(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 940 192 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.09.1999 Bulletin 1999/36

(51) Int. Cl.[6]: **B08B 9/087**

(21) Application number: **99200664.3**

(22) Date of filing: **08.03.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **06.03.1998 DK 30398**

(71) Applicant: **Larsen, Thorben**
6470 Sydals (DK)

(72) Inventor: **Larsen, Thorben**
6470 Sydals (DK)

(74) Representative: **Nielsen, Leif**
c/o Patrade A/S
Store Torv 1
8000 Aarhus C (DK)

(54) Apparatus for cleaning of containers and use of such apparatus

(57) The invention relates to an apparatus for cleaning primarily the inner of containers. The apparatus comprises a foremost carriage provided with means in the form of rotating brushes and spraying pipes for cleaning of the inner of containers. The carriage is moved forward by means of wheels mounted on the carriage. Maintaining the carriage in an initial direction takes place by means of jaw-tongs mechanisms extending behind the carriage in a vertical plane and which preferably are supported by wheels. The jaw-tongs mechanisms have great rigidity in lateral direction so that the risk is very small that the carriage deviates from its course.

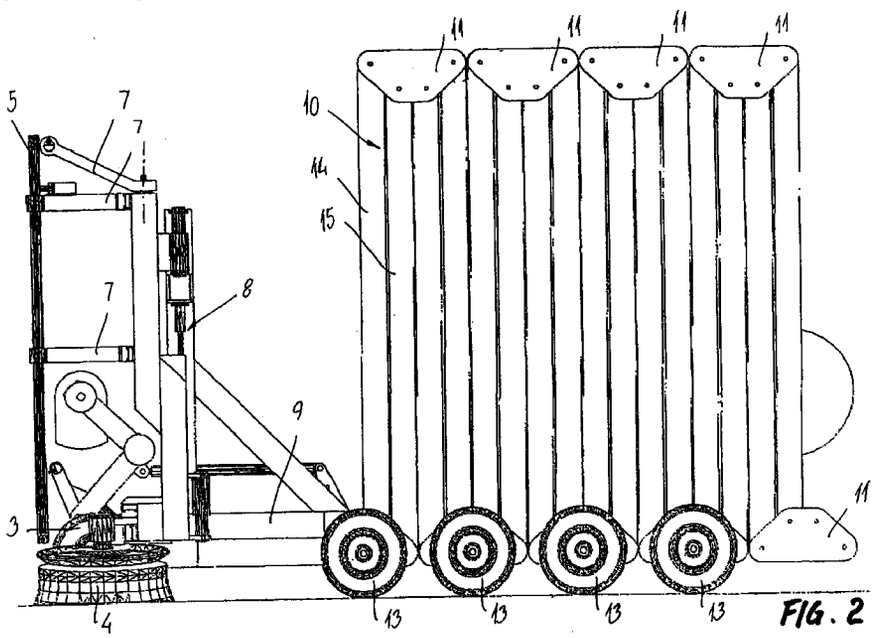

FIG. 2

EP 0 940 192 A2

Description

[0001] The present invention relates to an apparatus for cleaning containers and other tanks and transport cases, which apparatus may be displaced longitudinally along a longitudinal axis of the container from a staring position outside the container and inwards through an opening in the container, and which apparatus has a carriage intended to be displaced forward and inward through the container and subsequently backwards out of the container, and which is provided with washing means and drying means for washing and drying of the container as the carriages are displaced forward or backward in the container, and which apparatus is provided with at least one jaw-tongs mechanism for displacing the carriage forward and backward through the container. The invention also relates to the use of such an apparatus.

[0002] Containers are used as a term for all kinds of containers in freight or storage containers. Container may thus both be real freight containers, may be load compartments on lorries or on trailers for lorries, may be independent tanks or tanks on lorries or the trailers of these, or may be quite other kinds of containers.

[0003] EP 256,699 describes an apparatus of this kind for cleaning the inner of bodies of carriages on e.g. lorries or on trailers for lorries. The apparatus comprises a trolley mounted before a jaw-tongs mechanism which is mounted on a construction fixed in relation to the trolley. The jaw-tongs mechanism is capable of controlling the trolley if the inner of the carriage body is not completely aligned relative to a travelling direction for the trolley. Furthermore, the trolley is provided with laterally directed wheels intended for making contact between the trolley and the inner sides of the carriage body and thereby is capable of maintaining the achieved travelling direction of the trolley relative to the carriage body.

[0004] However, this apparatus implies certain drawbacks. Control of the trolley takes place with a jaw-tongs mechanism extending in a mainly horizontal plane. It is necessary to support the jaw-tongs mechanism with wheels so that the jaw-tongs mechanism do not bend downwards and scratches the bottom of the carriage body. At the same time there is the disadvantage, that the greatest flexibility of the jaw-tongs mechanism will be in the lateral direction which is also the direction that the trolley is to be brought in line with. I.e. with this jaw-tongs mechanism it is difficult to maintain an initial direction of travel of the trolley while at the same time it is further difficult to perform an alignment if the trolley should move in another direction than the initial direction as it is moved forward through the carriage body. Therefore, the trolley is also provided with the laterally directed wheels keeping the initial direction as it is just not possible subsequently to perform a further alignment with the jaw-tongs mechanism, but only possible to use the jaw-tongs mechanism for displacing the trolley forward and backward through the carriage body.

