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(54) **METHOD FOR ASSEMBLING A WATERBORNE SHIP HULL AND A DEVICE FOR CARRYING OUT SAID METHOD**

VERFAHREN ZUM ZUSAMMENFÜGEN EINES SCHIFFSRUMPFES UND VORRICHTUNG ZUR DURCHFÜHRUNG DES VERFAHRENS

PROCÉDÉ D'ASSEMBLAGE D'UN NAVIRE À FLOT ET DISPOSITIF CORRESPONDANT

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Description

Field of the Invention

[0001] This invention is defined in the claims and relates to ship production and is more particularly directed to assembly waterborne hull parts of large-size barges and other vessels. It can be used for joining waterborne hull parts embodied in the configuration of pontoons built at shipyards in the same or other water areas including riverine ones, with these parts being afterwards transported through the locks of waterways to an assembly site.

Background of the Invention

[0002] The method of waterborne hull assembly is known; wherein the pontoons are pre-mated on building ways, launched, ballasted, and joined, see Inventor's Certificate: USSR No 943077 IPC⁸ B63B 9/06, 1982.

[0003] When constructing ship parts such as pontoons at various shipyards, it is normally impossible to have their premating on the building ways. What is more, for the waterborne pontoons to be longitudinally joined by ballasting, it sometimes happens that a required inclination can not be attainable to let joinable edges fully withdrawn from the water.

[0004] The device of waterborne hull assembly is also known, wherein the ship components are tightened, using special equipment such as turnbuckles, see Inventor's Certificate: USSR No 835875, IPC⁸ B63B 9/06, 1979.

[0005] The method that most closely relates to the present invention as defined in the claims is the waterborne hull assembly with the use of centering and tightening devices. This includes the construction and launching of individual hull parts embodied in the form of water displacement pontoons having transverse bulkheads to be afterwards towed to an assembly site, equipped with centering and tightening devices, joined and finally welded, see Durmashkin S. Sh., Lobzov N. I. et al. Ships constructed from individually launched units. Leningrad: Shipbuilding, 1974, pp. 15-19, 96-98.

[0006] Carrying out the above method using said device is a matter of rather high man-hours and inadequate reliability in case of assembling a hull of greater length by joining its parts along the centerline. This method involves complication of arrangement and plurality of mounting accessories such as centering and tightening devices.

Disclosure of the Invention

[0007] Technical effect of the present method and device as defined in the claims makes it possible to concurrently increase the reliability of waterborne hull assembly and reduce man-hours when joining the hull parts along the centerline.

[0008] It is attained in the method for assembling a waterborne hull with the use of centering and tightening devices, comprising building and launching the individual hull parts embodied in the form of water displacement pontoons having transverse bulkheads, which are afterwards towed to an assembly site, where they are joined and welded, by applying said method in such a way that, prior to launching each pontoon, its field joint so outlined that the edges of all joinable framing elements are within the same vertical plane, with centering and tightening devices mounted on one pontoon so that providing the convergence of the edges of joinable outline, a compensator, embodied in the form of a thickened beam having thickness in excess of the main joinable plates within the hull field joinable outline, is mounted along the entire joint outline except for the deck area, after launching and towing the pontoons to an assembly site said pontoons are stepwisely tightened and centered with tightening and centering devices thereof in such a way that the accurate convergence of the edges of the joinable elements in the area of pontoon midship transversal bulkhead is afforded in the beginning, with the accurate convergence of the hull deck ensured afterwards, said compensator creating the convergence of the remainder of joinable outline edges in the process of subsequent tightening, whereupon the hull joined and welded.

[0009] The above technical effect is also attained in a device for carrying out said method for assembling a waterborne hull from water displacement pontoons, wherein said hull assembly device comprises: i) a compensator usable for compensating the difference of length and height dimensions of said pontoons and embodied in the form of a thickened metal beam having thickness in excess of the main joinable plates within the hull field joint outline, with said compensator mountable on a first pontoon along the field joint outline, except for the deck area, ii) wooden cushions attachable to the body of a second pontoon, iii) a centering devices embodied in the form of guiding catchers mountable on the deck level in the forward and aft ends of the first pontoon thereof, and fixing catchers mountable on deck of said first pontoon thereof along and on the field joint and transversal bulkhead arranged in the pontoon midship area for accurate convergence of the edges of the joinable outline in the area, and wherein the guiding catchers are mountable on the first pontoon for making possible their interaction with the wooden cushions on the body of the second pontoon accordingly.

