Sept. 23, 1924. 1,509,485

J. PRIMROSE

HANDHOLE

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Fig. 1.

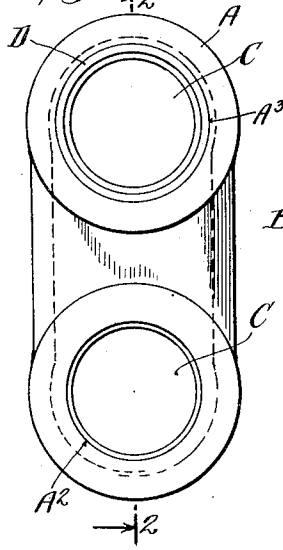


Fig. 2.

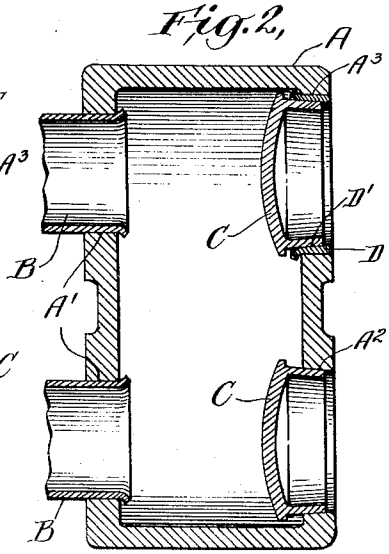
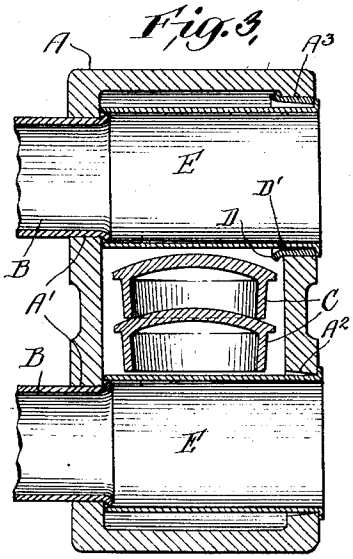


Fig. 3.



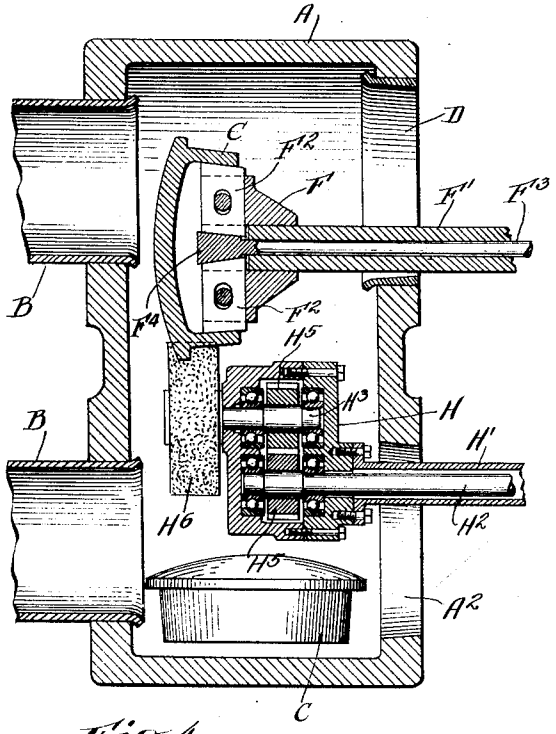


Fig. 4.

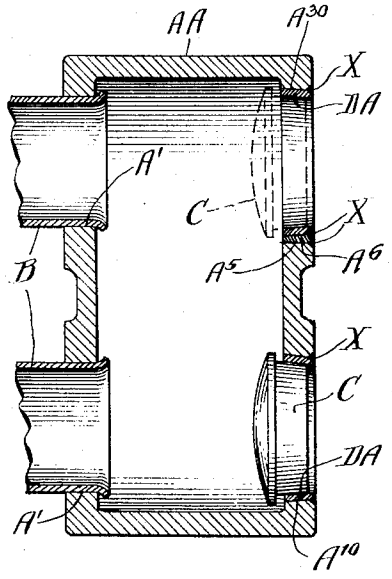


Fig. 5.

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Fig. 7.

