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(54) **FOLDING MOTOR-DRIVEN ROOF**

(57) The invention relates to an assembly consisting of base tracks inside which a drag chain moves and in the bottom part of which the tracks for the sheets, in the form of a "J", are attached along the entire length thereof, inside of which tracks the bearings of the guide shoes, which serve to guide the sheets as they move and fold, are housed. Drag tracks are provided on the upper part of the body of the base track, forming a "C" inside which a drag piece, on which the drag shaft is threaded, is housed and moves, a tube soldered to the drag track being attached to the upper part of said drag shaft, providing the seat for angle as a drip stopper and some neoprene bands. The lateral part of the track serves as a wall for channeling water.

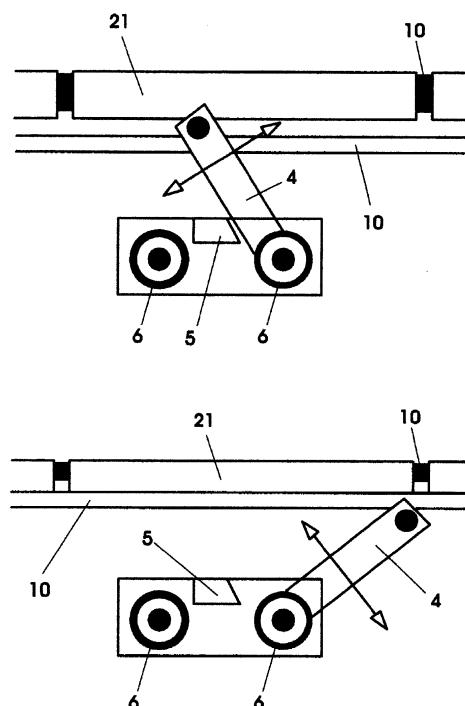


FIG. 6

Description

PURPOSE OF THE INVENTION

[0001] The present invention is a transparent covering that can be used as a roof for porches, patios, or other exterior spaces where it is desirable for the space to be covered or uncovered depending upon the season or the weather conditions, as well as to allow smoke to escape in the event of an emergency in shopping centers or metro station entrances, and even to allow firefighters to enter or exit in the event of a fire. This invention provides important improvements for this type of covering, allowing previously unresolved problems to be solved and incorporating significant advantages over existing designs. The first novelty consists of having developed a foldable system that allows the sheets of the covering to be stood up vertically on their guides in an accordion-like manner when opening. This design also causes the sheets to be lifted as they move towards the edge of the covering's opening on their guides, in this way achieving an extraordinary reduction in the space occupied once the covering is opened. The result is a full, clear opening without obstacles.

[0002] The disadvantage that is overcome by this novelty is that in existing coverings a considerable amount of space on the roof remains unopened even when the sheets are fully opened, since they open in a telescopic manner by overlapping each other.

[0003] The sheets of the covering that is the subject of this invention are supported on their guides by sliders with bearings, which ensures that the movement takes place smoothly, and these bearings also have a nylon strip as a roller track that minimizes the noise derived from the movement. This has solved problems caused by friction, rubbing, and wear on parts caused by sliding of the sheets without bearings. In addition, in existing coverings pads are positioned under the friction guides to obtain good isolation, with all of the weight of the sheets resting on the pads, which as a result causes the sheets to become blocked after a short length of time or simply to stop moving because of the stiffness of the pads. Furthermore, in existing coverings the maximum width of the sheets cannot be greater than 130 cm, since beyond this width the weight of the sheets would impede their movement over the pads. This is one of the most pronounced drawbacks since in order to cover a patio that is, for example, 6 meters in length and 4 meters wide, 3 guides would have to be mounted crossing the roof over the patio, plus 2 more that would have to be attached to the wall, and 3 sheets would also have to be used, 2 of which would be movable and 1 fixed, allowing only 60% of the space to be opened.

[0004] The proposed invention has its field of application in the roof covering construction industry and particularly in the production of foldable motorized coverings.

[0005] This section of the technical specifications emphasizes the developments that are effective and spe-

cifically dedicated to the function in question. These have allowed the creation of a system with simple installation, low costs, and results that can be appreciated technically. The characteristics of the system proposed in this invention are perfectly adapted to their purpose, contributing a novel, unified, and simple design to the state of the art that allows benefits in manufacturing, execution, and assembly, as well as in performance.

10 PRIOR ART FOR THE INVENTION

[0006] The documents cited below reflect the state of the art, although none of these negatively affect the novelty or inventive activity of the patent being applied for since they involve solutions for problems related to movement of the sheets on beam tracks, guide sliders, or guide tracks as well as systems for opening by telescopic action or overlapping, which are solutions that in reality bring up problems themselves that must be solved in another manner.

[0007] As such, document ES 1 015 514 U 6 refers to a movable enclosure for roofs, which consists of a framework structure made of transversely attached metal tracks, a rear one mounted in a fixed location and a front one that also functions as a rain collection gutter, as well as at least two longitudinal beam tracks, a plurality of covering plates, each with at least two guide sliders for movement along said longitudinal beam tracks, stoppage devices, movement limiters, and pulling devices that operate manually or automatically by achieving the guided movement of the covering plates.

