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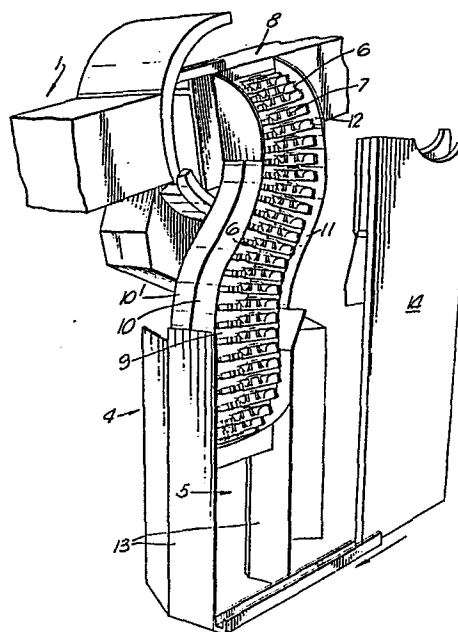
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⑤④ **A device for conveying linked-together cartridges from a magazine to an automatic gun, especially for use in a gun turret.**

⑤⑦ A device (4) feeds a belt of cartridges (6) to a weapon (1), the cartridges (6) being linked-together, by central clips (7). The cartridges (6) are automatically pulled up from a magazine and into the weapon (1) by a cartridge mechanism (8). The path is defined by a channel extending between the magazine and the weapon, two guiding side walls (10, 11) of the channel being of a flexible resilient material that is capable of forming a minimal length at all angles of elevation of the weapon (1). The walls (10, 11) engage slidably at their lower ends with fixed vertical guide plates (13), and are fixed at their upper ends to a holding bracket (12) secured to the cartridge mechanism (8) of the weapon (1).



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A device for conveying linked-together cartridges from a magazine to an automatic gun, especially for use in a gun turret.

This invention relates to a device for conveying ammunition from a magazine to a gun, with the cartridges linked together, preferably by clips on the central cartridge portion, and where said cartridges are pulled automatically from the magazine and into the gun.

The supply of ammunition to guns that are provided in turrets or other kinds of superstructures often cause problems. In such turret structures, e.g. in tanks, there is very restricted space and it is, thus, necessary to aim at the best possible utilization of the available space so as to leave the gun operator with optimal freedom of movement. In tank turrets this problem is especially noticeable since it must also be possible to introduce and advance ammunition from the magazine to the gun, i.e. the entering area of ammunition must be accessible. This problem of space is especially trying when the possibility of using several kinds of ammunition is also desired, since it is often difficult to change firing, e.g. between two kinds of ammunition.

In gun turrets of this kind the entire equipment will be provided on a platform having a limited circumference, preferably a circular platform on which the gunner sits, the gun rests, and ammunition is also kept from which the conveyer track to the gun is provided.

Several approaches for feeding devices suited for use, e.g. in gun turrets are known. Examples of such devices are found, e.g. in the Norwegian Patent Applications Nos. 82 2897, 82 2782, 82 3565, 83 4332, 83 4333, and 83 4334.

The kind of device most used today comprises a flexible ribbed channel in which cartridges clipped together are guided. Said channel is shaped so as to be bendable and twistable in several directions. Such a channel, however, must have a limited flexibility and its bendability and twistability will be substantially more restricted than is the case with the clipped-together cartridge chain per se. Since the gun must be able to move inside a relatively large sector of dial, the feeding area with said

ribbed channel is relatively large, also because it must provide space for channel bulging at all angles of elevation of the gun. This means a corresponding restriction of the gunner's post.

In addition to this disadvantage of the known arrangement there must be accommodation in the path of conveyance for at least one reliable driving member, that may e.g. be a star shaped wheel for the cartridge chain. Such drive mechanisms are used in most of the known devices and they are not only bulky, but they constitute an undesirable complication of the path of conveyance as well, with hazards of errors. Furthermore, it should be mentioned that flexible channels are very expensive.

