Nov. 18, 1947. J. L. MAINWARING 2,431,057

BLOWDOWN DEVICE

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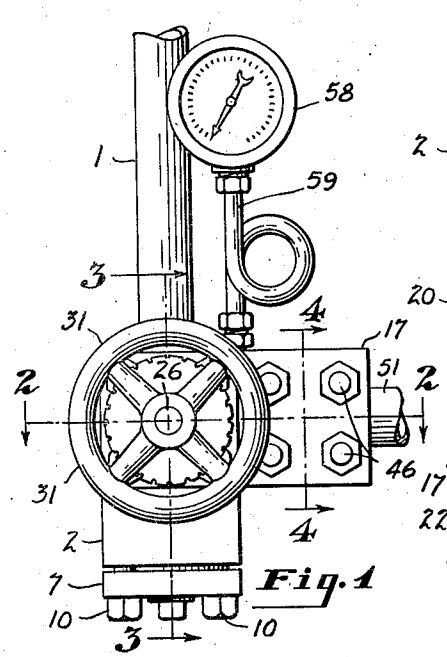


Fig. 1

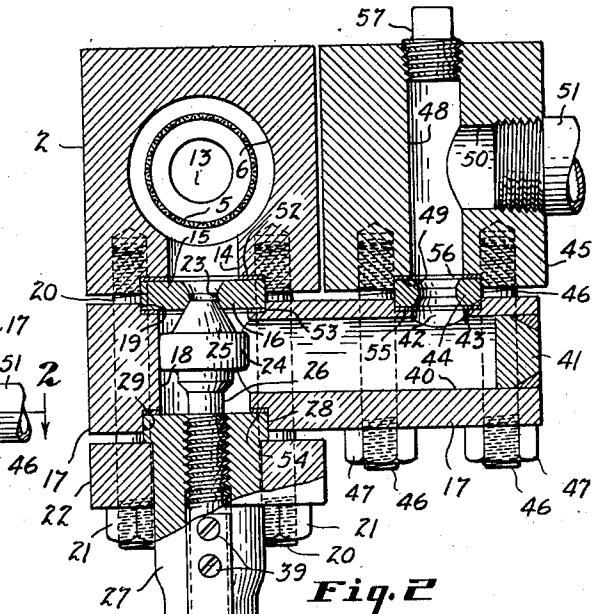


Fig. 2

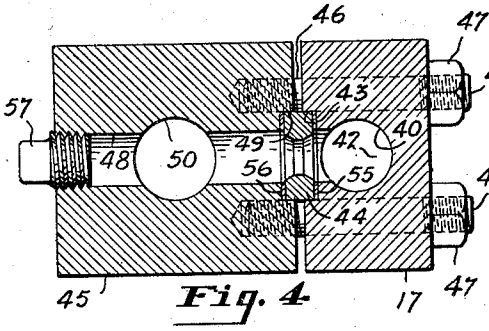


Fig. 4

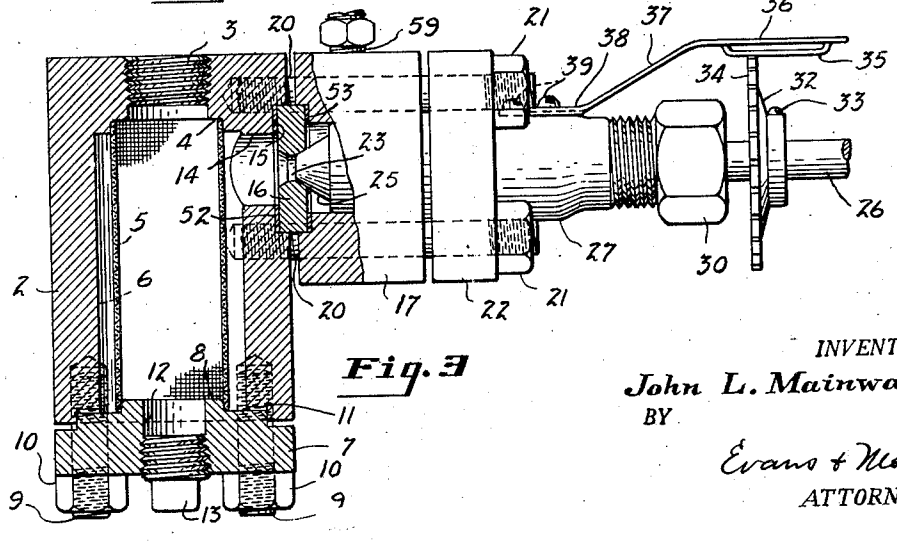


Fig. 3

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BLOWDOWN DEVICE

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5 Claims. (Cl. 137—69)

