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- (54) Benævnelse: **SYSTEM OMFATTENDE KOBLINGSMIDLER TIL SAMMENLÅSNING AF INTERMODALE CONTAINERE, DER TRANSPORTERES PÅ ET SKIB**
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DESCRIPTION

[0001] The object of the present invention is a system for locking together intermodal containers being transported on a ship, by means of the corner castings on the intermodal containers, whereby containers one above another are locked to each other by means of twistlocks to be fastened into the corner castings.

[0002] On a cargo ship, intermodal containers are transported in a hold below hatch covers and also on deck on top of the hatch covers in a number of parallel rows and lines and also in a number of tiers one on top of the other. On deck are detachable hatch covers, with which the hold below is closed. The containers above deck are transported on top of the hatch covers. This application focuses on the transportation of intermodal containers on the deck of a cargo ship, but it is not limited to this.

[0003] Intermodal containers have corner castings on all their eight corners, by means of which castings the containers can be locked to each other. Typically, two containers one above the other are locked to each other with twistlocks installed into the corner castings of the container. Twistlocks are disposed between the corner castings of two containers that are one above the other, and the twistlocks are locked into the holes in the horizontal surfaces of the corner castings.

[0004] Twistlocks known in the art are disclosed in, *inter alia*, the following publications: EP0776302B1, DE10200401A1 and WO8907079A1.

[0005] Intermodal containers that are one beside another are not generally locked to each other at all. For special situations, however, devices for supporting against each other containers that are one beside another do exist. One possible solution is disclosed in specification EP 1194353 B1.

[0006] Publication FR 2971239 discloses a device having a magnetized plate shaped to be inserted and locked within an ISO corner of a shipping container. The plate is provided with a projection projected with respect to the ISO corner. A turntable connects and locks the projection of the plate at the corner of the container. The turntable includes an opening that is dimensioned and spaced for being fitted on the projection of the plate. The turntable includes a nut that is shaped to be screwed or unscrewed on a screw of the plate.

[0007] Publication DE 1988580 U introduces a device for coupling containers comprising a plate with hook-shaped members projecting therefrom for insertion into the recesses of adjoining containers, the plate including clamp jaws adapted to be spread apart to engage against parts of the adjacent containers and urge the latter apart and into engagement with the members. The plate has a central projection provided with a screw engaging a wedge member which when the screw is rotated moves apart the clamp members against the action of springs. The projection has a square boss which engages the clamp members to prevent their rotation

when the screw is operated. The containers to be coupled are placed together in the correct relative position and a coupling attached to each of the four connecting points, the hooks of each coupling entering recesses in the corners of the containers and the wedge member and clamping jaws projecting into a gap between the containers. On rotation of the screw the jaws are moved apart to engage the container corners and couple the containers together.

[0008] Publication US 2011180558 describes an outer box connector (OBC). The OBC can include: a body having an outer surface and an inner surface; a first anchor and a second anchor extending inwardly from the inner surface; a lever extending substantially outwardly from the outer surface, the lever being connected to a distal portion of the first anchor; and the first anchor including an unlocked condition adapted for allowing insertion in and removal from a corner fitting and a locked condition for locking the first anchor with a corner fitting.

[0009] Publication GB 2439864 shows a building module having an exterior shape generally of a cuboid having side, end, top and bottom faces, and fabricated from metal, the module being hollow and defining a space of a size suitable for occupation by a person. The module includes fastening elements to allow the module to be fastened to another module. The module further includes metal panels including insulating material and fitted to the sides of the cuboid, and a cladding on one or more sides of the module.

[0010] At sea, large compression and tension forces are exerted on the twistlocks and on the corner castings of a container when the ship, and correspondingly a stack of containers on its deck, inclines. To increase the transportation capacity of ships, it is endeavored to transport increasingly higher and heavier stacks of containers on deck on ships. The strength of twistlocks is, however, limited. A typical maximum permitted tension force in twistlocks is 250 kN. This imposes a limit on increasing the container stack size and also on improving the efficient use of the ship.

[0011] The example embodiment provides a method for locking intermodal containers to each other in such a way that the locking will withstand a greater seaway-induced tension force than before, in which case the number of intermodal containers being transported on a cargo ship can be increased.

[0012] The aim of the present invention is to provide a system comprising coupling means according to claim 1. Preferred embodiments of the system are defined in the dependent claims.

