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(54) Title: VEHICLE FOR TRANSPORTING AND DISPENSING COILED PIPE

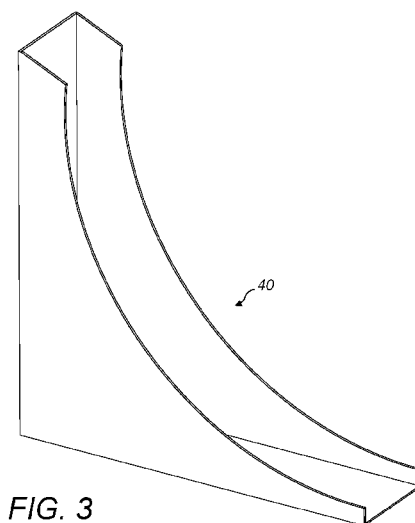


FIG. 3

(57) Abstract: Disclosed is a vehicle (1) for transporting and dispensing coiled pipe (520), comprising: an outer frame (10) arranged substantially around a periphery of the vehicle, such that the coiled pipe (520) is located inside the outer frame (10) for transit; a winch (100) and a towing line, the towing line arranged to couple with a free end of the pipe and being configured to transport the free end of the pipe towards a dispensing portion of the trailer, under control of the winch.

VEHICLE FOR TRANSPORTING AND DISPENSING COILED PIPE

The present invention concerns vehicles for transporting and/or dispensing coiled pipes. In particular, the present invention relates to vehicles of the type which are used to transport large coiled pipes of the type used to convey gas or liquids underground. The vehicles may be powered vehicles (such as customised trucks) or trailers for towing by another vehicle.

Typically, such vehicles in the prior art take the form of a trailer and are able to hold and transport one or more coils of pipe material which has been formed into a coil for ease of transport. However, once the coil of pipe material has been transported to the installation site, it must be safely removed from the vehicle and installed into position. Sometimes, the pipe is installed directly into a trench which has been pre-dug to receive the pipe. Other times, the pipe is forcibly pushed into a pre-installed conduit. Often, such a conduit is an existing pipe and the new pipe is used to line the existing pipe. Such an installation is relatively common where the integrity or structure of the existing pipe is questionable or coming to the end of its life. By forcibly pushing the new pipe into the existing pipe, a more economic means of installing pipe is provided. This can be achieved with or without the carrier pipe (pre-existing conduit) being drained/emptied/decommissioned. Such an operation is known respectively as live or dead insertion.

In societies such as the United Kingdom, which has a very large supply of ageing underground infrastructure, this technique of lining existing pipes is commonly used to avoid disruption and inconvenience caused by digging up highways. Instead, a smaller excavation is made at periodic intervals along the length of the existing pipe and the new pipe is installed by pushing it into the existing conduit from these smaller excavations.

The coiled pipe may be formed from any suitable material, but is commonly formed from polyethylene (PE). Typical dimensions of the pipes commonly transported by prior art vehicles range in diameter from 50mm and up to 125mm and lengths of up to 500m. Other materials and dimensions of pipe are, of course, possible

Figure 1 shows an example of a prior art trailer 500 used to transport coiled pipes to an installation site. Prior art vehicles typically take the form of an enclosed cage structure 510 in which the coiled pipe 520 resides. The trailer is provided with one or more axles each having a pair of wheels 530. Also provided is a coupling hitch
5 for attachment to a towing vehicle (not shown). The trailer 500 shown in figure 1 includes a rotatable hub 550 about which the pipe may be coiled. In the particular example shown, however, a relatively large diameter of pipe is coiled and this resides within the cage 510 of the trailer but is not wound tightly on the hub 550.

10 Once the trailer arrives at the installation site, operatives working in or around the cage are required to remove the strapping 560 which holds the coil in position. Often, the coiled pipes are secured in position using heat welded plastic or metal strapping. This must be cut before the pipe can be unwound and often a saw is used
15 for this cutting process. There is a danger associated with this cutting process that the end of the pipe 520, when free of its strapping, will tend to spring outwards. There is a significant amount of energy stored in the coiled pipe and it has been known for operatives to be injured once the pipe coil is freed. Furthermore, due to the size and scale of the pipe and trailer, operatives are frequently required to climb onto and/or
20 inside the cage in order to free the coiled pipe. This increases the chances of an accident or mishap occurring and the entire uncoiling operation is potentially quite dangerous.

It is therefore an aim of embodiments of the present invention to address these other shortcomings in the prior art.

25 According to the present invention there is provided an apparatus and method as set forth in the appended claims. Other features of the invention will be apparent from the dependent claims, and the description which follows.

30 For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings in which:

Figure 1 shows a prior art trailer for carrying coiled pipe;

Figure 2 shows the upper part of a vehicle according to an embodiment of the present invention;

Figure 3 shows a chute, which forms part of the vehicle shown in figure 2;

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Figure 4 shows a retractable conveyor for use in a second embodiment of the present invention;

Figure 5 shows an embodiment of the present invention with the chute and retractable conveyor in place;

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Figure 6 shows the embodiment of figure 5 with a coiled pipe in position;

Figure 7 shows a view of the second embodiment of the invention in use; and

15

Figure 8 shows a more detailed view of the pipe pusher.

Figure 2 shows the upper part of a vehicle according to an embodiment of the present invention. The upper part of the vehicle is arranged to be fitted to a suitable powered vehicle or to a chassis having wheels and a towing hitch for attachment to a towing vehicle. These parts of the vehicle or trailer have been omitted for clarity purposes since these are standard parts and well-known to the skilled person.

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The structure of embodiments of the present invention will be referred to as a vehicle, and it will be understood that the vehicle will include the structure shown in the figures and described herein, as well as the requisite parts of a powered vehicle or trailer, as appropriate.

