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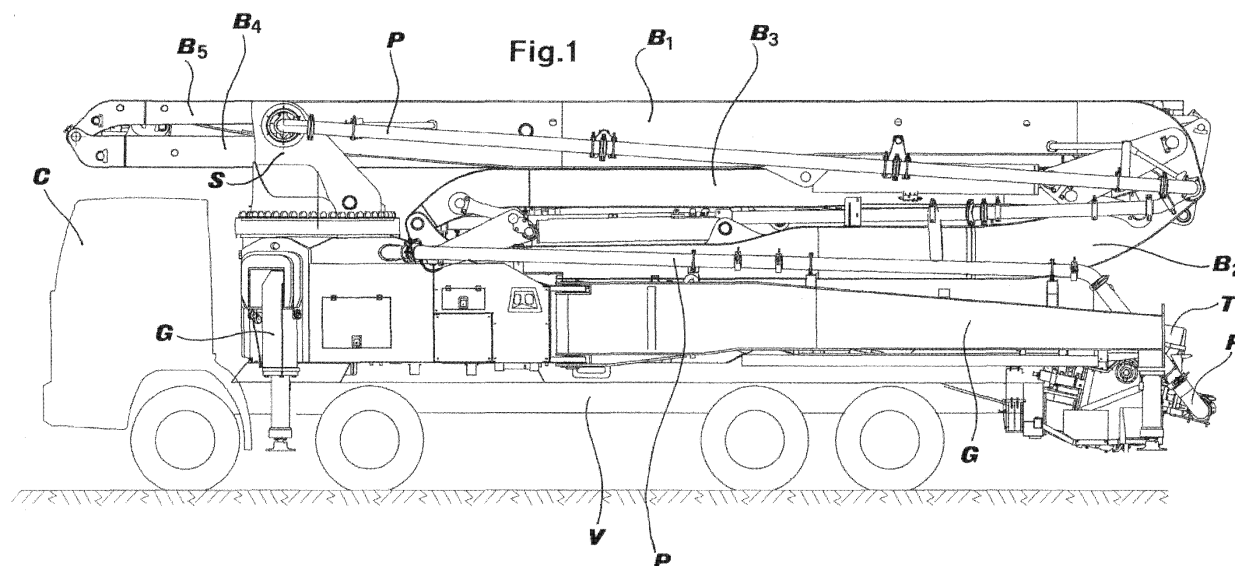
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(54) **Lorry-mounted concrete pump with increased extension of the articulated delivering boom and outline within the limits set by the European code on free circulation on the road**

(57) Lorry-mounted concrete pump comprising a vehicle (V) whereon a rotary turret (S) carrying a collapsible, articulated boom (B) is mounted, whereon a pipe (P) is mounted for carrying fluid concrete from a loading hopper (T) to a delivery hose. In a collapsed boom condition the

lorry-mounted pump falls within the outline limit of 12 m length, 2.5 m width and 4 m height, and is hence suited to free circulation on the road. The arrangement of the individual members of the articulated boom is optimised so as to have a maximum extension of the boom between 48 and 52 metres.



Description

[0001] The present invention refers to a lorry-mounted concrete pump having an increased extension of the articulated delivering boom. In particular, the invention refers to a pump of this type wherein the arrangement and the shape of the articulated boom have been optimised with respect to the overall useful length of the boom, despite remaining within the outline limits provided by European code on free circulation on the road, i.e. without the need for specific permission for each vehicle transfer.

[0002] The lorry-mounted pumps of the present invention are machines which are increasingly used to accomplish quick delivery of the concrete supplied by a truck mixer pump to the different casting areas of a building site. These machines comprise as essential elements: a vehicle suited to road traffic; a load hopper, whereto the concrete is supplied from truck mixers or from a concrete production plant; a piston pump which draws the concrete from the hopper and delivers it to a delivery pipe; a 360° rotary turret; and, finally, a multiple-member, articulated boom mounted on said turret and whereto said pipe and the relative joints are attached.

[0003] The features of the articulated boom, and in particular maximum length thereof in an extended position, strongly characterise the pump, determining the field of possible use thereof in connection with the size of the building site or, more precisely, of the casting area being used on each occasion. There is hence a strong interest by users in having available lorry-mounted pumps with an articulated boom which is as long as possible, the other outline features of the lorry being equal, which features determine the accessibility of the vehicle to the building site and the greater or smaller flexibility of use of the vehicle on the road.

