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(54) Title: MOBILE COVERING ELEMENT FOR A COVERING APPARATUS, PREFERABLY AN ADJUSTABLE SUNSHADE

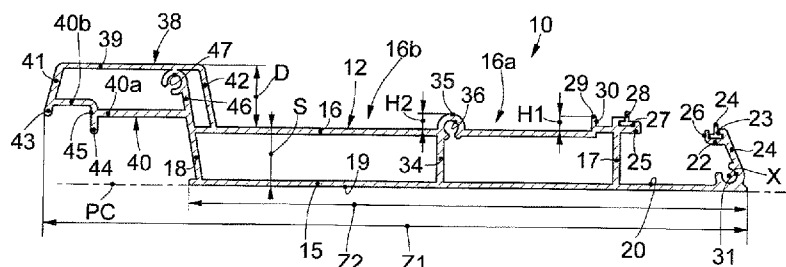


fig. 9

(57) Abstract: Mobile covering element (10) for a covering apparatus (11), preferably an adjustable sunshade, comprising a main body (12) with an oblong development having a lower wall (15) provided with a lower surface (19) configured to be disposed, in a covering position, substantially on a covering plane (PC), and an upper wall (16) configured to be substantially horizontal when the mobile covering element (10) is in the covering position. Longitudinal walls (29, 35, 42) together with the upper wall (16) define two upper longitudinal compartments (16a, 16b) which facilitate the conveying of water toward the lateral edges.

“MOBILE COVERING ELEMENT FOR A COVERING APPARATUS,
PREFERABLY AN ADJUSTABLE SUNSHADE”

* * * * *

FIELD OF THE INVENTION

5 The present invention concerns a mobile covering element for a covering apparatus, which can be preferably, but not limited to, an adjustable sunshade, even of a large size, in the range of several meters on each side. The covering element has an oblong shape and is mobile between an operative, or covering, position, in which it is parallel to a covering plane, and an inactive, or open,
10 position, in which it is inclined with respect to the covering plane, and vice versa. In the operative position, the covering element, together with other covering elements identical to and coplanar with it, produces an impermeable cover of a zone below, so that the latter is protected both from atmospheric agents, such as rain, snow, or hail, and also from other objects, such as branches, leaves, debris,
15 or other, which might possibly fall from above. In the inactive position, all the covering elements are reciprocally inclined and allow accessibility from above to the zone below, by any element or object whatsoever, including the sun's rays.

BACKGROUND OF THE INVENTION

20 Different types of covering apparatuses are known, such as for example adjustable sunshades, which use oblong covering elements and have the function of protecting, selectively and even only temporarily, a zone below, both from the sun's rays and also from atmospheric agents, such as rain, snow, or hail, and also from other objects that can fall from above.

25 In the state of the art there are covering elements for covering apparatuses which, although all are oblong, that is, with a length much larger than the width and height, or overall thickness, have the most diverse shapes, and are aesthetically similar to a blade, a fin, or a slat, therefore they are usually equally indicated with one or more of these terms.

30 One of the disadvantages of the known covering elements is that they are subject to a relative longitudinal flexion due to their own weight. The amplitude of this flexion is directly proportional to the length of the covering element. Furthermore, this flexion increases when there are atmospheric precipitations such as rain, snow, or hail, particularly when these are of considerable intensity,

compromising the structural resistance of the covering elements or, at least, causing undesired stagnation of water, in the form of puddles, more or less large, which are not managed optimally by the normal water discharge systems. This disadvantage entails both an increase in the power required of the movement
5 members of the covering elements, and also the undesired discharge of water into the zone below.

In order to overcome this problem, in the past covering elements have been designed with larger cross sections, in order to increase the radius of inertia of the latter and thus reduce the normal longitudinal flexion. However, this solution has
10 the disadvantage of causing both an increase in the overall weight of the covering elements of the covering apparatus, and also a reduction in the clear span of the latter in the open position and in the intermediate phases between the open and the covering position. The latter disadvantage is particularly felt in the field of application of the present invention, since the width of the clear span is one of the
15 main characteristics required by the market.

Covering elements with a curved conformation are also known, which guarantee a greater resistance to flexion. This latter type of covering elements, however, have the disadvantage of having high production costs, since the elements themselves have to be subjected to calendering, or to other complex and
20 expensive workings, in order to obtain the desired arched shape and, moreover, their final conformation is often unaesthetic and not appreciated by customers and end users, particularly when the covering elements are in their covering position, or in the intermediate positions between the open and covering positions. Furthermore, these do not guarantee an optimal passage of light and air
25 through the covering apparatus, when this is desired.

A first known type of covering apparatus comprises a plurality of oblong covering elements, parallel to each other and pivoted at their ends on two support elements of a support structure, opposite and perpendicular to the covering elements. The covering elements can rotate on their longitudinal axes of rotation
30 in order to assume both a covering position, in which they are coplanar with a covering plane and protect the zone below, and also an inclined, or open, position, in which the covering elements are inclined by many degrees, for example up to 140° and more, with respect to the covering plane, thus allowing

the sun's rays and atmospheric agents to pass between the covering elements and reach the zone below. An example of the first type of covering apparatus as above is described in the Italian patent IT-B-1.415.149, issued to the Applicant on 09.04.2015.

5 A second known type of covering apparatus comprises a plurality of oblong covering elements, parallel to each other and connected with their ends to an actuation mechanism, for example of the pantograph type, in turn slidably supported on two support elements of a support structure, opposite and perpendicular to the covering elements. The covering elements, commanded by
10 the actuation mechanism, can assume both a covering position, in which they are coplanar with a covering plane and protect the zone below, and also an inactive position, in which they are inclined by many degrees, for example up to 90°, with respect to the covering plane and packed toward a transverse element of the support structure, so as to allow the sun's rays and atmospheric agents to reach
15 the part of the zone below left uncovered.

Usually, regardless of the type of covering apparatus, the upper support structure has the shape of a rectangular frame, and is configured to be positioned at a determinate height, for example a few meters, from the floor, or from the ground. In some cases, the frame can be missing one side, so that the upper
20 support structure substantially has the shape of a U. In fact, for the support of the covering elements, it is essential that the upper support structure comprises at least three components, two of which are parallel to each other and perpendicular to the covering elements, and act as a support for the latter, while a third component, perpendicular to the first two, acts as a connection element between
25 the first two, and is usually also used to house the motor members for moving the covering elements.

The upper support structure can be supported by supporting vertical uprights, so that the corresponding covering apparatus is aesthetically similar to a pergola, or it can be attached in any suitable way whatsoever to fixed support elements,
30 for example to one or more lateral walls.

Furthermore, in the most recent covering apparatuses, which have very wide covering surfaces, in the range of tens of square meters, suitable to be installed in gardens, large terraces, open zones in public places, such as bars or restaurants,

or even private spaces, each individual oblong covering element usually comprises a central body, having a length in the range of a few meters, for example from 2 m to 6 m, a width in the range of a few decimeters, for example from 0.1 m to 0.3 m, and a height in the range of a few centimeters, for example from 0.01 m to 0.04 m, and provided with sealing means positioned along one or both of its longitudinal flanks, that is, along the longer sides, in order to guarantee impermeability when the same covering elements are in their covering position. Each covering element with the large sizes as above, in order to meet the following requirements: have a determinate and sufficient mechanical strength; support a determinate surface load, maintaining its flatness as much as possible, without excessive flexions in the center, particularly when it is in the closed condition; not be excessively heavy; and have low production costs, is usually made using metal section bars, for example made of steel, aluminum, or metal alloys.

Covering elements are also known that can be oriented, each provided with an end compartment disposed in correspondence with one of the longitudinal flanks and conformed so as to collect the fluids that deposit freely on the upper surface of the covering elements themselves, after atmospheric precipitations and other events.

One of the main disadvantages of these known covering elements is that they do not guarantee a perfect seal, so that even when they are in their covering position, water sometimes passes through the junction zones between two adjacent covering elements and, mostly during atmospheric events, especially if of particular intensity, reaches the zone below, which is undesirable.

Furthermore, the normal conformation of these known covering elements, in particular as the length increases, tends to make them flex in their central zone, thus creating a sagging, which causes water to accumulate which, as previously mentioned, forms pools in their upper part of the central zone.

This entails several disadvantages, including an increase in load in the central zone, with a consequent increase in the size and weight of the pool of water, a structural weakening of the covering element and an unsanitary stagnation of liquids. Furthermore, since it accumulates substantially in the center, it is difficult for the water to flow autonomously through the normal discharge systems, which

are typically located on the support structure in correspondence with the lateral edges of the covering elements, that is, their shorter sides, with a consequent possible discharge of the accumulated water on the zone below, in the step of opening the covering elements, by tilting them.