[0008] In comparison with the invention, that is the subject of this application, the one cited above moves the covering plates along track beams by means of guide sliders rather than on bearings, and the plates do not fold but rather remain horizontal. The drawbacks of this system are that this movement without bearings ends up producing jamming, sticking, and breakage, and since the plates do not fold, the total opening surface is excessively reduced.

[0009] Document ES 1 004 672 U 8 refers to outdoor covering and protection elements that consist of a roof designed to be mounted on metal frameworks and/or on metal auxiliary structures, whether these may be made of lightweight bars or tubes. These elements can be adapted in each case to the various activities to be protected and covered from inclement weather, with the covering sheet that constitutes the roof itself being made of plastic, canvas, or fabric. This is mounted on its own structure formed by supports that are essentially composed of three posts in the inner sections and by four posts in the outer sections of the covering, as well as by straps or tensioners, slings, and accessories for joining, anchoring, attaching, and tightening. On each support of the structure itself the upper end of the main vertically positioned post contains an attachment accessory and on its lower part is free and includes one or two feet that are coupled to the supporting framework or auxiliary

structure. This central vertical post has some attached parts that allow the joining and articulation of two or three other posts, depending on whether it is an inner support or end support, which make up this structure itself. One of the cited posts is polygonal in cross-section and takes a horizontal position, and it contains a T-shaped element made up of metal bars. One of these is horizontal and polygonal in cross-section, and it slides along this horizontal post in order to adapt to the various widths of the supporting framework or auxiliary structure. The other bar of the T-shaped element, the vertical one, represents the other foot that is also attached to the supporting framework or auxiliary structure. This vertical element is made up of two parts (upper and lower), with the upper one attached to the horizontal polygonal element and threaded into the lower part, which is coupled to the framework or auxiliary structure. Since this lower part is threaded, it can be rotated and tightened against the horizontal post to fix the T-shaped element in the desired position. The two mentioned feet, the one for the vertical post and the one belonging to the movable T-shaped element, are joined to the two upper ends of the supporting framework or auxiliary structure using pins or clamps connected to those used in the frameworks. The free end of the horizontal polygonal post also has an attachment accessory attached to it like the rest of the other posts. The third post of each support for each inner section, which is located on the same plane as the central vertical post and the polygonal horizontal post, is also joined to the central vertical post using the above-mentioned articulation, which allows it to form the appropriate angle with respect to the central vertical post in order to give the covering sheet the most appropriate slope or slopes. The fourth post of each support for each outer section is also joined and articulated to the central vertical post, forming an angle with the plane that contains the other three posts of this end support. In the specific case where it is not possible to install this fourth post, it will be replaced by bars connected to the end support and to the first adjacent inner support, in order to perform the function of absorbing the forces transmitted by the straps or tensioners. The various posts for each support, whether inner or end posts, are connected and attached to each other using slings attached to a series of holes in the aforementioned attachment accessories, and they are in turn connected to the supporting framework or auxiliary structure using slings with safety rings, and are tightened using tensioning sleeves. The attachment accessories are made up of various elements, including a bar forming a strip or sheet with two holes used to anchor the slings and with a third hole that serves as a passage through which the straps or tensioners that join the various parts of the structure are passed, and which in turn support the covering and protection sheet; a part formed by a U-shaped bar welded to the above-mentioned strip and to the rest of the body of the attachment accessory, and to the overhanging circular edge to which are anchored or attached the safety rings located at the ends of the straps

or tensioners for each section between supports; a part made from a sheet or strip that rotates on a pin and which has an approximately circular shape that is eccentric with respect to the point of rotation. This last part is placed onto the pin itself and has an enlarged prolongation that serves as a handle for manual operation. Part of the edge of the circular area is also toothed in order to ensure better attachment to the strap or tensioner confined within the aforementioned tube due to the pressure exerted by a spring. The covering and protection sheet is attached to the straps or tensioners using rings, straps, or some other means, and there are some holes hanging from the front of these for tying and attaching them.

[0010] This involves a structure to mount a small hut that can be disassembled with a fixed roof, and its extraordinary complexity contrasts with the simplicity of the invention being applied for, which is very different from the one described above.

[0011] ES 2 220 858 T3 10 is a telescopic covering for spaces, which includes a series of covering elements that can be moved along longitudinal side sliding tracks, from an extended position where the area is covered towards a retracted position in which the covering occupies a reduced space, and vice-versa. The covering elements include a pair of front legs and a pair of rear legs that are coupled to the longitudinal side sliding tracks, with the pair of front legs having a transversal distance that is different from the overall transversal distance between the pair of rear legs. The cited covering elements are all identical to each other, and the longitudinal side sliding tracks, which are common to all of the covering elements, are a pair of parallel sliding tracks on each longitudinal side, with each side track including an inner track and an outer track formed in opposite sides of the side track. These tracks have areas running above them that are inclined and separated on the same side, in a manner such that the identical covering elements can be installed adjacent to each other and can overlap in the retracted position.

[0012] As with the above-cited document ES 1 015 514 U 6, the one analyzed here also has sliding tracks without bearings and thus with the drawbacks already mentioned, and the covering elements overlap when sliding, with the drawback versus the invention being applied for being in relation to leaving only a portion of the roof uncovered.

