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

(11) EP 3 453 801 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
13.03.2019 Bulletin 2019/11

(51) Int Cl.:
E01F 15/00 *(2006.01)*

(21) Application number: **18193773.1**

(22) Date of filing: **11.09.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **11.09.2017 IT 201700101468**
11.09.2017 SM 201700427

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(54) ROAD BARRIER

(57) Road barrier (100), comprising a box-like structure extending along a first direction of greater extension; having a tapered upper portion (101, 102; 103) and a lower portion (104), joined to said upper portion; an enlarged base extending, along a second direction orthogonal with respect to said first direction of greater extension, by a width greater than the width that said tapered upper portion has along said same second direction; said barrier (100) being adapted in use for being at least temporarily rigidly anchored to the ground or road surface in correspondence of the lower portion (104) thereof; said barrier comprising at least one first wheeled trolley (210), axially mobile along a third direction orthogonal with respect to said first and second direction.

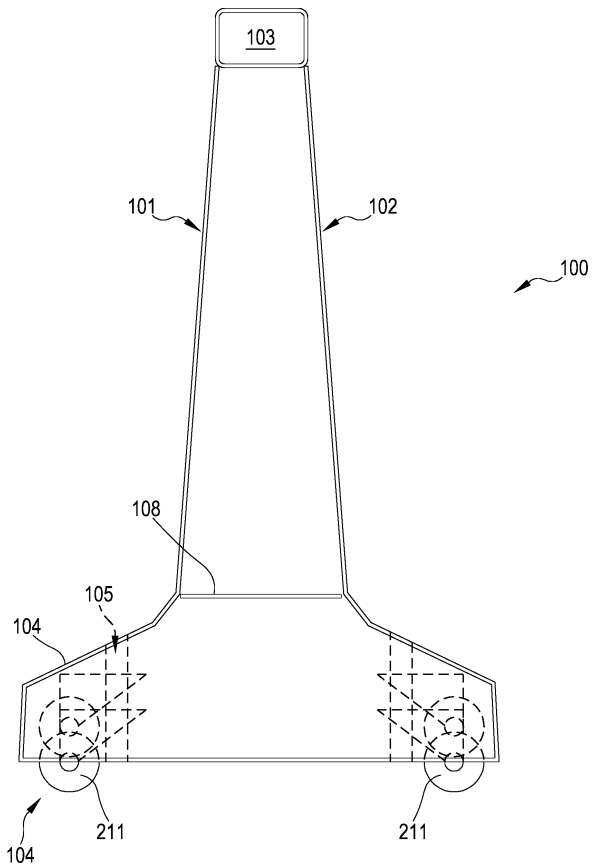

FIG.3

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Description

Field of the invention

[0001] The present invention relates in general to the field of elements adapted to be used in roads, and in detail it relates to a road barrier.

Prior art

[0002] It is known that on roads, especially with high traffic, barriers are used to confine traffic in both directions; these barriers, when installed between the two lanes, are in particular designed to prevent a vehicle from crossing the opposite lane, causing frontal collisions with vehicles coming from the opposite direction.

[0003] In particular, road barriers must be anchored in such a way that they cannot be broken down by light or heavy vehicles, and in containing their motion, they must not cause them to overturn or deceleration exceeding certain values. In Italy, the rules governing road barriers are indicated in the requirements of Ministerial Decree 21.06.2004.

[0004] The applicant has observed that road barriers must often be capable of being moved in order, for example, to temporarily open a gap between the two lanes of the road. In the case of reinforced concrete barriers, the movement typically takes place via a hydraulic lift. This movement is expensive, at least since it is necessary to use or rent a hydraulic lift, and it is also time-consuming; in any case, reinforced concrete barriers cannot be moved manually.

[0005] There are also metal barriers, which are lighter than the reinforced concrete barriers, which are interconnected to ensure good resistance in the event of an impact even of heavy vehicles. These metal barriers are typically riveted to each other and cannot be easily removed, except by a movement of the rivets.

[0006] An object of the present invention is therefore that of describing a road barrier which allows solving the drawbacks described above.

Summary of the invention

[0007] According to the present invention, a road barrier is described, comprising a box-like structure extending along a first direction of greater extension; said barrier comprises a tapered upper portion and a lower portion, joined to said upper portion; said lower portion having an enlarged base extending, along a second direction orthogonal with respect to said first direction of greater extension, for a width greater than the width that said tapered upper portion has along said same second direction; said barrier being adapted in use for being at least temporarily rigidly anchored to the ground or road surface in correspondence of the lower portion thereof; said barrier comprising at least one first wheeled trolley, axially mobile along a third direction orthogonal with respect to said first and second direction.

[0008] Advantageously, this allows implementing a structure for containing the motion of vehicles which is optimal from the standpoint of strength and likewise capable of being moved easily in order to create a temporary gap.

[0009] According to a preferred and non-limiting aspect of the present invention, said road barrier further comprises a second wheeled trolley, positioned in substantial correspondence of an end of said barrier opposite to the end substantially at which said first wheeled trolley is positioned.

[0010] According to a further non-limiting aspect, said barrier comprises a first end portion in correspondence of which the first wheeled trolley is positioned and a second end portion, opposite to the second end portion, on which the second wheeled trolley is positioned.

[0011] Advantageously, the presence of the second wheeled trolley allows preventing, during the handling, the end of the barrier without a trolley from touching the road surface or the asphalt significantly, thereby damaging it.

[0012] According to a preferred and non-limiting aspect of the present invention, said at least one first wheeled trolley is rotatably fixed on a support oriented substantially along said third direction.

[0013] According to a further preferred and non-limiting aspect of the present invention, said second wheeled trolley is rotatably fixed on a support substantially along said third direction.