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The present invention relates to blowdown devices such as are used for continuously and automatically discharging liquid from the lower portions of boilers or other liquid containing pressure chambers where impurities in suspension or in solution in the liquid are concentrated, thereby preventing the accumulation of undesirable amounts of such impurities in the liquid.

Devices of the character referred to have been used to prevent the accumulation of scale forming impurities in steam boilers and usually operate to discharge the liquid under reduced pressure.

The present invention has for an object to provide a simple, compact and inexpensive blowdown unit in which a strainer, a metering valve and an expansion chamber and pressure reducer are assembled in a compact and uniform fitting which occupies a minimum amount of space and in which all parts are conveniently accessible.

A further object is to provide removable and interchangeable orifice plates clamped between sections of the fitting that are bolted together so that they may be quickly and easily replaced, the sections of the fitting being spaced apart by the plates so that incipient leakages are quickly apparent and easily stopped by tightening the bolts.

A further object of the invention is to provide pressure and adjustment indicators in connection with the blowdown unit by means of which the metering valve may be readily set to maintain the desired rate of discharge of liquid.

With the above and other objects in view, the invention may be said to comprise the blowdown unit as illustrated in the accompanying drawings hereinafter described and particularly set forth in appended claims, together with such variations and modifications thereof as will be apparent to one skilled in the art to which the invention pertains.

Reference should be had to the accompanying drawings forming a part of this specification, in which:

Fig. 1 is a front elevation of the blowdown unit of the present invention;

Fig. 2 is a section taken on the line indicated at 2—2 in Fig. 1;

Fig. 3 is a section taken on the line indicated at 3—3 in Fig. 1, and

Fig. 4 is a section taken on the line indicated at 4—4 in Fig. 1.

The blowdown unit of the present invention is adapted to be connected to an inlet pipe 1 which conducts liquid from a boiler or other pressure chamber to the fitting. The pipe 1 is connected

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to an elongated block 2 which has a threaded bore 3 at its upper end to receive the pipe 1. The block 2 has a counterbore 4 extending up to adjacent the upper end of the block to provide a recess to receive the upper end of a perforated strainer cylinder 5. The block 2 also has a second counterbore 6 which forms a cylindrical chamber having its wall spaced radially outwardly from the cylinder 5. The cylinder 5 is held in place by a cap 7 which closes the lower end of the block 2, cap 7 having a central cylindrical projection 8 which fits within the lower end of the cylinder 5. The cap 7 is held in place by means of threaded studs 9 which are attached to the lower end of the block 2 and extend through openings in the cap 7, nuts 10 being threaded on the lower ends of the studs 9 to clamp the cap 7 against stepped sealing washers 11 interposed between cap 7 and block 2. The cap 7 is provided with a central bore 12 which is closed by means of a threaded plug 13 which may be removed for cleaning out the interior of the strainer cylinder.

The block 2 is of rectangular cross section and is provided with a lateral bore 14 extending from the upper end of the strainer chamber to a flat side face of the block, a counterbore being provided to form a recess 15 in the face of the block around the bore 14. A round orifice plate 16 which fits in the recess 15 is clamped between the main block 2 and a valve block 17 and serves as a replaceable valve seat and as a spacer between the blocks 2 and 17. The block 17 has a transverse valve bore 18 that is alined with the bore 14 of the block 2 and is counterbored on the side facing the block 2 to provide a recess 19 that registers with the recess 15 and receives the orifice plate 16. The block 17 is detachably clamped to the block 2 by suitable screw threaded attaching members such as stud bolts 20 fixed to the block 2 and projecting through apertures in the valve block 17, nuts 21 on the outer ends of the stud bolts 20 serving to clamp the valve block 17 and press the same against the main block 2. The stud bolts 20 also extend through a valve bonnet 22 and serve to clamp the same to the outer side of the valve block 17. The orifice plate 16 has a central aperture 23 and a valve 24 mounted for axial movement in the bore 18 has a conical seating portion 25 which is engageable in the aperture 23. The valve 24 is attached to a valve stem 26 which has threaded engagement with a tubular carrier 27 which is held in place by the valve bonnet 22. The bonnet 22 has a central opening to receive the carrier 27