[0013] Document ES 1 021 106 U 8 refers to a structure for roof coverings that can be opened, of the type that incorporates a rear bar or back bar, from which emerge towards the front a plurality of track beams spaced an appropriate distance apart, and between which will move respective groups of covering plates that can be retracted or extended by sliding. The track beams converge at their front end with a front bar that also functions as a rain gutter, essentially characterized by the fact that both the side rail-beams, which only need to incorporate guides or runners on the inner face, and the intermediate track beams, with runners on both sides, are structured based

upon a single bar that is provided with as many channels or guides as there are covering plates moving between two track beams, and elongated opposite these guides into two parallel side partition walls, one of which ends in a small tucked-in channel with a concavity oriented towards the outside and with asymmetrical branches, while the other ends in a small rib that is limited in a rectangular manner towards the inside and susceptible to being locked into the cited channel of another identical bar when two of them are assembled opposite each other to form an intermediate track beam. There is a tubular housing located between these two bars that is able to receive a steel pipe to rigidify the intermediate track beam, while on each side track beam the outside of the bar described above receives a channeled cover that in turn contains another tubular housing for another steel pipe to rigidify the beam.

[0014] The same rail-runners from document ES 1 105 514 U 6 also appear here, although here they are called guide rails with their drawbacks as mentioned above, and with the problem of opening solved by mounting some plates above others.

[0015] ES 2 323 824 B1 describes a sliding roof that consists of a series of equal and parallel fixed bars made up of a central core and side branches distributed on both sides of the central core, between which channels located at various levels are defined, along with a series of fixed and movable plates made up of a framework consisting of a front bar and a rear bar, each with side bars, and a sheet of material that is preferably translucent or transparent, with the movable plate also containing means to move by rolling while being guided between the channels. The movement of a motor is transmitted to a joining piece by means of a toothed belt, which is linked to the lower movable plate in order to cause movement of the sliding roof in the direction of opening or closing. The movable plates are sized in order to allow their coupling between channels faced by fixed bars, parallel from the lower part of the roof without the means of rolling, and because the means of rolling each include supports, and are then coupled on the side to slide on the side bars of the movable plates, which incorporate horizontal wheels and vertical wheels that rotate in the channel of the fixed bar during movement of the movable plate.

[0016] The most important difference versus the invention that is the subject of this application is that in the patent analyzed there are fixed sheets and movable sheets, with the movable ones moving in the opening or closing direction on channels located at various levels, while in the invention being applied for the sheets fold as they are sliding. In addition, the constitution of its elements is very different.

[0017] In sum, no movable roof has been found in the state of the art that presents the advantages of the present invention nor that includes its manner of improving the performance of the opening and closing system for the covering.

DESCRIPTION OF THE INVENTION

[0018] The motorized foldable skylight that is the subject of the present invention is made up of a series of base guides where the body is formed by a hollow tube that has a pulling chain moving inside of it. The J-shaped guides for the sheets are found along the full length of the lower part of the body of these base guides, attached by rivets or other means of attachment. The bearings for the sliders are housed inside of these J-shaped guides, which serve as a guide for the sheets when they are moving and folding and which support the weight of the sliders and the sheets until the point when the covering is closed. Some C-shaped pulling guides are located on the upper part of the body of the base guide and these are joined to it by welding or some other means of attachment. A pulling piece is housed and moves in their interior, into which the pulling shaft is threaded, which has on its upper part a welded pipe attached to the pulling guide for seating of an angled part that serves as a drip guard to prevent any water flow into the interior, and with some neoprene strips also installed on this angled part to ensure that the covering is watertight. The side part of the guide serves as a wall for channeling the rainwater or natural condensation collected by the covering.

[0019] Some L-shaped drainage gutters are located on the side of the guide base body and are made up of a tube at the base and a tube on the side, which prevent water flow from causing wetness inside the home or shop and with the start-up ramps, opening ramps, and rear stopping pieces for the sheets housed in the interior, and with the sheet closure stopping pieces located in the lower part.

[0020] The bearings are housed in the 4 drilled side holes aligned 2-by-2 in the respective slider, with the first of these being the rotating axle for the sheet support, in the center part of which the opening stopping piece for the sheets is attached, with this stopping piece limiting the movement of the support for the sheets and adjusting the distance to which the sheets will move on top of the neoprene strip.

[0021] The support for the sheets is made up of a connecting rod, the upper part of which is attached with a hinge to the sheets, and which is crossed in its lower part by the bearing axle and which incorporates a closure-stopping piece below this.

[0022] Galvanized steel is preferably used as the material for construction the tubes.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] For a better comprehension of the descriptions in this application, some drawings have been included. These depict a preferable, but not limiting, realization of the invention:

Figure 1: Plan view of the body of the base guide and pulling chain.

Figure 2: Schematic view of the guide for the sheets.

Figure 3: Schematic view of the pulling guide.

Figure 4: Schematic view of the drainage gutter.

Figure 5: Schematic view of the complete guide assembly.

Figure 6: Schematic view of the bearings.

