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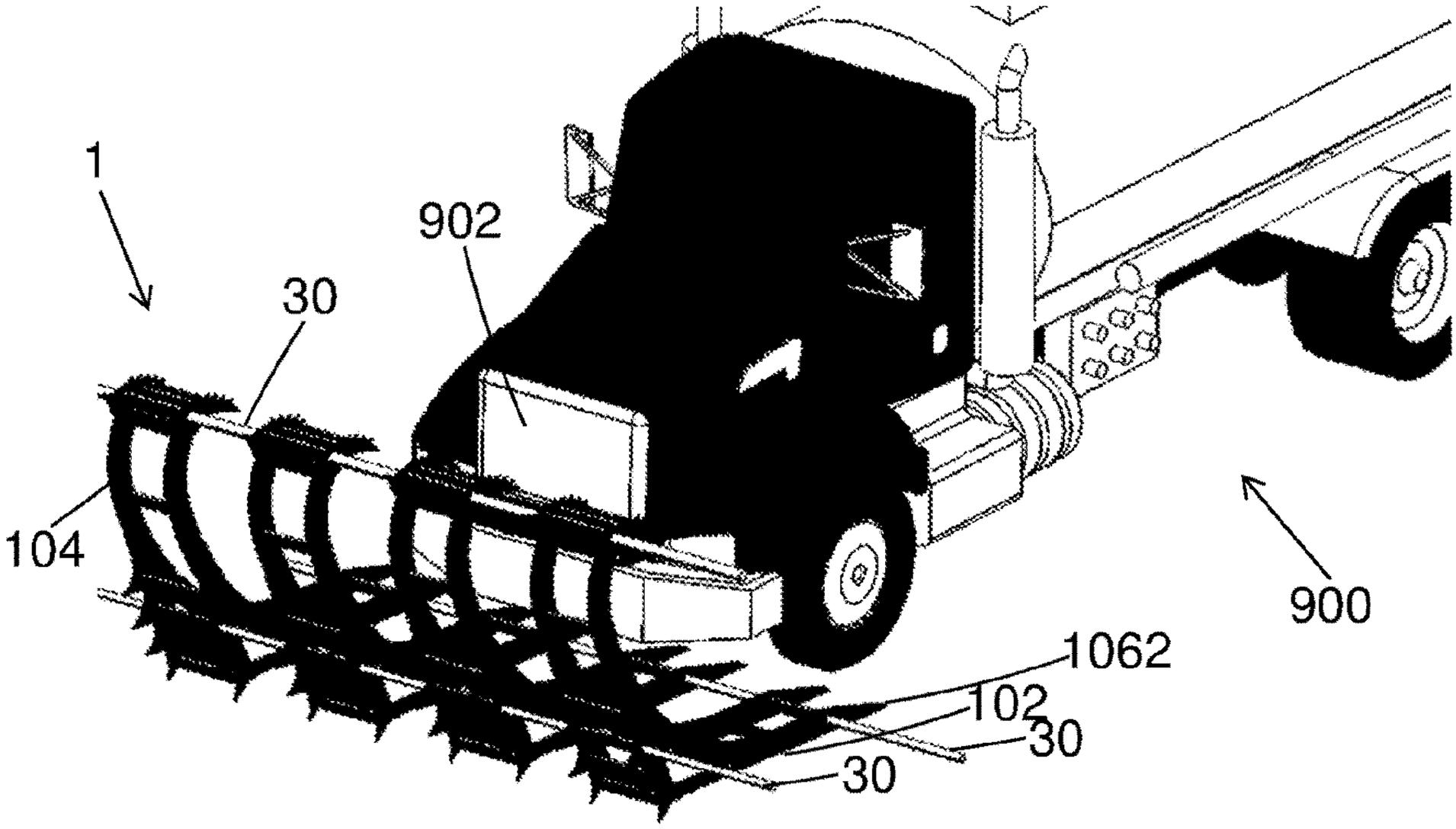

FIG. 26

(57) Abrégé/Abstract:
A rolling barrier system for eliminating movement of a vehicle attempting to cross the rolling barrier system, the rolling barrier system comprising at least one barrier unit configured to roll beneath the vehicle once impacted by the vehicle. Embodiments of the structure and function of the rolling barrier system are disclosed herein.

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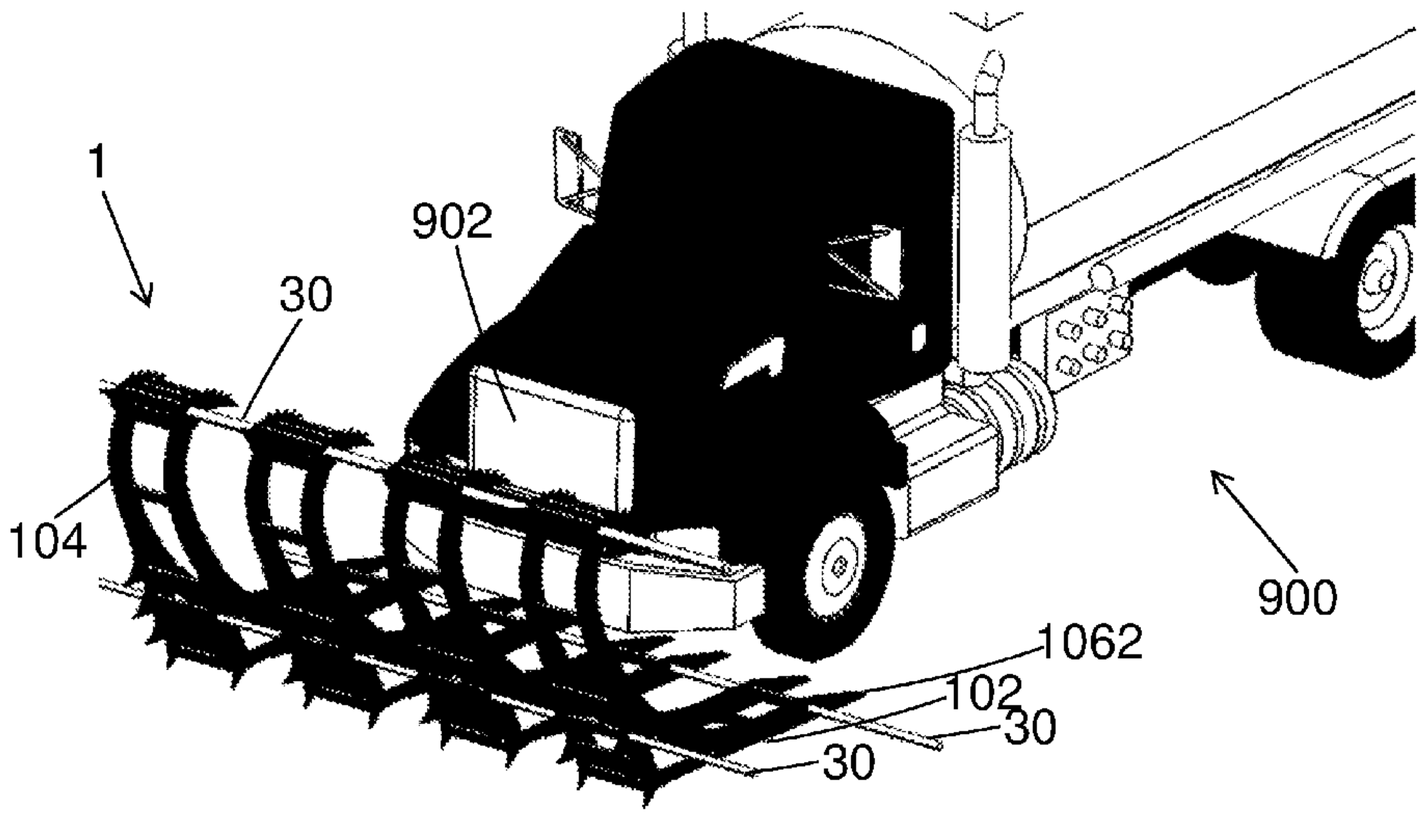

FIG. 26

(57) **Abstract:** A rolling barrier system for eliminating movement of a vehicle attempting to cross the rolling barrier system, the rolling barrier system comprising at least one barrier unit configured to roll beneath the vehicle once impacted by the vehicle. Embodiments of the structure and function of the rolling barrier system are disclosed herein.

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ROLLING BARRIER SYSTEM

CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority to United States Provisional Patent Application No. 62/533,745, filed July 18, 2017, the entire contents of which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

The present disclosed subject matter relates to road barriers. More particularly, the present disclosed subject matter relates to rolling barrier systems for eliminating further movement of vehicles.

BACKGROUND

Road barriers are used to block roads for the purpose of hostile vehicle mitigation as well as controlling vehicular transportation. Control over roads is a security measure that is essential especially in the last decades. It is a necessity to have better control over roads using erectable barriers that can be applied upon need.

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this disclosed subject matter belongs. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of the present disclosed subject matter, suitable methods and materials are described below. In case of conflict, the specification, including definitions, will control. In addition, the materials, methods, and examples are illustrative only and not intended to be limiting.

SUMMARY

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this subject matter belongs. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of the present subject matter, suitable methods and materials are

described below. In case of conflict, the patent specification, including definitions, will control. In addition, the materials, methods, and examples are illustrative only and not intended to be limiting.

According to one aspect of the present subject matter, there is provided a rolling barrier system for eliminating movement of a vehicle attempting to cross the rolling barrier system, the rolling barrier system comprising at least one barrier unit configured to roll beneath the vehicle once impacted by the vehicle.

According to one embodiment, the vehicle is a heavy vehicle.

According to anther embodiment, the barrier unit comprises:

a base configured to be positioned on a surface, and

an upright segment connected to the base and configured to impact a vehicle attempting to cross the barrier unit.

According to yet another embodiment, the base and the upright segment comprise at least one curved rod configured to roll on a surface on which the barrier unit is positioned.

According to still another embodiment, the at least one curved rod is a plurality of curved rods.

According to a further embodiment, the curved rods are configured to connect one to the other.

According to yet a further embodiment, the curved rods are configured to connect with at least one bar.

According to still a further embodiment, the curved rods are configured to connect with at least one plate.

According to an additional embodiment, an edge of the base distal from the upright segment is configured to be imbedded in a bottom of the vehicle attempting to cross the barrier unit.

According to yet an additional embodiment, an edge of the base distal from the upright segment is sharp.

According to still an additional embodiment, an edge of at least one of the at least one curved rods that is at the base, distally to the upright segment, is configured to be imbedded in a bottom of a vehicle attempting to cross the barrier unit.

According to one embodiment, an edge of at least one of the at least one curved rods that is at the base, distally to the upright segment, is sharp.

According to another embodiment, the barrier unit comprises at least one sticking element protruding from the barrier unit and configured to be imbedded in a surface on which the barrier unit stands when the barrier unit rolls.

According to yet another embodiment, at least one of the at least one curved rod comprises at least one sticking element protruding from the barrier unit and configured to be imbedded in a surface on which the barrier unit stands when the barrier unit rolls.

According to still another embodiment, the at least one barrier unit is configured to connect one to the other.

According to a further embodiment, the barrier unit comprises at least one receiving hole, configured to connect to a connector configured to connect barrier units.

According to yet a further embodiment, the connector is a strengthening bar configured to be inserted into corresponding receiving holes of barrier units, thereby connecting the barrier units.

According to still a further embodiment, the receiving hole is configured to accommodate a fastener for connecting the connector to the barrier unit.

According to an additional embodiment, the connector is rigid.

According to yet an additional embodiment, the connector is flexible.

According to still an additional embodiment, the connector is a crossed rigid connector.

According to an additional embodiment, the connector is a crossed flexible connector.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments are herein described, by way of example only, with reference to the accompanying drawings. With specific reference now to the drawings in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of the preferred embodiments, and are presented in the cause of providing what is believed to be the

most useful and readily understood description of the principles and conceptual aspects of the embodiments. In this regard, no attempt is made to show structural details in more detail than is necessary for a fundamental understanding, the description taken with the drawings making apparent to those skilled in the art how several forms may be embodied in practice.

In the drawings:

Figs. 1A-C schematically illustrate perspective views of some exemplary embodiments of a barrier unit 10.

Fig. 2 schematically illustrates, according to an exemplary embodiment, a back view of a barrier unit.

Fig. 3 schematically illustrates, according to an exemplary embodiment, a side view of a barrier unit.

Fig. 4A schematically illustrates, according to an exemplary embodiment, a side view of a barrier unit 10 further comprising at least one receiving hole 112.

Figs. 4B-E schematically illustrate, according to an exemplary embodiment, a side view, an upper view, a back view and a front view, respectively, of a barrier unit further comprising at least one receiving hole on an at least one protruding element.

Fig. 5 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system comprising a plurality of, specifically four, barrier units connected one to the other with three strengthening bars.

Fig. 6 schematically illustrates, according to an exemplary embodiment, a back view of a rolling barrier system comprising a plurality of, specifically four, barrier units connected one to the other with three strengthening bars.

Fig. 7 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system comprising a plurality of, specifically four, barrier units connected one to the other with four strengthening bars.

Fig. 8 schematically illustrates, according to an exemplary embodiment, a back view of a rolling barrier system comprising a plurality of, specifically four, barrier units connected one to the other with four strengthening bars.

Fig. 9 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system comprising a plurality of, specifically four, barrier units connected one to the other with rigid bar connectors.

Fig. 10 schematically illustrates, according to an exemplary embodiment, a back view if a rolling barrier comprising a plurality of, specifically four, barrier units connected one to the other with rigid bar connectors.

Fig. 11 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system comprising a plurality of, specifically four, barrier units connected one to the other by a combination of four strengthening bars and four rigid bar connectors.

Fig. 12 schematically illustrates, according to an exemplary embodiment, a back view of a rolling barrier system comprising a plurality of, specifically four, barrier units connected one to the other by a combination of four strengthening bars and four rigid bar connectors.

Fig. 13 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system comprising a plurality of, specifically four, barrier units connected one to the other with flexible chain connectors.

Fig. 14 schematically illustrates, according to an exemplary embodiment, a back view if a rolling barrier comprising a plurality of, specifically four, barrier units connected one to the other with flexible chain connectors.

Fig. 15 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system comprising a plurality of, specifically four, barrier units connected one to the other by a combination of four strengthening bars and four flexible chain connectors.

Fig. 16 schematically illustrates, according to an exemplary embodiment, a back view of a rolling barrier system comprising a plurality of, specifically four, barrier units connected one to the other by a combination of four strengthening bars and four flexible chain connectors.

Fig. 17 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system comprising a plurality of, specifically two, barrier units connected one to the other with rigid crossed connectors.

Fig. 18 schematically illustrates, according to an exemplary embodiment, a back view of a rolling barrier system comprising a plurality of, specifically two, barrier units connected one to the other with rigid crossed connectors.

Fig. 19 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system 1 comprising a plurality of, specifically four, barrier units 10 connected one to the other with rigid crossed connectors 206.

Fig. 20 schematically illustrates, according to an exemplary embodiment, a back view of a rolling barrier system comprising a plurality of, specifically four, barrier units connected one to the other with rigid crossed connectors.

Figs. 21A-B schematically illustrate, according to an exemplary embodiment, a perspective view of a rolling barrier system 1 comprising a plurality of barrier units 10 connected one to the other with flexible crossed connectors 208.

Figs. 22A-B schematically illustrate, according to an exemplary embodiment, a back view of a rolling barrier system 1 comprising a plurality of barrier units 10 connected one to the other with flexible crossed connectors 208.

Fig. 22C schematically illustrates, according to an exemplary embodiment, an upper view of a rolling barrier system 1 comprising a plurality of barrier units 10 connected one to the other with flexible crossed connectors 208.

Fig. 23 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system comprising a plurality of, specifically four, barrier units connected one to the other by a combination of four strengthening bars and two rigid crossed connectors.

Fig. 24 schematically illustrates, according to an exemplary embodiment, a back view of a rolling barrier system comprising a plurality of, specifically four, barrier units connected one to the other by a combination of four strengthening bars and two rigid crossed connectors.

Fig. 25 schematically illustrates, according to an exemplary embodiment, a perspective view of a vehicle impacting a rolling barrier system.

Figs. 26-28 schematically illustrate, according to an exemplary embodiment, a front perspective view (Fig. 26), a front view (Fig. 27), an upper view (Fig. 28) and a side view (Fig.

29), of a vehicle impacting a rolling barrier system comprising at least one barrier unit connected one to the other with at least one strengthening bar.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Before explaining at least one embodiment in detail, it is to be understood that the subject matter is not limited in its application to the details of construction and the arrangement of the components set forth in the following description or illustrated in the drawings. The subject matter is capable of other embodiments or of being practiced or carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein is for the purpose of description and should not be regarded as limiting. In discussion of the various figures described herein below, like numbers refer to like parts. The drawings are generally not to scale.

For clarity, non-essential elements were omitted from some of the drawings.

The present subject matter provides a rolling barrier system for eliminating movement of a vehicle attempting to cross the rolling barrier system, the rolling barrier system comprising at least one barrier unit configured to roll beneath the vehicle once impacted by the vehicle. According to one embodiment, the rolling barrier system 1 comprises at least one barrier unit 10. According to another embodiment, the rolling barrier system 1 comprises a plurality of barrier units 10. According to one embodiment, the at least one barrier unit 10 is configured to roll and eliminate movement of a vehicle attempting to cross the at least one barrier unit 10. According to another embodiment, the vehicle is a heavy vehicle, for example a truck, a bus and the like. According to another embodiment, the at least one barrier unit 10 is configured to connect one to the other. According to yet another embodiment, the at least one barrier unit 10, or the plurality of barrier units 10, either separately or connected one to the other, are placed one besides the other across a road, opposite to the traffic direction.

Figs. 1A-C schematically illustrate perspective views of some exemplary embodiments of a barrier unit 10.

Fig. 2 schematically illustrates, according to an exemplary embodiment, a back view of a barrier unit 10.

Fig. 3 schematically illustrates, according to an exemplary embodiment, a side view of a barrier unit 10.

According to one embodiment, illustrated in Figs. 1A-C, the barrier unit 10 comprises a base 102 connected to an upright segment 104. The base 102 is configured to stand on a surface, for example a road, and the upright segment 104 is configured to impact a vehicle attempting to cross the barrier unit 10. According to yet another embodiment, the base 102 and the upright segment 104 comprise at least one, curved rod 106, configured to roll on a surface on which the barrier unit 10 stands, for example once the barrier unit 10 is impacted by a vehicle. According to still another embodiment, the base 102 and the upright segment 104 comprise a plurality of, preferably two, curved rods 106, configured to roll on a surface on which the barrier unit 10 stands, for example once the barrier unit 10 is impacted by a vehicle. According to an additional embodiment, as can be seen in Figs. 1A and 2, two curved rods 106 are connected one to the other with at least one bar 108. According to yet an additional embodiment, illustrated in Figs. 1B-C, the two curved rods 106 are connected one to the other with at least one plate 500. In other words, the curved rods 106 are configured to be connected one to the other, for example with at least one bar 108, or at least one plate 500, or at least one bar 108 and at least one plate 500, as described hereinafter. As can be seen in Figs. 1B-C, the at least one plate 500 connects entirely along the length of the two curved rods 106 in the base 102 and the upright segment 104. However, this should not be considered as limiting the scope of the present subject matter. According to still an additional embodiment, not illustrated, only part of the length of the curved rods 106 is connected with a plate 500, for example only in the base 102 or part of it, or in the upright segment 104 or part of it, or only in part of the base 102 and the upright segment 106. According to a further embodiment, the two curved rods 106 may be connected with at least one bar 108, and above the at least one bar 108 the two curved rods 106 are connected with at least one plate 500, as can be seen for example in Fig. 1C.

According to one embodiment, the at least one plate 500 is made of a rigid material, for example wood, plastic, metal and the like. According to a preferred embodiment, the plate 500 is made of a reinforced rigid material, for example steel and the like.

According to one embodiment, an edge of the base 102 distal from the upright segment 104 is configured to be imbedded in a bottom of a vehicle attempting to cross the barrier unit 10.

According to another embodiment, the edge distal from the upright segment 104 is a sharp. According to the embodiment illustrated in Figs. 1A and 3, at least one of the curved rods 106 comprises a sharp edge 1062 at the edge of the base 102 distal from the upright segment 104, forming the sharp edge of the base 102. The sharp edge 1062 of the curved rod 106 is configured to be imbedded in a bottom of a vehicle attempting to cross the barrier unit 10.

According to another embodiment, illustrated in Fig. 1A, the barrier unit 10 further comprises at least one sticking element protruding from the barrier unit 10 and configured to be imbedded in a surface on which the barrier unit 10 stands when the barrier unit 10 rolls. Fig. 1A illustrates some exemplary sticking elements 1072, 1074, 1076, and 1078, protruding from the curved rods 106. Preferably, the sticking elements have a sharp tooth-like shape that is configured to be imbedded in the surface, for example a ground or a road, when the barrier unit 10 rolls. However, any shape of the sticking element that enables the imbedding of the sticking elements in a surface, for example a ground or a road is under the scope of the present subject matter. According to another embodiment, the sticking elements are preferably sharp protrusions on the two curved rods 106 of the barrier unit 10, or sharp protrusions of at least one of the two curved rods 106 at the direction that is opposite the direction of the vehicle.

According to one embodiment, at least one first sticking elements 1072 are positioned substantially at the merging point of the base 102 with the upright segment 104. According to another embodiment, at least one second sticking elements 1074 are positioned substantially at the upright segment 104, preferably at a lower part of the upright segment 104, adjacent to the base 102. According to yet another embodiment, at least one third set of sticking elements 1076 is positioned substantially at an upper part of the upright segment 104. According to still another embodiment, at least one fourth set of sticking element 1078 is positioned substantially near the edge of the upright segment 104. This edge of the upright segment is preferably bent towards the direction of the vehicle so that the set of sticking elements 1078 protrudes upwardly. When the barrier is upside down, those sticking elements are configured to be imbedded into the surface the barrier stands on. It should be noted though that the scope of the subject matter is not limited to the aforementioned positions of the sticking elements on the barrier unit 10, and that any positioning of the sticking elements that allows functioning of the barrier unit 10 during an impact with a vehicle as described hereinafter is under the scope of the present subject matter.

