SHARP CUTTING OBJECT DISPOSAL DEVICE PROVIDED WITH MEANS FOR AUTOMATIC UNSCREWING OF VENOPUNCTURE NEEDLES AND THE LIKE

DESCRIPTION

OBJECT OF THE INVENTION

The present specification refers to a Patent of Invention application regarding a sharp cutting object disposal device provided with means for automatic unscrewing of venopuncture needles and the like, whose evident purpose is based on being configured as a device fed by electric power, capable of massively disposing of sharp cutting objects such as hypodermic needles, scalpel blades and other objects constituting single use surgical instruments, practically instantaneously.

The invention acts with the collaboration of one or two motors fed by electric current, powered with the electric current passing through their rotating contacts, or through a gear wheel which rotates when a part which is also geared moves over the former, on whose upper part a cylinder is fixed moving up or down due to the pressure of a syringe with its needle.

The invention is provided with a device intended for exhausting the gases produced inside due to the disposal of the needles through a conduit or chute, which has an activated carbon filter inside intended for retaining the heated particles going up.

Likewise, the invention has means for automatic unscrewing of the needles connected to the syringes which acts as the venopuncture, hypodermic needles or the like are being disposed of.

A plastic container adhered to the machine has also been placed, inside of which there is an ozone or

ultraviolet valve for sterilizing the objects which are not sharp cutting, such as syringes or cotton, in addition to using replaceable cardboard containers or plastic bags inside this plastic container.

FIELD OF THE INVENTION

The applicant has knowledge of the existence of a plurality of drawbacks derived from involuntary punctures in medical and surgical centers where needles are used; drawbacks which obviously are not precisely corrected with the use of protective material as well as with plastic containers to later be transported and incinerated.

The applicant knows of the existence of recipients of a rigid material provided with an inlet inside of which sharp cutting objects are gradually deposited as they are disposed of, then specialized staff remove these recipients containing the wastes which are subsequently taken to facilities where they are massively disposed of, either by melting, or by autoclave, etc.

It has been shown that, as these are blind recipients, in other words, provided with inlets through which the disposable material manufactured of metal is introduced, occasionally, the incorporated objects are placed inside in strange positions, remaining next to the inlet, which leads to causing cuts or lesions upon carrying out a new removal of these elements.

The applicant has knowledge of the existence of the European Patent of Invention EP-0 947 210 regarding an "APARATO PARA LA DESTRUCCIÓN DE AGUJAS HIPODÉRMICAS Y DE ADENOPUNCIÓN" (NEEDLE DISPOSAL APPARATUS).

The applicant likewise knows the existence of the US Patent No. 5,676,859 regarding an "APARATO PARA LA DESTRUCCIÓN DE AGUJAS HIPODÉRMICAS Y SIMILARES" (INJECTION NEEDLE SAFETY DISPOSAL APPARATUS).

By the US Patent No. 5,138,124, an "APARATO PARA LA

DESTRUCCIÓN DE AGUJAS HIPODÉRMICAS" (APPARATUS FOR THE DISPOSAL OF HYPODERMIC NEEDLES) is known.

By the PCT Patent No. WO 96/38255, an "APARATO PORTÁTIL PARA DESTRUIR AGUJAS" (PORTABLE APPARATUS FOR DISPOSING OF NEEDLES) is known.

By the US No. 5,852,267, an "APARATO PARA ELIMINAR AGUJAS DE INYECCIONES" (INJECTION NEEDLE SAFETY DISPOSAL APPARATUS) is known.

By the US Patent No. 5,138,125, an "APARATO ALIMENTADO POR ENERGÍA ELÉCTRICA PARA LA DESTRUCCIÓN Y ESTERILIZACIÓN DE AGUJAS" (ELECTRIC NEEDLE DISPOSAL DEVICE WITH STERILIZABLE ASSEMBLY) is known.

By the US Patent No. 5,188,598, an "APARATO Y MÉTODO PARA LA DESTRUCCIÓN DE AGUJAS EVITANDO LA CONTAMINACIÓN" (APPARATUS AND METHOD FOR SAFELY DISPOSING CONTAMINATED NEEDLES) is known.