5 Therefore, another characteristic required of each oblong covering element is to allow water, both rain water and also of other types, for example voluntarily or accidentally poured from above onto the covering apparatus, to flow freely and without obstacles toward collection channels, or conduits, when the covering elements of the covering apparatus are in an operative, or covering, position, in
10 order to then be conveyed to suitable discharge means.

In order to meet this requirement, covering apparatuses are known which, in correspondence with their upper support structure, are provided in the internal perimeter with a plurality of channels, sometimes called “eaves gutters” by those skilled in the art, which are disposed, usually on each side, below the lateral
15 edges of the oblong covering elements, in order to collect the abundant water that flows onto the latter, as in the case of intense and copious precipitations, which are by the way increasingly abundant and with significant volumes per hour, per square meter, as in the case of heavy downpours, or thunderstorms.

In addition, the disposal of the water has to take place without it falling, even
20 in minimum quantities, into the zone below, even when the covering elements are moved in order to be taken from their covering position to their inactive, or open, position, for example at the end of the atmospheric precipitation.

Unfortunately, however, in known covering apparatuses this does not always happen satisfactorily, so much so that often the user who commands the
25 movement of the covering elements is faced with the unwelcome surprise of finding that a certain quantity of water, possibly left stagnant above the covering elements themselves, falls or drips downward and wets the zone below, where there people and/or objects, such as tables, chairs and more may be present.

Therefore, since all known covering elements have shown that they do not
30 possess all the characteristics as above, and consequently produce undesirable effects due to their shape and structure, both in terms of seal, so they do not guarantee perfect impermeability from above of the zone below when they are in their closed condition, particularly when atmospheric precipitations are intense

and abundant, nor do they prevent water from falling into the zone below when the covering elements are opened, for example after the end of the atmospheric precipitation, and also in terms of maintaining their flatness, particularly when in their covering position they are burdened by a high surface load, as in the case of snow, which can reach and exceed 800 N/m^2 .

One purpose of the present invention is to provide a mobile covering element for a covering apparatus, preferably an adjustable sunshade, which can easily be moved between a covering position, in which the mobile covering element itself is coplanar with, or parallel to, a determinate covering plane, preferably horizontal, and an open position, in which it is inclined by several degrees with respect to the covering plane as above and preferably packed toward a rear edge of the covering apparatus, and vice versa, and wherein, in the covering position as above, it guarantees, in association with other identical covering elements temporarily coupled with it, above all a perfect seal, or impermeability from above, even when it is subject to high loads located on top of it, which could deform it, for example bend it downward in its central part.

Another purpose of the present invention is to provide a mobile covering element for a covering apparatus, preferably an adjustable sunshade, which in the covering position as above only has one substantially flat surface, so that, in association with other covering elements identical to it and temporarily coupled with it, it defines a single flat, or differently shaped, surface substantially without irregularities of the entire covering apparatus, as if it were a flat, or shaped, ceiling of a room.

Another purpose of the present invention is to provide a mobile covering element for a covering apparatus, preferably an adjustable sunshade, which, while maintaining the required characteristics highlighted above, is relatively light in relation to its size, simple to produce and install, and has low production costs.

The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

The present invention is set forth and characterized in the independent claim.

The dependent claims describe other characteristics of the invention or variants to the main inventive idea.

In accordance with the above purposes, a mobile covering element for a covering apparatus, preferably a an adjustable sunshade, comprises a main body
5 with an oblong development, having a longitudinal axis, a first lateral edge, a second lateral edge opposite the first lateral edge, a first longitudinal flank, a second longitudinal flank opposite the first longitudinal flank, a lower wall having a lower surface disposed, in a covering position of the mobile covering element, on a covering plane, parallel to or passing through the longitudinal axis,
10 and an upper wall disposed substantially horizontal in the covering position.

In accordance with one characteristic aspect of the present invention, the mobile covering element as above also comprises conveying means configured to facilitate the outflow toward the lateral edges of what can possibly be deposited on the upper wall, in particular water, when the mobile covering element is in the
15 covering position.

In this way, advantageously, at least one first barrier is present on the mobile covering element, which prevents above all the water from going over the longitudinal flanks of the mobile covering element, when the same mobile covering element is in the covering position as above, spilling out into the zone
20 below.

In accordance with another characteristic aspect of the present invention, the mobile covering element also comprises a longitudinal containing compartment, disposed in correspondence with the first longitudinal flank and having an upper longitudinal aperture; in this case, advantageously, the conveying means as above
25 comprise a first longitudinal wall disposed on the upper wall as above, in correspondence with the first longitudinal flank and before the upper longitudinal aperture of the longitudinal containing compartment as above.

In accordance with another characteristic aspect of the present invention, the first longitudinal wall extends perpendicularly to the upper wall from the first
30 lateral edge to the second lateral edge, and has the shape of a longitudinal ridge having the upper end at a determinate first height, preferably comprised between about 3 mm and about 6 mm from the upper wall.

In accordance with another characteristic aspect of the present invention, the

conveying means comprise a second longitudinal wall disposed on the upper wall in an intermediate position between the first longitudinal flank and the second longitudinal flank.

5 In accordance with another characteristic aspect of the present invention, the second longitudinal wall extends perpendicularly to the upper wall from the first lateral edge to the second lateral edge and has its upper end at a determinate second height, preferably comprised between about 3 mm and about 6 mm from the upper wall.

10 In accordance with another characteristic aspect of the present invention, the mobile covering element also comprises a longitudinal lateral appendix, disposed in correspondence with the second longitudinal flank, outside and in continuation of the main body, and the conveying means comprise an internal lateral wall of the longitudinal lateral appendix as above, which rises from the upper wall in correspondence with the second longitudinal flank, so that the upper wall, the
15 first longitudinal wall, the second longitudinal wall and the internal lateral wall together form two upper longitudinal compartment, which facilitate the outflow toward the lateral edges and prevent the formation of a single pool of water at the center of the upper wall when the mobile covering element is in the covering position.

20 In this way, advantageously, when the mobile covering element is in the covering position, the water is evenly deposited and distributed in both the upper longitudinal compartments as above, reducing the load applied and, in any case, distributing the latter in the longitudinal direction of the mobile covering element itself. Therefore, on the one hand, the impact of the weight of the water on the
25 flexion effect is reduced and, on the other hand, the autonomous discharge of the water toward the lateral edges, and hence into the discharge systems normally provided in the covering apparatus is facilitated, reducing to a minimum the risk of spilling water into the zone below, particularly during the first steps of opening the mobile covering element, which can occur, for example, by tilting
30 the latter with respect to the longitudinal axis.

In accordance with another characteristic aspect of the present invention, the longitudinal lateral appendix is positioned at least partly, preferably wholly, above the bulk of the main body.

In accordance with another characteristic aspect of the present invention, the longitudinal containing compartment is substantially defined by the first longitudinal flank, by a terminal part of the first lower wall which extends outward beyond the first longitudinal flank, and by a lateral wall, which together
5 with the latter defines the upper longitudinal aperture.

In accordance with another characteristic aspect of the present invention, the lateral wall of the longitudinal containing compartment has in its upper part a first longitudinal protuberance, facing the longitudinal containing compartment and provided, in its upper part, with a first longitudinal seating, in which a first
10 packing is disposed, which preferably extends for the entire length of the main body.

In accordance with another characteristic aspect of the present invention, the mobile covering element also comprises a second longitudinal protuberance integral with the first longitudinal flank, facing the longitudinal containing
15 compartment and provided, in its upper part, with a second longitudinal seating, in which a second packing is disposed, which also preferably extends for the entire length of the main body.

In accordance with another characteristic aspect of the present invention, the second longitudinal seating and the first longitudinal wall define a longitudinal
20 cavity between them; moreover, the longitudinal lateral appendix comprises a first lower protuberance and a second lower protuberance which define a longitudinal recess; additionally, the first lower protuberance and the second lower protuberance are configured to act as drip-guard elements, cooperating with the longitudinal cavity and, respectively, with the upper longitudinal
25 aperture of another mobile covering element identical and adjacent thereto, of the covering apparatus, when the mobile covering elements are in the covering position.