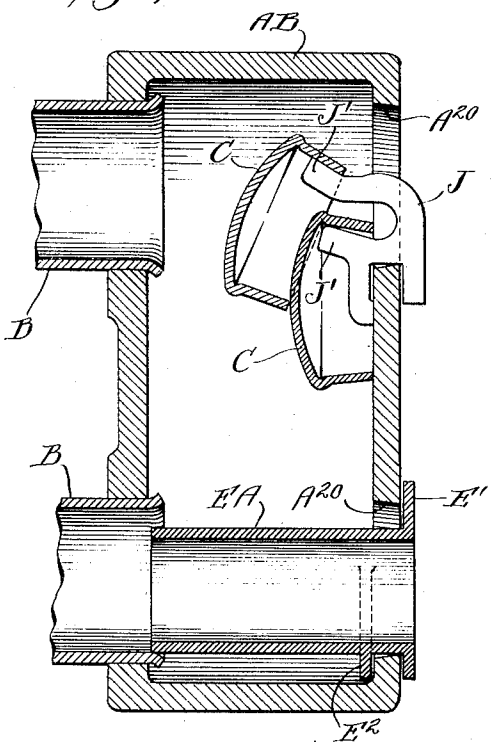


Fig. 6.

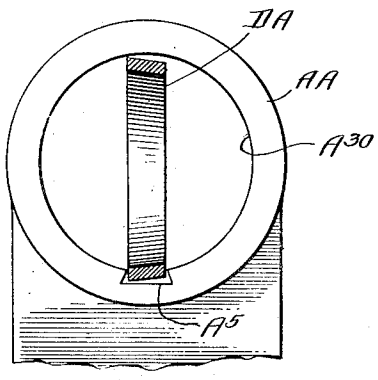


Fig. 10.

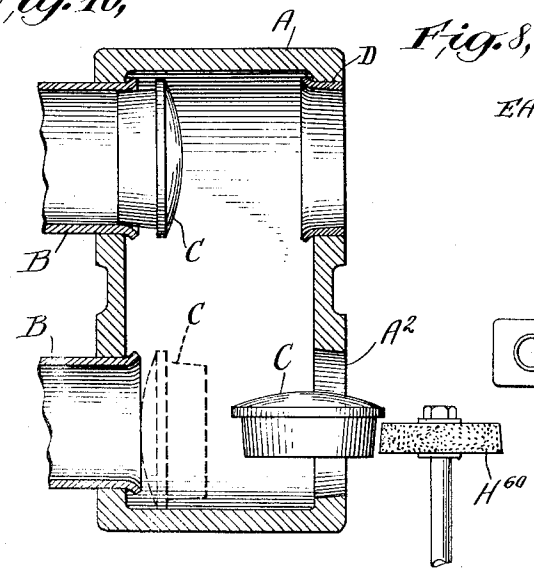


Fig. 8.

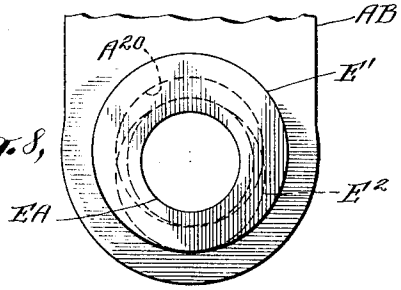
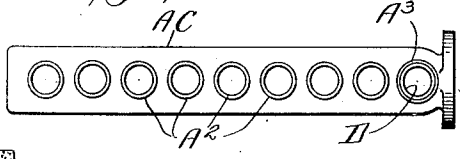


Fig. 9.



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Patented Sept. 23, 1924. 1,509,485

UNITED STATES PATENT OFFICE.

JOHN PRIMROSE, OF NEW YORK, N. Y., ASSIGNOR TO POWER SPECIALTY COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

HANDHOLE.

Application filed January 10, 1923. Serial No. 611,815.

To all whom it may concern:

Be it known that I, JOHN PRIMROSE, a citizen of the United States, and resident of borough of Richmond, in the county of Richmond and State of New York, have invented certain new and useful Improvements Pertaining to Handholes, of which the following is a specification.

The invention relates primarily to fluid handling apparatus comprising a header or other hollow element formed with hand hole openings; and in some of its aspects, though not in all, the invention pertains to apparatus in which a plurality of tubes are connected into the header or other hollow element, with a hand hole opening for each tube opening, the corresponding tube and hand hole openings being at opposite sides of the cavity or chamber in the hollow element, and in register with one another. The invention was primarily devised, and is especially adapted for use in apparatus such as boilers, oil heaters, superheaters and the like holding hot fluids under considerable pressure.