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The vehicle 1 comprises a structure, which is generally closed at the sides and generally open at the top, in which is accommodated the coiled pipe to be transported. In particular, there is an outer frame 10 which substantially surrounds the coiled pipe whilst it is being transported. The outer frame is further provided with a wire mesh which impedes access to the interior of the outer frame and is intended to prevent an operative or other person from placing their arms inside the outer frame since this can be dangerous. The wire mesh is not shown in the figures for clarity purposes but the

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skilled person would appreciate that this can be readily applied to the outer frame by means of welding or other fixing techniques.

Figure 6 shows a further embodiment of the vehicle, together with a coiled pipe 5 520 in position for transportation and later installation. As can be seen from figures 2 and 6, the coiled pipe sits on support rollers 20. At least one of these support rollers 20 is adjustable to accommodate coiled pipes 520 having a different coil diameter. The adjustment is performed by means of a suitable provider of motive force, such as a pneumatic or hydraulic system or an electrical motor. The adjustment is controlled 10 by an operative by means of a control panel situated outside of the outer frame.

Also provided to ensure the correct positioning of the coiled pipe within the outer frame are side rams 25 which may be operated to control the position of the coiled pipe from side to side within the outer frame. This can ensure that the coiled pipe is 15 evenly positioned, does not lean over to one side and is properly located for the free end to be dispensed from the vehicle in a process which will be described shortly.

Once the coil is loaded into the vehicle, lateral bars 35 are used to couple the two longer sides of the outer frame together. These are locked in position and ensure 20 that the coil is retained securely in the vehicle, as shown in Figure 6, where the lateral bars 35 sit within the coil.

The free end of the coiled pipe is intended to be discharged from the vehicle in the vicinity of one end of the vehicle 30. This may be the front or the rear of the 25 vehicle as required and may depend on whether the particular embodiment is in the form of a trailer or a powered vehicle.

In prior art vehicles, the free end of the pipe often becomes entangled or snagged on parts of the vehicle or chassis. In embodiments of the present invention, 30 in order to provide a smooth passage way for the coiled pipe to be dispensed, a chute 40 is provided such that the free end of the pipe passes into the chute and is smoothly guided towards the front 30 of the vehicle, from where it is dispensed. The chute 40 takes the form of a smoothly curved channel having a curved concave profile into which the free end of the pipe travels easily and without impairment. The chute is 35 shown in Figure 3 and in-situ in Figure 5.

When the coil is located in the vehicle for transportation, it is secured in a coil formation by a plurality of straps 560 located around the circumference of the coil. These must be individually released or severed before the pipe can be dispensed from the vehicle. In order to access the straps, in prior art vehicles, an operative was required to access the straps through the side of the cage supporting the coiled pipe. This could lead to injury in cases where the cold pipe sprang free with considerable force. Since the operative was accessing the pipe through the side of the cage, this had the potential to cause quite significant injury to the operative.

In the embodiment of the present invention which is shown in figure 2, there is provided at the rear of the vehicle an access platform 50 which includes a ladder (not shown) for accessing the upper portion of the coiled pipe. The access platform 50 further comprises one or more safety rails 55. These safety rails 55 surround the access platform and ensure that if an operative, working at the top of the ladder, leans back or otherwise stumbles, he will not fall to the road surface below. In cases where the free end of the pipe is liable to spring out, the operative is quite likely to react in a way which may cause him to fall backwards and be injured. The access platform and safety rails is intended to mitigate any risk of that happening, combined with further safety features also herein described.

Once located at the top of the ladder, the operative is able to access the various straps which secure the coil in formation. From here, the individual straps may be severed or released individually slowly freeing the coiled pipe. The coiled pipe is initially located in the vehicle such that the free end of the pipe, which is accessible, is positioned towards the end of the vehicle adjacent the access platform 50. In order to ensure that the coiled pipe uncoils safely and reliably, the operative fits a towing head into the free end of the pipe and secures its in position. The towing head is well-known in the art and includes a device which fits securely inside the open end of the pipe and can be fastened in position such that it cannot be easily released. The towing head features an eye at its free end and this eye can be coupled to a towing line (not shown) which is attached to a winch 100 such that the coiled pipe can be uncoiled in a controlled and reliable fashion by use of the winch.

The winch 100 is located conveniently at the same end of the vehicle from which the pipe is to be dispensed, and is controlled from there or elsewhere by an operative. The winch may be powered or manually operable. Suitably, the towing

cable runs from the winch 100 to the rear of the vehicle from where it can be attached to the towing head when the coiled pipe needs to be uncoiled. Usually, the towing cable will be positioned, using a series of rollers and/or pulleys, before the coiled pipe is placed into the vehicle. Once the towing head has been installed into the coiled pipe, the winch cable may be detached from a stowed position and attached to the eye of the towing head.

By careful operation of the winch, the towing head is drawn by means of the towing cable towards the end 30 of the vehicle. As the coiled pipe slowly rotates under the action of the winch and the towing cable, further individual restraining straps come into reach of the operative located on the access platform 50 at the rear of the vehicle. When one becomes available, the winch may be stopped and the strap nearest to the operative may be severed or released accordingly. At all times, the tension which would otherwise cause the pipe to spring outward and potentially injure an operative is kept under control by means of the winch 100 which is operably connected to the towing head in the free end of the pipe.

By continued operation of the winch 100 the free end of the pipe is caused to enter the chute 40 and, due to the gently curving nature of the chute, the free end of the pipe travels easily through it and along the lower part of the vehicle where it is guided by one or more rollers. By the time the free end of the pipe reaches the end 30 of the vehicle, all of the restraining straps holding the coil in formation will have been removed.

In a first embodiment of the present invention, the free end of the pipe is then dispensed from the vehicle and may be used as required. Such use may involve completely uncoiling the pipe and laying in a trench. Alternatively the pipe may be fed into a device for forcibly pushing it into a pre-existing conduit.

In a second embodiment of the present invention, when the free end of the pipe reaches the end 30 of the vehicle, from which it is to be dispensed, it is located into a pipe pushing machine 200 which is provided on a platform 210 which extends downwardly from the end of the vehicle towards the ground such that the free end of the pipe can be forcibly pushed into the pre-existing conduit, which is already positioned underground. Figure 7 shows a view of this second embodiment and Figure 8 shows a more detailed view of the pipe pushing machine.