[0013] In the invention, therefore, the locking of two or more intermodal containers, which are one above another, one beside another and/or end-to-end, to each other at their corner castings is implemented with simultaneously two or more separate coupling devices for increasing the total locking force.

[0014] The system can be applied in such a way that between the corner castings of two intermodal containers that are one on top of the other is a twistlock installed according to

current practice, in addition to which separate coupling means are installed into the gripping holes in the vertical front surfaces of the corner castings.

[0015] Alternatively, the system can be applied in such a way that between the corner castings of two intermodal containers that are one on top of the other is a twistlock installed according to current practice, in addition to which separate coupling means are installed into the gripping holes in the side surfaces of the corner castings.

[0016] Alternatively, the system can be applied in such a way that between the corner castings of two intermodal containers that are one on top of the other is a twistlock installed according to current practice, in addition to which separate coupling means are installed into the gripping holes in the front surfaces and the side surfaces of the corner castings.

[0017] It is also possible to couple two containers one beside another and two containers one above another (four corner castings) together in such a way that twistlocks are installed between the corner castings of the containers that are one above the other, and in addition to this separate coupling means are installed in the same corner castings, which coupling means are fastened into the gripping holes in the vertical surfaces of all four corner castings.

[0018] The operation of the system is contingent on the clearance between the twistlock and the support surfaces of the corner casting of the container being of substantially the same magnitude as the clearance between the coupling means and the support surfaces of the corner casting of the container, taking into account the structural flexibility and deformations of all these components, in particular when under tension loading. The dimensioning of the coupling means is therefore determined according to the dimensions of the twistlock and of the corner castings of the intermodal container. In this case the lifting force exerted from the upper container onto the lower container is distributed as evenly as possible between the twistlock and the coupling means.

[0019] The invention thus relates also to a system comprising coupling means that are fastened between the corner castings of intermodal containers that are one above another, one beside another and/or end-to-end in such a way that the coupling means bears the load between the corner castings, typically tensile stress, together with a second locking piece connected between the corner castings.

[0020] Alternatively, the object of the invention is a system comprising coupling means that is fastened between corner castings that are one above another in such a way that the coupling means bears the load between the corner castings, typically tensile stress, together with a twistlock connected between the corner castings.

[0021] One of the advantages of the invention that can be mentioned is that it enables the transportation of larger container loads than before on the deck of a ship, in which case the cargo capacity and cargo efficiency of the ship can be improved. The invention can be used with the intermodal containers and twistlocks currently in use. The system comprising the

coupling means according to the invention is structurally simple and operationally reliable.

[0022] In the following, the invention will be described in detail by the aid of some examples of its preferred embodiments with reference to the attached drawings, wherein

Fig. 1 presents the corner castings of two containers that are one on top of the other, the castings being locked to each other with a twistlock in the conventional manner.

Fig. 2 presents the same as Fig. 1, but now the corner castings are locked to each other also with a coupling means according to the invention via the gripping holes in the front surfaces of the corner castings.

Fig. 3 presents the same as Fig. 1, but now the corner castings are locked to each other also with a coupling means according to the invention via the gripping holes in the side surfaces of the corner castings.

Fig. 4 presents an embodiment wherein coupling means are installed into the gripping holes in both the front and the side surfaces.

Fig. 5 presents a cross-section of two corner castings one above the other, in the idle state, which castings are locked with a conventional twistlock and with a coupling means according to the invention.

Fig. 6 presents the same as Fig. 5, but when under tension loading.

[0023] Fig. 1 thus presents the corner castings of two intermodal containers that are one above the other. The upper corner casting 1 belongs to the upper container and the lower corner casting 2 to the lower container. The actual containers are not presented in these drawings but, as is known in the art, intermodal containers have a corner casting on each corner, by means of which casting the containers can be locked together by using a twistlock 3. The twistlock is used by means of an operating wire 4 in a manner that is *per se* known in the art. The twistlock 3 thus locks together the container corner castings 1, 2 that are one above another.

[0024] In addition, there are so-called gripping holes 5, 5'; 6, 6' in the flanks of the corner castings. The gripping holes marked with the reference number 5, 5' are situated on the ends of the container, in the so-called front surfaces, and the gripping holes marked with the reference number 6, 6' are situated on the long sides of the container, in the so-called side surfaces.

