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(54) **Container hooking and moving frame for hoisting trucks.**

(57) A hooking and moving frame of containers for front hoisting trucks the side arms of which, extensible through two stages, for the hooking of the container can be drawn back so that the maximum size of the frame, in the condition of maximum withdrawal of the extensible arms, is reduced, consistently with the requirements of structure strength, and does particularly permit the hoisting truck to pass through the loading and stowage doors of container carrying vessels without removal of the hooking frame.

EP 0 055 874 A2

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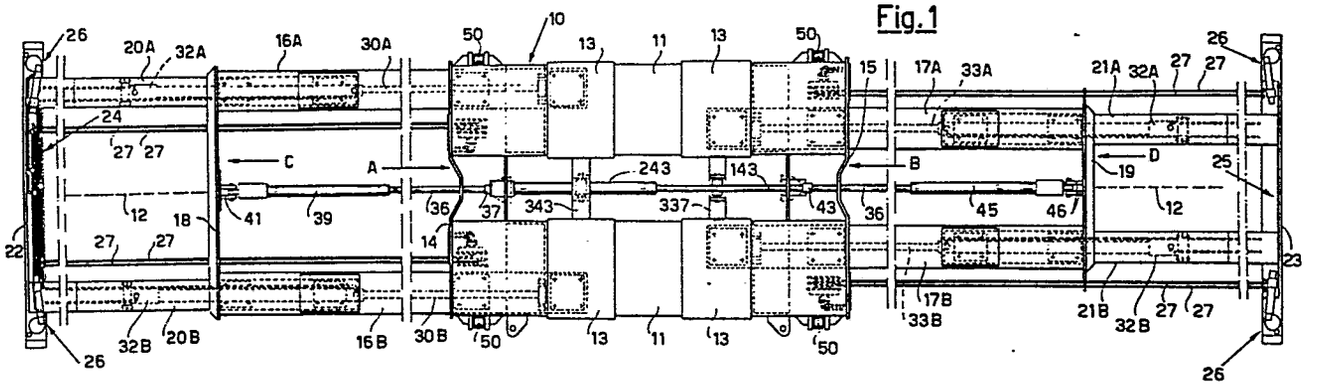
Fig.1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The present invention relates to a device which can be combined with a front hoisting truck for the hooking and the handling of containers.

In the field of the handling and hoisting of the containers, the rate of the loading, unloading and positioning of containers, between the parking and shunting yards and the transport means is of great importance.

In the case of sea transport means, the afore said operations take place partly on the dock and for a great part in the hold of the vessel.

Among the tire-mounted self-propelled means, on a worldwide base, the front hoisting trucks are considered as the machines having the best operating rate in the handling of the containers, it being meant as handling the loading onto and the unloading from trucks, the stacking on the yards and the stowage.

To this end, the front hoisting trucks are provided with hooking frames ("spreader"), by which the container is hooked at the upper part, by means of the proper angle blocks provided on the container itself.

It is known that containers of different sizes exists, whereby there correspondingly exist fixed hooking frames, namely provided for a given size of the containers, and telescopic frames, namely having arms extensible in a controlled manner, and suitable for the hooking of containers of different sizes.

Taking it into account the size and the weight of the containers, the hooking frames must have a remarkable strength, and thus comprise a fixed structure and telescopic arms, which are controlledly extended by means of hydraulic or oleodynamic jacks and are provided with the members ("twist") for the hooking of the container.

It is evident that the traditional approaches, with symmetrically opposed jacks do not permit the size of the said permanent structure to be reduced below certain limits.

Now these traditional sizes involved, due to the side dimensions of the

hooking frame, even if the telescopic arms were totally drawnback the impossibility for the hoisting truck of passing through the communication passages, mainly between the dock or the wharf and o the hold of a container carrying vessel.

Consequently, up to date, the hooking frame with the related mechanical and hydraulic or oleodynamic couplings had to be dismounted, carried from the dock to the vessel hold and then assembled again with a relevant time waste (of the order of hours), this time and the related labour being fully passive and heavily adding to the total transportation costs.

The main purpose of the invention is that of providing a container hooking frame for front hoisting trucks which can be reduced to dimensions such as to pass, in the condition assembled to the hoisting truck , through the available passages in the handling operations and particularly through the loading doors of containers carrying vessels, the characteristic of structural strenght and of operating reliability needed for the use being of the same time maintained.