Brief Description of the Drawings

[0010]

Fig.1 shows the hull parts embodied in the form of pontoons before their joining.

Fig.2 is a top view of the pontoons to be mated

Fig.3 is an A-A section in Fig.2.

Fig. 4 is a B-B section of the hull as mated.

Preferred Embodiment of the Invention

[0011] The device as claimed for carrying out the method of waterborne hull assembly, comprising building and launching hull individual parts embodied in the form of water displacement pontoons 1 and 2 to be afterwards towed to an assembly site where these are to be mated and welded, further comprising tightening devices such as chain tackles (not shown here) and turnbuckles 4 as well as centering devices mounted on the pontoon 1.

[0012] For the purpose of increasing the reliability of waterborne hull assembly, when the hull being joined along its centerline, and compensating the difference of length and height dimensions, a compensator is provided in the form of an thickened metal beam 5 having thickness in excess of the main plates within the outline of hull field joint 6. The compensator 5 is mounted on the pontoon 1 along the outline of field joint 6, except for the area of joint 6 on the deck 7, with the centering devices embodied in the form of guiding catchers 8 and fixing catchers 9.

[0013] For accurate convergence of the element edges of joint 6 in way of the transverse bulkhead 3 at the mid-section of pontoons 1 and 2 and hull deck 7, the guiding catchers 8 are embodied in the form of box-type structures and mounted at the level of deck 7 in the fore and aft ends of pontoon 1 where they possibly interact with wooden cushions 10 on the body of pontoon 2 accordingly to said guiding catchers 8.

[0014] The fixing catchers 9 are uniformly mounted on the deck 7 of pontoon 1 along the edge of field joint 6 and transverse bulkhead 3 at close range away from the midship of pontoon 1.

[0015] Each of the fixing catchers 9 is embodied in the form of two parallel plates 11 having bent ends 12, with the parallel plates fitted to the deck 7 (transversal bulkhead 3) using stiffeners 13.

[0016] Said method with the use of the proposed device is carried out in the following way.

[0017] Prior to launching the pontoons 1 and 2 built at the various shipyards, their field joints 6 are outlined in such a way that all the edges of hull framing joinable elements are within one vertical plane. The pontoons 1 and 2 ready for mating are launched and towed by sea or through the locks of inland waterways to an assembly site. While tightening the waterborne pontoons 1 and 2, chain tackles (not shown here) and turnbuckles 4 are employed.

[0018] While interacting with the wooden cushions 10, the guiding catchers 8 embodied in the form of box-type structures, restrict the longitudinal displacement of the pontoon 1 in relation to the pontoon 2 and further provide, in the process of tightening, proper entry of the transverse bulkhead 3 in the gap between the bent ends 12 of plates of the fixing catchers 9 and exact convergence of the

edges of field joint 6 of the transverse bulkhead 3, which makes the length difference of pontoons 1 and 2 half the initial figure.

[0019] While stepwisely tightening the pontoons 1 and 2, the fixing catchers 9 uniformly arranged along the edge of field joint 6 on deck 7 automatically provide the exact convergence of the edges of field joint 6 on the deck 7 in the same way. The thickened beam 5 enables the convergence of the remainder of the edges of the joinable outline and compensation of the difference of length and height dimensions of pontoons 1 and 2.

Industrial Applicability

[0020] Providing significant decrease in man-hours, said method and device enable to effectively mate the hulls of more than 100m in length, comprising separate pontoons built at the various shipyards and transported through the locks of inland waterways.