[0004] As a matter of fact, at least as far as the European market is concerned, a strict code exist which establishes a limit outline for all vehicles, exceeding which, circulation on the road is subject to specific permission whenever the vehicle is to be transferred. The need to ask for permission to transfer the vehicle of course introduces additional costs in the management of the lorry-mounted concrete pump but, in particular, strongly reduces the flexibility and speed of use of such equipment. There is hence a strong drive by European users to use preferably, whenever building site conditions allow, lorry-mounted pumps falling within the maximum dimensions of the outline limit mentioned above, i.e. 12 m length, 2.5 m width and 4 m height.

[0005] Lorry-mounted pumps trying to exploit to a maximum this outline limit - despite using a maximum number of individual main members of the boom equal to 5, which prevents excessive construction complexity and excessive complexity of the management of the boom - are currently equipped with foldable booms having a maximum length, with the boom fully extended vertically, of about 48 m. As a matter of fact, the measure of the foldable booms of lorry-mounted pumps is conventionally

defined as the maximum height reached by the tip of the boom, when said boom is fully extended vertically. In practice, hence, it coincides with the actual length of the boom, which is topped by the height of the turret from floor level, about 4 m. The above-said 48-m booms of the prior art hence have a length of about 44 m which, when the boom is arranged vertically, becomes indeed a useful length of 48 m. Boom lengths exceeding this measure are hence currently supplied only by lorry-mounted pumps exceeding the above-said limit dimensions and which hence, at least in Europe, are subject to a specific request for permission whenever the vehicle is to drive on the road, hence resulting in all the drawbacks described above.

[0006] The object of the present invention is hence that of providing a lorry-mounted pump of the type described above which, despite remaining within the above-said outline limit in its maximum outline dimensions, can offer a significant increase of the working length of the extended boom.

[0007] Such object is achieved, according to the present invention, through a lorry-mounted pump having the features defined in the enclosed main claim.

[0008] Further features are defined in the dependent claims.

[0009] The lorry-mounted pump of the present invention will in any case now be better described in detail with reference to a preferred embodiment of the same, illustrated in the accompanying drawings, wherein:

[0010] fig. 1 is a left-hand, side view of a lorry-mounted pump according to the present invention with the delivery boom in a collapsed position;

[0011] fig. 2 is an elevation, right-hand, side view of the lorry-mounted pump of fig. 1;

[0012] fig. 3 is a top plan view of the lorry-mounted pump of fig. 1, with stabiliser legs in an open position and with the delivering boom removed; and

[0013] fig. 4 is a similar view to fig. 2 with the delivering boom in a partially-extended position.

[0014] As illustrated in the drawings, the lorry-mounted pump according to the present invention comprises a lorry V, preferably of the 4-axle type, on whose loading platform the entire pump structure is fastened. Such structure comprises: a rotary turret S arranged immediately behind driving cabin C of vehicle V, whereon a collapsible, multiple-member, delivery boom B is mounted; four lateral stabiliser legs G; a concrete loading hopper T; a piston pump F housed in the inner part of the machine which draws the concrete from hopper T and delivers it to a delivery pipe P. Pipe P extends - through suitable rotary joints - along all the members of delivering boom B, whereto it is hence steadily fastened, as far as a flexible end hose M, for the delivery of the pumped concrete to the casting areas (only the initial portion of pipe P is shown in figs. 1-3 for the sake of clarity).

[0015] Collapsible, multiple-member boom B preferably has a structure referred to in the field as RZ, i.e. consisting of a first group "R" of three spirally-collapsible

booms B1, B2 and B3, and then of a second group "Z" of two end booms B4 and B5 which open caliper-like one on the other and on boom B3.