[0024] The following numbered elements can be seen in these figures:

1. Body of the base guide
2. Pulling chain
3. Guide for the sheets
4. Support for the sheets
5. Opening stopping piece for the sheets
6. Closing stopping piece for the sheets
7. Bearing
8. Nylon
9. Pulling guide
10. Drip guard
11. Neoprene strip
12. Seat for the sheets
13. Threads of the pulling shaft
14. Pulling shaft
15. Pulling piece
16. Drainage gutter
17. Opening piece
18. Opening ramp
19. Start-up ramp
20. Stopping piece for the sheets
21. Closing stopping piece
22. Support for the closing stopping piece
23. Sheet

DESCRIPTION OF PREFERRED REALIZATION

[0025] A preferred realization of the proposed invention would use the following elements: base guides with a body (1) that is made of a hollow tube that has a pulling chain (2) moving inside of it. The J-shaped guides for the sheets (3) are found along the full length of the lower part of the body of these guides (1), attached by rivets or other means of attachment. The rollers (7) for the sliders are housed inside of these J-shaped guides, which serve as a guide for the sheets (3) when they are moving and folding and which support the weight of the sliders and the sheets until the point when the covering is closed. Some C-shaped pulling guides (9) are located on the upper part of the body (1) of the base guide and are joined to it by welding or some other means of attachment. A pulling piece (15) is housed and moves in their interior, into which the pulling shaft (14) is threaded, which has on its upper part a welded pipe attached to the pulling guide (9) for seating of an angled part that serves as a drip guard (10) to prevent any water flow into the interior, and with some neoprene strips (11) also installed on this angled part to ensure that the covering is watertight. The side part of the guide serves as a wall for channeling the

rainwater or natural condensation collected by the covering.

[0026] Some L-shaped drainage gutters (16) are located on the side of the body of the guide base (1) and are made up of a tube at the base and a tube on the side, which prevent water flow from causing wetness inside the home or shop and with the start-up ramps (19), opening ramps (18), and rear stopping pieces (20) for the sheets housed in the interior, and with the sheet closure stopping pieces (21) located in the lower part.

[0027] The bearings (7) are housed in the 4 drilled side holes aligned 2-by-2 in the respective slider, with the first of these being the rotating axle for the sheet support (23), in the center part of which the opening stopping piece (5) for the sheets is attached, with this stopping piece (5) limiting the movement of the support for the sheets (4) and adjusting the distance to which the sheets (23) will move on top of the neoprene strip (11).

[0028] The support for the sheets (4) is made up of a connecting rod, the upper part of which is attached with a hinge to the sheets, and which is crossed in its lower part by the bearing axle and which incorporates a closure stopping piece (21) below this.

Claims

1. A foldable motorized covering, made up of some base guides with a body (1) that is made of a hollow tube that has a pulling chain (2) moving inside of it. It is characteristic because the J-shaped guides for the sheets (3) are found along the full length of the lower part of the body of these base guides (1), attached by rivets or other means of attachment. The rollers (7) for the sliders are housed inside of these J-shaped guides. C-shaped pulling guides (9) are located on the upper part of the body (1) of the base guide and there is a pulling piece (15) that is housed and that moves in their interior into which the pulling shaft (14) is threaded, with a pipe welded to the pulling guide (9) found in its upper part for seating of an angled part that serves as a drip guard (10) and with some neoprene strips (11) also present.
2. A foldable motorized covering, as in claim 1, which is characteristic by having L-shaped drainage gutters (16) located on the side of the body of the guide base (1) and which are made up of a tube at the base and a tube on the side, and which in their interior house the start-up ramps (19), opening ramps (18), and rear stopping pieces (20) for the sheets, and with the sheet closure stopping pieces (21) located in the lower part.
3. A foldable motorized covering, as in claim 1, which is characteristic by having the rollers (7) housed in the 4 drilled side holes aligned 2-by-2 in the respective slider, with the first of these being the rotating

axle for the sheet support (23), in the center part of which the opening stopping piece (5) for the sheets is attached, with this stopping piece (5) limiting the movement of the support for the sheets (4) and adjusting the distance to which the sheets (23) will move on top of the neoprene strip (11).

4. A foldable motorized covering, as in claim 1, which is characteristic by having the support for the sheets (4) made up of a connecting rod, the upper part of which is attached with a hinge to the sheets, and which is crossed in its lower part by the bearing axle and which incorporates a closure stopping piece (21) below it.