[0025] In Fig. 2 the corner castings 1, 2 are locked with coupling means 7 according to the invention as well as with a conventional twistlock 3. The coupling means 7 have been installed between gripping hole 5 in the front surface of the upper corner casting 1 and the gripping hole 5' in the front surface of the lower corner casting 2.

[0026] Also in Fig. 3 the corner castings 1, 2 are locked with coupling means 7 according to the invention as well as with a conventional twistlock 3. In this case, the coupling means 7 have been installed between the gripping hole 6 in the side surface of the upper corner casting 1 and the gripping hole 6' in the side surface of the lower corner casting 2.

[0027] Fig. 4, for its part, presents a combination of the solutions of Figs. 2 and 3, i.e. there are two units of coupling means 7, one between the gripping holes 5, 5' of the front surface, and one between the gripping holes 6, 6' of the side surface.

[0028] Fig. 5 presents a cross-section wherein the corner casting 1 of the bottom corner of the upper container rests in the idle state on top of the body 8 of the twistlock, which in turn rests on top of the corner casting 2 of the top corner of the lower container. Coupling means 7 are installed into the gripping holes 6, 6' in the side surfaces of the corner castings 1, 2. The coupling means 7 rest supported on the inside surface 11 of the upper corner casting 1.

[0029] In the idle state, a clearance A remains between the upper retaining clip 9 of the twistlock and the inside surface 11 of the upper corner casting and, correspondingly, a clearance B remains between the lower retaining clip 10 of the twistlock and the inside surface 12 of the lower corner casting 2. These clearances make the locking and opening of the twistlock in harbor possible. Furthermore, in the idle state, a clearance C remains between the bottom part of the coupling means 7 and the inside surface 12 of the lower corner casting 2. The dimensioning of the coupling means 7 is such that the clearance C equals the sum of the clearances A and B.

[0030] Fig. 6 presents the tension loading of the arrangement according to Fig. 5, wherein tension is thus exerted in the direction of the arrow V. Tension loading can be produced e.g. when a ship inclines a sufficient amount at sea and the second edge of the upper container starts to rise upwards (container stack starts to fall). In such a case, the upper corner casting 1 lifts the twistlock 3 and the coupling means 7 upwards until they collide with the inside surface 12 of the lower corner casting 2. In this situation, the clearances A, B and C presented in Fig. 5 no longer exist, and movement of the upper corner casting 1 in relation to the lower corner casting 2 is prevented. The coupling means 7 are thus fastened between the corner castings 1, 2 in such a way that they bear the load between the corner castings, such as tensile stress, together with the twistlock 3 connected between the corner castings 1, 2. Since both the twistlock 3 and the coupling means 7 bear the load simultaneously, it is possible to increase the height and/or weight of a stack of containers compared to a conventional arrangement in which only a twistlock is used.

[0031] Presented above are embodiments in which the coupling means 7 are installed in the front surface or the side surface of the corner castings 1, 2, or in both these surfaces. There is also an option whereby two containers one beside another and two one above another are coupled together, in which case there are four units of corner castings in the same group, in such a way that between the corner castings of the containers that are one on top of the other is a twistlock installed according to current practice, and in addition to that separate coupling

means are installed into the same corner castings, which coupling means are fastened into the gripping holes on the vertical surfaces of all four corner castings.

[0032] The coupling means 7 according to the invention can thus be installed between the corner castings of intermodal containers that are one above another, one beside another and/or end-to-end. Coupling means can be fastened into the gripping holes 5, 5'; 6, 6' of a corner casting of an intermodal container by means of turnable locking elements or by means of fixed locking claws (not presented in the drawings). The fastening can also be effected by means of magnets.

[0033] Furthermore, it is possible to provide the coupling means 7 with a support arm facilitating handling (not presented in the figures). The support arm can be fastened at one of its ends directly or indirectly to hull structures of the ship or to a lashing bridge. Coupling means provided with a support arm can transmit forces between an intermodal container and the hull structures of the ship or a lashing bridge.

[0034] Coupling means 7 are essentially a U-shaped part, the free ends of which are fastened into the gripping holes 5, 5'; 6, 6' of the corner castings of intermodal containers.