Figure 4 shows a view of the platform 210 which, in transit, is raised so that it does not foul the road. However, when the vehicle 1 arrives at the installation site, the platform is lowered into position. The platform rotates about hinge points 215 so that
5 the other end of the platform 210 sits on or near the ground.

In this second embodiment, the winch 100 is located part way up the end of the vehicle such that the towing cable passes through the body of the pipe pushing machine 200, via a roller 220. In this way, once the free end of the pipe has been
10 located inside the pipe pushing machine, by action of the winch and towing cable, and the pipe pushing machine has engaged the pipe, the winch may be detached from the towing head and the towing head may be removed from the free end of the pipe.

The pipe pushing machine 200 operates in a grasping and reciprocating fashion
15 to slowly push the pipe into a pre-existing conduit underground. The pipe pushing machine 200 comprises a collar, having 2 halves 201, 202, which surround the pipe. Shims of appropriate dimensions may be inserted as needed. The two halves can be separated and brought into contact. The two halves have a hinged connection 203 on one side and, at the other side, may be opened or closed by means of hydraulic,
20 pneumatic or electrical means 205. Once the free end of the pipe is located inside the pipe pushing machine, the 2 halves of the machine are brought into close proximity so that the pipe is gripped firmly. The pipe pushing machine is then propelled forward along the platform 210 such that the pipe is forcibly propelled from the vehicle and into an underground conduit. Once the pipe pushing machine 200 has reached the end of
25 the platform 210, the pipe pushing machine releases its grip on the pipe by opening the two halves 201, 202 of the collar. The pipe pushing machine then travels back towards the opposite end of the platform 210, where it again grips the pipe and the process is repeated to push a further length of pipe underground. As will be appreciated, the length of pipe which can be pushed underground in any one action is
30 equal to the length of travel along the platform 210. The pipe pushing machine 200 is propelled along the platform by means of hydraulic, pneumatic or electrical force.

By providing the pipe pushing machine in an integral fashion with the vehicle 1, the speed with which pipe may be installed in an underground conduit can be greatly
35 increased. Furthermore, the ease with which the pipe may be initially uncoiled and fed into the pipe pushing machinery as a single process by means of the winch 100,

greatly increases the efficiency of the pipe laying operation and significantly reduces the likelihood of any operative being injured during the process.

There may be occasions when an operative is required to enter the interior of the cage which houses the coil pipe and for this purpose, a door 60 is provided in one or more sides of the outer frame. An operative may be required to enter the interior of the cage to realign the cold pipe or to remove a blockage or obstruction should that be necessary. However, there is a danger to the operative by being inside the cage and as a safety precaution, if the door 60 is opened and audible and/or visual alarm is provided to other operatives in the vicinity so that they are aware that someone is potentially at danger inside the cage of the vehicle.

Embodiments of the present invention provide a quicker and safer means of transporting and, particularly, dispensing coiled pipe.

Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

CLAIMS

1. A vehicle for transporting and dispensing coiled pipe, comprising:

5 an outer frame arranged substantially around a periphery of the vehicle, such that the coiled pipe is located inside the outer frame for transit;

a winch and a towing line, the towing line arranged to couple with a free end of the pipe and being configured to transport the free end of the pipe towards a
10 dispensing portion of the trailer, under control of the winch.

2. A vehicle as claimed in claim 1 wherein a floor of the vehicle comprises at least one adjustable roller, arranged so that the coiled pipe sits upon the at least one adjustable roller, so that the coiled pipe may be appropriately supported in transit and
15 during dispensing.

3. A vehicle as claimed in any preceding claim wherein the outer frame comprises at least one adjustable ram, arranged to contact at least one side of the coiled pipe, so as to adjust the vertical alignment of the coiled pipe and to support it in
20 transit.

4. A vehicle as claimed in any preceding claim wherein the vehicle comprises a curved chute arranged to receive the free end of the pipe, the chute being arranged to guide the free end of the pipe towards the dispensing portion.
25

5. A vehicle as claimed in any preceding claim comprising a pipe-pushing device arranged to grip the pipe and force it from the vehicle into a conduit.

6. A vehicle as claimed in claim 5, wherein the pipe-pushing device is
30 arranged on a platform wherein the platform is configured to move between a stowed position, substantially free of a ground surface and an in-use position where it is positioned adjacent the ground surface.

7. A vehicle as claimed in claim 5 or 6 wherein the pipe-pushing device is
35 arranged to travel back and forth along the platform so as to force the pipe into the conduit.

8. A vehicle as claimed in any preceding claim further comprising an access platform arranged to provide elevated access to an upper portion of the vehicle.

5 9. A vehicle as claimed in claim 8 wherein the access platform is provided with a safety rail arranged to at least partially enclose the platform.

10 10. A vehicle as claimed in any preceding claim wherein the outer frame is further provided with a safety mesh arranged to impede access to the interior of the outer frame.

11. A vehicle as claimed in any preceding claim further comprising an access door provided in the outer frame, said door being provided with an alarm to indicate that the door is open.

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12. A vehicle substantially as hereinbefore described and having particular reference to Figures 2-8 of the accompanying drawings.