By the European Patent No. EP-913 163, an "APARATO PARA LA DESTRUCCIÓN DE AGUJAS HIPODÉRMICAS POR MEDIOS ELECTROMAGNÉTICOS" (NEEDLE DISPOSAL APPARATUS WITH REDUCED ODORS, ENHANCED SAFETY AND REDUCED ELECTROMAGNETIC NOISE) is known.

However, the applicant has no knowledge of the current existence of an invention capable of disposing of the needle at the same time that as the unscrewing thereof from the adaptation area on the syringe or the like, likewise having no knowledge of the existence of an invention having a plastic deposit placed against the invention or the inside thereof, inside of which deposit replaceable cardboard containers or plastic bags with a certain thickness can be placed, where the objects which are not sharp or cutting are placed to later be sterilized by means of an ozone or ultraviolet valve, which leads to significantly reducing the cost of rigid plastic containers, since, upon disposing of the sharp object, the syringes can be placed in a cardboard container or plastic bag since the sharp object was already

disposed of.

DESCRIPTION OF THE INVENTION

In accordance with an aspect of the present invention, there is provided a sharp cutting object disposal device provided with means for automatic unscrewing of venopuncture needles and the like, of those constituted of a chassis or general structure internally provided with fixing means or box, having a container drawer for the syringes, as well as a container drawer for the needle wastes, provided with a gas exhaust system without a ventilator, with an activated carbon filter on its upper part and a slit for the inlet of the sharp cutting objects upon being introduced through the slit, incorporating one or two electric motors and inside which, by means of the shafts and the electric conductors, provide movement to two contacts fed by the brushes, provided with a tube or chimney inside, located on top of the solid contacts for exhaust of the gases produced by melting the needle, and at a 45^{0} angle to the vertical of said tube there is a tube formed by two complementary parts and, which is intended to serve as a conduit of the needles to the solid contacts and to unscrew the needles from the so-called screw-on syringes, the inside of the tube formed by parts and being provided with a helical shaped track or rail, the track starting and ending on the two inner sides of parts and, and inside of the tube thus formed a cylindrical part is provided for whose movement is vertical inside the tube due to the effect created by the track or rail, the inside of the cylindrical part having two metallic parts and, adopting a "Y" shape, which slide horizontally inside part due to the action of two springs and, the cylindrical part being moved inside the tube formed by complementary parts and due to pressure by a

syringe, causing the rotation of the cylindrical part in a downward vertical direction, carrying out a counter-clockwise rotation, having a spring, parts and being adjacent at their ends opposite the projecting lugs, which will be forced out through the openings and upon reaching the lower part due to the action of the springs, and once the pressure of the syringe carrying the needle against the cylindrical part stops and the needle is unscrewed from the syringe, the upward force of the spring makes the part go up again up to the standstill position, the part rotating in a direction similar to a clockwise direction, characterized in that, with the cylindrical part pressed by the syringe, the latter goes down and in its movement, makes the geared part slide, causing the gear wheel to turn, creating movement so as to make the solid contacts and turn.

The sharp cutting object disposal device provided with means for automatic unscrewing of venopuncture needles and syringe sterilization system may itself be configured as an evident novelty within its field of application, because, apart from the features shown to be suitable for its actuation, it may permit automatically unscrewing the needle from the syringe without there being any need to carry out this operation manually by manually capping the needle with the cap to unscrew it and remove it, and thus preventing an accidental puncture, and at the same time disposing of the needle as it is unscrewed in order for the latter to be deposited in a specific container, the syringe housing container being incorporated or inside of the machine for its subsequent sterilization.

More specifically, also disclosed is a sharp cutting object disposal device provided with means for automatic unscrewing of venopuncture needles or the like object, is constituted as an apparatus fed by electric power from the

electric network as well as from a battery, to which a container is adjacently incorporated for the wastes of the objects which are not sharp, such as the syringes, sterilized by means of an ozone or ultraviolet valve, and a second recipient or container for the disposed wastes of sharp cutting objects, also having a gas exhaust system or conduit lacking a ventilator or system forcing the gases out which are produced inside due to the disposal of the needle, in whose upper part a filter with the suitable specifications will be installed.

The disposal of the sharp cutting objects may be carried out by introducing the object to be disposed of through a slit incorporated on a tubular structure, in which a pair of motors or a gear wheel are fixed, actuated by a saw-toothed part which, upon sliding on the gear wheel, will cause the latter to rotate, and in turn, this gear wheel will move several gears which will make two cylindrical and solid contacts turn.

