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AUTOMATIC CONTROL FOR WATER LOCK FEED FOR STEAM BOILERS

Filed Oct. 28, 1935

2 Sheets-Sheet 1

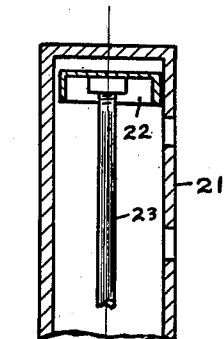
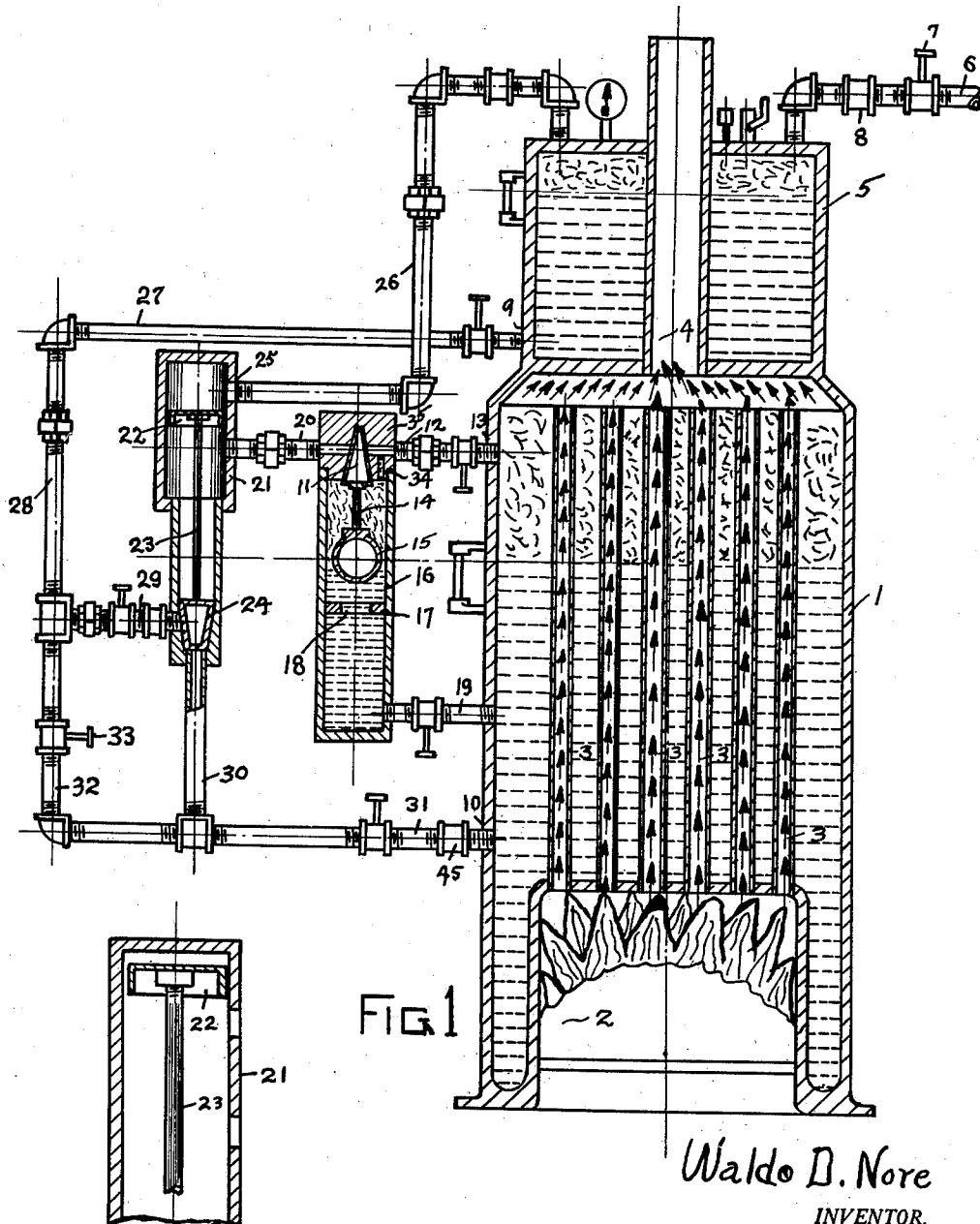


