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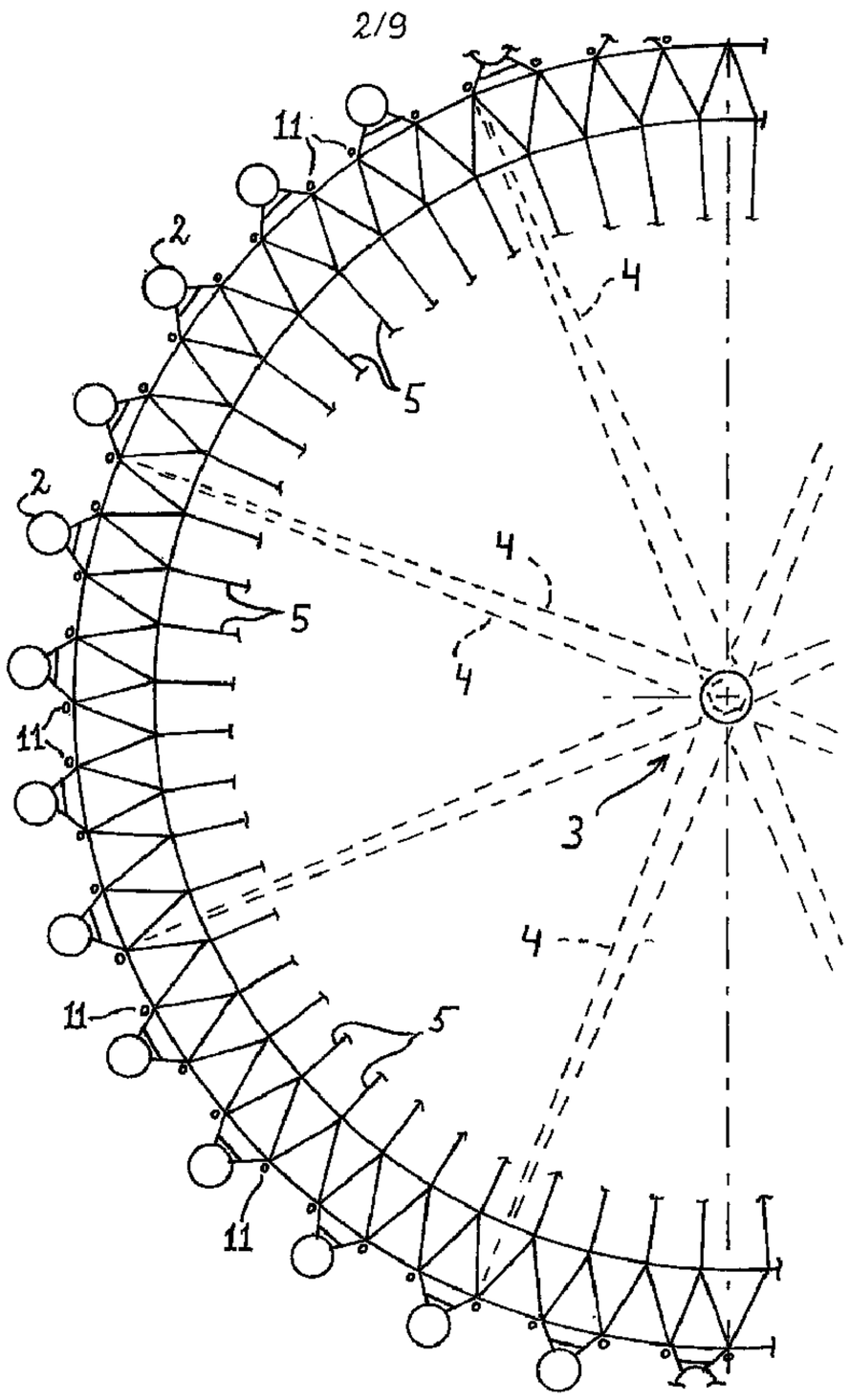

(57) Abrégé/Abstract:
The invention is concerned with a ferris wheel. It has a system for measuring a deformation of it, comprising one or more sensors, providing a source and a target, to detect mutual displacement of the hub (3) and the rim (1), with which an unallowable twisting

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(57) Abrégé(suite)/Abstract(continued):
between hub and rim can be detected. The motoric driving system is provided with one or more rollers, comprising a rigid roller rim of cast metal and thereon a pneumatic tyre of flexible thin walled material, filled with a foam material. It further has a system to protect against dynamic wind loads, comprising close to each gondola (2), a mounted damper (11), directed perpendicular to the rotation plane of the gondolas, which damper has an at both ends closed, liquid filled tube containing a displaceable heavy element which with a spring element is displaceably mounted in the tube.

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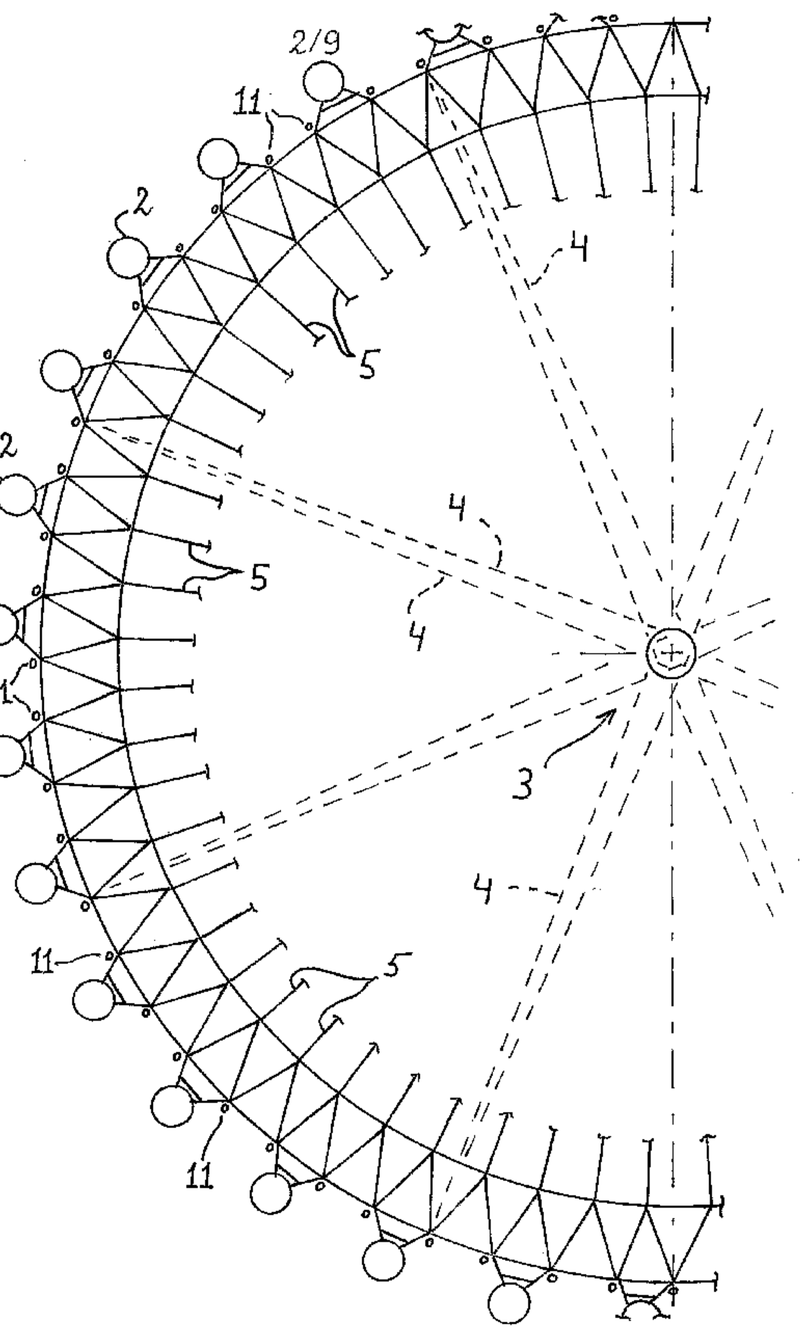

(57) Abstract: The invention is concerned with a ferris wheel. It has a system for measuring a deformation of it, comprising one or more sensors, providing a source and a target, to detect mutual displacement of the hub (3) and the rim (1), with which an unallowable twisting between hub and rim can be detected. The motoric driving system is provided with one or more rollers, comprising a rigid roller rim of cast metal and thereon a pneumatic tyre of flexible thin walled material, filled with a foam material. It further has a system to protect against dynamic wind loads, comprising close to each gondola (2), a mounted damper (11), directed perpendicular to the rotation plane of the gondolas, which damper has an at both ends closed, liquid filled tube containing a displaceable heavy element which with a spring element is displaceably mounted in the tube.

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Title: Ferris wheel

The inventions proposed are related to a ferris wheel or such amusement, e.g. at least 80, 90 or 100 m high. With this type the gondolas continuously keep the outer side of the amusement, such that at the highest level the gondola projects above the structure and an unimpeded view is offered in all directions. The inventions are however also applicable to other structures whrein a plurality of gondolas circulate in a closed loop by way of convenient stationary or moving bearing and/or guiding structure. The bearing and/or guiding structure is e.g. a rim like, circular, vertical or inclined ring structure, rotatable around a central hub, such as with a traditional ferris wheel, or e.g. a comparable ring structure, but in that case mounted without the possibility to rotate. In the first case (e.g. of the type with hub), the gondolas are undisplacable mounted to the ring structure and follow the movements thereof. In the latter case (e.g. of the hubless type) the gondola are mounted displacable/advancable along the ring structure and advance therealong. In the latter case the bearing/guiding structure can also be designed different from circular, e.g. with a flattened part or helical or in the shape of the digit 8.

Hereafter the amusements to which the inventions are directed are commonly referred to as "ferris wheel" or "wheel".

It is typical for the ferris wheel to which these inventions are directed, that in use, but possibly also during stand still, gondolas, e.g. 10 or 20, are substantially equally distributed with mutual spacing along the complete bearing/guiding structure or moving track, respectively, of the gondolas. This is clearly different from e.g. a so called roller coaster, wherein only one gondola is at the track each time. Thus with the amusements to which these inventions apply, a constant advancing speed of the gondolas can be apllied during a plurality of succeeding circulations of the gondolas, which is very important from the point of view of comfort for the passangers that have the desire to

enjoy the view in a comfortable manner. With a view to the observing character it is further caracterising the relatively low circulation speed of the gondolas, with the additional feature that during entrance and exit of the passangers, it is not required to bring the gondola to stand still. Besides the gondolas are closed with a view to the safety and to offer protection against the weather. With a view to this and due to the relatively long stay of the passangers, the gondolas are typically provided with one or more of the following: an air conditioner, one or more closable entrance doors for the passangers, a vending machine (e.g. for beverages or snacks), one or more binocculars mounted on a bracket, a music device, telecommunication equipment.

According to an embodiment the ferris wheel has a substantially ring or rim unit with thereon along the complete circumference with mutual spacing the gondolas carrying the passengers, possibly a hub unit centrally within the rim unit, bearing on the sub surface through a supporting structure, possibly a spoke unit with which the rim unit is load bearing coupled to the hub unit, and a driving unit to rotate the rim unit around the hub shaft, or to displace the gondola along the rim unit. Besides the ferris wheel has equipment such as for entrance and exit of the passengers, closing the gondola, keeping the gondola in the desired position.

The rim or such unit can comprise a space structure such as a space frame, but also a more closed structure, such as a tube with any desired section, or be fabricated from sheet material. The rim unit makes a closed ring or loop which preferably is positioned vertically and is turned in its plane around its horizontal central axis.

The spoke unit has slender, possibly flexible pulling elements, wherein the spoke unit can be designed such that it only has slender flexible pulling elements. The term "slender flexible pulling elements" means elongated structural elements, which can substantially only bear tension forces in lengthwise direction. Examples are cables, ropes, chains,

cords. Also e.g. tubes with small buckle strength, i.e. elements with such small strenght to bear longitudinal compression forces, that this strength is not used when designing the ferris wheel. Use is prefered of so called "locked coil cables", made of bundles of ropes, of which at least the outer ropes have a substantially Z-shaped section.

The slender flexible pulling elelemts preferably extend radially from the hub to the rim and keep at the rim a constant circumferential spacing. Preferably the slender flexible pulling elements are inlined with respect to the plane in which the rim turns around the hub, such that loads from the rim perpendicular to said plane (e.g. wind forces) can also transferred to the hub through the slender flexible pulling elements.