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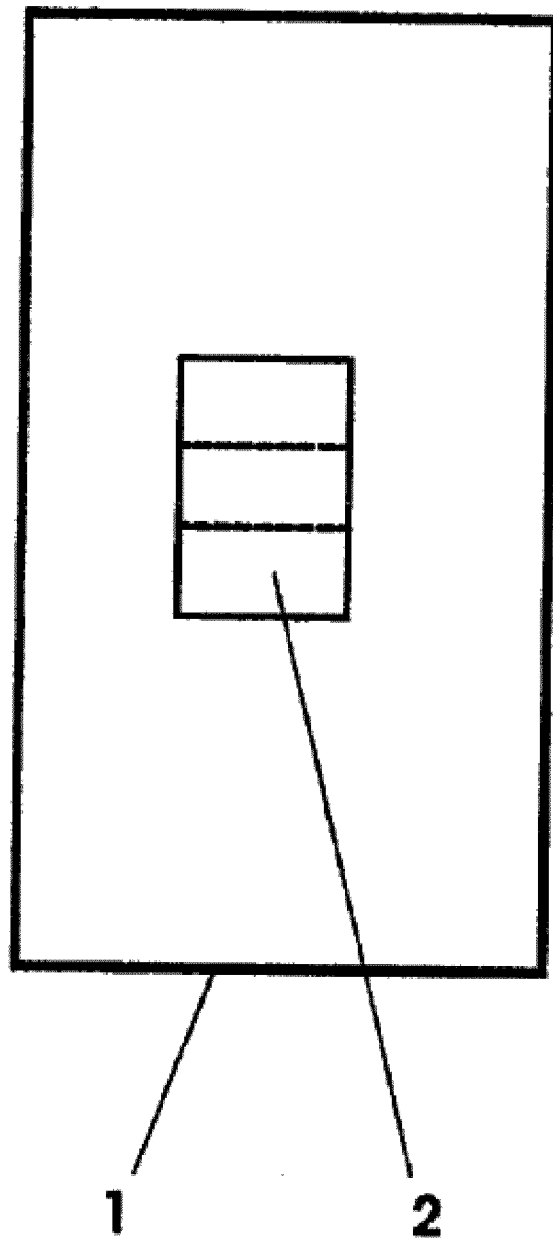