FIG 2

FIG 1

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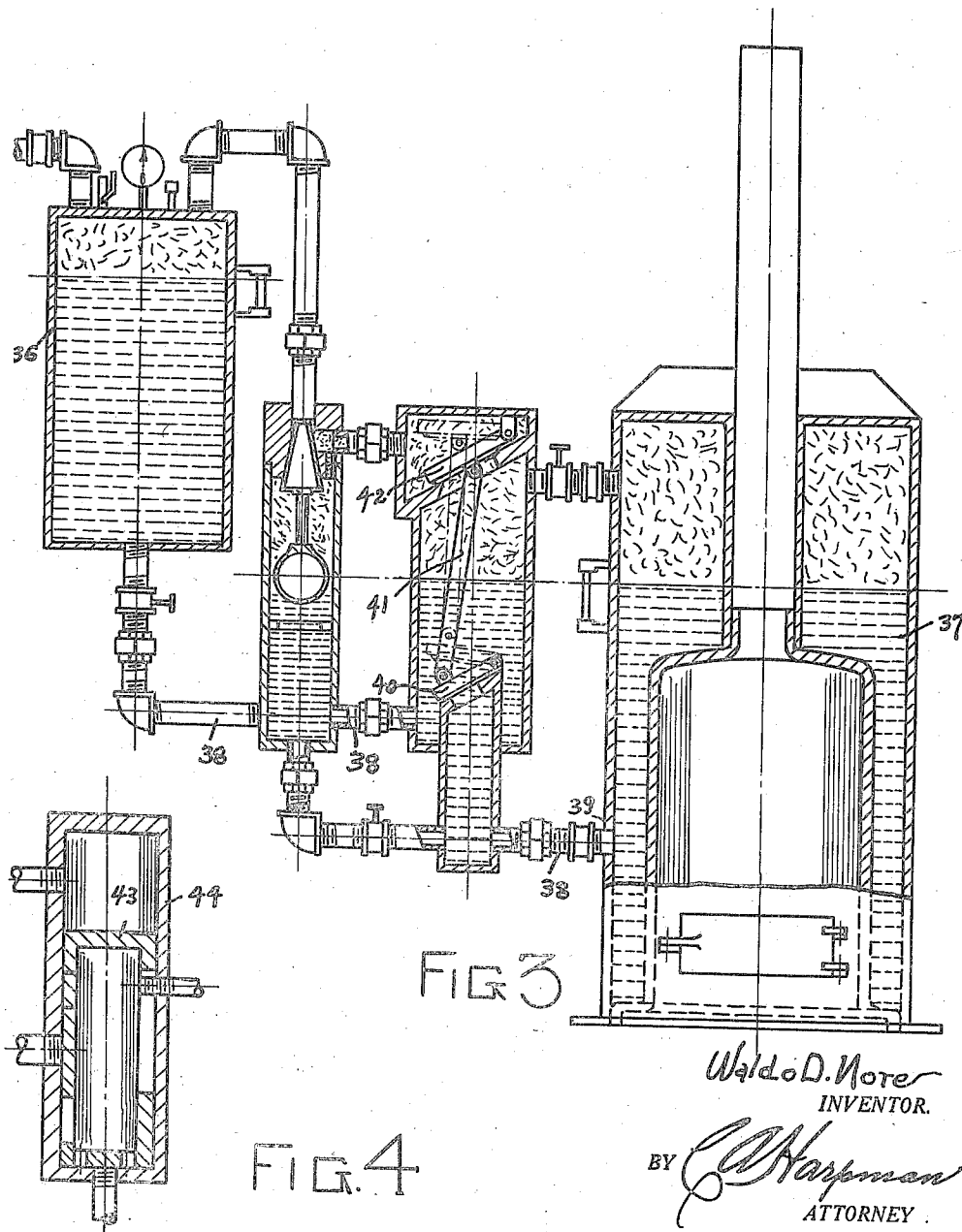
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UNITED STATES PATENT OFFICE

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AUTOMATIC CONTROL FOR WATER LOCK
FEED FOR STEAM BOILERS

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Application October 28, 1935, Serial No. 47,154

6 Claims. (Cl. 122-456)

This invention relates to a water lock boiler feed system.