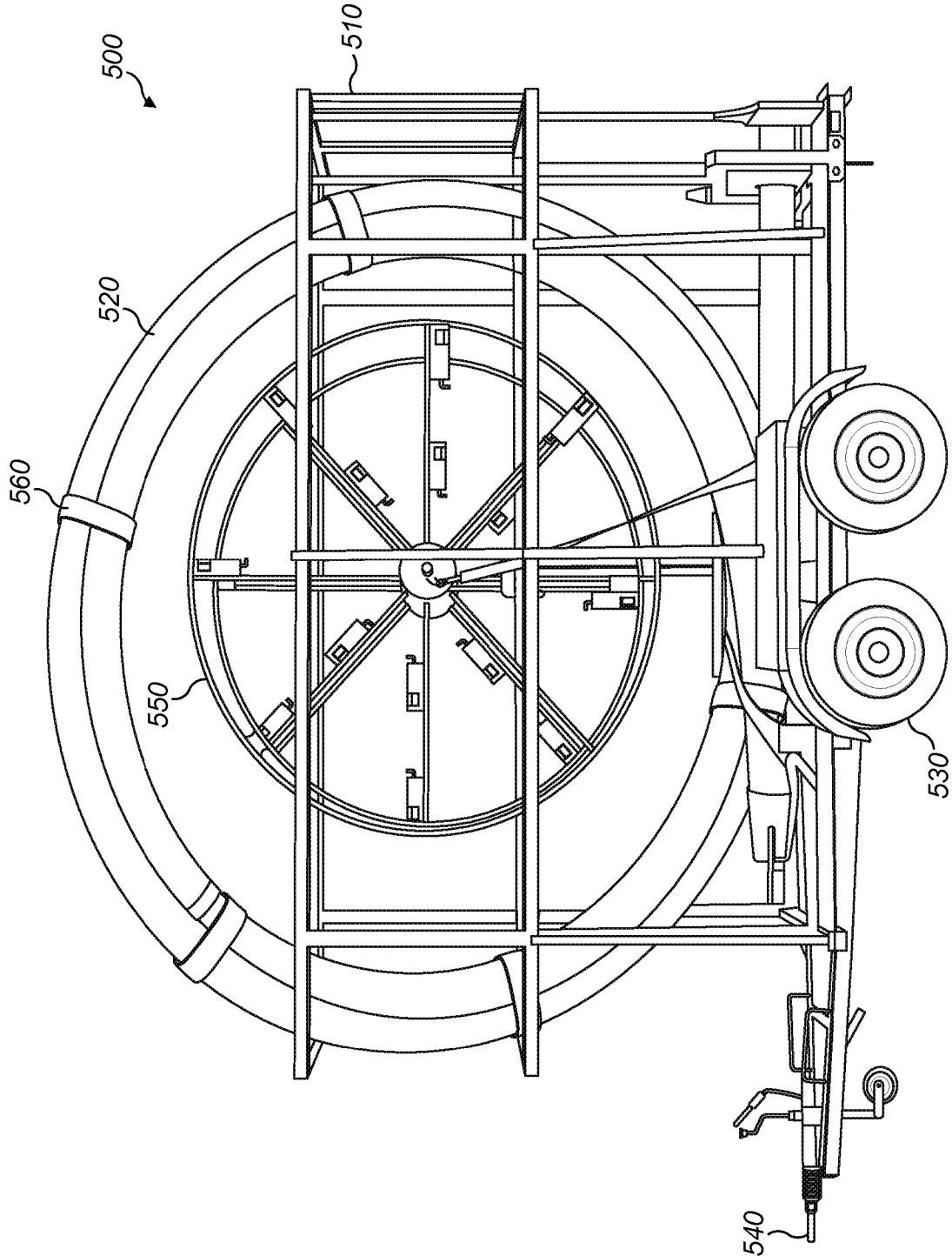


FIG. 1

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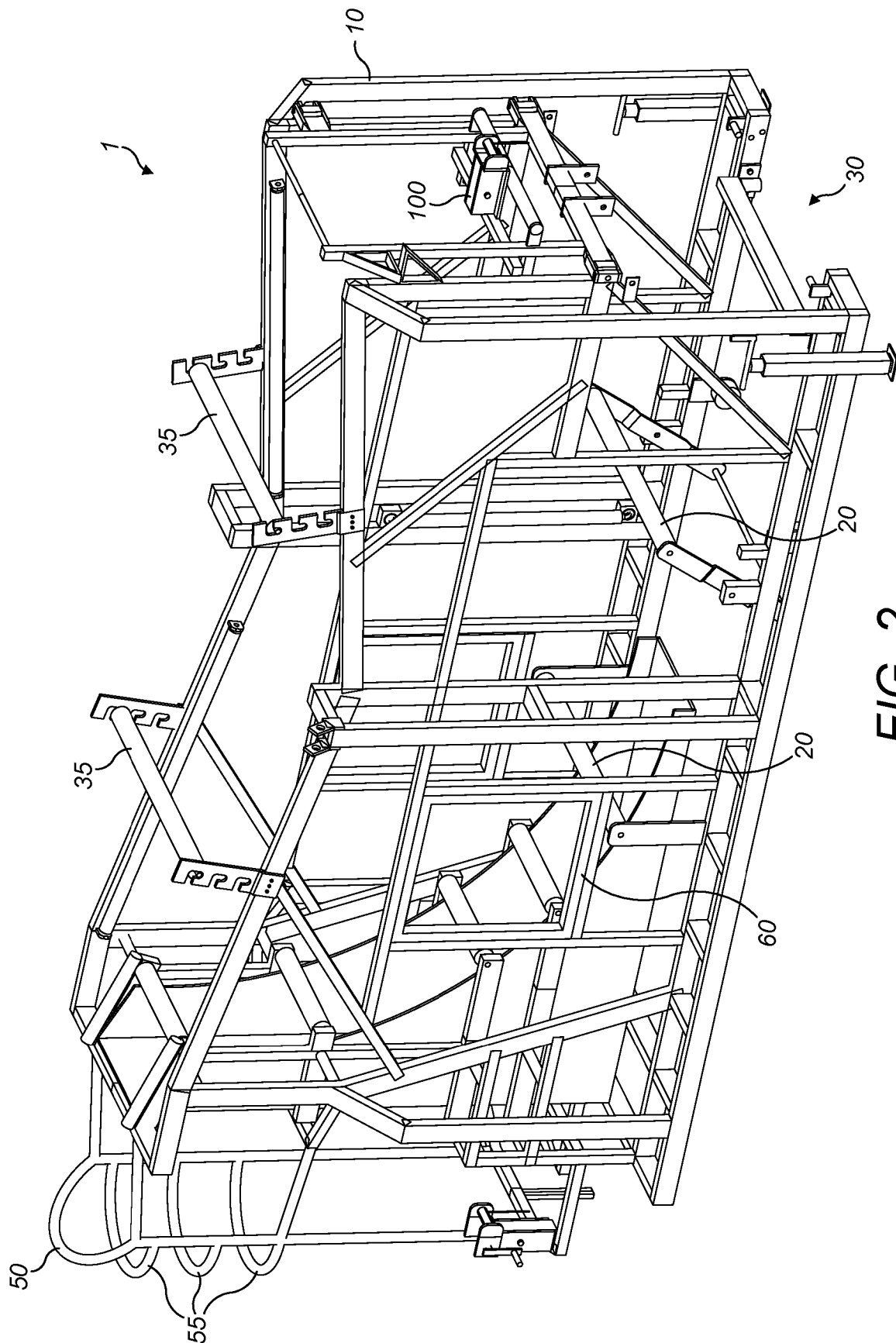