ILLUSTRATION OF THE DRAWINGS

These and other characteristics and advantages of the present invention will
30 become apparent from the following description of a preferential form of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a perspective view from above, which schematically shows a covering

apparatus that uses, by way of example, a group of six mobile covering elements, according to the present invention and identical to each other, shown in an inactive, or open, position;

- fig. 2 is a schematic cross section of the covering apparatus of fig. 1;

5 - fig. 3 is a perspective view, from above and from the left, of a part of the apparatus of fig. 1, showing the example group of six mobile covering elements of figs. 1 and 2;

- fig. 4 is a front view, partly sectioned, of the apparatus of fig. 1, showing a mobile covering element of figs. 1 and 2;

10 - fig. 5 is a perspective view taken from below of the upper structure of the covering apparatus of fig. 1;

- fig. 6 is a perspective view taken from below of the covering apparatus of fig. 1, but with the mobile covering elements according to the present invention shown in an operative, or covering, position;

15 - fig. 7 is a schematic cross section of the covering apparatus in the position of fig. 6;

- fig. 8 is a perspective view, from above and from the left, of the part of the apparatus of fig. 3, but with the example group of six mobile covering elements shown in the operative, or covering, position as above;

20 - fig. 9 is a cross section of a single mobile covering element, according to the present invention, on an enlarged scale;

- fig. 10 is a cross section of a pair of mobile covering elements, according to the present invention, shown in their operative, or covering, position;

25 - fig. 11 is a right lateral view of a part of the apparatus of fig. 1, showing the example group of six mobile covering elements shown in their inactive, or open, position;

- fig. 12 is a left lateral view of the example group of six mobile covering elements of fig. 11, on an enlarged scale;

30 - fig. 13 is a perspective view, from above and from the right, of a part of the apparatus of fig. 1, showing the example group of six mobile covering elements of figs. 11 and 12;

- fig. 14 is a right lateral view of a part of the apparatus of fig. 1, showing the example group of the six mobile covering elements of figs. from 11 to 13, but

shown in an intermediate position between the inactive and the operative position;

- fig. 15 is a left lateral view of the example group of six mobile covering elements, in the intermediate position of fig. 14, on an enlarged scale;

5 - fig. 16 is a perspective view, from above and from the right, of a part of the apparatus of fig. 1, showing the example group of six mobile covering elements of figs. 15 and 16;

- fig. 17 is a right lateral view of a part of the apparatus of fig. 1, showing the example group of the six mobile covering elements of figs. from 11 to 16, but
10 shown in their operative, or covering, position;

- fig. 18 is a perspective view, from above and from the right, of a part of the apparatus of fig. 1, showing the example group of six mobile covering elements of fig. 17.

We must clarify that in the present description and in the claims the terms
15 vertical, horizontal, upper, lower, right, left, internal, external, high and low, with their declinations, have the sole function of better illustrating the present invention with reference to the drawings and must not be in any way used to limit the scope of the invention itself, or the field of protection defined by the attached claims.

20 DESCRIPTION OF A FORM OF EMBODIMENT OF THE PRESENT INVENTION

With reference to fig. 1, a mobile covering element 10 according to the present invention, for a covering apparatus 11, which preferably is an adjustable sunshade, comprises an oblong main body 12 having a longitudinal axis X. The
25 covering apparatus 11 has a covering plane PC (figs. 2, 4, 7, 10 and 17), parallel to, or coinciding with, the longitudinal axis X. For example, the covering plane PC is horizontal.

By way of example, the mobile covering element 10 shown from above substantially has the shape of a rectangle and comprises two lateral edges 13 and
30 14 (fig. 4), parallel to each other and perpendicular to the longitudinal axis X. In this specific case, the mobile covering element 10 preferably has a length L comprised between about 1 m and about 6 m, for example 4 m, and a width Z1 (fig. 5) comprised between about 100 mm and about 350 mm, for example 250

mm.

The main body 12 is preferably made with a metal section bar having a substantially box-like structure, has a height S comprised between about 10 mm and 40 mm, for example about 20 mm, and comprises a lower wall 15, an upper wall 16, parallel to the lower wall 15, a first longitudinal flank 17, which in this specific case is substantially parallel to the longitudinal axis X and substantially perpendicular to the walls 15 and 16, and a second longitudinal flank 18, also in this specific case substantially parallel to the longitudinal axis X, but slightly inclined toward the outside starting from the lower wall 15 toward the upper wall 16.

According to a variant, not shown in the drawings, the first longitudinal flank 17 and the second longitudinal flank 18 could be freely inclined with respect to the longitudinal axis X, that is, they could have a broken, or curved, development with respect to the direction of the longitudinal axis X.

The lower wall 15 of the main body 12 has a lower surface 19, which has the same length L as the mobile covering element 10, but a width Z2, which is less than the width Z1 of the entire mobile covering element 10. Preferably the width Z2 of the lower surface 19, which is substantially equal to a pitch PE (fig. 10) between two identical and adjacent mobile covering elements 10, is comprised between about 70 mm and about 300 mm, and is for example 200 mm.

In the example provided here, the lower surface 19 is completely flat, even if, according to a variant of the present invention, not shown in the drawings, but easily understandable for a person of skill in the art, the same lower surface 19 could have an undulating development, or be shaped differently, in any other way whatsoever, having an aesthetic function both for each individual mobile covering element 10, and also for the set of mobile covering elements 10 of the covering apparatus 11, particularly when all the lower surfaces 19 lie on the covering plane PC and are therefore visible from below.

Adjacent to the first longitudinal flank 17 and parallel to the longitudinal axis X there is made a longitudinal containing compartment 20, which is configured to collect rainwater that can fall on the main body 12 itself, particularly on the upper wall 16. Specifically, the longitudinal containing compartment 20 is defined by the first longitudinal flank 17, by the terminal part of the lower wall

15 which extends toward the outside beyond the latter (that is, toward the right in fig. 9), by a lateral wall 21, slightly inclined toward the upper wall 16 and having in its upper part a first longitudinal protuberance 22, facing toward the upper wall 16 and provided, in its upper part, with a first longitudinal seating 23, in which a first packing 24 is disposed, which preferably extends for the entire length L of the main body 12.

The longitudinal containing compartment 20 is completed by a second longitudinal protuberance 25, which is integral with the first longitudinal flank 17, is parallel to the upper wall 16, is located at a slightly higher level with respect to the latter and faces the lateral wall 21 (that is, toward the left in fig. 9), so that between the two longitudinal protrusions 22 and 25 there is defined an upper longitudinal aperture 26, which is also, in this specific case, substantially parallel to the longitudinal axis X.

The second longitudinal protuberance 25 is provided, in its upper part, with a second longitudinal seating 27, in which a second packing 28 is disposed, which also extends preferably for the entire length L of the main body 12.

At the level of the second longitudinal protuberance 25, toward the upper wall 16, there is a longitudinal ridge 29, which defines a first longitudinal wall which extends perpendicularly to the latter for the entire length L of the main body 12 and has the upper end at a determinate first height H1, for example from about 3 mm to about 6 mm from the upper wall 16 itself. The second longitudinal seating 27 and the longitudinal ridge 29 define a longitudinal cavity 30 substantially parallel to the longitudinal axis X.

Inside the longitudinal containing compartment 20, at the corner between the lower wall 15 and the lateral wall 21, a first pivoting seating 31 is made, coaxial with the longitudinal axis X, and configured to house a first pin 32 (figs. 11 and 14) of an actuation mechanism 33, of the pantograph type, which will be described in detail below.

The main body 12 also comprises a first reinforcement rib 34 (fig. 9) which is substantially made in its middle zone, between the longitudinal lateral flanks 17 and 18, perpendicular to the lower wall 15 and to the upper wall 16. In continuation of the first reinforcement rib 34, beyond the upper wall 16, a second longitudinal wall 35, or partition, is made which in the example provided here

has an arched shape and also acts as a second reinforcement rib. The second longitudinal wall 35 has a determinate second height H2, for example from about 3 mm to about 6 mm, which inside it forms a second pivoting seating 36, parallel to the longitudinal axis X, and configured to house a second pin 37 (figs. 11 and 14) of the actuation mechanism 33. For example, the first height H1 and the second height H2 can be the same.

Furthermore, the mobile covering element 10 comprises a longitudinal lateral appendix 38 (fig. 9) disposed adjacent to the second longitudinal flank 18 of the main body 12 (that is, toward the left in fig. 9), parallel to the longitudinal axis X and integral with the main body 12 itself, in order to cooperate, during use, with the longitudinal containing compartment 20 of another mobile covering element 10 identical and adjacent to it, as will be described in detail below. In particular and advantageously, the longitudinal lateral appendix 38 is positioned, at least for a part, but preferably wholly, above the bulk of the main body 12, that is, outside and higher than the upper wall 16 thereof.

The longitudinal lateral appendix 38 also advantageously has a substantially box-like structure which contributes to the strength of the entire mobile covering element 10.