Claims

1. A method for assembling a waterborne hull with the use of centering and tightening devices, comprising the steps of:

- building and launching the individual hull parts embodied in the form of water displacement pontoons (1, 2) having transverse bulkheads (3),
- towing afterwards said pontoons (1, 2) to an assembly site, and
- joining and welding the pontoons thereof, **characterized in that,**
- prior to launching each of the pontoons (1, 2) the edges of joinable framing elements of the pontoons (1, 2) are within the same vertical plane, with the centering and tightening devices mounted on one of the pontoons (1, 2) such as to provide the convergence of all the edges of the joinable outline (6),
- providing a compensator (5) embodied in the form of a thickened beam having thickness in excess of the main plates of the hull mounted along the entire joinable outline (6), except for the deck (7) area,
- after launching and towing the pontoons (1, 2) to an assembly site, said pontoons (1, 2) are stepwisely tightened and centered with tightening and centering devices, in such a way that the accurate convergence of the edges of the joinable elements in the area of pontoon (1, 2) midship transversal bulkhead (3) is achieved at first, with the accurate convergence of the hull deck (7) ensured afterwards,
- said compensator (5) creating the convergence of the remainder of joinable outline edges

in the process of subsequent tightening,
- whereupon the hull joined and welded.

2. A hull assembly device for carrying out the method of claim 1 for assembling a waterborne hull from water displacement pontoons (1, 2), **characterized in that** said hull assembly device comprises:

- i) a compensator (5) usable for compensating the difference of length and height dimensions of said pontoons (1, 2) and embodied in the form of a thickened beam (5) having thickness in excess of the main joinable plates within the hull field joinable outline (6), with said compensator (5) mountable on a first pontoon (1, 2) along the field joinable outline (6) except for the deck area (7),
- ii) wooden cushions (10) attachable to the body of a second pontoon (1, 2),
- iii) centering devices embodied in the form of

- guiding catchers (8) mountable on the deck level (7) in the forward and aft ends of the first pontoon (1, 2) thereof, and

- fixing catchers (9) mountable on deck (7) of said first pontoon (1, 2) along the field joinable edge (6) and on the transversal bulkhead (3) arranged in the pontoon (1, 2) midship area for accurate convergence of the edges of the joinable elements in the area, and

wherein the guiding catchers (8) are mountable on the first pontoon (1, 2) for making possible their interaction with the wooden cushions (10) on the body of the second pontoon (1, 2) accordingly.

3. Combination of a ship hull built according to the method of claim 1 from water displacement pontoons (1, 2) welded on a compensator (5) formed by a thickened beam (5) having a thickness in excess of the main joined plates within the hull field joinable outline (6) and an assembly according to claim 2 mounted on said pontoons (1, 2).

Patentansprüche

1. Verfahren zur Montage eines Schiffskörpers unter Verwendung von Zentrier- und Spannvorrichtungen, umfassend die Schritte:

- Bauen und zu Wasser lassen der individuellen Schiffskörperteile, die in Form von wasserverdrängenden Pontons (1, 2) mit Querschotten (3) ausgeführt sind,
- anschließendes Schleppen der Pontons (1, 2) zum Montageort, und

- Verbinden und Schweißen der Pontons, **dadurch gekennzeichnet, dass,**

- vor dem zu Wasser lassen bei jedem der Pontons (1, 2) die Kanten der verbindbaren Rahmenelemente der Pontons (1, 2) in derselben vertikalen Ebene liegen, mit den Zentrier- und Spannvorrichtungen an einem der Pontons (1, 2) befestigt, so dass die Konvergenz von allen Kanten der teilnehmenden Kontur (6) bereitgestellt wird,

- Bereitstellung eines Kompensators (5) in Form eines verdickten Trägers mit einer Dicke, die über der der Hauptplatten des Schiffskörpers liegt und entlang der gesamten Verbindungskontur (6) mit Ausnahme des Deckbereichs (7) angebracht ist,

- nach dem zu Wasser lassen und Schleppen der Pontons (1, 2) zum Montageort werden die Pontons (1, 2) mit den Spann- und Zentriervorrichtungen schrittweise zusammengezogen und zentriert in einer Art und Weise, dass zunächst die genaue Konvergenz der Kanten der Verbindungselemente im Bereich der Pontons (1, 2) mittschiffs transversal des Schotts (3) erreicht wird, mit nachfolgend gesicherter genauer Konvergenz des Deckbereichs (7),

- der Kompensator (5) schafft die Konvergenz der übrigen Konturkanten im Prozess des anschließenden Festziehens,

- woraufhin der Schiffskörper verbunden und geschweißt wird.