FIG. 2

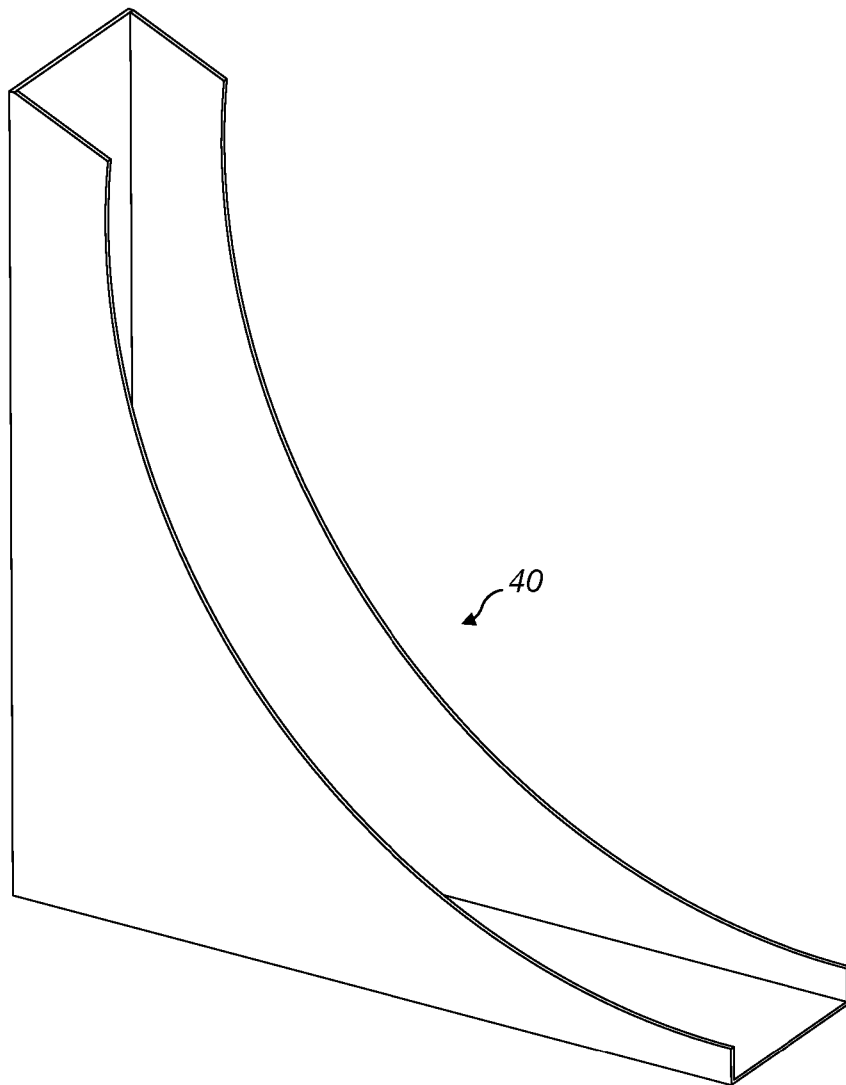
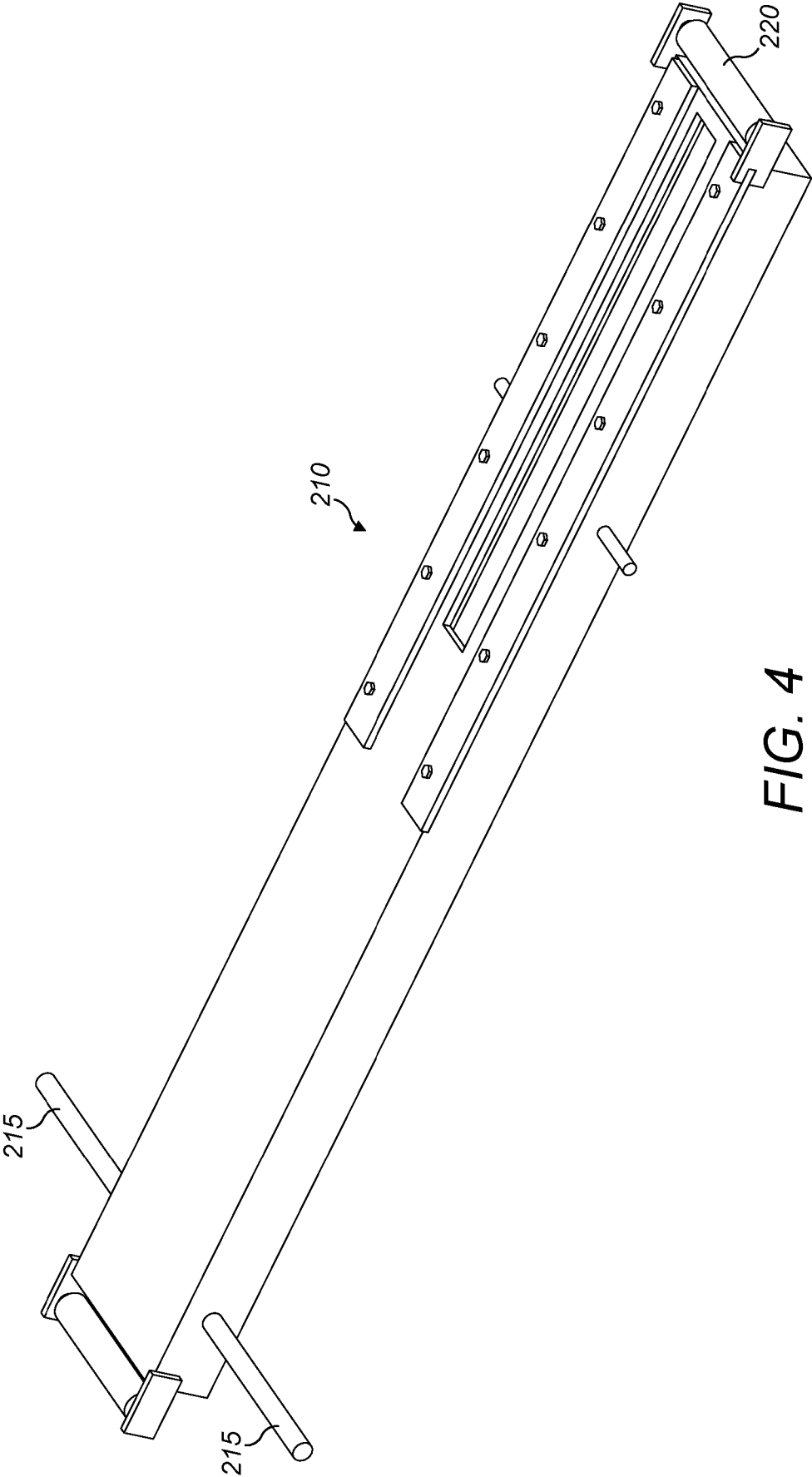