The principal object of this device is to provide automatic means for controlling water supplied to steam boilers.

This invention is an improvement on my water lock boiler feed system, Patent No. 2,001,431, issued under date of May 14, 1935.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, can be made within the scope of what is claimed, without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a front elevation of the device partly in cross section with a water lock tank carried on top of the steam boiler.

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

Figure 3 is a front elevation of the device partly in cross section with the water lock tank not carried upon the boiler.

Figure 4 is an enlarged detail view showing a modification of a valve in cross section.

By referring to Figure 1 it will be seen that there is provided a steam boiler 1 provided with a combustion chamber 2. This steam boiler 1 is provided with a plurality of flues 3 which lead to an outlet stack 4. There is positioned upon the top of this steam boiler 1 a water lock tank 5. It will also be seen that there is an intake water line 6 which is connected to the top of the water lock tank 5. It will be seen that the intake water line 6 carries a valve 7 and a check valve 8.

The purpose of this invention is to take water from the water lock tank 5 at a point 9 and control the movement of this water by automatic means so that sufficient water is introduced into the steam boiler at a point 10, which is located near the bottom of the steam boiler, to raise the water in the boiler to a predetermined level. The water being controlled by means of a valve chamber which acts as a stop member when the steam pressure is decreased or shutdown, thus the water level in the boiler will remain the same whether there is steam in the boiler or not, and will not flood the boiler by gravity flow.

In Figure 1 the steam boiler is filled to a maximum point and the movement of the water from

the water lock tank 5 is held in a locked position due to a cone valve 11 closing a steam line 12 connected to the steam boiler 1 at a point 13. It will be seen that this cone valve 11 is connected by means of a connecting rod 14 to a float 15 positioned inside of a valve chamber 16. The valve chamber 16 is filled to the same level as the steam boiler 1, the water coming from a pipe 19 connecting the steam boiler 1 and the valve chamber 16. When the water in the steam boiler 1 drops to a predetermined minimum level the float 15 will drop downwardly and seat itself on a horizontal seat 17 having an opening 18. This horizontal float seat 17 stops the fall of the cone valve 11, thus keeping it from becoming unseated. The cone shaped valve 11 will now open the steam line 12 and steam is allowed to pass into a line 20 which connects to a piston chamber 21. It will be seen that this piston chamber 21 carries a piston 22 and a connecting rod 23 which is connected to a tapered valve 24 or stop member at its lower end. The steam within the piston chamber 21 will now force the piston 22 upwardly past an end 25 of a steam line 26. It is obvious that the tapered valve 24 will be unseated and will allow water to flow from the water lock tank 5 by gravity down through pipe lines 27, 28, 29, 30, and 31 into the steam boiler 1, and when the boiler has been filled the tapered valve 24 will be seated due to the closing of the steam line 20 by the rising of the float 15 and the cone valve 11. In the event that the boiler is shutdown, this piston 22 and valve 24 will close or seat thus preventing the boiler from being flooded. In order that there will be a head of steam in the top end of the valve chamber 16 at all times, there is provided a relatively small steam opening 34 formed in a valve seat 35 of the cone valve 11. A check valve 45 is provided on the pipe line 31 near the steam boiler.

The drawings show a by-pass pipe 32 which is controlled by means of a valve 33. This by-pass pipe 32 is to be utilized when the steam boiler is being originally filled.

By referring to Figure 3 it will be seen that a water lock tank 36 may be placed off to the side of a steam boiler 37 as well as on top of it as illustrated in Figure 1. The water lock tank 36 is spaced any convenient distance from the steam boiler but is elevated so as to allow water under automatic control to flow by gravity through pipes 38 into the steam boiler at a point 39.