[0035] It is obvious to the person skilled in the art that the invention is not limited to the embodiments described above, but that it can be varied within the scope of the claims presented below. The need for using coupling means 7 in different points of a stack of containers is determined, *inter alia*, on the basis of the height of the container stack and on the basis of the weight of the containers. Instead of steel, coupling means can also be fabricated from a more flexible material, which must be taken into account when dimensioning the magnitudes of the clearances A, B and C. Furthermore, coupling means can include a clearance adjustment property, implemented e.g. with a screw-like structure.

[0036] The characteristic features possibly presented in the description in conjunction with other characteristic features can also, if necessary, be used separately to each other.

REFERENCES CITED IN THE DESCRIPTION

Cited references

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

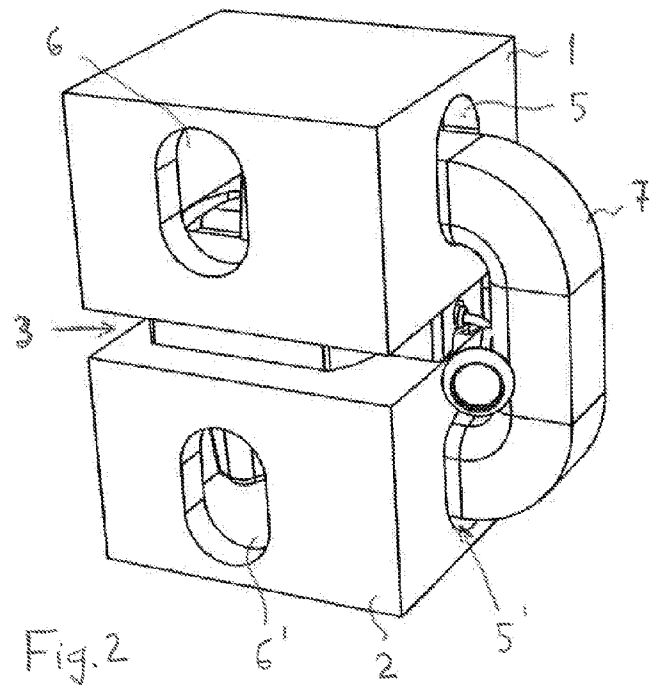
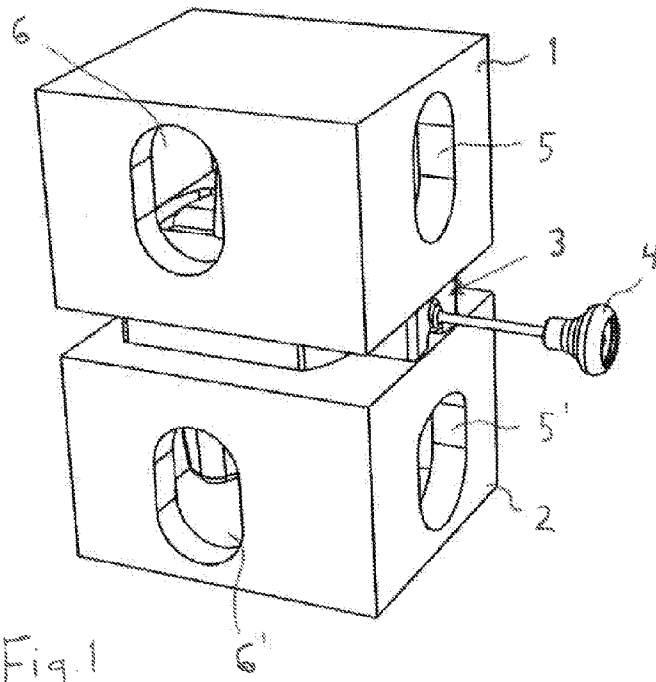
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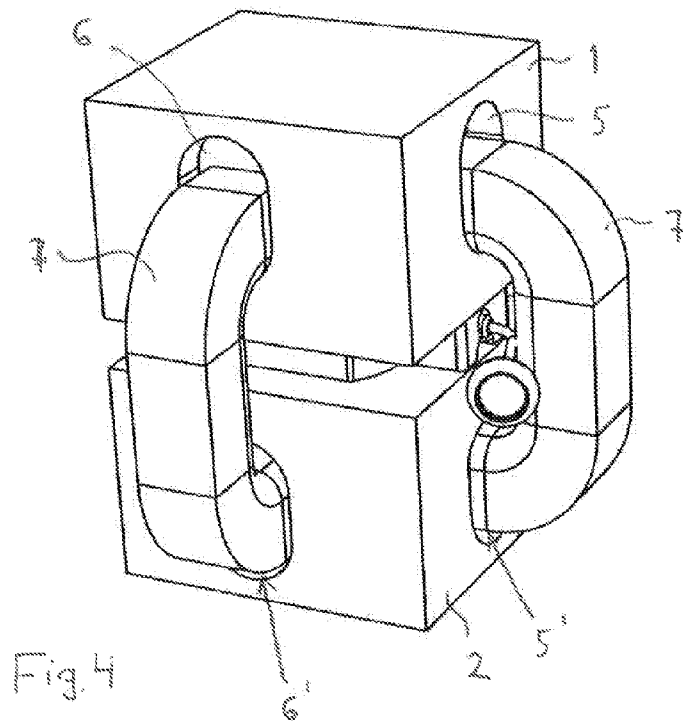
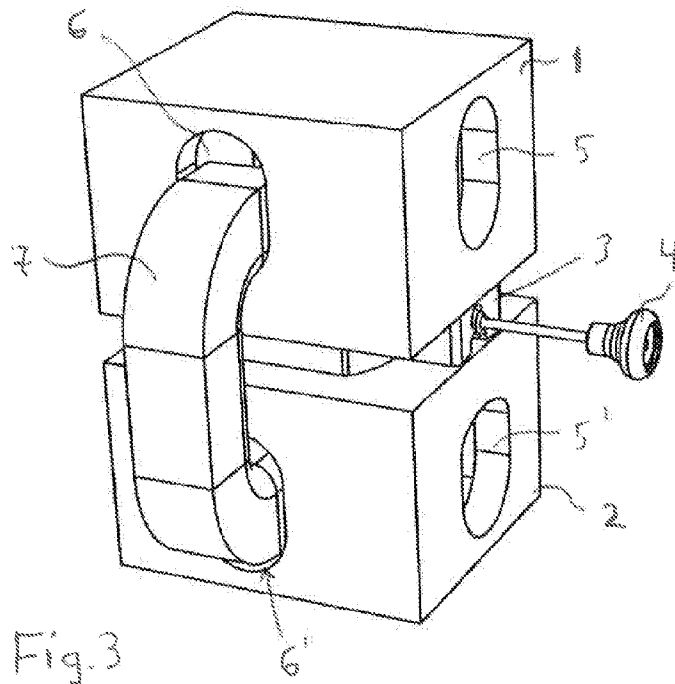
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Patentkrav