It is an object of the present invention to provide a feeder of a kind as simple as possible for ammunition from a magazine to a weapon, which feeder should be inexpensive, reliable, and easily accessible for insertion of feed belts. It is, furthermore, desired that it should be possible to use cartridges that are linked together in the simplest possible manner, preferably by the aid of clips in the center portion of the cartridges, this being the method of linking together that is the least bulky one of those known today. The feeder should, furthermore permit designing for parallel feeding of one or a number of feed belts, e.g. from magazine boxes placed on top of each other or side-by-side.

The objects are achieved by a device of the kind mentioned at the beginning that is characterized by what appears from the claims.

In many ways the device according to the invention may rather be regarded as a guide means, the feeding drive being provided directly by the gun pulling up the cartridges. In this connection the device according to the invention ensures that the series of cartridges, i.e. the clipped-together belt, follows the best path and can slide in a controlled and reliable manner along said path. This path also means the shortest distance and it will occupy a minimum of space. It is also easy to arrange two such paths side-by-side, one of them starting from the lower ammunition box. When ammunition is to be guided from the ammunition box to the gun, i.e. the threading process, e.g. a sliding portion forming a protection for the gunner against the ammunition, may be pushed aside. The transport will then be accessible. When there are two paths of

conveyance side-by-side the rear path may be open laterally, so that the feed belt may easily be advanced by hand.

In the longitudinal direction the feed path or channel is limited by resilient, flexible strip-shaped plate elements, e.g. made from a resilient material, like steel or plastic. These strips or strip-shaped plates constituting the guide path of the ammunition are provided at a mutual distance leaving space for the cartridges, i.e. a distance somewhat larger than the length of a cartridge, and they are preferably attached at their top edge area and are held in a slide at their lower ends. The strips may, possibly, be unrestricted at their lower portion.

The flexibility of the strip shaped plates must be adapted to the ammunition. In case of larger or heavier ammunition more rigidity may e.g. be achieved by adding further plates or wafers, e.g. of spring steel. The number of elements of the flexible strip-plate is, thus, increased when it is desired to increase the rigidity of the path of conveyance.

The invention will now be disclosed in more detail with reference to an embodiment shown in the drawings, in which:-

Figure 1 is a diagrammatic elevation of a gun turret, illustrating the conditions of accommodation according to the invention.

Figure 2 is a diagrammatic view in perspective of the feeding device according to the invention at a low angle of elevation of the gun.

Figure 3 is a view like Figure 2 showing the gun with a high angle of elevation.

Figure 1 of the drawing shows a gun 1 in a gun turret 2, the gun being raisable and lowerable to angle, e.g. between the dash-and-dot-lines, and the gun turret being rotatable as indicated by arrow A. The gunner sits on a seat 3 inside the turret. The chair 3 and, thus, the gunner as well are placed on a turntable constituting the bottom of the turret and being rotatable as indicated by arrow A in Figure 1. At his side the gunner has the ammunition boxes and the feeder device designated 4. As will appear from the Figure there is very restricted space in said turret, especially if several kinds of ammunition are to be advanced.

In Figures 2 and 3 the ammunition feeding device 4 according to the invention is illustrated in more detail. In the shown embodiment the device is designed for feeding two kinds of ammunition side-by-side. The ammunition boxes are placed on the turntable in the area designated 5 in Figures 2 and 3. Said boxes may either be placed on top of each other the ammunition being pulled out laterally, or side-by-side. The ammunition provided in the boxes is in a linked-together state every single cartridge 6 being linked in its central area by clips 7 in a manner known per se. Such a chain of clipped-together cartridges has great freedom of movement and bendability in all directions, and the possibility of bending said chain is only restricted when the ends of the cartridges butt against each other. Such a clipped-together belt, thus, provides for great freedom of movement. The gun diagrammatically indicated at 1 is provided with a cartridge mechanism, also diagrammatically shown at 8, since it does not constitute any part of the invention. The feed path or path of conveyance of the ammunition comprises a plane and smooth wall 9 which may form the partition between the paths in the case of two paths of conveyance. The ammunition guide in the longitudinal direction is, however, formed by strip shaped plate members 10 and 11. Said strip shaped plate members may be composed of one or several leaves, e.g. made from spring steel, depending on the desired degree of rigidity of the guide strip. The guide strip is attached to a holding bracket 12 at the top. Said holding bracket 12 is secured to the cartridge mechanism 8 of the gun and follows the movement of the latter when the gun is raised or lowered. The strip shaped plate members 10 and 11 are arranged in parallel and at a mutual distance so that there is room for the cartridge belt between them. Said strip shaped plate members 10 and 11 at the lower ends open to a substantially vertical fixed guide 13 on each side, said guide also forming the place to put the ammunition boxes. The strip shaped plate members 10 and 11 are not secured to said guide plates 13, but they are slidingly held by the latter, either due to the inherent spring force or, most advantageously, by the aid of a groove means ensuring freedom of movement for said plate members 10 and 11 and, at the same time, holding them close to the

respective guide plates 13.