2. Schiffskörpermontagevorrichtung zum Durchführen des Verfahrens nach Anspruch 1 zur Montage eines Schiffskörpers aus wasserverdrängenden Pontons (1, 2), **dadurch gekennzeichnet, dass** die Schiffskörpermontagevorrichtung umfasst:

- i) einen Kompensator (5), der verwendet werden kann, um die unterschiedlichen Längen- und Höhendimensionen der Pontons (1, 2) auszugleichen und in Form eines verdickten Trägers ausgeführt ist (5), mit einer Dicke, die über der der Hauptverbindungsplatten innerhalb der Verbindungskontur (6) des Schiffskörperbereichs liegt, mit einem Kompensator (5), der an einem ersten Ponton (1, 2) entlang des Bereichs der Verbindungskontur (6) mit Ausnahme des Deckbereichs (7) befestigt werden kann,
- ii) Holzdämpfer (10), die an dem Körper des zweiten Pontons (1, 2) befestigt werden können,
- iii) Zentriervorrichtungen, ausgeführt in Form von

- Führungsvorrichtungen (8), die auf dem Deckniveau (7) an Vorder- und Hinterenden des ersten Pontons (1, 2) befestigt werden können, und

- Fixiervorrichtungen (9), die an Deck (7) des ersten Pontons (1, 2) entlang des Bereichs der Verbindungskante (6) und des Querschotts (3) am Ponton (1, 2) im Mittschiffbereich zur genauen Konvergenz der Verbindungselemente in dem Bereich angeordnet sind, und
wobei die Führungsvorrichtungen (8) am ersten Ponton (1, 2) befestigt werden können um ihre Interaktion mit den Holzdämpfern (10) am Körper des zweiten Pontons (1, 2) entsprechend zu ermöglichen.
3. Kombination eines Schiffskörpers, der nach dem Verfahren nach Anspruch 1 aus wasserverdrängenden Pontons (1, 2) gebaut wurde, an die ein als verdickter Träger geformter Kompensator geschweißt wurde mit einer Dicke, die über der der Hauptverbindungsplatten innerhalb der Schiffskörperverbindungskontur (6) liegt, und einer Montagevorrichtung nach Anspruch 2, die an den Pontons (1, 2) befestigt ist.
- Revendications**
1. Procédé pour assembler une coque à flot à l'aide de dispositifs de centrage et de serrage, comprenant les étapes consistant à :
- construire et lancer les parties de coque individuelles mises en oeuvre sous la forme de pontons à refoulement d'eau (1, 2) ayant des cloisons transversales (3),
 - remorquer ensuite lesdits pontons (1, 2) vers un site d'assemblage, et
 - assembler et souder les pontons, **caractérisé en ce que** :
 - avant de lancer chacun des pontons (1, 2), les bords des éléments d'ossature pouvant être assemblés des pontons (1, 2) sont dans le même plan vertical, avec les dispositifs de centrage et de serrage montés sur l'un des pontons (1, 2) afin de fournir la convergence de tous les bords du contour pouvant être assemblé (6),
 - prévoir un compensateur (5) mis en oeuvre sous la forme d'une poutre épaissie ayant une épaisseur en excès des plaques principales de la coque, montée le long de tout le contour pouvant être assemblé (6) excepté pour la zone du pont (7),
 - après avoir lancé et remorqué les pontons (1, 2) vers un site d'assemblage, lesdits pontons (1, 2) sont serrés et centrés par palier avec des dispositifs de serrage et de centrage, de sorte que la convergence pré-
- cise des bords des éléments pouvant être assemblés dans la zone de la cloison transversale (3) par le travers du ponton (1, 2) est obtenue dans un premier temps, avec la convergence précise du pont (7) de la coque garantie ensuite,
- ledit compensateur (5) créant la convergence du reste des bords de contour pouvant être assemblés dans le procédé de serrage suivant,
 - suite à quoi la coque est assemblée et soudée.
2. Dispositif d'assemblage de coque pour réaliser le procédé selon la revendication 1, afin d'assembler une coque à flot à partir de pontons à refoulement d'eau (1, 2), **caractérisé en ce que** ledit dispositif d'assemblage de coque comprend :
- i) un compensateur (5) pouvant être utilisé pour compenser la différence des dimensions de longueur et de hauteur desdits pontons (1, 2) et mis en oeuvre sous la forme d'une poutre épaissie (5) ayant une épaisseur en excès des plaques pouvant être assemblées principales dans le contour pouvant être assemblé (6) de chantier de coque, avec ledit compensateur (5) qui peut être monté sur un premier ponton (1, 2) le long du contour pouvant être assemblé (6) de chantier excepté pour la zone de pont (7),
 - ii) des amortisseurs en bois (10) pouvant être fixés au corps d'un second ponton (1, 2),
 - iii) les dispositifs de centrage mis en oeuvre sous la forme de :
 - receveurs de guidage (8) pouvant être montés sur le niveau de pont (7) dans les extrémités avant et arrière de son premier ponton (1, 2), et
 - des receveurs de fixation (9) pouvant être montés sur le pont (7) dudit premier ponton (1, 2) le long du bord pouvant être assemblé de chantier (6) et sur la cloison transversale (3) agencée dans la zone par le travers du ponton (1, 2) pour la convergence précise des bords des éléments pouvant être assemblés dans la zone, et dans lequel les récepteurs de guidage (8) peuvent être montés sur le premier ponton (1, 2) pour permettre leur interaction avec les amortisseurs en bois (10) sur le corps du second ponton (1, 2) de manière correspondante.
3. Combinaison d'une coque de navire construite selon le procédé selon la revendication 1 à partir de pontons à refoulement d'eau (1, 2) soudés sur un compensateur (5) formé pour une poutre épaissie (5)