These aforementioned contacts may be fed with electric current through brushes located inside of brush holders and in turn through the pertinent electric wires or conductors.

Embodiments of the invention may be capable of carrying out the disposal of the sharp cutting objects by means of the actuation of a single motor, which generates movement in one of the shafts on which a solid contact is assembled, in this manner, one of the contacts is fixed and the other is movable, actuated by the motor's rotation.

These shafts may have two solid contacts at the end thereof which rotate and which receive current from the brushes, by means of the electric current passage plus the friction due to the rotation, they carry out the disposal of the needles or of the scalpel blades.

Inside, the device may have a tube or chimney located in the upper part of the solid contacts for the purpose of

permitting the exhaust of gases produced by the melting required for disposing of the needles, lacking a ventilator or system forcing the gas exhaust, the gases being retained in the upper part of the tube by means of an activated carbon filter which prevents harmful particles from passing through which, due to the effect of the heat produced by melting the needle, go up this tube where a hollow, screw-on cap is placed on the end thereof.

Another tube may be placed at a 45^{0} angle to the tube vertical, serving as a conduit for the needles to the solid contacts where they are disposed of, likewise having means for unscrewing the needles from the so-called "screw-on" type syringes.

Said tube may have a helical shaped track or rail inside which begins and ends on both sides or on one side, depending on the rotation carried out by the cylindrical part inside of the tube, there being on the inside thereof a cylindrical part with vertical and rotational movement originating from the existence of said track or rail, cylindrical part in turn provided with two Y-shaped metallic parts, which slide horizontally inside the cylindrical part and due to the action of two springs, these preventing said parts from joining together, unless they are pressed on their ends in the form of lugs.

As the aforementioned cylindrical part may vertically slide downwards through the tube, a movement carried out due to the pressure created by a syringe, turning the needle as it goes down in a counter-clockwise or clockwise direction, according to where the direction of the track or rail is inclined, and keeping the syringe in place, the needle moving from the upper part of the tube down to the lower part, pressing on a spring in its path and during

this vertical, downward path of the cylindrical part, said "Y"-shaped parts may be joined at their ends opposite the lugs and upon reaching the lower part of the tube, the lugs will project through the slits or holes provided for that purpose due to the force originated from springs, being necessary to point out that that once the pressure of the syringe against the cylindrical part has ended and the needle has consequently been unscrewed from the syringe, the downward force of a spring will make the cylindrical part go up again to its upper or standstill position, again permitting carrying out a similar one for unscrewing the needles.

The cylindrical part may also be prevented from turning when the part is going down through the tube, as this other tube has a system of one or two straight and hollow parallel rails on only one side of the tube or in both sides thereof in which the lug or lugs of the cylindrical part will be maximally separated from its ends opposite the lugs; thus, the cylindrical part may carry out an upward or downward movement without carrying out any type of rotation for those needles which are not of the "screw-on" system, and for those needles which are, inside the tube, a system of inner inclined rails or tracks may be provided, as previously indicated.

In this entire downward process, for example, the cylindrical part unscrews the needle, which is also disposed of, since it is provided for that the rotating solid contacts are in the lower part of the tube.

Likewise, once the sharp cutting objects have been disposed of by the previously disclosed mechanisms, the non-sharp or non-cutting objects, such as the syringe, may be sterilized with an ozone or ultraviolet valve, this valve may be fed by a battery or electrical transformer; this valve may be arranged in the adjacent

container for collecting this type of material, and once this material has been exposed to the different valves, it may be completely sterilized.

BRIEF DESCRIPTION OF THE DRAWINGS

To complement the description being made and for the purpose of helping to better understand the features of the invention, a set of drawings is attached to the present specification as an integral part thereof, which, with an illustrative and non-limiting character, show the following:

Figure 1.- shows a developed view of the object of the invention regarding a sharp cutting object disposal device provided with means for actuating the gear wheel and with another tube or chute for gas exhaust.

Figure 2.- shows a sectional view of the inner area of the tubular body with the cylindrical part inside it and the so-called "Y" parts in working position.

Figure 3.- shows a perspective view of the cylindrical part carrying the springs in working position or closed.

Figure 4.- shows a view similar to the one shown in

figure 3, the so-called "Y" metallic parts being in standstill or open.