[0016] According to the specific structure of the lorry-mounted pump of the present invention, end booms B4 and B5 are laterally offset with respect to the group of three basic booms B1-B3 by a measure sufficient for them to arrange themselves, when fully collapsed, entirely to the side of turret S. Moreover, such members, instead of ending in correspondence of turret S - as is presently the case in all known lorry-mounted pumps which fall within the above-said outline limits - extend beyond the same and above cabin C, up to the front limit of the maximum admissible outline, substantially coinciding with the front portion of cabin C. As a matter of fact, while the first member B1 is slightly longer than 9.0 m, and the second and third member B2 and B3 have lengths ranging between 7.0 and 8.0 m, the fourth and fifth member B4 and B5 can reach without problems much longer lengths, preferably ranging between 11 m and 12 m, precisely exploiting the capability of extending above cabin C of vehicle V and hence using fully the maximum admissible length of 12.0 m of the vehicle outline limit.

[0017] This particular arrangement of the collapsible boom is allowed by a combination of different factors. Firstly, as already said, the lateral offset of the last two members B4 and B5 with respect to the group comprising the first three. Secondly, a lower construction of cabin C, with respect to the standard size of the vehicles on the market, which allows to leave sufficient room above the cabin for housing booms B4 and B5, with the necessary safety outline, without exceeding the outline limit of 4 m height from the road floor. Last but not least, an electronic control unit of the boom extension, equipped with a suitable software, whereby any possible interference between the front ends of booms B4 and B5 and the roof of cabin C or other parts of vehicle V is automatically avoided during the boom extension operation, for example limiting the admissible angular run of boom B1, according to the instant position taken up by booms B4 and B5.

[0018] In an improved variant of the present invention (which is the one shown in the drawings), which may be used when articulated boom B is required to have high flexibility of use, there is provided that end member B5 has a joint H in correspondence of the centreline thereof, so that the end portion of the boom - intended to approach the casting area, where various types of obstacles are obviously found - has a reduced length of about 6 metres which allows the operator improved agility and manoeuvring speed.

[0019] Due to this combination of elements, the space available to the designer - defined by the outline limit of the vehicles which are allowed to drive on the road without having to request specific permission every time - is optimally exploited to obtain the maximum possible length of the concrete delivering boom, which as a matter

of fact can reach a limit measure of 52 m, exceeding by some four meters the limit of currently circulating lorry-mounted pumps.

[0020] The result obtained by the lorry-mounted pump according to the present invention is particularly interesting and appealing to the industrial field of reference. As a matter of fact, the opportunity of having a 4-metre boom extension, i.e. by over 8% compared to the machines having the same mobility features found on the market today, allows to increase the area served by the boom by well over 17%, hence considerably reducing the number of equipment repositioning operations, and consequently increasing output yield.

[0021] Moreover, the specific structure adopted for collapsible boom B allows a more correct distribution of the weights of the lorry-mounted pump between the front and rear axles of vehicle V, both in the case of 4-axle and of 5-axle vehicles. It is hence possible to use vehicles on the market having standard wheel base, consequently avoiding all the problems and costs associated with the type approval procedure of special-wheel-base vehicles.

[0022] The lorry-mounted pump according to the present invention has been described with reference to a preferred embodiment illustrated in the drawings. The scope of protection of the invention, however, is not limited to the construction peculiarities of such embodiment, but to the general layout of the structure thereof, as defined in the accompanying claims.

