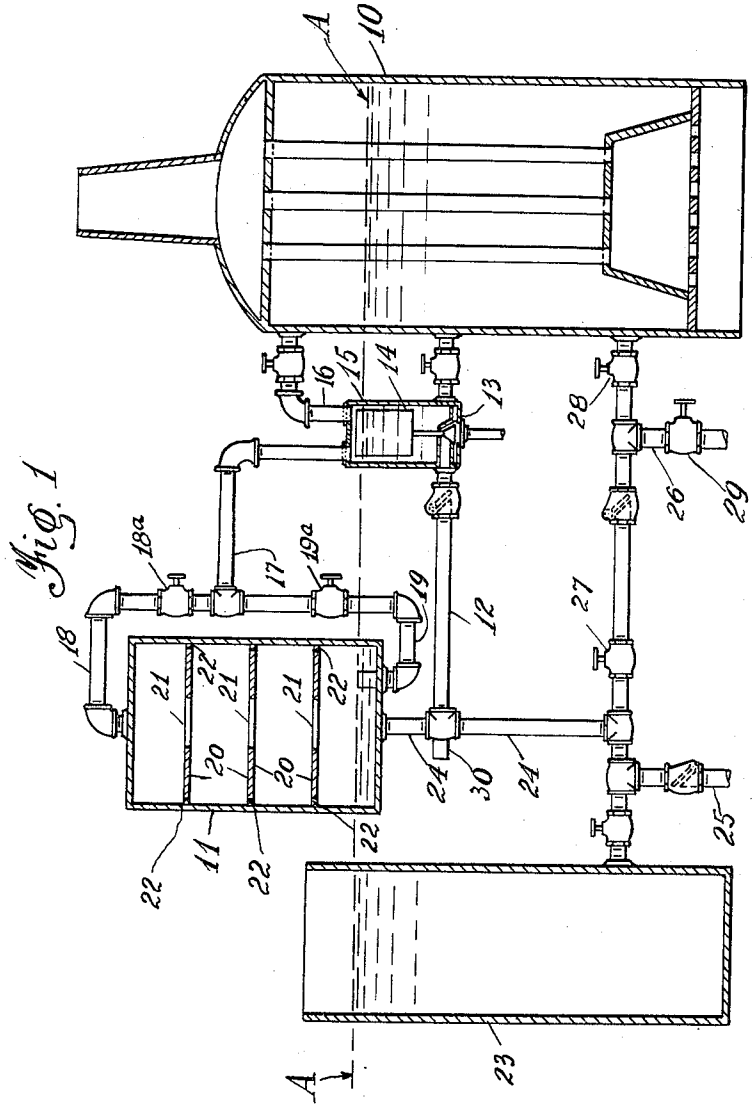
Sept. 3, 1957 W. D. NORE 2,804,852

WATER LOCK BOILER FEEDWATER SYSTEM

Filed Sept. 22, 1953

2 Sheets-Sheet 1

Fig. 1



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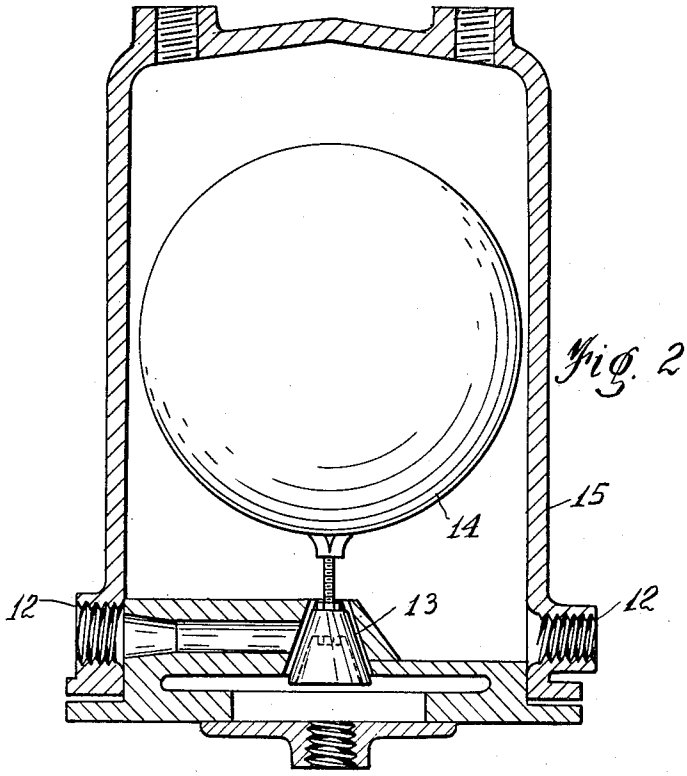