A more specific purpose of the present finding is that of providing a hooking frame which in the non operating condition has a maximum size, as meant transversely to the motion direction of the hoisting truck, lower than 600 mm.

These purposes are fulfilled by means of a hooking frame comprising a fixed casing, having two cross housings for the engagement by the forks of the gooseneck of the hoisting truck, and two headpieces having the container hooking members, said headpieces being extensible in two stages outwardly and symmetrically with respect to the said fixed casing characterized in that it comprises a pair of first extension means, connected to the said headpieces and opposite to each other, said first extension means being movable between a first position in which said headpieces are fully drawn back against said fixed casing and a second position in which said headpieces are displaced at both sides of the fixed casing by a predetermined distance, said first extension means being positioned in a central position with respect to the said fixed casing and being vertically staggered, whereby the respective operating lines are coplanar and parallel in a vertical plane parallel to the extension and

withdrawing direction of the said headpieces, and second extension means, movable between a first position in which said headpieces are drawn back to the said second position of said first extension means and a second position in which said headpieces are further displaced outwardly by a predetermined distance, said second extension means being opposed to each other and having operating lines which are parallel to each other and coplanar in a horizontal plane, parallel to the extension and withdrawing direction of said headpieces.

The particular features and the advantage of the invention shall more clearly appear from the following description of a preferred embodiment having exemplifying but non limiting purpose, with reference to the accompanying drawings wherein, the figs. 1 and 1A are plan views from above of the hooking frame in the position respectively fully extended and fully withdrawn;

the fig. 2 is a side view of the hooking frame with the hooking headpieces fully drawn back;

the figs. 3 and 4 are views like fig. 2, with the headpieces outwardly extended by a first and respectively a second stage;

the fig. 5 is a partial cross-section of the hooking frame taken along the plane V-V of fig. 1A;

the figs. 6,7,8 and 9, are views respectively taken in the directions indicated by the arrows A,B, C, and D of fig. 1.

Referring to the drawings, the reference 10 indicates a fixed structure or casing, comprising two box-like members 11, which are identical and symmetrical with respect to a longitudinal median line 12.

The two box-like members 11 are provided with reinforcement parts 13, whereas the two plates 14 and 15 close at the two ends respectively the box-like members 11, these plates being detailedly shown in the figs. 6 and 7.

From the box-like members 11, through the plates 14 and 15, extensible box-like arms 16 (A and B) and 17 (A and B) extend, being symmetrical with respect to the median line 12, and terminating at respective first stage plates 18 and 19.

Further pairs of box-like extensible arms 20 (A and B) and 21 (A and B),

symmetrical with respect to the median line 12, extend from the plates 18 and 19, and terminate with the end plates 22 and 23, connected to cross beams 24 and 25, carrying the container hooking devices ("twist"), as generically indicated by the number 26 and of known type, whereby they are not described in a more detailed manner.

For the actuation of these devices oledynamic actuators are foreseen, the connections of which to the control panel on the hoisting truck are formed by flexible pipes (suitable to follow the displacements of the extensible arms), as generically indicated in fig. 1 by the reference 27.

In fig. 1 there are also shown, by light lines, the connections of the said oleodynamic circuit, both inside the cross-beams 22, 23 and within the fixed casing 10.

From the fig. 1 it will be seen, lastly, that the pairs of extensible arms 17 (A,B) and 21 (A,B) are staggered with respect to the pairs of extensible arms 16 (A,B) and 20 (A,B) in the horizontal plane, whereby, without affecting the requirements of structural strength of the fixed casing 10, the extensible arms can be drawn back by a distance such that the maximum dimension of the hooking frame in the closed condition is lower than the magnitude of the fixed passages for the hoisting truck and particularly than the width of the loading doors of the container carrying vessels.

Such a staggering of the pairs of extensible arms is clearly observed in the fig. 1 as well as in the figs. 6 and 7. As a matter of fact the plate 14 of fig. 6 comprises two symmetrical openings 28 (A and B), in which the extensible arms 16 (A and B), pass, whereas in the plate 15 of fig. 7 openings 29 (A, B),like the openings 28 (A,B), are provided, but are staggered in the horizontal plane, for the passage of the arms 17 (A,B).