One general object of the invention is to facilitate the use of internal hand hole closing devices which are too large to pass through the hand hole openings normally closed by the devices and which are moved away from their seats into the interior of the hollow element to which they pertain when access to said interior through the hand hole openings is desired. Further objects of the invention are to facilitate the occasional cleaning of the hand hole closing devices and the occasional cleaning of the corresponding tubes when this becomes necessary or desirable.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, and of its advantages, and specific objects attained with its use, reference should be had to the accompanying drawings and descriptive matter in which I have illustrated and described preferred embodiments of my invention.

Of the drawings:

Fig. 1 is an elevation of a tube connecting header;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a view taken similarly to Fig. 2 illustrating tube cleaning provisions;

Fig. 4 is a view taken similarly to Fig. 2 illustrating cleaning provisions for the hand hole closing devices;

Fig. 5 is a view taken similarly to Fig. 2 illustrating a modified header construction;

Fig. 6 is an elevation of a portion of the construction shown in Fig. 5;

Fig. 7 is a sectional elevation illustrating another modification;

Fig. 8 is an elevation of a portion of the apparatus shown in Fig. 7;

Fig. 9 is an elevation of a manifold in which my invention is employed; and

Fig. 10 is a sectional elevation illustrating another mode of cleaning the hand hole closing devices.

In the drawings, and referring first to the construction shown in Figs. 1 and 2, A represents a return header for connecting two parallel tubes B, B. As shown the header A is in the form of a box-like casting having in its rear wall two tube openings A′ in which the tubes B may be secured in any usual or suitable manner. Advantageously as shown each tube B is secured in the corresponding opening by expanding it in its seat, with the inner end of the tube projecting into the header a short distance and expanded to form a bell end portion B′ as shown.

In the front wall of the header A there is a hand hole opening A^2, and an opening A^3 which I call a master opening. The opening A^2 which is in register with one of the two openings A′ is circular in form, and is normally closed by a corresponding closing device C also circular in outline and too large in diameter to pass through the opening. Advantageously the closing device C is in the form of a conical plug which seats in the opening A^2, made conical for that purpose, with the smaller ends of the plug and opening outermost, but the closing devices employed may be provided with seat engaging portions adapted to engage annular seats surrounding the hand hole openings at their inner margins.

The master opening A^3 is circular in form and in register with the second tube opening A′, and is of a diameter large enough to permit the passage into the header of the closing devices C. After the insertion of the devices C, a bushing mem-

ber D is firmly secured in the opening A^3. This bushing member is so shaped that it may be closed by one of the inserted closing devices C. Preferably as shown, the two closing devices C in the header A are identical in form and dimensions, and the inner curved wall D′ of the bushing member D forms a closing device seat similar to that formed by the conical wall of the opening A′. The bushing D may be secured in the opening A^3 in any suitable manner. In the preferred construction shown in Fig. 2, the bushing D is initially of a size to permit its insertion in the opening A^3 from the outside, and is then expanded into place, the inner end of the bushing being belled, as shown. With both hand hole openings open, one of the openings may be sealed by hammering one of the plug closing devices C into place with a lead mallet or the like inserted into the header and manipulated through the other hand hole opening. To close the second opening it is then ordinarily necessary to engage the other plug closing device with a suitable implement by which the closing device may be pulled into place against its seat with the proper force. When the closing devices are of the preferred cup shape illustrated, the closing device last put in place may include a gripping device F, as shown in Fig. 4, and provisions for supplying the proper force to the outer of the supporting sleeves of that device.

The header A is advantageously formed with sufficient internal space to permit the two closing devices C to be stacked between sleeves E inserted through the opening A^2 and through the bushing D, as shown in Fig. 3, when it becomes necessary or desirable to clean the tubes B. In the preferred construction illustrated in Figs. 1, 2 and 3, the parts are so proportioned that when the sleeves E are inserted, they fit snugly in the opening A^2 and in the sleeve D with their inner ends making a snug telescopic fit about the bell end portions B′ of the tubes B. The sleeves E protect the seats for the closing devices C during the cleaning operation, and provide conduits through which scale, coke, water, etc. may be passed out of the tubes in the cleaning operation without fouling or accumulating in the headers.

