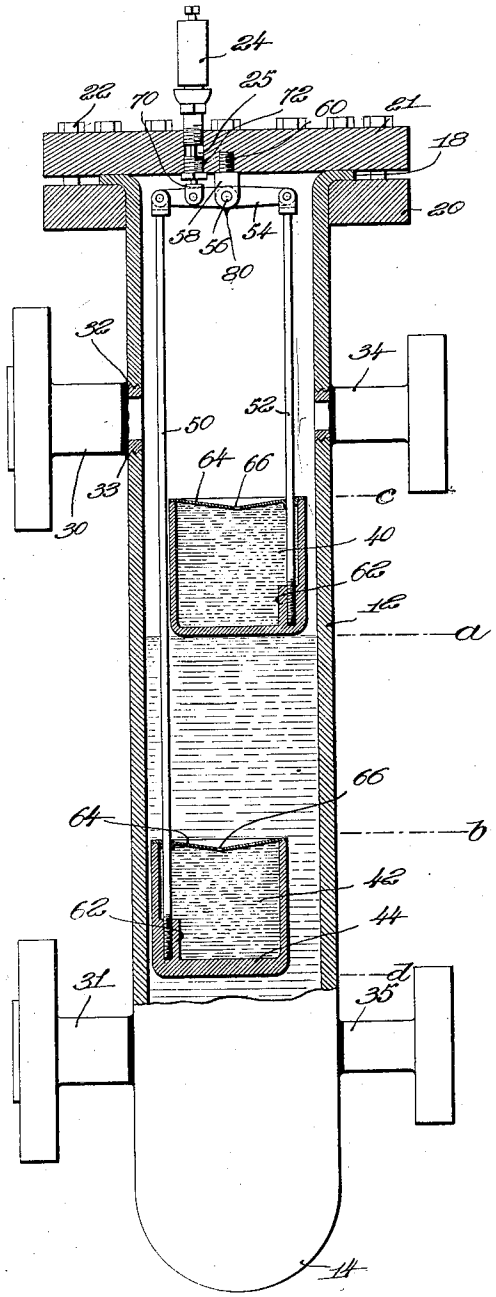
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WATER COLUMN FOR STEAM BOILERS

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WATER COLUMN FOR STEAM BOILERS

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The present invention relates to water columns for steam boilers, and more particularly to a water column of this type embodying a high and low water alarm.

The object of the present invention is to provide a simple and efficient form of high and low water alarm which is capable of satisfactory and long-continued operation under relatively high pressure conditions.

With this object in view, a feature of the invention contemplates the provision of two open, water-filled floats of dissimilar weight connected with a whistle or equivalent alarm device in such a manner that raising or lowering of the water level beyond predetermined limits permits the operation of the whistle.

A further feature of the invention consists in the provision of a column cylinder of seamless steel integrally closed at one end, and having threaded and welded connections for attachment to the boiler and connection with the water glass, and other auxiliary devices.

The accompanying drawing illustrates an elevation partially in section of a water column embodying the improved features of the present invention.

As shown in the illustrated embodiment of the invention, the column comprises a drawn steel tube 12 with an integrally closed, hemispherical bottom portion 14, capable of withstanding the relatively high internal pressures to which the column is subjected. The upper end of the column cylinder is provided with an outwardly-turned flange 18, which is engaged and clamped between sealing flanges 20 and 21 by a series of connecting bolts 22. The upper or solid flange 21 is provided with a whistle 24, of conventional type, threaded into an opening 25 formed in the flange. Connected to the column cylinder 12 at opposite ends are two flange connections 30 and 31, which are threaded into the cylinder at 32 and integrally united therewith by welded areas 33. In a similar manner, a second series of flange connections 34 and 35 are connected to the opposite side of the column cylinder. The first-mentioned connections may serve for attachment of the column to the boiler, and the second set of connections for attachment of a gage glass mounting. It will be evident that if so desired the lower sealing flange 20 may be slipped over the cylinder prior to the attachment of the flange connections 30 to 35, inclusive. Supported within the column cylinder and capable of rising and falling movements with relation thereto are upper and lower buckets or floats 40 and 42, respectively. These buckets have substantially the same cubicle capacity, and are therefore capable of holding equal volumes of water, but the bucket 42 is heavier than the bucket 40 by an amount which approximates one-half the weight of the water contained in each bucket. From this it will be evident that if both buckets are filled with water and freely suspended at opposite ends of a centrally pivoted lever, the weight of the bucket 42 will cause depression of that side of the lever, lowering the bucket 42 and elevating the bucket 40. The increase of weight of the bucket 42 may be accomplished conveniently by an increased bottom thickness, as indicated by 44, or by making the buckets identical and weighting the bucket 42 with solid material. Each bucket is supported by a vertical rod, indicated at 50 and 52, respectively, the rods being connected to opposite ends of a supporting lever 54 pivoted centrally at 56. The pivot 56 is conveniently mounted in a trunnion 58 threaded into the flange 21 at 60. Each of the supporting rods 50 and 52 passes downwardly through the cover of the float or bucket, and is threaded at its lower end into a boss 62 projecting inwardly from the wall of the bucket. This construction steadies the floats and serves to maintain them in a vertical position without the necessity for additional support at the opposite side. Each of the buckets is normally completely filled with water, and is provided with a cover portion 64 having an opening 66 formed at the lowermost portion of the cover to collect and direct water of condensation into the interior of the floats, and compensate for any unusual losses which may occur during operation or idle periods. While the water level in the column remains within normal operating limits, which are designated approximately by the dot-and-dash lines *a* and *b*, respectively, the upper