In particular, in the example provided here, the longitudinal lateral appendix 38 comprises an upper wall 39, parallel to the upper wall 16 of the main body 12, a lower wall 40, shaped so as to have a first zone 40a and a second zone 40b parallel to the upper wall 39, but disposed on slightly offset levels, that is, with the second zone 40b closer to the upper wall 39 than the first zone 40a.

Furthermore, the longitudinal lateral appendix 38 comprises an external lateral wall 41 (that is, toward the left in fig. 9), which connects the second zone 40b of the lower wall 40 to the upper wall 39, and an internal lateral wall 42 (that is, toward the right in fig. 9), which connects the lower wall 16 of the main body 12 to the upper wall 39. In the example provided here, the two walls, external 41 and internal 42, of the longitudinal lateral appendix 38 converge slightly toward the upper wall 39 of the latter.

We must point out that, in this way, the upper wall 16 of the main body 12, the longitudinal ridge 29, the second longitudinal wall 35 and the internal lateral wall 42 of the longitudinal lateral appendix 38, together form two upper longitudinal

compartments 16a and 16b, which facilitate the outflow toward the lateral edges 13 and 14 of what can possibly be deposited on the upper wall 16, in particular water, and prevent the formation of a single pool of water at the center of the upper wall 16 itself when the mobile covering element 10 is in a covering position, that is, with its lower surface 19 lying on, or parallel to, the covering plane PC.

The first zone 40a and the second zone 40b of the lower wall 40 of one mobile covering element 10 are configured to cooperate, during use, respectively with the first packing 24 (fig. 10) and with the second packing 28 of another mobile covering element 10 identical and adjacent to it, as will be described in detail below.

By way of example, the external surface of the upper wall 39 of the longitudinal lateral appendix 38 is located at a distance D from the upper wall 16 of the main body 12, which is equal to, or greater than, the height S of the latter, and is for example from 20 mm to 25 mm.

Furthermore, the longitudinal lateral appendix 38 also comprises a first lower protuberance 43 (fig. 9), which acts as a drip-guard element, in continuation of the external lateral wall 41 starting from the first zone 40a (that is, downward in fig. 9), and a second lower protuberance 44 which extends toward the outside between the two zones 40a and 40b of the lower wall 40 and which also acts as a drip-guard element. The two lower protuberances 43 and 44 define a longitudinal recess 45, parallel to the axis X, which develops for the entire length L of the mobile covering element 10.

In particular, the first lower protuberance 43 and the second lower protuberance 44 of a mobile covering element 10 are configured to cooperate with the longitudinal cavity 30 (fig.10) and, respectively, with the upper longitudinal aperture 26 of another mobile covering element 10 identical and adjacent to it, as will be described in detail below, and act as barriers against the passage of water, or other, when the mobile covering elements 10 are in the covering position.

In addition, the longitudinal lateral appendix 38 comprises a third reinforcement rib 46 disposed substantially parallel to the internal lateral wall 42, in continuation of the second longitudinal flank 18 of the main body 12. This

geometry defines another box-like structure, substantially vertical, or slightly inclined, as in the example provided here, which, in cooperation with the box-like structures of the main body 12 and the longitudinal lateral appendix 38 previously described, actively participates in the structural flexural rigidity of the mobile covering element 10.

Inside the longitudinal lateral appendix 38, at the corner formed by its upper wall 39 and by the third reinforcement rib 46, a third pivoting seating 47 is made, parallel to the longitudinal axis X, and configured to house a third pin 48 (figs. 11 and 14) of the actuation mechanism 33.

Preferably, the longitudinal lateral appendix 38 is made in one piece, or in a single body, with the main body 12.

Indicatively, a mobile covering element 10 of the embodiment described heretofore, with a length L of 4 m, a width Z1 of about 250 mm and a height S of 20 mm, has a weight of about 132 N and, with an average distributed load of about 700 N/m², flexes in the center only by less than 3 mm, that is, less than the height H1 of the longitudinal ridge 29 and the height H2 of the second reinforcement rib 35.

The covering apparatus 11 (figs. from 1 to 8 and from 11 to 18) comprises a support structure 50, which in the example provided here comprises an upper frame which defines the covering plane PC and is made up of, in the example provided here, two lateral crosspieces 51 and 52, parallel to each other and perpendicular to the longitudinal axis X, which are connected to each other by a front longitudinal beam 53 and by a rear longitudinal beam 54, parallel to the longitudinal axis X. Advantageously, at least the rear longitudinal beam 54 is internally hollow. Four vertical uprights 55 are configured to support the support structure 50 and the corresponding covering plane PC at a determinate height from the floor, or from the ground, for example about 3 m. Advantageously, also at least one of the vertical uprights 55 is internally hollow and comprises, or acts as, a vertical channel for the discharge of the water which possibly falls from above onto the mobile covering elements 10 of the covering apparatus 11, when they are in the covering position.

Associated with the lateral crosspieces 51 and 52, and with the front longitudinal beam 53 and rear longitudinal beam 54 there are four channels, or

gutters, 56, 57, 58 and 59 respectively (figs. from 1 to 7), which are disposed just below the covering plane PC and substantially parallel to it. In particular, the position of the two channels 56 and 57 associated with the lateral crosspieces 51 and 52 (fig. 4) is such that the two lateral edges 13 and 14 of each mobile
5 covering element 10 are positioned in the center of them. The four channels 56, 57, 58 and 59 are fluidly connected to each other and to the vertical discharge channel by means of discharge holes 60.

The support structure 50 supports a plurality of mobile covering elements 10, the number of which can vary up to more than twenty, although in the example
10 provided here (figs. from 1 to 8 and from 10 to 18) only six are shown, as a function of the needs of the users of the covering apparatus 11 and the sizes of each mobile covering element 10.

In particular, all the mobile covering elements 10 are guided slidingly on the two lateral crosspieces 51 and 52 and can move together in a direction
15 perpendicular to the longitudinal axis X, in both directions, between an inactive position (figs. from 1 to 4 and from 11 to 13), in which the mobile covering elements 10 are packed toward the rear longitudinal beam 54 and occupy a minimum space, and a covering position (figs. from 6 to 8, 10, 17 and 18), in which the mobile covering elements 10 are parallel to the covering plane PC,
20 with their lower surfaces 19 of the respective main bodies 12 which are coplanar with each other and with the covering plane PC itself, passing through a plurality of intermediate positions (figs. from 14 to 16).

This is possible thanks to the fact that the mobile covering elements 10 are connected to each other by means of the actuation mechanism 33, in order to
25 form a pantograph connection with the latter, known in the state of the art. We must clarify that the actuation mechanism 33 can be of any known type whatsoever, or which will be developed in the future, and is not included in the present invention.

In the example provided here, indicatively, the actuation mechanism 33
30 comprises two groups of connection levers 61, of rectilinear shape, equal to each other and associated with each of the two lateral crosspieces 51 and 52, and a command device 52, which in turn comprises an electric motor 63, for example installed inside a service beam associated with the rear longitudinal beam 54,

which is connected to a pair of transmission belts 65, each disposed on a corresponding lateral crosspiece 51 and 52, and parallel thereto. The transmission belts 65 are connected to the mobile covering element 10 furthest away from the rear longitudinal beam 54 itself.

5 Each connection lever 61, apart from the end ones, which are reduced by half, is connected at the lower part to the first pin 32 of a mobile covering element 10, in an intermediate zone to the second pin 37 of a mobile covering element 10 adjacent to the first, and at the upper part to the third pin 48 of another mobile covering element 10 adjacent to the second. Rotatable casters 66, slidable on
10 guides of the lateral crosspieces 51 and 52, are associated on both sides with the first pins 32 of the mobile covering elements 10, in order to reduce to the minimum the friction during the movements of the latter between their inactive and covering positions.

The functioning of the covering apparatus 11 which uses the mobile covering
15 elements 10 according to the present invention is very simple and substantially of the known type. In fact, by commanding the electric motor 63 all the mobile covering elements 10 are displaced between their inactive and covering positions.

We must point out that, advantageously, thanks to the shape and strength of each mobile covering element 10, in the inactive position the set of packed
20 mobile covering elements 10 (figs. from 1 to 4 and from 11 to 13), thanks also to the partial overlap of each longitudinal lateral appendix 38 with the main body 12 of an adjacent mobile covering element 10, occupies a very small space, in the range of about 20 mm for each element, that is, substantially half of the bulk with respect to the solutions of the state of the art, to the benefit of the extension of the
25 area open to the sky in the inactive position, with the same covering surface.