The opening 129 of lower size in the plates 14 and 15 serves on the contrary for the passage of the afore said hoses 27.

For the actuation of the extensible arms of second stage 20 (A,B) coupled to the head plate 22 a pair of hydraulic or oleodynamic or pneumatic jacks, is provided comprising a stem 30 (A,B) extensible and retractable with respect to a cylinder 32 (A,B) rigidly fastened to the related

extensible arm 20 (A,B).

In fig. 8 the plate 18 is shown, with the openings 51 (A,B) for the passage of the extensible arms 20 (A,B) whereas in the plate 19 shown in fig. 9 the openings 52 (A,B) for the extensible arms 21 (A,B) are provided.

A like arrangement of jacks is provided for the pair of extensible arms 21 (A,B) the single components being indicated by the numbers 32 (A,B) and 33 (A,B).

For the operating displacements of the first stage plates 18 and 19 two hydraulic or oleodynamic or pneumatic jacks are provided, which respectively comprise for the plate 18 a piston having a stem 36 coupled by a joint 37 to a second stem 37 coupled to a cylinder 237 in turn fastened at 337 to the fixed casing 10, whereas the cylinder 39 is anchored to the plate 18.

In order to permit the extension and the retraction of the cylinder 39 onto the stem of the piston 36, a hole 40 is provided in the plate 14, having a size suitable to permit the eyes 41, by which the cylinder 39 is coupled to the plate 18, to be retracted too.

Likewise for the plate 19 there is provided the piston 42 having the end fixed through the coupling 43 to a second stem 143 to a cylinder 243, which in turn is fixed at 343 to the fixed casing 10 whereas the cylinder 45 is coupled through the eyes 46 to the plate 19 and passes through the hole 47 of the plate 15.

From the figures 2,3 and 4, it will be appreciated that the jacks for the extension and withdrawal of the first stage plates 18 and 19 are mounted in a vertical plane passing through the symmetry axis 12 but are vertically staggered whereby their extension and withdrawal movement is possible without affecting the possibility of keeping the maximum dimension of the hooking frame within the aforesaid limits (below 6000mm) for the specified reasons.

By the reference 48 there are indicated the housings for the forks of the gooseneck of the hoisting truck, having rollers 49 and 50 to facilitate their entry and coming out.

From the preceding description and from the accompanying figures it shall appear clear how by means of the hooking frame according to the

invention the technical problem as shortly illustrated in the preamble is essentially and advantageously solved with the evident benefits from the operating point of view.

In fact it will be enough to remember that by the hooking frame according to the invention there are first of all saved dead times of the order of hours for each stowage operation and secondly there is eliminated the need of particularly skill,ed personnel for carrying out, with the due skill, the dismounting and assembling operations of the hooking frame with respect to the front hoisting truck.

It is lastly pointed out that changes and modifications which are conceptually and mechanically equivalent are possible and foreseable without falling out of the scope of the invention; for instance, instead of the two-box-like members 11 it is possible to realize a structure, which is substantially identical from the functional point of view, having only one box-like member forming the fixed casing.

CLAIMS

1. Container hooking and handling frame for front hoisting trucks, of the type comprising a fixed casing and two headpieces having container hooking members, said headpieces being extensible in two stages outwardly and symmmetrically with respect to the said fixed casing, characterized by comprising a pair of first extension and withdrawal means, connected to the said headpieces and opposite to each other, said first extension means being movable between a first position in which said headpieces are fully retracted against said fixed casing, and a second position, in which said headpieces are displaced at both sides of the casing by a predetermined distance, said first extension means being centrally positioned with respect to the fixed casing and having axes parallel and passing in a vertical plane of symmetry of the fixed casing, and second extension and retraction means for said headpieces, movable between a first position, in which said headpieces occupy said second position of said first extension means, and a second position in which said headpieces are further removed by a fixed distance at both sides of said fixed casing, said second extension means having action lines which are parallel and staggered to each other but contained in a horizontal plane perpendicular to the said vertical symmetry plane of the fixed casing.

2. Hooking frame according to claim 1, characterized in that said fixed casing comprises two box-like members parallel and connected by fixed cross-members, terminating with end plates having openings for the passage of telescopic extensible arms having the outer end fixed to said headpieces.