When the angle of elevation of the gun is changed between the two extreme points shown in the drawing, i.e. from the lowermost to the highest angle, the strip shaped guide plate members 10 and 11 due to their flexibility and inherent spring force, will follow the shortest curved path between the fixed guides 13 and the cartridge mechanism 8, the ends of said strip shaped plates sliding up and down along guide plate 13. The advance path of the cartridge belt will, thus, follow the shortest path possible, i.e. the bending radii of the cartridge belt.

The wall 9 is made in at least two parts which can be displaced relative to each other so as to be able to follow the curvature of plate members 10 and 11. The upper or uppermost of these relatively movable parts is fixed to the holding bracket 12, and the lower or lowermost relatively movable part is fixed to the guide plates 13. A wall structure formed by two such relatively movable parts is illustrated partly eclipsed by a sliding wall 14, the wall structure in this example consisting of a lower part that can slide into and be displaced relative to an upper part that is constructed as a double wall with one element at each side face of the lower part.

When a cartridge belt is to be inserted the gunner, generally sitting behind the protecting sliding wall 14, will slide said wall to the rear and expose the feeding path of the cartridges. He can then pull the cartridge belt out of the ammunition box, easily pull it up along the guide path and feed it into the cartridge mechanism of the gun. The wall 14 is then pushed forward again and the gun is ready for firing.

In the embodiment shown two feeding paths are provided. The rear path, designated 10' and comprising elements corresponding to those of the front path, can be provided with another type of ammunition. Said paths are separated by the partition. For insertion the gunner can move his hands about the front path to pull ammunition from the magazine (boxes), the rear path of conveyance being freely accessible when an inside wall has been pushed aside.

From the above it will be seen that by the aid of the feeding device according to the invention a path is provided for the cartridge belt which path will ensure the shortest, and, thus most

space-saving shape of the mechanism of conveyance, so that the available space is utilized to a maximum. At the same time very flexible and reliable feeding is achieved for which it is possible to use ammunition that is clipped together in the simplest manner.

The flexible strip-shaped plates 10 and 11 may be produced from any suitable flexible material, e.g. steel, but a plastic material may also be considered. The strip-shaped plates may be produced in series, e.g. from a leaf-shaped material, and the desired rigidity of the path of conveyance may be achieved by adapting the number of leaves to be used for the plate member and/or by changing the shape and thickness of the leaves.

Only one embodiment of the invention is shown in the figures and discussed above, and there are many possible modifications within the scope of the claims. By this invention a reliable, inexpensive design having great freedom of movement is achieved, so that maximal flexibility of the cartridge belt can be utilized and a minimum of space is needed. Obviously, this device is not only useful in connection with gun turrets, but it may be used for all kinds of belt-shaped feeding where simple and reliable guidance is desired.

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CLAIMS

1. A device for feeding ammunition from a magazine to a weapon, where the cartridges are mutually connected, preferably by the aid of clips on the central portion, and where the cartridges are automatically pulled from the magazine into said weapon, characterized in that a channel portion is provided between the magazine and the weapon, where the two guiding walls (10,11) are made from a flexible resilient material that is capable of forming a minimal length at all gun elevations.
2. A device as defined in claim 1, characterized in that the two guiding walls (10,11) are secured at one end, whereas they are slidably held in a guide (13) at the other end.
3. A device as defined in claim 1, characterized in that the guide walls (10,11) have an adjustable flexibility, e.g. by changing the shape and thickness of the leaves and/or increasing the number of leaves of a leaf staple plate member.
4. A device as defined in claim 2, characterized in that the guide walls (10,11) are attached to a holder (12) which follows the movement of the weapon.
5. A device as defined in claim 1, characterized in that it is partitioned from the gunner by the aid of a slidable side wall (14).
6. A device as defined in claim 1, characterized in that two guide channels (10,10') are provided, one behind the other, leading to two different ammunition boxes.