FIG. 3



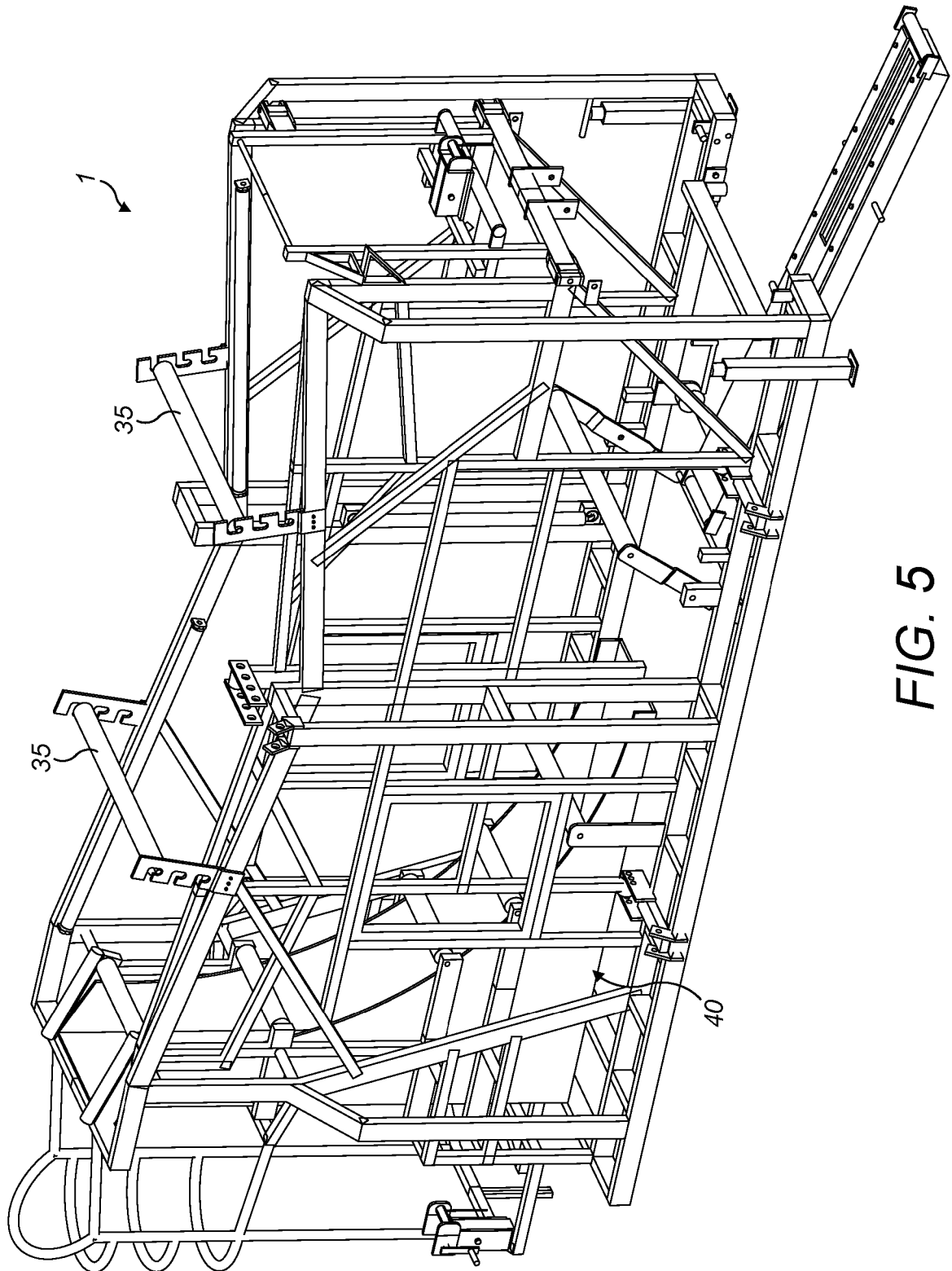


FIG. 5

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