FIG. 1

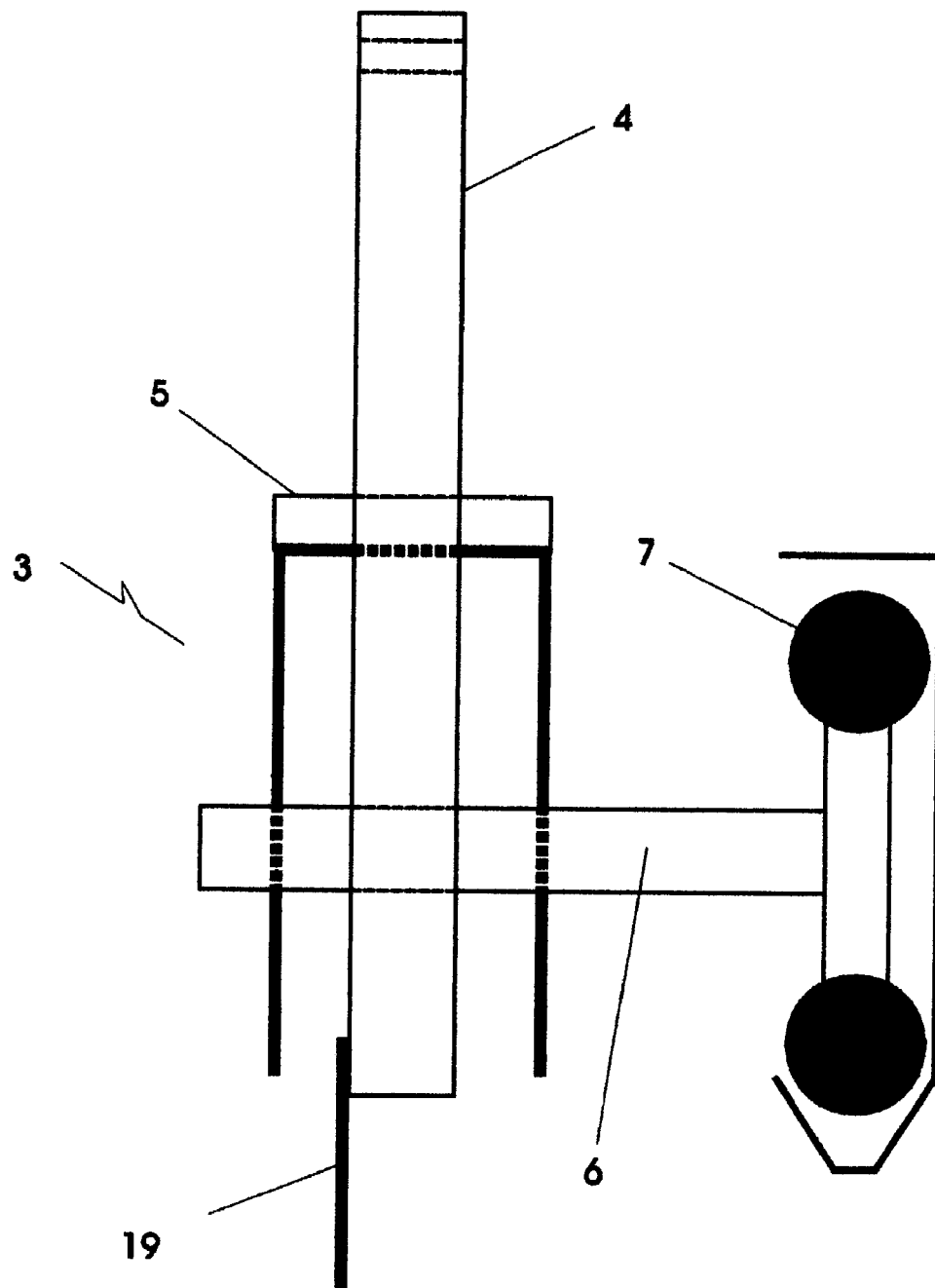


FIG. 2

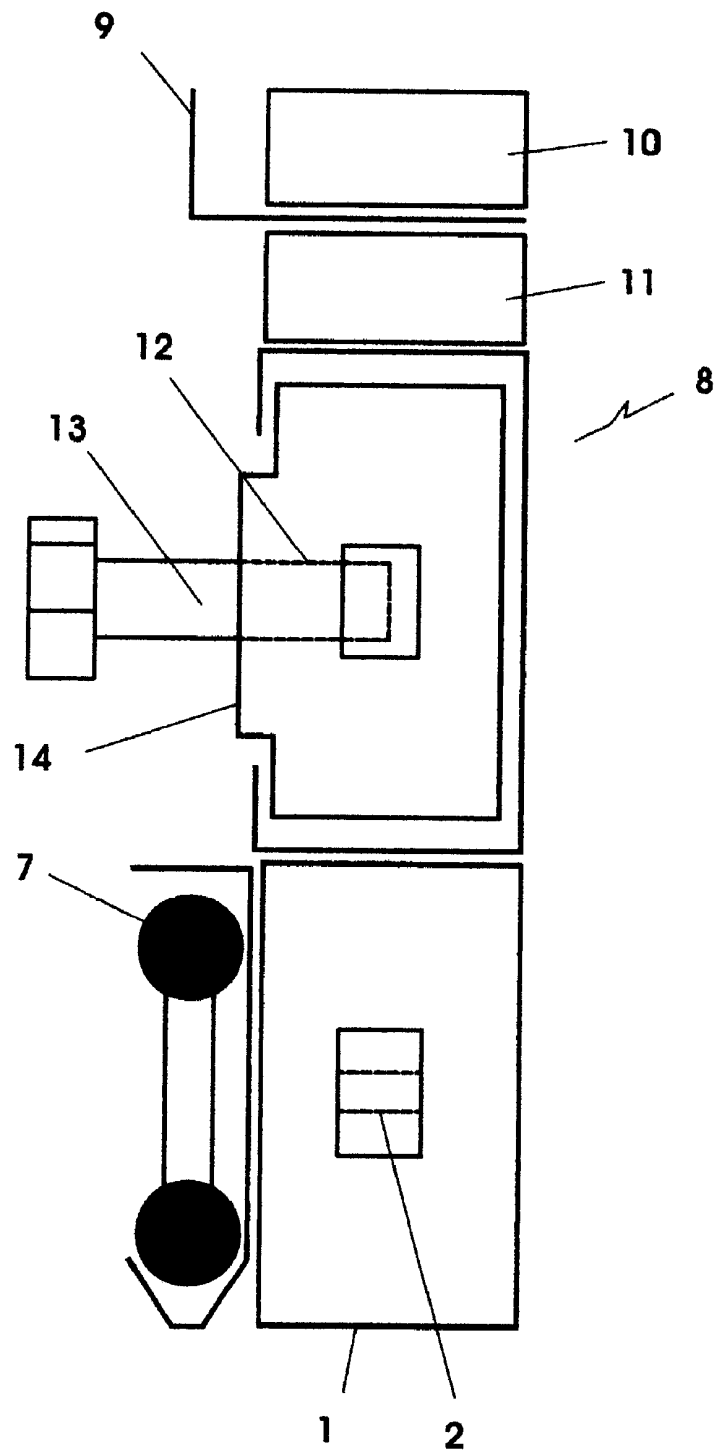


FIG. 3

