

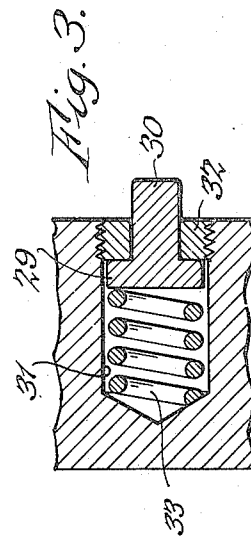
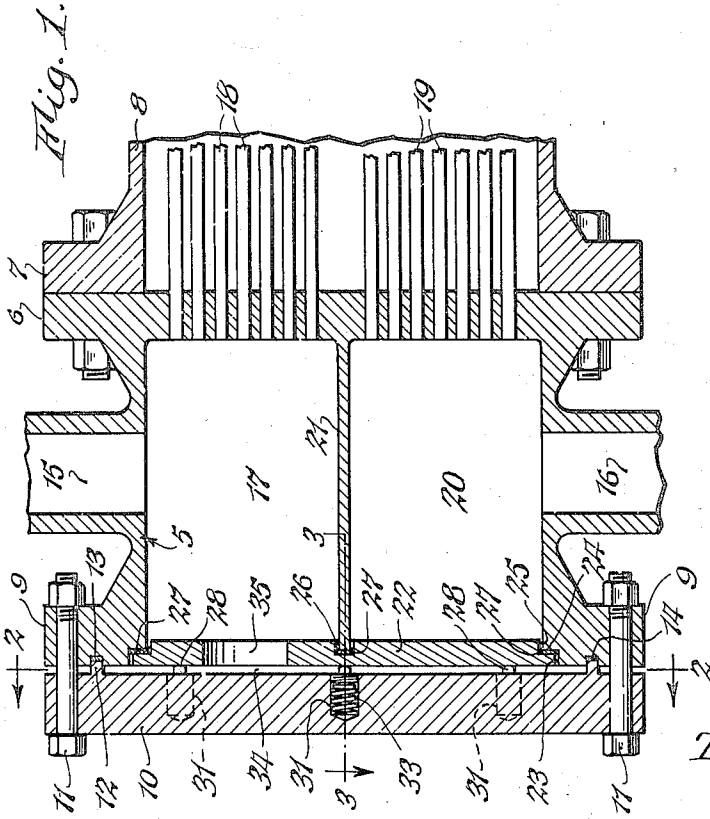
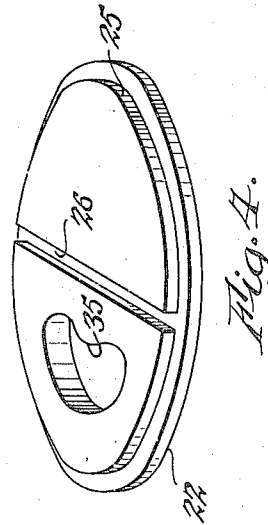
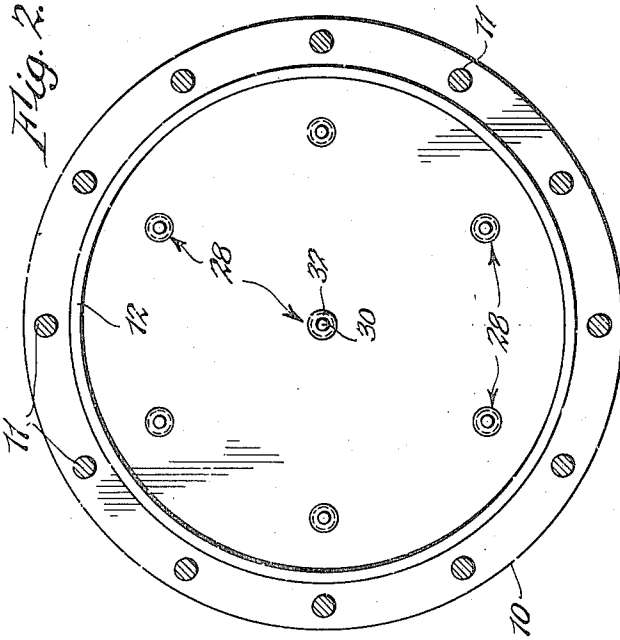
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CLOSURE FOR PRESSURE VESSELS

