W. W. HOLLAND AND F. J. GAINER.

HAND HOLE COVER.

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1,339,340. Patented May 4, 1920.

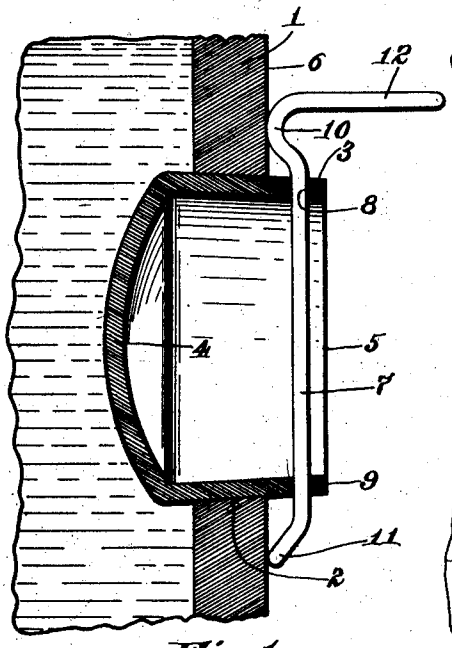


Fig. 1.

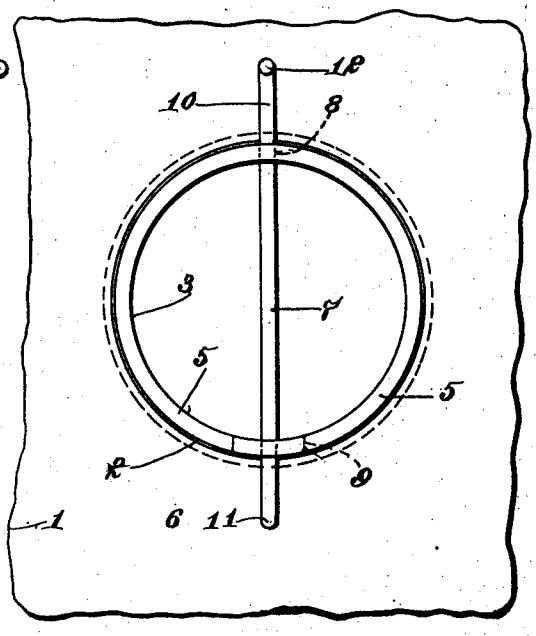


Fig. 2.

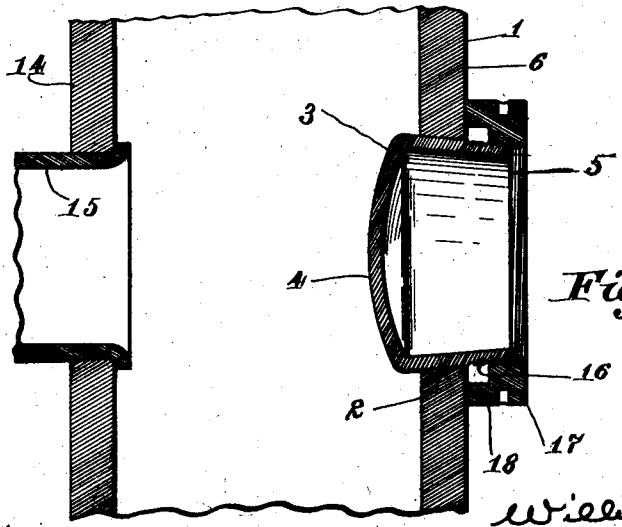


Fig. 3.

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UNITED STATES PATENT OFFICE.

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HAND-HOLE COVER.

1,339,340. Specification of Letters Patent. Patented May 4, 1920.

Application filed December 19, 1919. Serial No. 346,096.

To all whom it may concern:

Be it known that we, WILLIAM W. HOLLAND, a resident of Woodriver, county of Madison, State of Illinois, and FRANK J. GAINER, a resident of Woodriver, county of Madison, State of Illinois, both citizens of the United States of America, have invented certain new and useful Improvements in Hand-Hole Covers, of which the following is a specification.