Figure 5.- shows a plan view of the object shown in figures 3 and 4.

Figure 6.- again shows a view of the object shown in figure 2, but this time the "Y" parts are in standstill state.

Figure 7.- shows a perspective view of the object of the invention from the upper area.

Figure 8.- shows a duly sectioned side elevational view of the object shows in figure 7, without showing the syringe container.

Figure 9.- shows an exploded view of the inside of the tube, showing the two motors and their actuation of the solid contacts.

Figure 10.- shows a perspective view of the deposit containing the needleless syringes, where it is possible to see the door with handgrip for accessing the inside.

Figure 11.- shows a view of the object shown in figure 10, in which the inside access cover is open, where it is possible to see the cardboard container housing the syringes, which will be removed and replaced by another when full.

Figure 12.- shows the tube of figure 1 but from the inside part thereof, where the gears and solid contacts disposing of the needle can be seen.

Figure 13.- shows the different positions carried out by the cylindrical part in its path which, when going up or down, makes the gear wheel move by means of an also geared part and this gear wheel in turn makes the solid contacts move without any type of motor.

Figure 14.- shows the different positions carried out by the cylindrical part in its path, inside of which movable lugs are housed, and it carries out a 180º rotation in its upward and downward path.

Figure 15.- shows the different positions carried out by the cylindrical part in its path, inside of which a movable lug and another fixed one are housed, and it carries out a 360º turn in its upward and downward path.

Figure 16.- shows a perspective view of the cylindrical part with a movable lug and another fixed one on the inside thereof, in standstill and working position.

Figure 17.- shows a perspective view of a machine container.

Figure 18.- shows a sectional side view of the machine container, where the tube, drawer, ozone valve and cardboard container for the syringe wastes can be seen on the inside thereof.

Figure 19.- shows a perspective view of the inside of the machine container, the cover with the machine parts in the upper part separated from the plastic container with its cardboard container on the inside thereof.

PREFERRED EMBODIMENT OF THE INVENTION

Following figure 7, it can be seen how the sharp cutting object disposal device provided with means for automatic unscrewing of venopuncture needles and the like, configured as a general body referenced with (1), showing a container for needleless syringes (2) in the rear part, and a drawer with a container (neither shown nor referenced) in the lower part referenced with 3, incorporated in the recipient deposit for needleless syringes, there is an additional and auxiliary recipient (70), preferably made of cardboard or tetra-pack, or from plastic bags provided with a suitable thickness, according to its application.

The invention is provided with an activated carbon filter (4) and a slit (5) intended for being used as an opening for introducing the sharp cutting objects.

The disposal of the sharp cutting objects, generally referenced with (40), is carried out as indicated in figure

13, the cylindrical part (43) pressed by the syringe (93), the latter moves downwards and in its movement, makes the toothed part (92) slide, causing the rotation of the gear wheel (90) and pressing on the spring (47), thus, as can be seen in figures 11 and 12, there being a gear wheel (90') in the lower part of the tube (20) which in turn actuates the small gear wheels (23) and (24) which, by means of shafts (25) and (25'), provide movement to the solid contacts (26) and (27), which are provided with current by means of brushes (28) and (29).

In a second embodiment, the disposal of the objects (40) can be done as shown in figure 9, by means of only one or two motors, motors (6) and (6') being responsible for making the solid contacts (9) and (10) move, which are provided with current by means of brushes (11) and (12) and in turn by means of wires (13) and (14).

The invention is provided with a tube or chimney (30) on the inside thereof, located in the upper part of the solid contacts (26) and (27) incorporated inside the box (20), the tube (30) being intended for facilitating the exhaust of gases produced by melting the sharp cutting objects (40), the gases being retained in the upper part of the tube due to the incorporation of an activated carbon filter (4) which prevents harmful particles from passing through, particles which, due to the effect of the heat produced by melting, will go up this tube (30) where a hollow screw-on cover (32) is incorporated on its upper end for fixing the filter to the tube (30).

It should be indicated that there is another tube at a 45º angle to the vertical of the tube (30) shown in figure 8, which, for the purpose of describing it and understanding its inner functioning, has been shown with greater clarity in figure 2.

Continuing with said figure 2, it can be seen that the tube in question is formed by two complementary parts (41)

and (41') being intended for serving as a conduit of the needles to the solid contacts where they are disposed of, having means for unscrewing the needles from the so-called "screw on" syringes, since the needles are not coupled to or introduced in these syringes by pressure on the neck thereof, but rather they require being screwed on.

