicaciones: 1 a 29

Maniquí

1.1. Reivindicaciones: 1 a 25, 28, 29

Un maniquí con articulación que gira en torno a dos ejes que se extienden en dirección paralela a la del tiro del pantalón.

1.2. Reivindicaciones: 26, 27

Un maniquí con placas perfiladas intercambiables, diseñadas para estar en contacto con las costuras interior y exterior de una pernera de pantalón.

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]