[0005] It is the object of the present invention to provide an apparatus for washing the inner of carriage bodies, tanks, containers, and the like, but where it is ensured that a carriage foremost on the apparatus during all of its movement forward to the bottom of the container as well as back again against the opening of the container is moved straight without the risk that the carriage wedges or has to be aligned all the time.

[0006] This object is achieved with an apparatus which is peculiar in that the jaw-tongs mechanism extends in a mainly vertical plane.

[0007] By providing a jaw-tongs mechanism directed in a vertical plane, the jaw-tongs mechanism will have its greatest flexibility in a vertical plane which is of less importance for guiding the carriage as the carriage rests on the bottom of the container and thus does not have to be controlled upwards or downwards, but only has to be guided in lateral direction. Lateral stability of the jaw-tongs mechanism is very great as the single links in the jaw-tongs mechanism are rigid. Simultaneously, it will not be necessary either to support the jaw-tongs mechanism with e.g. wheels in lateral direction as the jaw-tongs mechanism will not bend when the jaw-tongs mechanism is situated in a vertical plane.

[0008] In a preferred embodiment, the apparatus is peculiar in that a number of links on the jaw-tongs mechanism are provided with wheels disposed lowermost on the links.

[0009] Disposing wheels under the jaw-tongs mechanism implies that the travel of the carriage becomes easy as the weight of the jaw-tongs mechanism itself does not cause problems with guiding and moving the carriage. The wheels are mounted on journals with a certain given length which means that the wheels are placed with a relatively large mutual distance. Thus, there is provided a jaw-tongs mechanism over each set of wheels and both jaw-tongs mechanisms are mutually connected transversely of the direction of travel of the carriage. The jaw-tongs mechanism then constitutes a closed structure with very great rigidity in lateral direction so that when the car initially is directed inwards in the correct direction of travel, the jaw-tongs mechanism will cause that this direction will be maintained during the whole movement forward and backward.

[0010] The invention will hereafter be described more closely with reference to the accompanying drawing, where

- Fig. 1 is a perspective view of an embodiment of an apparatus according to the invention,
- Fig. 2 is a side view of the apparatus according to the invention,
- Fig. 3 is a front view of the apparatus according to the invention,
- Fig. 4 is a view of a rotating brush on a carriage for the apparatus according to the invention,
- Fig. 5 is a perspective view of a nozzle beam mounted on the carriage for the apparatus

according to the invention, and

Fig. 6 is a schematic view of washing a freight container performed with an apparatus according to the invention.

[0011] Fig. 1 shows an embodiment for an apparatus according to the invention. The apparatus comprises a carriage 1 with cleaning means (see Fig. 2 and Fig. 3) together with two jaw-tongs mechanisms 2 placed behind the carriage. As an alternative to two jaw-tongs mechanisms another number, e.g. a single jaw-tongs mechanism, may be placed behind the carriage. The carriage 1 runs on wheels 3 mounted under and foremost on the carriage. Rotating brushes 4 are mounted lowermost and forward and outward against the side of carriage 1 on each side of the wheels 3. Spraying pipes 5,6 with nozzles (see Fig. 5) for flushing with a fluid detergent is mounted on the carriage 1 uppermost and along the sides of the carriage.

[0012] The laterally directed spraying pipes 5 are mounted on arms 7 which are pivotable relative to the carriage 1 about vertical axes. The lateral spraying pipes 5 may be pivoted laterally inward and outward by rotating the arms 7 about the vertical axis. The uppermost nozzle beam 6 is mounted on vertical telescopic guides 8 (see Fig. 2). The uppermost nozzle beam 6 may thus be displaced upwards and downwards by displacing the vertical telescopic guides 8.

[0013] At the back, the carriage 1 is mounted to the foremost link 10 on the two jaw-tongs mechanisms 2. The jaw-tongs mechanisms 2 extend as mentioned backward relative to the carriage 1. The rear part of the jaw-tongs mechanisms 2 is intended to be held fixed relative to a fixed starting point (not shown) for the travel of the carriage 1. The jaw-tongs mechanisms 2 are placed in parallel at a distance A (see Fig. 3) from each other and both jaw-tongs mechanisms 2 extend in a mainly vertical plane P (see Fig. 3). Between fittings 11 on the two jaw-tongs mechanisms 2, there is mounted transverse rods 12. The carriage 1 is moved forward by at least the wheels 3 on the carriage being driven by a motor (not shown). The motor may be powered electrically, hydraulically, pneumatically, or in another way.

[0014] A preferred way to power the motor 3 on the carriage 1 is by means of water or other fluid detergent which is led to the motor via hoses (not shown), and where the water or other detergent subsequently is led to the rotating brushes 4 and to the spraying pipes 5,6 for cleaning the container. In an alternative embodiment, one or more sets of wheels 13 on the jaw-tongs mechanisms 2 are driven simultaneously with or instead of the wheels 3 on the carriage 1.

[0015] Fig. 2 shows the apparatus from the side. The apparatus comprises as mentioned a carriage 1 with cleaning means to be moved forwards and backwards through the container together with two jaw-tongs mechanisms 2 for moving the carriage 1 forward and backward. The carriage 1 comprises a chassis and is provided with the wheels 3 driving the carriage forward. Besides that, the carriage is provided with rotating brushes 4, lateral vertical spraying pipes 5 and the horizontal spraying pipes 6. The vertical spraying pipes 5 are as mentioned mounted on arms 7 which are pivotable about vertical axis The horizontal spraying pipe 6 is as mentioned mounted on telescopic guides 8 that may be displaced upward and downward.