[0014] The support of said first and/or said second trolley is fixed to said barrier in correspondence of the upper portion of said barrier.

[0015] Advantageously, this makes the lower portion of the barrier free and facilitates the operation of fixing and adjusting the height of the trolley.

[0016] According to a preferred and non-limiting aspect of the present invention, said support is introduced into a hole of a support plate present in correspondence of said upper portion of said barrier.

[0017] In particular, said first and/or said second wheeled trolley can be adjusted, and/or are adjustable, in height with respect to the position of said lower portion of the barrier, and/or with respect to said lower portion of the barrier, and has a plurality of operating positions identified between a first operating position, in which the wheels of said first and/or second trolley are enclosed in the shape identified by said lower portion, and a second operating position in which the wheels of said first and/or second trolley project outside the shape identified by said lower portion.

[0018] According to a further non-limiting aspect, when the wheels project outside the shape identified by the lower portion, such wheels raise at least part of the barrier from the ground.

[0019] This advantageously allows achieving two operating conditions for containing the motion of the vehicle and for easy movement of the barrier itself, respectively.

According to a preferred and non-limiting aspect of the present invention, said barrier has means of adjustment of the height of said first and/or second trolley comprising a nut meshing on said support and abutting with said support plate.

[0020] According to a preferred and non-limiting aspect of the present invention, said barrier comprises a left side wall and a right side wall, each extending between the upper portion and the lower portion; said barrier integrating at least one reinforcing rib arranged between said left side wall and said right side wall.

[0021] According to the present invention, a road barrier is further described, comprising a box-like structure extending along a first direction of greater extension having a tapered upper portion and a lower portion, joined to said upper portion having an enlarged base extending, along a second direction orthogonal with respect to said first direction of greater extension, by a width greater than the width that said tapered upper portion has along said same second direction, said barrier being adapted in use for being at least temporarily rigidly anchored to the ground in correspondence of the lower portion thereof; said barrier comprising a reinforcing rib interposed between said left side wall and said right side wall.

[0022] Advantageously, the reinforcing rib contributes to the strengthening of the barrier, limiting the increase in weight thereof and optimizing the weight/strength ratio of the barrier itself. More particularly, the reinforcing rib contributes to the strengthening of the barrier to impact from a vehicle impacting along a direction which comprises a significant component along said third direction.

[0023] More preferably, said barrier comprises multiple reinforcing ribs positioned sequentially along said first direction.

[0024] Advantageously, this contributes to the strengthening of the barrier uniformly throughout its length.

[0025] According to a further aspect of the present invention, said barrier comprises a plurality of stakes for fixing to the ground or road surface, introduced in correspondence of perforations made in correspondence of said lower portion.

[0026] This advantageously allows exerting an optimum force of contrast to the impact of the vehicle.

[0027] According to a preferred and non-limiting aspect of the present invention, the reinforcing rib is a metal sheet having a pair of wings tapering each in correspondence of a first end thereof, said wings joining with a base having a width substantially equal to the width of the second ends of said wings opposite to said first end.

[0028] According to a further non-limiting aspect, the base is interposed between the pair of wings.

[0029] According to a preferred and non-limiting aspect of the present invention, said reinforcing rib has V-bent wings with respect to said base, said wings having the respective said first end positioned in correspondence of the upper portion of said barrier.

[0030] This advantageously allows achieving a strengthening of both the upper portion and the lower portion of the barrier.

[0031] According to a preferred and non-limiting aspect of the present invention, said barrier has a lower portion comprising a plurality of holes for fixing to the ground.

[0032] Preferably, although not limitedly, said holes are placed side by side. This advantageously allows having a symmetrical fastening on both sides of the barrier itself. Preferably, although not limitedly, the holes have an axis substantially parallel to the third direction.

[0033] Preferably, although not limitedly, said barrier is at least partially made of metal material; even more preferably, said material is galvanized sheet.

[0034] The choice of using a metal material allows a considerable weight saving compared to what would happen with a barrier made of concrete, and advantageously also allows a cost-effective implementation. The galvanized sheet is however optimally resistant to corrosion.

[0035] According to a preferred and non-limiting aspect of the present invention, said barrier is a modular barrier.

[0036] This advantageously allows constructing structures for the containment of the motion of vehicles of any length, not forcing the manufacturer, for example, to create barriers of different lengths to adapt to the various situations.

[0037] According to a further preferred and non-limiting aspect of the present invention, said upper portion has an inclination with respect to said third direction that is lower than the inclination assumed by said lower portion with respect to the same third direction.

[0038] This advantageously contributes to the overall lateral stability of the barrier.

[0039] According to the present invention, a separating structure for roads or road lanes is also provided, using a sequence of barriers according to the preceding features, said structure further comprising a metallic cable for holding together the barriers, said metallic cable being removably bound to each of the barriers of said sequence.

[0040] Advantageously, such a structure may have the preferred length without resistance limitations.

[0041] According to a preferred and non-limiting aspect of the present invention, said metallic cable is positioned in correspondence of the upper portion of said barrier.

[0042] According to a further non-limiting aspect, said metallic cable is positioned in correspondence of a box positioned in correspondence of said upper portion.

Description of the figures

[0043] Further features of the barrier object of the present invention will be described with reference to a preferred and non-limiting embodiment, and with the aid of the accompanying drawings, in which:

- figure 1 shows a side view of a road barrier object of the present invention;
- figure 2 shows a side view of the road barrier object of the present invention, shown in section; and
- figure 3 shows a view of the road barrier of the present invention along the direction identified by arrow F in figure 2;
- figure 4 shows a side view of a part of the road barrier object of the present invention in a planar configuration;
- figure 5 shows a side view of part of the road barrier object of the present invention, in a bent configuration;
- figure 6 shows a side view of part of an element of the road barrier object of the present invention;
- figure 7 shows the road barrier object of the present invention in a perspective bottom view;
- figure 8 shows a side view of a section of junction to the road surface for the barrier object of the present invention;
- figure 9 shows the junction section in figure 8, observed from the direction of observation identified by arrow G; and
- figure 10 shows a top view of several road barriers object of the present invention, joined together.