Fig. 2

Fig. 3

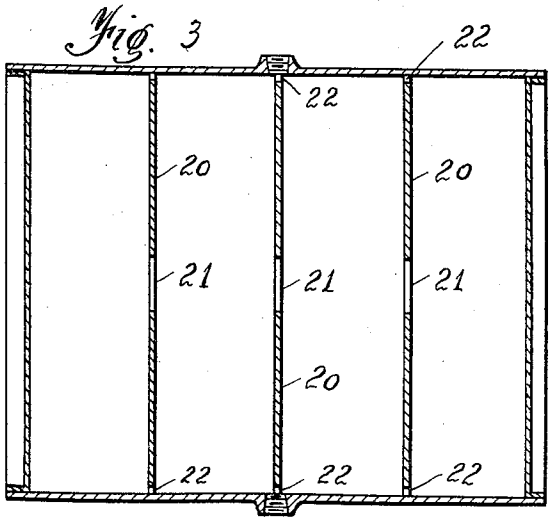
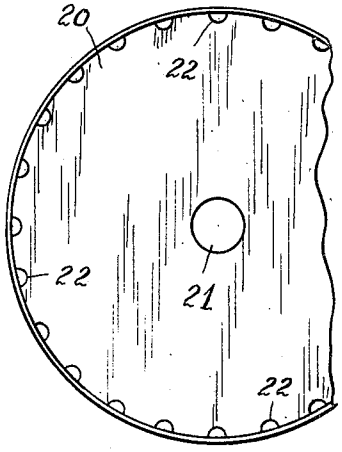


Fig. 4



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WATER LOCK BOILER FEEDWATER SYSTEM

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Application September 22, 1953, Serial No. 381,658

4 Claims. (Cl. 122—457)

This invention relates to a water lock boiler feed system and particularly to automatic means for controlling water supplied to boilers.

This invention is an improvement on the water lock boiler feed systems disclosed in Patents 2,072,467 issued March 2, 1937 and 2,001,431 issued May 14, 1935.

An object of the present invention is to provide means for controlling water supplied to boilers.

Another object of this invention is to provide means for furnishing a constant equalizing pressure of live steam into the auxiliary or supply tank during the feeding cycle thereby to control the entrance of water into the steam boiler.

A further object of the invention is to provide an auxiliary tank into which is introduced a direct jet of live steam thereby producing a boiling, preheating and purifying action in the water prior to introduction into the boiler.

Other objects and advantages of this invention will become apparent from a consideration of the following description of a preferred embodiment and from the accompanying drawings in which:

Figure 1 is a front elevation of a preferred embodiment partly in section.

Figure 2 is an enlarged detail showing a valve chamber in section.

Figure 3 is an enlarged detail showing an auxiliary tank.

Figure 4 is an enlarged detail in top plan of a diaphragm for use in the tank of Figure 3.

Referring to the drawings there is illustrated a steam boiler **10** filled to the maximum point with water from the auxiliary water lock tank **11** through a water line **12**. The movement of water from the auxiliary tank **11** through the water line **12** is controlled by a cone valve **13**. The cone valve **13** is controlled by a float **14** all located in the housing **15**. The interior of the housing **15** is in direct communication with the boiler so that the level of the water in the boiler controls directly the level of the float **14**. A steam line **16** passes from the steam chamber of the boiler to the upper part of the cone valve housing **15**. Another steam line **17** passes from the housing **15** to the auxiliary tank **11** to provide a constant equalizing pressure in the auxiliary tank identical with that in the boiler and in the valve housing **15** at the feeding cycle. The steam line **17** is divided into two branches **18** and **19** entering the auxiliary tank **11** so that steam can be introduced into the tank at the top through branch **18** or bubbled through the water in the tank by means of branch **19**.

The auxiliary tank **11** is provided with a series of parallel diaphragms **20**, each of which is provided with a central aperture **21** and a series of peripheral apertures **22** through which the steam and water may pass. The auxiliary tank **11** is also connected to a water receiving tank **23** or to any external source of water by a filler pipe **24**. The receiving tank **23**, if one is used, is fed from an external supply of water by pipe **25**.