The slender flexible pulling elements are preferably pre tensioned such that during all expected condictions in use tension forces act in the slender flexible pulling elements. Thus the rim is circumferentially loaded with compression forces.

The gondolas are preferably at the radially outer side of the rim and can be provided with a feature such that they, or at least their passangers floor or seats, each can turn around a relevant axis parallel to the rotating axis of the rim such that during turning of the rim the gondolas always keep the same position, such that the passengers always stand/sit upright. Preferably said feature has a mechanic drive means such that the positioning is guaranteed under all circumstances.

Non-limiting examples of the ferris wheel are now illustrated by way of the enclosed drawing.

Fig. 1 shows a front view of a ferris wheel;

Fig. 2 shows a side view;

Fig. 3 shows a view of a rim part;

Fig. 4a-c show details of a hub;

Fig. 5a-b show details of a rim;

Fig. 6 shows a perspective of another wheel;

Fig. 7a-b show a perspective of a part of a wheel during erection;

Fig. 8 shows a view of another wheel during erection;

Fig. 9 shows a damper

The rim of fig. 1 is in this example a space frame with at the inner ring 64 (positioned in the vertical symmetry plane of the rim) node points with equal spacing, to each of which a longitudinal end of a spoke (tension cable) is connected. In a symmetrical manner from said node points to the outside the space frame widens radially and then narrows to end in coupling points for the gondolas at both sides of the vertical symmetry plane of the rim.

The spokes extend absolutely radially, or slightly different therefrom, to the central hub and are connected thereto with the other end. When different from absolutely radial, axis symmetric loads in the plane of the rim can be transferred to the rim through the spokes.

Besides the spokes extend inclined relative to the vertical symmetry plane of the rim, wherein viewed circumferentially the spokes alternatingly incline oppositely.

The hub is journalled onto a shaft, which at only one side is mounted to a bearing structure of buckle free tubes and tension cables that are connected to a foundation. Alternatively, the hub shaft is mounted at both its ends.

At low level the rim is sideways guided at two locations along its circumference to avoid too large sideways displacement (i.e. parallel to the hub axis) thereof, to protect entering and exiting passangers. Between said two guiding locations along the circumference of the rim the entrance platform for the gondolas is provided.

The wheel is provided with 32 gondolas which each are provided with two equal driving rings with common rotating axis, between which the vertical symmetry plane of the rim extends and with which the gondolas are connected to the rim. Each gondola can thus turn around a body axis parallel to the hub axis relative to the rim to maintain the position of the gondola during turning of the wheel (e.g. keep the floor of the passangers cabin horizontally).

Fig. 3 shows the rim 1, the gondola 2, the hub 3 and the so called rotation cables 4 (illustrated further on).

LASER SYSTEM

The ferris wheel is provided with a system to measure shape disturbances thereof. It can be designed with one or more sensors, e.g. a source and a goal, to detect mutual displacement of two parts. E.g. a transmitter is mounted to the hub 3, transmitting e.g. high frequency radiation, such as a radio or light wave (visible or invisible e.g. UV or IR radiation), such as a beam of laser light. A receiver or reflector is mounted to the rim. In case of a reflector a receiver is mounted to the hub 3. Transmitter and receiver/reflector are mounted such that with it an unallowable twist between hub 3 and rim 1 can be detected. E.g. when the hub 3 makes a too large angle twist relative to the rim 1, the radiation from the transmitter no longer or does arrive at the receiver/reflector at the rim 1. Alternatively sensors are used that measure displacement of two objects, e.g. by providing the rim 1 and the hub 3 each with an own pulse counter to measure the rotating displacement of each separately, and these are connected to an evaluation unit, such as computer, to supply it with the measuring data and compare it to detect unallowable large mutual twisting. Another example is mounting of one or more strain gauges to a part of the wheel, e.g. a cable 4, and connecting it to an evaluation unit.

Another protection system is e.g. provided by sensors with which the tension in the rotation or spoke cables is measured during use of the wheel. E.g. said sensors are provided near the hub, e.g. measuring pins or strain gauges in or on the cable sockets mounted to the hub. These sensors are e.g. connected to an evaluation unit, such as computer, e.g. provided in the hub. Preferably the computer is provided with a transmitter for wireless signal transmission of the measuring data from the sensors or a signal that is determined therefrom.

ROTATION CABLES

In the view of fig. 3 the so called spoke cables are eliminated for clearancy, which are indeed shown in fig. 1. Fig. 4 shows the hub 3 of fig. 3 and views according to arrow

I (fig. 4c) and II (fig. 4b), respectively, thereof, in which the spoke cables 5 are indeed schown. Fig. 5 shows a part of the rim 1 of fig. 3, also with illustration of the spoke cables 5. There are more then two times spoke cables 5 than rotation cables 4 (in this example at eich end of the hub 3: 32 spoke cables 5 and 8 rotation cables 4, thus at least three times more spoke cables 5). The spoke cables 5 extend absolutely radially (or differ 2° at the most), the rotation cables 4 extend each at an angle of at least 10°, 20° or 30°, e.g. in the range of 20°-70° relative to the radial direction. The rotation cables 4 extend inclined, at the one hub side in the direction and at the other hub side opposite the rotating direction of the wheel (in the direction of arrow A in fig. 4). Thus the rotation cables 4 can independently transmit the rotation driving power and braking power from the hub 3 to the rim 1.

As fig. 4 shows, the spoke cables 5 extend inclined relative to the plane in which the rim turns around the hub 3, and are centrally mounted to the radial inner side of the rim 1. The rotation cables 4 are mounted radially further to the outside, at both sides of the symmetry plane 6 of the rim 1. The rotation cables 4 are mounted to the hub 3 outside the spoke cables 5, at the sdie corresponding to the rim 1.

According to a variant the wheel has no rotation cables 4. The soke cables 5 are inclined at an angle of at least 5° or 10° relative to the radial, all at the one hub side in the direction and all at the other hub side opposite the direction of rotation of the wheel. This inclination of the spoke cables 5 is illustrated in phantom in fig. 4 with dash line 7. Thus the spoke cables 5 can independently transmit the rotation driving power and braking power from the hub 3 to the rim 1. This embodiment can be obtained starting from that according to fig. 4 and 5, by eliminating the rotation cables 4 and shifting the mounting location of the spoke cables 5 over one mounting location at either the hub 3 or rim 1.

rim OF SHEET

In stead of a space frame for the rim 1, it can be made of sheet material. In stead of the diamond shape (viz. fig.

5A), the rim can have a sectional shape as a triangle, preferably with equal sides.

CENTRELESS WHEEL

Fig. 6 shows a so called centreless wheel, wherein the 24 gondolas (only schematically shown) displace along a stationary rim or guide/suspension. The rim is flattened at the lower side, such that the gondola at that point advance horizontally during some time, which is advantageous to let the passengers enter/exit. Each gondola has an own electro motor for its propulsion along the rim. The gondolas keep a mutual spacing of at least 1 or 2 gondola diamters, i.e. the space between two succeeding gondolas offers room to one or more identical gondolas in the same orientation. Is has shown that in this manner it is possible to realise a relatively light weight but also safe structure. The galvanic power for the own propulsion motor obtain the gondola through a stationary power rail, co-extending with the rim. The gondolas are preferably mutually mechanically coupled, such that they provide a kind of train in closed loop shape. Thus the gondolas reliably maintain mutual distance and when the power of a gondola is gone, the propulsion of it can be obtained by the other gondolas. Track shapes differing from the circular shape as shown are also feasible, such as ellips, 8-shape, etc.

ENTRANCE DOORS

Fig 6 shows at both sides of the wheel a platform. By providing the gondola at both its longitudinal ends with an entrance door, the passengers can enter/exit at both ends. By demanding that at the one side one only can entre and at the opposite side exit, logistic time saving and safety imporvement can be obtained. This can e.g. de provided by an automatic deur open/closing system designed to open the doors of a gondola at different times. E.g. first the one door opens at the side where no future passengers are waiting at the platform, such that passangers automatically exit toward said side.

MOUNTING METHOD

Fig. 7a-b show a mounting method, wherein the wheel is

assembles in flat position and thereafter is erected by a crane structure 8, while pivoting around the ends of the supporting tubes 9 pointing away from the hub 3.

Fig. 8 shows an alternative mounting method, wherein first the hub 3 is mounted in its use position, whereafter the rim 1 is mounted thereto. During that, preferably a circle part segment of the rim 1 with the relevant pulling elements (spoke cables/rotation cables) is each time successively mounted to the hub 3. During that the circle part segment to be added is present in the lowest position of the wheel, symmetrically relative to the vertical symmetry axis of the wheel. The relevant circle part segment is mounted to the hub 3 with the aid of a bending stiff temporary sub structure 10 (a kind of bending stiff spoke). Subsequently the hub 3 is turned such that the added circle part segment turns over half its length, by which its place during mounting comes free. Fig. 8 shows the situation after the first circle part segment is mounted and displaced (turned in the direction of arrow B). For advantageous loading during mounting, after mounting of a circle part segment one turns in the one direction and then turns in the opposite direction after mounting of the next circle part segment. Comparing fig. 7 no expensive hoisting means are required. But the mounting is more elaborate due to the required sub structure 10 and because the hub 3 must be finished already at the start of assembling.

TYREFILL

The motoric driving or brake system for e.g. turning the rim or advancing the gondolas along the rim or turning the gondola around its axis to maintain its orientation in space can be provided with one or more rollers, each comprising a rigid roller rim with thereon a pneumatic tyre (preferably tubeless) of flexible thin walled material, comparable to the supporting wheel of an automobile or lorry. Thus the tire has a central running face at a radial distance to the roller rim and at both sides side walls connecting thereto and extending to the roller rim, with at their end facing away from the running face a bead following the outer diameter of the

roller rim and mounted thereto. The roller rim provides the air tight closure between the side walls. Preferably the tyre is substantially completely filled with a foam material, e.g. of latex or latex like. Preferably said filler has such properties, that the tyre filled therewith does not substantially behave different from the situation when the filler is absent. Thus the roller remains in use, also when the tyre is punctured. If the foam material adheres to the rim, a high couple transmission can be ensured. The roller rim is preferably of cast metal, such that the couple transmission is maximum.

TUNED MASS DAMPERS

The wheel is preferably provided with a system for protection against particularly dynamic wind loads (particularly af low frequency). It is desirable, with a view to comfort, to keep deflections small to avoid passengers becoming sea sich. It is therefor proposed to mount one or more dampers to preferably the rim 1 of the gondola 2. The dampers are preferably equally distributed along the circumference of the rim 1. In an example, near each gondola a damper is located. Fig. 5 shows a possible embodiment with dampers 11, schematically illustrated. Each gondola 2 is provided with two dampers 11. The dampers are elongated elements, extending perpencidular to the rotation plane of the wheel or the vertical plane or in the width direction of the rim. Differently said, the dampers are substantially directed in the direction in which the deflections by dynamic loads must be limited. The damper is e.g. about as long as the rim is wide, e.g. at least 5 m.

As fig. 9 shows schematically, the damper comprises a hollow, elongated body, e.g. a tube 11 closed at both ends and mounted to the part to be damped. Within it a heavy element 12 is displacable, through a spring element 13 (e.g. coil spring) at its one end mounted to the one end of the tube 11. The damper contains friction lowering means, such as free rotating rollers, balls or another roll bearing mounted to the element 12 and bearing on the inner wall of the tube 11, such that the heavy element 12 can displace within the

tube 11 with low friction. The tube 11 is further filled with liquid, such as oil. While in rest the relaxed spring 13 keeps the element 12 approximately in the centre of the tube 11. When the part to be dampened, e.g. rim, deflects the tube 11 moves with it and the element 12 initially remains in position, such that spring 13 is stretched or compressed. Subsequently the element 12 is displaced by the force from the spring 13 while the spring 13 tries to relax.

Good results are obtained with a mass of 100 kg or 150 kg minimum, e.g. between 200 kg and 500 kg for the element 12. The components of the damper are preferably selected such that the eigen frequency of the element 12 is below 1 or 0.5 Hz.

According to a variant wherein the gondolas move along a fixed track, one can provide to only locally provide one or more dampers. E.g. with the wheel according to fig. 6 merely in the area of the rim where the upper three gondolas are present.