Fig. 1.

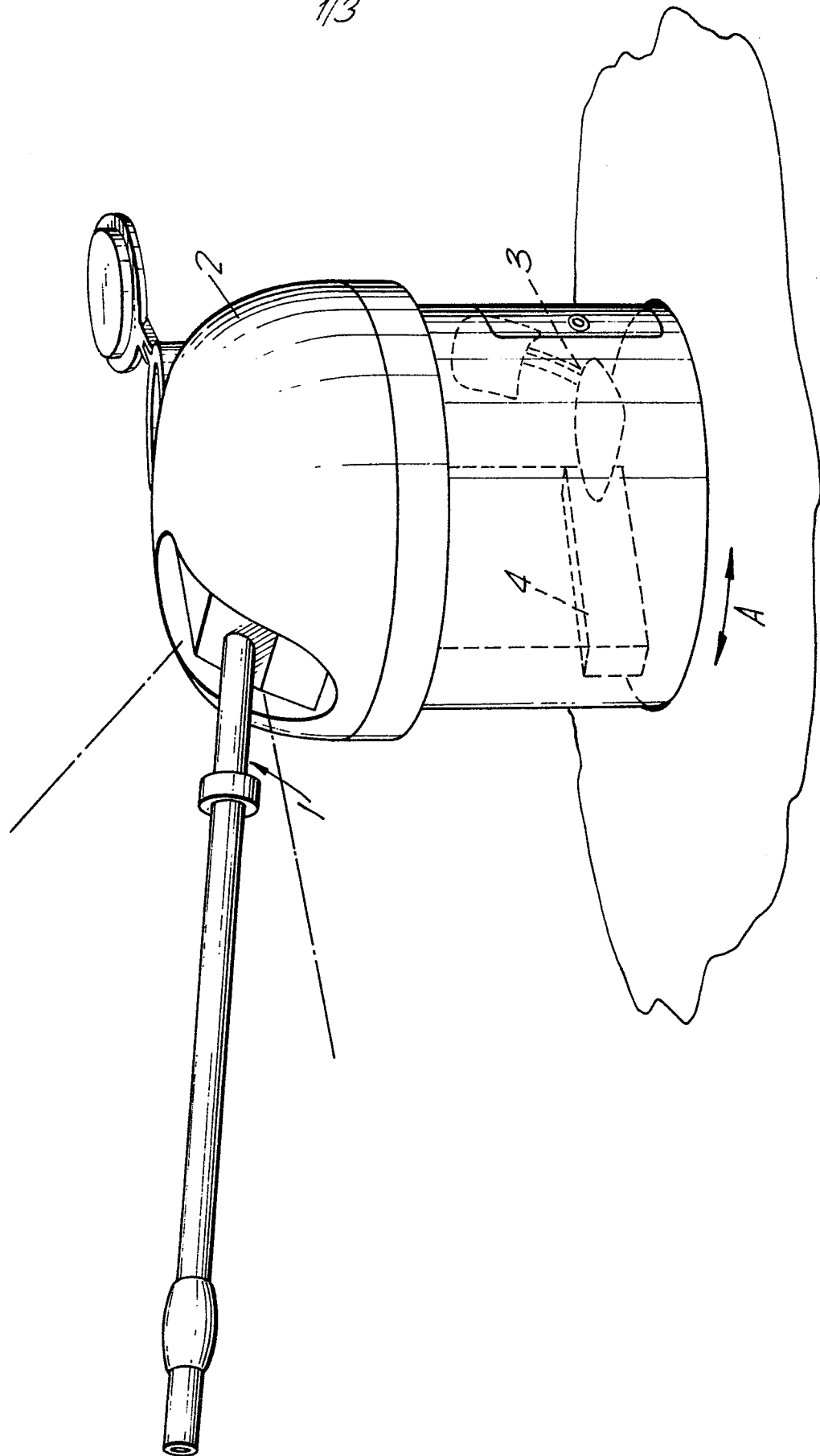
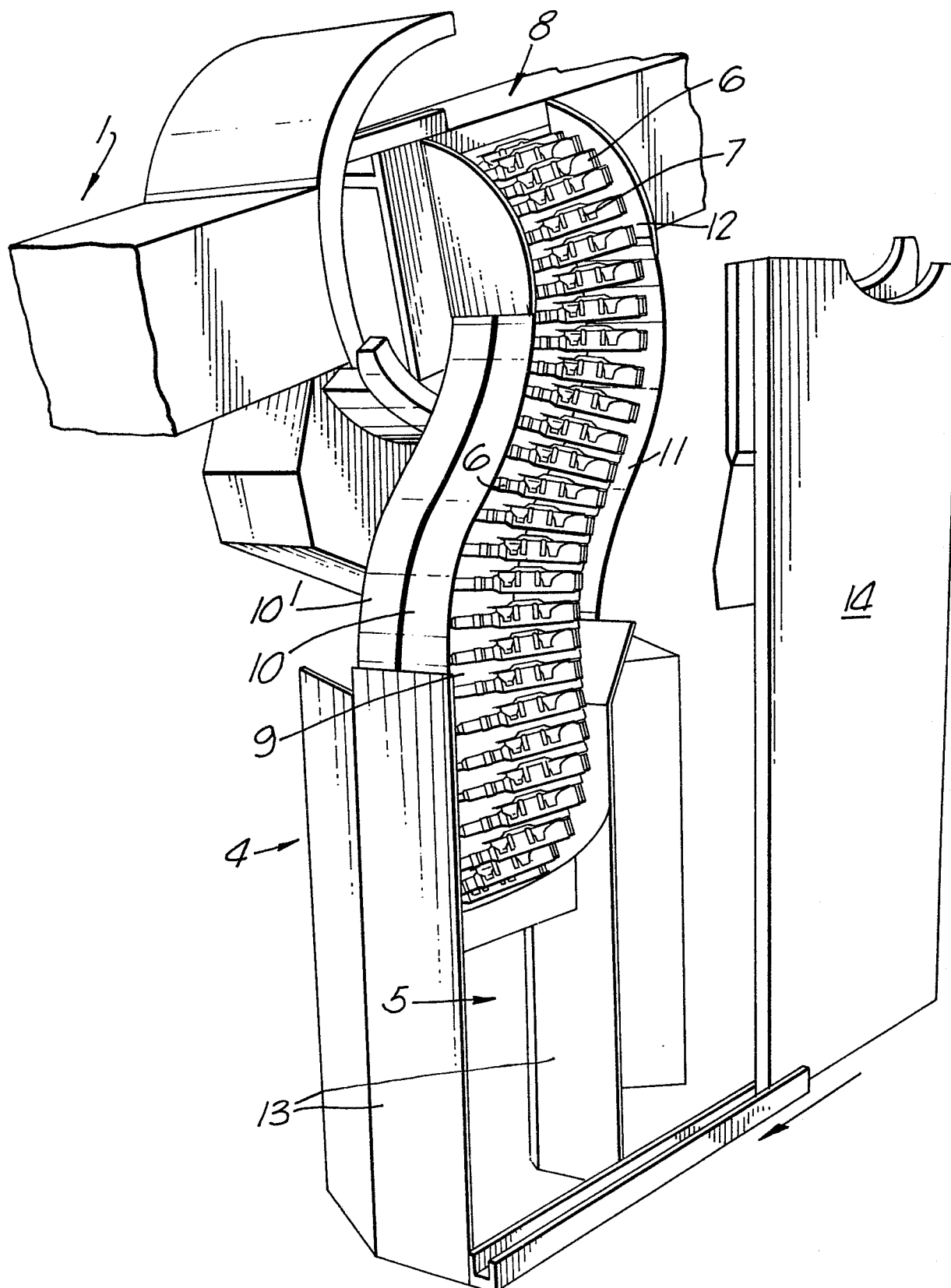
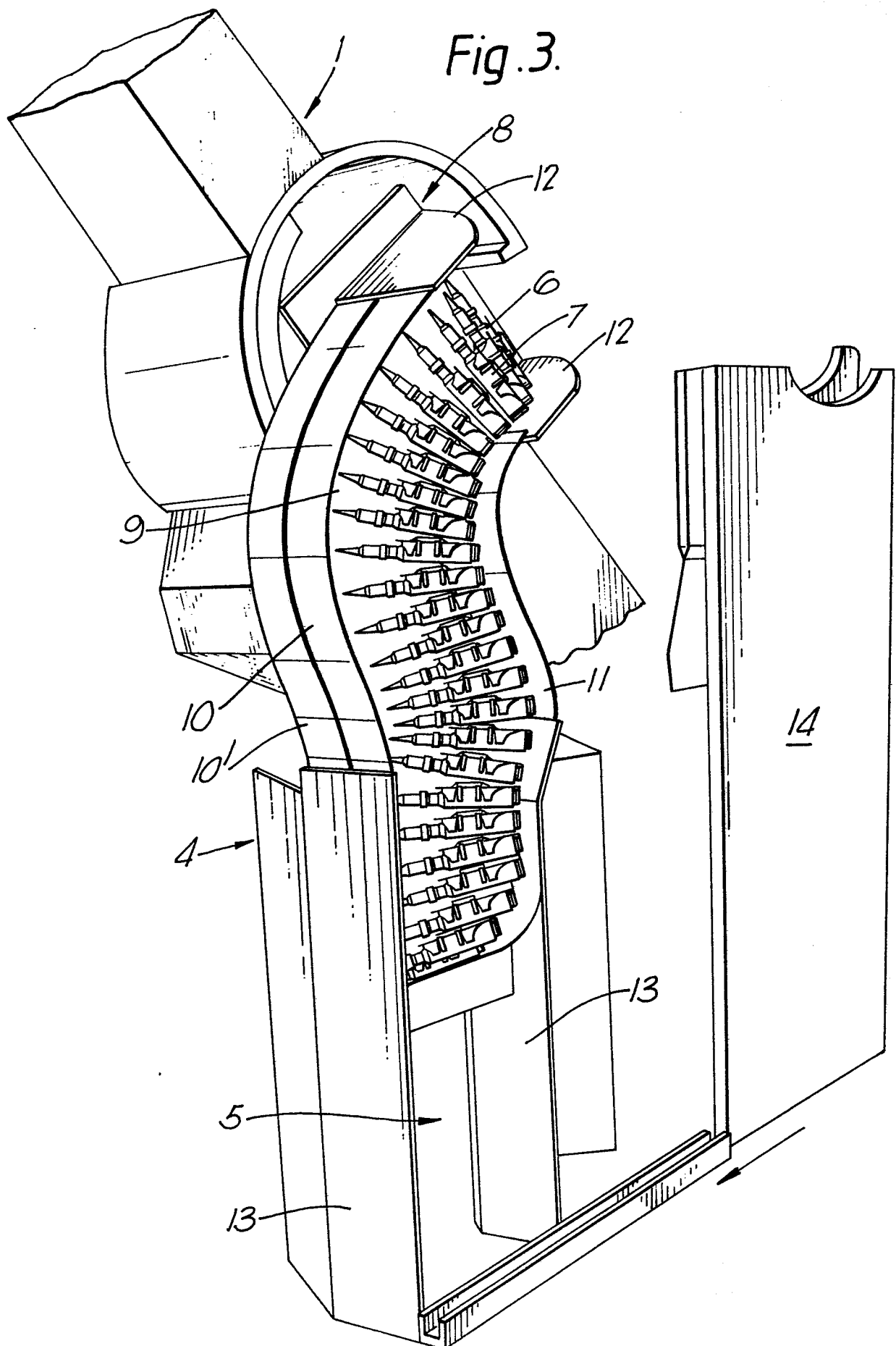


Fig. 2.



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Fig. 3.





European Patent
Office

EUROPEAN SEARCH REPORT

0201176

Application number

EP 86 30 3278

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	FR-A-2 436 960 (LIENHARD et al.) * Figures 2-5; page 3, lines 16-32; page 4, lines 1-6; page 5, lines 2-25 * -----	1,2,4	F 41 D 10/40
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			F 41 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 23-07-1986	Examiner FISCHER G.H.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	