[0016] The rearmost part of the carriage 1 is connected with the jaw-tongs mechanisms 2. The jaw-tongs mechanisms 2 constitute semi-jaw-tongs mechanisms with members 14,15 mutually connected with the fittings 11. A first member 14 and a second member 15 constitute a foremost link on the jaw-tongs mechanisms 2. Other links on the jaw-tongs mechanisms 2 consist also of a first member 14 and a second member 15. The wheels 13 are mounted on lowermost fittings 11 of the jaw-tongs mechanisms 2 so that the jaw-tongs mechanisms are supported when the jaw-tongs mechanisms are moved forward simultaneously with the carriage being moved forward.

[0017] When the jaw-tongs mechanisms 2 become displaced forward, the members 14,15 in each link 10 become moved forward either by the foremost link 10 moving completely forward before the displacement of one or more subsequent successive links 10 is commenced, or by each link 10 being displaced relatively equally forward simultaneously (see Fig. 6). In an alternative embodiment one or more of the members in the single links are provided with a knee joint (not shown) so that the single members may bend in knee joints between the lowermost fittings 11 and the uppermost fittings 11. Thereby the jaw-tongs mechanisms 2 may be displaced into containers that are lower.

[0018] Fig. 3 shows the carriage 1 as seen from the front. The jaw-tongs mechanisms 2 behind the carriage 1 are also shown. The carriage 1 comprises as mentioned a chassis 9 and is provided with two wheels 3 supporting the carriage foremost. The rotating brushes 4 are mounted on each of the wheels 3 and are directed inclined inwards so that the outermost of brush hair of the rotating brushes 4 achieves the strongest abutment on the bottom of the container. The lateral spraying pipes 5 are pivoted outwards on the pivotable arms 7. The horizontal spraying pipes 6 are displaced upwards to a level at the upper side of the lateral spraying pipes 5. Behind the carriage 1, the jaw-tongs mechanisms 2 are shown with the foremost first members 14,15 (see Fig. 2), fittings 11, and transverse rods 12 between the jaw-tongs mechanisms 2 for keeping the jaw-tongs mechanisms at a distance A from each other.

[0019] Fig. 4 shows a rotating brush 4 mounted foremost and lowermost on the carriage 1 on each side of the wheels (not shown) on the carriage. The rotating brush is mounted on arms 16,17 which are pivotable relative to the chassis 9 of the carriage about vertical axes. A motor 18 is mounted upon the brush 4 for rotating the brush. The motor 18 may be electrical, hydraulic, or

pneumatic. The brush 4 is provided with a disc 19 rotating together with the brush 4. The disc 19 is provided with a collar 20 turning upwards and which is coated with a friction creating material. When the carriage 1 is moved forward, the collar 20 on the disc is intended to bear against the side of the container. Because the disc 19 is provided with a friction creating material, and because the brush 4 rotates when the carriage 1 is moved forwards, the collar 20 on the disc 19 will aid in driving the carriage 1 forward.

[0020] Fig. 5 shows a possible embodiment of a vertical and/or horizontal spraying pipe 5,6. The spraying pipe 5,6 consists of a pipe provided with holes 21 constituting nozzles. Water or other detergent is intended to be led through the pipe and out through the holes 21 in order to, as shown, create a spray fan 22 of detergent.

[0021] The spray fans 22 from respective nozzles 21 are overlapping so that there is achieved a complete covering with detergent along the extension of the spraying pipe. Because the lateral, vertical spraying pipes 5 (see Fig. 3) may be pivoted outwards and because the horizontal spraying pipe 6 may be displaced upwards, it is possible to move the spraying pipes 5,6 so close to the sides and the ceiling, respectively, of the container that the spray fans of detergent are able to wash and flush the sides and the ceiling of the container completely.

[0022] Fig. 6 shows the use of an apparatus as described above for washing the inner of a freight container. The apparatus is placed on a platform 23. The platform 23 is mounted on a slide 24 with wheels 25. The platform 23 may be displaced upwards and downwards relative to the slide 24 so that the apparatus according to the invention may be brought in level with the bottom of the freight container. The wheels 25 on the slide 24 run on rails 26 extending perpendicularly to the plane of the paper.

[0023] With the slide it is thus possible to move the apparatus laterally in relation to several freight containers placed side by side (not shown) outward or inward in the plane of the paper. It is also possible with the slide to move the apparatus upward or downward in relation to several freight containers stacked upon each other (not shown). With the apparatus placed on a slide as shown, it will thus be possible to wash the inner of any freight container having an opening mainly in the same plane ad perpendicular to the plane of the paper, but which also may be placed arbitrarily side by side or upon or under each other, respectively.

[0024] When the inner of the freight container has to be washed, the carriage constituting a part of the apparatus is moved forward against hitherto closed doors on the freight container. The carriage is provided with sensors which at a given distance from the hitherto closed doors on the container open for water or another detergent to the vertical lateral spraying pipes simultaneously with the spraying pipes by means of the arms being pivoted to and fro in front of the doors. In this way the doors are initially cleaned externally. Then the doors on the containers are opened and the carriage is moved in through the opening at one end of the freight container.