The tube formed by parts (41) and (41') is provided with a helical shaped track or rail (42) inside, the track starting and finishing on both inner sides of the parts and on the inside of the tube thus formed a cylindrical part (43) is provided, whose movement is vertical and rotational inside the bodies (41) and (41') constituting the tube, and at the same time rotational due to the effect created by the track or rail (42), being necessary to indicate that on the inside of the cylindrical part (43) there are two "Y"-shaped metallic parts (45) and (45') which slide horizontally inside of part (43) due to the action of two springs (46) and (46'), respectively, which prevent the parts (45) and (45') from joining unless they are kept pressed by their ends or lugs, as shown below.

As the cylindrical part (43) goes down through parts (41) and (41') due to the pressure of a syringe (93), the cylindrical part will be rotating in a counter-clockwise direction as it goes down from the highest part to the lowest part, pressing on a spring (47) in its path, and during this path, the cylindrical part (43) in a vertical downward direction makes the parts adopting a "Y" shape, referenced with (45) and (45'), respectively, stay together at their ends opposite the lugs, as seen in figure 3, and upon reaching the lower part of the tube, as seen in figures 4 or 6, the lugs will project outwards through the openings (44) and (44'), respectively, as a result of the action of the springs (46) and (46').

Once the pressure created by the syringe against the cylindrical part (43) has stopped and the needle (40) has

been unscrewed from the syringe, the upward force of the spring (47) will make the cylindrical part go up again to its upper or standstill position, as it was prior to beginning the actuation thereof.

It must be indicated that in this entire cylindrical part's (43) downward movement process unscrewing the needle (40), the needle has also been disposed of due to the existence of the rotating solid contacts located in the lower part of the tube.

The disposal of a needle (40) and the automatic unscrewing thereof occurs as the needle penetrates the perforation or hole (5), as shown in figure 8, and since the lugs of parts (45) and (45') are located inside the tube formed by parts (41) and (41') on their rails (42) pressed against the inner wall of said tube, part (43) will begin to rotate in a counter-clockwise direction as it is being pressed by the syringe in a downward direction, unscrewing and disposing of the needle (40) as it approaches the solid contacts (25) and (26), and during this downward movement process of the part (43), the needle is pressed or held by parts (45) and (45').

Once the cylindrical part has gone down until the end of its path, as shows in figure 6, the lugs of parts (45) and (45') will project outwards through the perforations or holes (44) and (44') due to the action of the springs (46) and (46').

Thus, once the needle cone has been disposed of by the contacts (26) and (27) and unscrewed from the lower end of the syringe, it is free to be incorporated in a container (70) which can be of any nature, as previously mentioned, the container (70) being incorporated in the recipient area (2), which has a cover (60) provided with an access trapdoor (62) and a handgrip (63), likewise provided with several guides (61) and (61') for the fixing thereof to the rear part of the device, as shown in figures 7 or 11.

At the same time the syringe stops pressing on the part (43), the latter goes up again due to the force created by the spring (47) which, rotating in a clockwise direction, reaches its standstill position in the upper part of the tube formed by parts (41) and (41').

The drawer (3) has a disposable container inside of it, made of a rigid plastic material, where the pulverized metal remains are introduced.

The invention is provided with the pertinent electric transformer or battery (54) which feeds the motors and contacts or, where applicable, only the contacts since the motors are omitted, as shown in figure 1.

As shown in figure 14, another variant of the unscrewing tube can also be placed in which, in this case, the cylindrical part (43) can vertically move up and down in the tube (41) without causing any type of rotation since the parts (45) and (46') have not entered the rail through the ramp (95), or enter through this ramp and go down, rotating in a clockwise direction on the rail (42) and will rotate only 180º, as can be seen in the drawing, in order for the lug (45) to project through the ramp (96), in other words, when the part (43) is in the lower part of the tube, it will have rotated 90º, and when it goes up again, it will turn another 90º.

There is also the other variant which can be seen in figure 15, in which the effect produced by the upward and downward movement of the cylindrical part (43) is the same as in figure 14, except that now, there is only a mobile lug (45) and another fixed one (45'), as seen in figure 16, when the cylindrical part (43) rotates upon entering on the ramp (45) and moves downward, rotating in a clockwise direction on the rail (42), it will now describe a 360º turn, in other words, when the part (43) is in the lower part of the tube, it will have turned 180º and when it goes up again, it will turn another 180º.