When a vehicle attempts to cross the barrier unit 10, the front of the vehicle impacts the upright segment 104, and as the vehicle moves forward, the upright segment 104 is pushed forward, and due to the curvy structure of the barrier unit 10, the barrier unit 10 rolls forward while the edges 1062 of the two curved rods 106 at the base 102 are imbedded in the bottom of the vehicle. As the barrier 10 continues to roll forward, the edges 1062 are lifted and lift the vehicle. During the rolling of the barrier unit 10, the at least one first sticking element 1072 is imbedded in the surface, for example a ground or a road, thus embedding the barrier unit 10 in place, and preventing sliding of the barrier unit 10 on the surface. Then, as the barrier unit 10 continues to roll forward, the at least second sticking element 1074 sticks in the ground or road, and then the at least one third sticking element 1076 sticks in the ground or road, thus further embedding the barrier unit 10 in place, and preventing sliding of the barrier unit 10 on the ground or road. At this point of time, due to the high energy level of the impact of the vehicle with the rolling barrier 10, the rolling barrier 10 continues to roll forward and then it turns over to an inverted orientation in which the barrier unit 10 stands on the surface upside down, standing essentially on the edges 1062 and the at least one fourth sticking element 1078, while the vehicle is positioned on the inverted barrier unit 10, while the bottom of the vehicle lies on the at least one first sticking element 1072 and the at least one second sticking element 1074. Thus, a vehicle that attempts to cross the barrier unit 10 undergoes a shift from a state of moving forward to a state of being lifted on the inverted barrier unit 10. In other words, the forward kinetic energy of the vehicle is converted, as the vehicle moves forward, to potential energy, when the vehicle is being lifted on the inverted barrier unit 10.

According to another embodiment, illustrated in Figs. 1A-C, the barrier unit 10 further comprises holes 1092 configured to allow insertion of forks of a forklift, thus enabling easy and convenient transport and positioning of the barrier unit 10.

According to one embodiment, the barrier unit 10 is configured to connect one to the other. According to another embodiment, the barrier unit 10 comprises at least one receiving hole 112, configured to connect to a connector configured to connect barrier units 10. According to yet another embodiment, the connector is a strengthening bar 30 configured to be inserted into corresponding receiving holes 112 of barrier units 10, thereby connecting the barrier units 10. According to still another embodiment, the receiving hole 112 is configured to accommodate a

fastener for connecting the connector to the barrier unit 10. According to a further embodiment, the connector is rigid. According to yet a further embodiment, the connector is flexible. According to still a further embodiment, the connector is a crossed rigid connector. According to an additional embodiment, the connector is a crossed flexible connector. Some examples of the aforementioned embodiments relating to connecting barrier units 10 are given hereinbelow.

Fig. 4A schematically illustrates, according to an exemplary embodiment, a side view of a barrier unit 10 further comprising at least one receiving hole 112. According to one embodiment, the receiving hole 112 is configured to accommodate a strengthening bar 30. Thus, a plurality of barrier units 10 are configured to be connected one to the other by inserting at least one strengthening bar 30 into corresponding receiving holes 12 of different barrier units 10, as will be illustrated hereinafter. According to the embodiment illustrated in Fig. 4A, the at least one receiving hole 112 is on the curved rod 106 and allows insertion of a strengthening bar 30 through the receiving hole 112, as described hereinafter, for example in Fig. 5.

Figs. 4B-E schematically illustrate, according to an exemplary embodiment, a side view, an upper view, a back view and a front view, respectively, of a barrier unit further comprising at least one receiving hole on an at least one protruding element. The barrier unit 10 illustrated in Figs. 4B-E is similar to the barrier unit 10 illustrated in Figs. 1B-C. According to another embodiment, illustrated for example in Figs. 1B-C and Figs. 4B-E, the at least one receiving hole 112 is on a protruding element 117 attached to the curved rod 106. The receiving hole 112 that is on the protruding element 117 is configured to accommodate a fastener, for example a screw, a bolt, a nail, a pin and the like.

According to one embodiment, the receiving hole 112, in any of the aforementioned embodiments is configured to connect to a connector 20 configured to connect adjacent barrier units 10, as described hereinafter.

Fig. 5 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system 1 comprising a plurality of barrier units 10 connected one to the other with strengthening bars 30 that passes through the units 10 so as to form a united front.

Fig. 6 schematically illustrates, according to an exemplary embodiment, a back view of a rolling barrier system 1 comprising a plurality of, specifically four, barrier units 10 connected one to the other with three strengthening bars 30.

According to the embodiment illustrated in Figs. 5 and 6, the rolling barrier system 1 comprises four barrier units 10 connected one to the other with three strengthening rods 30 – one at an upper part of the upright segments 104, one a lower part of the upright segments 104 and one at the bases 102.

Fig. 7 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system 1 comprising a plurality of, specifically four, barrier units 10 connected one to the other with four strengthening bars 30.

Fig. 8 schematically illustrates, according to an exemplary embodiment, a back view of a rolling barrier system 1 comprising a plurality of, specifically four, barrier units 10 connected one to the other with four strengthening bars 30.

According to the embodiment illustrated in Figs. 7 and 8, the rolling barrier system 1 comprises four barrier units 10 connected one to the other with four strengthening bars 30 – one at an upper part of the upright segments 104, and three at a lower part of the upright segments 104.

The length of the strengthening bars 30 is configured to allow connection of any desired number of barrier units 10 according to the desired size of the rolling barrier system 1. An advantage of this embodiment is that it allows rapid and convenient assembly and disassembly of a rolling barrier 1. Assembly is essentially achieved by placing multiple barrier units 10 one adjacent to the other and inserting at least one strengthening bar 30 through corresponding receiving holes 112 of the adjacent barrier units 10. Disassembly is achieved simply by pulling out the at least one strengthening bar 30 from the receiving holes 112.

A method for assembling a rolling barrier system 1 using strengthening rods 30 comprises:

- arranging multiple barrier units 10 one aside another; and
- inserting at least one strengthening rod 30 into corresponding receiving holes 112 of the barrier units 10.

A method for disassembling a rolling barrier system 1 comprising multiple barrier units 10 connected with at least one strengthening bar 30 comprises:

- pulling out the at least one strengthening bar 30 from the receiving holes 112 of the barrier units 10.

Another way of connecting barrier units 10 one to the other is by using connectors 20 configured to connect two adjacent barrier units 10. It should be noted though that the aforementioned strengthening bars 30 may also be considered as connectors 20. The connectors 20 may be of any type and shape. Any number of connectors 20 may be used to connect two adjacent barrier units 10, and the connection point of the connectors 20 to the barrier units 10 may be at any place on the barrier unit 10. Some exemplary connectors 20 are described hereinafter.

Fig. 9 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system 1 comprising a plurality of, specifically four, barrier units 10 connected one to the other with rigid bar connectors 202.

Fig. 10 schematically illustrates, according to an exemplary embodiment, a back view if a rolling barrier 1 comprising a plurality of, specifically four, barrier units 10 connected one to the other with rigid bar connectors 202.

According to the embodiment illustrated in Figs. 9 and 10, the connectors 20 are rigid bar connectors 202, made of any rigid material known in the art, for example steel. Figs. 9 and 10 illustrate an exemplary embodiment, according to which each two adjacent barrier units 10 are connected with four rigid bar connectors 202, two rigid bar connectors 202 are connected to the upper segments 104 of the adjacent barrier units 10, and two rigid bar connectors 202 are connected to the bases 102 of the adjacent barrier units 10.

According to some embodiments, a plurality of barrier units 10 may be connected one to the other by a combination of connectors 20 and strengthening bars 30, as illustrated for example in Figs. 11 and 12. This embodiment increases the strength and durability of the rolling barrier system 1

Fig. 11 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system 1 comprising a plurality of, specifically four, barrier units 10 connected one to the other by a combination of four strengthening bars 30 and four rigid bar connectors 202.

Fig. 12 schematically illustrates, according to an exemplary embodiment, a back view of a rolling barrier system 1 comprising a plurality of, specifically four, barrier units 10

connected one to the other by a combination of four strengthening bars 30 and four rigid bar connectors 202.

According to some embodiments, the connectors 20 may be flexible, as illustrated for example in Figs 13 and 14.

Fig. 13 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system 1 comprising a plurality of, specifically four, barrier units 10 connected one to the other with flexible chain connectors 204.

Fig. 14 schematically illustrates, according to an exemplary embodiment, a back view if a rolling barrier 1 comprising a plurality of, specifically four, barrier units 10 connected one to the other with flexible chain connectors 204.

According to one embodiment, the connector 20 is a flexible chain connector 204. An advantage of the embodiment illustrated in Figs. 13 and 14 is that the flexible chain connector 204 allow some flexibility in the positioning of the barrier units 10, for example they allow easy and convenient distancing of adjacent barrier units 10 one from the other.

Fig. 15 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system 1 comprising a plurality of, specifically four, barrier units 10 connected one to the other by a combination of four strengthening bars 30 and four flexible chain connectors 204.

Fig. 16 schematically illustrates, according to an exemplary embodiment, a back view of a rolling barrier system 1 comprising a plurality of, specifically four, barrier units 10 connected one to the other by a combination of four strengthening bars 30 and four flexible chain connectors 204.

According to the aforementioned embodiments, the connectors 20 have a linear shape, for example a rigid bar connector 202 and a flexible chain connector 204. According to other embodiments, illustrated hereinafter, the connectors 20 may have a crossed shape, either rigid or flexible.

Fig. 17 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system 1 comprising a plurality of, specifically two, barrier units 10 connected one to the other with rigid crossed connectors 206.

Fig. 18 schematically illustrates, according to an exemplary embodiment, a back view of a rolling barrier system 1 comprising a plurality of, specifically two, barrier units 10 connected one to the other with rigid crossed connectors 206.

Fig. 19 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system 1 comprising a plurality of, specifically four, barrier units 10 connected one to the other with rigid crossed connectors 206.

Fig. 20 schematically illustrates, according to an exemplary embodiment, a back view of a rolling barrier system 1 comprising a plurality of, specifically four, barrier units 10 connected one to the other with rigid crossed connectors 206.

According to the embodiment illustrated in Figs. 17-20, the connector 20 is a rigid crossed connector 206 comprising two crossed rigid bars 2062 connected to two adjacent barrier units 10, as well as connected one to the other at the crossing point 2064, as can be seen in Fig. 18.

According to the embodiment illustrated in Figs. 17 and 18, the rolling barrier 1 comprises two barrier units 10 connected one to the other with two rigid crossed connectors 206 – one rigid crossed connector 206 connecting the bases 102 of two adjacent barrier units 10, and another rigid crossed connector 206 connecting the upright segments 104 of two adjacent barrier units 10.

According to the embodiment illustrated in Figs. 19 and 20, the rolling barrier 1 comprises four barrier units 10 connected one to the other with two rigid crossed connectors 206 – one rigid crossed connector 206 connecting the bases 102 of two adjacent barrier units 10, and another rigid crossed connector 206 connecting the upright segments 104 of the adjacent barrier units 10.

Figs. 21A-B schematically illustrate, according to an exemplary embodiment, a perspective view of a rolling barrier system 1 comprising a plurality of barrier units 10 connected one to the other with flexible crossed connectors 208.

Figs. 22A-B schematically illustrate, according to an exemplary embodiment, a back view of a rolling barrier system 1 comprising a plurality of barrier units 10 connected one to the other with flexible crossed connectors 208.

Fig. 22C schematically illustrates, according to an exemplary embodiment, an upper view of a rolling barrier system 1 comprising a plurality of barrier units 10 connected one to the other with flexible crossed connectors 208.

It should be noted that the barrier units 10 illustrated in Figs. 21A and 22A do not comprise at least one plate 500, whereas the barrier units 10 illustrated in Figs. 21B and 22B-C comprise at least one plate 500.

According to the embodiment illustrated in Figs. 21A-B and 22A-C, the connector 20 is a flexible crossed connector 208 comprising two crossed flexible connectors 2082 connected to two adjacent barrier units 10, as can be seen in Figs. 22A-C. The flexible connectors 2082 are made of any flexible material known in the art, for example a metal cable.

Further according to the embodiment illustrated in Figs. 21A-B and 22A-C, the rolling barrier 1 comprises four barrier units 10 connected one to the other with two flexible crossed connectors 208 – one flexible crossed connector 208 connecting the bases 102 of two adjacent barrier units 10, and another flexible crossed connector 208 connecting the upright segments 104 of the adjacent barrier units 10.

Fig. 23 schematically illustrates, according to an exemplary embodiment, a perspective view of a rolling barrier system 1 comprising a plurality of, specifically four, barrier units 10 connected one to the other by a combination of four strengthening bars 30 and two rigid crossed connectors 204.

Fig. 24 schematically illustrates, according to an exemplary embodiment, a back view of a rolling barrier system 1 comprising a plurality of, specifically four, barrier units 10 connected one to the other by a combination of four strengthening bars 30 and two rigid crossed connectors 204.

Fig. 25 schematically illustrates, according to an exemplary embodiment, a perspective view of a vehicle 900 impacting a rolling barrier system 1. The rolling barrier system 1 comprises four barrier units 10, when adjacent barrier units 10 are connected with two rigid crossed connectors 206. When a vehicle 900, for example a heavy vehicle 900 like a truck, impacts the upright segments 104 of the barrier units 102, further movement of the vehicle 900 is eliminated.

Another embodiment that is clearly illustrated in Fig. 3 and 4 is the preferable sharp edge 1062 of the base 102 that is configured to imbed in a bottom of the vehicle 900 impacting the barrier unit 10, or a rolling barrier system 1 comprising at least one barrier unit.

Figs. 26-28 schematically illustrate, according to an exemplary embodiment, a front perspective view (Fig. 26), a front view (Fig. 27), an upper view (Fig. 28) and a side view (Fig. 29), of a vehicle 900 impacting a rolling barrier system 1 comprising at least one barrier unit 10 connected one to the other with at least one strengthening bar 30. When a vehicle 900 moves towards the rolling barrier system 1, the front 902 of the vehicle 900 impacts the upright segments 104 and as the vehicle 900 continues to move, the upright segments 104 are pushed forward, and because of the curved shape of the barrier units 10 the barrier units 10 roll forward and eliminate further movement of the vehicle 900 as described above.

It is appreciated that certain features of the subject matter, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the subject matter, which are, for brevity, described in the context of a single embodiment, may also be provided separately or in any suitable sub combination.

Although the subject matter has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, it is intended to embrace all such alternatives, modifications and variations that fall within the spirit and broad scope of the appended claims.

CLAIMS

1. A rolling barrier system for eliminating movement of a vehicle attempting to cross the rolling barrier system, the rolling barrier system comprising at least one barrier unit configured to roll beneath the vehicle once impacted by the vehicle.

2. The rolling barrier system of claim 1, wherein the vehicle is a heavy vehicle.

3. The rolling barrier system of claim 1, wherein the barrier unit comprises:
a base configured to be positioned on a surface, and
an upright segment connected to the base and configured to impact a vehicle attempting to cross the barrier unit.

4. The rolling system of claim 3, wherein the base and the upright segment comprise at least one curved rod configured to roll on a surface on which the barrier unit is positioned.

5. The rolling barrier system of claim 4, wherein the at least one curved rod is a plurality of curved rods.

6. The rolling barrier system of claim 5, wherein the curved rods are configured to connect one to the other.

7. The rolling barrier system of claim 6, wherein the curved rods are configured to connect with at least one bar.

8. The rolling barrier system of claim 6, wherein the curved rods are configured to connect with at least one plate.

9. The rolling barrier system of claim 3, wherein an edge of the base distal from the upright segment is configured to be imbedded in a bottom of the vehicle attempting to cross the barrier unit.

10. The rolling barrier system of claim 3, wherein an edge of the base distal from the upright segment is sharp.

11. The rolling barrier system of claim 4, wherein an edge of at least one of the at least one curved rods that is at the base, distally to the upright segment, is configured to be imbedded in a bottom of a vehicle attempting to cross the barrier unit.

12. The rolling barrier system of claim 4, wherein an edge of at least one of the at least one curved rods that is at the base, distally to the upright segment, is sharp.

13. The rolling barrier system of claim 1, wherein the barrier unit comprises at least one sticking element protruding from the barrier unit and configured to be imbedded in a surface on which the barrier unit stands when the barrier unit rolls.

14. The rolling barrier system of claim 4, wherein at least one of the at least one curved rod comprises at least one sticking element protruding from the barrier unit and configured to be imbedded in a surface on which the barrier unit stands when the barrier unit rolls.

15. The rolling barrier system of claim 1, wherein the at least one barrier unit is configured to connect one to the other.

16. The rolling barrier system of claim 1, wherein the barrier unit comprises at least one receiving hole, configured to connect to a connector configured to connect barrier units.

17. The rolling barrier system of claim 14, wherein the connector is a strengthening bar configured to be inserted into corresponding receiving holes of barrier units, thereby connecting the barrier units.

18. The rolling barrier system of claim 14, wherein the receiving hole is configured to accommodate a fastener for connecting the connector to the barrier unit.

19. The rolling barrier system of claim 14, wherein the connector is rigid.

20. The rolling barrier system of claim 14, wherein the connector is flexible.

21. The rolling system of claim 14, wherein the connector is a crossed rigid connector.

22. The rolling system of claim 14, wherein the connector is a crossed flexible connector.

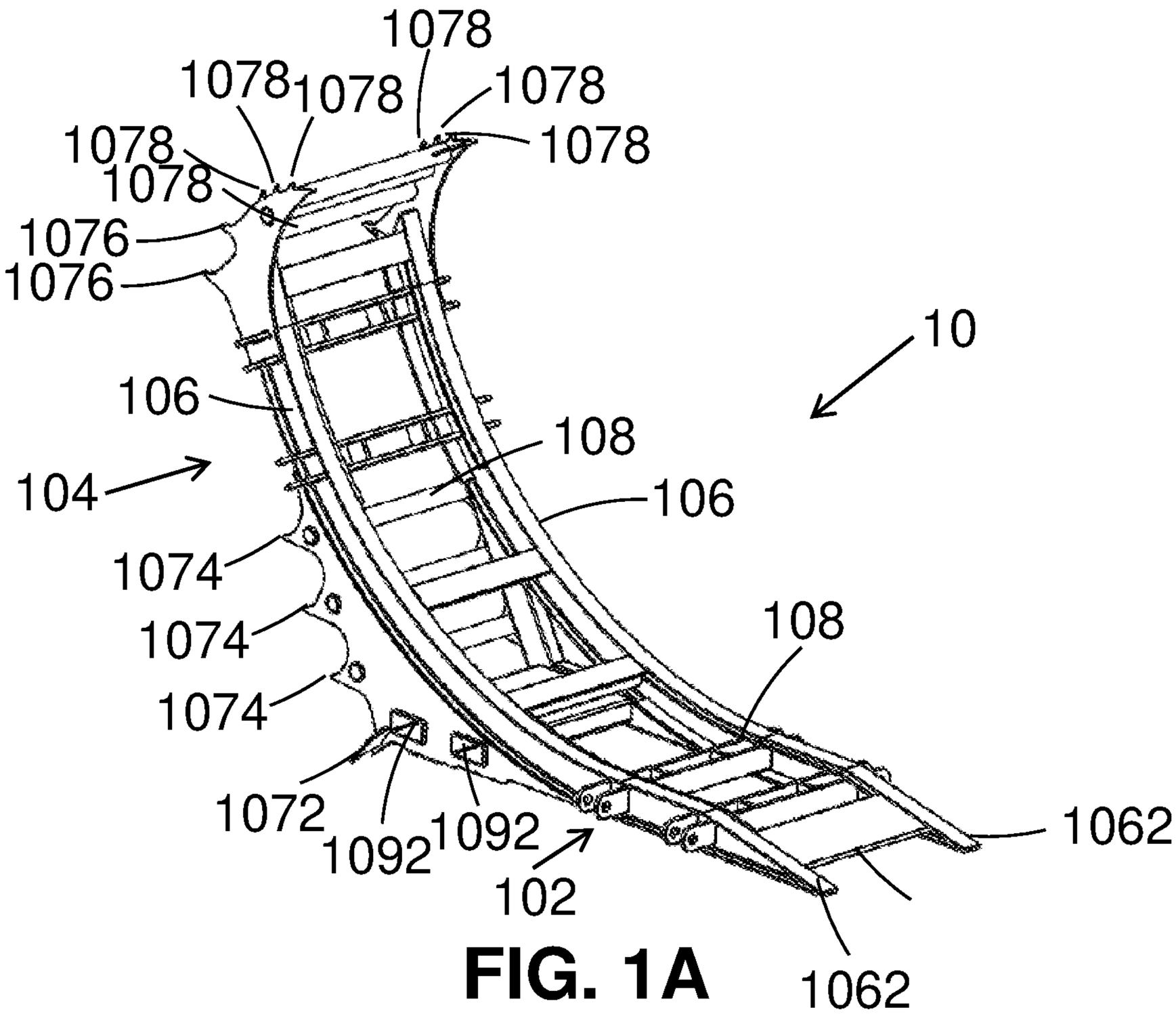
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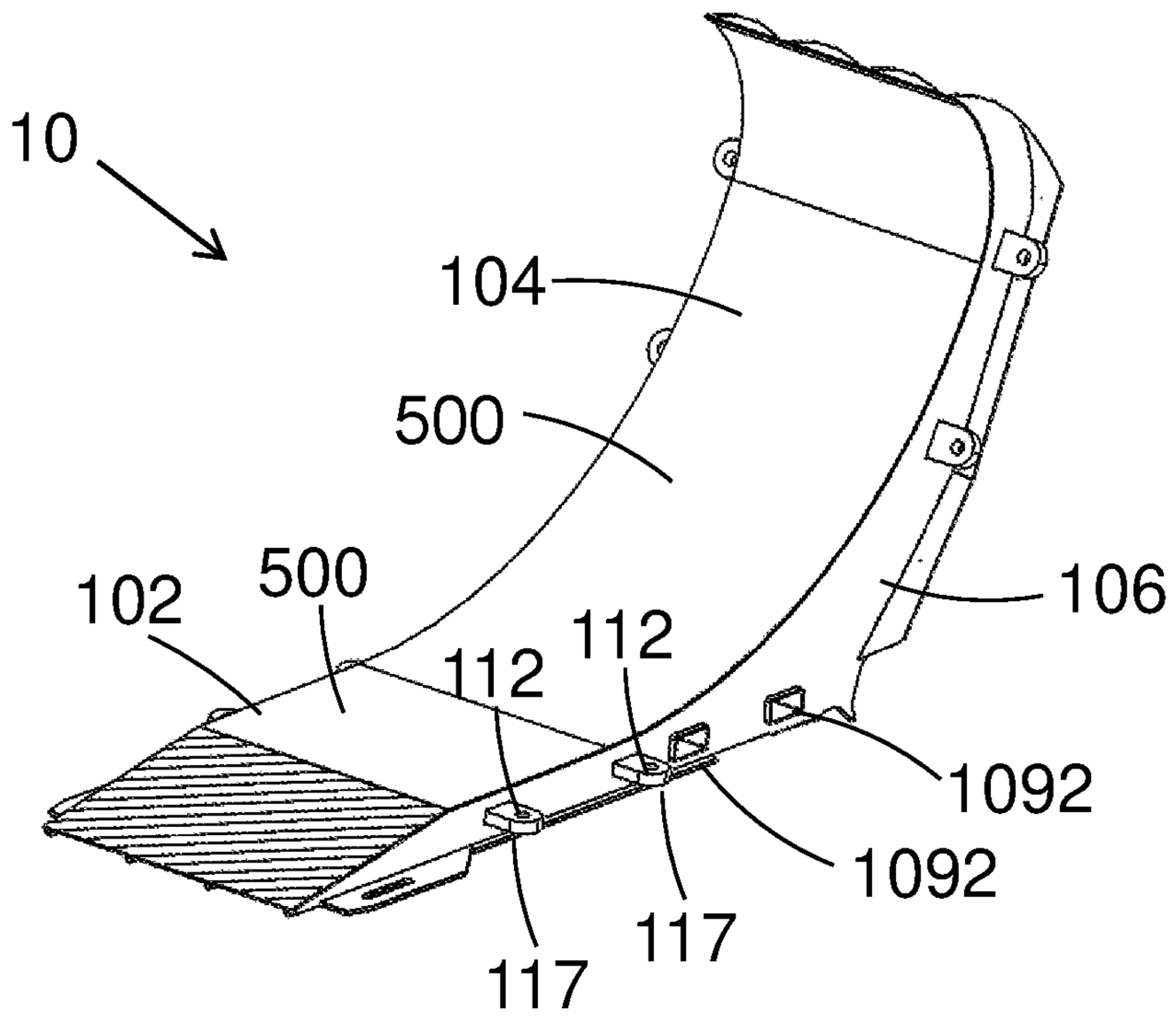
FIG. 1A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117