Alternatively an observation tower or such amusement is proposed, wherein a cabin or such passenger space can move up and down with the aid of displacement, guiding and/or driving means along an upward extending fixed column, tower structer or such (hereafter commonly refered to as column), such that the cabin can serve as a passanger elevator and can bring the passangers to a level of 100 m or more above the ground to enjoy the view. It is desired that the passangers are brought up and down in a comfortable, safe manner and also can enjoy the view during upward and downward movement. It is further desired that the passangers during the complete ride stay in the cabin. Differently spoken, it is unnecessary that at the top of the column a cabin is present which e.g. stays at the same level and to which the passangers are transported by an elevator. It is further desired that the column does not obstruct the view from the cabin, such that the cabin preferably extends outside, e.g. around, the column and e.g. is designed substantially in a closed loop in a ring or donut shape (e.g. angled or rounded). Thus the cabin functions as elevator and observation space and is therefor equiped with

sufficient windows for viewing outside. For a panoramic view the cabin is substantially transparent at the side facing away from the column, such that the view straight forward while standing or sitting is substantially unobstructed, e.g. obstructed at the most by structurally necessary elements such as glazing bars, frame elements, a safety guide.

The amusement can be equiped with driving means for both moving up and down of the cabin and turning of the cabin around an upward axis. By said turning around a passanger staying at the same position in the cabin can have a view of 360°. The turning around will as a rule be with low speed, e.g. a single revolution per at least 1, 5, 10 or 15 minutes, adjusted to the use as observation tower.

There are already observation towers known wherein a donut shaped cabin with passangers inside moves upward along a central stationary vertical column projecting through a hole that is encircled by the cabin, wherein the cabin functions as elevator and observation space and wherein the cabin turns around the column. The cabin is designed such that the passangers only have access to a relatively narrow passage extending at a distance to the column there around (designed for walking traffic in one direction) with at the inner edge thereof a row of chairs in a single crown, the back rests of which are facing the column. Thus it is desired that during entrance no more passangers are allowed as there are chairs and that all passangers be seated before the cabin rises, and the passangers during the ride remain seated or at the most rise but do not walk around. The passage is sufficiently narrow such that it is not easy for passangers to walk around without obstructing other passangers. In that case they walk obstructingly in front of the seated passangers, while a passanger standing in front of its chair must place himself against the front wall or must be seated to allow passage of another passanger.

This invention now proposes to design the cabin that during the ride passangers are offered sufficient space to walk around and take several positions without obstrucing other passangers. Different from the prior art a passanger

can easily change places during the ride. E.g. the passangers belonging to a group have better opportunities due to the larger available space in the cabin to stay together. According to the prior art a group will more easily become spread if they are distributed among the last remaining seats at random positions within the cabin. With a cabin that is turning around a passanger can, if he so desires, observe the same object for a longer period by walking within the cabin opposite the turning direction, without obstructing the view of other passangers or asking them to step aside.

E.g. the floor of the cabinb extends over a distance of at least 3, 4 or 5 m from the side wall of the column. Differently spoken, the floor measures diagonally at least about 15, 20 or 25 m with a column diameter of about 10 m. The cabin keeps several tens cm spacing with the column, e.g. between about 0.25 and 0.75 cm.

The invention also proposes to equip the cabin with two or more levels, such that passangers can stay at the same number of levels and enjoy the view. Thus the cabin has two walking surfaces and two window groups above each other, with a mutual distance according to the human ergonomy, e.g. at least 2 m. Preferably those levels are mutually connected through the inside of the cabin by a stairs or elevator or such bridging means, such that passangers e.g. during the ride can change level. When e.g. the cabin has a smoking and non-smoking compartment, the one level can be designed for smokers while another for non-smokers. In connection with a view that is as unobstructed as possible it is prefered that the one level projects further outside the column than another.

The invention also proposes to provide the floor and/or ceiling of the cabin with windows, such that the passangers can enjoy the view straight downward or upward, respectively.

The bigger cabin offers the possibility to ease making one´s toilet and eating/drinking during the ride. The cabin e.g. has a toilet room and/or selling point for refreshments of other consuming goods. It is even feasible to make in the cabin an arrangement of (standing) tables and possibly

chairs, at which the passangers can eat/drink. A breakfast, lunch or dinner with waiters is even possible. Also a counter with seats is feasible.

Taking account of the large freedom of movement of the passangers, the structure must be designed such that it also remains safe during important asymmetric loading since passangers crowd together at a single side of the cabin, e.g. since fron that position something special outside can be seen. Think of a guiding system of the cabin along the column and/or the lifting system, designed to bear said asymmetric load, e.g. the weight of 25 or 50 persons or more, without loss of function.

A particularity of the invention is further that the cabin is preferably free of relative to the horizontal inclined structural elements extending from the inside to the outside, such as stiffening beams or cables, or vertical bulk heads as high as the cabin or substantial part thereof, serving to stiffen and strengthen the floor sufficiently. Such structural elements obstruct the passangers in the moving space. The cabin of the invention is preferably of the type with self bearing walls, such that it has a monocoque like structure or self bearing hull. Thus the space between the inner and outer wall and ceiling and floor is substantially completely available to the passangers.

Thus the cabin preferably offers a passangers space with panoramic observation windows and of sufficient depth such that passangers can stand or walk around the column in three, four, five, six of more concentric rows without passangers in different rows mutually contacting.

The enclosed drawing shows a non-limiting example of the invention, showing in:

Fig. 10 schematically a side view, partly broken, of an observation tower;

Fig. 11 a side view of the cabin;

Fig. 12 a perspective view of the cabin;

Fig. 13 a side view of another cabin;

Fig. 14 a sectional view, broken, of said other cabin.

The illustrated amusement comprises a vertical column

100 as a space frame with six vertical piles 21 (only four are visible) with equal spacing, arranged in a pattern in top view with six corners. At the outer side of the column inclined stiffening rods 31 are mounted to adjacent piles 21, to improve the buckling stiffness and strength. Inside the column 100 an escape track (not shown) extends from top to bottom, e.g. a fire stairs. Within the column 100 also a counter weight 71, suspended from cables 41, of the cabin 51 can move up and down. The cables 41 extend in the column 100 over guide wheels 81 and from there to the cabin 51. The top of the column is e.g. 100 m above the ground 61.

With the cables 41 the substantially cilindric cabin 51 can be hoisted from the ground (only the sectional circumference of the cabin is shown) to the top of the column 100. Fig. 10 shows the position of the counter weight 71 when the cabin 51 is at the lowest location; and when the cabin as at the highest level.

The cabin 51 has the shape of a closed ring or donut, closely fitting around the column 100. This the cabin extends at the outer side of the column 100. The cabin has two levels and is thus at two levels provided with a substantially uninterrupted group of windows 91 in the side wall of the cabin 51 facing away from the column 100 and extending around the column 100. The floor of the top level projects further from the column 100 than the floor of the lower level of the cabin 51.

Each floor extends from close to the column 100 outwardly. If the diameter provided by the piles 21 is about 10 m, the floor of the cabin extends over a distance of at least 3 m from the side wall of the column. Differently spoken, the floor measures diagonally about 20 m. Between the two floors a stairs 101 extends. The stairs 101 projects through a hole in the floor of the top level of the cabin 51 and is provided at the from the column away facing side of the side wall of the cabin adjacent the column 100.

At groud level 61 are the entrance and exit, here with moving stair 111. They end within the space in the column 100 that is enclosed by the cabin 51. Through entrance and exit

doors in the to the column 100 facing side wall of the cabin 51 the passangers arrive in and out the cabin 51. At ground level 61 there is a waiting room 112 and several different rooms for e.g. toilet, ticket sell, etc.

Fig. 12 shows the floors 131, uninterrupted extending from the inner wall 114 to the completely glass outer wall 115 of the cabin. The ronds 31 are eliminated. The walls 114, 115, the floors 131 and the roof 118 of the cabin are designed to be load bearing such that the space enclosed by them is freely accessible for passangers. Window bars 119 are further shown in the wall 115.

Fig. 13 and 14 show another cabin with just one passangers level, wherein fig. 14 shows the centre line 116 of the column 100 and a part of the cabin. Passangers 117 can move anywhere in the cabin 51 from close to the column 100 to the window 115. In fig. 13 the cabin is in the top position and the column is broken.

According to the invention as an alternative the ferris wheel is arranged on a turning disc or ring or such structure such that the ferris wheel can be turned around an upward or vertically axis such that the upward or vertical directed plane in which the ferris wheel rotates kan change position, e.g. dependent from the position of an object in the sky, such as the sun, or the wind direction. The turning disc or ring is provided with driving means to turn it around the upward or vertical, e.g. symmetry axis. Both the ferris wheel and its foundation/bearing structure turns with the turning disc/ring.

Of course variants and changes based on the above belong to the invention. E.g. the number of specified or illustrated elements, such as spokes, gondolas, guides, supports, etc. can be more or less than indicated. Also equivalents or differently designed elements can be applied; also embodiments with one or more elements of one or more embodiments of this specification or drawing.

Independent invention: Observation tower or such amusement with a cabin with e.g. free bearing external walls, possibly in two or more levels.

CLAIMS

1. Ferris wheel or such amusement with a frame and gondolas and driving means to let the gondolas move along a predetermined path.

2. Ferris wheel according to claim 1, provided with a system for measuring a deformation of it, comprising one or more sensors, providing a source and a target, to detect mutual displacement of two parts; wherein to the hub (3) a transmitter and possibly a receiver is mounted that transmits high frequency radiation, and to the rim (1) a receiver or reflector, respectively, with which an unallowable twisting between hub and rim can be detected; with extending between the rim and the hub substantially radially running spoke cables (5) and at least 10°, e.g. in the range of 20°-70° inclined relative to the radial running rotation cables (4), wherein the rotation cables extend inclned, at the one hub side according to and at the opposite side opposite to the turning direction of the rim; the motoric driving system to drive the gondolas (2) is provided with one or more rollers, comprising a rigid roller rim of cast metal and theron a pneumatic tyre of flexibel thin walled material, filled with a foam material, wherein said foam material adheres to the tyre and the rim, and the running surface of the roller drivingly engages the element to be driven; with a system to protect against dynamic wind loads, comprising close to each gondola a mounted damper, directed perpendicular to the rotation plane of the gondolas, which damper has an at both ends closed, liquid filled tube (11) containing a displacable heavy element (12) which with a spring element (13) is displacable mounted in the tube (11); the gondolas are provided at the radial outer side of the rim.