We must also point out that the longitudinal ridge 29, when the mobile covering element 10 is in the covering position, that is, with the upper wall 16 horizontal, prevents water from freely entering into the longitudinal containing compartment 20 and, therefore, it reduces to a minimum the risk that water can
30 accidentally spill over the longitudinal containing compartment 20 itself, filtering and falling through the groove defined between two adjacent mobile covering elements 10. This barrier effect against the flow of water is emphasized by the cooperation between the longitudinal ridge 29 and the two lower protuberances

43 and 44 of an adjacent mobile covering element 10.

We must also point out that, advantageously, in the covering position (figs. from 6 to 8, 10, 17 and 18), the longitudinal lateral appendix 38 (fig. 10) of each mobile covering element 10 covers, completely and in a perfectly hermetic manner, both the upper longitudinal aperture 26 of the longitudinal containing compartment 20, and also the first lateral flank 17 of an adjacent mobile covering element 10. In particular, the water that falls from above is naturally conveyed toward the lateral edges 13 and 14 (fig. 4) and from there it falls into the channels 56 and 57 below. Furthermore, the same water encounters two vertical barriers, consisting of the second reinforcement rib 35 (fig. 10), for the water that falls between the latter and the longitudinal lateral appendix 38, and the longitudinal ridge 29, for the water that falls between the latter and the second reinforcement rib 35. The same water, thanks also to the presence of the two packings 24 and 28 and to the lower protuberances 43 and 44, therefore cannot fall into the zone underneath the covering apparatus 11.

Furthermore, in the transition between the covering position (figs. from 6 to 8, 10, 17 and 18) and the inactive position (figs. from 1 to 4 and from 11 to 13), that is, in any intermediate position whatsoever, exemplified in figs. from 14 to 16, any water left on the upper wall 16 of each mobile covering element 10 would not fall below, but would be conveyed toward its lateral edges 13 and 14 (fig. 4) and the longitudinal containing compartment 20 (figs. 14, 15 and 16).

Furthermore, another advantage of the present invention is that, in the covering position, the set of the mobile covering elements 10 coplanar with each other (figs. 3, 4, 13, 14 and 15) guarantee a perfect, or almost perfect, flatness and a lower surface that is flat, or shaped differently, and substantially without a break in continuity, apart from the thin grooves between one mobile covering element 10 and the adjacent ones.

In addition, the set of mobile covering elements 10 has a much lower weight than those of the state of the art, with the same flexural inertia and covering surface, so that there are reduced production costs and the possibility of using less powerful drive motors, with all the advantages that follow.

It is clear that modifications and/or additions of parts may be made to the mobile covering element 10 for a covering apparatus 11, preferably an adjustable

sunshade as described heretofore, without departing from the field and scope of the present invention.

It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be
5 able to achieve many other equivalent forms of mobile covering elements for a covering apparatus, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

CLAIMS

1. Mobile covering element (10) for a covering apparatus (11), preferably an adjustable sunshade, comprising a main body (12) with an oblong development, having a longitudinal axis (X), a first lateral edge (13), a second lateral edge (14) opposite said first lateral edge (13), a first longitudinal flank (17), a second longitudinal flank (18) opposite said first longitudinal flank (17), a lower wall (15) having a lower surface (19), disposed, in a covering position of the mobile covering element (10), on a covering plane (PC), parallel to or passing through said longitudinal axis (X), and an upper wall (16) disposed substantially horizontal in said covering position, **characterized in that** it also comprises conveying means (29, 35, 42) configured to facilitate the outflow toward said lateral edges (13, 14) of what could possibly be deposited on said upper wall (16), in particular water, when the mobile covering element (10) is in said covering position.
2. Mobile covering element (10) as in claim 1, also comprising a longitudinal containing compartment (20), disposed in correspondence with said first longitudinal flank (17) and having an upper longitudinal aperture (26), **characterized in that** said conveying means comprise a first longitudinal wall (29), disposed on said upper wall (16) in correspondence with said first longitudinal flank (17) and before said upper longitudinal aperture (26) of said longitudinal containing compartment (20).
3. Mobile covering element (10) as in claim 2, **characterized in that** said first longitudinal wall (29) extends perpendicularly to said upper wall (16) from said first lateral edge (13) to said second lateral edge (14), and has the shape of a ridge having the upper end at a determinate first height (H1), preferably comprised between about 3 mm and about 6 mm from said upper wall (16).
4. Mobile covering element (10) as in claim 1, 2 or 3, **characterized in that** said conveying means comprise a second longitudinal wall (35) disposed on said upper wall (16) in an intermediate position between said first longitudinal flank (17) and said second longitudinal flank (18).
5. Mobile covering element (10) as in claim 4, **characterized in that** said second longitudinal wall (35) extends perpendicularly to said upper wall (16) from said first lateral edge (13) to said second lateral edge (14) and has its upper end at a

determinate second height (H2), preferably comprised between about 3 mm and about 6 mm from said upper wall (16).

6. Mobile covering element (10) as in any of claims 2, or 3, and 4, or 5, also comprising a longitudinal lateral appendix (38), disposed in correspondence with
5 said second longitudinal flank (18), outside and in continuation of said main body (12), **characterized in that** said conveying means comprise an internal lateral wall (42) of said longitudinal lateral appendix (38), which rises from said upper wall (16), in correspondence with said second longitudinal flank (18), so that said upper wall (16), said first longitudinal wall (29), said second longitudinal wall
10 (35) and said internal lateral wall (42) together form two upper longitudinal compartments (16a, 16b), which facilitate said outflow toward said lateral edges (13, 14) and prevent the formation of a single pool of water at the center of said upper wall (16) when the mobile covering element (10) is in said covering position.

15 7. Mobile covering element (10) as in claim 6, **characterized in that** said longitudinal lateral appendix (38) is positioned at least partly, preferably wholly, above the bulk of said main body (12).

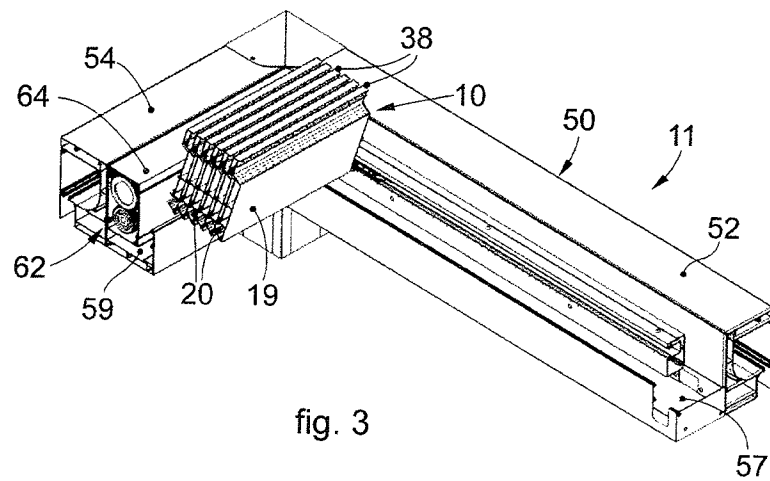
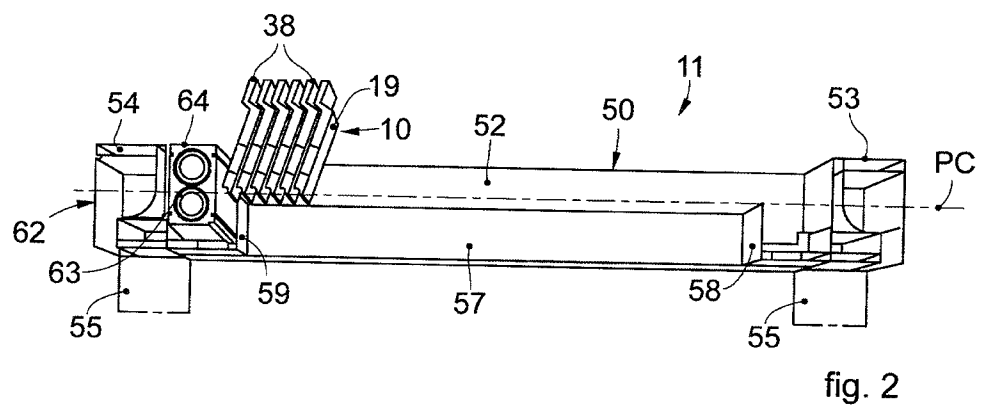
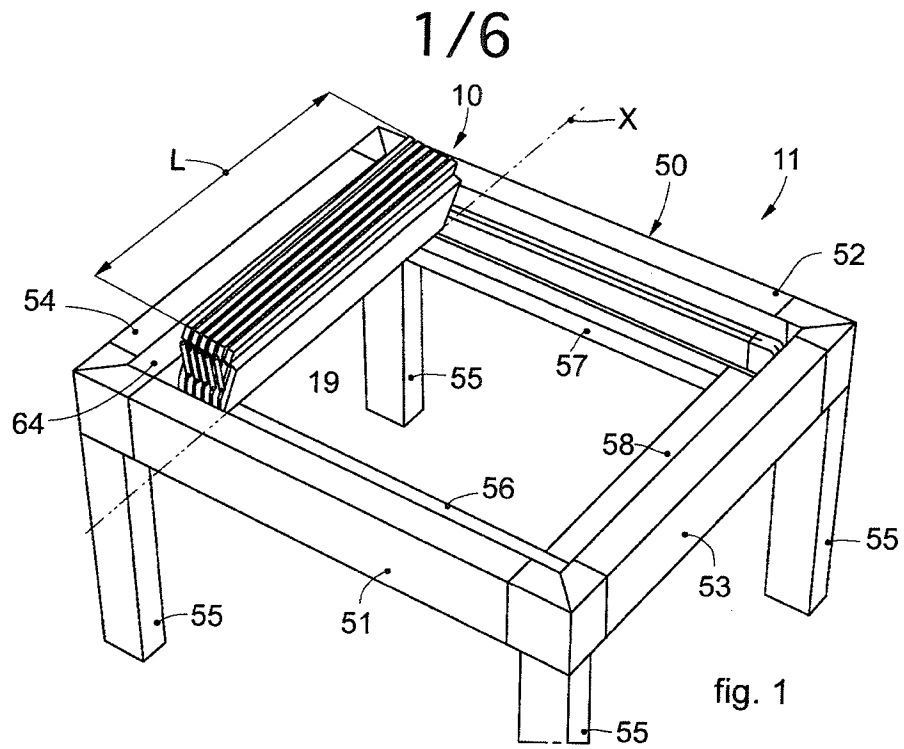
8. Mobile covering element (10) as in any claim from 2 to 7, **characterized in that** said longitudinal containing compartment (20) is substantially defined by
20 said first longitudinal flank (17), by a terminal part of said first lower wall (15) and extends outward beyond said first longitudinal flank (17), and by a lateral wall (21), which together with the latter defines said upper longitudinal aperture (26).