FIG. 1B

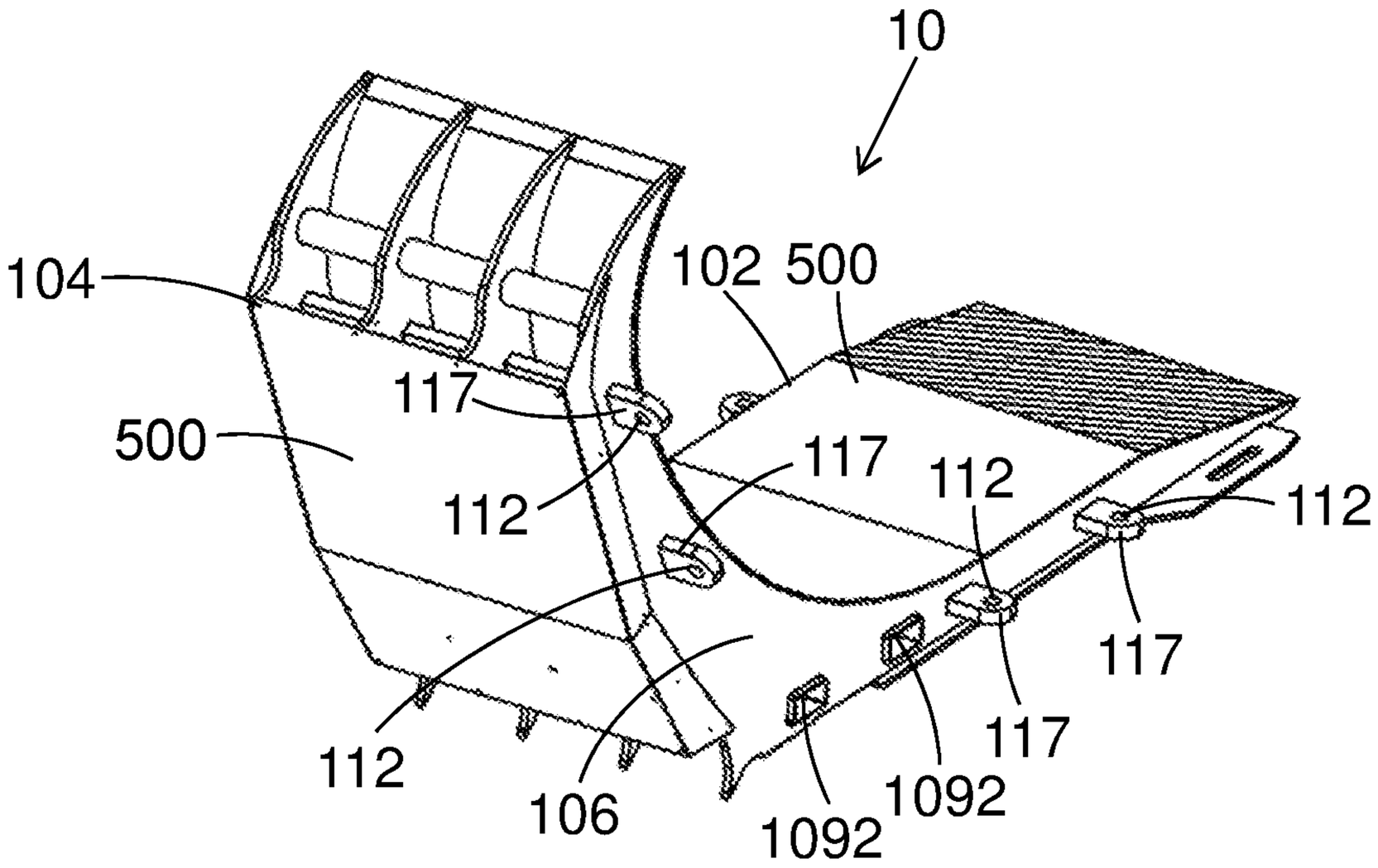
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FIG. 1C

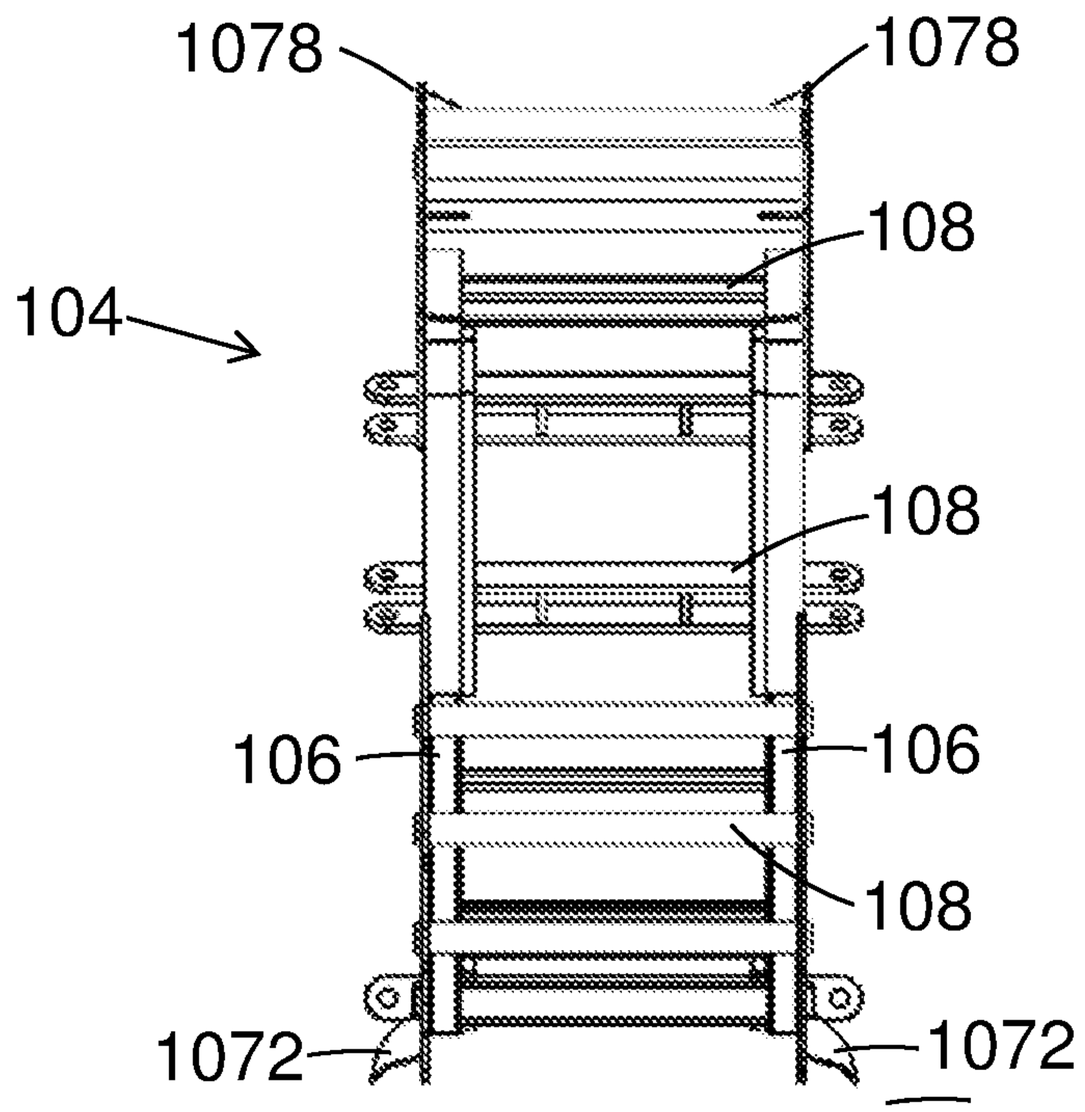
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FIG. 2

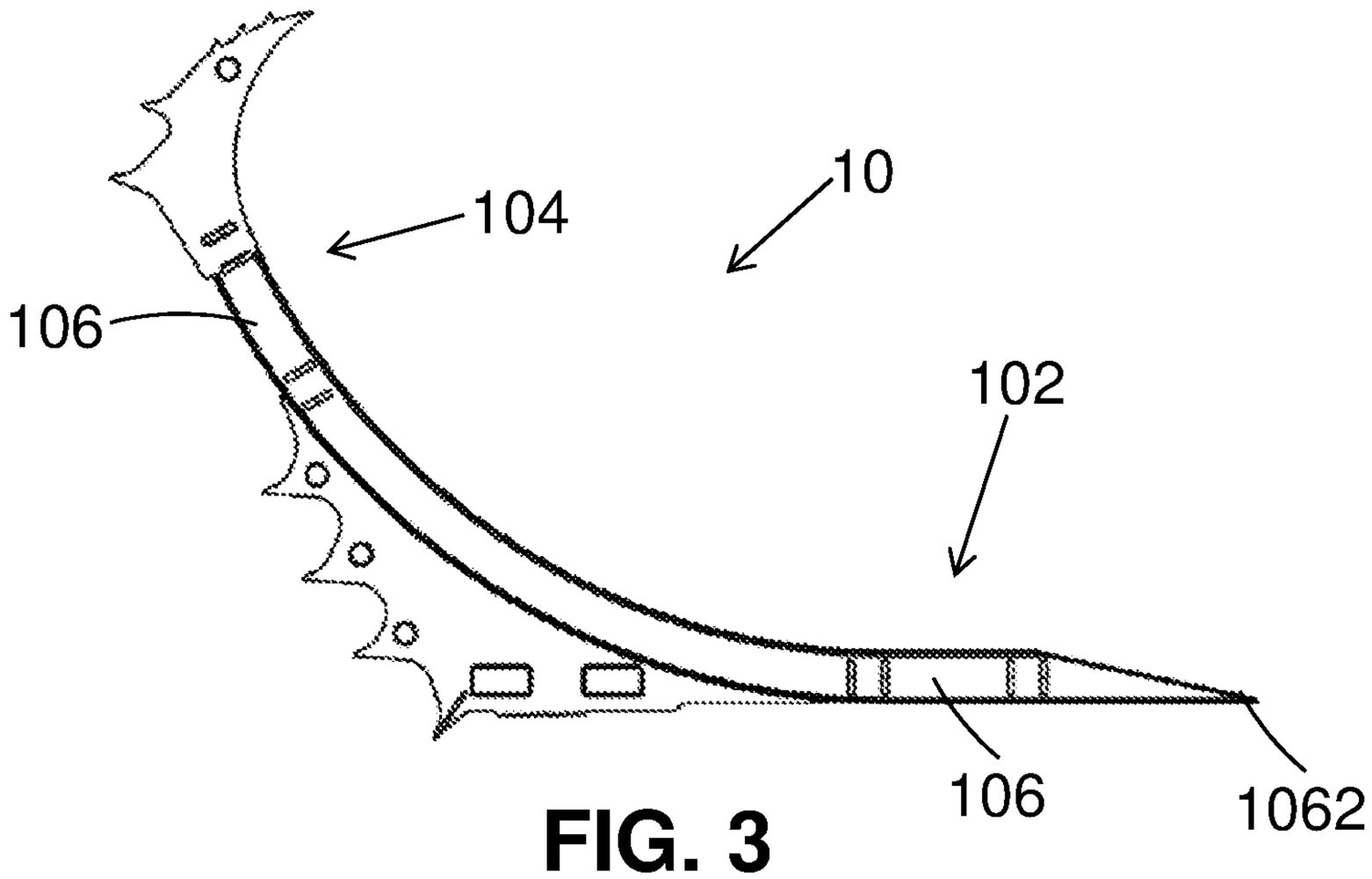

FIG. 3

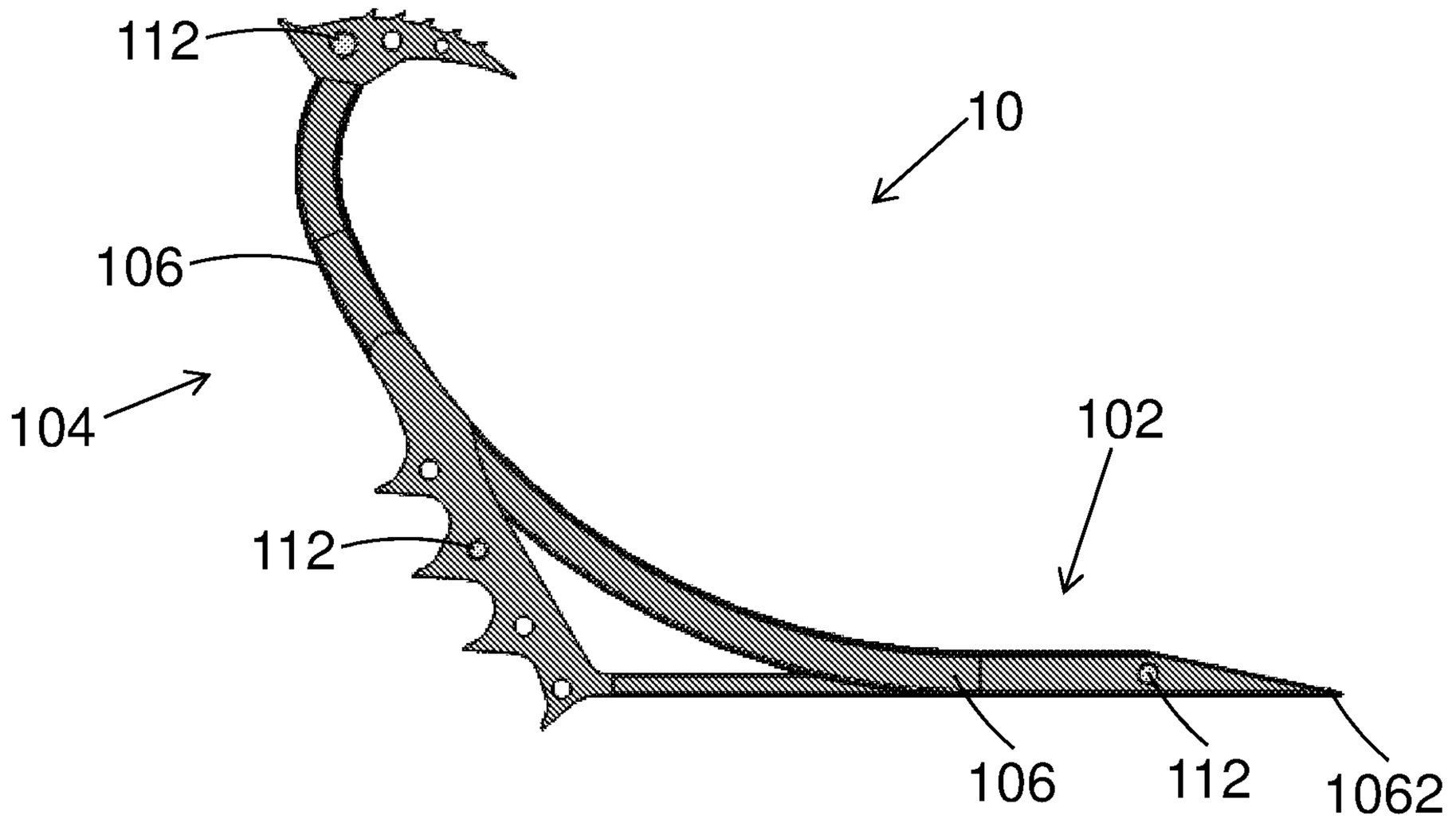

FIG. 4A

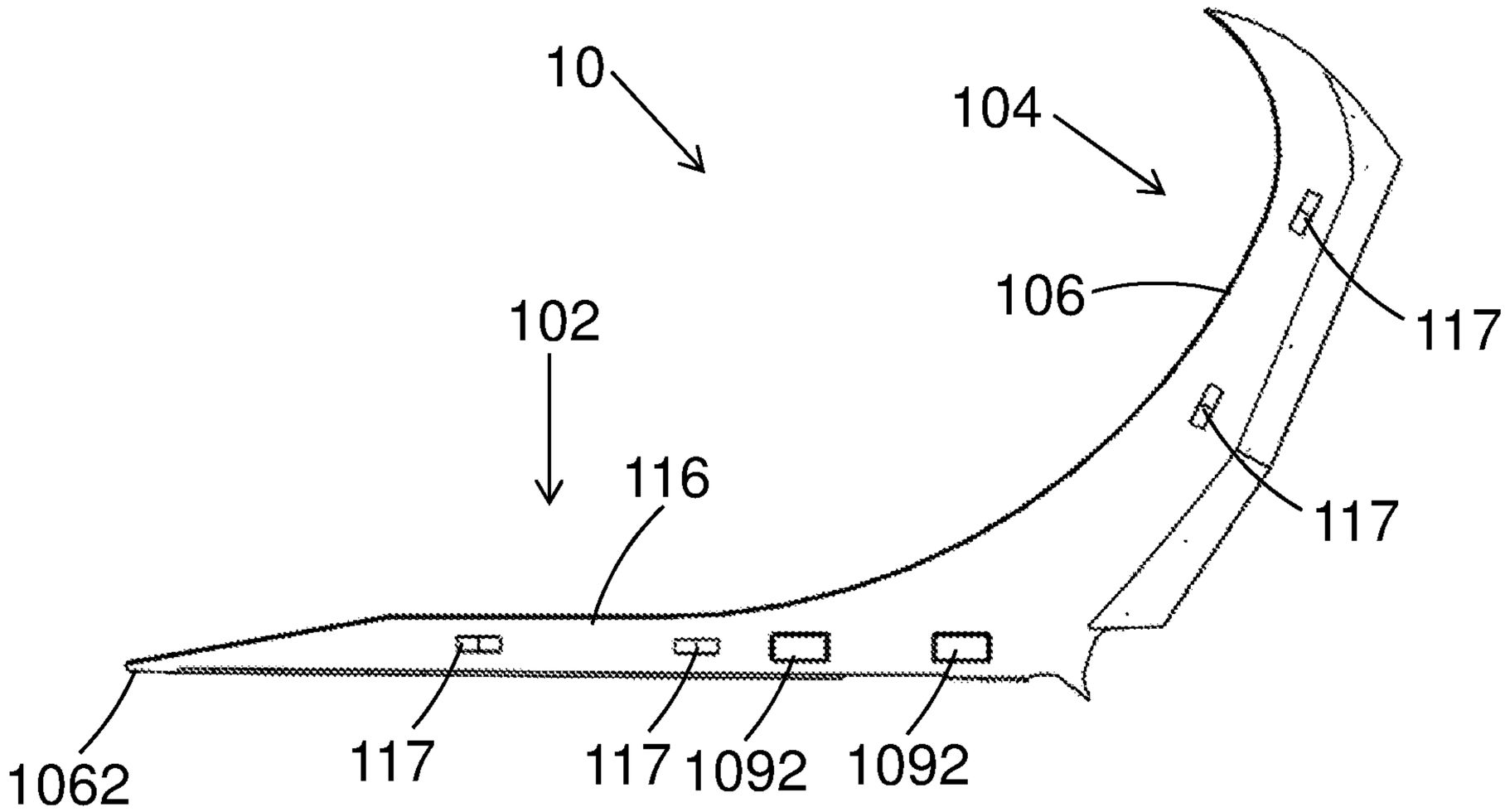
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FIG. 4B