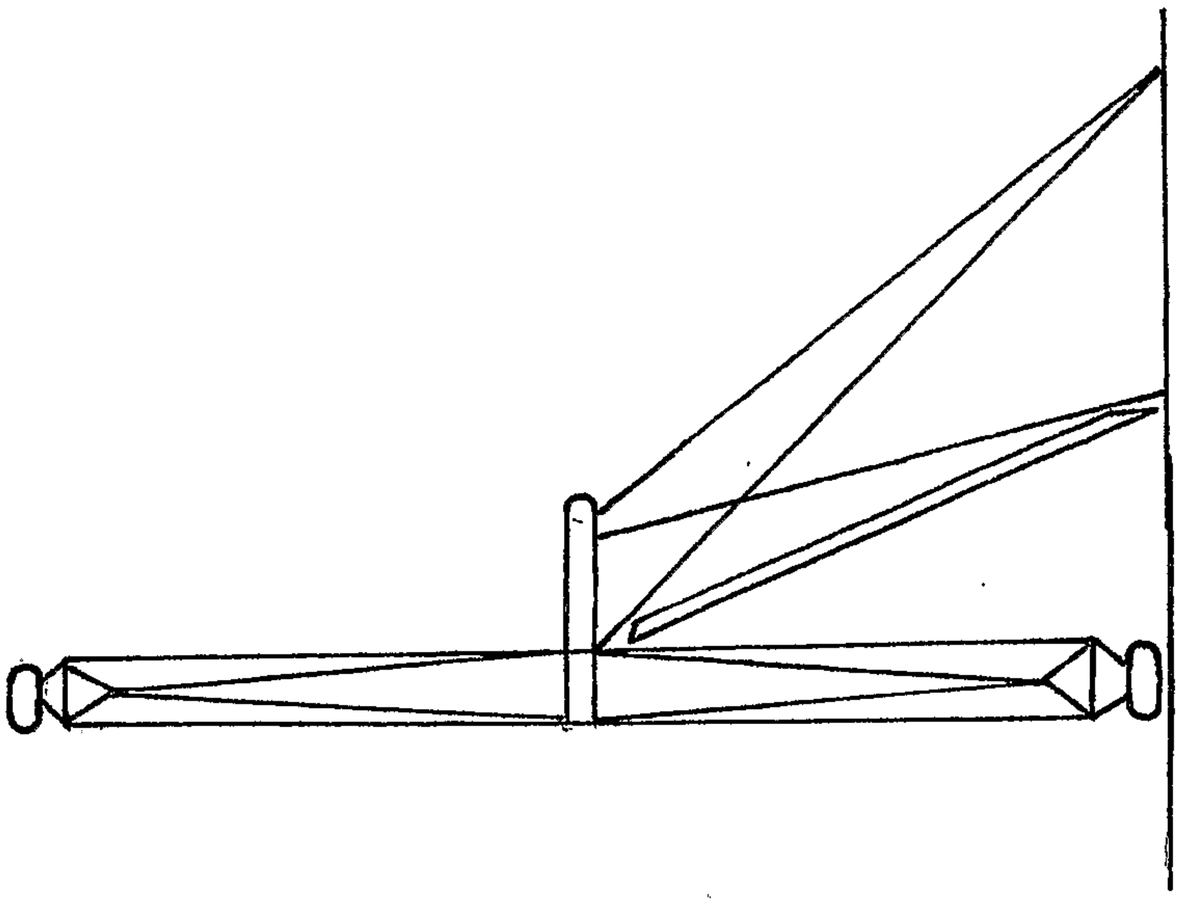


Fig 5

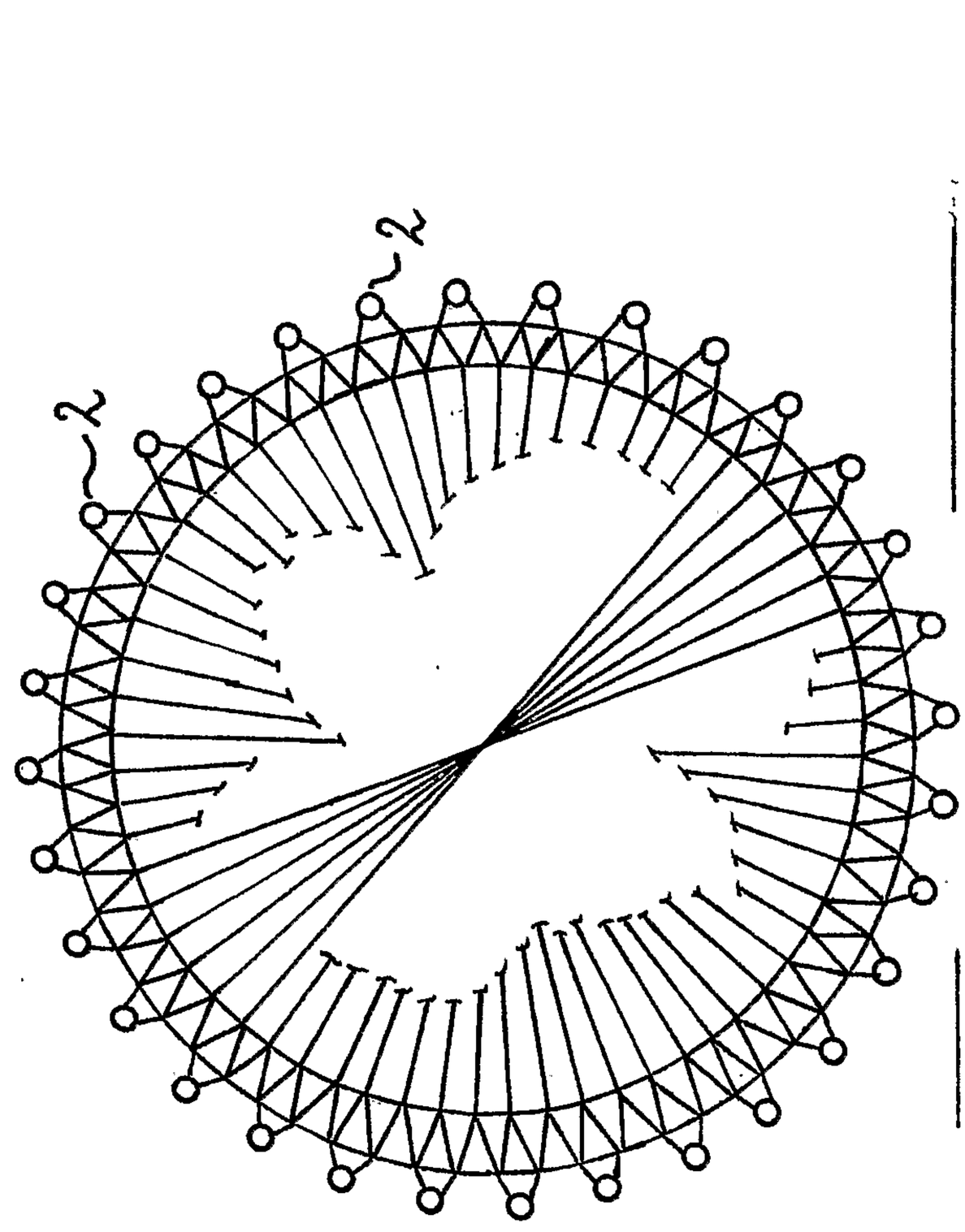


Fig 1

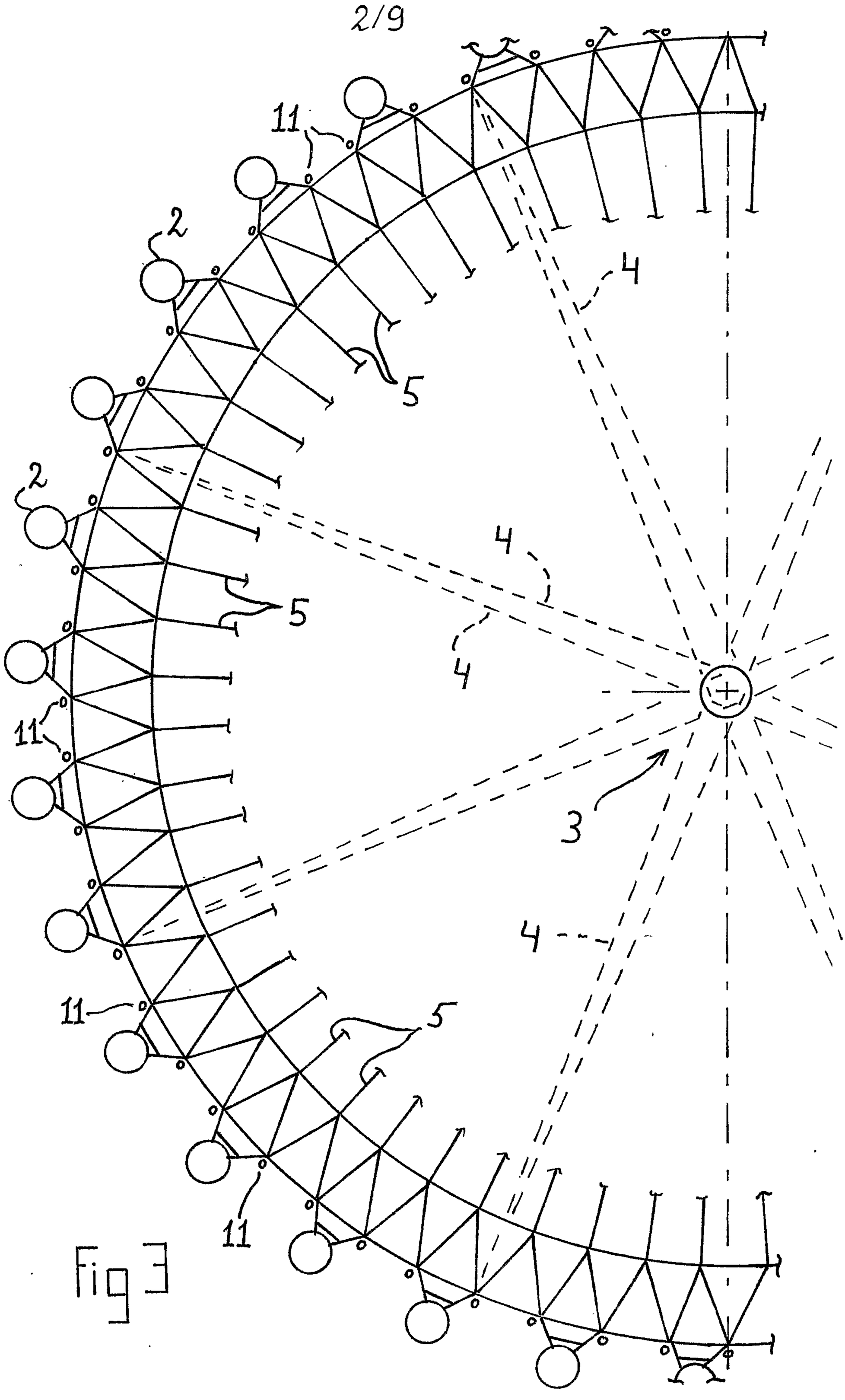


Fig 3

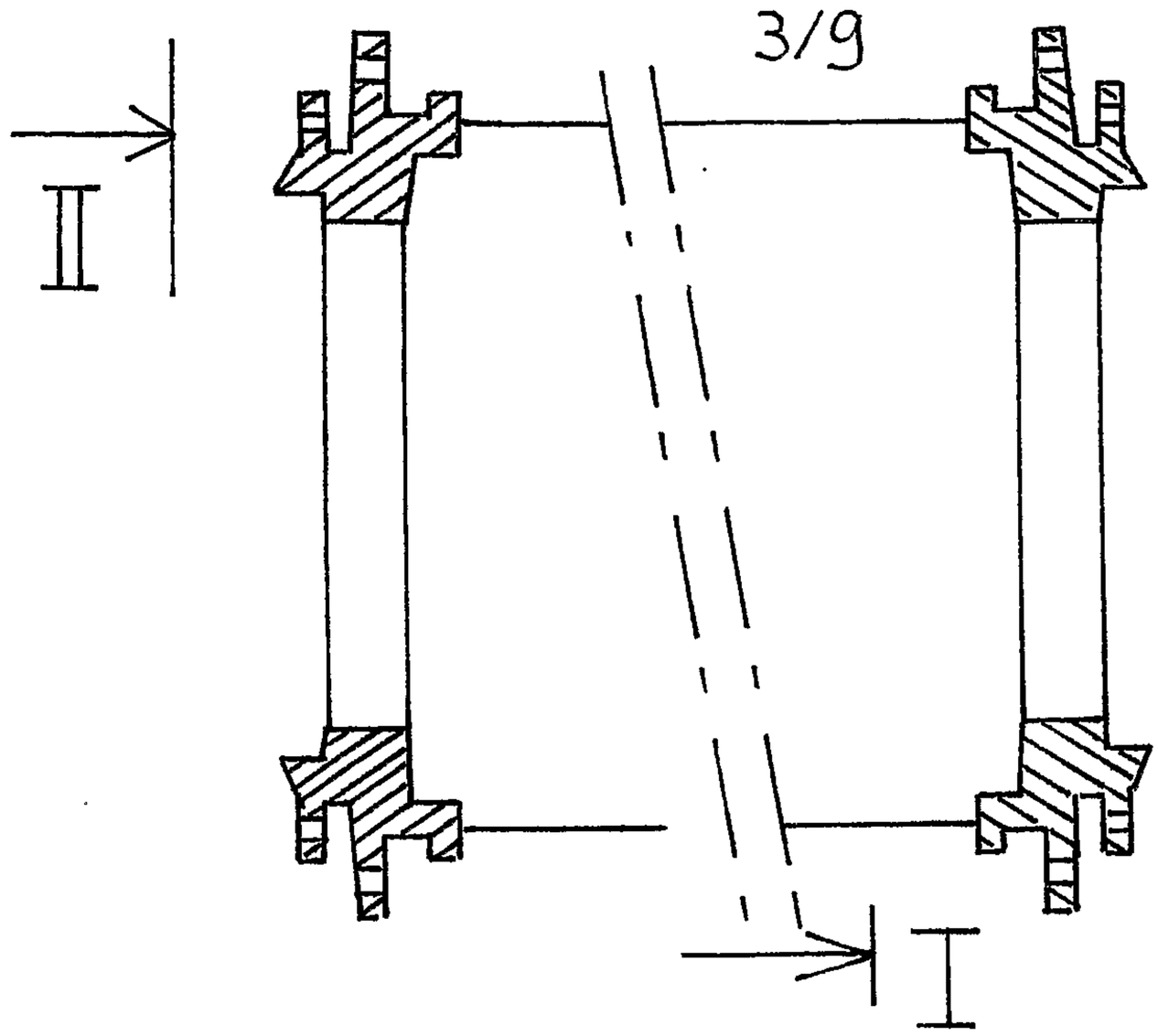