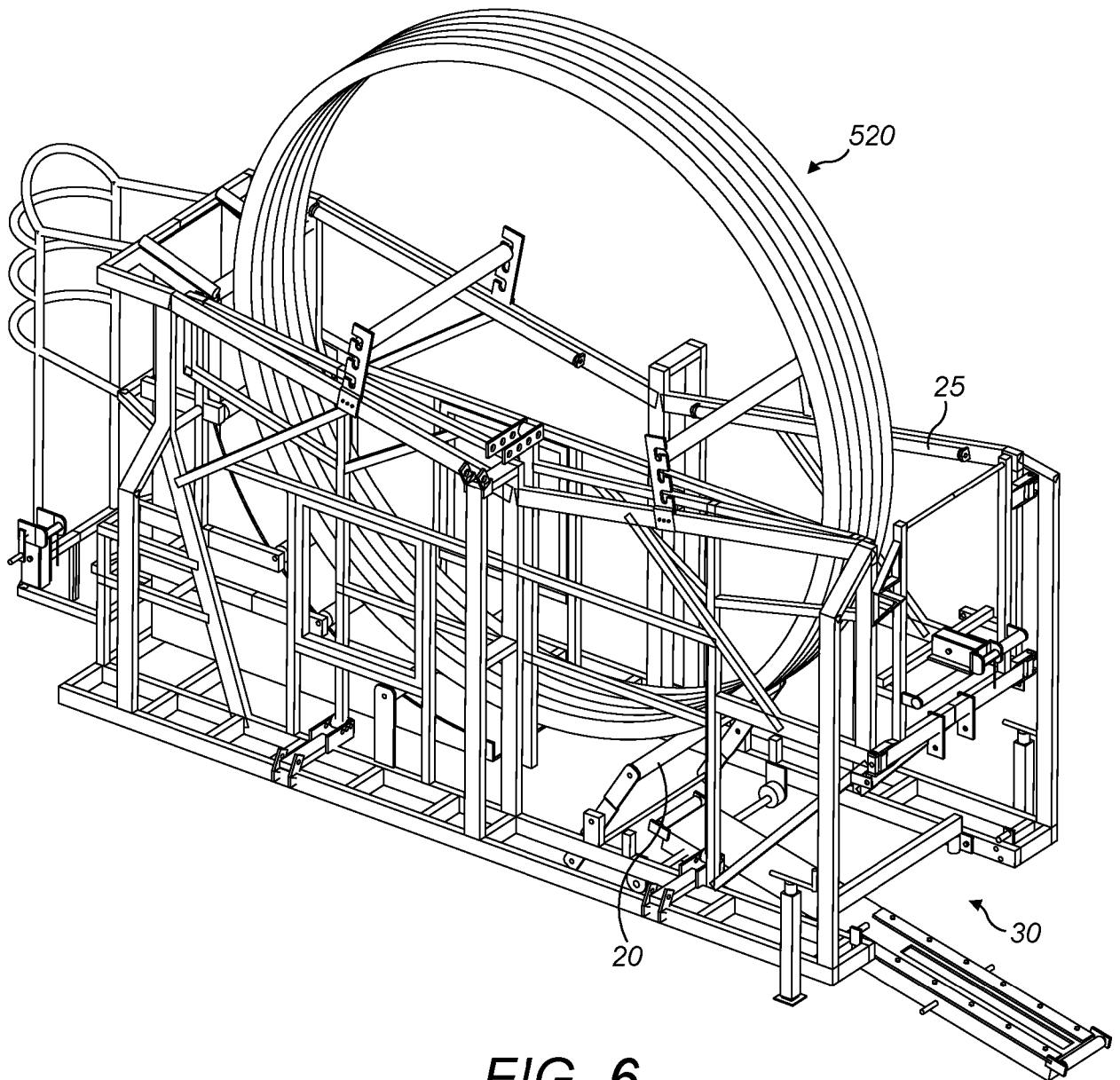


FIG. 6

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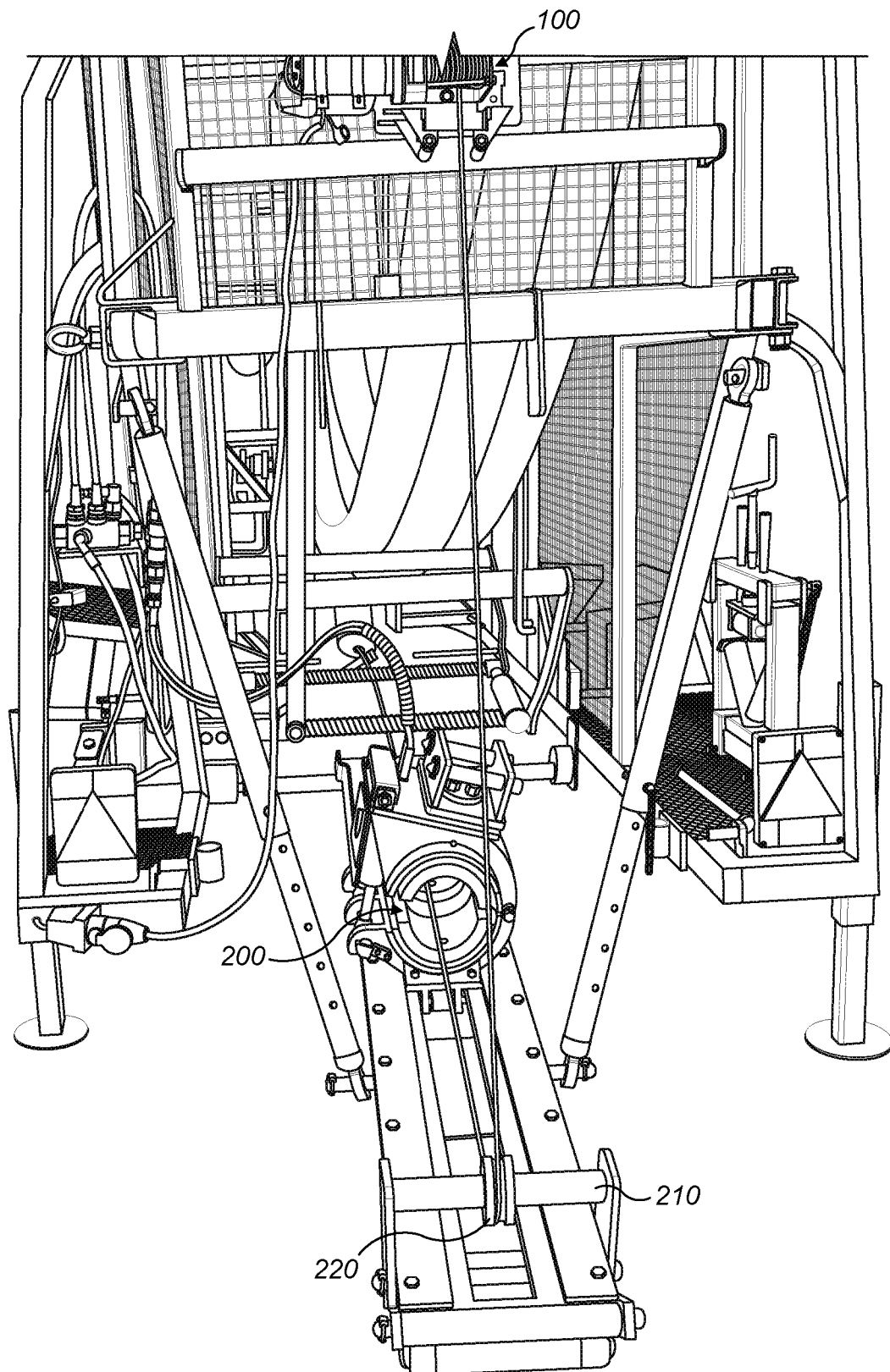