9. Mobile covering element (10) as in claim 8, **characterized in that** said lateral wall (21) of said longitudinal containing compartment (20) has in its upper part a
25 first longitudinal protuberance (22), facing said longitudinal containing compartment (20) and provided, in its upper part, with a first longitudinal seating (23), in which a first packing (24) is disposed, which preferably extends for the entire length of said main body (12).

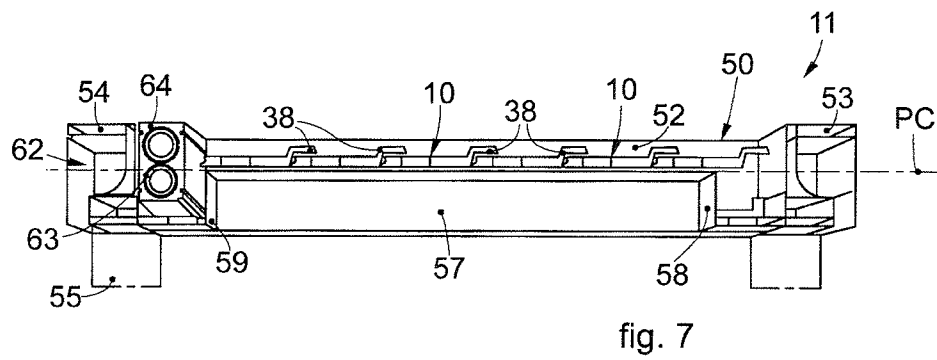
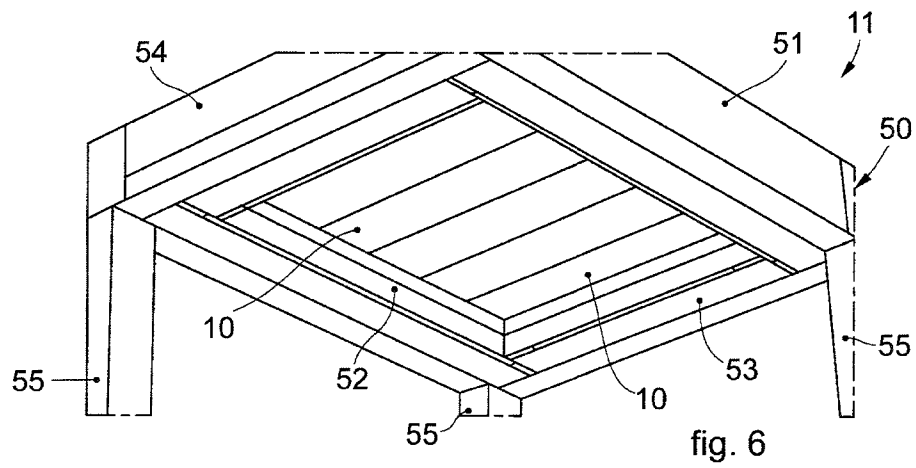
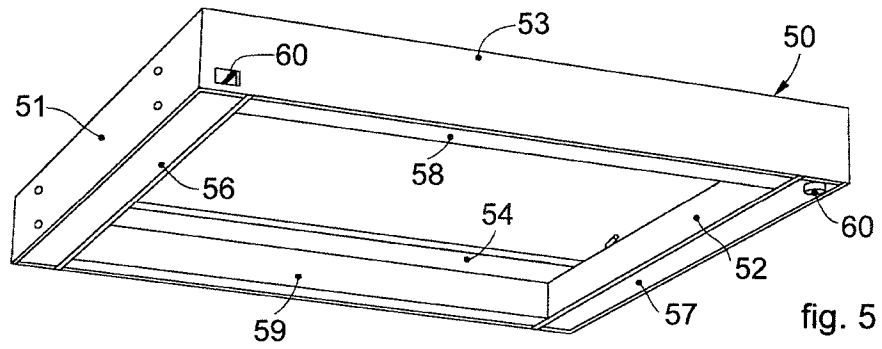
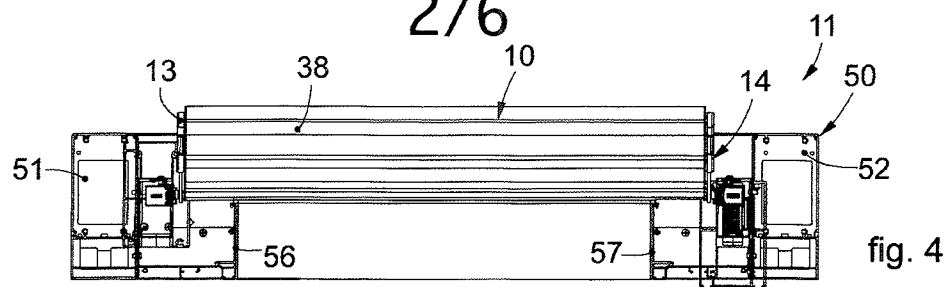
30 10. Mobile covering element (10) as in claim 9, **characterized in that** it also comprises a second longitudinal protuberance (25) integral with said first longitudinal flank (17), facing said longitudinal containing compartment (20) and provided, in its upper part, with a second longitudinal seating (27), in which a

second packing (28) is disposed, which also preferably extends for the entire length of said main body (12).