Fig 4A

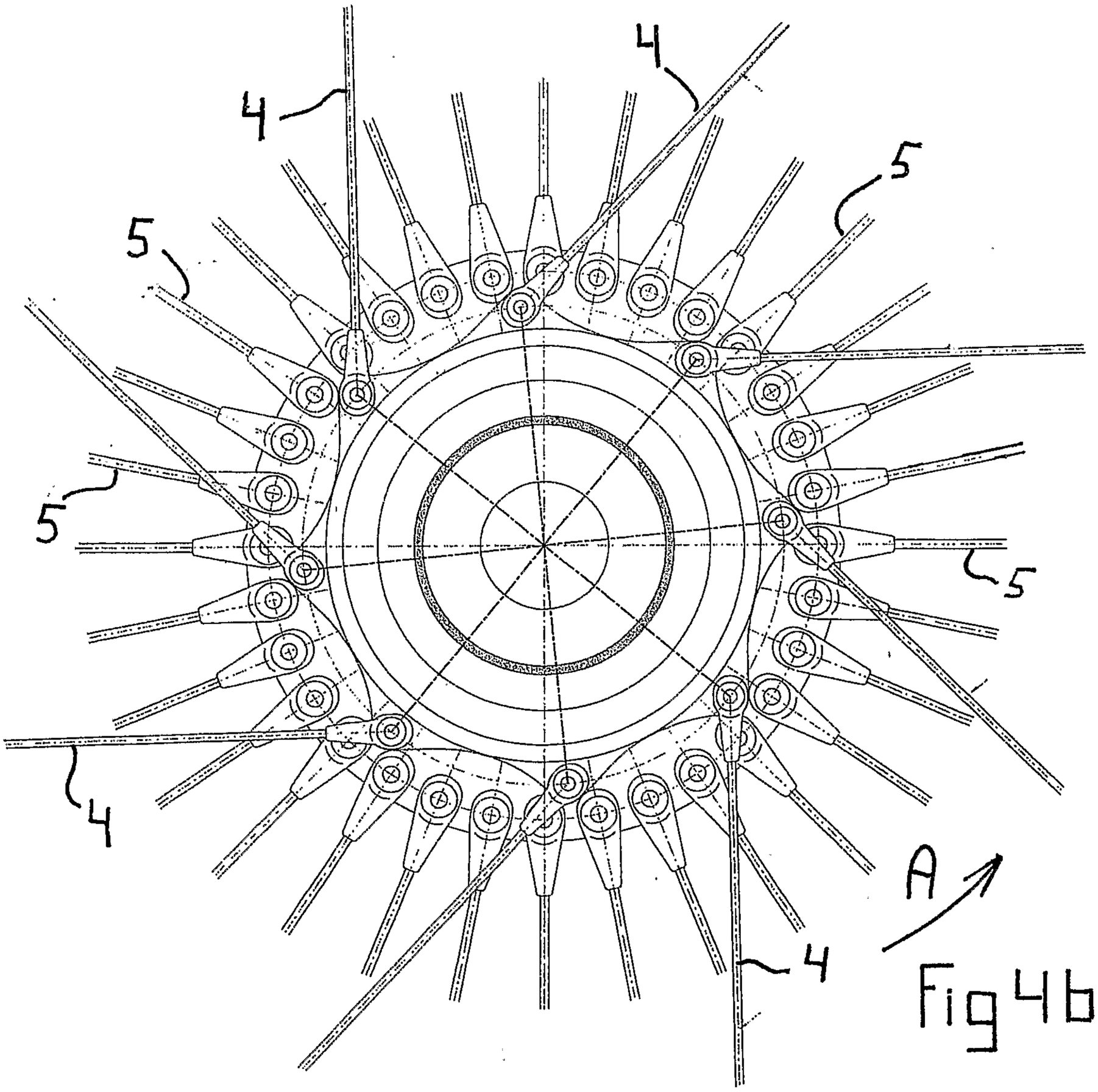


Fig 4B

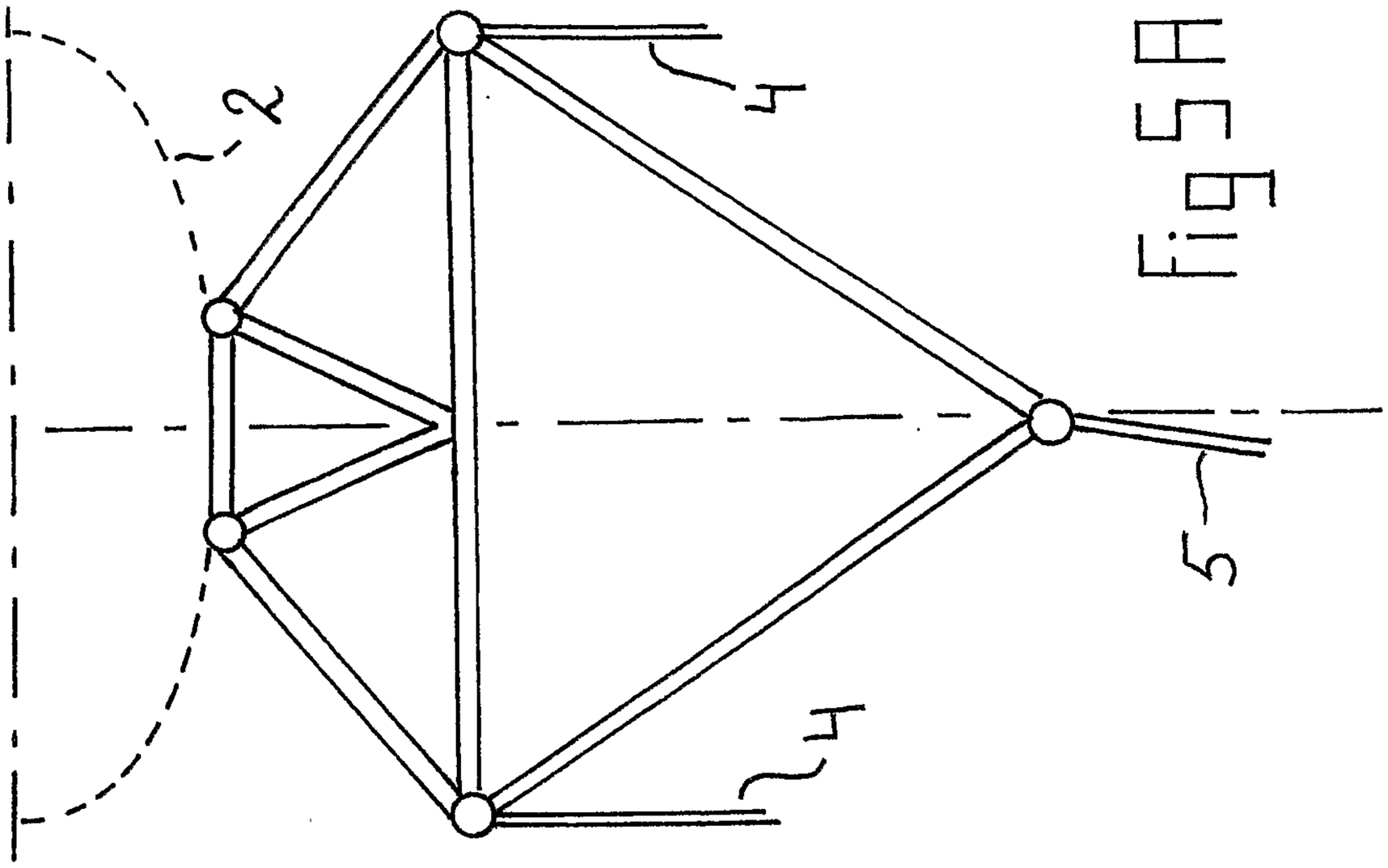


Fig 3

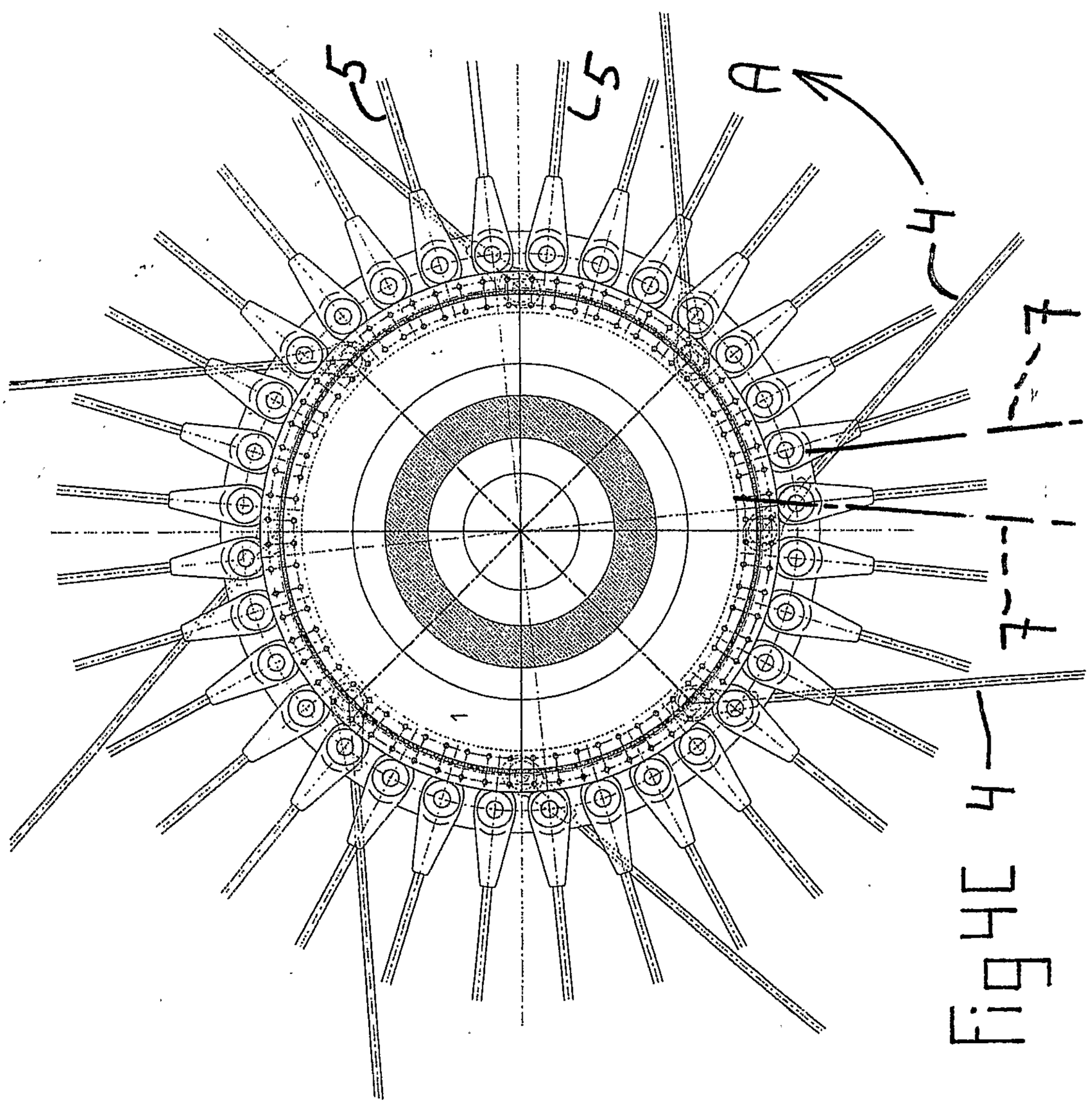


Fig 4

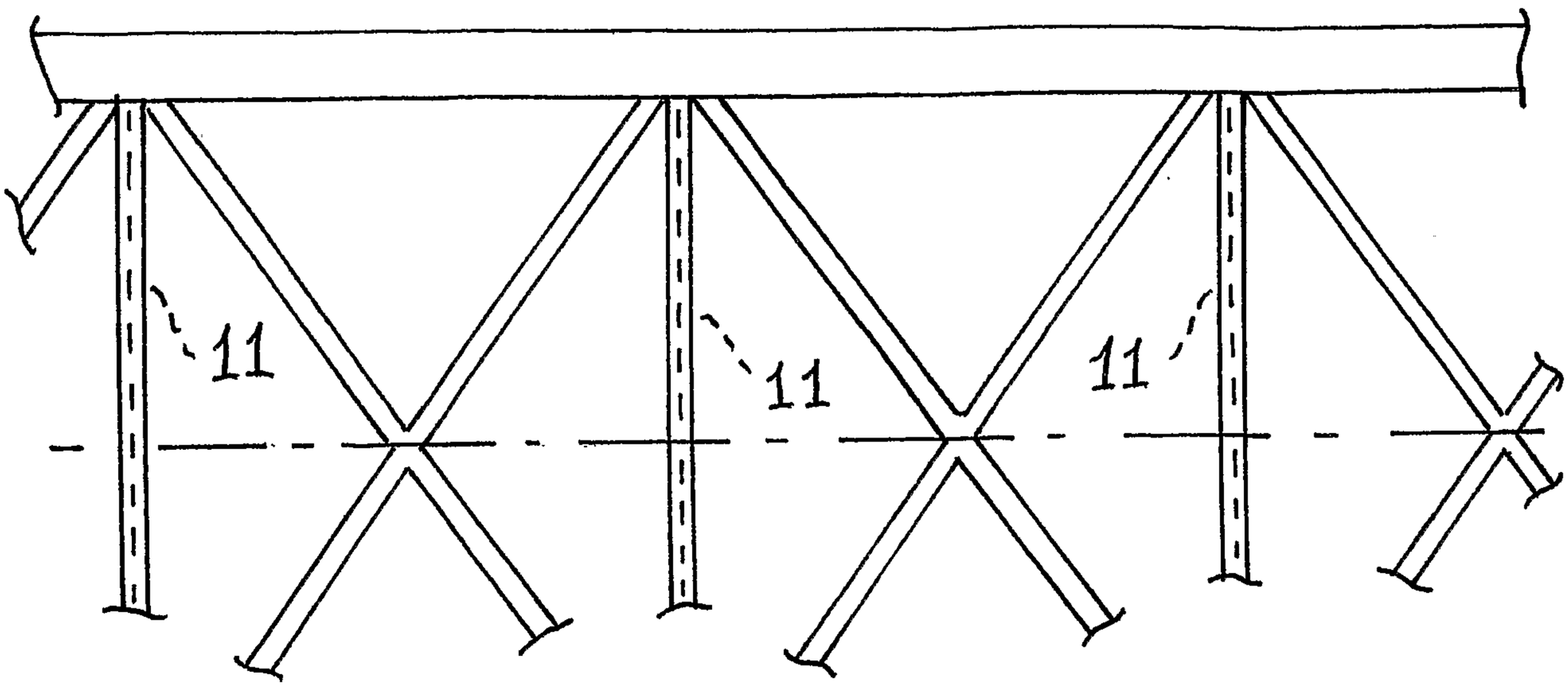