[0025] When the carriage for the apparatus is moved forward, the jaw-tongs mechanisms simultaneously are unfolded by the single links on the jaw-tongs mechanisms being moved forward simultaneously. The jaw-tongs mechanisms have a sufficient number of links with a sufficient length in order that the carriage on the apparatus can be moved completely forward to the other end of the freight container. When the carriage is moved into and forward in the inner of the freight container, the spray of detergent from the spraying pipes and the rotating brushes will successively wash the inner of the container. The horizontal spraying pipes are provided with sensors so that if, in the ceiling of the container there is mounted e.g. a refrigerator, the horizontal spraying pipe by means of the telescopic guides will be moved downwards immediately before the refrigerator in order not to hit the refrigerator mounted in the ceiling. Accordingly, the vertical lateral spraying pipes may be provided with corresponding means.

[0026] The apparatus is preferably intended to perform all cleaning operations with a little number of travels through the container, typically between one and three travels depending on what the container has contained the last time, and depending on how thorough a cleaning of the container is desired. Especially, it will be possible to perform a kind of cleaning operation by moving the carriage from one end of the container to the other and to perform another kind of cleaning operation by moving the carnage back from the other end to the first end of the container. In an alternative embodiment, the apparatus may be provided with means for drying the inner of the container so that the apparatus may dry the inner of the container when the carriage is moved back again against the first end of the container after the carriage has been moved completely forward to the other end of the container and thus spray cleaned the freight container in its full extension.

Claims

1. An apparatus for cleaning containers and other tanks and transport cases, which apparatus may be displaced longitudinally along a longitudinal axis of the container from a starting position outside the container and inwards through an opening in the container, and which apparatus has a carriage intended to be displaced forward and inward through the container and subsequently backwards out of the container, and which is provided with washing means and drying means for washing and drying of the container as the carriages are displaced forward or backward in the container, and which apparatus is provided with at least one jaw-tongs mechanism for displacing the carriage forward and backward through the container, **charac-**

terised in that the jaw-tongs mechanism extends in a mainly vertical plane.

2. An apparatus according to claim 1, **characterised** in that a number of links on the jaw-tongs mechanism are provided with wheels that are disposed lowermost on one or more of each of the links of the jaw-tongs mechanism.

3. An apparatus according to claim 2, **characterised** in that each link on the jaw-tongs mechanism consists of two members, that each member is mounted pivotably to a lower fitting and to an upper fitting, which fittings form transition to an adjacent link on the jaw-tongs mechanism.

4. An apparatus according to claim 3, **characterised** in that a number of the members on the jaw-tongs mechanism are provided with knee joints and that the members are capable of being bent in the knee joint in such a way that each of the members provided with knee joint may be divided into a first part of the member and a second part of the member, and that the first parts and the other parts, respectively, of the member each have a length which is considerably shorter than the total length of the two parts of the member.

5. An apparatus according to any preceding claim, **characterised** in that the apparatus comprises two jaw-tongs mechanisms extending in parallel, vertical planes, that the two jaw-tongs mechanisms are disposed at a distance from each other, and the two jaw-tongs mechanisms are mutually connected between one or more of the single links of the jaw-tongs mechanisms.

6. An apparatus according to any preceding claim, **characterised** in that the carriage is provided with rotating brushes that are arranged laterally outward lower-most on the carriage, and that the brushes are provided with friction means along an outer periphery of the brushes, which friction means are intended to bear against sides of the container and to drive the carriage forward by frictional engagement with the sides of the container.

7. An apparatus according to claim 6, **characterised** in that the brushes are mounted on arms that are suspended on the carriage pivotably about a vertical axis, that the arms are provided with means for pivoting the arms from a forward directed position to a laterally directed position in order to establish the frictional engagement with the sides of the container, and that the means are capable of holding the arms in the lateral position in order to maintain the frictional engagement between the outer periphery of the brushes and the sides of the container.

8. An apparatus according to any preceding claim, **characterised** in that the carriage is provided with nozzles for flushing detergent forward and laterally, that the nozzles are formed with at least two laterally, mainly vertical opposite spraying pipes and at least one upward directed mainly horizontal nozzle beam that each is provided with holes for discharging the detergent, that the vertical spraying pipes are capable of being displaced laterally inwards and outwards, and that the horizontal nozzle beam is capable of being displaced vertically upwards and downwards.

9. An apparatus according to any preceding claim 2-7, **characterised** in that the carriage is provided with driving wheels that are intended to be driven by an electric, hydraulic, mechanical or pneumatic motor, and that the wheels on the jaw-tongs mechanism are free-running wheels.

10. Use of an apparatus according to any preceding claim for internal cleaning of a freight container for shipping or of a freight container on a lorry or of a freight container on a lorry trailer.