and the carrier 27 has an enlarged head 28 that is clamped between the valve bonnet and the valve block 17, the block 17 being provided with counterbore 29 to receive the head 28.

The stem 26 projects beyond the outer end of the tubular carrier 27 and the carrier is provided with a threaded sealing cap 30 at its outer end. The outer end of the valve stem has a handle 31 attached thereto and inwardly of the handle there is a disk 32 which is attached to the stem by means of set screw 33. The disk 32 has a scalloped periphery 34 that engages with a yieldable detent 35 attached to the under side of a scale plate 36. The scale plate 36 is formed of spring steel, the outer end of the plate being disposed parallel to valve 26, an intermediate portion 37 being disposed at an inclination and an offset portion 38 being attached to the carrier 27 by means of screws 39.

The valve block 17 is an elongated block and is secured to the main block 2 at right angles thereto. The valve block 17 has a longitudinal bore 40 that extends from one end thereof to the transverse bore 18, the outer end of the bore 40 being closed by means of a plug 41 which may be welded in place. Bore 40 forms an elongated expansion chamber in the block 17 and is provided adjacent its outer end with a lateral bore 42 and a counterbore 43 to receive an orifice plate 44 which provides a second spacer for the valve block 17 and a reduced outlet for the expansion chamber. The orifice plate 44 is clamped between the valve block 17 and an outlet block 45. The block 45 is of rectangular cross section and has a flat face flush with the side face of the block 2, to which the valve block 17 is attached. The outlet block 45 carries threaded stud bolts 46 which extend through the valve block 17 on opposite sides of the bore 40 and have nuts 47 on their outer ends by which the blocks 17 and 45 are clamped together and by which clamping pressure is applied to the plate 44. The block 45 has a transverse bore 48 that is alined with the outlet bore 42 of the valve block and has a counterbore 49 to receive the orifice plate 44. Block 45 is provided with a lateral threaded bore 50 extending to the transverse bore 48, and a suitable discharge pipe 51 may be screwed into the bore 50.

The orifice plate 16 and 44 are of a thickness sufficient to space the valve block 17 from the blocks 2 and 45 so that the pressure exerted upon either of the orifice plates may be increased to stop a leak by means of the clamping bolts. Suitable sealing washers 52 and 53 are interposed between the opposite faces of the orifice plate 16 and the recesses in which it is mounted. The enlarged head 28 of the valve carrier 27 is of a thickness to space the bonnet 22 from the valve block 17 and a suitable sealing washer 54 is interposed between the head 28 and the recess in the block 17 in which it is mounted. Washers 55 and 56 are interposed between the opposite faces of the orifice plate 44 and recesses in which it is mounted. Any leakage which may develop around any of the sealing washers 52, 53, 54, 55 or 56 will be readily apparent and can be quickly and easily stopped by tightening nuts 21 or 47 to put additional pressure on the sealing washers. The pressure on the orifice plate 16 can be increased to stop a leak by means of the nuts 21 and additional pressure may be imposed upon the plate 44 by means of the nuts 47. Also the valve is held in place by the nuts 21 and may be removed without disconnecting the blocks.

The outer end of the transverse bore 48 of the outlet block 45 is closed by means of a threaded plug 57 which may be removed to permit cleaning of the passage through the block 45 and the orifice in the plate 44.

A pressure gauge 58 is connected to the expansion chamber 40 by means of a pipe 59 and plate 36 is provided with a scale 60 which serves to indicate the position of the valve 24 with respect to the orifice plate 16. By means of the pressure gauge and adjustment indicator, accurate regulation of the rate of discharge of the liquid through the blowdown unit may be obtained.