Detailed description of the invention

[0044] With reference to the accompanying figures, reference numeral 100 indicates a road barrier as a whole.

[0045] The road barrier object of the present invention is configured to be removably installed between two lanes of a two-way road or, alternatively, to the sides of a single or double lane road, for the purpose of containing light or heavy vehicles in the event of an accident or loss of control by the driver, thus limiting the risk of such vehicles invading the opposite lane or leaving the road.

[0046] The road barrier object of the present invention is made of metal and in detail it is made, at least in part, of galvanized sheet thick enough to contain the impact of a 13t heavy vehicle at 80 km/h, without breaking. Compared to a reinforced concrete type barrier, this solution allows a particular advantage in terms of ease of positioning and handling. The particular box-like structure of the barrier object of the present invention allows, with the same weight, a particular strength. In particular, as can be seen in figure 2, the barrier object of the present invention develops along a first direction which identifies the length thereof. If viewed in section, i.e. along a plane orthogonal to the first direction, the barrier has a tapered upper portion which is joined, by a pair of inclined walls 101, 102, respectively left and right, with a bottom section 104 with an enlarged base. In other words, having identified a second direction defining the width of the article, the linear extension of the article along said second direction is smaller than the extension of the article in correspondence of the second lower portion 104.

[0047] The upper portion of each of the walls 101, 102 left and right ends ends with a square or rectangular box 103, with angles preferably but not limited to tapered.

[0048] Such a lower portion 104 is that which in use is anchored at least temporarily to the ground or road surface by means of a plurality of bolts. For this reason, the lower portion integrates, for each left and right side of the barrier, a plurality of holes 105. In particular, the holes are symmetrical with respect to a plane passing through the center of the barrier and extending along said first direction. The axis of each hole is substantially parallel to a third direction perpendicular to both the first and second directions.

[0049] A particular feature of the barrier 100 of the present invention is that of accommodating at least one trolley 210, and preferably two trolleys 210, which are adapted to advantageously allow movement thereof with respect to the road surface with greater ease with respect to known barriers.

[0050] In the non-limiting embodiment shown in the figures, the trolleys 210 are two, and are positioned in substantial correspondence of the two ends of the barrier. Preferably, although not limitedly, such trolleys comprise each a set of swivel wheels 211.

[0051] The particularity of these trolleys is that they can be axially movable with respect to the third direction, which defines the height, orthogonal to the first and second directions. Advantageously, the possibility of adjusting the trolleys 211 in height allows both the stable positioning of the barrier and easy movement thereof, without causing damage if the barrier is fixed to the ground. In particular this is made possible by the fact that the height adjustment of the two trolleys identifies for each at least:

- a first configuration in which the wheels 211 of the trolley 210 remain confined within the shape of the lower portion of the barrier; and
- a second configuration in which the wheels 211 of the trolley 210 project outside the shape of the lower portion of the barrier.

[0052] In said first configuration, the barrier can be easily moved; in said second configuration, the barrier is ready to be firmly anchored to the ground.

[0053] In particular, each trolley is fixed on a tube support 105t extending along said third direction. A thread is present on such a tube support. A plurality of nuts, rotatable with respect to said tube 105t on which the trolley is constrained, allow by this respective rotation to lift and lower the first and the second trolley as desired, identifying in fact not only said first and second configuration, but a plurality of intermediate configurations in which said wheels 211 still project outside the shape identified by the lower portion of the barrier. Advantageously, such a configuration allows adjusting the extent of lifting of the barrier 100 from the ground as desired.

[0054] In correspondence of the upper portion, and more in detail in the two ends thereof, the barrier com-

prises a box-like structure 111, preferably E-shaped, which is flanked to the box 103, with stems 112, 114, oriented along the third direction; this box-like structure is interposed between the left and right wall of the box. This box-like structure integrates a horizontal wall 115 within which holes 105f are made to allow the passage of said tube, and above which said nut 105d for adjusting the height of the trolley is positioned; the horizontal wall therefore is an abutment for said support.

[0055] In other words, each of the wheeled trolleys is fixed to the barrier in correspondence of the upper portion, while in the lower portion the support structure of the three wheels, which is preferably but non-limitedly triangular, is free to move within the box, at least in terms of rotation with respect to said third direction and as long as the inclined walls do not come into contact with the support structure itself, thus limiting the rotation thereof.

[0056] As already briefly mentioned above, a peculiar feature of the present invention is that of having a particular high resistance box-like structure. Advantageously, a plurality of reinforcing ribs 106 is introduced between the left wall 101 and the right wall 102 of the box-like structure. Depending on the length of the barrier, this reinforcing rib 106 may be single or, alternatively, a plurality of reinforcing ribs 106 arranged sequentially along said first direction may be found in longer barriers.