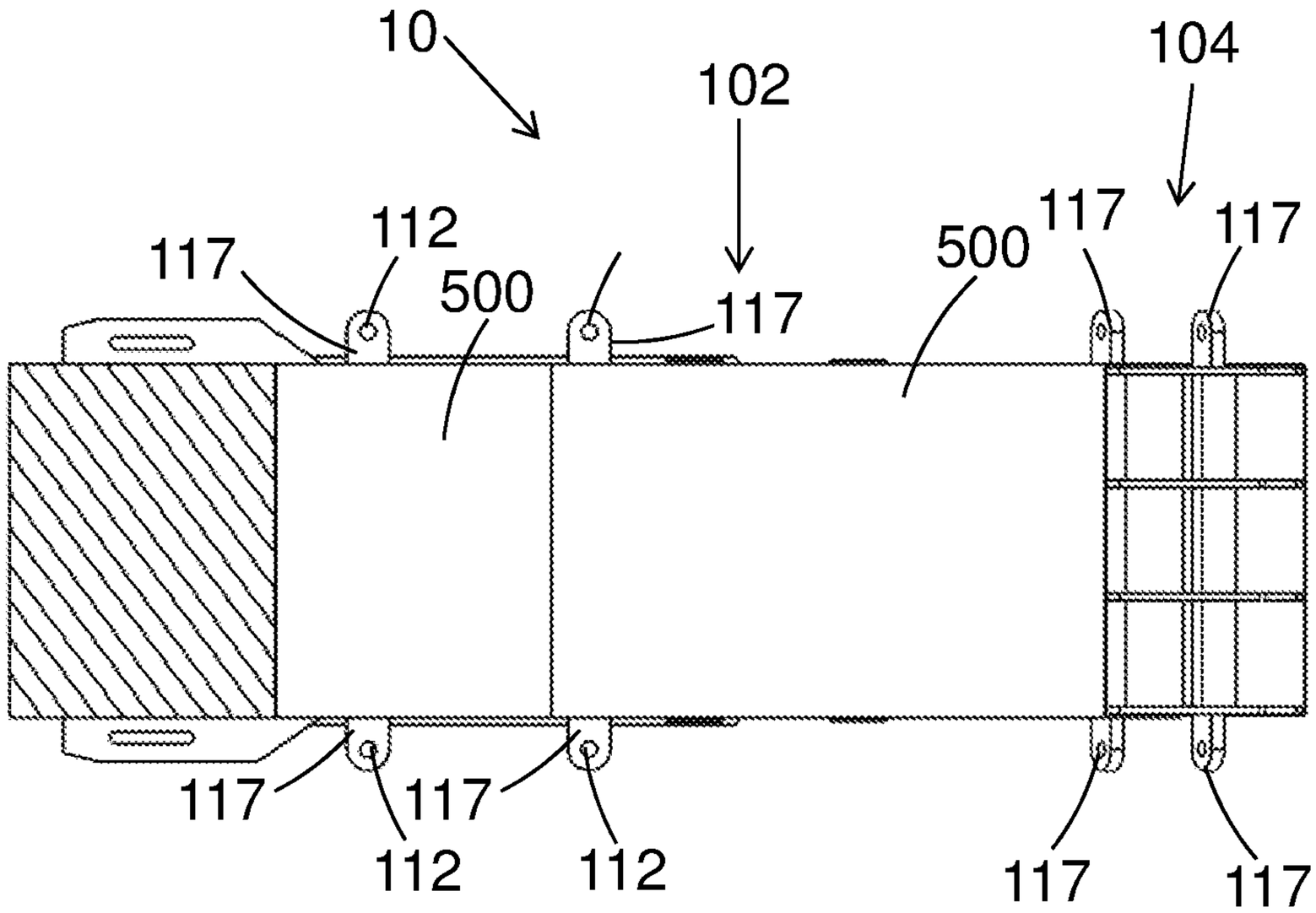
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FIG. 4C

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FIG. 4D

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FIG. 4E

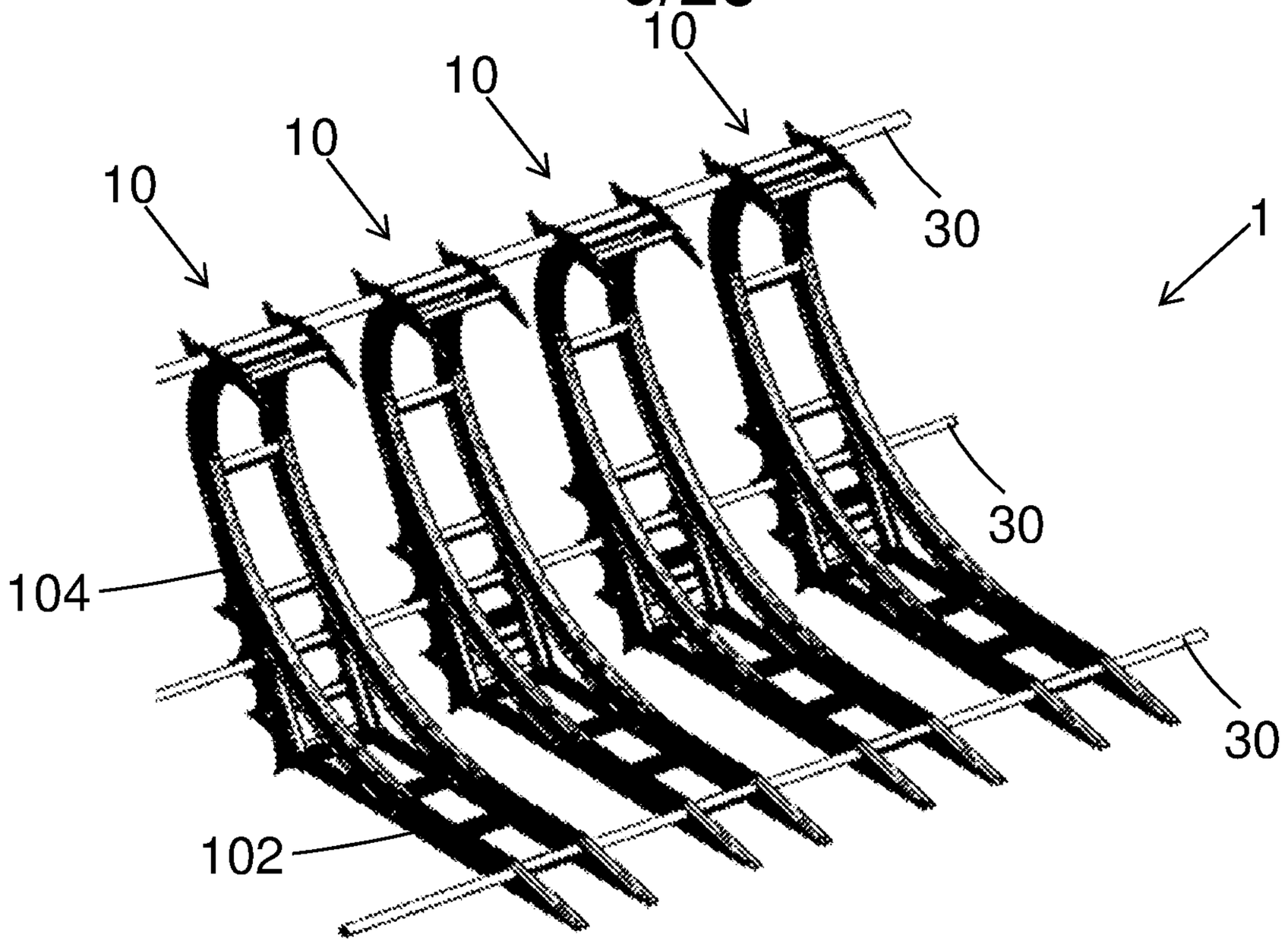

FIG. 5

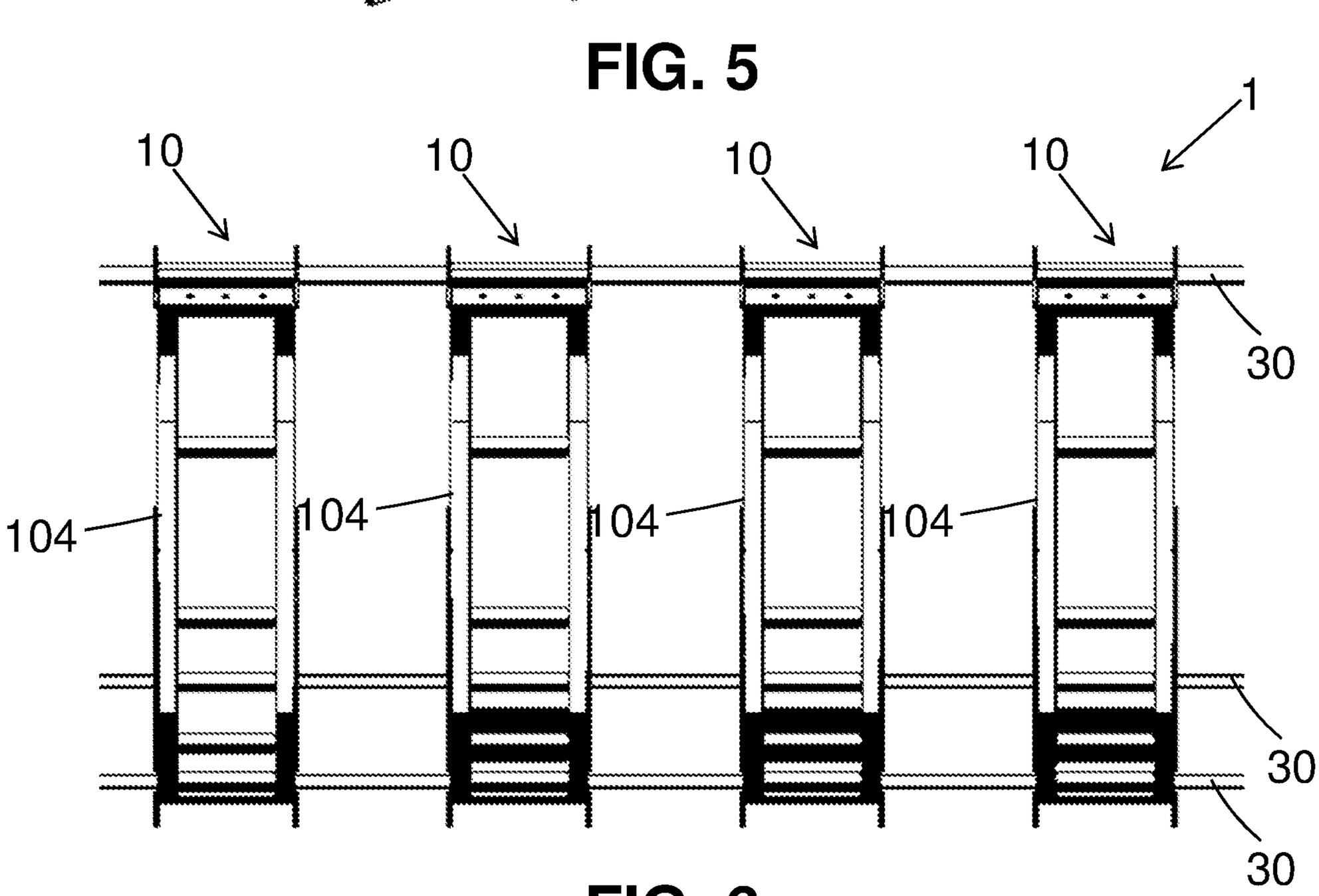

FIG. 6

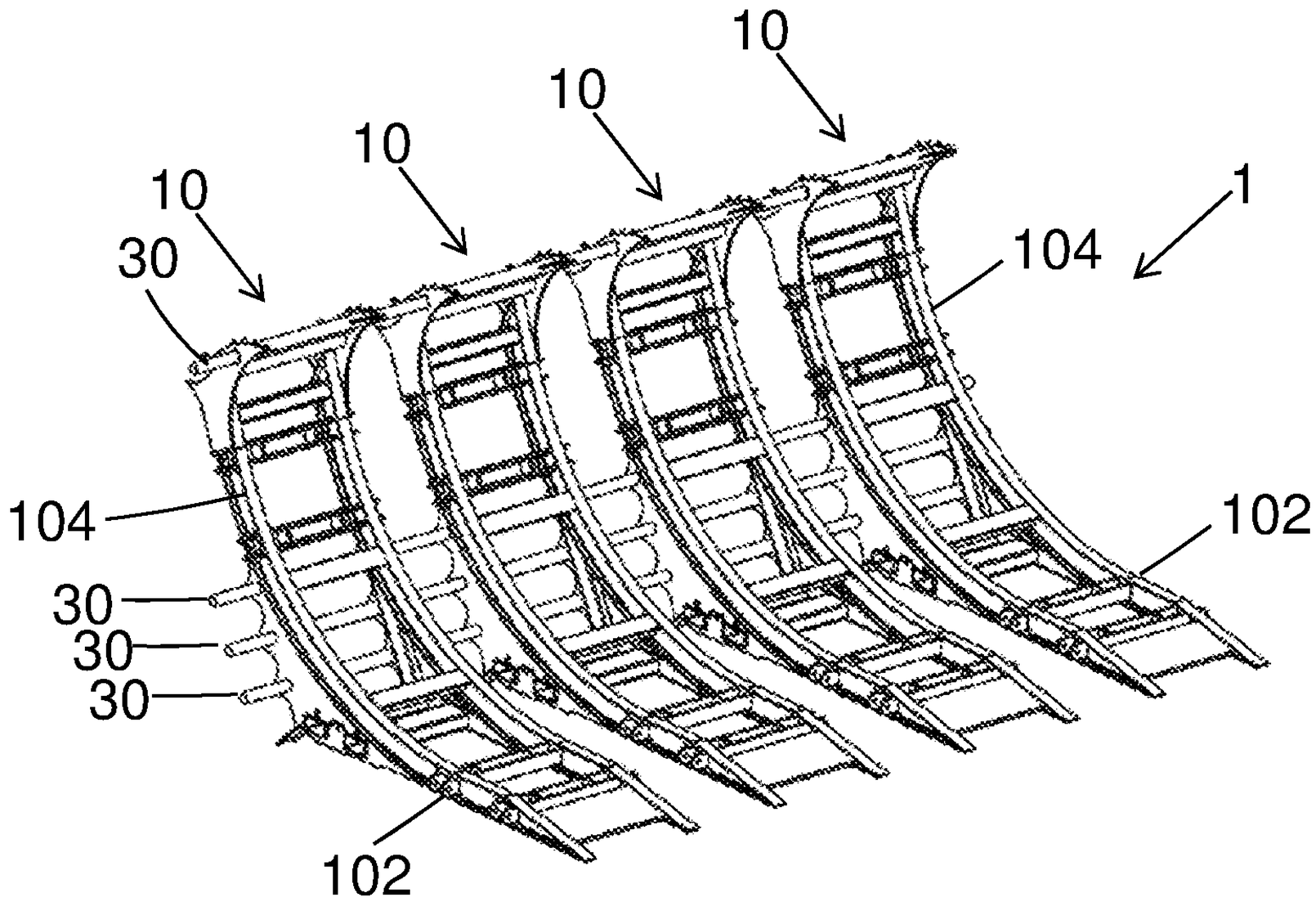
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FIG. 7

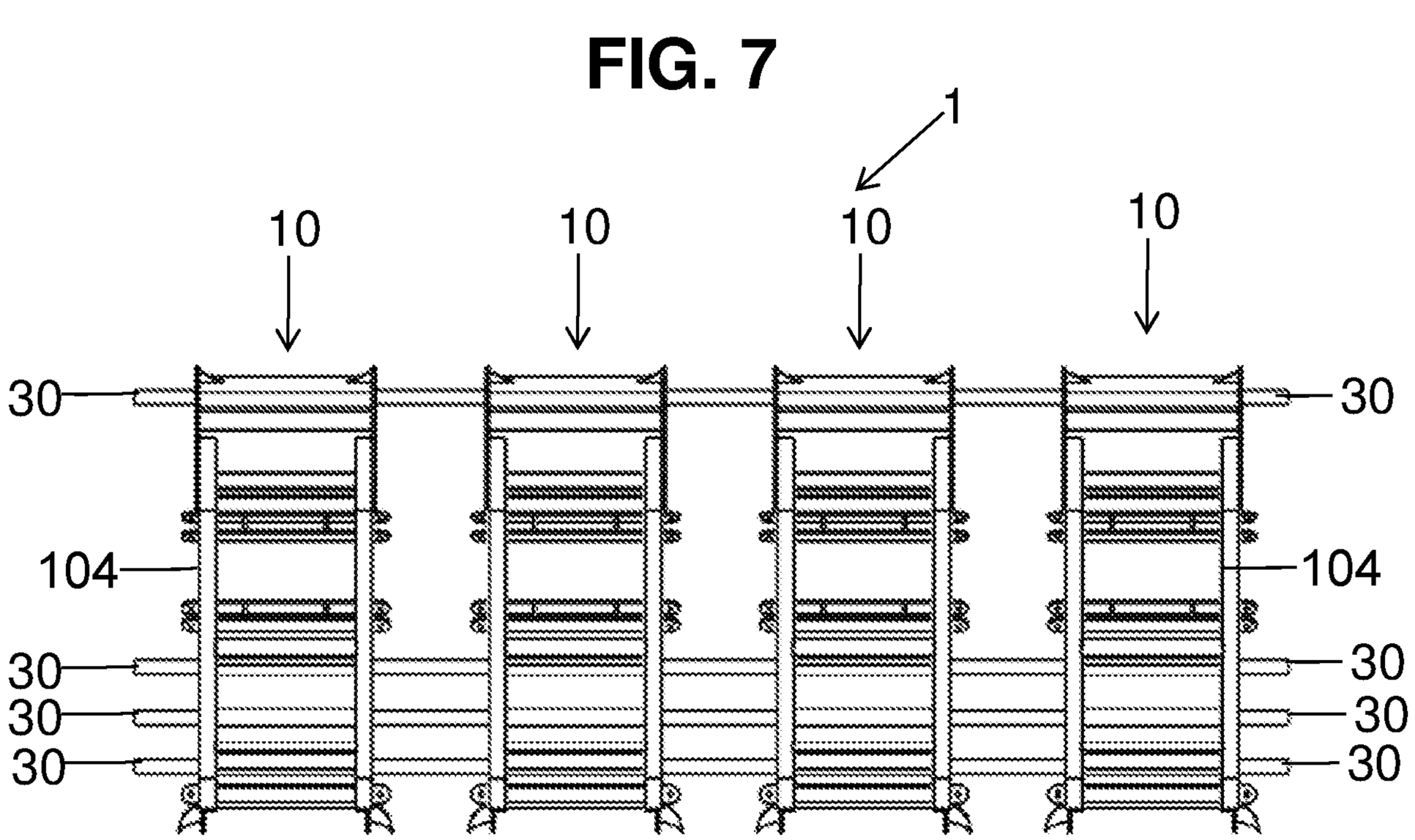
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FIG. 8

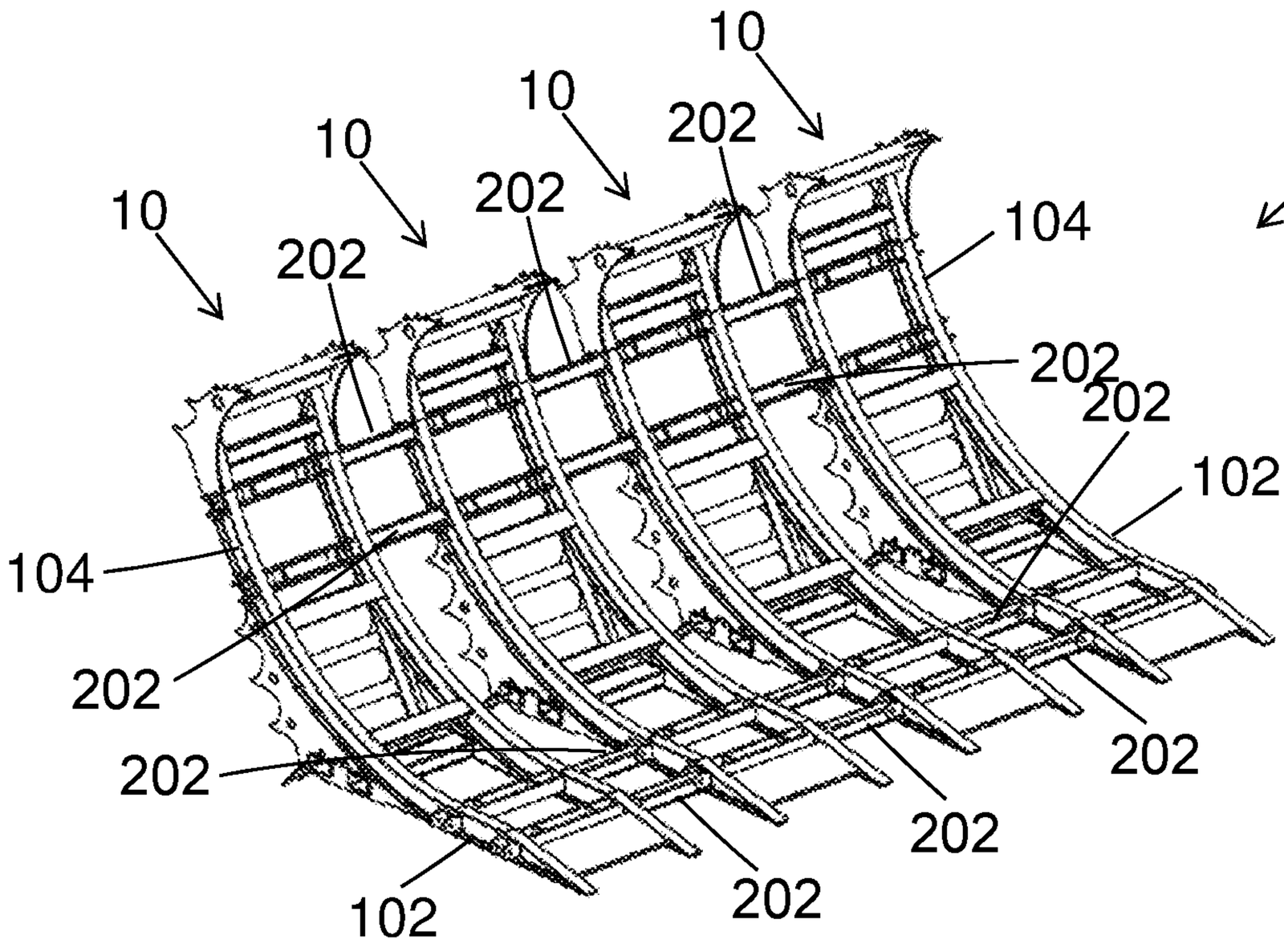
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FIG. 9

