

# PATENT SPECIFICATION

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## (54) A DEVICE FOR OUTWARDLY SEALING-OFF A JOINT TO BE WELDED BETWEEN TWO FLOATING METAL STRUCTURES

(71) We, AB LÖDÖSE VARF, a Swedish Company, of Ludödöse, Sweden, and NAVIRE CARGO GEAR INTERNATIONAL AB, a Swedish Company, of Gustaf Dahlgrens gatan 8, Göteborg, Sweden, do hereby declare the invention for which we pray that a Patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

During recent years the shipbuilding industry has developed sectional building methods in which the hull is built in two halves, or a forebody and an afterbody are built at one shipyard and in a late stage are joined to a mid-ship body, which may have been built by another yard. This joining is usually performed in a dry-dock, but means have also been proposed in which a channel-shaped member is used for sealing-off a welding joint between two floating metal-structures, for example, a forebody and a mid-ship body.

Known devices for sealing-off a joint have been bulky and expensive, and usually include a tunnel-shaped member which has been brought to bear against the metal structures to both sides of the joint. On occasions this tunnel member has been large enough to permit welding being performed from the outside of the metal structures, and it is evident that the initial expenditure, as well as the costs for storing and mounting such a big unit will be high. The safety precautions will during these tunnel works, be very severe.

The object of the present invention is to provide in a simple and efficient manner, a device for outwardly sealing-off a joint to be welded between two floating metal structures.

According to the invention there is provided a device for outwardly sealing-off a joint to be welded between two floating metal structures, comprising a rigid U-

shaped beam structure at which the spacing between the branches of the U, and the height of said branches are selected so the beam structure will enclose the submerged portions of the metal structures, said beam structure being provided with means facilitating the transportation thereof to the desired position, a pliable belt having a substantially plane cross-section and of sufficient length to extend below the metal structures, from a first point above the water level, at one side of the aligned metal structures, to a second point above the water level, at the opposite side of the metal structures, an elongated packing member extending along each side edge of the belt, means for connecting the ends of the belt to the upper ends of branches of the beam structure and adapted to stretch the belt, thus forcing the packings mounted thereon against the metal structures at each side of the joint to be welded, at least one drain opening in the horizontally extending part of the belt and pumping means connected to said opening.

The invention will below be described with reference to the accompanying drawings in which:

Figure 1 schematically shows the device as fitted to a ship's hull.

Figure 2, on a larger scale, shows one vertical portion of the device.

Figure 3, on somewhat larger scale, shows a section along lines III-III in Figure 2.

Figure 4 shows a detail at the horizontal portion of the device.

Figure 5, on a larger scale, shows the arrangement for pumping out water from the channel member, and

Figure 6 shows an arrangement for stretching the belt.

Figure 1 shows a cross-section through a ship 10, which has been built in two parts, which are to be joined together along a

transverse joint while the sections are floating. For sealing-off this joint in the outward direction a device is provided, which includes a U-shaped beam structure 11 and a pliable belt 12, provided with packings, and carried by the beam structure. In Figure 1 this belt is schematically denoted by an undulating line. The belt is mounted at the beam structure in suitable manner, to be described below, so it can be tightened along the external faces of the sections of the ship. By means of wires 13, the beam structure may be suspended from a crane for facilitating the transportation thereof, and may in this manner easily be brought to the correct position with respect to the joint. The device further includes a pumping means, generally denoted by 14, which will be described more in detail in connection with Figures 4 and 5.

The cross-section of a ship will at the location, where it usually is required to join two sections, have a substantially rectangular cross-section with rounded corners, the lower ones termed bilges.

The beam structure 11 is preferably composed of two vertical side branches and a number of horizontal component parts, so it will be possible, by selecting parts of suitable length, to accommodate the beam structure to ships of different breadths. A satisfactory fitting along the rounded bilge will, even with varying ship's breadths be ensured by the elastic deformation of the belt.

Figure 2 shows on a larger scale one vertical branch 11a of the beam structure. The belt 12, which preferably consists of a band of sheet steel, of substantially plane cross-section, is provided with two U-shaped packings 15, running along its side edges, spaced a distance to make an efficient sealing along the joint 16 possible. Figure 6 shows how the ends of belt 12 are suspended from the upper ends of the branches of the beam structure so as to be displaceable along the latter in order better to fit along the hull. The adjustment of the belt is obtained by means of tightening bolts 30 mounted at brackets 19.