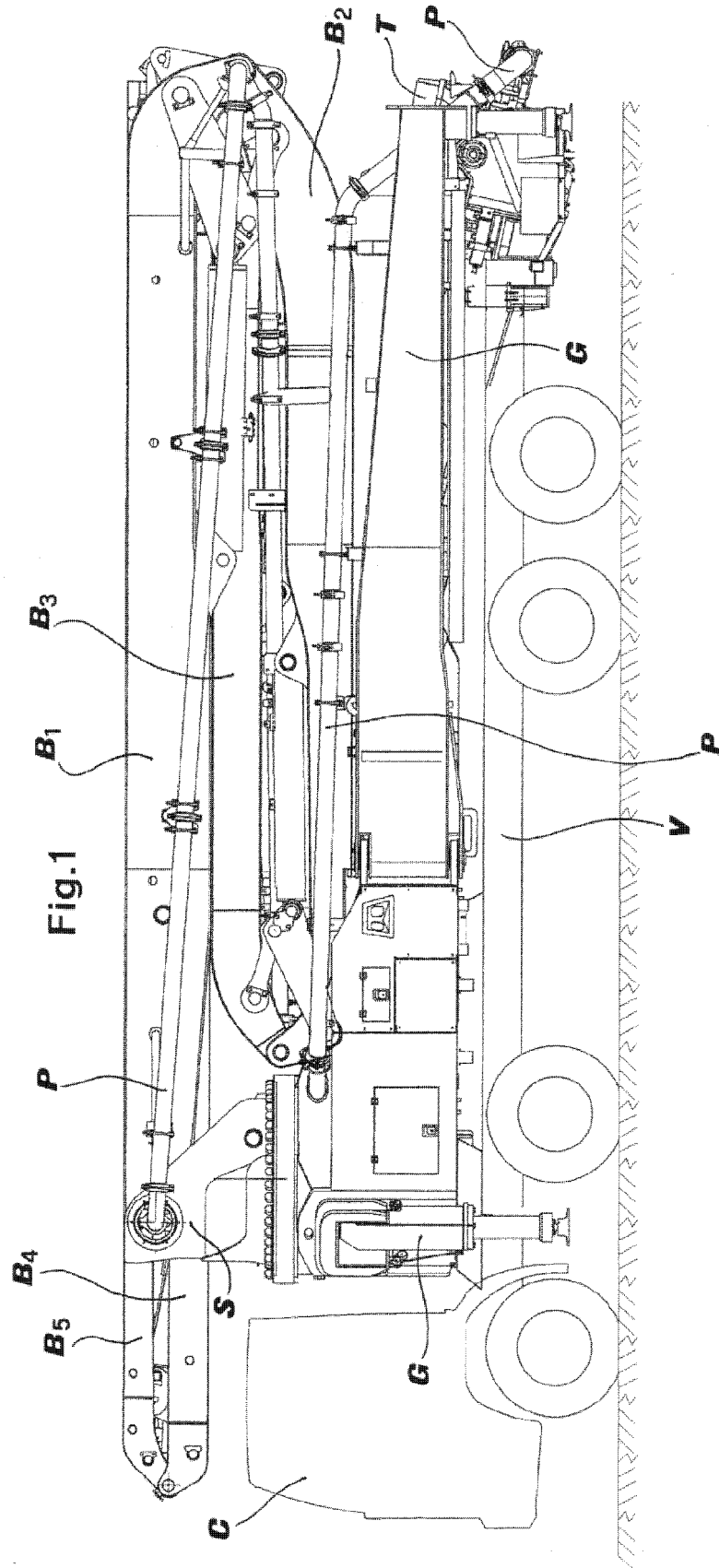
Claims

1. Lorry-mounted concrete pump, of the type comprising a vehicle (V) whereon a rotary turret (S) is mounted carrying a collapsible, articulated boom (B), wherewith a pipe (P) for carrying fluid concrete from a loading hopper (T) to a delivery hose is associated, **characterised in that**, in a collapsed boom condition, the lorry-mounted pump falls within a outline limit of 12 m length, 2.5 m width and 4 m height, and **in that**, in a maximum extension condition, the boom is over 48 m long.
2. Lorry-mounted pump as claimed in claim 1), wherein said articulated boom consists of at least 5 members (B1-B5).
3. Lorry-mounted pump as claimed in claim 2), wherein said at least 5 members of the articulated boom (B) are arranged according to an "RZ" layout, comprising a basic group of three spirally-collapsible members (B1-B3) and an end group of members (B4-B5) which may be folded caliper-like.
4. Lorry-mounted pump as claimed in claim 3), wherein said end group of boom members (B4-B5) is laterally offset with respect to said basic group of boom members (B1-B3).