water-filled float is suspended in steam and the lower water-filled float is completely submerged below the water level. Under these conditions, the submergence of the lower float balances the weight of the water therein, and the weight of the upper water-filled float exceeds the weight of the lower float by an amount equal to one-half the weight of the water contained therein, it being recalled in this connection that the weight of the lower float exceeds the weight of the upper float by one-half the weight of the water load when both floats are freely suspended. Under these normal operating conditions, the upper float maintains the supporting lever 54 in such a position that a valve 70 connected to the lever at one side of the fulcrum remains closed and prevents the operation of the whistle. In this connection it will be evident from the drawing that the valve 70 comprises merely a needle operating in a separable valve seat 72 which is threaded in the flange 21 beneath the whistle. Rising of the water level to cause a partial submergence of the upper float gradually decreases the effective weight of the upper float until complete submergence of the float creates a condition in which the effective weight of the lower float exceeds that of the upper float by an amount which approximates one-half the water load. When the water level rises sufficiently to cause the effective weight of the lower float to exceed that of the upper float by an amount sufficient to move the supporting lever and open the valve, the whistle operates. Under ordinary conditions the operation of the whistle will occur prior to complete submergence of the upper float. In a like manner, lowering of the water level to the line *d*, or thereabouts, increases the effective weight of the lower float to a point where this weight exceeds the effective weight of the upper float, and operates the whistle valve in the manner described for the high water level.

It will be evident that during the major portion of the operation, the lower float is maintained completely submerged and filled with water through the opening 66. The upper float is also maintained full through the opening 66 in the cover, water of condensation dropping directly thereon from the supporting hanger 58 which may be provided with a tit 80, as indicated. Owing to the fact that the cover flange 21 is normally cooler than the remainder of the apparatus through conduction of heat, the hanger connected directly therewith is also cooler, and acts as a medium together with the under portion of the cover for causing condensation. Actual practice has demonstrated that condensate dropping upon the cover is ample to maintain the upper float full of water during long-continued operation. In addition to collecting and directing condensate into the interior of the float, the cover portions on both floats serve to prevent spillage and removal of water therefrom during blow-down of the column.

By virtue of this construction, relatively thin, light floats may be employed inasmuch as these floats are not subjected to dissimilar internal and external pressures. Furthermore, due to this equalizing of the pressure upon opposite sides of the floats, the susceptibility to damage and the probability of leakage under long-continued and arduous operation is substantially removed. In addition, the effective difference in weight sufficient to operate the alarm valve is created without normally placing a considerable weight upon the supporting parts of the apparatus. As contrasted with this, if it is attempted to make the operating members of solid material, the size of the floats, due to the necessity of displacing sufficient water to guarantee operation of the alarm, compels the employment of relatively heavy weights which impose a substantial strain, friction and wear upon the supporting parts of the apparatus, and require these parts to be relatively heavy and sluggish in their operation.

From the foregoing it will be evident to those skilled in the art that an exceedingly simple and compact form of apparatus is provided for accomplishing the desired result. The supporting of the individual floats by single rods located at opposite ends of a single lever permits the relative movement of the two floats without interference, and causes operation of the alarm under high and low water conditions with an exceedingly simple and compact mechanism with a minimum of friction.

What is claimed is:

1. A water column for steam boilers comprising a column cylinder, upper and lower floats of equal cubic capacity within the cylinder, the lower float being heavier than the upper float by an amount approximating one-half the weight of water contained in each float, a centrally pivoted lever at the upper portion of the column, and connections between each float and one end of the lever to cause movement of the lever upon rising and falling of the water level beyond predetermined limits.

2. A high and low water level indicator comprising a column, floats of equal displacement and with a constant and predetermined dissimilarity in weight supported in the column at different levels, a pivoted lever, a high and low water alarm connected with the lever, and means for suspending the floats from opposite ends of the lever to provide equal moment arms for the operation of the lever, and produce an operating movement of the lever about its pivot upon undue rise or fall of the water level within the column.

3. A high and low water level indicator comprising a column, open water-filled floats of equal displacement and with a constant and predetermined difference in weight supported at different levels in the column, a pivoted lever, a high and low water alarm connected with the lever, and means for suspending the floats from opposite ends of the lever to provide equal moment arms and produce an operating movement of the lever upon undue rise or fall of the water level.

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