EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent: 01.09.1999 Bulletin 1999/35

(21) Application number: 94200485.4

(22) Date of filing: 24.02.1994

(54) Improved closure system for a heat exchanger distributor

Verschlussystem für einen Verteiler eines Wärmetauschers

Système de fermeture pour une boîte de distribution d’un échangeur de chaleur

(84) Designated Contracting States:

AT BE CH DE DK ES FR GB GR IE LI LU MC NL PT SE

(30) Priority: 03.03.1993 IT MI930404

(43) Date of publication of application: 07.09.1994 Bulletin 1994/36

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Description

[0001] This invention relates to a new closure system for a heat exchanger distributor which, by providing easy access to the distributor interior while maintaining the sealed clamping of the tube plate without the need for independent auxiliary seal members, enables the dimensions of the distributor to be limited with consequent reduction in manufacturing costs, and the down times and hence the relative maintenance costs to be minimized.

[0002] In the heat exchanger field there are many known devices for sealedly clamping the tube plate against a suitable bearing surface on the end of the heat exchanger shell via a gasket.

[0003] In a widely used known device, said clamping is effected via the cover of the distributor which is provided for this purpose with both the adjustable device necessary to form the pressure seal for the cover, and with the adjustable device necessary for clamping the tube plate by the breech lock method.

[0004] NL-A-B 300 397 in the name of Lummus Nederland N.V., which is the closest prior art document, discloses a distributor for heat exchangers ending with a distributor cover that comprises a central door which must be opened together with the entire cover, when the tube plate has to be inspected.

[0005] EP-A-0 093 242 in the name of Belloi SpA discloses a distributor in which the tube plate is assembled by segmented circumferential members in order to improve the clamping of the tube plate.

[0006] It is however always essential to be able to gain access to the interior of the distributor in order to check the functional clamping of the tube plate.

[0007] This requirement has resulted in the use of an additional adjustable device within the distributor to keep the tube plate clamped in the absence of the cover, with a consequent obvious increase in the distributor length and cost. In addition, access to the distributor interior depends on removing the entire cover, which is not particularly easy.

[0008] The present invention seeks to obviate said drawbacks by providing a closure system for a heat exchanger distributor which enables said additional internal adjustable member for clamping the tube place to be eliminated, while still allowing easy access to the distributor interior.

[0009] According to the invention, there is provided a closure system for the distributor of a heat exchanger comprising inter alia a tube plate sealedly pressed via a gasket against a bearing surface on the end of the heat exchanger shell by a cylindrical presser operated by an adjustment device in a distributor cover and removable partition walls separated from said cover, said cover also being provided with an adjustable device for its sealed clamping through an annular gasket against said distributor characterised in that said cover is provided with a central aperture hermetically sealable by means of a door, and said door is connected to the cover by an independent sealing system constituted by a seal gasket and axial pressing, that can be opened to gain access to the distributor interior without altering the seal at the annular gaskets of the tube plate and of the cover, respectively.

[0010] This avoids the need to remove the cover for any inspection or maintenance work within the distributor, so that this keeps the tube plate tightly clamped during said operations.

[0011] According to a preferred embodiment of the present invention, said door for hermetically sealing said central aperture in the cover is screwed into said cover and is provided along its circumferential periphery with a screwed series of position-adjustable axial pressers which press a diaphragm against an internal projection provided on said aperture, via the seal gasket.

[0012] According to a modification of the present invention, said door is pressed against an internal projection on said aperture, via a gasket, by a circumferential series of axial prerssers position-adjustable by screwing, the series being supported by a cylinder retained in position by a sector ring housed in a circumferential recess provided within said aperture.

[0013] The invention is further described hereinafter with reference to the accompanying drawings, which show preferred embodiments thereof by way of non-limiting example only, in that technical or constructional modifications can be made thereto without leaving the scope of the present invention.

[0014] In said drawings:

Figure 1 is a partial view in longitudinal semi-section of a tubular heat exchanger using a distributor closure system according to the invention;

Figure 2 is a considerably enlarged section through a modification of the invention.