In order to drain the system a drain pipe **26** and valves **27**, **28** and **29** are provided in conventional manner.

In operating the system of this invention the system is filled to the maximum level indicated by line A. The boiler is fired to produce steam and the automatic water feeding system begins to operate. Steam enters the tank **11** and heats the tank walls and diaphragms **20**. The valves **18***a* and **19***a* are then closed, the diaphragms cool, the steam condenses and a vacuum is formed drawing water into tank **11** through line **24**. When the water in the boiler drops below the level A the float **14** drops opening the cone valve **13** thereby permitting water to flow from the auxiliary tank **11** into the boiler. Steam in turn continually passes from the boiler **10** to the valve housing **15** and into the auxiliary tank **11** thereby maintaining an equalizing steam pressure in the auxiliary tank and the valve housing. When the steam is brought into the auxiliary tank **11** through the bottom line **19** it bubbles through the water therein, heating it and causing impurities etc. to precipitate in large measure before entering the boiler. At the same time the diaphragms are heated and cause the steam to be evenly distributed through the water. After water is drawn from the auxiliary tank **11**, the valves in lines **18** and **19** are closed, the heated diaphragms cool and some of the steam condenses causing a vacuum to be created thereby drawing water into the auxiliary tank to fill it after which valves **18***a* and/or **19***a* are immediately open to feed the boiler **10**. When the boiler is filled to the maximum, steam passes through the water introduced into the auxiliary tank to preheat the water and precipitate hardening agents and impurities.

A breather pipe **30** is connected to the system to exhaust to atmosphere. The breather pipe maintains the feeding side of the system at atmospheric pressure and prevents excessive build up of steam pressure in the tank **11** by bleeding of the steam through a check valve (not shown) in the breather pipe.

While there is illustrated and described a present preferred embodiment of this invention it will be understood that it may be otherwise embodied within the scope of the following claims.

I claim:

1. In combination, a steam boiler, a water tank located to feed said boiler, means for delivering water from said tank to the boiler, valve means controlled by the level of water in the boiler regulating the flow through said delivery means, a housing around said valve means, means for delivering steam from the boiler to the water tank through the valve means housing whereby the water tank and valve housing are maintained at the same pressure with the boiler, said steam delivery means being adapted to deliver steam to one of the top and bottom of the water tank, and diaphragm means in the water tank acting on the steam to distribute it through the water in the tank, said diaphragm means contracting and condensing steam after water is discharged from the tank to the boiler to aid in refilling the tank, control valve means in the steam delivery means adapted to be closed after water is discharged from the tank whereby the condensing steam creates a vacuum and connections from the tank to a source of water whereby water flows to the tank by reason of the vacuum therein.

2. A combination as claimed in claim 1 wherein the water tank comprises a substantially cylindrical housing and the diaphragm means comprises a plurality of spaced apart perforated members extending through the interior thereof transverse to the axis of said housing.

3. In combination, a steam boiler, a water tank located to feed said boiler, means for delivering water from said tank to the boiler, valve means controlled by the level of water in the boiler regulating the flow through said

delivery means, a housing around the valve means, means delivering steam from the boiler to the water tank through the valve means housing whereby the water tank and valve housing are maintained at the same pressure with the boiler, and a plurality of spaced apart perforate diaphragms in said tank fixed to the sidewalls thereof, said diaphragms acting to distribute the steam through the water when the tank is substantially filled with water, and when water is removed from the tank and the steam is cut off, contracting and condensing the steam, control valve means in the steam delivery means adapted to be closed after water is discharged from the tank whereby the condensing steam creates a vacuum in the tank to cause it to be refilled and connections from the tank to a source of water whereby water flows to the tank by reason of vacuum therein.

4. In combination, a steam boiler, a water tank located to feed said boiler, means for delivering water from said tank to the boiler, valve means controlled by the level of water in the boiler regulating the flow through said delivery means, a housing around the valve means, means connecting the water tank and valve housing to the boiler whereby the tank and valve housing are maintained under the same pressure as the boiler, control valve means on said means connecting the water tank and boiler adapted to be closed after water is discharged from the

tank, diaphragm means in the water tank acting to contract and condense the steam after the water is discharged from the water tank and the control valve means is closed and to be heated after the control valve means is opened and while the water in the tank is heated by the steam, and connections from the tank to a source of water under atmospheric pressure whereby water flows to the tank by reason of the vacuum therein when the control valve means on the means connecting the water tank and boiler is closed.

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