The beam structure is further provided with a number of screw members 17, by means of which the belt, and thus the packings may be locked against the hull. The beam structure furthermore is provided with a number of guides 18, which maintain the belt in position transversely with respect to the joint. The screw members as well as the guides are adapted to permit the adjustment of the belt in its longitudinal direction.

A bracket 19 is provided at each end of the beam structure, by means of which the beam structure may be temporarily attached to the hull, e.g. by welding, in order

to securely maintain it in the desired position. It is evident that the beam structure, as well as the belt, shall have sufficient depth to ensure that their ends will reach above the water level, in Figures 1 and 2 denoted by 20. When the structure has been located in its proper place the crane may be used for other purposes while the welding operations are performed.

At the centre of the horizontal portion there is a guide, the shape of which is best explained in connection with Figure 5. This guide is adapted to be hung in brackets 21 at the two sections, to each side of the welding joint, and includes bolts 22 and a cross beam by means of which it is possible, as an initial step, to locate the lower centre of the beam structure 11 with respect to the joint, and then to arrange the remainder in the desired position.

When this has been done, and the belt has been tightened along the hull, it is necessary to drain the water from the space between the belt and the hull. The belt is, preferably about at the centre of its horizontal portion, provided with an opening 23, through which water may flow down into a box 24 hermetically welded to the outside of the belt. This communicates, by way of a short outlet conduit 25, with a further box 26, carried by the beam structure and enclosing an electric motor and a submersible pump 27 driven thereby. The motor is supplied with electric current by a cable 28, and the pump is mounted at an opening 29 in one side wall of the second box 26. The space between belt 12 and the hull may in this way be drained in a simple manner, and as soon as the draining operation can start in the usual manner from inside the hull. A possible back weld may be tried out when the ship is docked for the painting of the bottom of the ship.

A non-return valve should be fitted at opening 29, but it is also possible to attach a conduit to box 26 so the drain water may be led above the water line. The screw members 17 located below the water line will have to be attended to by skin divers.

#### WHAT WE CLAIM IS:

1. A device for outwardly sealing-off a joint to be welded between two floating metal structures, comprising a rigid U-shaped beam structure at which the spacing between the branches of the U, and the height of said branches are selected so the beam structure will enclose the submerged portions of the metal structures, said beam structure being provided with means facilitating the transportation thereof to the desired position, a pliable belt having a substantially plane cross-section and of suf-



transverse joint while the sections are floating. For sealing-off this joint in the outward direction a device is provided, which includes a U-shaped beam structure 11 and a pliable belt 12, provided with packings, and carried by the beam structure. In Figure 1 this belt is schematically denoted by an undulating line. The belt is mounted at the beam structure in suitable manner, to be described below, so it can be tightened along the external faces of the sections of the ship. By means of wires 13, the beam structure may be suspended from a crane for facilitating the transportation thereof, and may in this manner easily be brought to the correct position with respect to the joint. The device further includes a pumping means, generally denoted by 14, which will be described more in detail in connection with Figures 4 and 5.

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The beam structure 11 is preferably composed of two vertical side branches and a number of horizontal component parts, so it will be possible, by selecting parts of suitable length, to accommodate the beam structure to ships of different breadths. A satisfactory fitting along the rounded bilge will, even with varying ship's breadths be ensured by the elastic deformation of the belt.

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to securely maintain it in the desired position. It is evident that the beam structure, as well as the belt, shall have sufficient depth to ensure that their ends will reach above the water level, in Figures 1 and 2 denoted by 20. When the structure has been located in its proper place the crane may be used for other purposes while the welding operations are performed.

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- efficient length to extend below the metal structures, from a first point above the water level, at one side of the aligned metal structures, to a second point above the water level, at the opposite side of the metal structures, an elongated packing member extending along each side edge of the belt, means for connecting the ends of the belt to the upper ends of branches of the beam structure and adapted to stretch the belt, thus forcing the packings mounted thereon against the metal structures at each side of the joint to be welded, at least one drain opening in the horizontally extending part of the belt and pumping means connected to said opening.
2. A device according to claim 1 in which a box is hermetically attached to the belt outside of said at least one opening and connected to an outlet conduit, which in turn is connected to a further box located close by the first box and including a submersible pump driven by an electric motor.
3. A device according to either of the claims 1 or 2 including means at the beam structure for laterally pressing the belt against the metal structures.
4. A device for outwardly sealing-off a joint to be welded between two floating metal structures, substantially as hereinbefore described with reference to and as shown in the accompanying drawings.
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