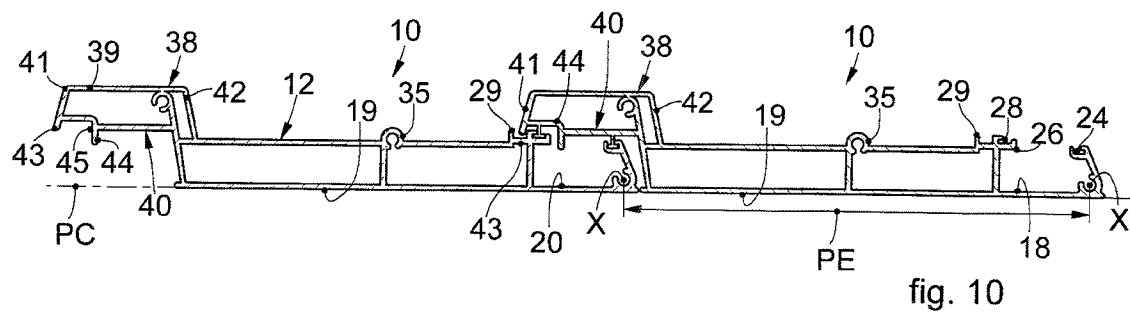
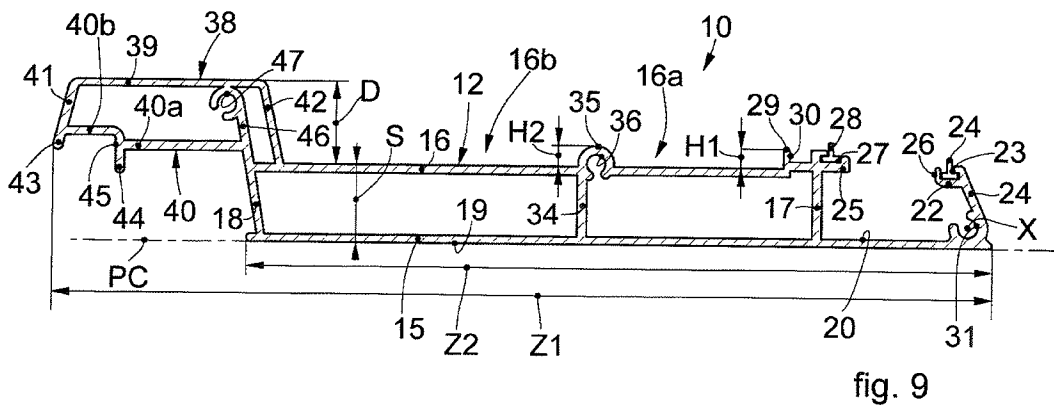
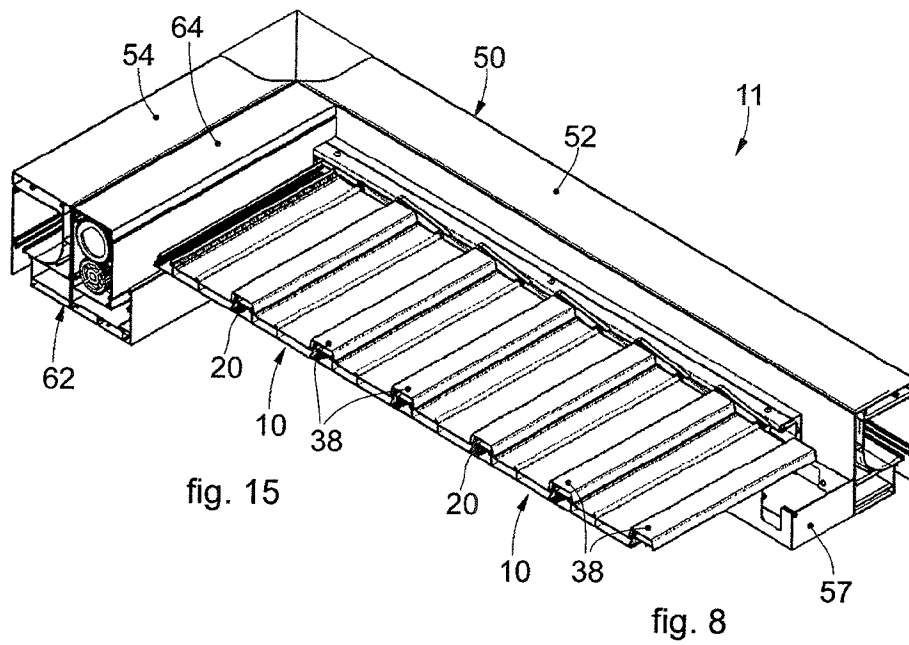
11. Mobile covering element (10) as in claim 6 or 7 and 10, **characterized in that** said second longitudinal seating (27) and said first longitudinal wall (29) define a longitudinal cavity (30) between them **and in that** said longitudinal lateral appendix (38) comprises a first lower protuberance (43) and a second lower protuberance (44) which define a longitudinal recess (45), **and in that** said first lower protuberance (43) and said second lower protuberance (44) are configured to act as drip-guard elements, in cooperation with said longitudinal cavity (30) and, respectively, with said upper longitudinal aperture (26) of another mobile covering element (10) identical and adjacent thereto, of said covering apparatus (11), when said mobile covering elements (10) are in said covering position.