1. System, der omfatter intermodale containere, koblingsmidler (7), intermodale containeres hjørnestøbninger (1, 2) med gribehuller (5, 5'; 6, 6') og drejelåse (3), hvori koblingsmidlerne (7) til at låse hjørnestøbningerne (1, 2) til intermodale containere, der transporteres på et skib, hvorved koblingsmidlerne (7) fastgøres i gribehullerne (5, 5'; 6, 6') i hjørnestøbningerne mellem hjørnestøbningerne (1, 2) af de containere der er over hinanden og/eller ved siden af hinanden, **kendetegnet ved, at** de intermodale containere, der er oven på hinanden, låses til hinanden med drejelåsene (3), hvorved afstanden mellem drejelåsen (3) i tomgangstilstand og understøtningsfladerne af containerens hjørnestøbningerne (1, 2) er i det væsentlige af samme størrelsesorden, som afstanden mellem koblingsmidlerne (7) og understøtningsfladerne af containerens hjørnestøbninger (1, 2).
2. System ifølge krav 1, **kendetegnet ved, at** der mellem en øvre fastholdelsesklip (9) på drejelåsen (3) og af den øvre hjørnestøbning (1) indvendige overflade (11) er et spillerum (A), at der mellem en nedre fastholdelsesklip (10) af drejelåsen (3) og en indvendig overflade (12) af det nedre hjørnestøbning (2) er et spillerum (B), og at der mellem en nederste del af koblingsmidlerne (7) og den indvendige overflade (12) af den nederste hjørnestøbning er et mellemrum (C), i hvilket tilfælde mellemrummet (C) i det væsentlige er lig med summen af mellemrummene (A) og (B).
3. System ifølge krav 1 eller 2, **kendetegnet ved, at** koblingsmidlerne (7) er fastgjort mellem hjørnestøbningerne (1, 2) på en sådan måde, at de bærer belastningen mellem hjørnestøbningerne, såsom trækspænding, sammen med drejelåsen (3), der er forbundet mellem hjørnestøbningerne (1, 2).
4. System ifølge et hvilket som helst af kravene 1-3, **kendetegnet ved, at** koblingsmidlerne (7) er forsynet med en støttearm, for at lette håndteringen af koblingsmidlerne.
5. System ifølge krav 4, **kendetegnet ved, at** støttearmen er tilpasset til at blive fastgjort ved en af sine ender direkte eller indirekte til skibets skrogstrukturer eller til en forankringsbro, hvorved koblingsmidlerne (7), som er forsynet med støttearmen, er tilpasset til at overføre kræfter mellem den intermodale container og skibets skrogstrukturer eller surringsbroen.