[0057] The reinforcing rib advantageously acts as an interposed element between the left wall 101 and right 102 so that these ones cannot be freely compressed against one another; in particular, the reinforcing rib 110 is made of a V-shaped metal sheet, in particular having a truncated V-shaped end. As can be seen in figure 4 and figure 5, the V-shaped sheet comprises a pair of wings 107 tapering in correspondence of each first end thereof; both wings 107 are joined to a base 108 having a width substantially equal to the width of the second opposite ends with respect to the respective first end. The base 108 extends on a plane parallel to the first and second directions, and the two wings 107 are inserted between the left and right walls of the box so as to protrude upwards, in particular with their first end positioned in substantial correspondence of the upper portion of the barrier itself. More in detail, the inclination with which the wings taper is equal to the inclination of the left and right walls 101, 102 with respect to the third direction, also taking into account the inclination that the wing has with respect to the third direction itself, in such a way that the edges of the wings 107 and of the base 108 when bent as a V touch the inner face of the left and right wall of the barrier so as to solidly join both walls without causing excessive weighting of the barrier. In particular, the Applicant has found that the barrier thus conceived can have an indicative weight of 80-150kg per linear meter of length.

[0058] The reinforcing rib 110 is produced starting from a sheet, for example sheared or molded, and then bent, before being introduced into the box of the barrier.

[0059] As can also be seen in the accompanying figures, in the lower portion the left and right side walls of the barrier assume - with respect to the third direction - an inclination greater than that which is found in the upper portion of the barrier itself and in detail an inclination of more than 45 degrees. This advantageously allows having an upper medium portion of much reduced thickness with respect to the base, which being significantly wider than the previous one, gives considerable stability to the structure. Furthermore, when the barrier 100 is firmly anchored to the ground, a wide base requires more force to be torn apart by the impact of a vehicle than a barrier with a narrow base.

[0060] The barrier 100 object of the present invention is a modular structure; in particular, it is possible to implement a separating structure for roads or road lanes using a sequence of barriers as described above. As shown in figure 10, the barriers 100 are aligned along said first direction, so as to form a nearly continuous structure along that direction.

[0061] In order to contribute to the structural strength of the assembly, in correspondence of the upper section and/or at the box-like structure 111, a metallic cable is introduced which, at least at one point and more preferably at two distinct points, is anchored to each barrier. This means that even if a vehicle impacts in correspondence of the junction between one barrier and the other, the metallic cable dissipates the impact energy on the remaining barriers and advantageously prevents complete opening of the barrier sequence.

[0062] As shown in figures 8 and 9, anchoring beams 300 to the ground are present in correspondence of the first and last barrier of the sequence. Such anchoring beams 300 to the ground advantageously comprise a body 301 installed obliquely and having a first end joined in correspondence of the upper portion of the barrier 100 of the present invention and a second end opposite the first end in correspondence of which a plate 302 for fixing to the ground is welded, provided with a plurality of holes 303 in which pins are inserted - preferably but not limitedly four, like the number of holes - for fixing to the ground. In correspondence of the first end there is a column 304 extending mainly along said third direction, which rests on a base 305 in turn provided with a plurality of holes 306 in which pins for fixing to the ground are introduced. Such a column 304 is in use fixed to the barrier object of the present invention.

[0063] Finally, it is clear that additions, changes or variants may be made to the barrier object of the present invention which are obvious to a man skilled in the art, without departing from the scope of protection that is provided by the appended claims.

Claims

1. Road barrier (100), comprising a box-like structure extending along a first direction of greater extension; said barrier comprises a tapered upper portion (101,

102; 103) and a lower portion (104), joined to said upper portion; said lower portion having an enlarged base extending, along a second direction orthogonal with respect to said first direction of greater extension, for a width greater than the width that said tapered upper portion has along said same second direction; said barrier (100) being adapted in use for being at least temporarily rigidly anchored to the ground or road surface in correspondence of the lower portion (104) thereof; said barrier comprising at least one first wheeled trolley (210), axially mobile along a third direction orthogonal with respect to said first and second direction.

2. Road barrier (100) according to claim 1, also comprising a second wheeled trolley (210), positioned in substantial correspondence of an end of said barrier opposite to the end substantially at which said first wheeled trolley (210) is positioned.

3. Road barrier (100) according to claim 1, wherein said at least one first wheeled trolley (210) is fixed on a support (105t) oriented substantially along said third direction.

4. Road barrier (100) according to any one of the preceding claims 1-3, **characterised in that** said at least one first wheeled trolley (210) is fixed to said barrier in correspondence of the upper portion of said barrier (100).

5. Road barrier (100) according to claim 3, wherein said support (105t) is introduced in a hole of a support plate (111) present in correspondence of said upper portion of said barrier (100).

6. Road barrier (100) according to any one of the preceding claims 1-5, **characterised in that** said at least one first wheeled trolley (210), preferably the first wheeled trolley (210) and/or the second wheeled trolley (210), is adjustable in height with respect to the position of said lower portion (104) of the barrier (100), and has a plurality of operative positions defined between a first operative position in which the wheels (211) of said first trolley (210) are enclosed in the shape defined by said lower portion (104), and a second operative position in which the wheels of said first and/or second trolley project outside the shape defined by said lower portion (104).

7. Road barrier (100) according to claim 6, comprising means of adjustment of the height of said at least one first wheeled trolley (210) comprising a nut engaging on said support (105t) and abutting with said support plate.

8. Road barrier (100) according to claim 1, **characterised in that** it comprises a left side wall (101) and a right side wall (102), each extending between the upper portion and the lower portion; said barrier integrating at least one reinforcing rib (106) arranged between said left side wall (101) and said right side wall (102).

9. Barrier according to claim 8, **characterised in that** it comprises a plurality of reinforcing ribs (106) positioned in sequence along said first direction.

10. Road barrier (100) according to claim 8 or claim 9, **characterised in that** said reinforcing rib (106) is a metal sheet having a pair of wings (107) tapering each in correspondence of a first end thereof, said wings joining with a base (108) having a width substantially equal to the width of the second ends of said wings (107) opposite to said first end.

11. Road barrier (100) according to any one of the preceding claims 8-10, **characterised in that** said at least one reinforcing rib (107) has wings (107) bent in a V with respect to said base (108), said wings (107) having the respective said first end positioned in correspondence of the upper portion of said barrier.