5. Lorry-mounted pump as claimed in claim 4), wherein the first member (B1) of said basic group of boom members has a length exceeding 9 m, while each of the second and third member (B2, B3) of said basic group has a length ranging between 7 and 8 metres. 5
6. Lorry-mounted pump as claimed in claim 4), wherein the two members (B4, B5) of said end group of members have each a length ranging between 11 and 12 m. 10
7. Lorry-mounted pump as claimed in claim 4), wherein members (B4, B5) of said boom end group extend above cabin (C) of said vehicle. 15
8. Lorry-mounted pump as claimed in claim 7), wherein said members (B4-B5) extend as far as near the front length limit and the upper height limit of said outline limit. 20
9. Lorry-mounted pump as claimed in claim 7), wherein cabin (C) of vehicle (V) is lower than the standard height of commercial vehicles, to allow housing thereabove the front portion of members (B4, B5) of the boom end group. 25
10. Lorry-mounted pump as claimed in any one of claims 1) to 9), wherein the boom end member (B5) has an intermediate joint (H). 30
11. Lorry-mounted pump as claimed in any one of claims 1) to 10), wherein said boom has a length exceeding 50 m.
12. Lorry-mounted pump as claimed in any one of claims 1) to 11), wherein said boom has a length of 52 m. 35
13. Lorry-mounted pump as claimed in any one of the preceding claims, comprising a software for the management of the movement of the individual members of the collapsible boom, capable of controlling the mutual position of the first base member and of the two end members of said boom so as to avoid any interference between said end members, the cabin (C) of said vehicle (V) or other vehicle parts. 40
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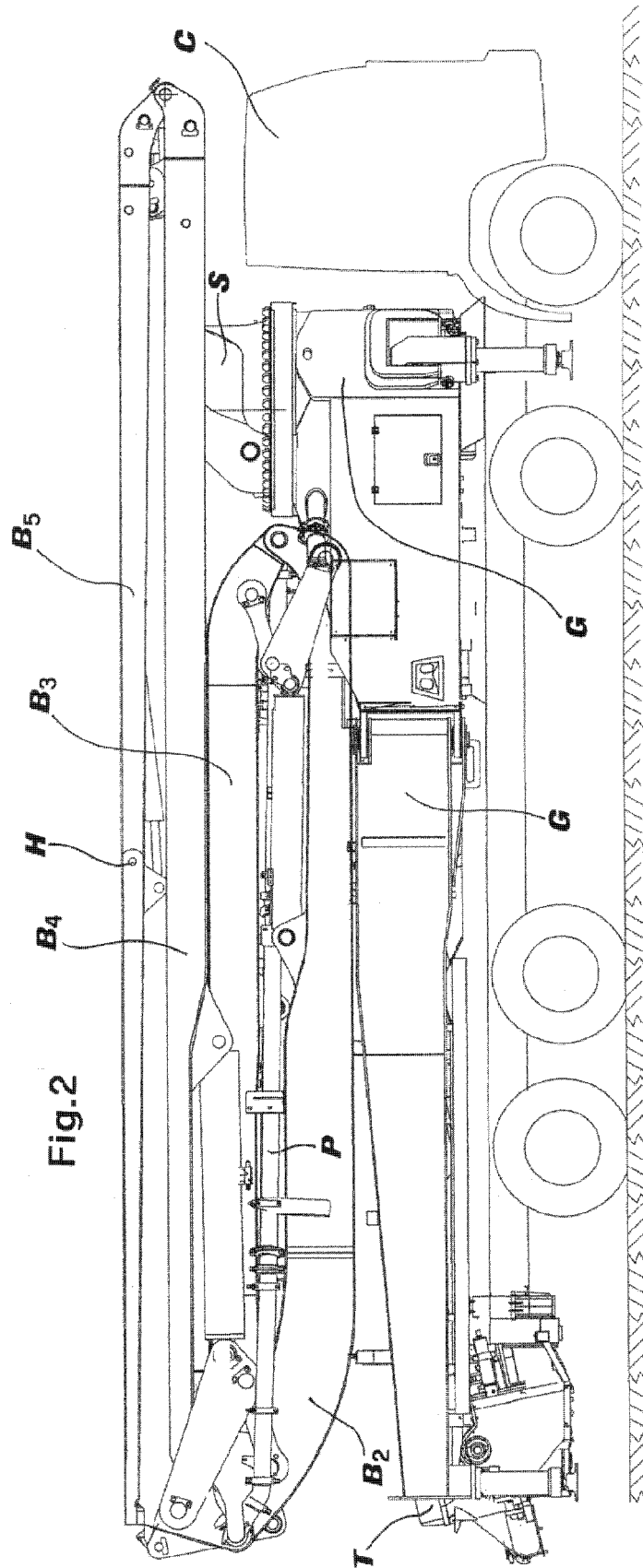


Fig.3