Various devices have been designed and used for closing the hand holes in the headers of water tube boilers, and high pressure oil stills. These are all subject to certain defects, so that no one of those which is in use has been found, in any considerable measure, fool proof or satisfactory, so that it could be generally adopted as wholly suited to the purpose in question, having particular reference to the application of the device to high pressure tubular oil stills used for cracking oils in the manufacture of gasolene. Screw plugs, which are most generally used, have the obvious defect that the threads may be crossed when the plugs are inserted, or threads otherwise in a weakened condition, may strip, causing the plug to blow out, releasing the contents of the still, and causing disaster of a nature which is quite familiar.

With the ordinary type of hand hole covers, clamped in the usual manner, *i. e.* by means of a crab clamp, fatal results from blowing out of the gaskets, the actual effect being identical with that in the case of the failure of screw plugs or covers are not infrequent.

The present invention relates to a type of hand hole cover in which the closure becomes tighter as the internal pressure increases. This is accomplished by forming a tapered plug, which is preferably hollow, being formed of sheet steel. Such a plug may be inserted from the inside of the header.

To those familiar with the operation of tubular pressure stills, the question arises as to what prevents such a plug from being dislodged, should it receive even a slight blow, as from a falling hammer, wrench, or any of the tools used around such plants. Also there is the danger that such a plug will be blown in in case of explosion inside of the cover doors adjacent to the header or even in the vicinity of the still, as such explosions frequently occur between the cover doors and the header, owing to an accumulation of inflammable gases and air in the proportions to form explosive mixtures. The concussion would dislodge the tapered plugs referred to, and cause the contents of the still to be released, resulting in a fire, which would probably destroy the still and plant. The probability that the plugs may be thus blown or knocked in is increased by the fact that the internal pressure is not always high.

Another element in the situation having the same tendency is the tubes are inclined to the horizontal in pressure still construction, the angle being usually from 20 to 30 degrees, the header, being at right angles to the tubes is also set at an angle with the vertical plane. This means that the plugs, as inserted, are turned upward at a similar angle, giving them a correspondingly increased tendency to fall out when loosened. The only means of preventing this is the friction between the two tapered surfaces, *i. e.* that of the hole and the plug, and the internal pressure. As the still is not always under pressure when it is full of oil, a slight tap on one of these plugs or a mild explosion would, at certain times, result in the destruction of the plant, or at least in a disastrous fire.

In view of the conditions thus described, the applicants have constructed a tapered hand hole plug or cover which is inserted, small end first, from within the header, and therefore becomes more securely seated and tighter, the greater the internal pressure, and to guard against and eliminate the danger from causes which may tend to loosen the plug and thrust it inward, releasing the contents of the still, the applicants have supplied this hand hole cover or plug with fastening means adapted to engage the plug, and the outside surface of the wall of the header, the fastening means being of greater dimension than the hole.

While we have shown such fastening means in the form of a locking pin, particularly adapted to this purpose, and also in the form of a nut engaging the thread on the end of the plug, this fastening means may be in any preferred or convenient form, the object being to provide, in connection with a header wall, having a hand hole opening, a tapered plug or closure of a cross section at its large end greater than

the opening and being adapted to be inserted from within, so that it protrudes through the wall, and means of greater dimension than the opening for fastening it on the inside of the wall, and preventing the small end of the plug from being withdrawn. The plug is preferably hollow so it can be made of sheet steel or the like.

In the accompanying drawing, we have illustrated such a plug or hand hole cover in connection with so much of a header wall as is necessary to a full understanding of the invention.

In the drawings,

Figure 1 is a section through the header wall taken on the vertical diameter of a hand hole, showing a vertical central section of a hand hole plug, closing the hand hole.

Fig. 2 is an elevation, looking at the same from the outside, both views being fragmentary as to the header wall.

Fig. 3 is a section taken through both walls of a header, the two walls being fragmentarily shown, and the sections being on the vertical diameter of a tube, and hand hole both fragmentarily shown, and the hand hole cover being shown in vertical central section.