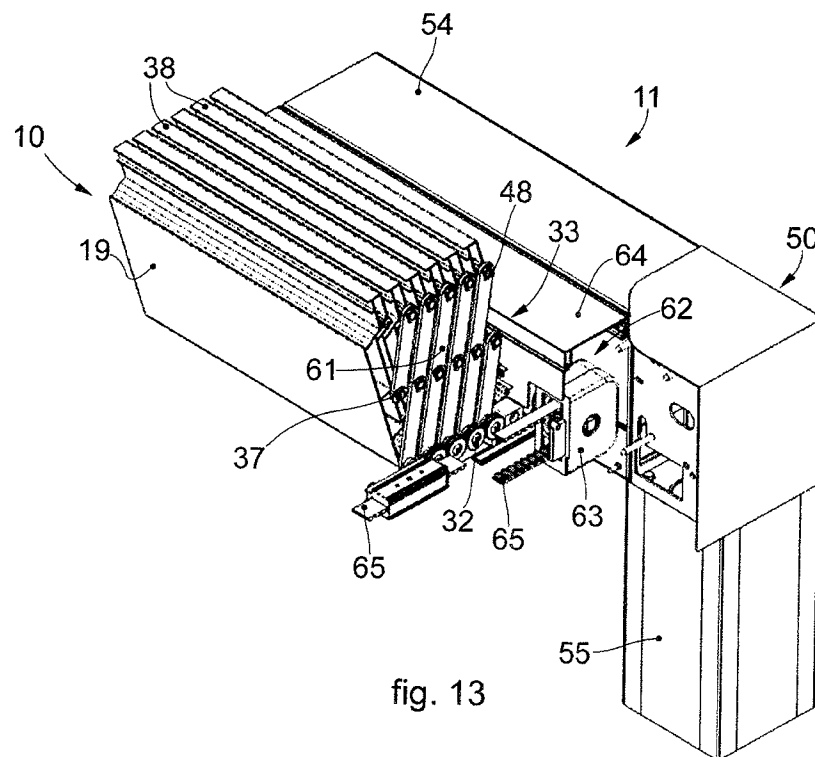
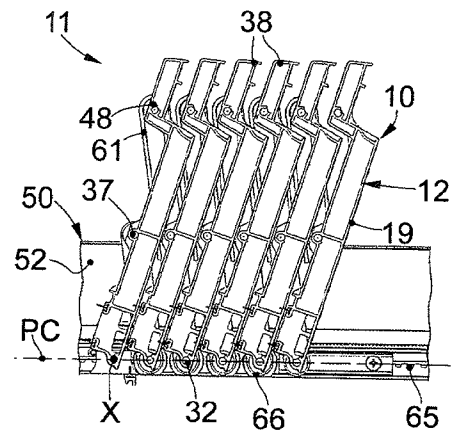
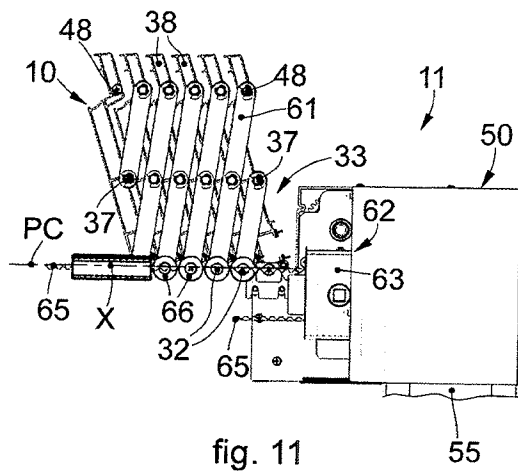
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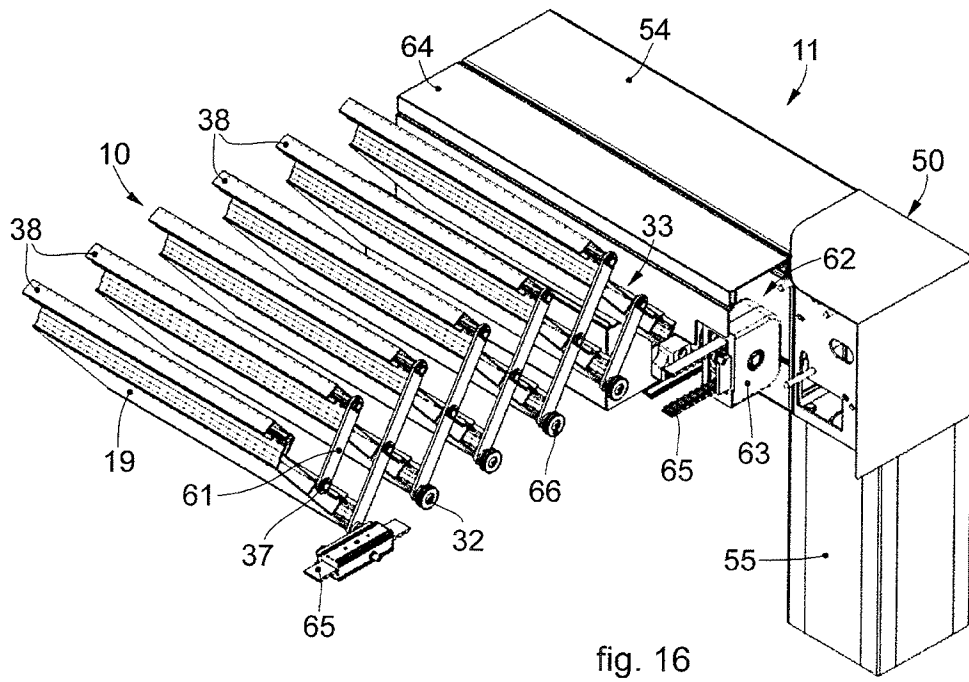
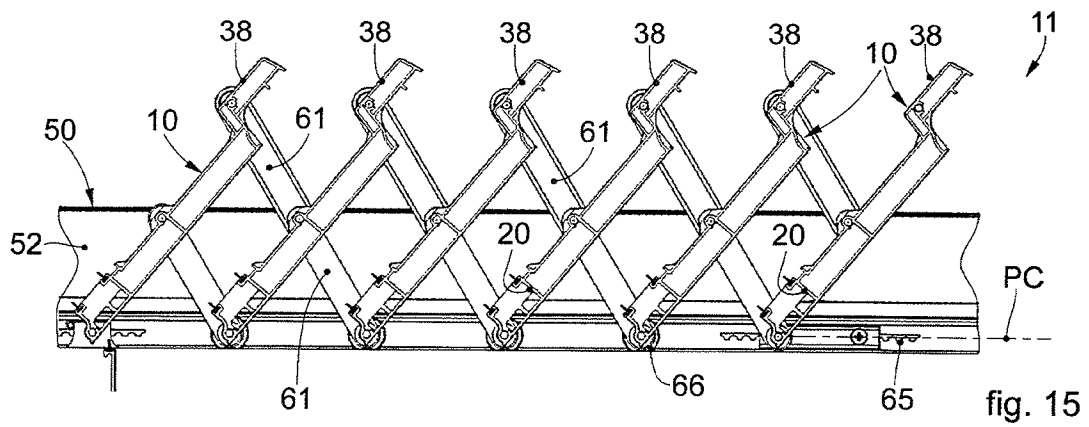
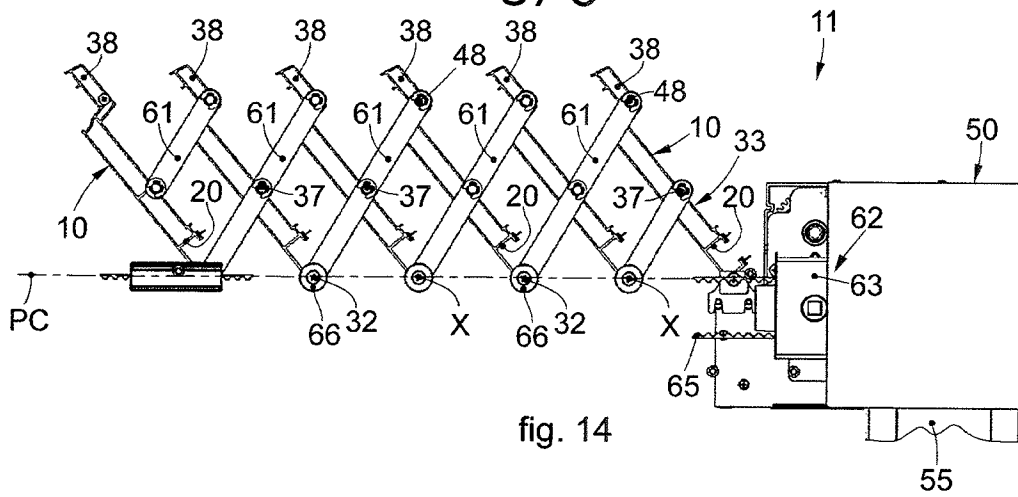
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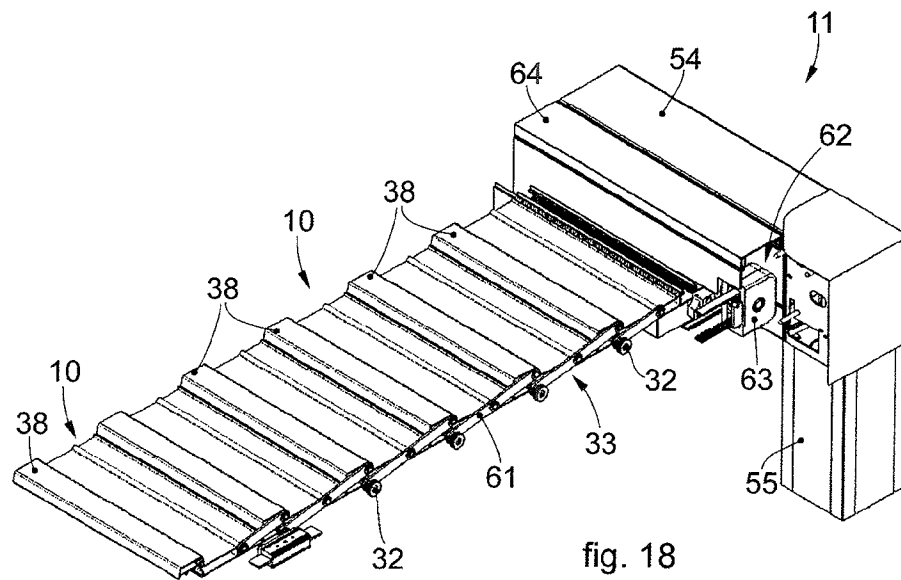
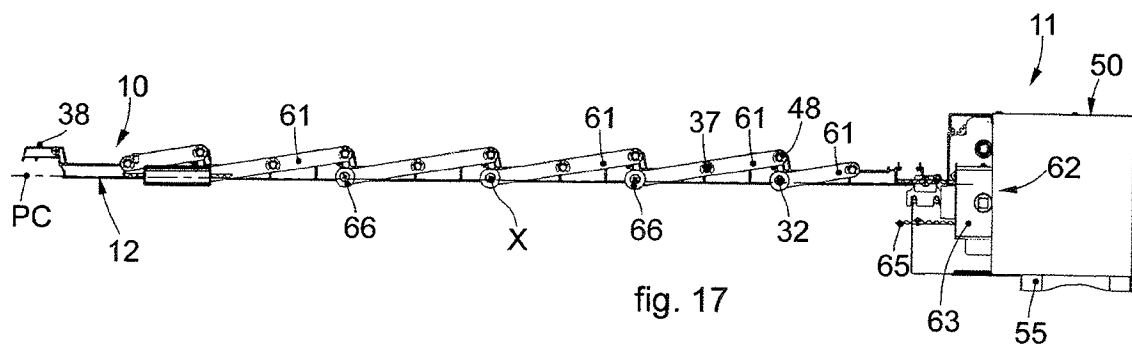
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INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2019/050267

A. CLASSIFICATION OF SUBJECT MATTER
INV. E04F10/10
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E04F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2015/063699 A1 (RENSON SUNPROT SCREENS NV [BE]) 7 May 2015 (2015-05-07)	1-3
A	page 1, lines 1-10, 20-26; figures 1-4 page 8, line 6 - page 9, line 8 page 10, line 21 - page 11, line 7 -----	4-11
X	DE 10 2016 117772 A1 (GRIMMEISEN JUERGEN [DE]) 22 March 2018 (2018-03-22)	1
A	figures 1, 3-5 paragraphs [0001], [0016], [0049] - [0064], [0106], [0107] -----	2-11
X	EP 2 366 846 A2 (FRIGERIO TENDE DA SOLE S R L [IT]) 21 September 2011 (2011-09-21)	1
A	figures 1-4 paragraphs [0008] - [0013], [0015] - [0033] -----	2-11



Further documents are listed in the continuation of Box C.



See patent family annex.

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

11 March 2020

Date of mailing of the international search report

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Altamura, Alessandra

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IT2019/050267

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