The blowdown unit of the present invention can be quickly assembled by placing the valve block against the body of the unit with the orifice plates 16 and 44 in place, and then applying the nuts 21 and 47 to the outer ends of the studs 20 and 46. The orifice plates 16 and 44 can be replaced with plates having orifices of different sizes when desired, and an ordinary wrench only is required for assembling the unit.

It is to be understood that variations and modifications of the specific device herein shown and described for purposes of illustration, may be made without departing from the spirit of the invention.

What I claim is:

1. A blowdown unit comprising a main block having a flat side face, a strainer chamber, an inlet to the chamber and a lateral outlet from said chamber to said side face, an outlet block provided with a side face alongside the said side face of the main block and having a discharge passage spaced laterally from said outlet, and opening to said side face of the outlet block, a valve block having an elongated expansion chamber provided with lateral inlet and outlet openings, adapted to aline with said outlet and said discharge passage, independent screw threaded means for detachably clamping said valve block to the main block and to the outlet block, an orifice plate clamped between the valve block and outlet block for regulating flow into said discharge passage and a valve carried by said valve block for controlling flow from the strainer chamber into the pressure chamber.

2. A blowdown unit comprising a main block and an outlet block having flat side faces disposed one alongside the other and each provided with a recess, a strainer chamber in the main block having an inlet and an outlet to the recess in the side face of the block, said outlet block having a discharge passage opening to the recess in its side face, a valve block having a side face provided with recesses registering with the said recesses and an expansion chamber having an opening to each recess, independent screw threaded means for clamping the valve block to each of the other blocks, a plate detachably clamped in each pair of registering recesses and provided with openings controlling flow into and out of the expansion chamber, and a valve mounted in the valve block adjustable with respect to the flow controlling opening in the plate clamped to the main block to regulate the flow from the strainer chamber into the expansion chamber.

3. A blowdown unit comprising a main block and an outlet block disposed side by side having flat side faces substantially flush one with the other and each provided with a recess, a strainer chamber in the main block having an inlet and an outlet to the recess in the side face of the block, the outlet block having a discharge passage opening to the other of said recesses, a series of threaded studs attached to said main and outlet blocks

and projecting from the flat faces thereof, a valve block having openings to receive said studs, recesses registering with the recesses of the main and outlet blocks and an expansion chamber having openings to the valve block recesses, apertured plates fitting in said recesses and spacing said blocks apart, nuts on said studs for detachably clamping the valve block and plates to said main and outlet blocks, and a valve mounted in the valve block for regulating the flow from the strainer chamber into said expansible chamber.

4. A blowdown unit comprising a main block and an inlet block disposed side by side and having flat side faces substantially flush one with the other, the main block having a strainer chamber provided with an inlet and an opening to the flat side face thereof, the outlet block having a discharge passage laterally of said chamber opening to its flat side face, said side faces having recesses around the said opening and passage, a valve block having an expansion chamber and inlet and outlet openings registering with said opening and passage, orifice plates fitting in said recesses and spacing said valve block from said main and inlet blocks, sealing washers interposed between said orifice plates and the blocks, and stud bolts carried by said main and outlet blocks and extending through the valve block for securing said main and outlet blocks independently to said valve block and for independently clamping said orifice plates.

5. A blowdown unit comprising a main block and an inlet block disposed side by side and having flat side faces substantially flush one with the other, the main block having a strainer chamber provided with an inlet and an opening to the flat side face thereof, the block having a discharge passage laterally of said chamber opening to its

flat side face, said side faces having recesses around the said opening and passage, a valve block having an expansion chamber and inlet and outlet openings registering with the outlet opening and passage of the main and outlet blocks, said valve block having an opening alined with its inlet opening, a valve carrier mounted in said opening, a valve bonnet for securing said carrier in place, a valve mounted in said carrier and movable toward and away from the inlet to said expansion chamber, and means for securing said valve block to said main block comprising bolts extending through said valve block and valve bonnet and other bolts independently connecting the valve body to said outlet block.

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