Fig 5b

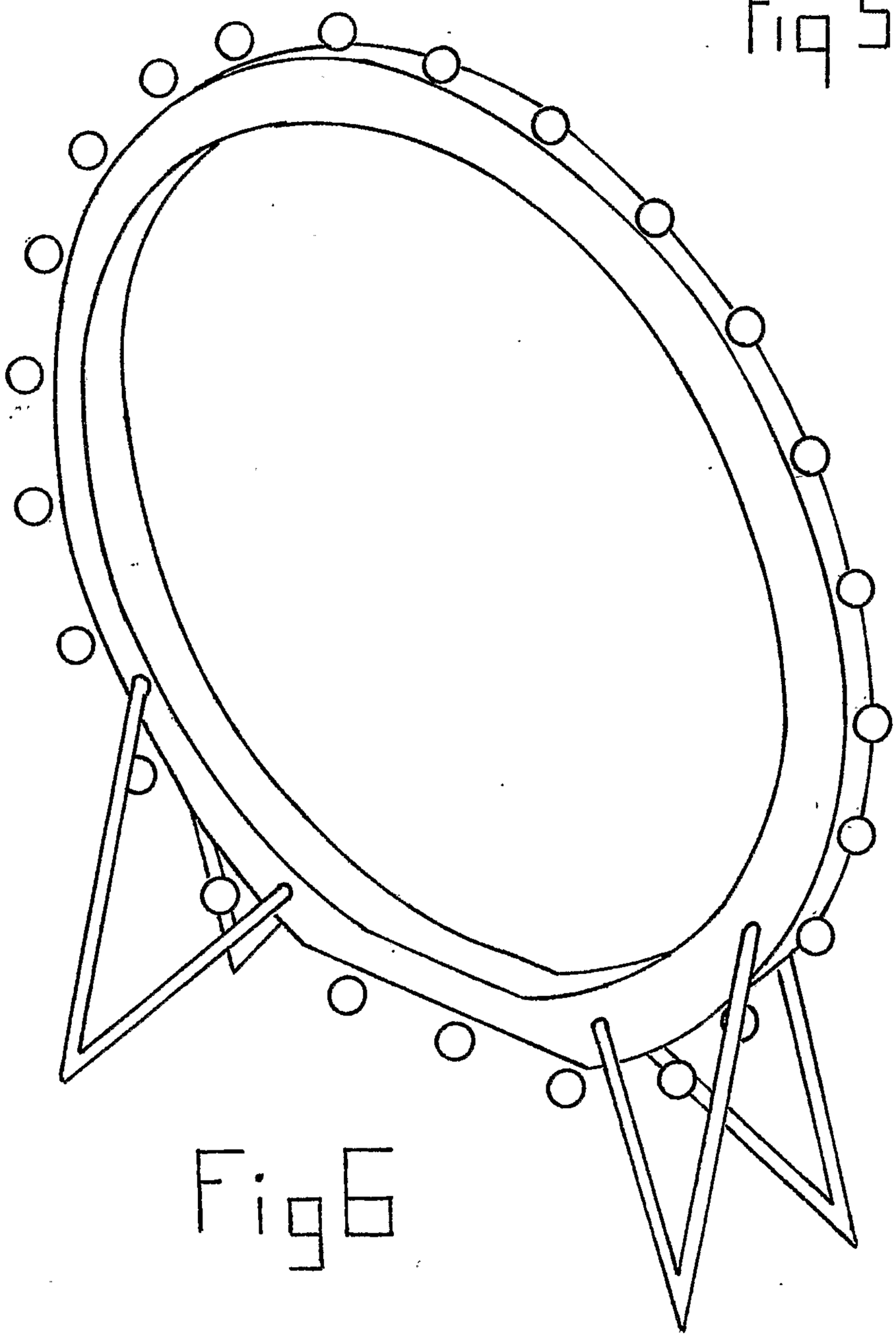


Fig 6

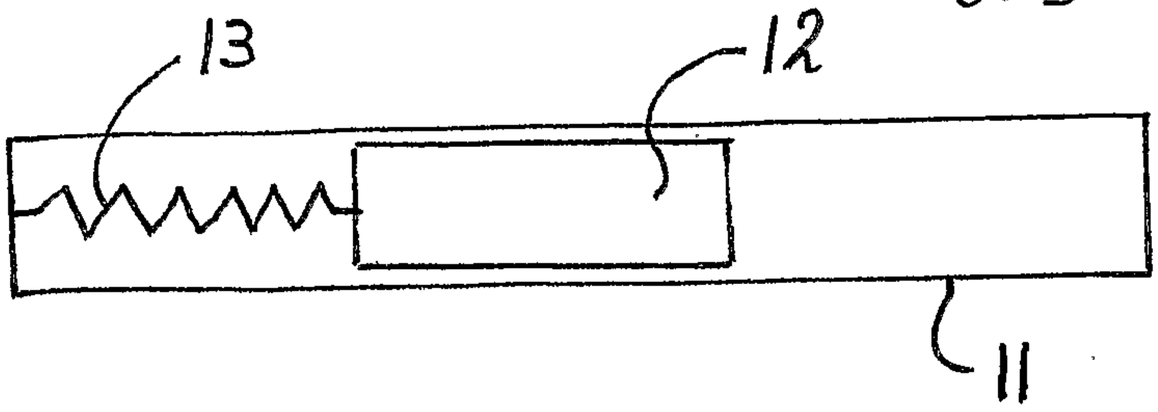


Fig 9

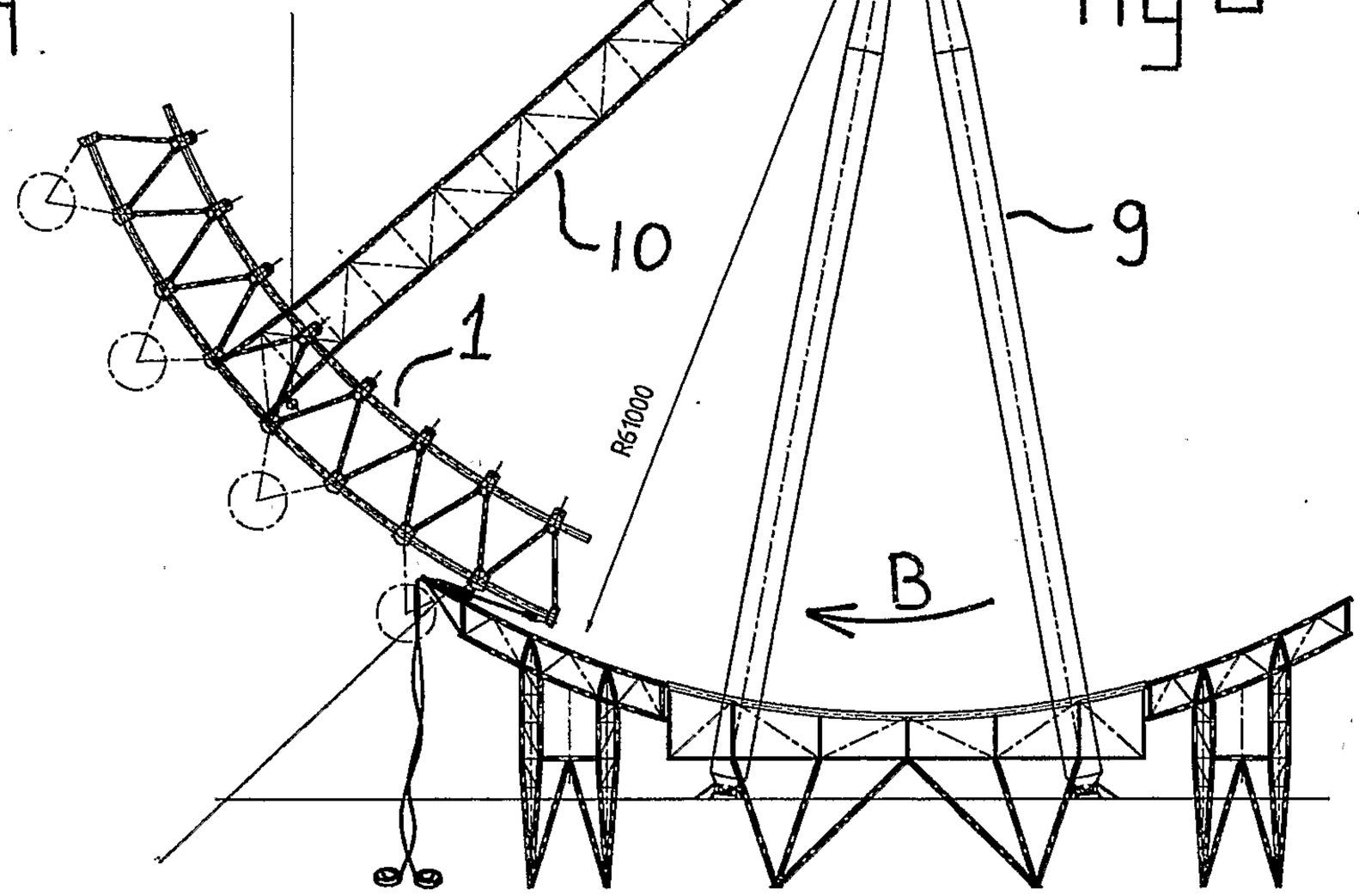
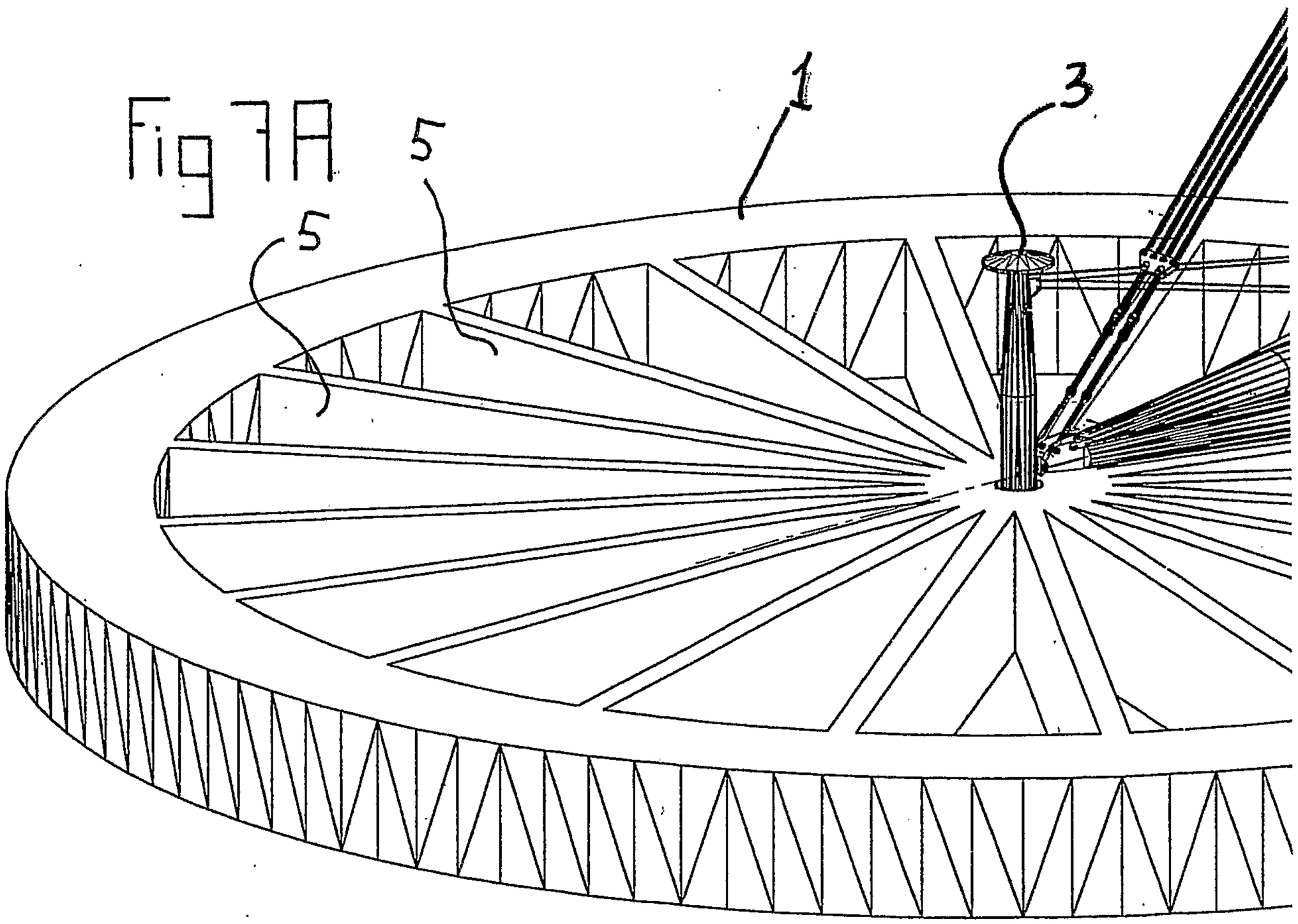