ayant une épaisseur en excès des plaques assemblées principales à l'intérieur du contour pouvant être assemblé de chantier (6) de coque et un assemblage selon la revendication 2, monté sur lesdits pontons (1, 2).

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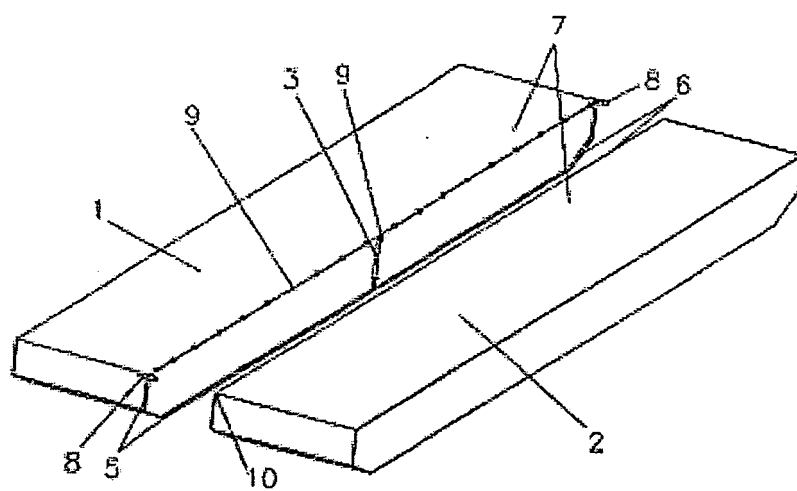