To clean the seat engaging portions of the devices C, one of the devices may be placed in the bottom of the header as shown in Fig. 4, while the other is held by the hand of an operator or by a suitable tool inserted through one of the hand hole openings, and is cleaned by a suitable tool or an operator's hand inserted through the other hand hole opening. By way of example, I have illustrated in Fig. 4, one form of tool F which may be used for holding the particular cup shaped closing device C illustrated, while the device is being cleaned, and have illustrated one form of cleaning device H which may be employed. The holding device F comprises a head which is carried by a sleeve F′ and may be passed into the header A through a hand hole opening. In the head of the device are mounted jaws F^2 which may be moved radially outward by axial movement of a conical head F^4 carried at the inner end of a rod F^3 axially movable in the supporting sleeve F′. I have not thought it necessary to illustrate any means for forcing the rod F^3 axially outward in the sleeve F′ to spread the jaws F^2 apart, and thus grip the closing device C, or to show any stand or other support such as ordinarily would be employed to hold the sleeve F and effect its rotation during the cleaning operation, as those skilled in the art will readily understand how such parts may be arranged and used and their particular form is no part of my present invention. Moreover, while a stand or support for the sleeve F′ would ordinarily be employed, it is practically feasible to manually hold the sleeve F′ during the cleaning operation. The cleaning device H shown in Fig. 4, comprises a supporting sleeve H′ insertable through a hand hole opening, and carrying at its inserted end, a head containing bearings for a driving shaft H^2 axially disposed in the sleeve H′ and for a cleaning tool shaft H^3 which is laterally displaced from the shaft H^2, and is connected to the latter by spur gears H^5. At the inner side of the head the tool shaft H^3 carries a suitable wire brush or other cleaning tool.

The hand hole and cleaning provisions illustrated in Figs. 1 to 4 inclusive, are exceedingly simple and effective, and possess the great practical advantage that they permit the surfaces to be machined and cleaned in, or at the margins of the hand hole openings, and the closing devices themselves to be circular, and that the closing devices employed are held against their seats by the internal pressure to which they are subjected so that in general it is unnecessary to provide joint sealing gaskets, or special provisions for bolting or otherwise clamping the closing devices in place. In apparatus such as the return headers illustrated in Figs. 1 to 4, of relatively small size, the invention possesses the practical advantage that it permits of hand hole openings of relatively large size, thus facilitating the cleaning and tube renewing operations.

It is apparent, of course, that where the hand hole opening is provided with a plurality of hand hole openings A^2 as in the manifold AC shown in Fig. 9, but a single master opening A^3 is required. In such cases closing devices for all of the open-

ings A^2 and A^3 may be inserted through the master hand hole opening.

In the modified construction illustrated in Figs. 5 and 6, the header AA has a master hand hole opening A^{30} shaped to provide a tapered seat for a bushing DA, the inner surface of which forms the seat for the corresponding closing device C. The opening A^{30} is formed with a slot A^5 at one side to permit the insertion of the bushing DA as illustrated in Fig. 6. After the bushing DA is thus inserted in the header, it is turned around and then forced into place in any suitable manner, and the opening A^5 is closed by a suitable plug A^6 which, as well as the bushing DA, may advantageously be welded to the header at the outer side of the casing as indicated. Aside from the features already referred to, the header AA may be exactly similar to the header A first described. As shown, however, the hand hole opening A^{10} is shaped to receive a bushing DA similar to that seated in the master opening D^{30}. The bushing DA for the opening A^{10} is inserted through the opening A^{30} before the slot A^5 is closed, and may be secured in the opening A^{10} before the closing devices C are put in place.

In Figs. 7 and 8 I have illustrated a construction in which the header AB is formed with tube openings A' large enough to permit the insertion into the header of the closing devices C for the hand hole openings A^{20}, prior to securing the tubes in the header. This makes a special master opening in the header AB unnecessary. With this arrangement I employ a sleeve EA in the tube cleaning operation, which comprises a tubular body portion, the inner end of which extends into the tube to be cleaned. At its outer end the sleeve is provided with a flange E' abutting against the outer face of the header when the sleeve is in place as shown in Fig. 7, and I also provide the tubular body with a rib or flange E^2 extending part way around its circumference and adapted to engage the inner wall of the header at the bottom of the corresponding opening A^{20} when the sleeve is in place. The body portion of the sleeve and the rib E^2 are so proportioned as to permit the ready insertion and removal of the sleeve through the openings A'. In the arrangement shown in Fig. 7, the closing devices C are supported, during the operation of cleaning the lower tube or tubes B, by means of a bracket J adapted to seat in the upper opening A', and provided with arms J' on which the closing devices C may be hung as shown in Fig. 7.