DRAWINGS





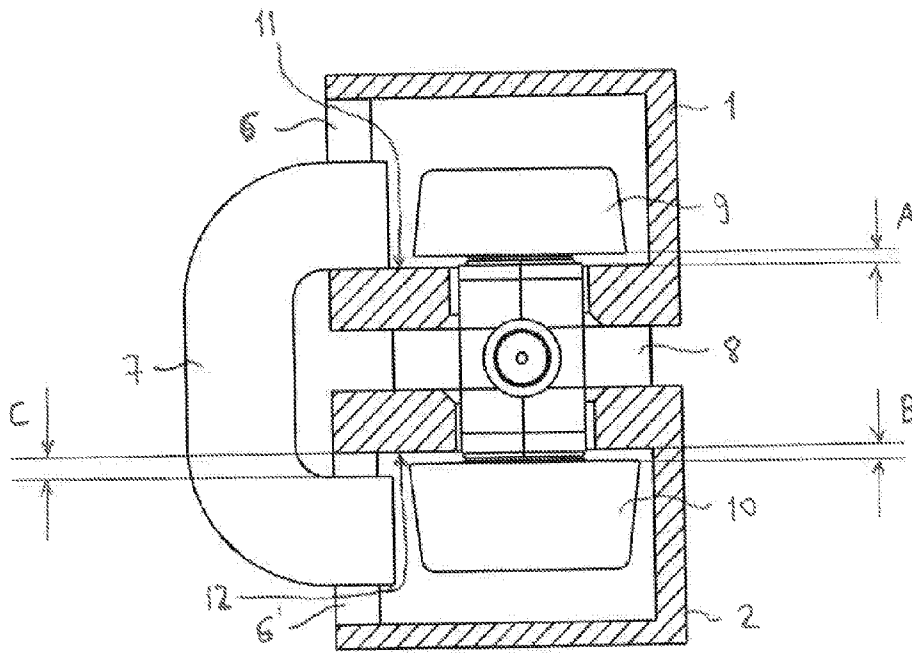


Fig.5

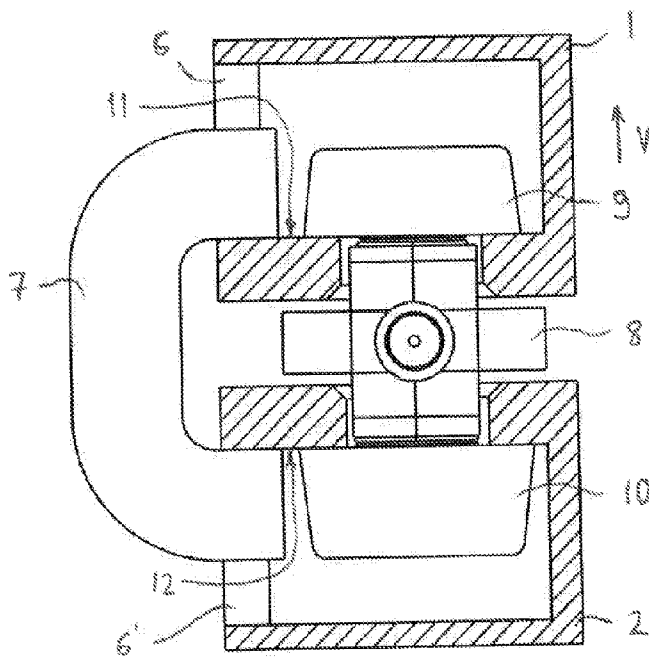


Fig.6