[0015] In the figures the reference numeral 1 indicates the cylindrical body of a heat exchanger distributor, comprising a hole 2 for fluid entry, a similar fluid exit hole being provided in the distributor body in a diametrically opposite position. Within said distributor 1 there is housed the tube plate 3 which, provided with heat transfer tubes 10, is sealedly pressed, via the gasket 4, against the bearing surface 5 on the end 6 of the heat exchanger shell 7 by a cylindrical presser 8 comprising a hole 9 in correspondence with said hole 2 and provided with suitable known seals, not shown in the figure. Said cylindrical presser 8 is operated, via a diaphragm 11, by an adjustment device consisting of a series of threaded pins 12 (only one being visible in the figure for reasons of clarity) distributed circumferentially along the closure cover 13 for the distributor 1. Said cover 13, of the breech lock type, is screwed into the distributor 1 to achieve a pressure seal by means of an adjustable clamping device consisting of a second series of threaded pins 14 (only one being visible in the figure for rea-
sons of clarity) which compress said diaphragm 11 and the annular gasket 15 against a projection 16 provided on the interior of the distributor 1. In the distributor 1 the entering fluid is kept separated from the exit fluid by known partition walls 17 and 18 bolted together and hence easily removable.

[0016] Finally, said cover 13 is provided with a central aperture 19 hermetically sealable by the door 20 which is screwed into the cover 13 and supports along its circumferential periphery a screwed series of position-adjustable axial pressters 21 which, via a diaphragm 22, press the annular gasket 23 against an internal projection 24 provided on said cover 13.

[0017] In this manner it is necessary only to unscrew said door 20 to gain access to the distributor interior without altering the seal at the annular gaskets 4 and 15.

[0018] In the modification of Figure 2, said door 20 is pressed against said internal projection 24 on the cover 13, via the annular gasket 23, by means of a circumferential series of axial pressters 21 position-adjustable by screwing into the support cylinder 25, which is held in position by a ring in the form of sectors, respectively 26, 26**, 26***, housed in a circumferential recess 27 provided in the cover 13.

Claims

1. A closure system for the distributor of a heat exchanger comprising inter alia a tube plate (3) seal-edly pressed via a gasket (4) against a bearing surface (5) on the end (6) of the heat exchanger shell by a cylindrical presser (8) operated by an adjustment device (12) in a distributor cover (13) and removable partition walls (17, 18) separated from said cover, said cover (13) also being provided with an adjustable device (14) for its sealed clamping through an annular gasket (15) against said distributor characterised in that said cover (13) is provided with a central aperture (19) hermetically sealable by means of a door (20), and said door (20) is connect-ed to the cover (13) by an independent sealing sys-tem constituted by a seal gasket (23) and axial pressters (21), that can be opened to gain access to the distributor interior without altering the seal at the annular gaskets (4, 15) of the tube plate (3) and of the cover (13), respectively.

2. A closure system for the distributor of a heat exchanger as claimed in claim 1, characterised in that said door (20) for hermetically sealing said central aperture (19) in the cover (13) is screwed into said cover and is provided along its circumferential periphery with a screwed series of position-adjustable axial pressters (21) which press a diaphragm (22) against an internal projection (24) provided on said aperture, via the seal gasket (23).

3. A closure system for the distributor of a heat exchanger as claimed in claim 1, characterised in that said door (20) for hermetically sealing said central aperture (19) in the cover (13) is pressed against an internal projection.