Referring to the drawings by numerals, the header wall, 1, the inside being to the left as indicated by the shading, has a hand hole in alinement with each tube as shown. The holes are preferably tapered so that the surface presented to the plugs is a conical frustum, the larger section or base being toward the inside of the header, *i. e.* toward the left in Fig. 1, the small end being turned outward. Seated in this hand hole or opening, 2, as shown, is a tapered plug or cover, 3, the surface of which is also a conic section or frustum, the base or larger end, 4, which is larger than the opening, 2, being toward the inside of the header. The small end, 5, as shown protrudes beyond the outer surface, 6, of the wall, 1. This plug is preferably hollow, and formed by pressing from sheet metal.

As the openings are always made large enough to admit the hand, such covers or plugs having been passed inside the header, are conveniently inserted from within. The small end of the plug, which protrudes outward through the opening, extending beyond the outer surface of the header wall, is provided with fastening means, engaging the outer surface of the wall to prevent the plug from being unseated, blown in, or falling by gravity, or from being otherwise displaced from the opening when the still or boiler is in operation, or at any time against the will of the operator. In the present instance, *i. e.* as shown in Figs. 1 and 2, this means consists of a pin, 7, seated in openings, 8, 9, in opposite sides of the wall near the small end. Preferably the opening, 8, is round and the opening, 9, is elongated in the direction of the circumference. The pin, 7, which is passed through these openings, being offset at both ends, indicated by reference characters, 10, at the upper end, and 11 at the lower end, the upper end, 10, being in the form of a goose neck or return bend, providing a lever arm, 12, by which the pin may be rotated, *i. e.*, the pin is to be inserted from the top through the opening, 8, and then through the opening, 9, the offset ends being turned parallel to the wall of the header. The lower opening, 9, being elongated, provides for the passage of the offset end, 11. The opening, 8, need not be elongated as the pin may be inclined to pass the offset at this point. The offsets, 10 and 11, are slightly greater than the distance of the openings, 8, 9, from the wall of the header, so that when the pin is rotated to the position, which it is shown as occupying in Fig. 1, the plug is drawn closer to its seat, and held by a considerable spring tension, the lever arm, being provided for engagement by the hand or wrench in rotating the pin.

In Fig. 3, we have shown, in addition to the outer wall of the header, 1, a tube plate, 14, and the tube, 15. In this instance the plug, 4, which is frustoconical, as described in connection with the form shown in Fig. 1, is threaded at its outer end at 16, and this threaded portion is engaged by a threaded nut or ring, 17, which in turn has a bearing surface, 18, which engages the outer face, 6. of the header wall, drawing the plug into engagement with the opening, and preventing displacement of the plug by accidental shocks or blows, or explosions between the head and the cover doors and the like. This plug, as well as the one shown in Fig. 1, is intended to be inserted from within.

We have thus described, specifically and in detail, a hand hole cover embodying our invention in the preferred, and in a secondary form. This description is specific and in detail in order that the nature of the invention and its application may be so clearly understood as to enable those skilled in the art to practise the invention. However the specific terms herein are used descriptively rather than in the limiting sense, the scope of the invention being defined in the claims.

What we claim and desire to secure by Letters Patent is:

1. In combination a hand hole cover consisting of a tapered plug adapted to be inserted in a hand hole from within, means for holding said plug and preventing its displacement toward the inside of the header consisting of a pin passing through the end of the plug, having both ends offset in the same direction, and means for rotating the pin to bring the offset ends in contact with

the header wall, applying tension to the plug, tending to draw it outward.

2. A hand hole cover consisting of a frustoconical plug adapted to be inserted small end first from within the header so that the small end of the plug protrudes outward beyond the header wall and a spring pin extending through the small end of the plug outside the wall and offset at both ends so that both ends engage the header wall preventing the plug from becoming unseated.

Signed by us at Woodriver, Illinois, this 15th day of December, 1919.

WILLIAM W. HOLLAND.
FRANK J. GAINER.

Witnesses:
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