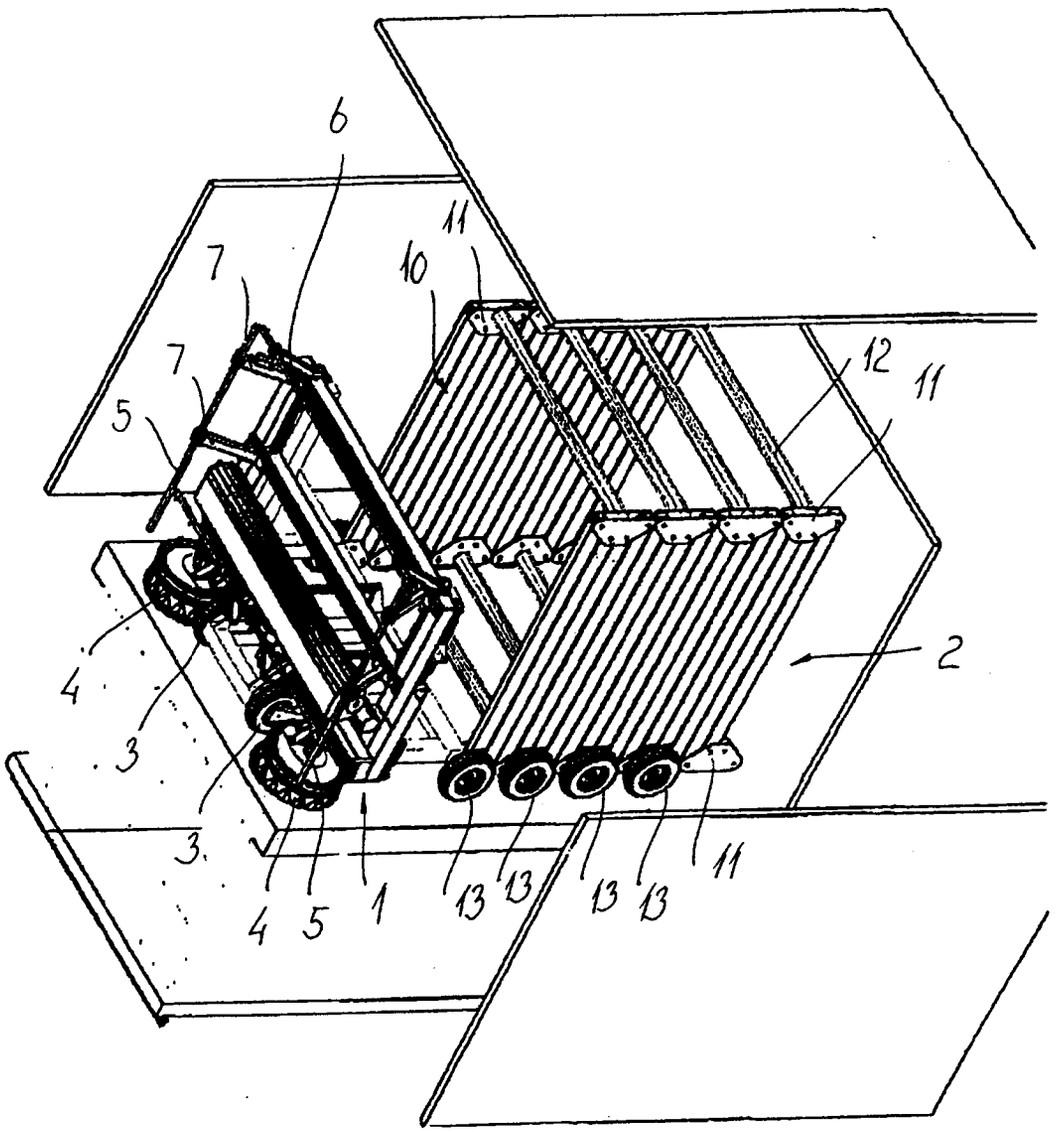

FIG. 1

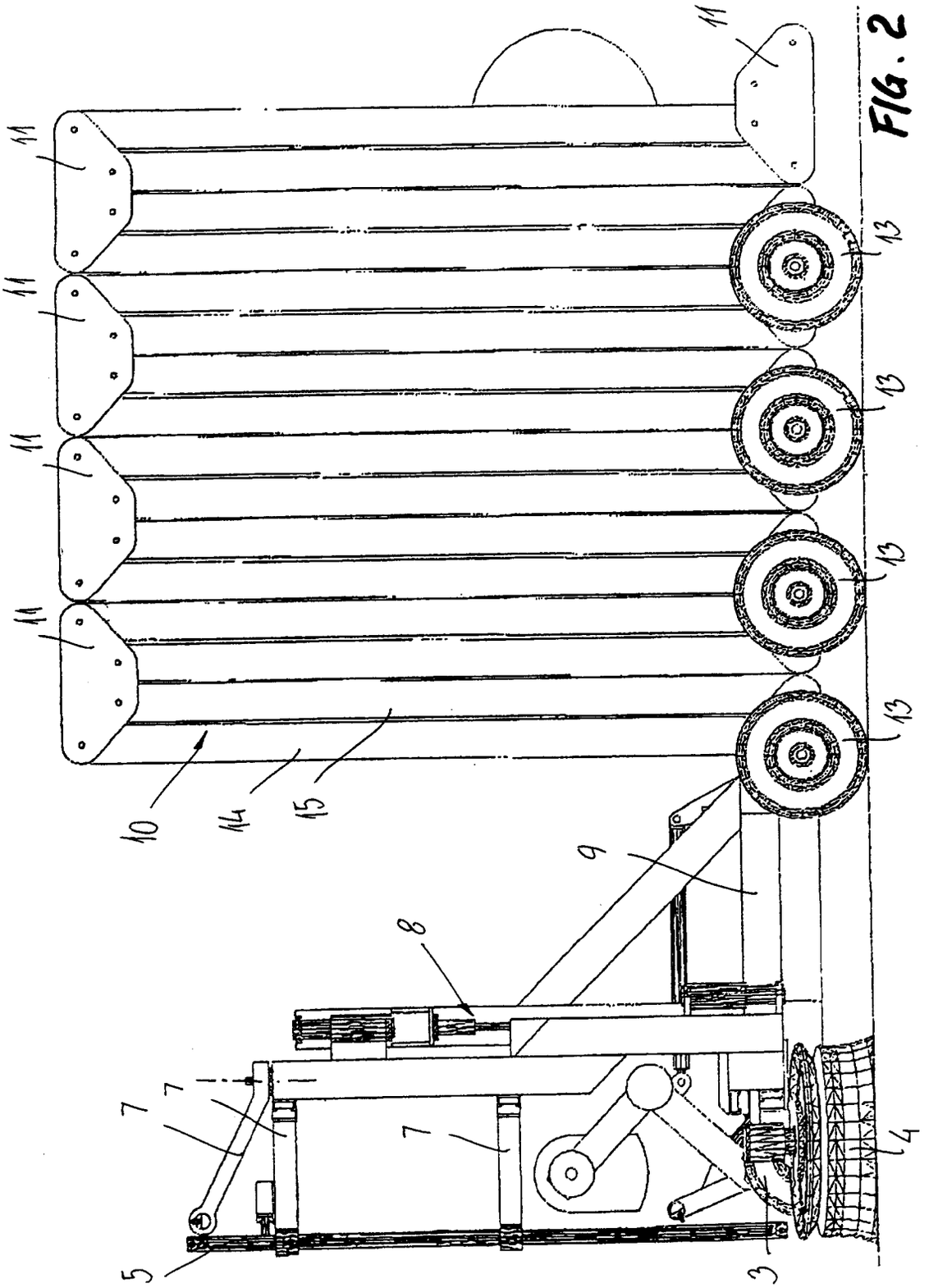

