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DRUM WITH REMOVABLE HEAD FOR VAPORS UNDER PRESSURE

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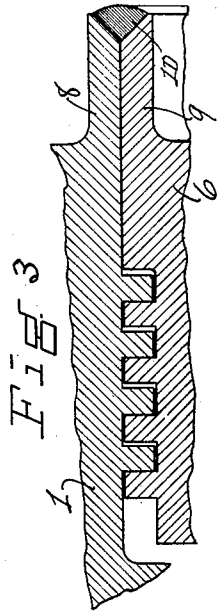


Fig. 3

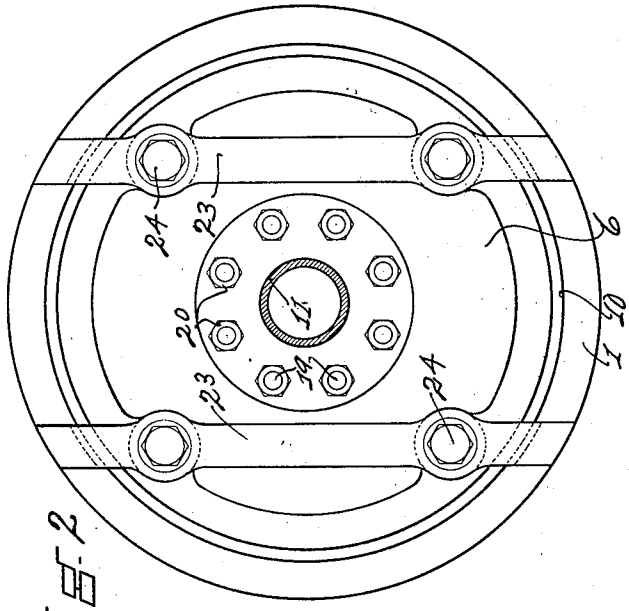


Fig. 2

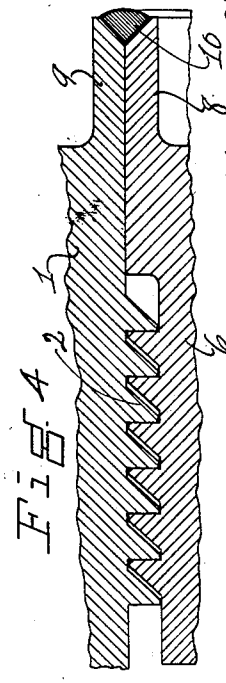


Fig. 4

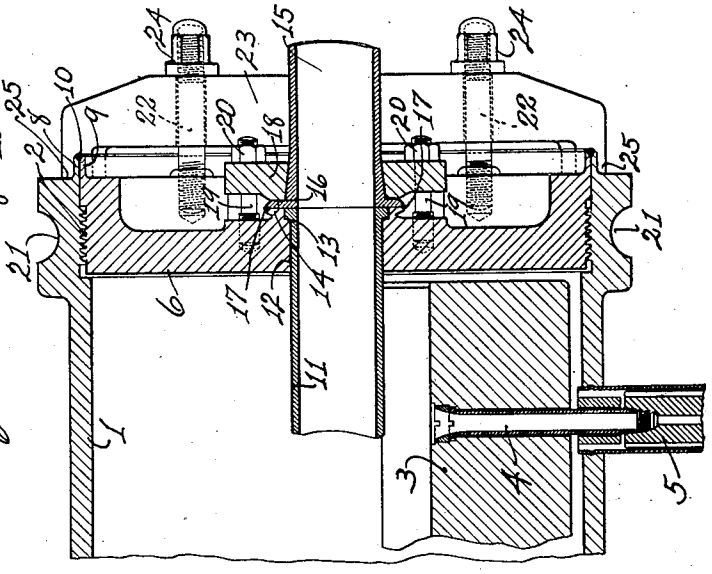


Fig. 1

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DRUM WITH REMOVABLE HEAD FOR VAPORS UNDER PRESSURE

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10 Claims. (Cl. 220—3)

This invention relates to a device for containing hot vapors under pressure, and comprises a metallic cylindrical drum with a removable head that permits expansion between the head and metal drum and is also made permanently tight. The invention is especially useful as a drum for mercury boilers, but is not restricted to this particular use. The invention will be understood from the description in connection with the accompanying drawing in which Fig. 1 is a longitudinal section through the end of the drum; Fig. 2 is an end view of the same; and Figs. 3 and 4 are sectional views on an enlarged scale showing some of the details.

In the drawing, reference character 1 indicates a cylindrical drum that is internally threaded near the end as shown at 2. A displacer block 3 is placed in the drum and is spaced slightly from the inside wall of the drum. This block decreases the amount of mercury that is required when it is used as a drum for a mercury boiler. Nipples or ferrules 4 extend through the filler block 3 for feeding mercury through the tube displacers into the bottom closed ends of tubes 5 that are connected to the lower side of the drum and are contacted with hot products of combustion (from a furnace) in the well known manner. Insertion of the interior parts of the drum including the displacer, make it desirable to have a removable head.