FIG. 7

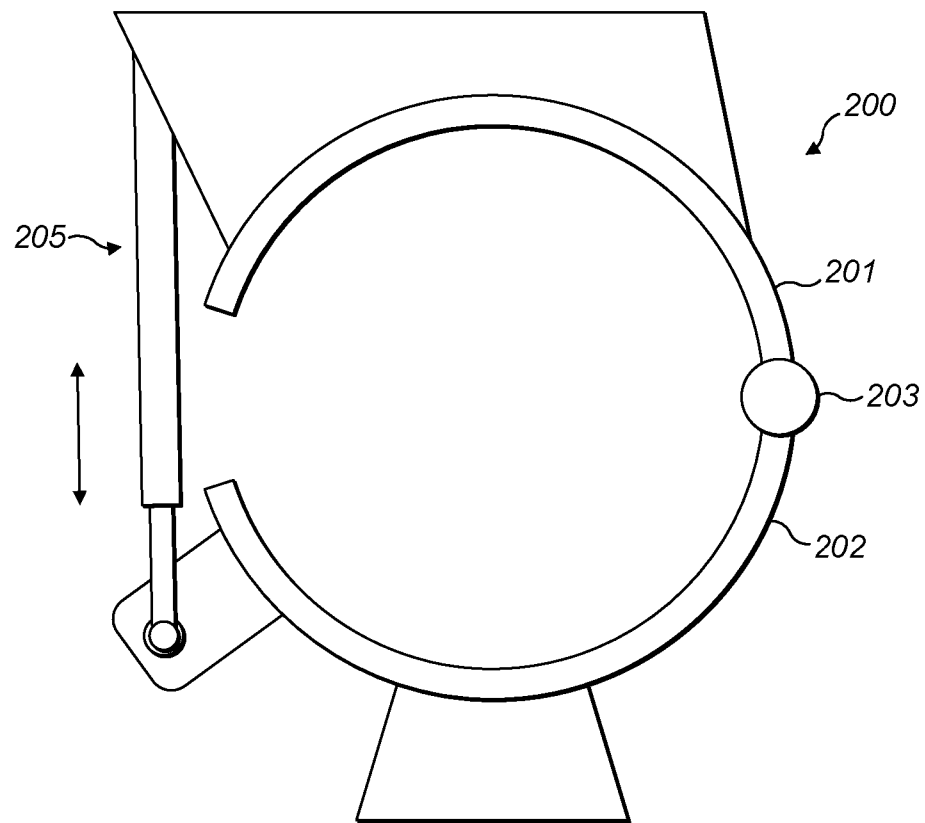


FIG. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2015/050581

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65H49/24 B65H49/30 B65H51/18 B65H51/28
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)
B65H F16L B60P

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.
A	GB 2 211 907 A (PIPE EQUIPMENT LIMITED [GB]) 12 July 1989 (1989-07-12) page 7, line 21 - page 9, line 2; figure 1 -----	1-11
A	GB 2 201 129 A (INDESPENSION LTD INDESPENSION LTD [GB]) 24 August 1988 (1988-08-24) pages 3-5; figure 1 -----	1-11
A	GB 2 471 488 A (BALFOUR BEATTY PLC [GB]) 5 January 2011 (2011-01-05) page 12, lines 4-6; figures 3a-3e -----	1-11
A	US 6 419 424 B1 (NULL ROBERT L [US] ET AL) 16 July 2002 (2002-07-16) figures 1,2 ----- -/-	1-11



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search

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Pussemier, Bart

INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 20 2005 020441 U1 (BAGELA BAUMASCHINEN GMBH & CO [DE]) 9 March 2006 (2006-03-09) figures 1-3 -----	1-11
A	WO 2010/133879 A1 (WELLSTREAM INT LTD [GB]; POWELL MICHAEL [US]) 25 November 2010 (2010-11-25) page 9, lines 18-24; figures 4B, 4C -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2211907	A	12-07-1989	NONE
GB 2201129	A	24-08-1988	NONE
GB 2471488	A	05-01-2011	GB 2471488 A 05-01-2011 WO 2011001183 A1 06-01-2011
US 6419424	B1	16-07-2002	NONE
DE 202005020441	U1	09-03-2006	NONE
WO 2010133879	A1	25-11-2010	CN 102625776 A 01-08-2012 EP 2432721 A1 28-03-2012 US 2012061504 A1 15-03-2012 WO 2010133879 A1 25-11-2010