FIG. 2

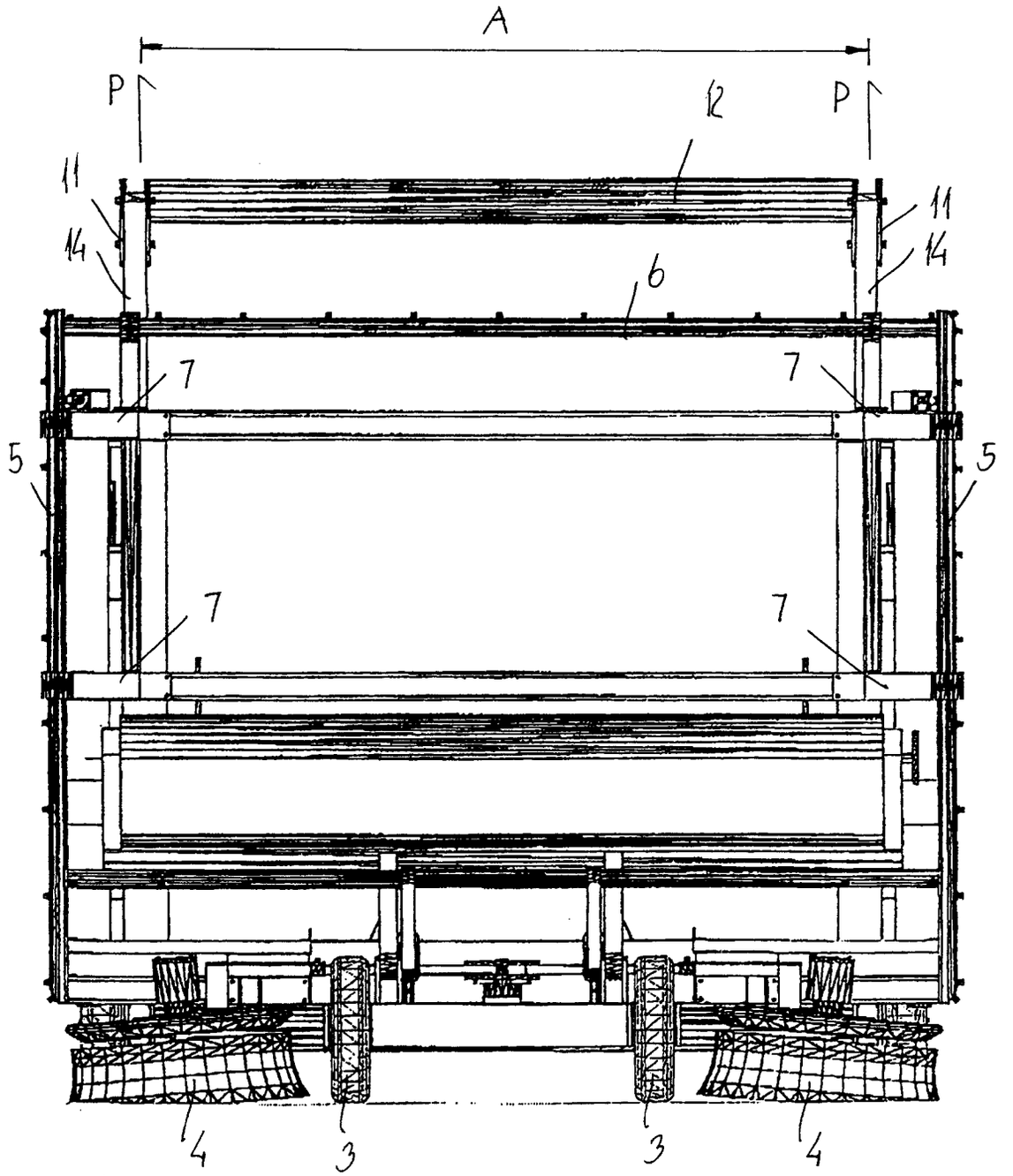

FIG. 3