12. Road barrier (100) according to any one of the preceding claims 1-11, **characterised in that** it comprises a lower portion comprising a plurality of perforations (105) for fixing to the ground.

13. Road barrier (100) according to any one of the preceding claims 1-12, **characterised in that** it is made at least partially of metallic material; even more preferably, said material is galvanized metal sheet.

14. Road barrier (100) according to any one of the preceding claims, **characterised in that** it is modular.

15. Road barrier (100) according to any one of the preceding claims, **characterised in that** said upper portion has an inclination with respect to said third direction that is lower than the inclination assumed by said lower portion (104) with respect to the same third direction.

16. Road barrier (100) according to claim 1, **characterised in that** it comprises a plurality of stakes for fixing to the ground or road surface, introduced in correspondence of perforations (105) made in correspondence of said lower portion (104).

17. Separating structure for roads or road lanes using a sequence of road barriers (100) according to any one of the preceding claims 1-16, said structure also comprising a metallic cable for holding together said barriers (100), said metallic cable being removably constrained to each of the barriers of said sequence.

FIG.1

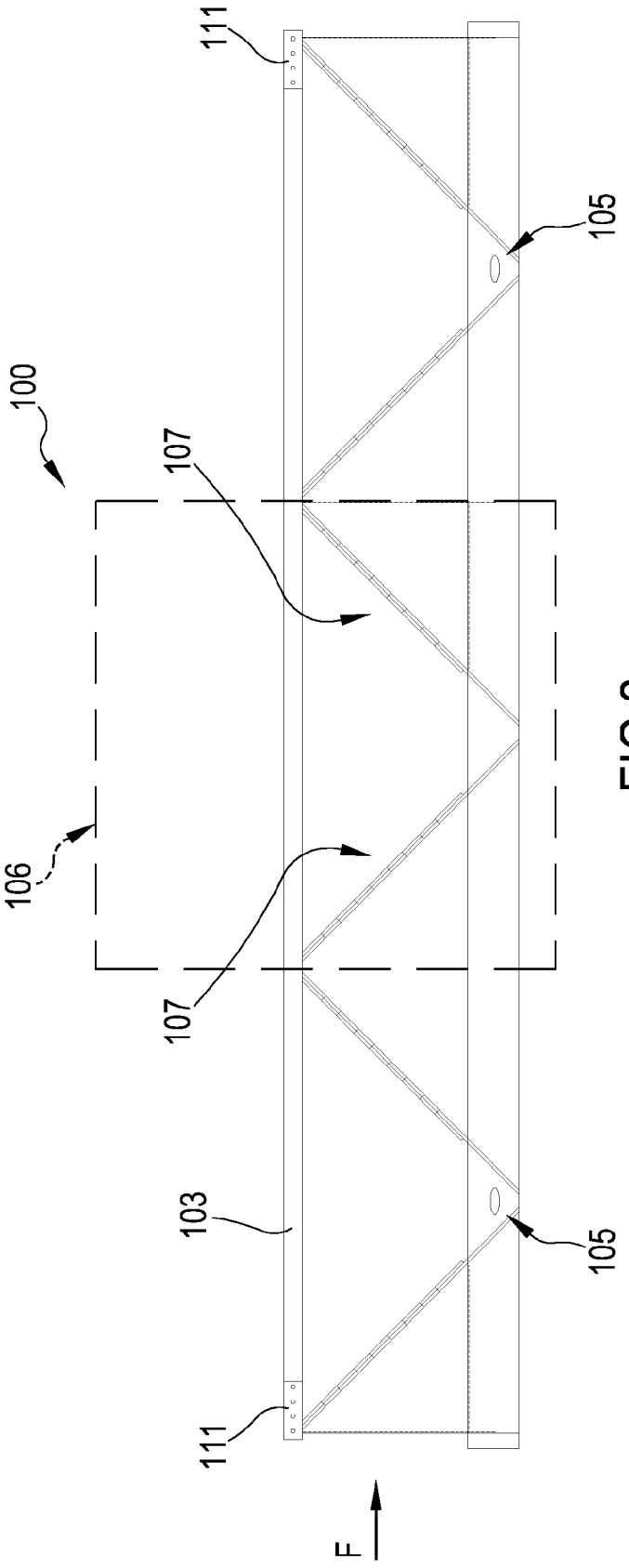


FIG.2

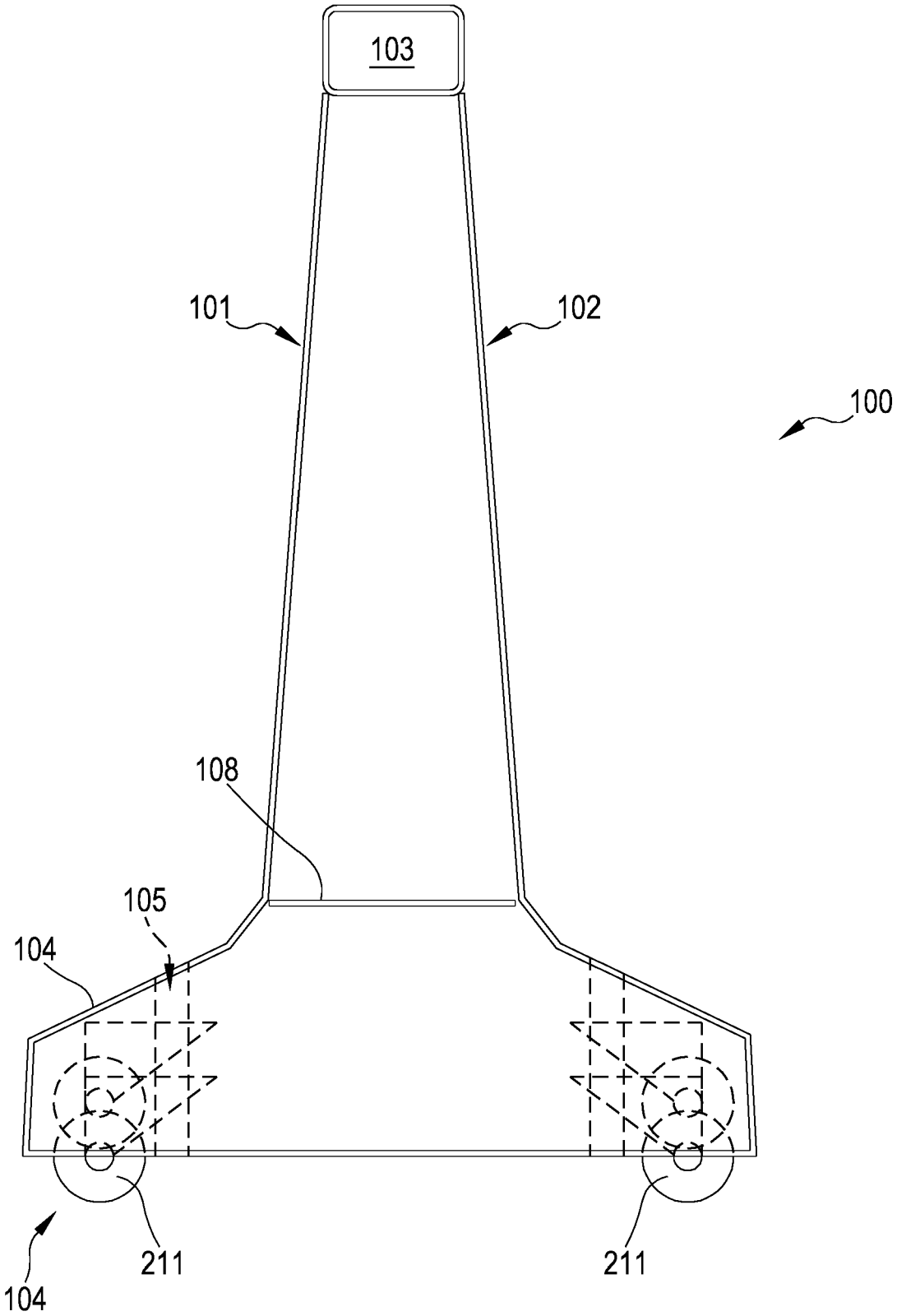


FIG.3

FIG.4

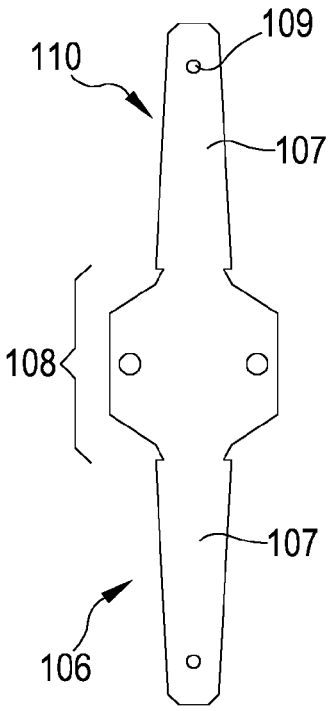
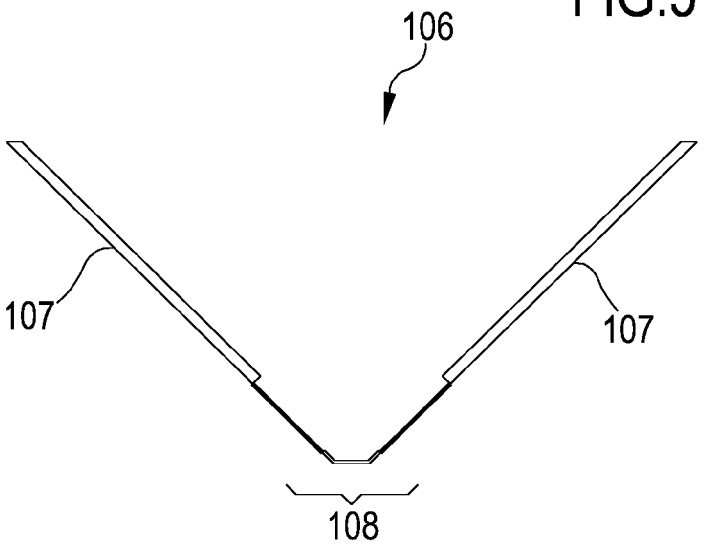