Fig 8

Fig 7A



7/9

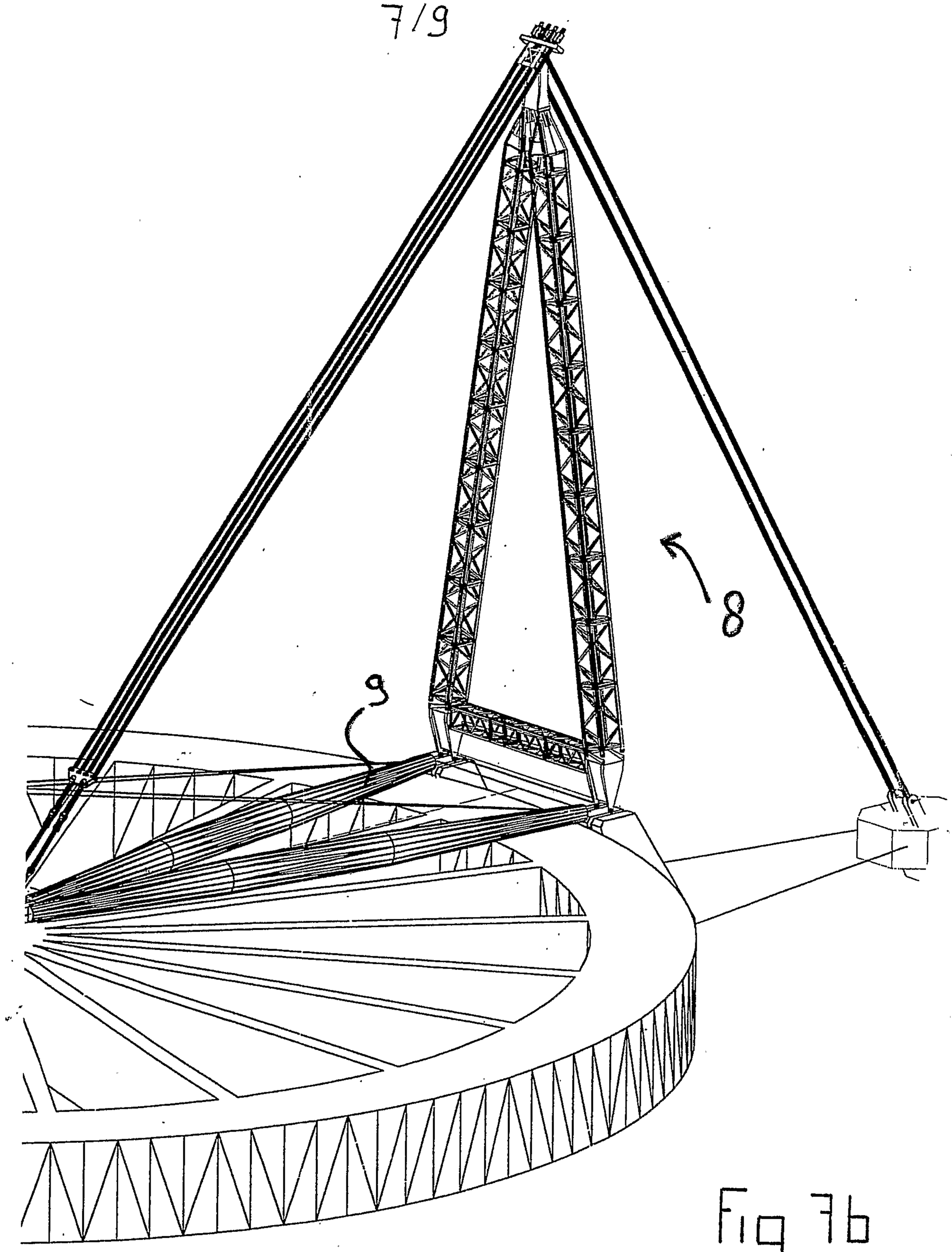


Fig 7b

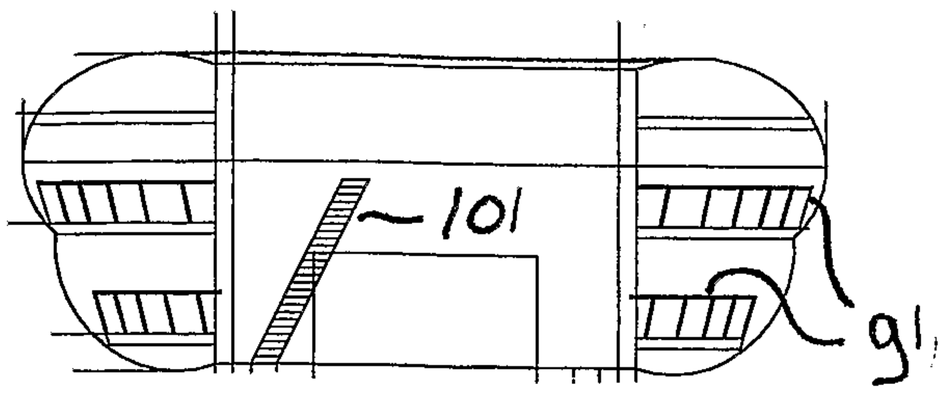


Fig 11

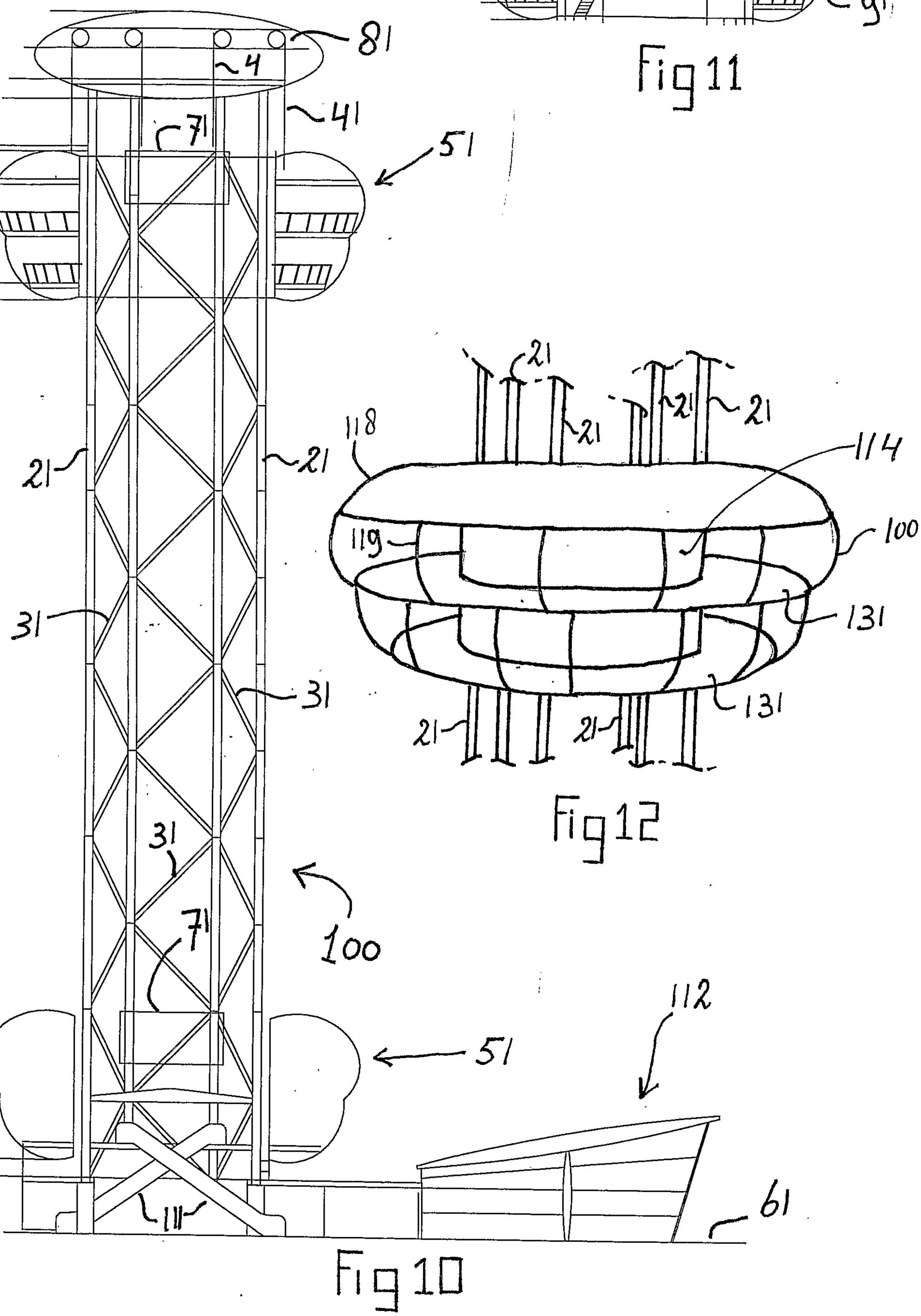


Fig 12

Fig 10

9/9