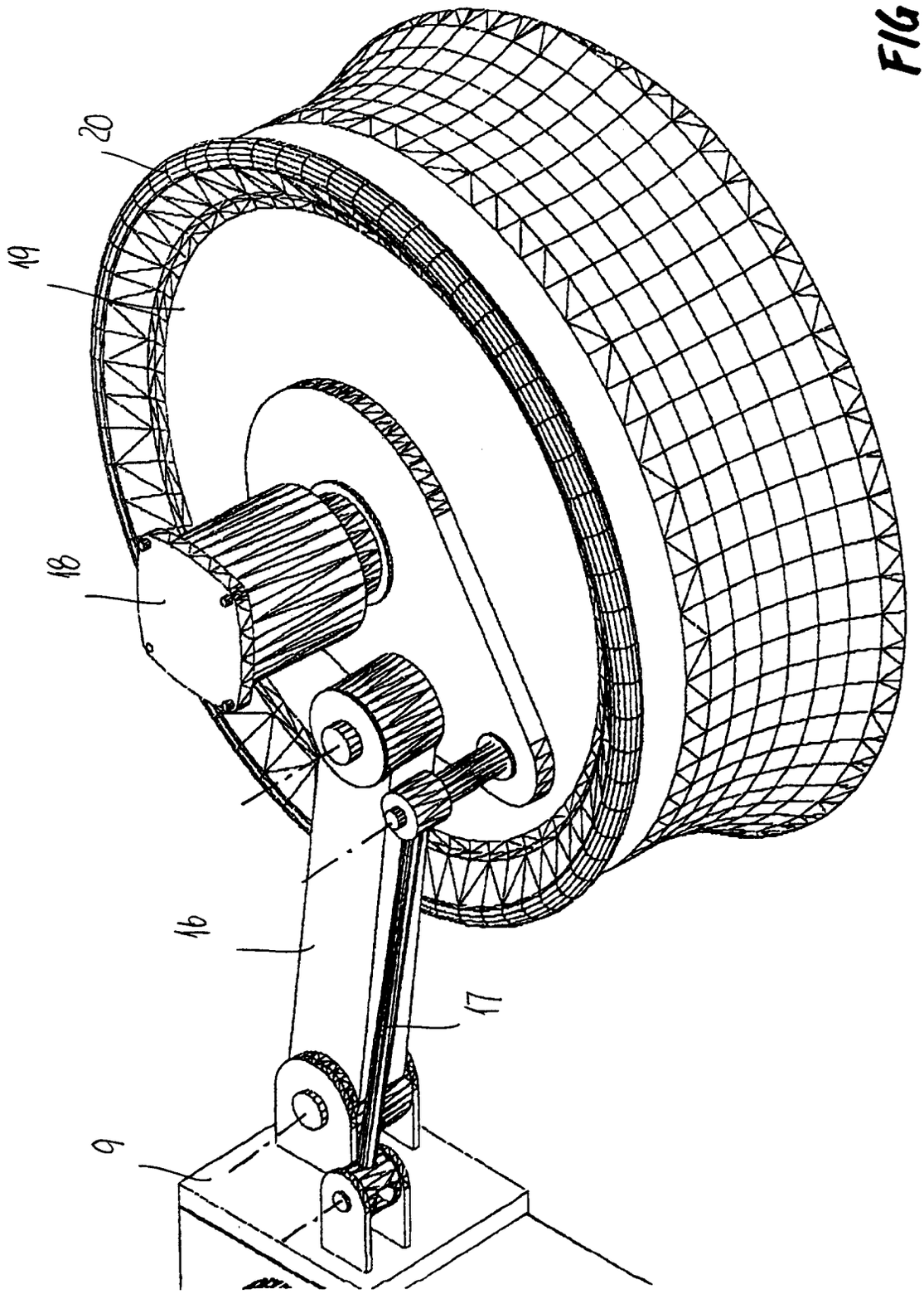

FIG. 4

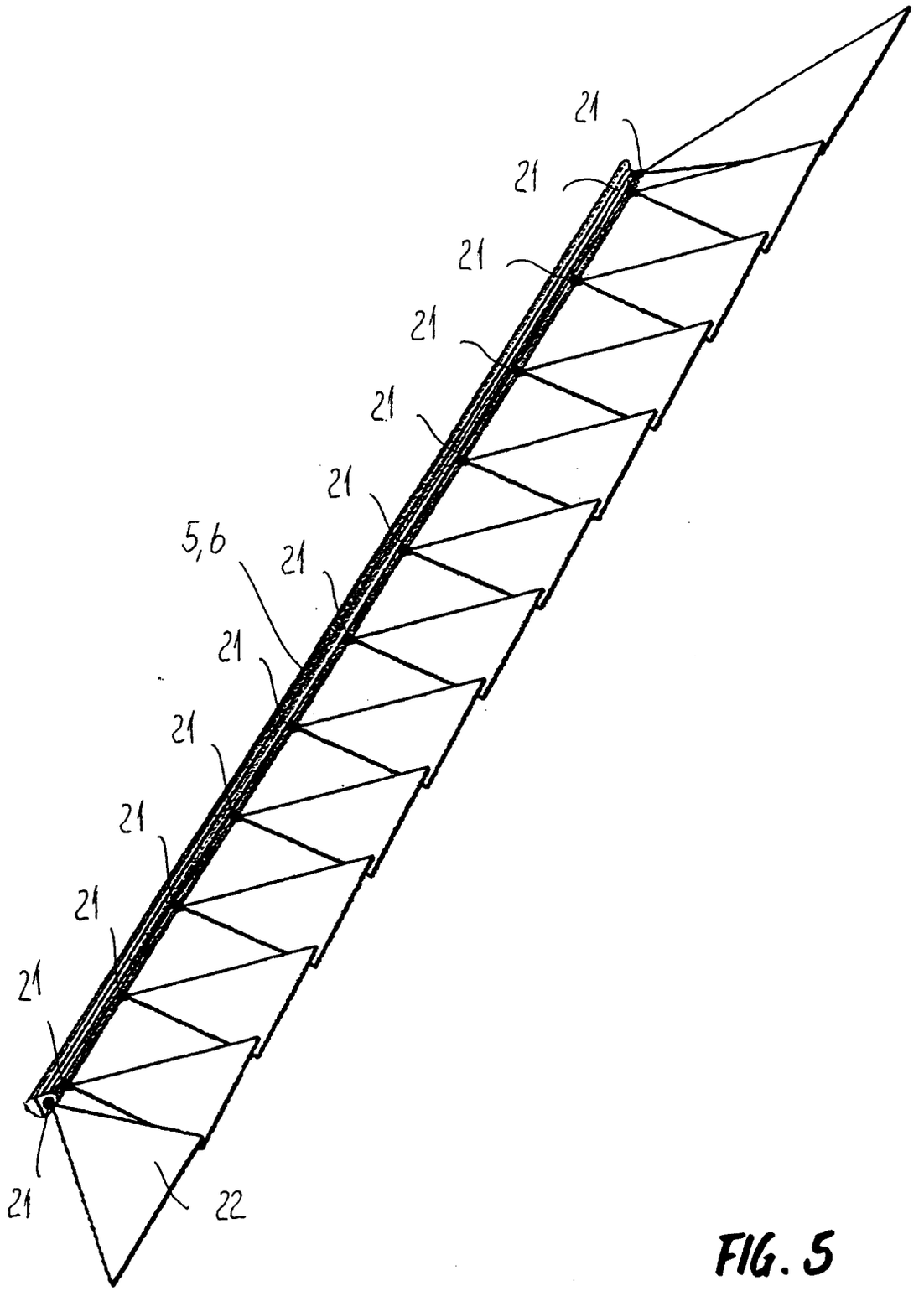