Patentansprüche

1. Verschlußsystem für den Verteiler von einem Wärmetauscher, enthaltend unter anderem eine Rohrplatte (3), die über eine Dichtungsscheibe (4) dich-tend gegen eine Lagerfläche (5) auf dem Ende (6) von dem Wärmetauschermantel durch eine zylindri-sche Prüfvorrichtung (8) gepreßt ist, die durch eine Stellvorrichtung (12) in einer Verteilerabdeckung (13) betätigt ist, und lösbare Trennwände (17, 18), die von der Abdeckung getrennt sind, wobei die Abdeckung (13) auch mit einer einstellbaren Vorrich-tung (14) versehen ist, um sie durch eine ringförmi-ge Dichtungsscheibe (15) abgedichtet gegen den Verteiler zu klemmen, dadurch gekennzeichnet, daß die Abdeckung (13) mit einer Mittelloffnung (19) versehen ist, die durch eine Tür (20) hermetisch abgedichtet ist, und die Tür (20) mit der Abdeckung (13) durch ein unabhängiges Dichtungssystem verbunden ist, das durch eine Dichtungsscheibe (23) und axiale Prüfvorrichtungen (21) gebildet ist und das geöffnet werden kann, um Zugang zu dem Innern des Verteilers zu gewinnen, ohne die Dich-tung an den ringförmigen Dichtungsscheiben (4, 15) von der Rohrplatte (3) bzw. der Abdeckung (13) zu ändern.

2. Verschlußsystem für den Verteiler von einem Wärmetauscher nach Anspruch 1, dadurch gekennzeichnet, daß die Tür (20) zum hermetischen Abichten der Mittelloffnung (19) in der Abdeckung (13) in die Abdeckung geschraubt ist und entlang ihres Umfanges mit einer geschraubten Reihe von verstellbaren axialen Prüfvorrichtungen (21) versehen ist, die eine Trennplatte (22) über die Dichtungsscheibe (23) gegen einen inneren Vorsprung (24) presen, der auf der Öffnung vorgesehen ist.

3. Verschlußsystem für den Verteiler von einem Wärmetauscher nach Anspruch 1, dadurch gekennzeichnet, daß die Tür (20) zum hermetischen Abichten der Mittelloffnung (19) in der Abdeckung (13) gegen einen inneren Vorsprung gepreßt ist.

Revendications

1. Système de fermeture pour la boîte de distribution d'un échangeur de chaleur, comprenant entre autres une plaque tubulaire (3) appuyée d'une ma-nière étanchée par l'intermédiaire d'un joint (4) con-
tre une surface d'appui (5) à l'extrémité (6) de l'enveloppe de l'échangeur de chaleur par un dispositif presseur cylindrique (8) actionné par un dispositif de réglage (12) logé dans un couvercle (13) de boîte de distribution, et des cloisons amovibles (17, 18) séparées dudit couvercle. L'édit couvercle (13) étant également pourvu d'un dispositif réglable (14) servant à serrer celui-ci de manière étanche par l'intermédiaire d'un joint annulaire (15) contre ladite boîte de distribution, caractérisé en ce que ledit couvercle (13) est pourvu d'un orifice central (19) pouvant être hermétiquement obturé à l'aide d'une trappe (20), et ladite trappe (20) est reliée au couvercle (13) par un système d'étanchéité indépendant constitué par un joint d'étanchéité (23) et des dispositifs presseurs axiaux (21), qu'on peut ouvrir pour accéder à l'intérieur de la boîte de distribution sans modifier l'étanchéité au niveau des joints annulaires respectifs (4, 15) de la plaque tubulaire (3) et du couvercle (13).

2. Système de fermeture pour la boîte de distribution d'un échangeur de chaleur selon la revendication 1, caractérisé en ce que ladite trappe (20) servant à obturer hermétiquement ledit orifice central (19) du couvercle (13) est vissée dans ledit couvercle et comporte sur son pourtour une série vissée de dispositifs presseurs axiaux (21) à position réglable qui appuient un diaphragme (22) contre une saillie interne (24) réalisée sur ledit orifice, par l'intermédiaire du joint d'étanchéité (23).

3. Système de fermeture pour la boîte de distribution d'un échangeur de chaleur selon la revendication 1, caractérisé en ce que ladite trappe (20) pour obturer hermétiquement ledit orifice central (19) du couvercle (13) est appuyée contre une saillie interne.