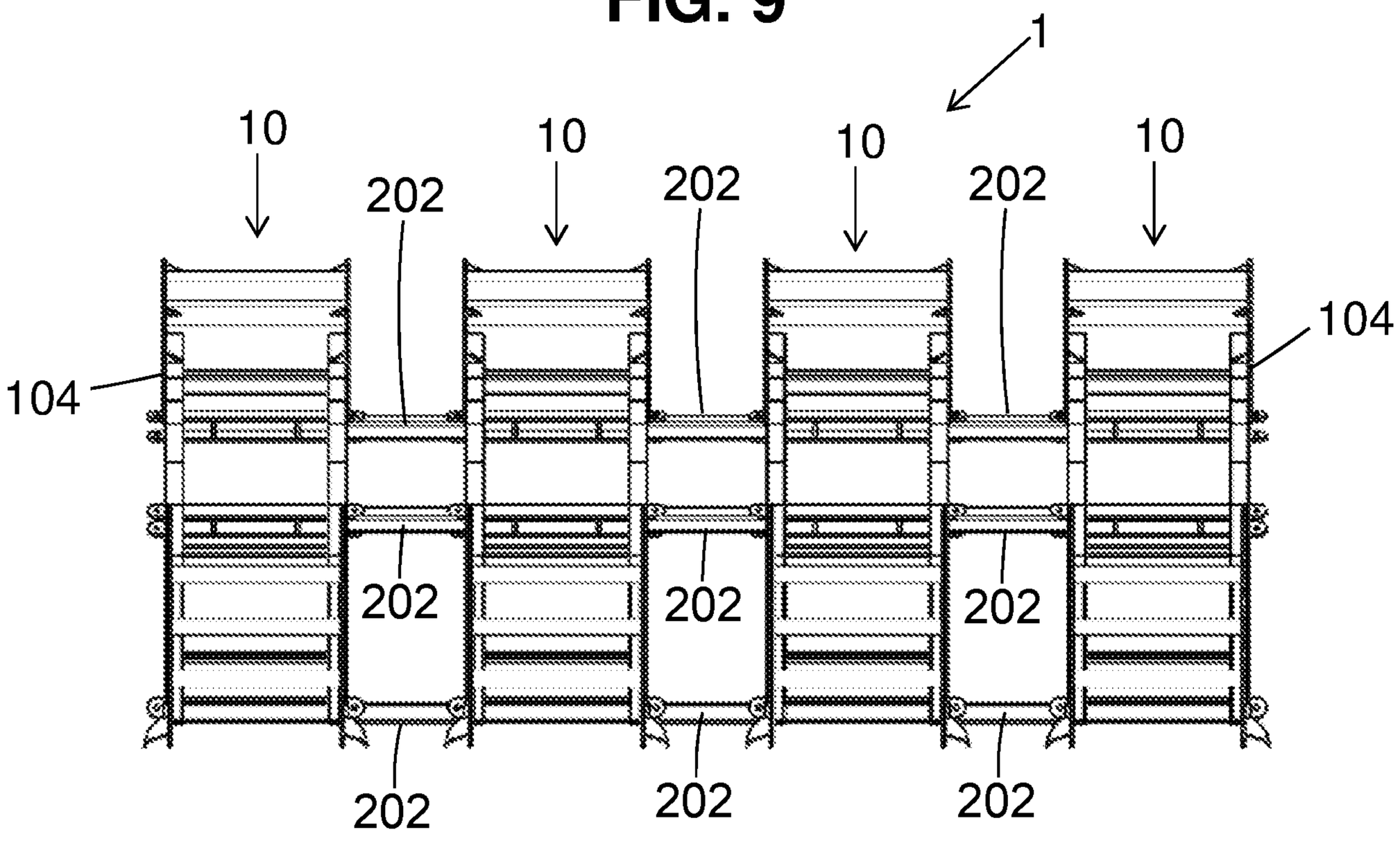
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FIG. 10

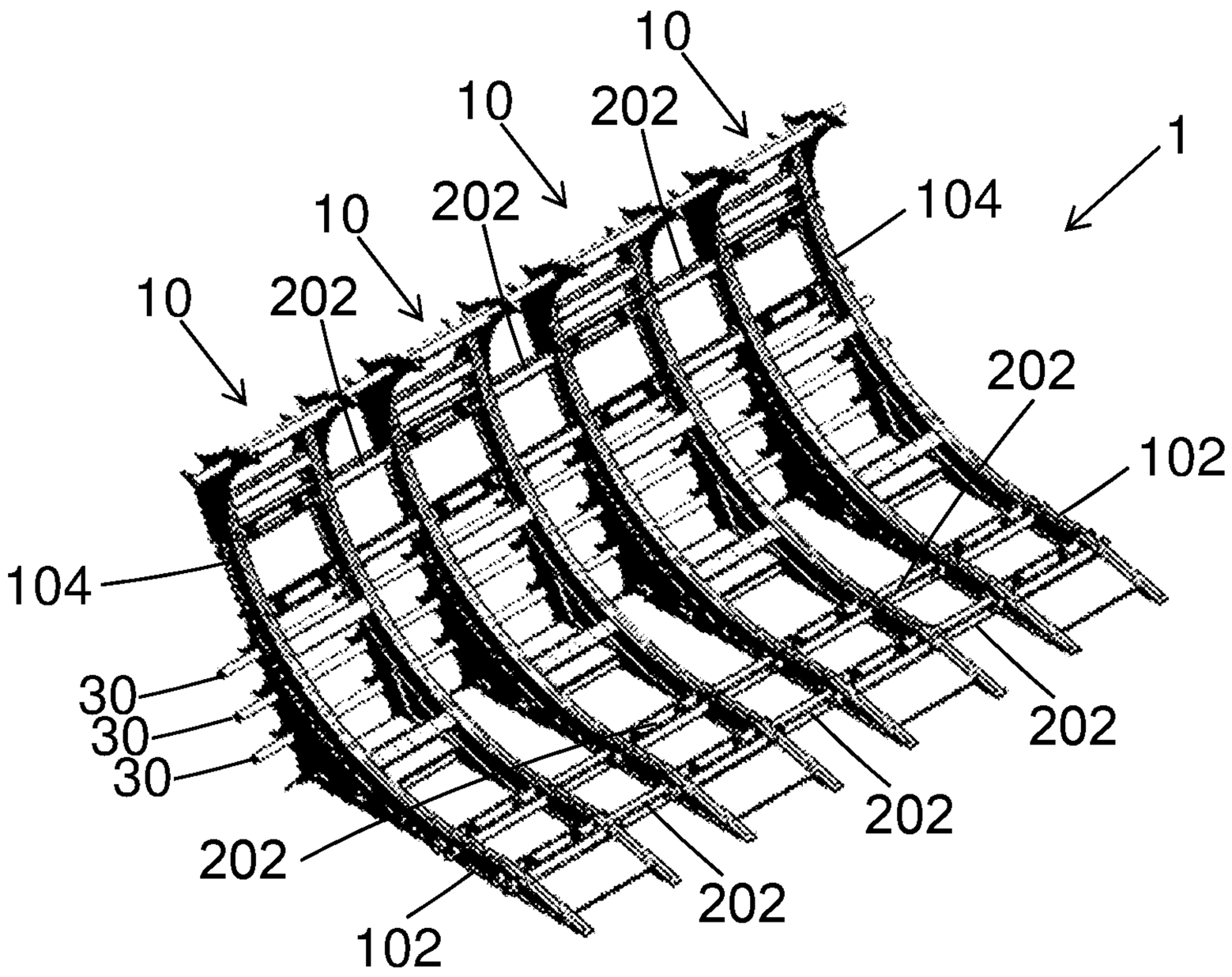
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FIG. 11

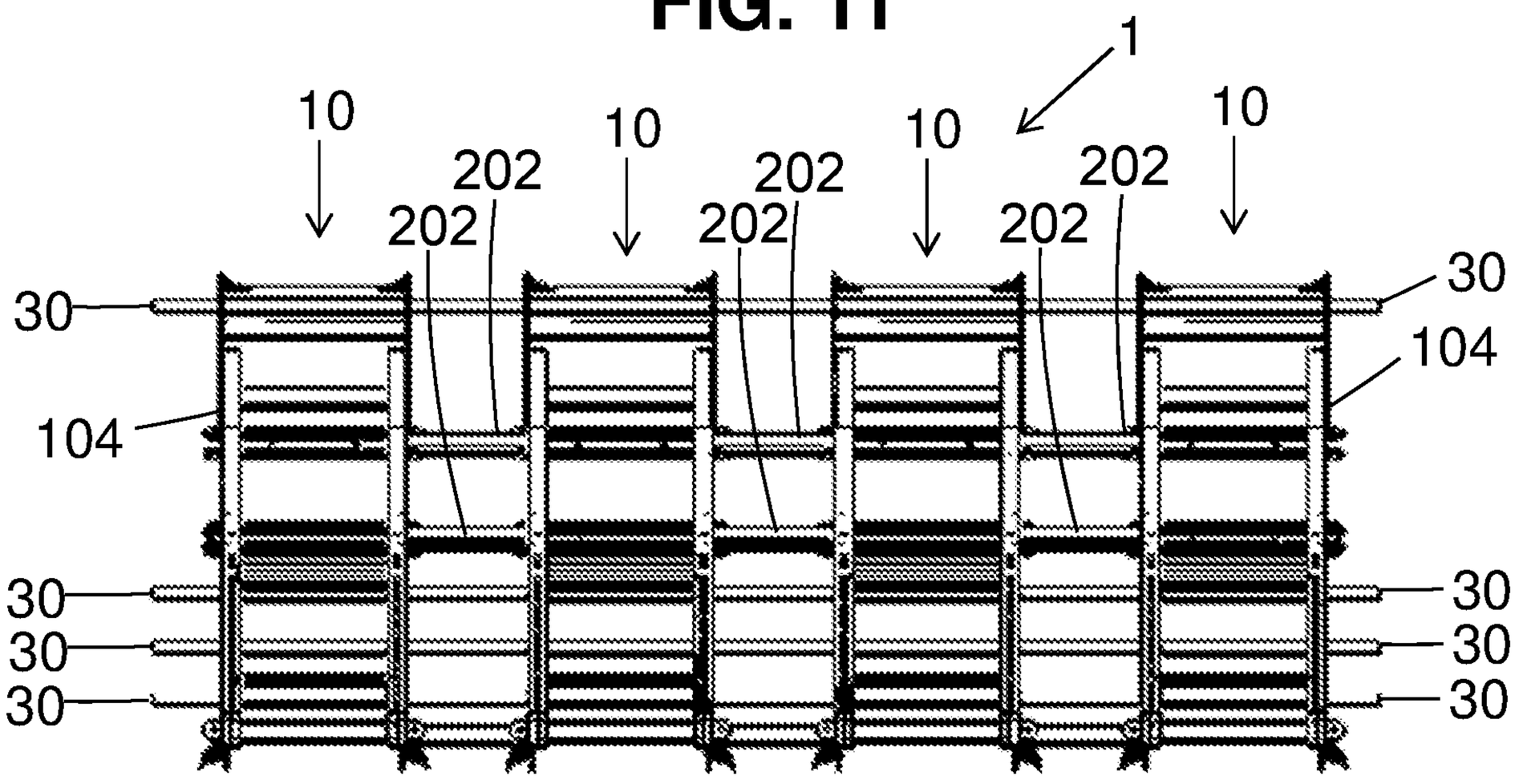
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FIG. 12

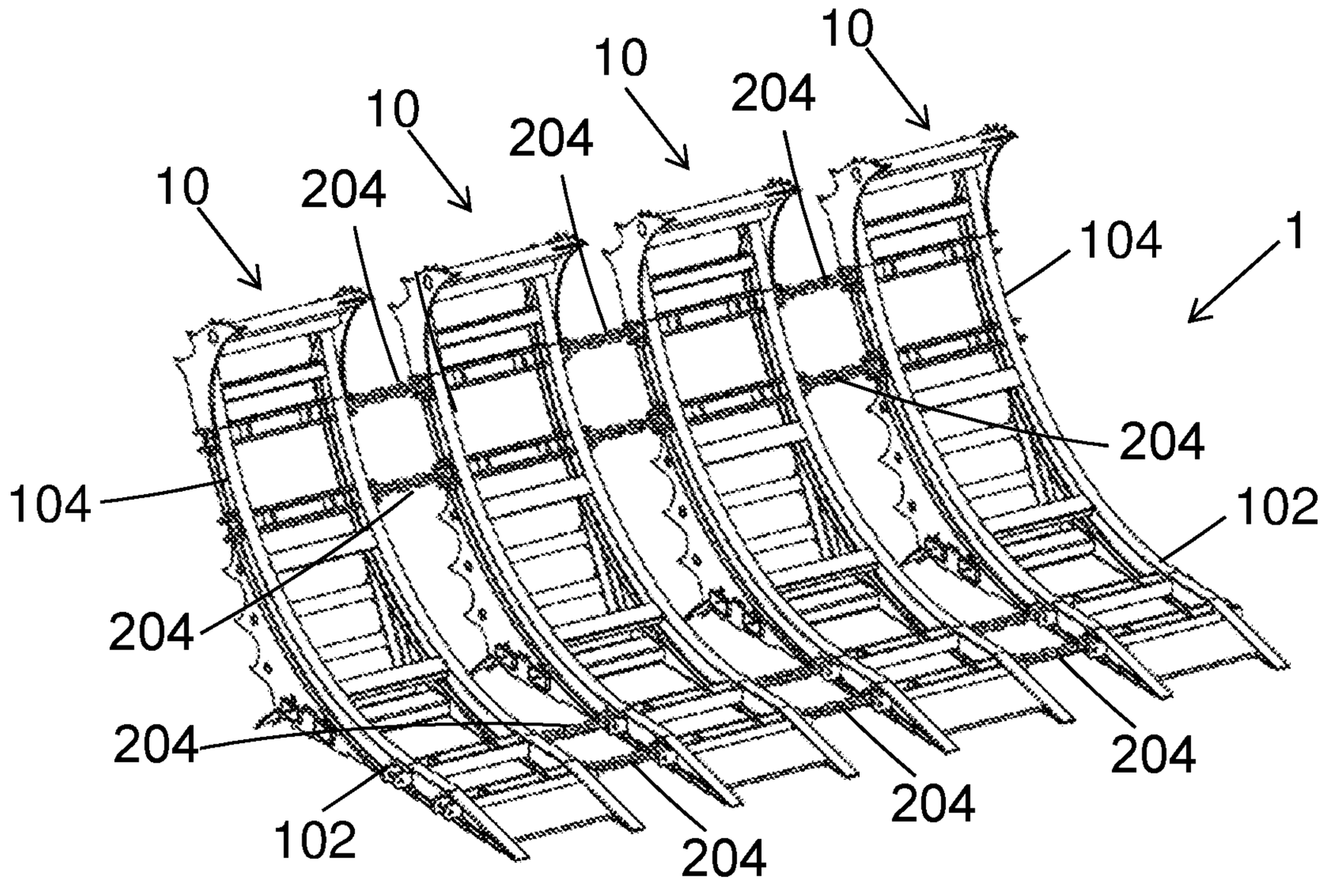
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FIG. 13

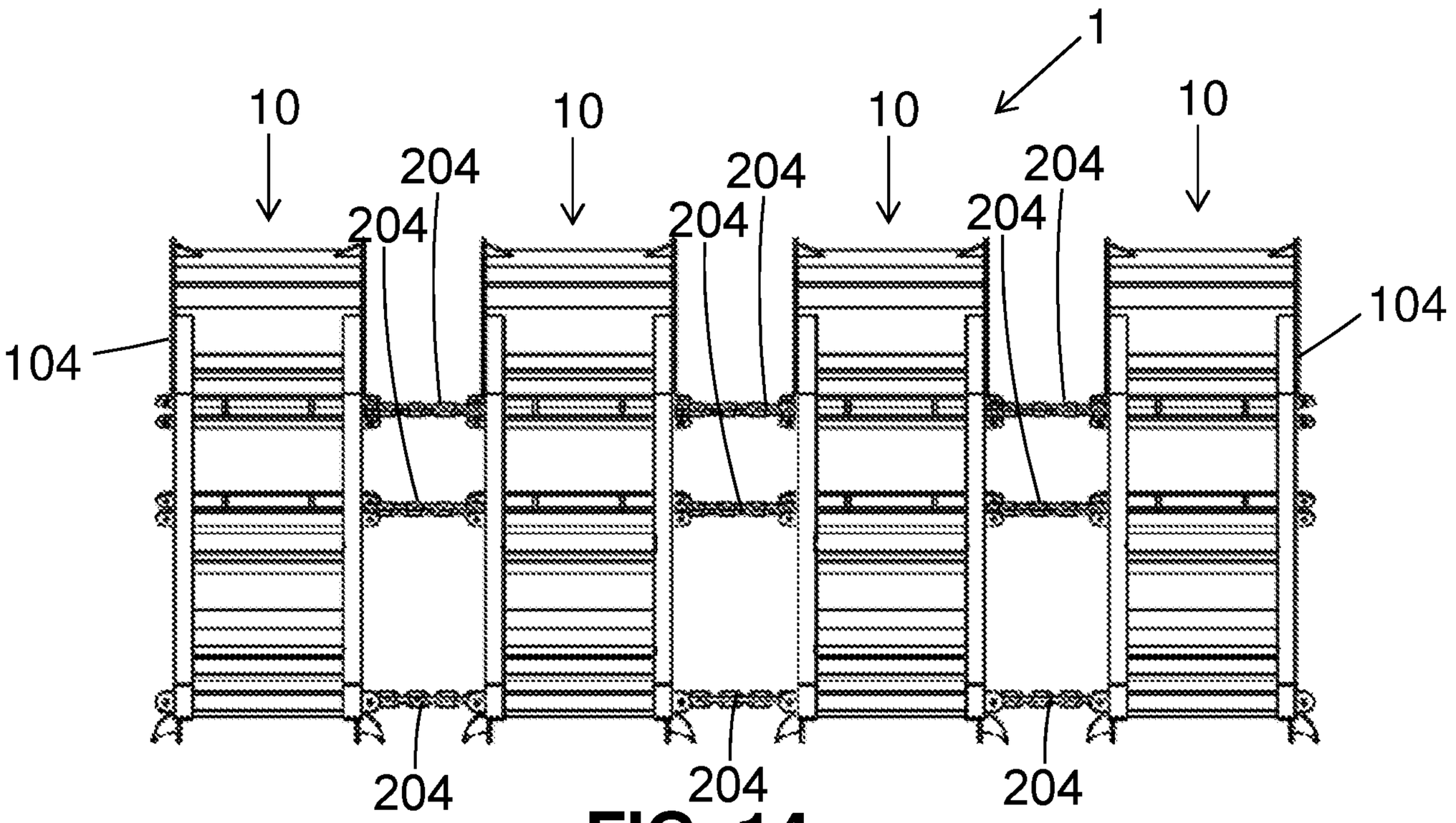
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FIG. 14

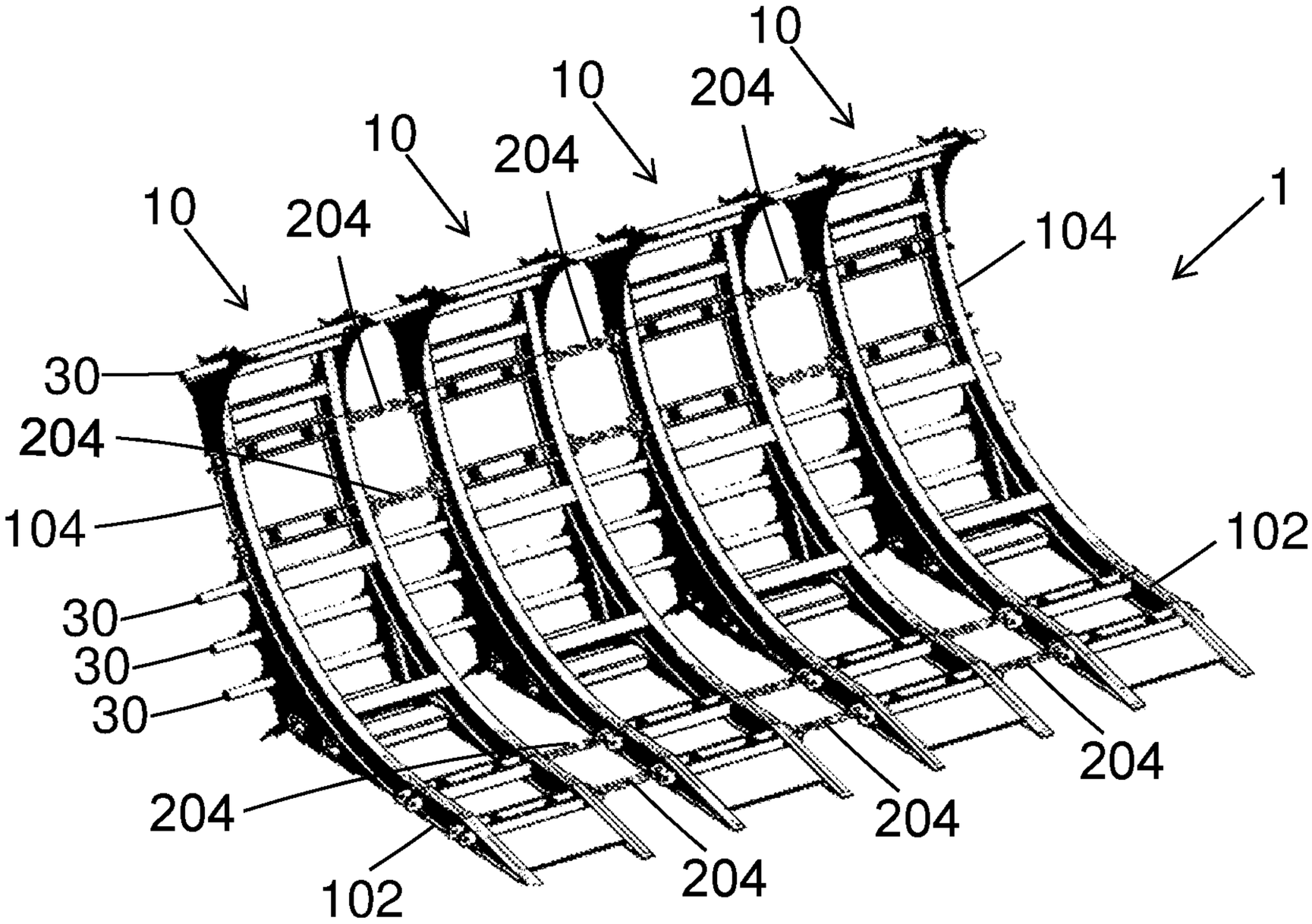
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FIG. 15