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CLOSURE FOR PRESSURE VESSELS

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3 Claims. (Cl. 220-3)

This invention relates to improvements in pressure vessels of the kind having a plurality of chambers provided by one or more partitions and a sealing plate which is urged against the partitions by the fluid medium from one of the chambers, the sealing plate being so designed and arranged as to escape the distortive forces to which the cover of the vessel is subjected and hence having the advantage that it prevents such leakage between the chambers as ordinarily accompanies the direct association of the cover with the partitions.

Heretofore it has been the practice to secure the sealing plate upon its seat by bolts. The latter, in most instances, screw into threaded holes formed in the seat and although they may be, and usually are, relatively small in size the necessity for accommodating them and for providing clearances for their heads and the wrenches employed in the assembling and dismantling operations exacts the use of substantially larger parts than would otherwise be required, thereby adding to the size of the vessel and increasing its cost.

The principal object of the present invention is to overcome the above objections, this object contemplating a novel design and arrangement of the parts of the vessel whereby to attain a simple, compact and economical construction and to facilitate assembling and dismantling operations.

The invention is illustrated in the accompanying drawing in which:

Figure 1 is a sectional view through a heat exchanger embodying the features of the invention.

Figure 2 is a section taken along line 2-2 of Figure 1.

Figure 3 is an enlarged fragmentary section taken along line 3-3 of Figure 1.

Figure 4 is a perspective view of the sealing plate.

The invention is illustrated, by way of example, in connection with a heat exchanger. The latter includes a header 5 formed at one end with a flange 6 for connection to a flange 7 of a shell 8 and at its opposite end with a flange 9 to which a cover 10 is secured by bolts 11, the cover being formed with a flange 12 which fits in a sealing groove 13 formed in the flange 9 and seats upon a gasket 14. Inlet and outlet connections 15 and 16, respectively, are formed in the header. The fluid medium introduced into the exchanger through the connection 15 enters a chamber 17, is conducted through the shell 8 by banks of tubes 18 and 19, returns to the

chamber 20 and is discharged through the connection 16, the chambers 17 and 20 being separated by a pass partition 21.

A sealing plate 22 is associated with the partition 21. The said plate is in the shape of a disc and fits in the opening defined by the annular wall 23 of the header, the said opening being counterbored to provide a narrow seat 24 for the marginal edge of the plate. The upper face of the latter is preferably substantially flush with the outer face of the flange 9 while the inner marginal edge is rabbeted as indicated at 25. A diametrically extending channel 26 is formed in the under side of the plate 22 to accommodate the upper edge of the partition 21. Preferably gaskets 27 are arranged upon the seats thus provided, whereby to increase the effectiveness of the joints in preventing leakage between the chambers 17 and 20.

In accordance with the invention means is provided whereby a moderate seating pressure is applied to the plate 22 at all times. To this end the cover 10 carries a plurality of spring loaded elements 28. The latter engage the outer face of the plate and may be employed in any desired number and arrangement. As illustrated, one of them is centrally located and engages the sealing plate directly over the partition 21 midway between its ends while the remaining elements are arranged in a circular series and engage marginal portions of the plate at regularly spaced intervals. As best shown in Figure 3, each element is formed with a head 29 and a stem 30 and is arranged in a bore 31 having a threaded ring 32 screwed into its outer end. The stem of the element passes through the ring 32 and is held in an extended position by a spring 33 which is compressed in the bore 31 between the inner end of the latter and the head of the element, the desired degree of compression of the spring being effected by properly adjusting the said ring. When the cover 10 is secured in place the engagement of the stems 30 of the elements 28 forces the latter further into the bores 31, as illustrated in Figure 1, thereby further compressing the springs 33, this slight additional movement of the elements being primarily to insure movement of all of their heads away from the rings 32 so that the action of the springs will be transmitted in the desired manner to the sealing plate.