A head 6 may be screwed into the drum and the thread is loose leaving radial and axial spaces. The thread may be square or triangular, as shown in Figs. 3 and 4, but on the side away from the drum the face of the thread is radial or substantially so. This flat face takes the end thrust of the load due to internal pressure and when in position there is no contact on the opposite face or radially so that expansion due to temperature is free in both directions while the bearing faces are in contact. To hold the bearing faces of the male and female threads into operative thrust carrying contact, studs 22 are provided in the head and they have nuts 24 bearing on strong backs or bars 23 extending across the ends of the drum. The ends of the bars 23 seat on the drum at 25. When the nuts 24 are tightened the head is drawn outward bringing the radial bearing faces of the male and female threads into contact in the direction of internal pressure. Annular lips 8 and 9 on the head 6 and drum 1, respectively, extend longitudinally of the drum and are of sufficient lengths to provide flexibility. The edges of the lips 8 and 9 are welded together all the ways around as indicated at 10. Unequal radial expansion of drum and head will not break the weld because the flexibility of the lips 8 and 9 prevents overstressing of the weld metal.

A section 11 of a feed tube is inserted through the hole 12 in the head 6 and is provided with a shoulder 13 that rests in a corresponding seat in the head. A flange 14 having an annular lip surrounds the seat for the shoulder 13. A section 15 of a feed pipe is provided at the end with an external annular lip 16 which contacts with the lip 14 and the edges of the two lips are welded together all the way around as shown at 17. A loose flange 18 provided with a conical opening to fit a corresponding surface upon the section 15, surrounds the section 15 and studs 19 in the head 6 extend through holes in the loose flange 18, and nuts 20 on the studs serve to force the collar 18 into position to hold the section 15 firmly in contact with the section 11 and lip 14 while still permitting the flexibility of the lips carrying the weld to protect it.

The portion of the drum 1 surrounding the head 6 may be provided with a groove 21 to receive a supporting strap so it may be hung from above.

We claim:

1. In fluid pressure apparatus, a pressure vessel having internal threads constituting internal thrust carrying devices, a pressure head having external threads engaging the thrust carrying devices, extensions on the vessel and the head, and a weld joining the extensions to complete an external pressure sealing device, the extensions being of such length that differential radial expansions and contractions of the head and the adjoining parts of the vessel will not break the weld.

2. In a fluid heat exchange device, a pressure vessel having an opening therein and formed with a radial projection constituting a thrust carrying member, a pressure head adapted to close the opening and provided with a co-operating thrust member, external pressure seal extensions on the vessel and the head, and a weld joining the extensions to complete a pressure seal.

3. In fluid heat exchange apparatus, a pressure vessel, a head for the vessel, contacting and co-operating projections on the head and the vessel to resist such thrusts as are produced by a fluid under pressure within the vessel, continuous extensions on the head and the vessel located one within the other, and a continuous weld joining said extensions to provide a fluid pressure seal for the device.

4. In fluid pressure apparatus, a pressure vessel having internal threads constituting internal

thrust carrying devices, a pressure head having external threads having thrust portions engaging the thrust carrying devices, adjoining extensions on the vessel and the head located one within the other, a weld joining the extensions to complete an external pressure sealing device, and means maintaining the thrust portions of the threads constantly in contact so that the weld is not subject to high stresses which would otherwise be set up by the force of the fluid pressure within the vessel.

5. In a fluid heat exchange device, a pressure vessel having an opening therein and formed with a radial projection constituting a thrust carrying member, a pressure head closing the opening and provided with a co-operating thrust member, external pressure seal extensions on the vessel and the head arranged one within the other, and a weld joining the extensions to complete a pressure seal, said thrust members contacting to relieve the weld of thrusts which might destroy the pressure seal.

6. In fluid heat exchange apparatus, a pressure vessel, a head for the pressure vessel, two sets of co-operating projections carried by the head and the vessel, a continuous weld joining the projections of one of said sets to afford a fluid pressure seal between the head and the vessel, and means acting on the head to maintain parts of the projections of the other set in thrust resisting contact.

7. In combination, a pressure vessel, a head for the vessel, contacting and cooperating formations on the head and the vessel to resist thrusts directed outwardly of the vessel, continuous extensions of the head and the vessel located one within the other, and a continuous weld joining said extensions to provide a fluid pressure seal for the device.

8. In fluid pressure apparatus, a pressure vessel having an internal thrust carrying device, a pressure head having an external projection engaging the thrust carrying devices, means engaging parts of the head and vessel to complete the pressure sealing device, and means acting against the vessel to press said projection against the thrust carrying device and to maintain such contact, said thrust carrying device and the projection overlapping each other and being relatively movable under the influence of contraction or expansion without effect on the pressure seal and without interruption of the thrust absorption by the projection.

9. A pressure drum, a head for said drum, said drum and head having interengaging screw-threads with radial surfaces and said threads constituting internal thrust carrying devices, and protruberant flexible lips on said drum and head extending exteriorly and longitudinally of the drum, said lips contacting throughout their length and welded together at their extremities to form an external sealing device between the head and adjoining portions of the drum.

10. In a fluid heat exchange device, a pressure drum having an opening therein, a pressure head for closing said opening, a multiplicity of interengaging surfaces provided on said drum and head and constituting internal thrust carrying devices, and annular, protuberant contacting lips on said drum and head extending longitudinally from the drum and welded together at their extremities to form an exterior sealing device between the head and the adjoining portions of the drum, said multiplicity of interengaging surfaces arranged to permit both longitudinal and radial expansion without disturbing the effectiveness of the seal.

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