Lastly, a drawer-container is disclosed as shown in figures 17, 18, and 19, where all the aforementioned has been introduced, but with the advantage, as seen in these figures, of introducing an ozone or ultraviolet valve (55) in the lower part of the container (72) for sterilizing the syringes placed in the cardboard container (71) once the door (65) has been closed.

CLAIMS

1.- A sharp cutting object disposal device provided with means for automatic unscrewing of venopuncture needles and the like, of those constituted of a chassis or general structure internally provided with fixing means or box, having a container drawer for the syringes, as well as a container drawer for the needle wastes, provided with a gas exhaust system without a ventilator, with an activated carbon filter on its upper part and a slit for the inlet of the sharp cutting objects upon being introduced through the slit , incorporating one or two electric motors and inside which, by means of the shafts and and the electric conductors, provide movement to two contacts fed by the brushes, provided with a tube or chimney inside, located on top of the solid contacts for exhaust of the gases produced by melting the needle , and at a 45º angle to the vertical of said tube there is a tube formed by two complementary parts and , which is intended to serve as a conduit of the needles to the solid contacts and to unscrew the needles from the so-called screw-on syringes, the inside of the tube formed by parts and being provided with a helical shaped track or rail , the track starting and ending on the two inner sides of parts and , and inside of the tube thus formed a cylindrical part is provided for whose movement is vertical inside the tube due to the effect created by the track or rail , the inside of the cylindrical part having two metallic parts and , adopting a "Y" shape, which slide horizontally inside part due to the action of two springs and , the cylindrical part being moved inside the tube formed by complementary parts and due to pressure by a syringe, causing the rotation of the cylindrical part

in a downward vertical direction, carrying out a counter-clockwise rotation, having a spring , parts and being adjacent at their ends opposite the projecting lugs, which will be forced out through the openings and upon reaching the lower part due to the action of the springs and , and once the pressure of the syringe carrying the needle against the cylindrical part stops and the needle is unscrewed from the syringe, the upward force of the spring makes the part go up again up to the standstill position, the part rotating in a direction similar to a clockwise direction, characterized in that, with the cylindrical part pressed by the syringe , the latter goes down and in its movement, makes the geared part slide, causing the gear wheel to turn, creating movement so as to make the solid contacts and turn.

2.- A sharp cutting object disposal device provided with means for automatic unscrewing of venopuncture needles and the like according to claim 1, characterized in that the deposit provided with the cover is internally provided with a cardboard deposit in which the needleless syringes are incorporated through the trapdoor , provided with handgrips .

3.- A sharp cutting object disposal device provided with means for automatic unscrewing of venopuncture needles and the like according to claim 2, characterized in that the recipient is preferably made of cardboard or else shaped as a plastic bag with a suitable thickness.

4.- A sharp cutting object disposal device provided with means for automatic unscrewing of venopuncture needles and the like according to the previous claims, characterized in that there is an ozone or ultraviolet valve inside

of the container which sterilizes the wastes dumped in this container, such as the needleless syringes , assembling everything in only one piece of equipment.

ABSTRACT

A sharp cutting object disposal device provided with means for automatic unscrewing of venopuncture needles and the like, consisting of a tube (2) to which a pair of motors or a gear wheel are fixed, the wheel which, actuated by a geared part that upon sliding on the gear wheel, will cause the rotation of the latter and in turn, this gear wheel will move several gears which will make two cylindrical and solid contacts turn, carrying out the disposal of the needle by means of friction plus the passing of electric current, provided with a conduit inside for exhaust of gases produced by melting the needle, without needing ventilators or any other forced air system, in addition to having another tube for separating the needle from the "screw-on" type syringe during the same needle disposal operation, the inside of the drawer (3) having a housing recipient for the needle wastes, and another recipient (70) incorporated inside the container (2) for housing the plastic needleless syringes or non-sharp hospital wastes, and inside this container, there is an ozone or ultraviolet valve (55) for sterilizing the needles.

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LEGEND OF THE DRAWINGS

FIGURE 13:

POSITION A

POSITION B

POSITION C

POSITION D