Figure 3 shows a modification in the construction of the water lock by the use of a water valve 40 connected to a connecting rod 41 which has

its upper end attached to a steam controlled valve 42. This steam controlled valve 42 works upon the same principle as that shown and described in Figure 1, namely, when the water has
 5 dropped in the steam boiler 37, the valve 40 is opened by the steam controlled valve 42. This valve 42 will also close when the steam pressure drops as in case of the boiler being shutdown, thus no water may enter the boiler and flood it.
 10 By referring to Figure 4 it will be seen that there is shown a modified form of the water valve 40 and steam controlled valve 42 by the use of a slidable cylinder 43 within a chamber 44. This valve 43 will close itself when the steam pressure
 15 drops, shutting off the water line, so the boiler will not be flooded.

What I claim is:—

1. In a device of the class described comprising a tank positioned upon a steam boiler, a valve
 20 controlled water inlet pipe for said tank, water and steam line connections between said steam boiler and said tank, automatically controlled steam valve means responsive to the water level in the boiler for allowing water within said tank
 25 to flow downwardly by gravity and enter said steam boiler, said automatically controlled steam valve means including a stop member to prevent said boiler from being flooded when steam pressure drops to a low value.

2. In a device of the class described comprising a tank positioned upon a steam boiler, a valve controlled water inlet pipe for said tank, water and
 30 steam line connections between said steam boiler and said tank, steam actuated valve means responsive to the water level in the boiler for allowing water within said tank to flow downwardly by gravity and enter said steam boiler, said steam
 35 actuated valve means including a stop member to prevent the boiler from flooding when steam pressure drops to a low value, said means comprising a float chamber connected to the boiler, a float operated valve in said chamber adapted to control the passage of steam in said steam line,
 40 a cylinder in said steam line, a piston operated valve in said cylinder arranged to operate a valve in said water line, said piston constructed and arranged to close said valve in said water line when no steam is passing through said float
 45 operated valve.

3. In combination with a boiler, a water lock tank positioned above the water line of a steam boiler, a valve controlled water inlet pipe for said tank, water and steam line connections between
 50 said steam boiler and said tank, steam actuated valve means responsive to the water level in the

boiler for allowing water within said tank to flow downwardly by gravity and enter said steam boiler, said means comprising a float chamber connected to the boiler, a float operated valve in
 5 said chamber adapted to control the passage of steam in the said steam line, a cylinder in said steam line, a piston operated valve in said cylinder arranged to operate a valve in said water line, said piston constructed and arranged to close said valve in said water line when no steam
 10 is passing through said float operated valve.

4. An automatic control for water lock feeds for steam boilers comprising a tank positioned above the water line of a steam boiler, a valve controlled water-inlet pipe for said tank, water
 15 and steam line connections between said steam boiler and said tank, a stop member to prevent the boiler from being flooded, said stop member comprising a valve chamber, a water pipe connecting said valve chamber and said boiler, a
 20 float in said valve chamber, a cone valve connected on said float, a piston chamber, steam lines connecting said boiler and said valve chamber and said piston chamber, a piston head within said chamber, a valve in said water line connection
 25 to the boiler connected to said piston head, a valve seat for said cone valve having a small steam opening in order to keep a head of steam in the top of said valve chamber, steam line connection between said tank and said piston chamber.

5. In combination, a steam boiler, a water tank located so as to feed said boiler by gravity, steam and water lines connecting said boiler and tank, means for controlling the feeding of the water
 35 from said tank to said boiler comprising a float operated valve arranged to regulate the flow of steam to said tank in said steam line, a piston actuated valve in said steam line connected to a valve in said water line, said piston constructed and arranged to close said valve by gravity when no steam is admitted to said piston operated valve.

6. In combination, a steam boiler, a water tank located so as to feed said boiler by gravity, steam
 45 and water lines connecting said boiler and tank, means for controlling the feeding of the water from said tank to said boiler comprising, a float operated valve in said steam line and means operated by the flow of steam through said steam line for actuating a valve in said water line, said means acting to close said valve in said water line when said float valve is closed.

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