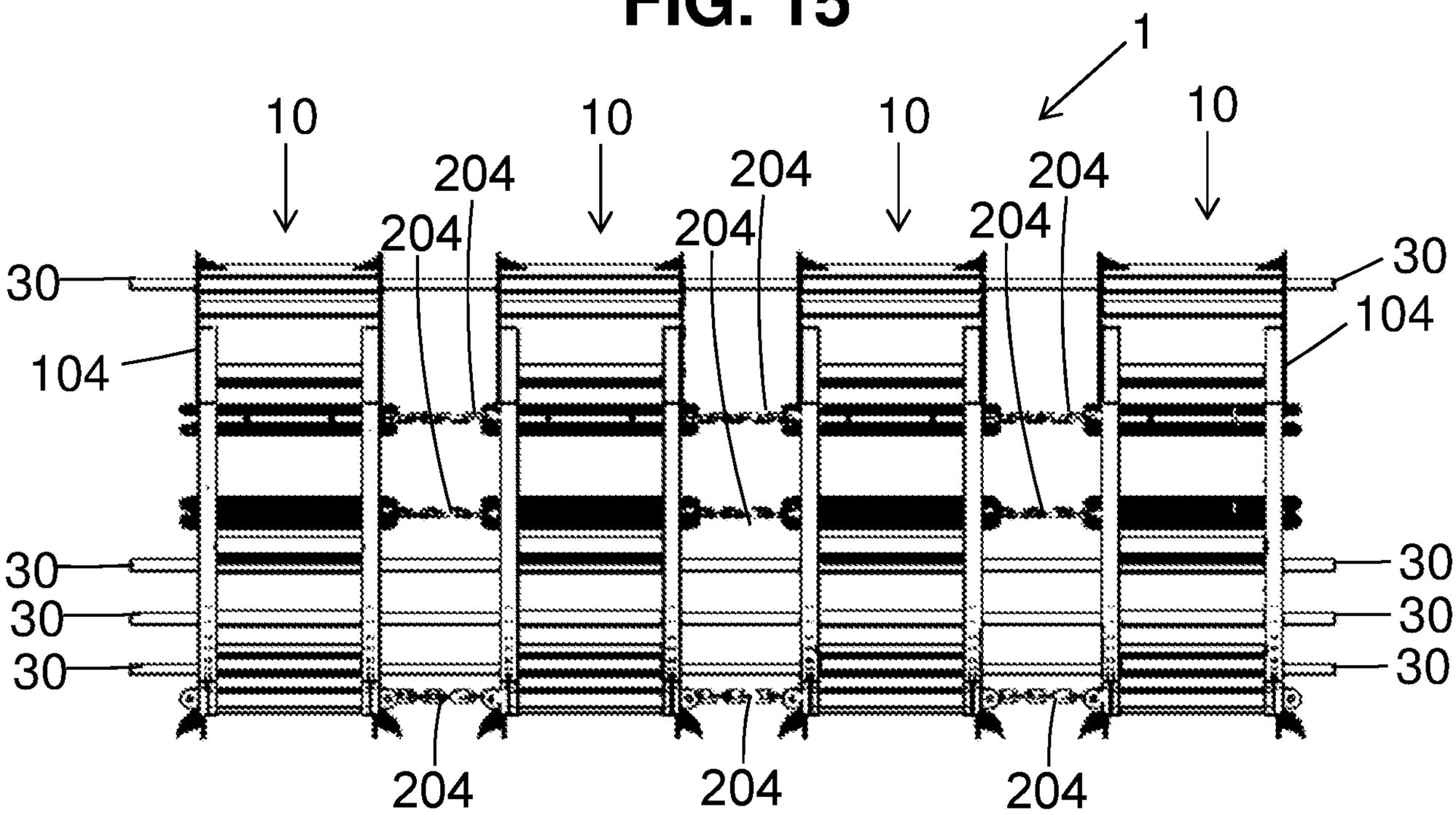
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FIG. 16

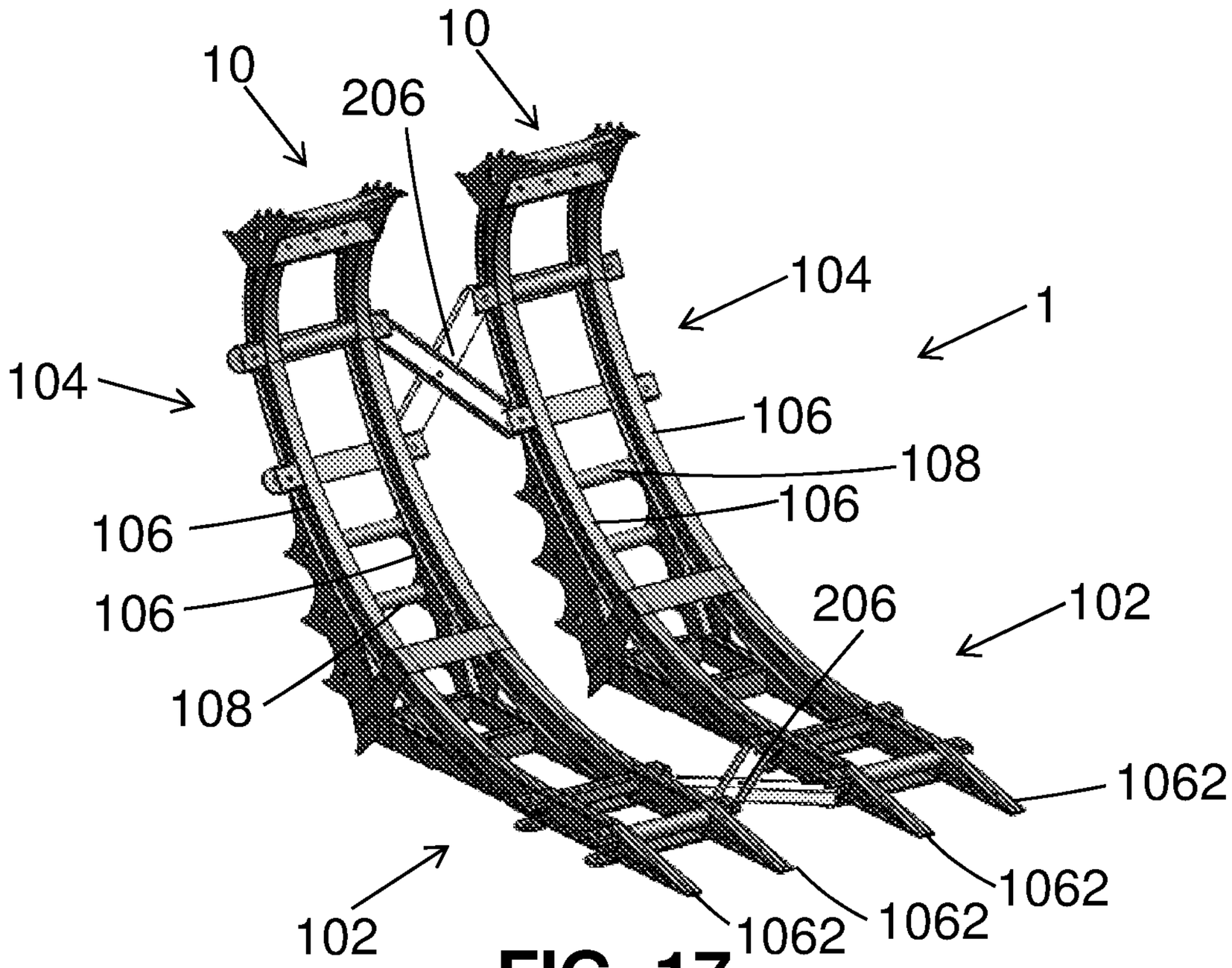
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FIG. 17

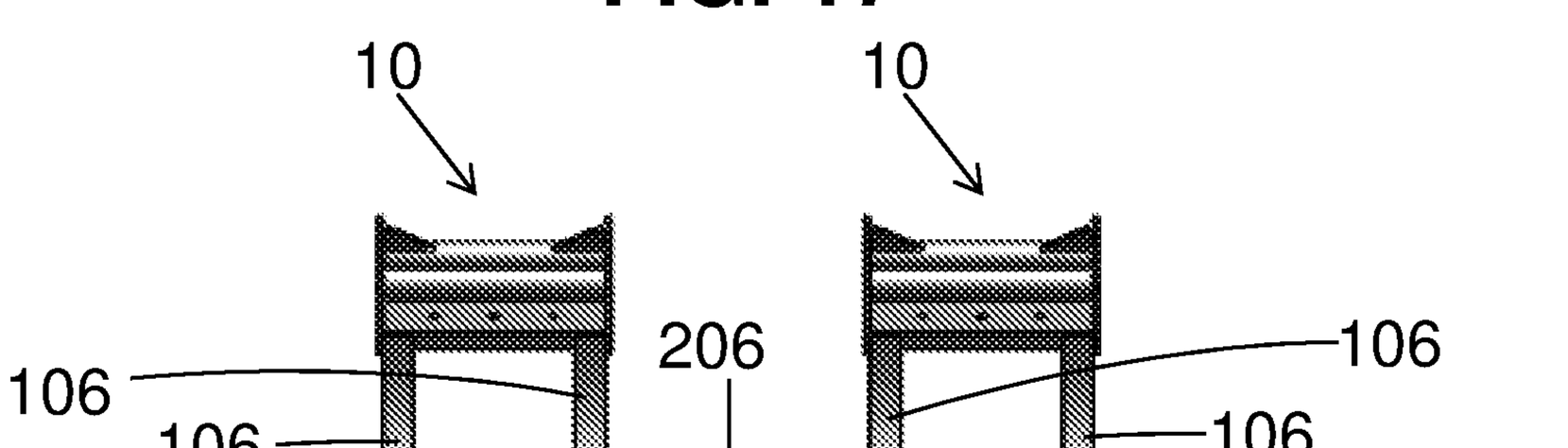
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FIG. 18

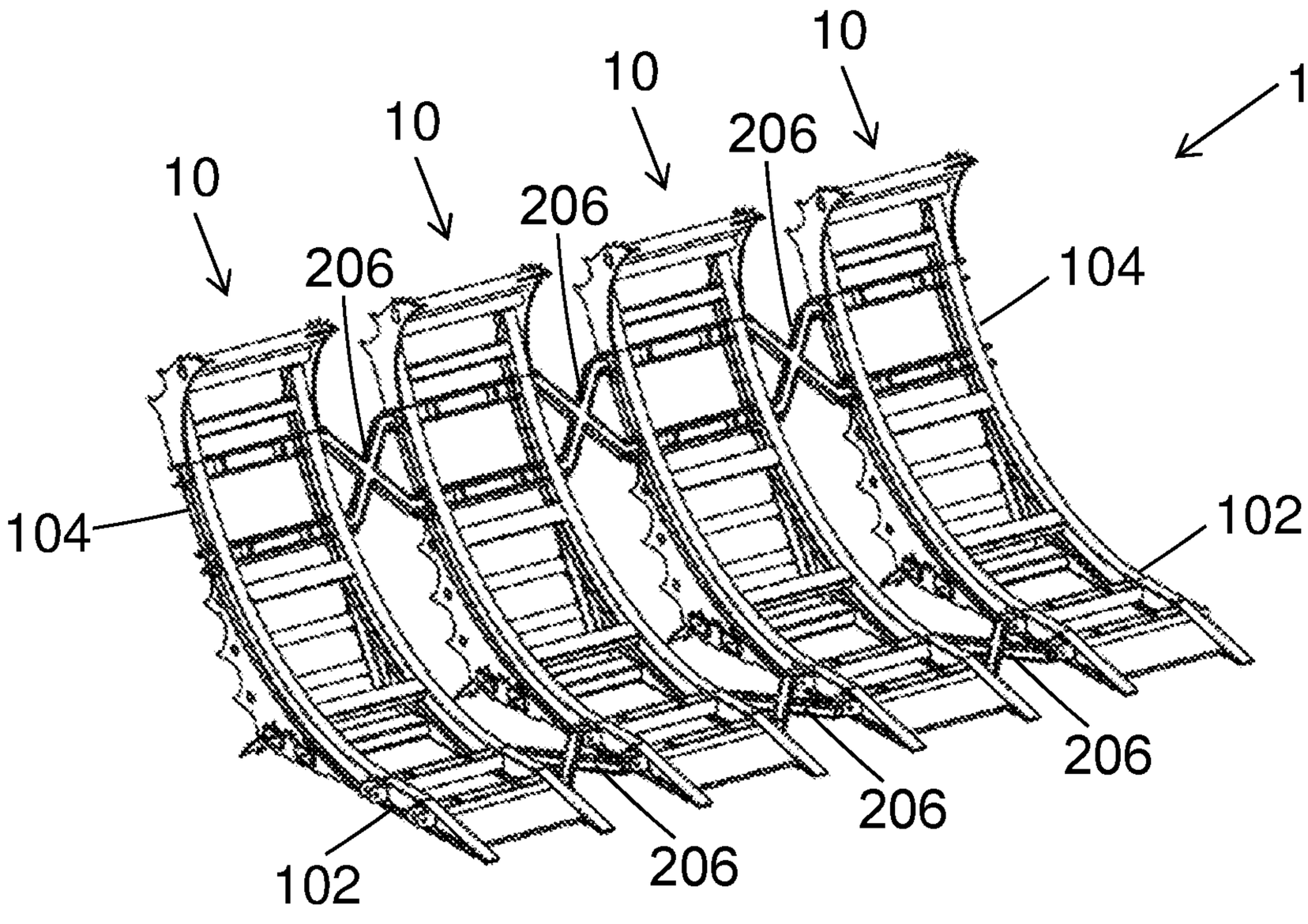
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FIG. 19

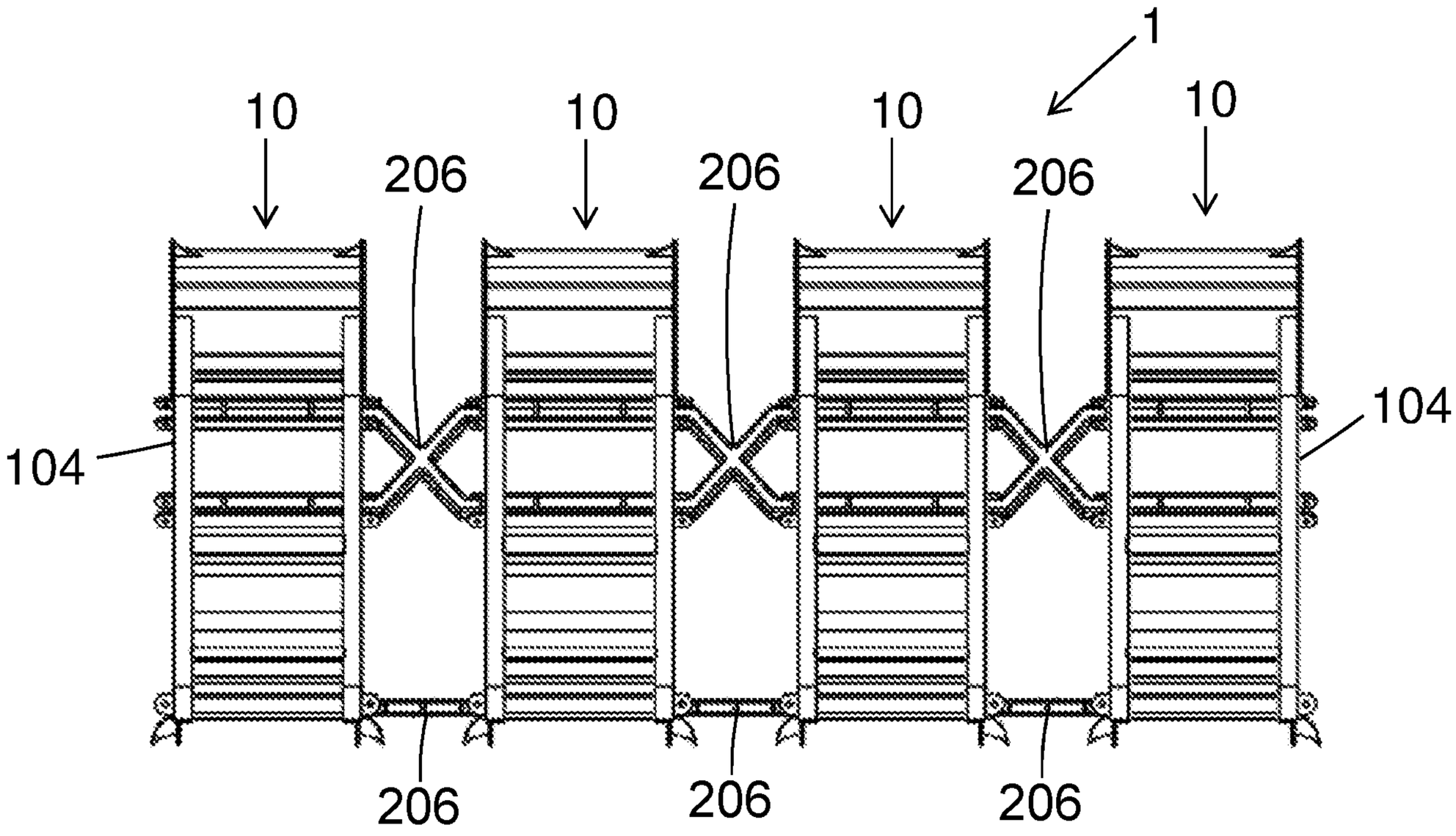
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FIG. 20