When the sealing plate 22 is seated in the manner described its outer face is spaced from the inner face of the cover 10 to delimit a narrow chamber 34 which communicates with the cham-

ber 17 through an opening 35 formed in the sealing plate, the side wall of the chamber 34 being provided by the flange 12. In the use of the exchanger the pressure in the chamber 17 will be higher than that in the chamber 20 owing to the resistance to flow offered by the banks of tubes 18 and 19. Hence as the pressure in the chamber 34 corresponds to that in the chamber 17 the pressure acting against the outer face of the sealing plate will be greater than that acting against the inner face. The plate, therefore, is held firmly seated. Leakage between the chambers 17 and 20 is thus prevented regardless of the hydrostatic thrust of the fluid medium against the cover 10 or the bowing action to which the latter is subjected by the bolts 11. In this connection it is to be understood that the primary purpose of the spring loaded elements 28 is to maintain the sealing plate permanently under a pressure which will be adequate to hold the latter lightly seated, whereby when it responds to pressure of the fluid medium introduced into the chamber 17 proper coaction between it and its seat is insured. The construction described renders the use of bolts unnecessary for this purpose and hence avoids the necessity of forming a seat wide enough to accommodate such bolts and provide clearances for their heads and wrenches for tightening and loosening them. Thus a substantial reduction in the sizes of the parts is effected, thereby insuring a compact and economical construction. As the cover 10 serves to hold the sealing plate in the desired relation with respect to its seat, it is necessary only to remove the bolts 11 to enable detachment of both. Facility in assembling and dismantling of the parts of the vessel is, therefore, a further advantage that is obtained.

I claim as my invention:

1. A pressure vessel having a head formed with a chamber and an opening which communicates with said chamber, said head having an outer seat and an inner seat, a cover, means for securing said cover against said outer seat to seal said opening, a partition for separating said chamber into high and low pressure compartments, a sealing plate for preventing leakage between said compartments, said sealing plate being separated from said cover to provide a space and being formed with an opening for connecting said space with said high pressure compartment, resilient means for urging said sealing plate against said inner seat and partition, means for initially compressing said resilient means and means whereby

when said cover is secured in place said resilient means is further compressed.

2. A pressure vessel having a head formed with a chamber and an opening which communicates with said chamber, said head having an outer seat and an inner seat, a cover, a series of bolts for removably securing said cover against said outer seat to seal said opening, said cover being formed with a bore which is located within the area delimited by said bolts, a partition for separating said chamber into high and low pressure compartments, a sealing plate for preventing leakage between said compartments, said sealing plate being separated from said cover to provide a space and being formed with an opening for connecting said space with said high pressure compartment, an element which is located partially within and partially without said bore and which engages said sealing plate, said element being movable along an axis substantially parallel with the axes of said bolts and resilient means in said bore for holding said element extended in the position described, whereby it resiliently urges said plate against said inner seat and partition.

3. A pressure vessel having a head formed with a chamber and an opening which communicates with said chamber, said head having an outer seat and an inner seat, a cover, a series of bolts for removably securing said cover against said outer seat to seal said opening, said cover being formed with a bore which is located within the area delimited by said bolts, a partition for separating said chamber into high and low pressure compartments, a sealing plate for preventing leakage between said compartments, said sealing plate being separated from said cover to provide a space and being formed with an opening for connecting said space with said high pressure compartment, an element which is located partially within and partially without said bore, said element having a range of movement along an axis parallel with the axes of said bolts, an adjustable stop and a spring which is under compression in said bore and which normally holds said element against said stop, said spring being adapted to be further compressed as said element is engaged by said plate and is moved further into said bore when said cover is applied, whereby said element is held away from said stop and said plate is resiliently urged against said inner seat and partition.

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