3. Hooking frame according to claim 2, characterized in that said extensible arms consists of two telescopic box-like elements, the outermost of which are coupled to said headpieces and the innermost of which to an intermediate plate.

4. Hooking frame according to claim 3, characterized in that said first extension means comprise two opposite, hydraulic or oleodynamic or pneumatic jacks, having the cylinder fixed the said intermediate plate and

the free end of the piston stem fixed to a fixed part of the casing.

5. Hooking frame according to claim 4, characterized in that said jacks have action lines parallel and lying in a vertical plane passing through the symmetry axes of said fixed casing.

6. Hooking frame according to claim 3, characterized in that said second extension means comprise two pairs of hydraulic or oleodynamic or pneumatic jacks, having the free end of the piston rigidly coupled to the said fixed casing and the cylinder fixed to the outermost telescopic elements of said extensible arms, the action lines of all the jacks being parallel and staggered and lying in a horizontal plane parallel to the lying plane of said casing.

7. Hooking frame according to claim 6, characterized in that said pairs of jacks are mounted so that the action lines of the jacks pertaining to the extensible arms of one side of said casing are symmetrically more external with respect to the action lines of the jacks pertaining to the extensible arms of the other side of said casing.

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Fig.1

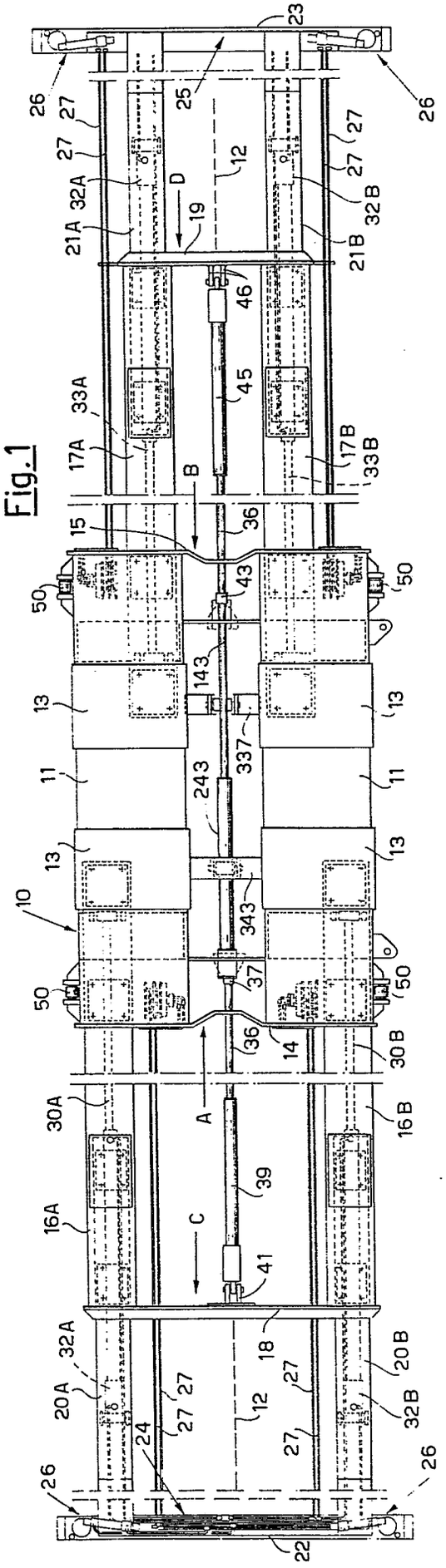


Fig.4

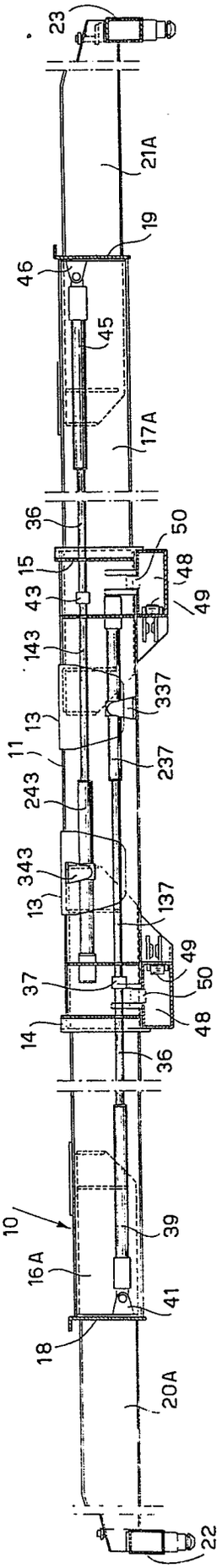


Fig.2

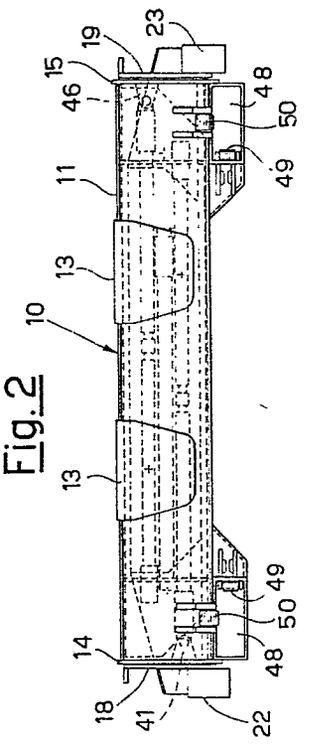


Fig.3

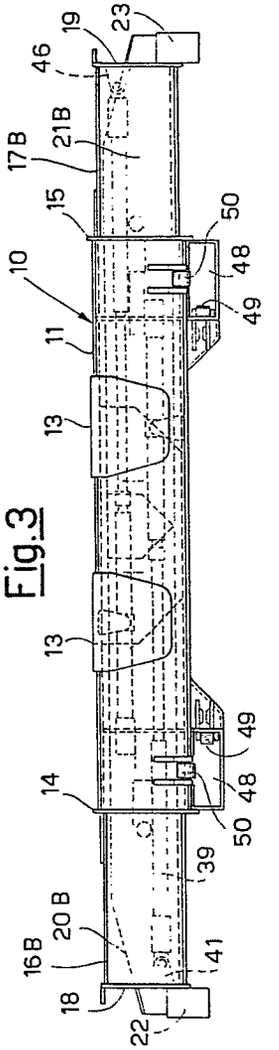


Fig.1A

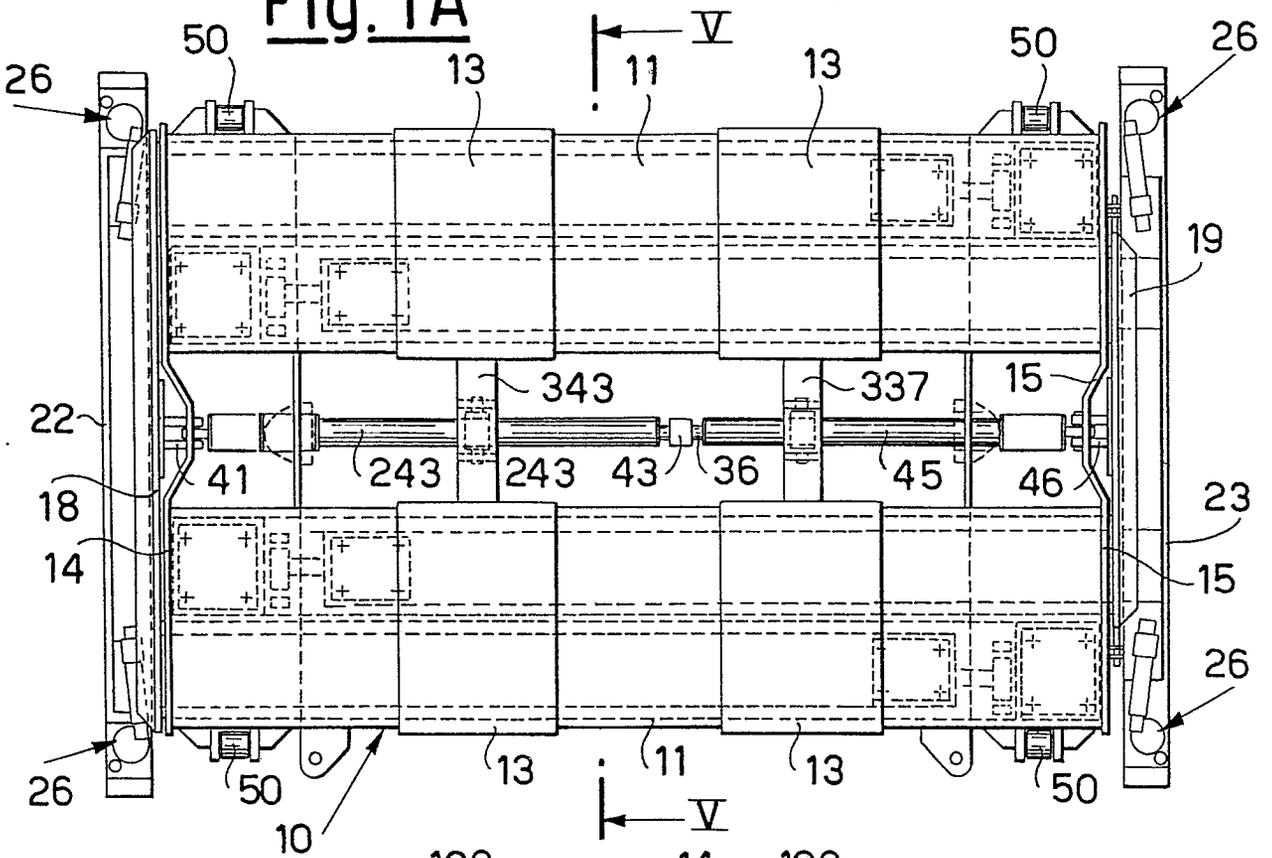


Fig.6

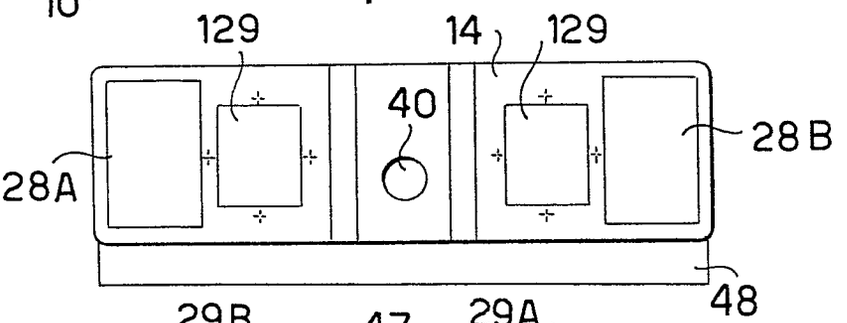


Fig.7

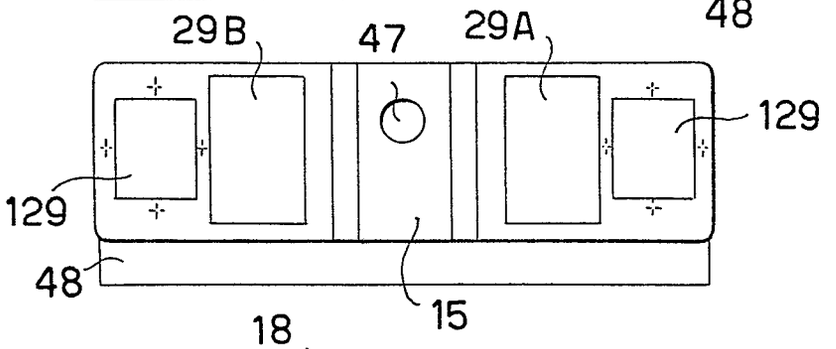


Fig.8

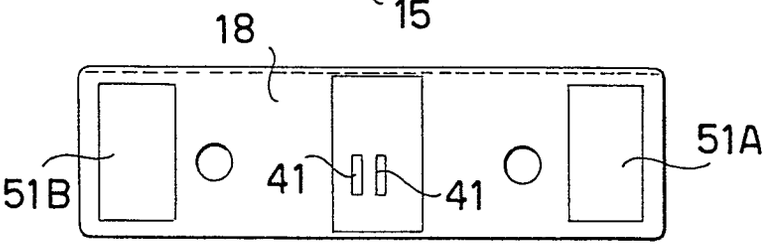


Fig.9

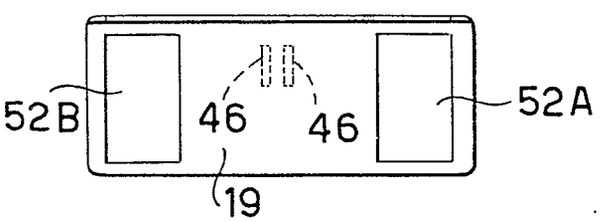
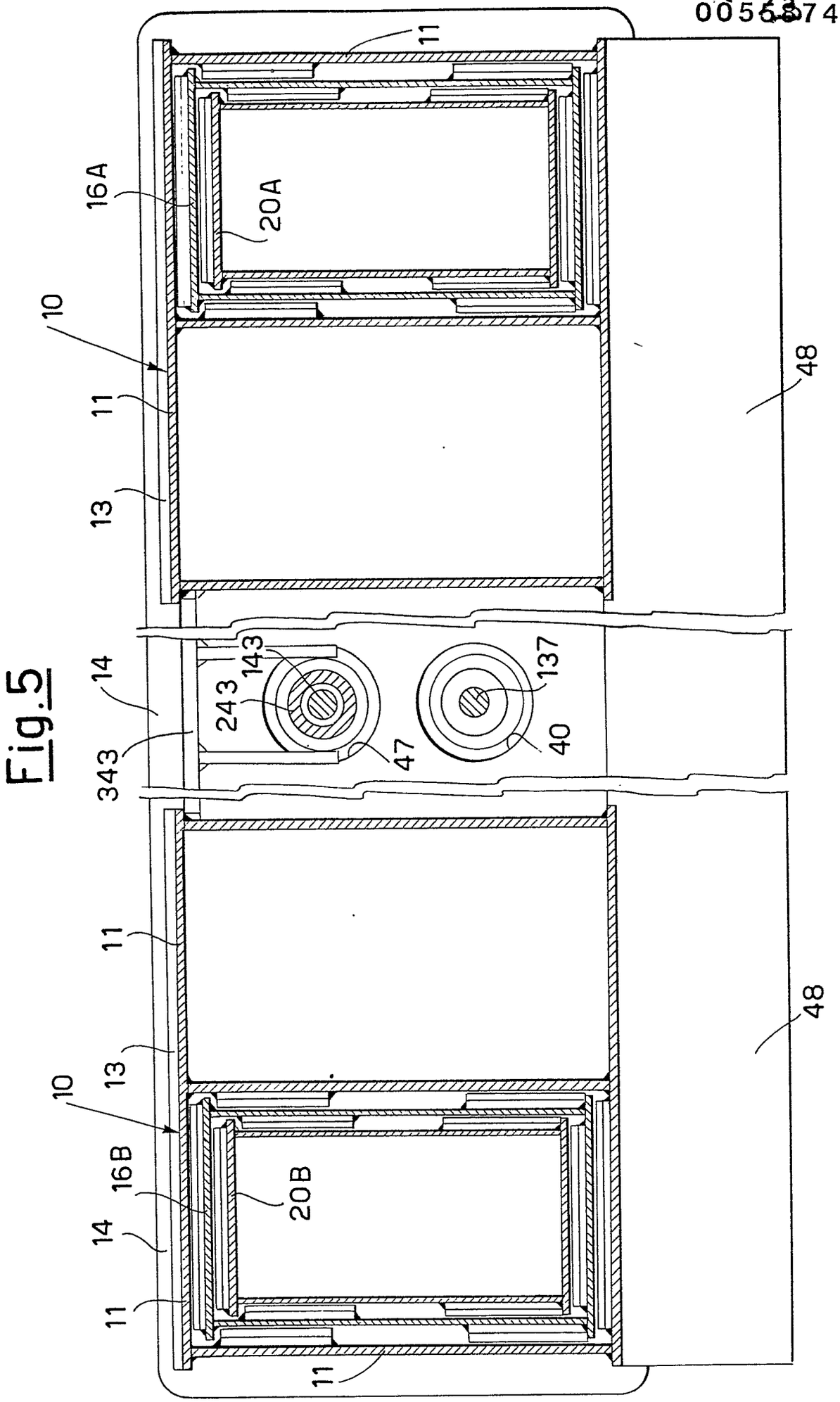


Fig.5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