FIG.5



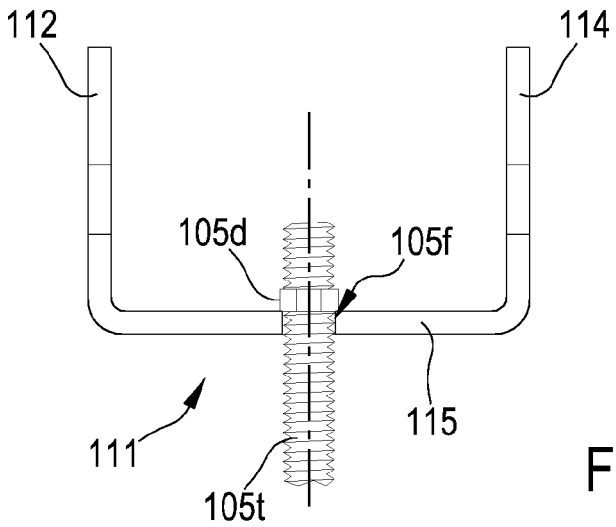
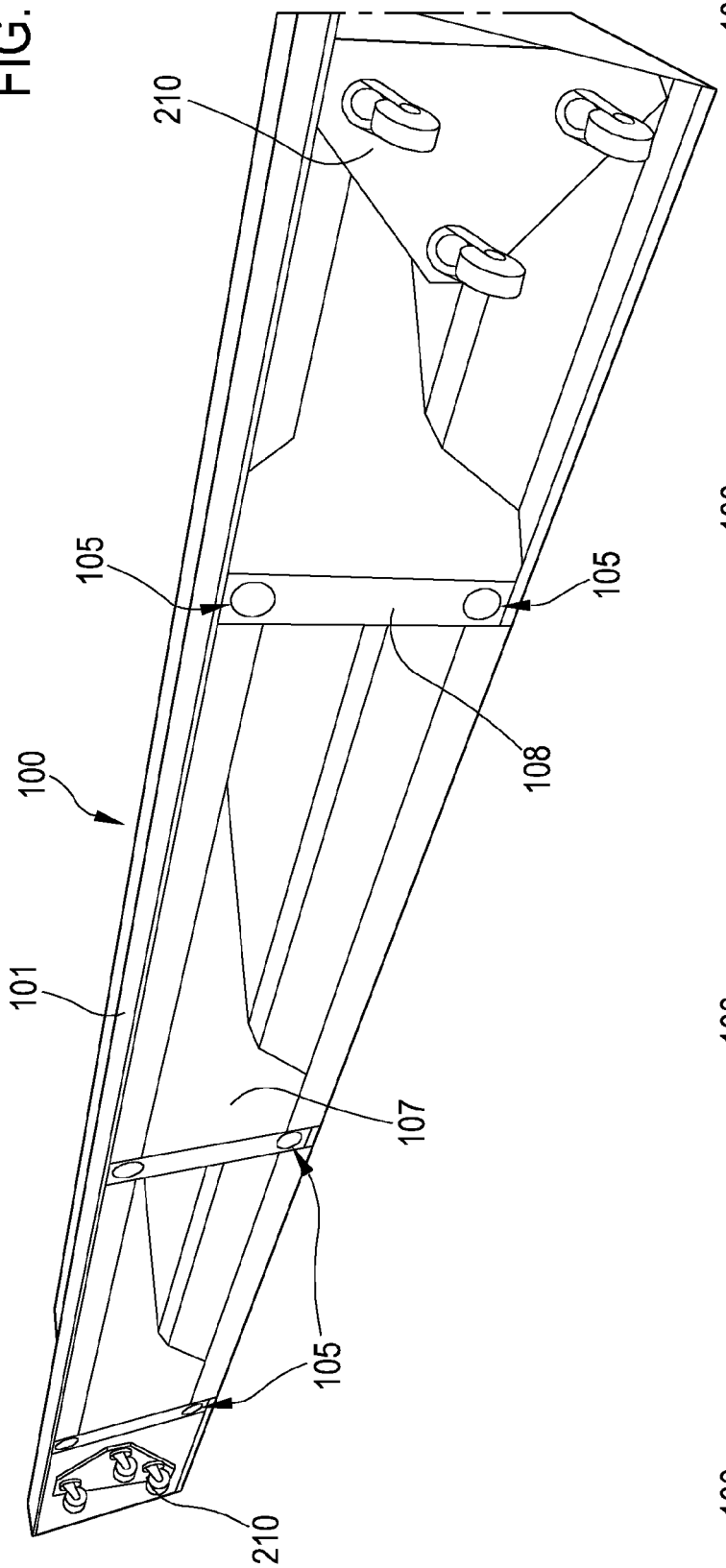


FIG.6

FIG.7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210

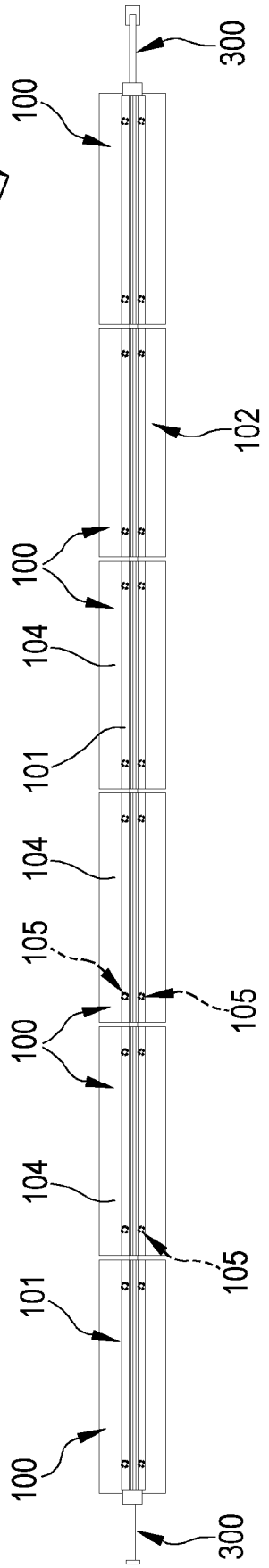
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FIG.10

