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G. F. CARLSON

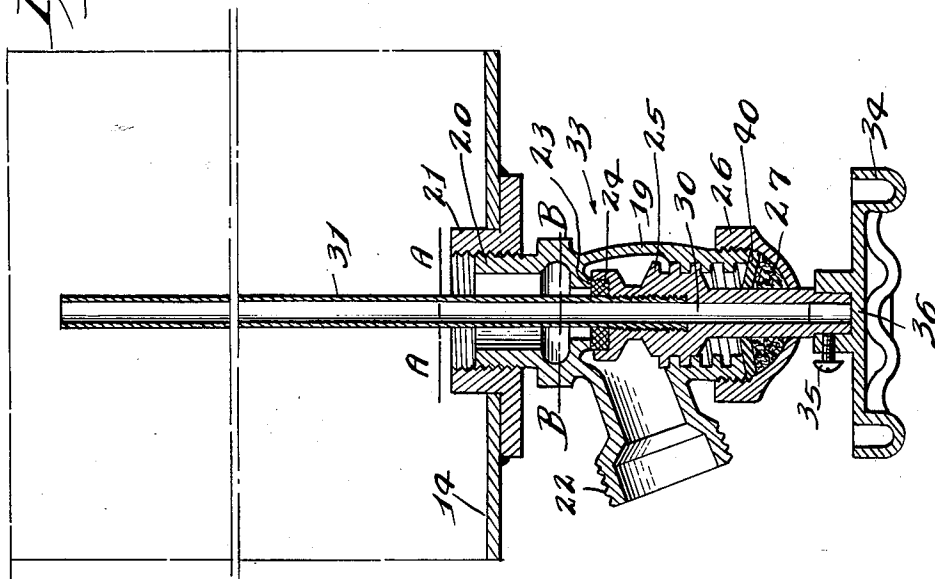
2,810,398

DRAIN AND VACUUM BREAKER VALVE

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Fig. 3



Inventor:
Gilbert F. Carlson

By: John D. Darley
Attorney.

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DRAIN AND VACUUM BREAKER VALVE

Gilbert F. Carlson, Skokie, Ill., assignor to Bell & Gossett Company, Morton Grove, Ill., a corporation of Illinois

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1 Claim. (Cl. 137—588)

My invention relates to a combination drain and vacuum breaker valve for facilitating the drainage of liquid from a tank by the simultaneous and free admission of air thereto.

By way of example and not of limitation, the invention will be described in connection with a compression or expansion tank forming part of a closed hot water heating system. Such a tank is employed to absorb or cushion expansion surges of the water in the system without loss of water below a predetermined system pressure and ordinarily functions with the tank partially filled with water and above which is collected a mass of air trapped when the system is first filled and including that liberated from the heated water. The air mass provides the cushion factor and when, as occasionally happens, the tank becomes completely or almost completely filled with water, the cushion is lost and the tank must be drained preparatory to refilling with water and retrapping of a new air mass.

It is desirable to accomplish this drainage with a rapidity that is not possible with the ordinary drain valve which a compression tank carries since the outrushing water and the inflowing air which is endeavoring to break at least the partial vacuum in the tank pass through the same drain opening. Drainage is therefore slow and, for a thirty gallon tank, may require as much as thirty minutes or more.

It is therefore one object of the invention to provide a combination unit which includes separate passages for the drainage flow of water and the vacuum breaking air flow.

A further object is the provision of a unit as indicated above in which the required operating characteristics are attained by a modification of the standard type of drain valve customarily attached to a compression tank.

These and further objects of the invention will be set forth in the following specification, reference being had to the accompanying drawings, and the novel means by which said objects are effectuated will be definitely pointed out in the claims.

In the drawings:

Fig. 1 is a schematic view of a typical hot water heating system, less the radiating elements, which is illustrative of the operating environment with which my improved valve is used.

Figs. 2 and 3 are enlarged, sectional elevations showing variant forms of the valve.

Referring to Fig. 1, the numeral 10 designates the usual hot water boiler which connects through supply and return pipes 11 and 12, respectively, with the customary radiating or heating elements (not shown). The pipe 12 may include a pump 13 for forcibly circulating the water through the system under well known conditions of control. A compression tank 14 is disposed above the boiler 10 and connects therewith through a pipe 15 which includes a normally open valve 16 and attached to a convenient part of the lowermost portion of the boiler is my

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improved drain and vacuum breaker valve 17 whose delivery branch may or may not connect with a hose 18.