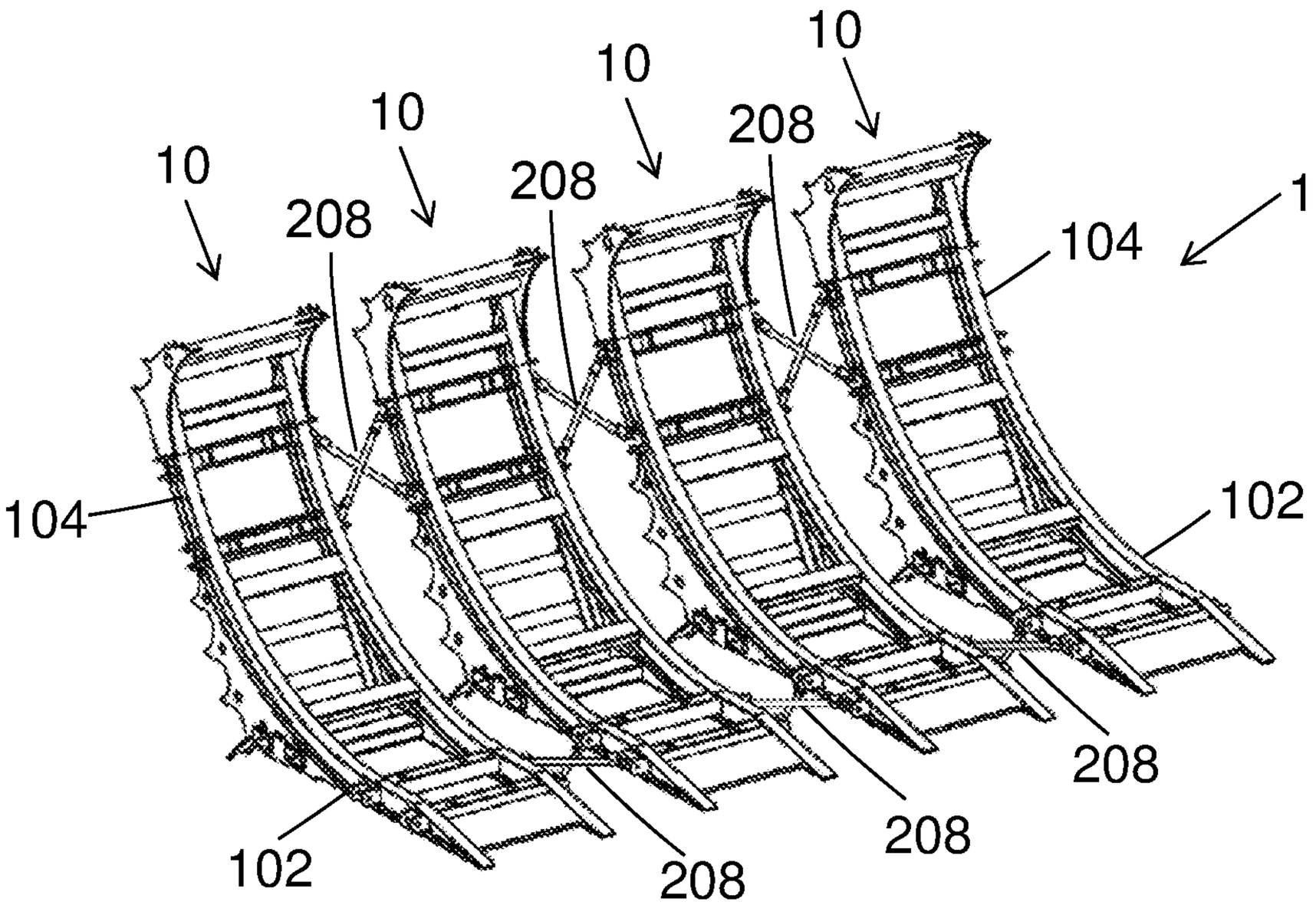

FIG. 21A

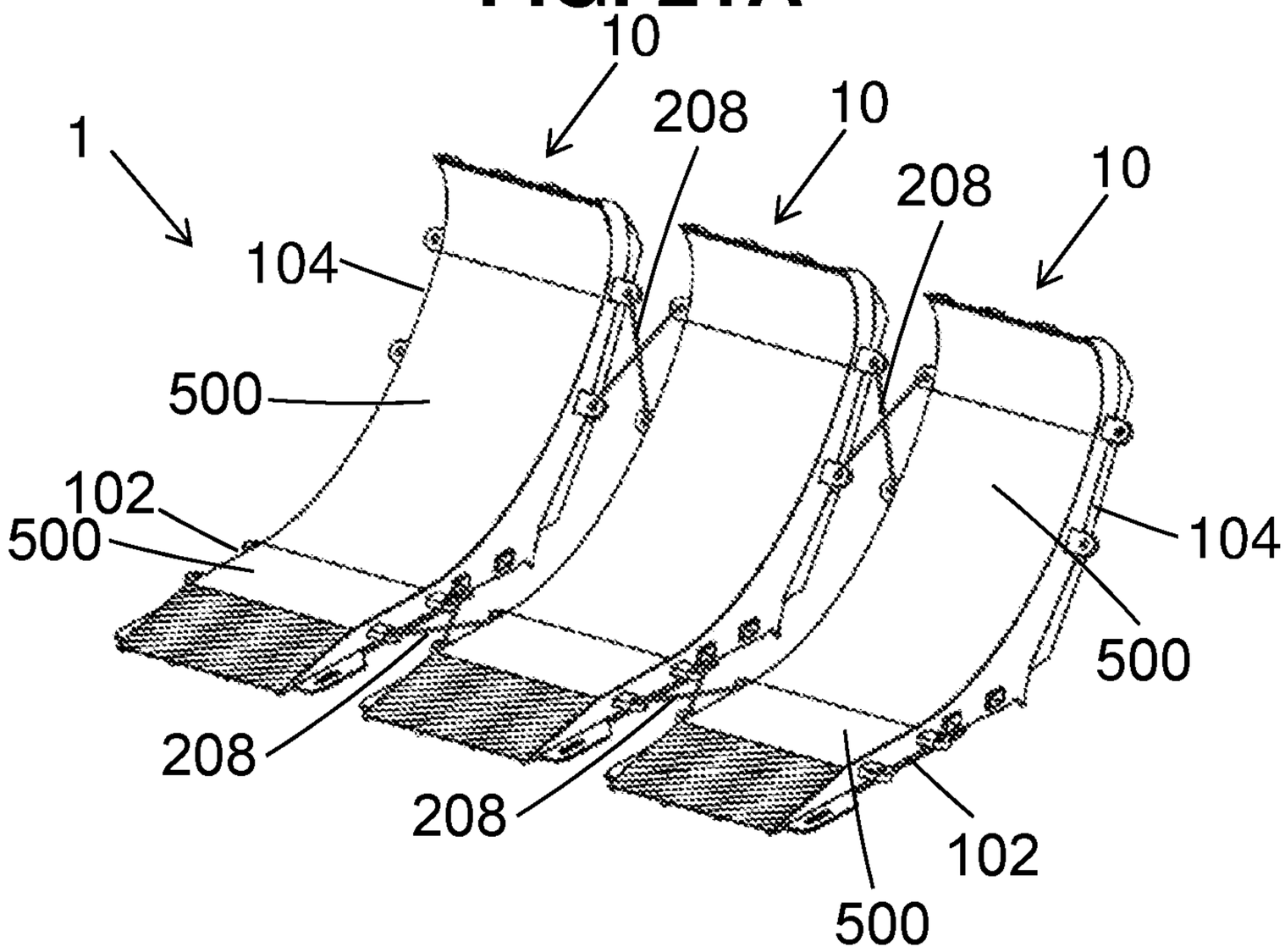

FIG. 21B

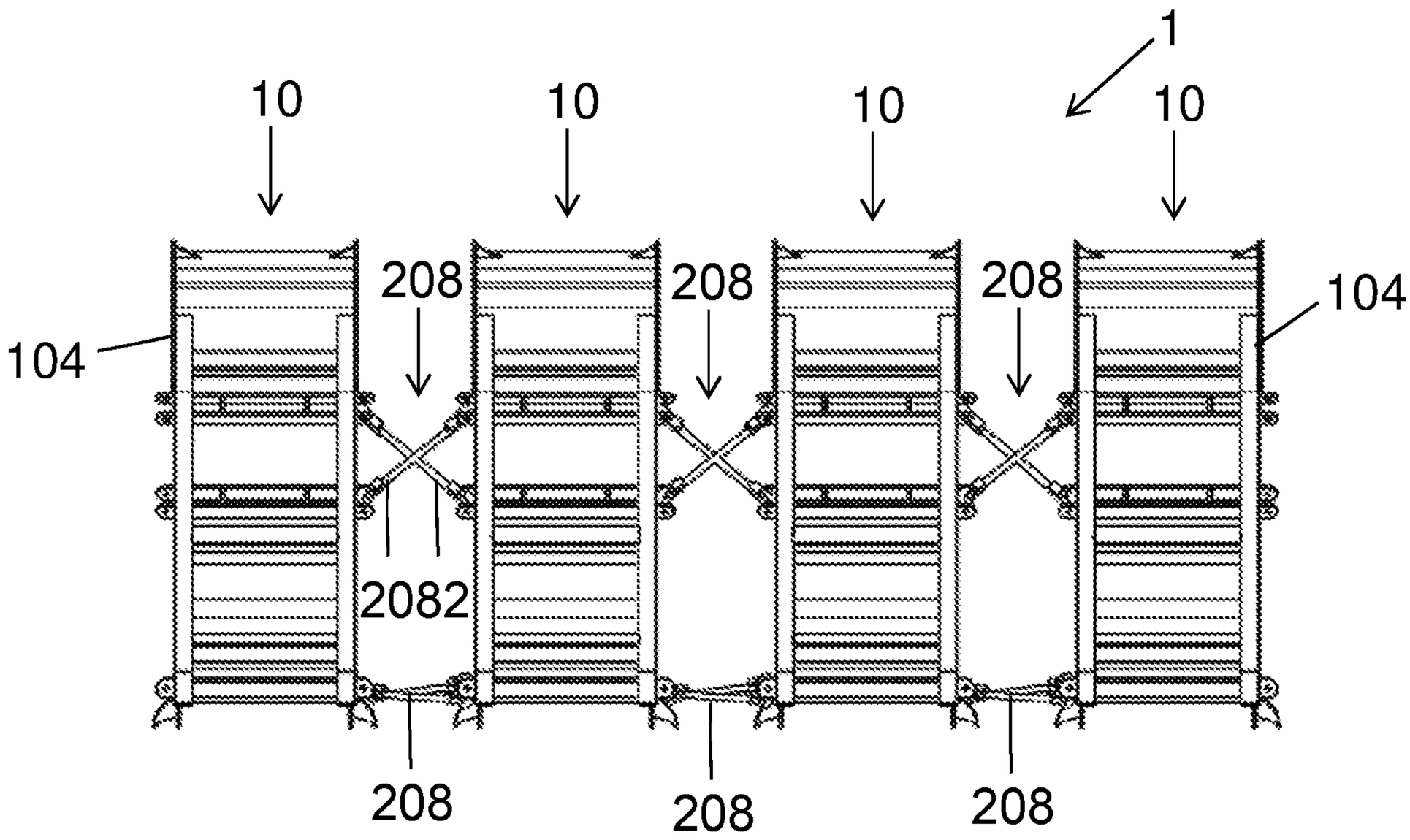

FIG. 22A

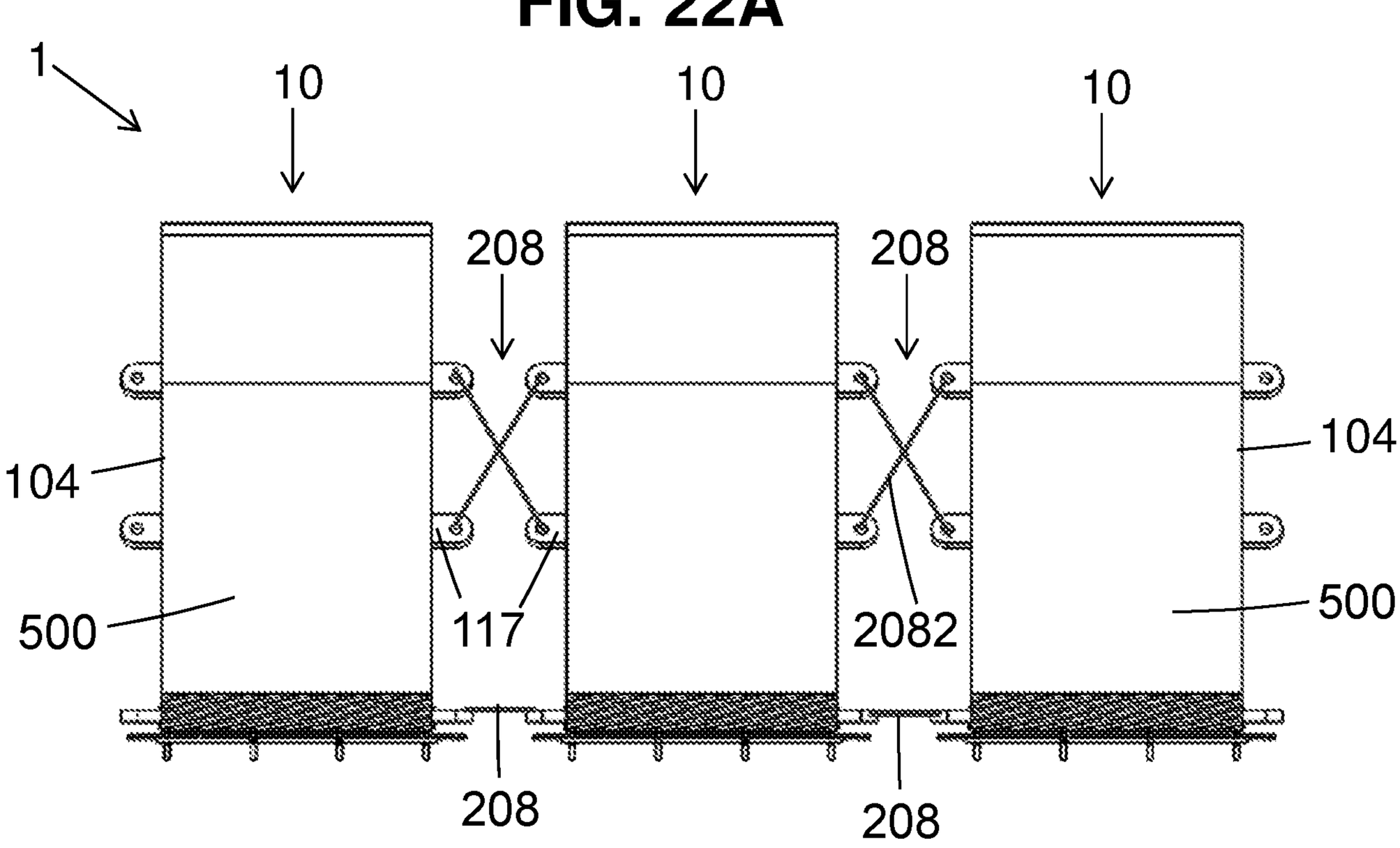

FIG. 22B

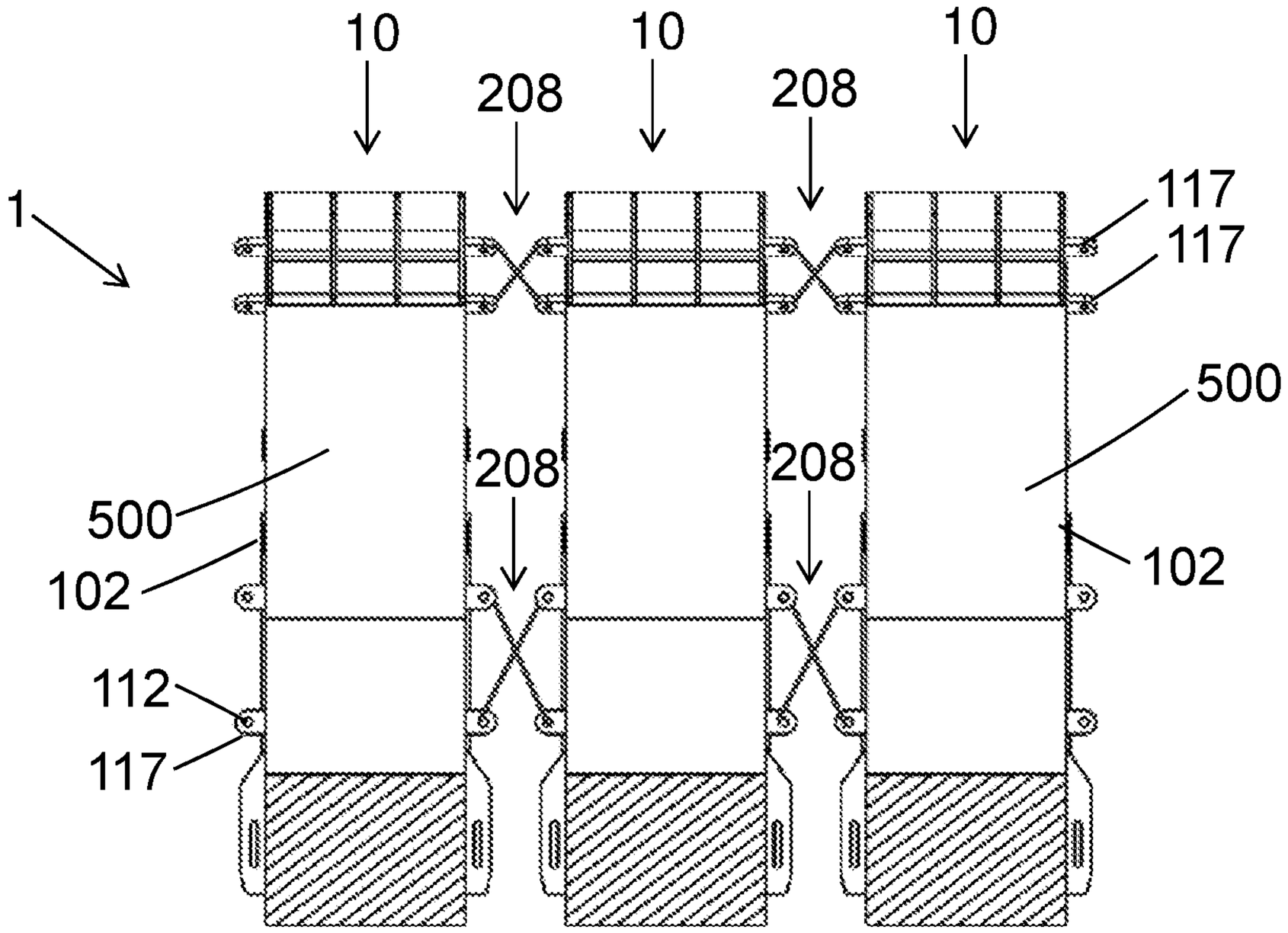

FIG. 22C

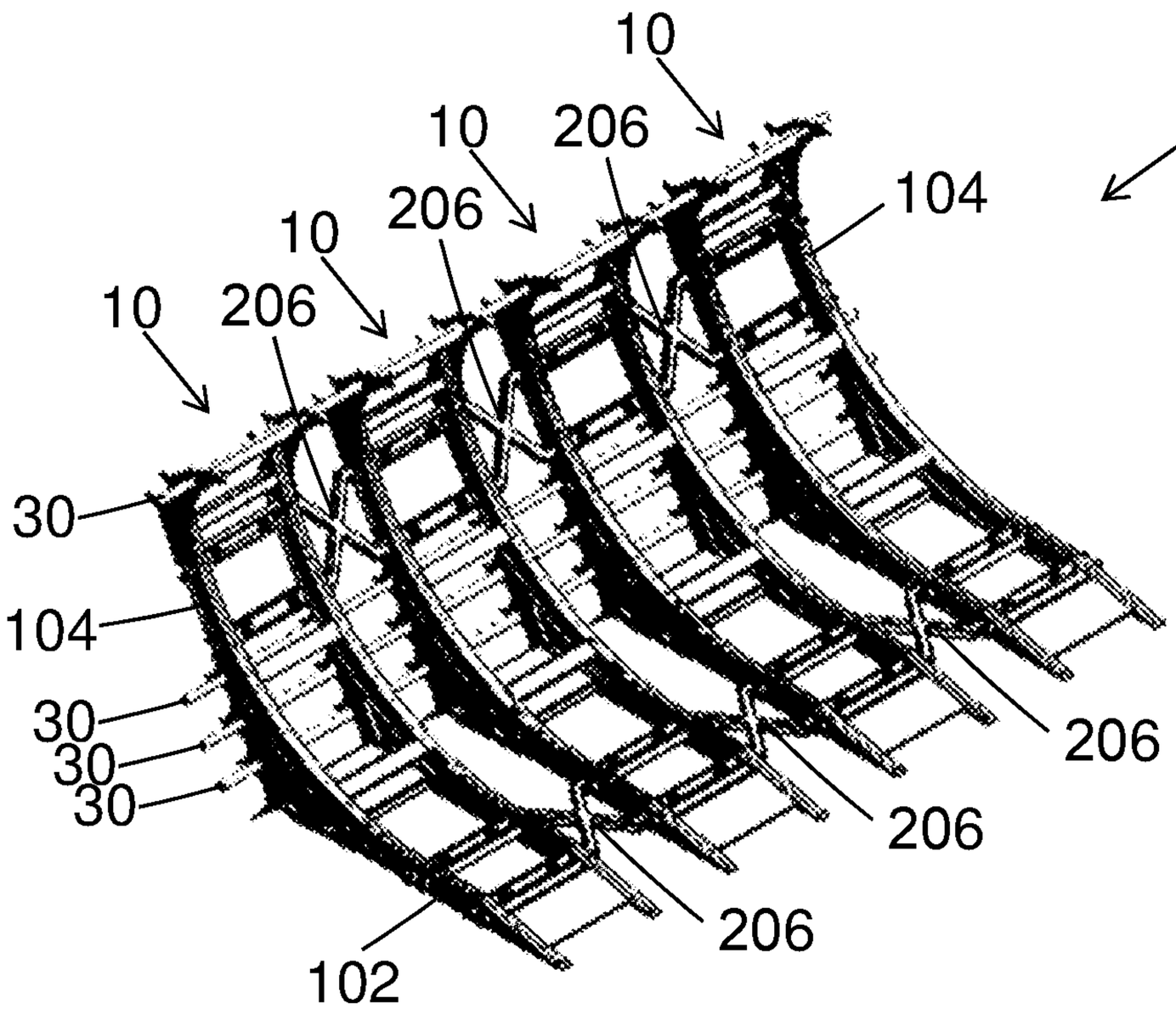
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FIG. 23

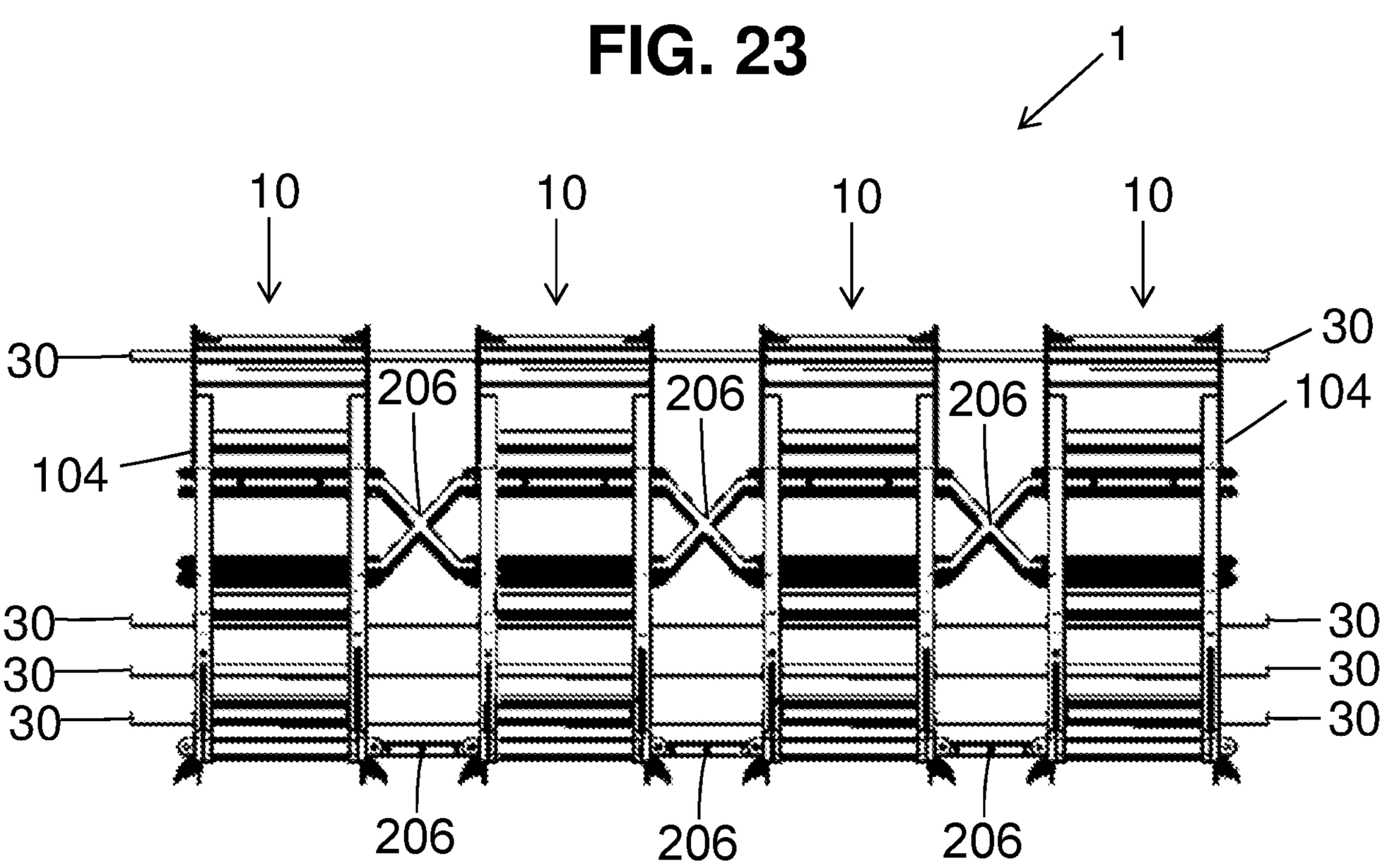
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FIG. 24