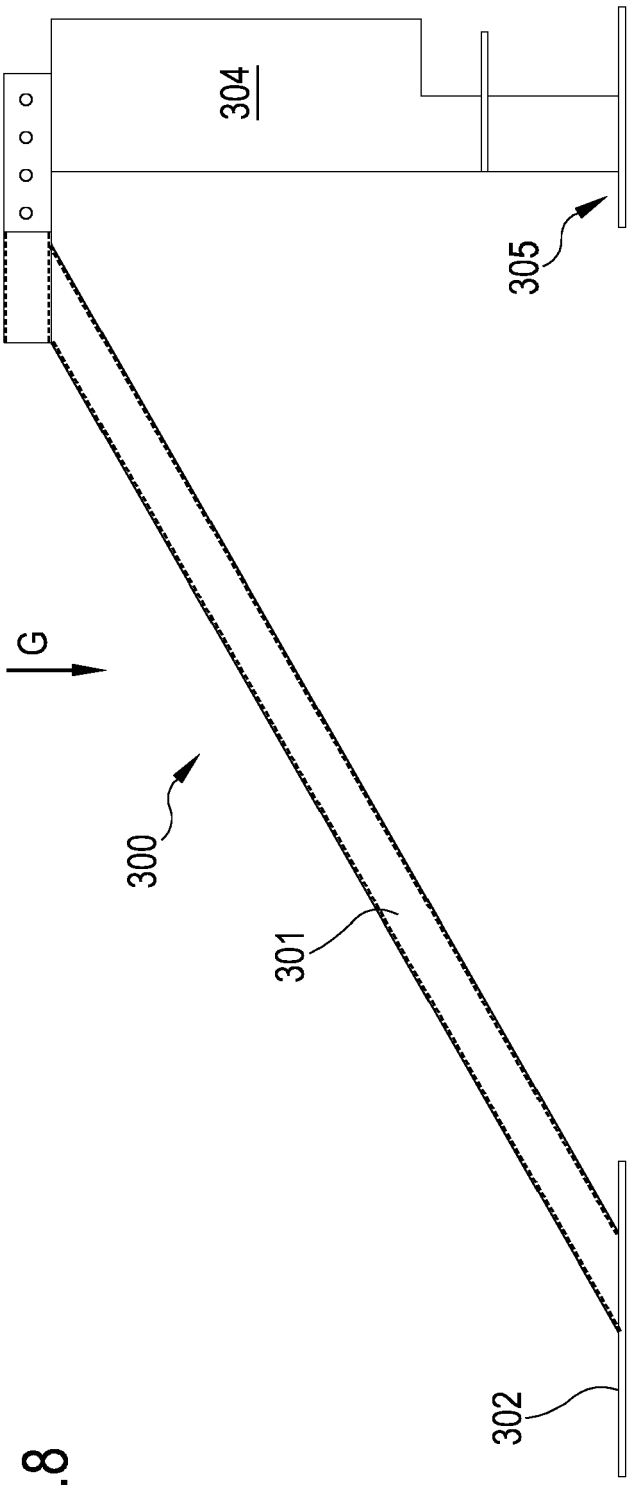

FIG.8

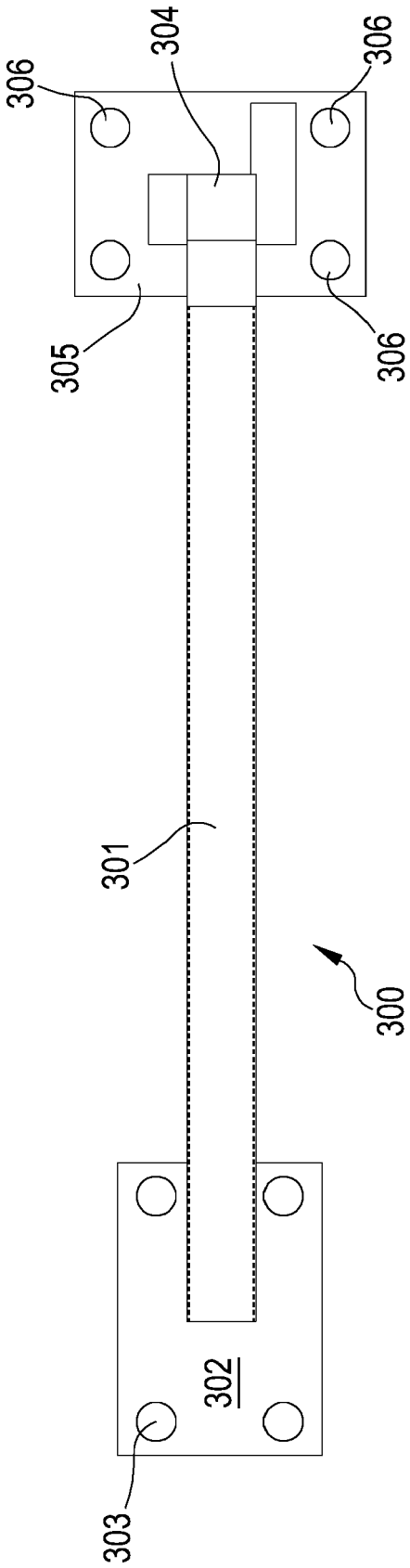

FIG.9

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European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 18 19 3773

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 758 698 A1 (GASPARETTO STORI LEOPOLDO [IT]; SERAFIN LUIGI [IT]) 19 February 1997 (1997-02-19) * the whole document *	1-7	INV. E01F15/00
X	FR 2 741 093 A1 (STUDIA [FR]) 16 May 1997 (1997-05-16) * the whole document *	1-3,6,8,9	
A	FR 2 701 499 A1 (COFIROUTE [FR]; ROUTIER EQUIP SA; SODIREL) 19 August 1994 (1994-08-19) * page 2, line 20 - page 3, line 30; figures 1,2 *	1-17	
A	EP 1 001 090 A2 (POZIN FRANCOIS XAVIER [FR]; VERDIERE PIERRE [FR]) 17 May 2000 (2000-05-17) * paragraphs [0022], [0023], [0051]; figures 13,14 *	1-17	
			TECHNICAL FIELDS SEARCHED (IPC) E01F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 January 2019	Flores Hokkanen, P

CATEGORY OF CITED DOCUMENTS

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