FIG. 5

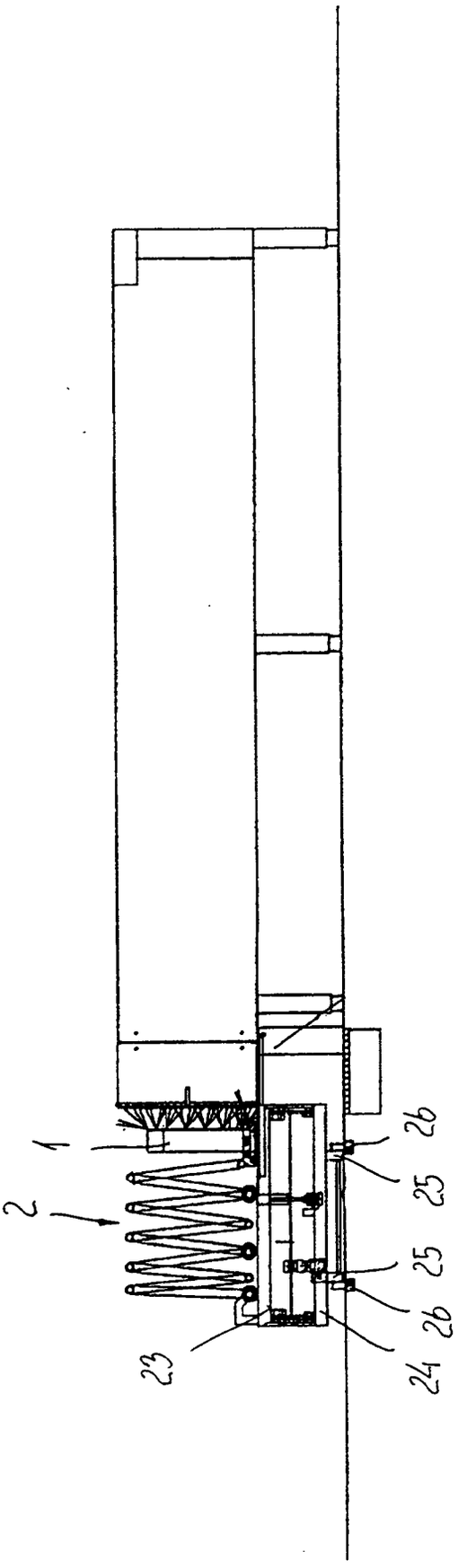

FIG. 6