Referring to Fig. 2, the valve 17 includes a casing 19 having an annular inlet end 20 threaded in a fitting 21 in the lower part of the tank 14 and a lateral drain branch 22. Within the casing 19, a valve seat 23 is provided which is normally engaged by a seal ring 24 carried by the upper end of a valve stem 25 to deny communication between the inlet end 20 and drain branch 22. The valve stem 25 is threaded in the casing 19 below the connection of the branch 22 thereto and is reduced and extended through a gland nut 26 externally threaded on the lower end of the casing with appropriate packing 27 included in the space between the casing 19, stem 25 and nut 26. The lower or exposed end of the stem 25 has affixed thereto in any convenient manner, as by a set screw 28, a handwheel 29 whereby the stem may be advanced or retracted in the casing 19.

So far as described, the valve 17 is identical with the well known and commercially available type of drain valve which is customarily employed for compression and other kinds of closed tanks that may require drainage at various times. To drain with this structure, the valve stem 25 is rotated to separate the seal ring 24 from the seat 23 and so connect the inlet end 20 and drain branch 22. Drainage time, however, is excessive because of the counterflow relation between the outgoing water and incoming air which replaces the discharged water.

The invention consists in modifying the standard drain valve as described above so that a separate passage is provided for the vacuum breaking air. To this end and referring to Fig. 2, a passage 30 is drilled axially and completely through the stem 25 including the seal ring 24 and press fitted as shown in this figure, or threaded as shown in Fig. 3, in the upper end of the passage 30 is the lower end of a tube 31 which extends upwardly and coaxially through and in spaced relation to the interior of the inlet end 20. The tube 31 may extend well within the tank 14 and close to the top thereof, or it may be cut off along the line A—A or the line B—B so that the upper end of the tube 31 lies just above the bottom of the tank 14 or just above the seat 23, respectively. Any intermediate position between the complete showing in Fig. 1 and line B—B is also usable. This tube length variation also applies to the modifications shown in Figs. 3 and 4. The lower end of the passage 30 is threaded to receive a screw 32 which sealably closes the indicated passage end in the relation of parts shown in Fig. 2.

When it is desired to drain the tank, the valve stem 25 is rotated by the handwheel 29 to separate the seal ring 24 from the seat 23 to start the water flow and thereafter the screw 32 is removed. The water then drains freely and rapidly through the drain branch 22 since the relieving air may flow relatively unobstructedly through the passage 30 and tube 31, the valve 16 (see Fig. 1) being previously closed.

In Fig. 3 is illustrated a modification designated generally by the numeral 33 which is identical with the valve 17 except for the detail presently noted. Parts in Fig. 3 which are like those in Fig. 2 are designated by the same numerals. A handwheel 34 is secured by means of a set screw 35 to the exposed end of the valve stem 25 and the adjacent end of the passage 30 is normally closed by a hub part 36 of the handwheel.

To drain, the valve 16 is closed and the handwheel 34 rotated to separate the seal ring 24 from the seat 23 and thereafter, the handwheel is removed to uncover the lower end of the passage 30 so that air may flow into the tank 14.

Either of the above modifications provides in a compact form a highly adequate solution of the drainage and

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vacuum breaking problem in a closed tank. The manufacturing advantage is important in that the results are attained by a relatively simple change in the well standardized type of drain valve which does not affect in any substantial way the characteristic structure thereof. 5 Therefore, for the major part of the valve, parts are easily available.

I claim:

A drain and vacuum breaker valve for use with a tank, said valve including a casing having an inlet adapted for connection to said tank, a drain branch, a circular valve seat coaxial with said inlet and located between said inlet and drain branch with said seat facing away from said inlet, and internal threads coaxial with the valve seat proximate the end of the casing opposite to said inlet, a 15 hollow valve member having external threads mating with said internal threads and adapted to move the valve member axially upon rotation of said valve member toward said inlet and toward closing position, said valve member also having a valve head at its inner end adapted to register with said valve seat, thus forming a fluid tight seal therebetween when the valve is closed, said valve member also including a valve stem at its other end protrud-

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ing beyond said casing, stem packing means coacting with said casing and valve stem to form a fluid tight seal, a handle secured to the protruding end of the valve stem and having an aperture in the central portion thereof, and vacuum breaking means including a cylindrical bore extending the full length of said valve member with a tube tightly mounted in said bore in hermetically sealed relationship thereto, said tube extending coaxially through said valve head and beyond said casing for entry into said tank, and a removable plug at said protruding outer end of the valve stem adapted to seal the adjacent end of said tube and bore from the atmosphere.

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