Fig. 1

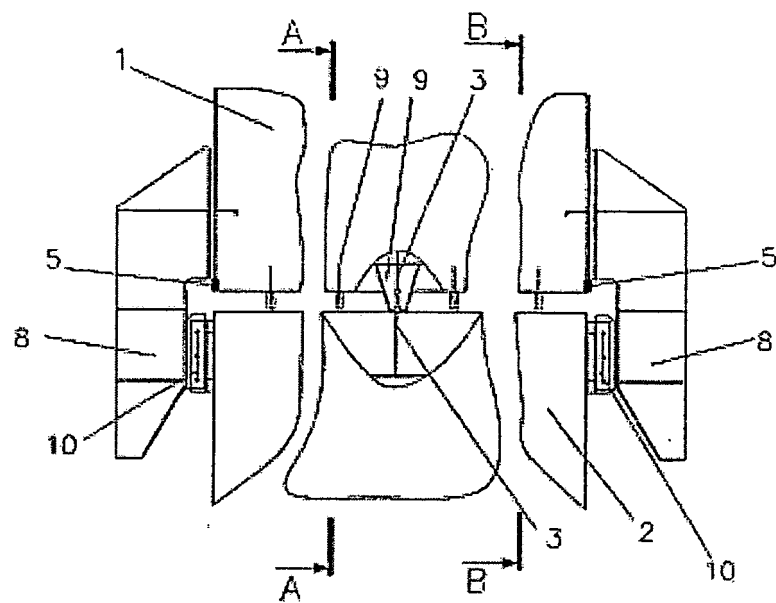


Fig. 2

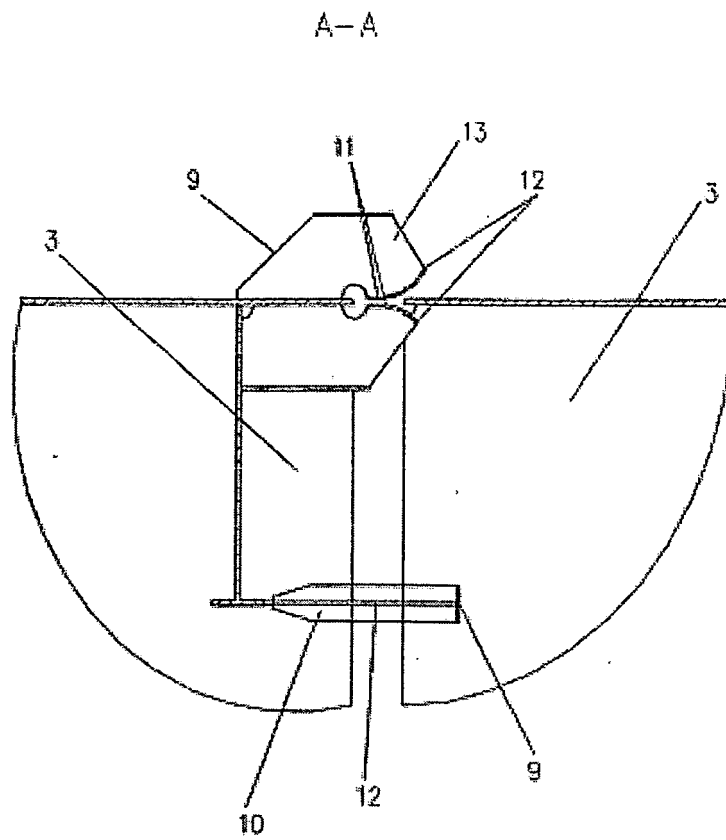


Fig. 3

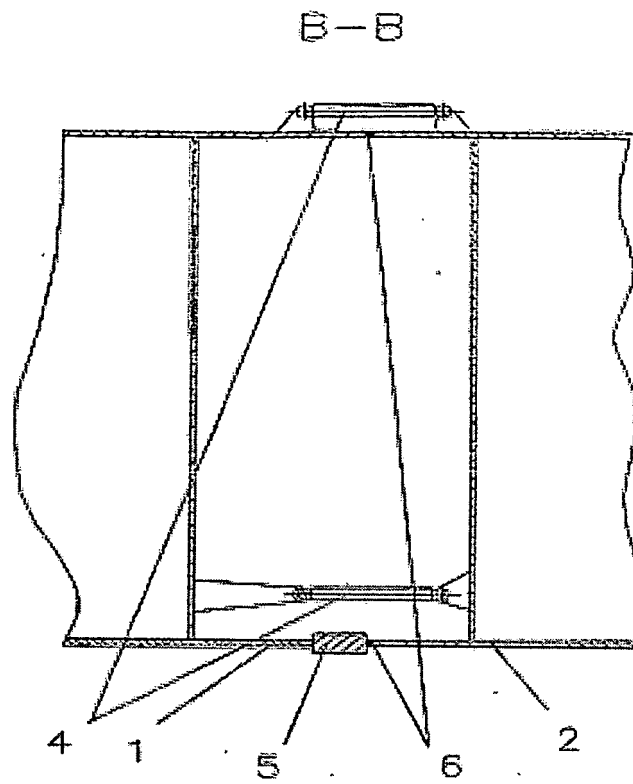


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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