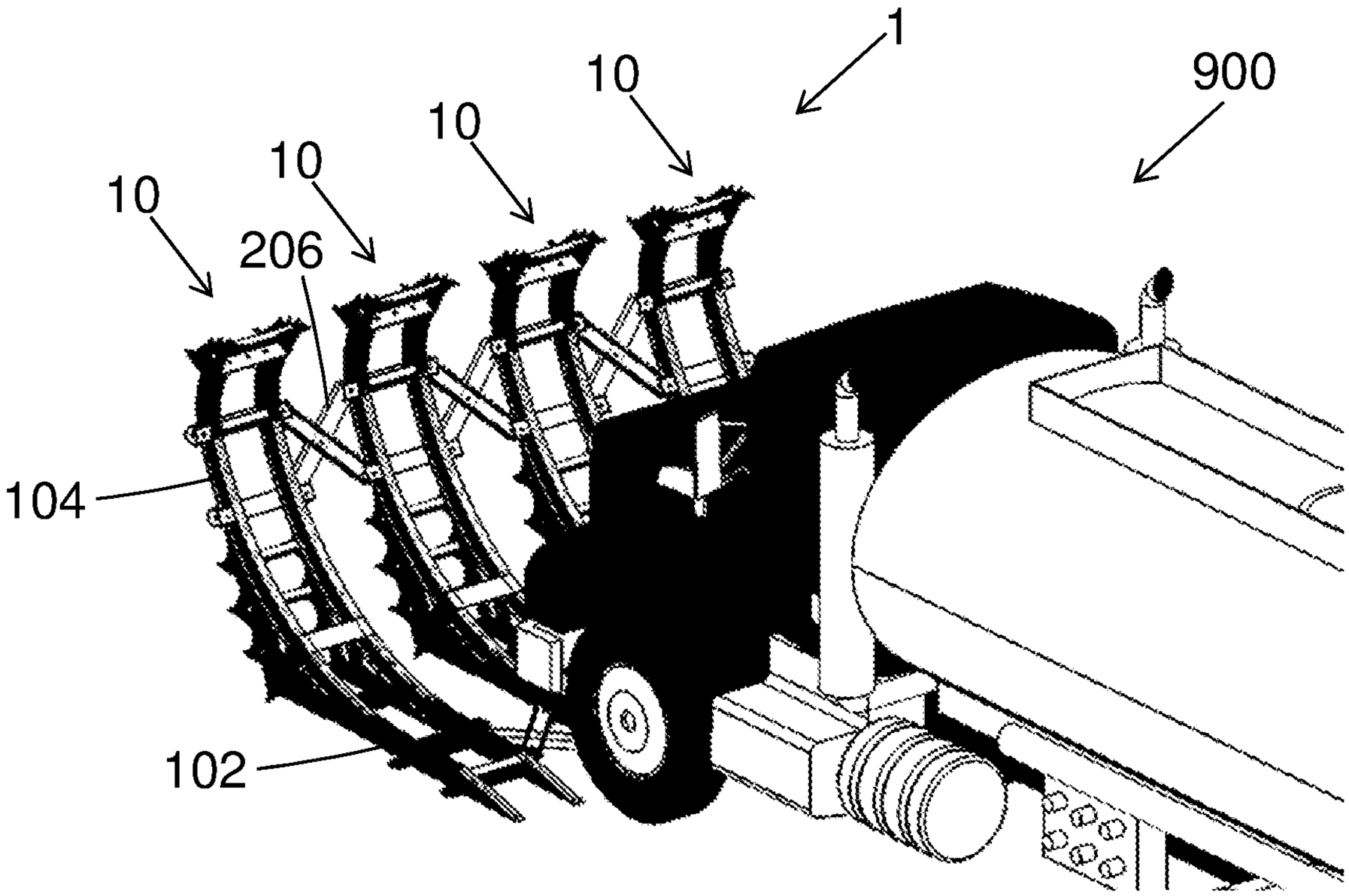

FIG. 25

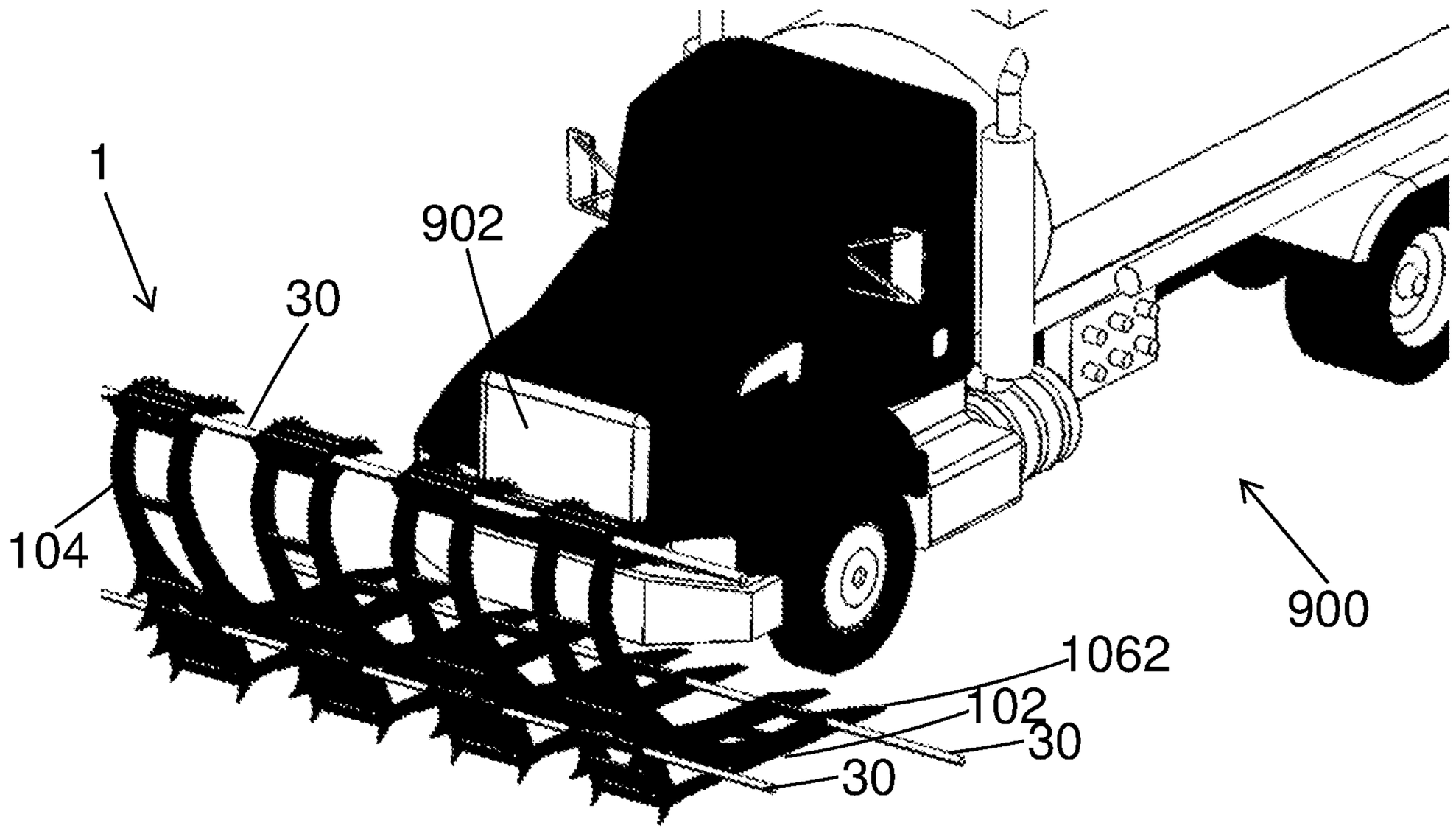

FIG. 26

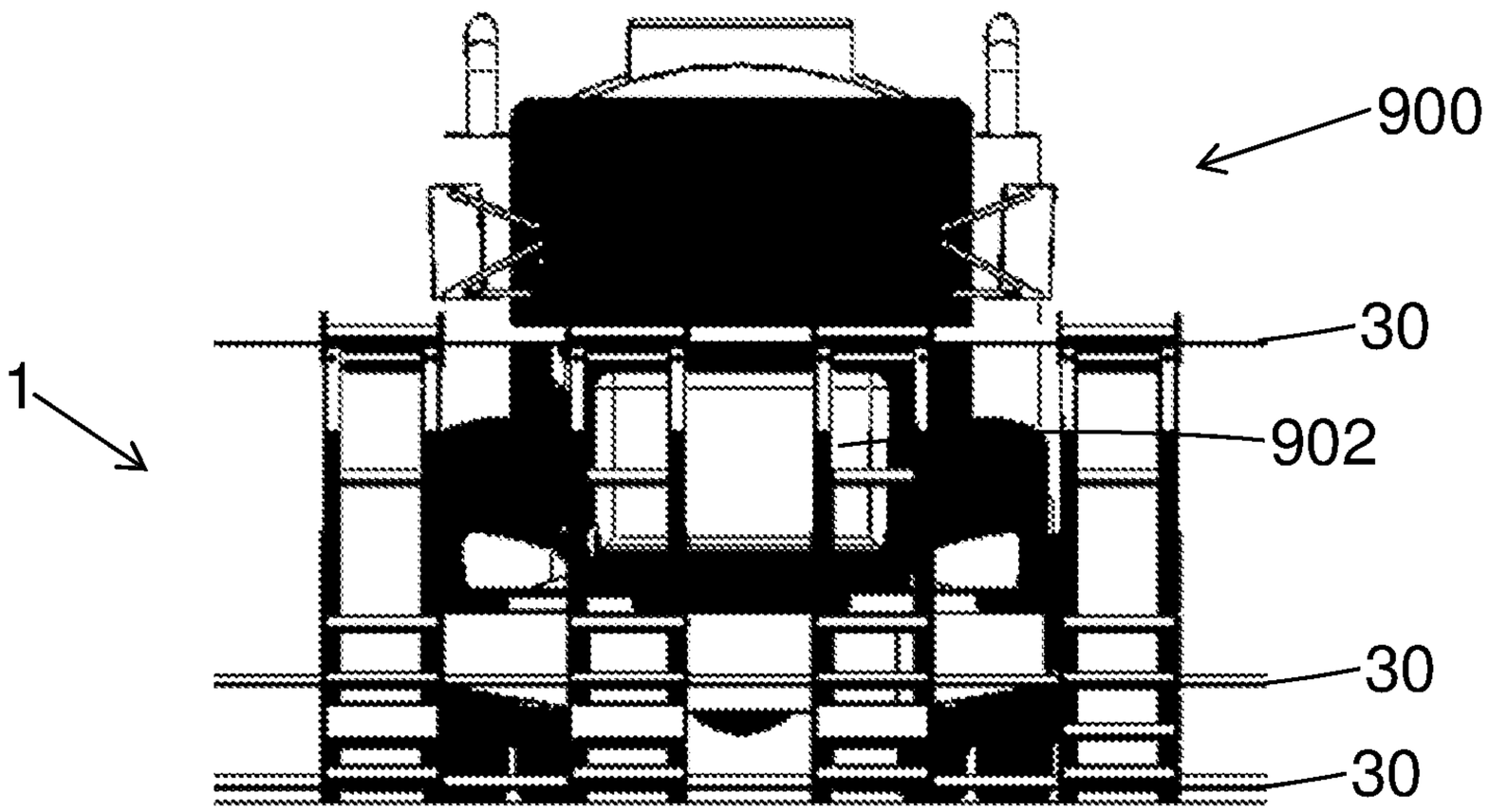

FIG. 27

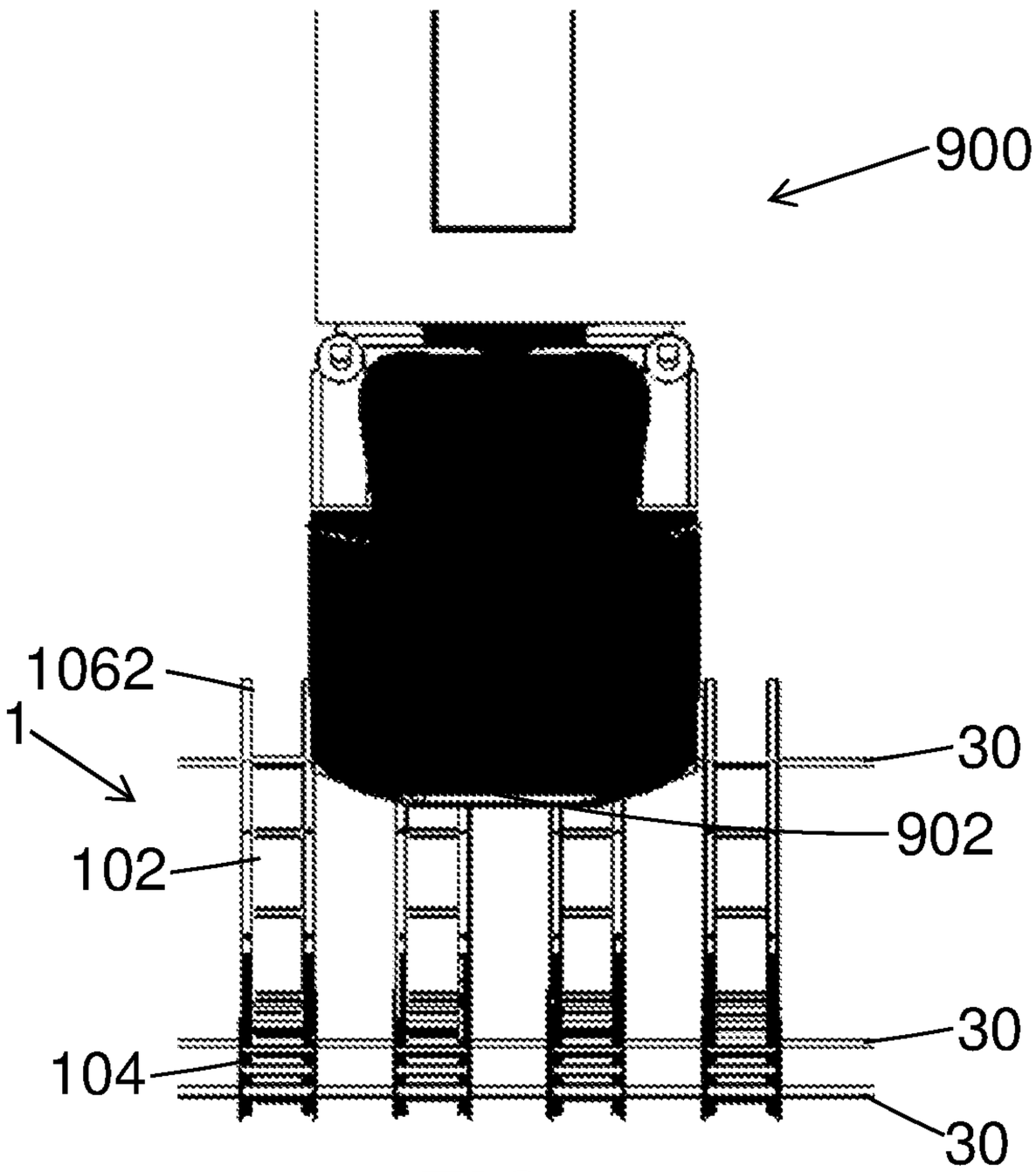

FIG. 28

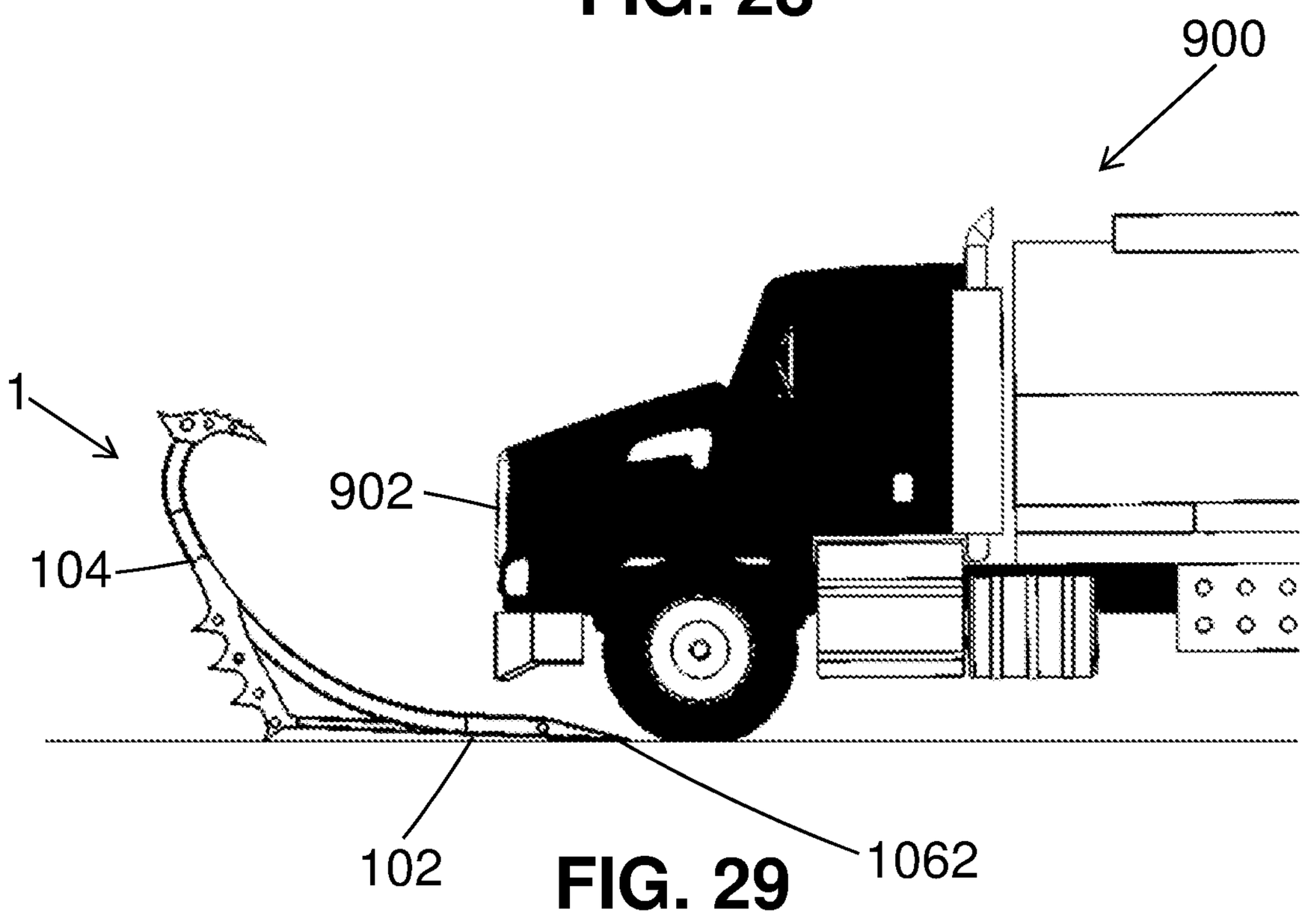

FIG. 29

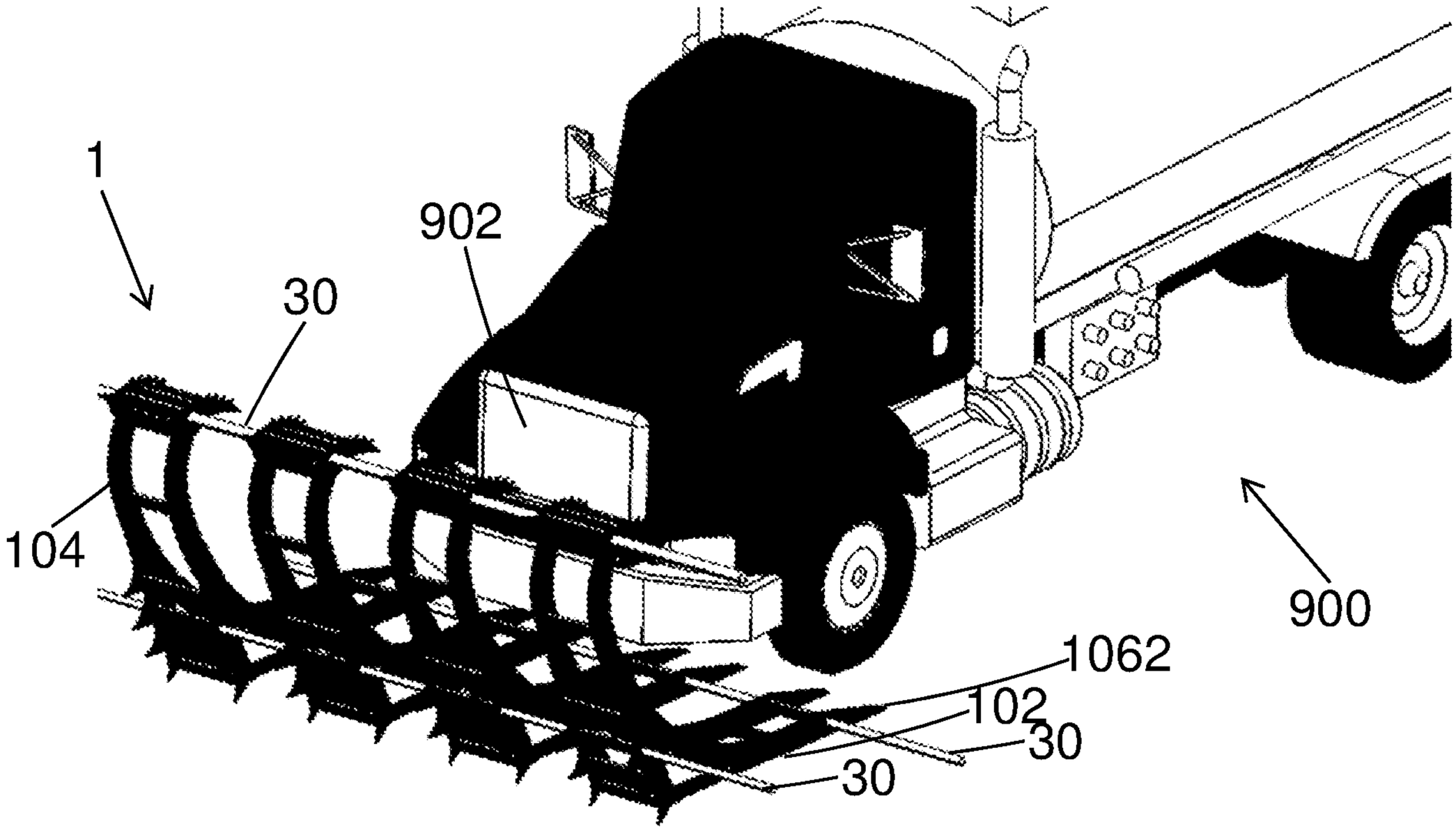

FIG. 26