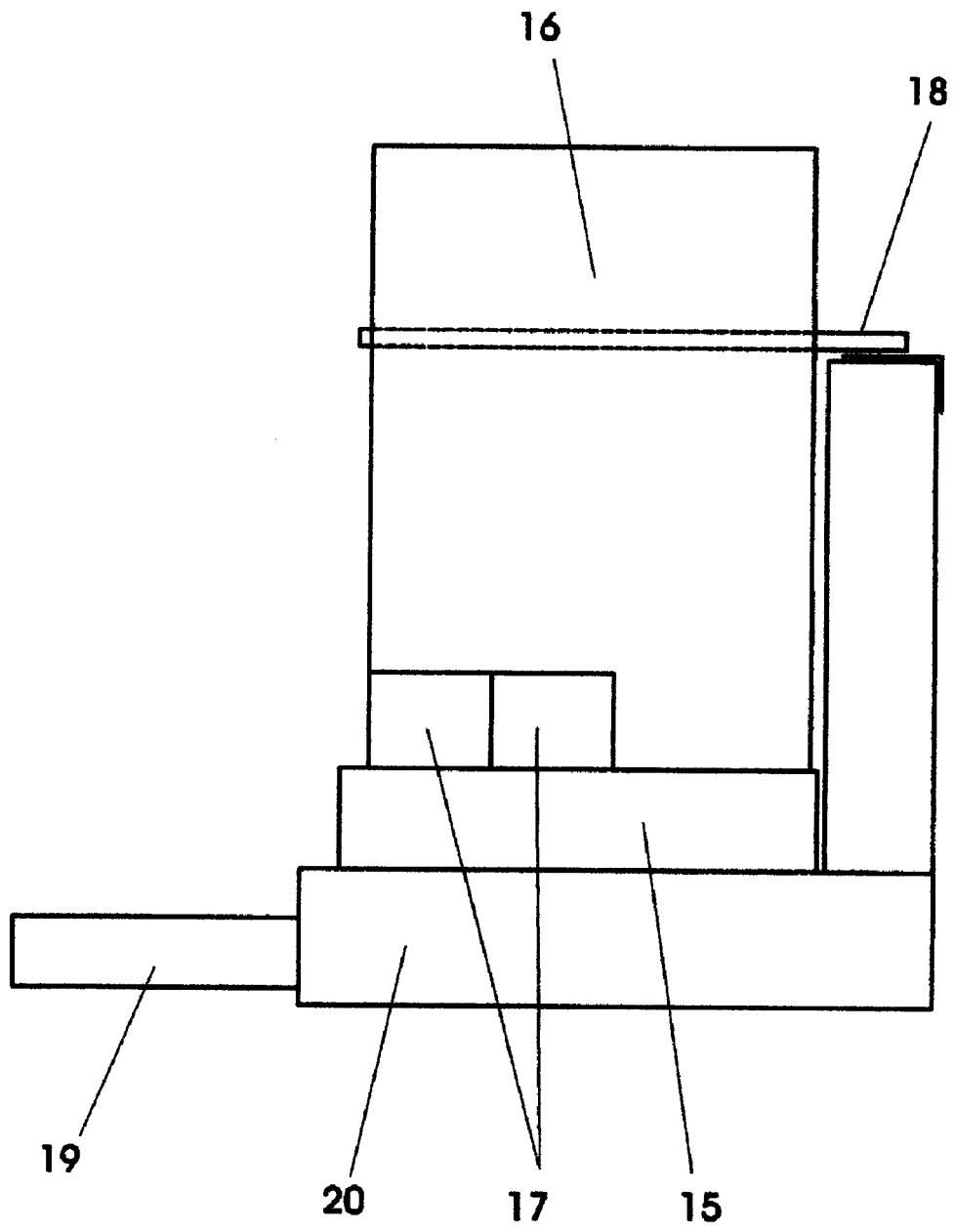


FIG. 4

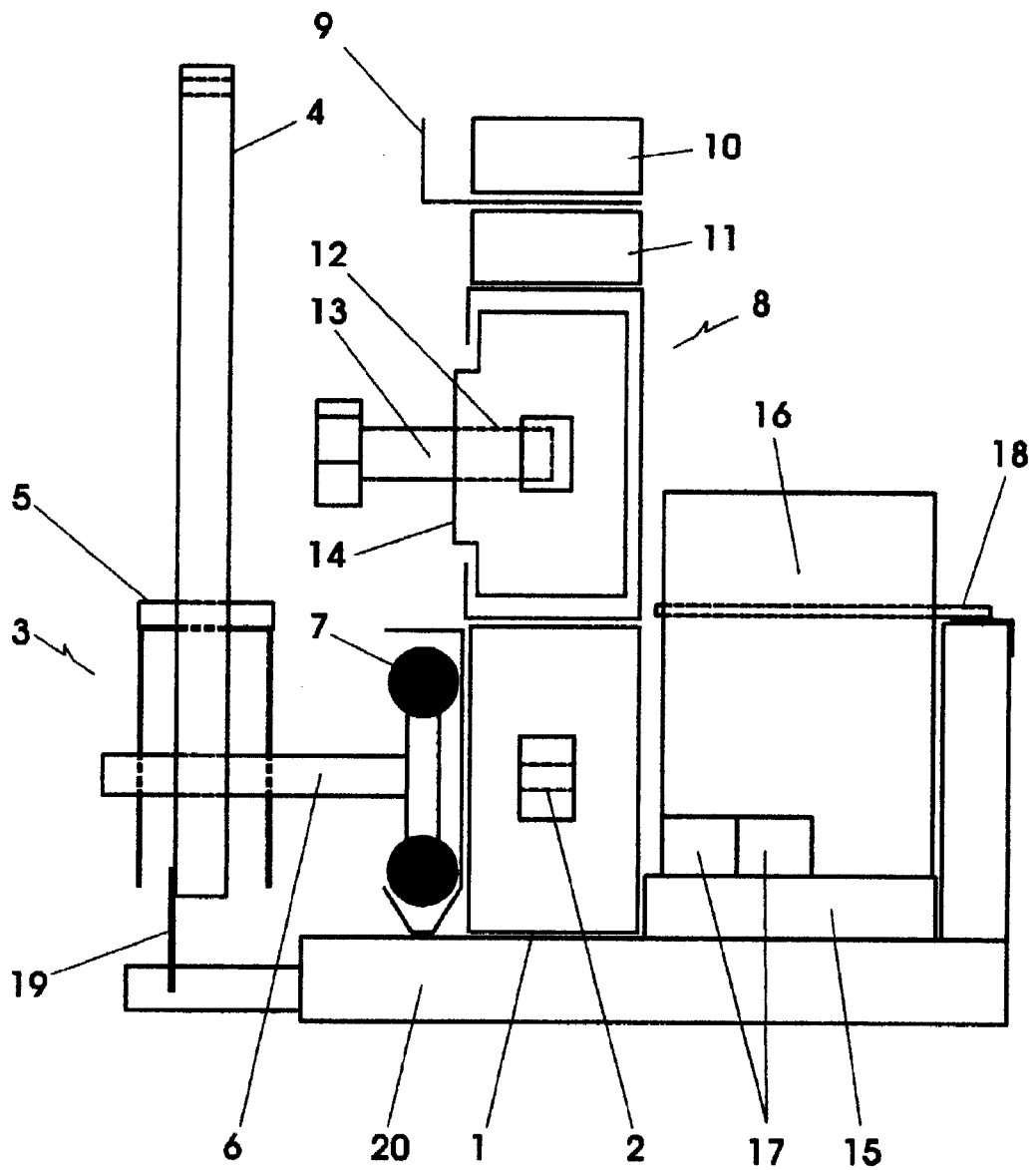


FIG. 5

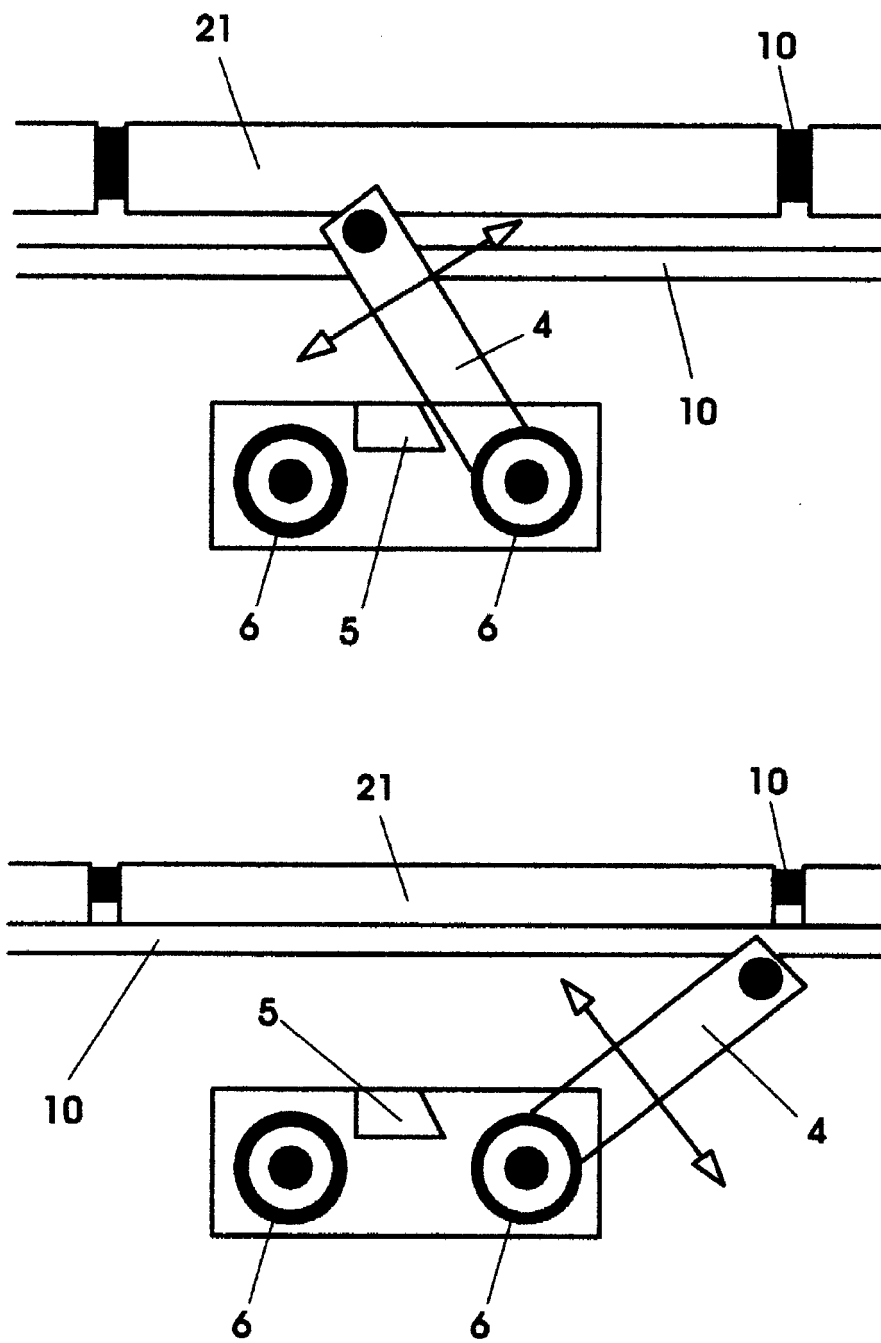


FIG. 6

REFERENCES CITED IN THE DESCRIPTION

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