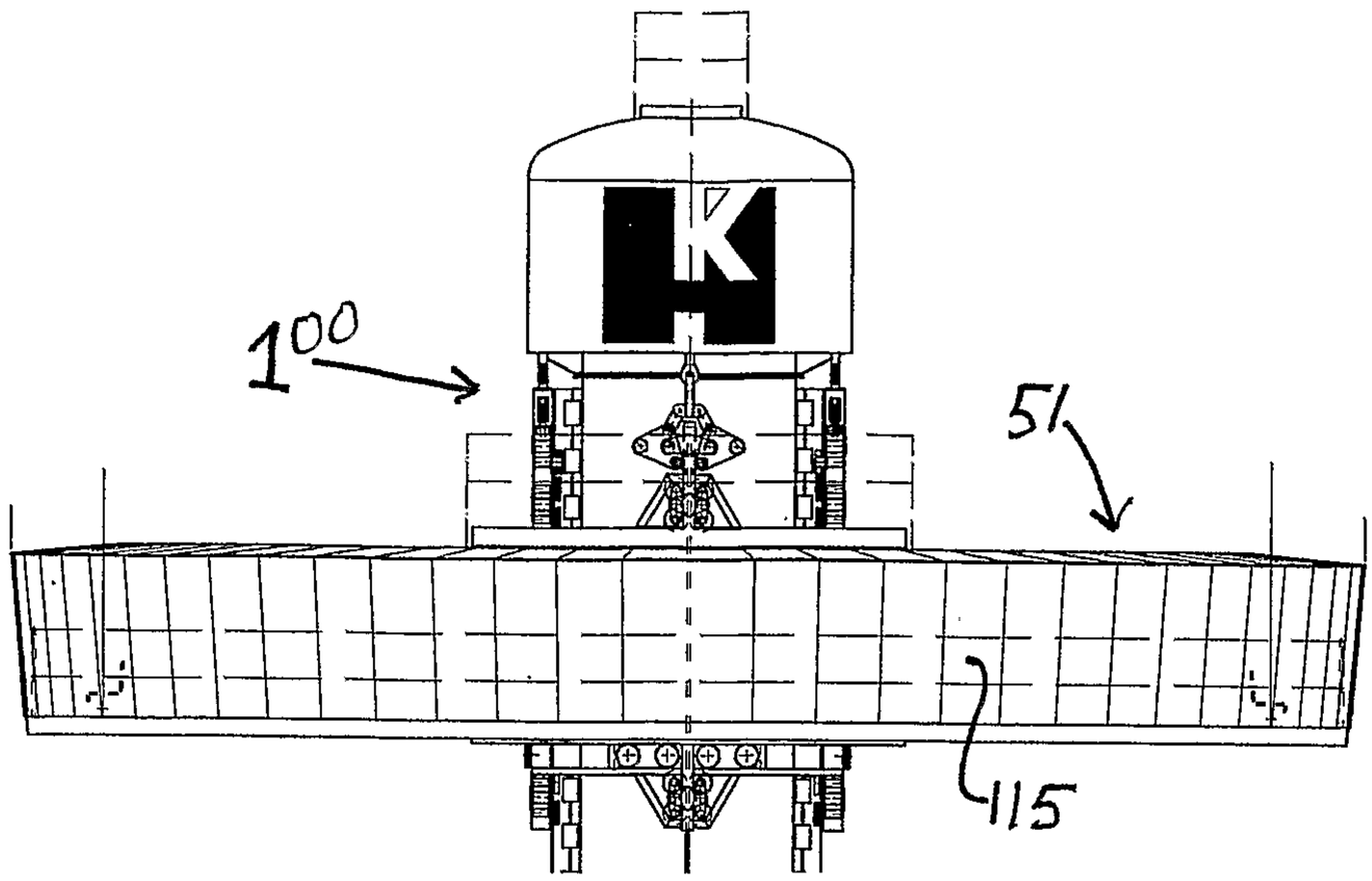


Fig 13

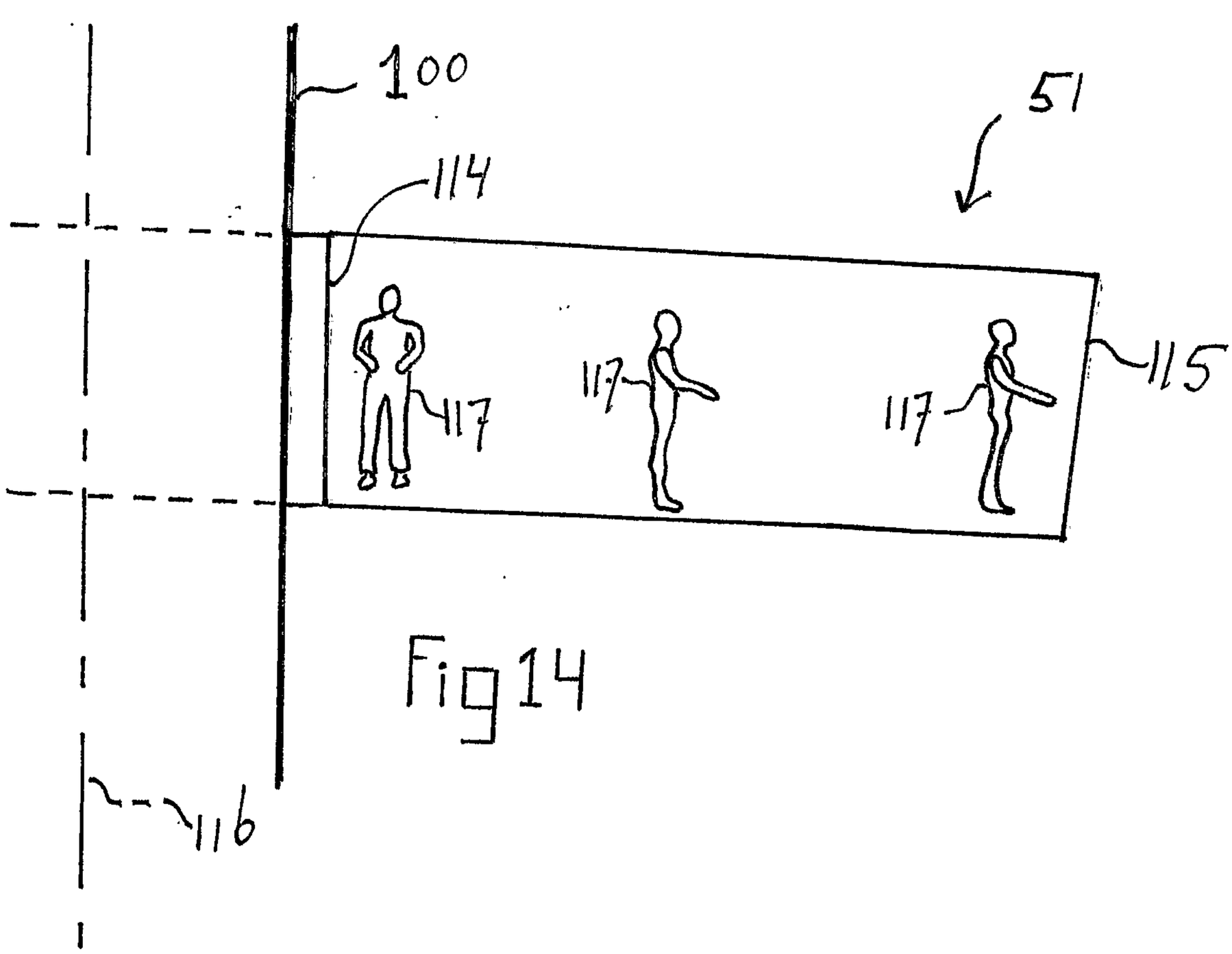
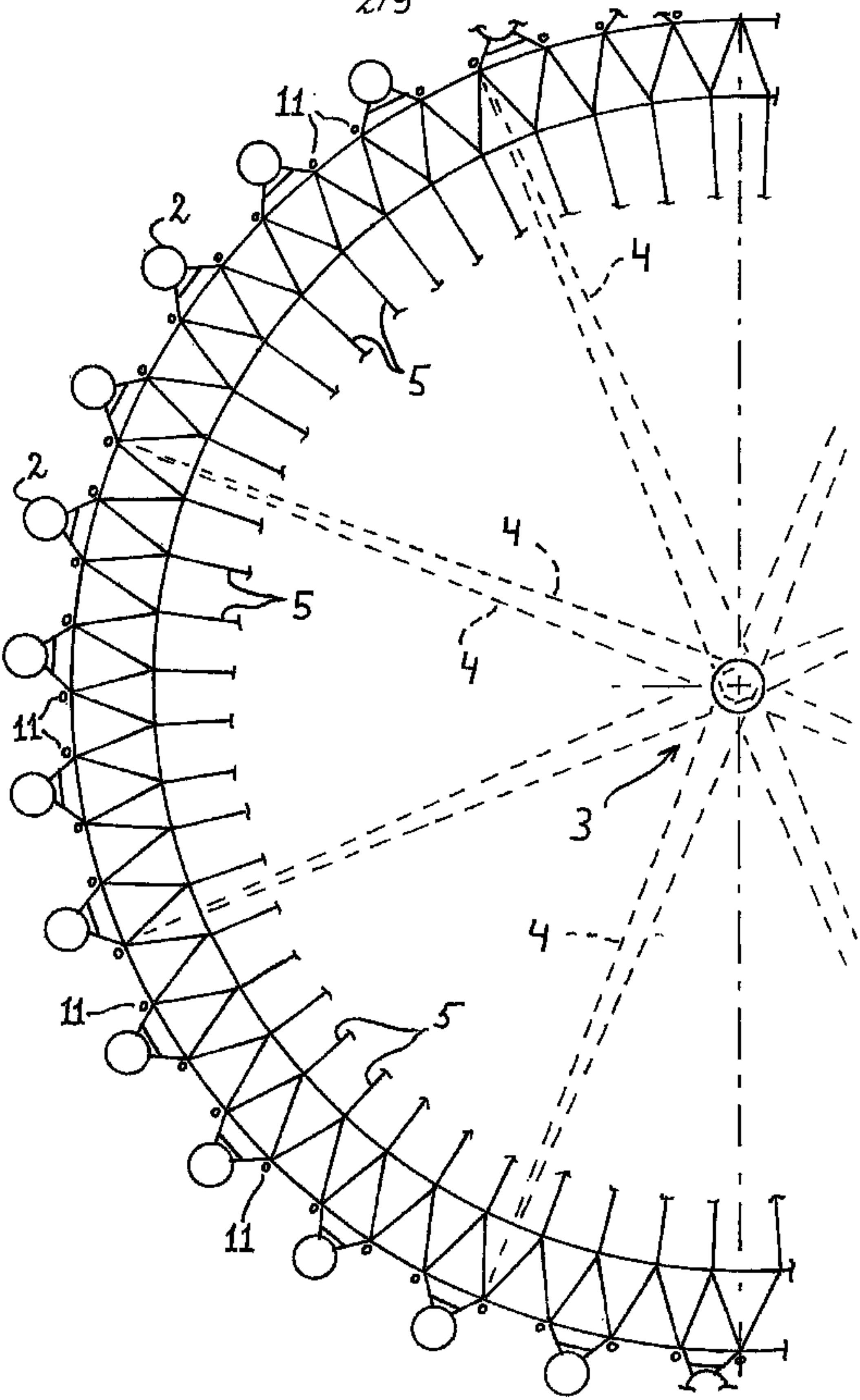


Fig 14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