In lieu of cleaning the seat engaging surfaces of an internally removable hand hole closing device, by means of a cleaning device inserted through one of the hand hole openings as illustrated in Fig. 4, the closing devices C may have their seat engaging surfaces exposed through the hand hole openings A^2 or A^3, to the action of an external cleaning device, as shown in Fig. 10. In cleaning the closing devices C in the mode illustrated in Fig. 10, each closing device C may be manually held at the time of cleaning, and is rotated as the cleaning operation proceeds to expose different portions of its seat engaging surface to the action of the external rotating wire brush H^{60}, or other cleaning tool or implement. With this arrangement the unseated closing device C not undergoing the cleaning operation, may be temporarily lodged in the end of one of the tubes B as shown in full lines in Fig. 10, or may rest on edge on the bottom wall of the chamber in the element A, as illustrated in dotted lines in Fig. 10.

While in accordance with the provisions of the statutes, I have illustrated and described the best forms of my invention now known to me, it will be apparent to those skilled in the art, that changes in form may be made without departing from the spirit of my invention as set forth in the appended claims, and that some features of my invention may sometimes be used to advantage without a corresponding use of other features.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A hollow element formed with one or more hand hole openings and with a master opening through which closing devices for said openings, too large to pass through the first mentioned openings may be inserted in said element, and means secured to said element at the margin of said master opening to restrict said opening so that it may be closed by one of the inserted devices.

2. A hollow element formed with one or more circular hand hole openings and with a master opening through which closing devices for said openings too large to pass through the first mentioned opening may be inserted in said element, and means secured to said element at the margin of said master opening to restrict said opening to the shape and size of said hand hole openings.

3. A hollow element formed with one or more circular hand hole openings and with a master opening through which closing devices for said openings too large to pass through the first mentioned openings may be inserted, and a bushing secured in said master opening after the insertion of said devices and formed with a passageway therethrough too small to pass said closing devices.

4. A hollow element provided with one or more hand hole openings, each of conical form with its inner end the larger, and also

provided with a master opening, tapered plug closing devices for said openings inserted through said master opening, and a bushing firmly secured in said master opening after the insertion of the closing devices and having a conical passageway therethrough forming a closing device seat similar to those formed by the conical walls of the first mentioned openings.

5. A hollow element formed with tube openings, and with hand hole openings smaller in diameter than said tube openings, and hand hole closing devices for said hand hole openings, which are small enough to pass through said tube openings but are too large to pass through said hand hole openings.

6. The combination with a hollow element formed with tube openings in one wall and registering hand hole openings in an opposing wall and tubes secured in said tube openings, of a tubular element adapted to extend through an open hand hole opening and into telescopic connection with the corresponding tube, to facilitate tube cleaning.

7. The combination with a hollow element formed with tube openings in one wall and registering hand hole openings in an opposing wall and tubes secured in said tube openings, and internally removable hand hole closing devices, of a tubular element adapted to extend through an open hand hole opening and into telescopic connection with the corresponding tube, to facilitate tube cleaning, said element having its interior proportioned to permit the closing device to be supported by said element during the cleaning operation.

8. The method of cleaning a hand hole closing device of a hollow element provided with a plurality of hand hole openings and internal closing devices too large to pass out of said element through the hand hole openings which consists in unseating the closing device to be cleaned and unseating the closing device for an adjacent hand hole opening, and supporting the device through one of said openings while exposing it to the operation of cleaning means through the other opening.

9. The method of cleaning a hand hole closing device of a hollow element provided with a plurality of hand hole openings and internal closing devices too large to pass out of said element through the hand hole openings which consists in unseating the closing device to be cleaned and unseating the closing device for an adjacent hand hole opening, and supporting the device through one of said openings while operating on it with the means inserted through the other opening.

Signed at New York, in the county of New York and State of New York, this 8th day of January, A. D. 1923.

JOHN PRIMROSE.