HOW TO CLEAN WATER-GAGE GLASS ON STEAM BOILER WITHOUT REMOVING IT

1. Draw a cupful of hot water from the boiler, into which pour at least a tablespoon of raw muriatic or other acid.

2. Close both water-gage valves.

3. Open top water-gage valve and also pet cock at bottom, and blow water out of glass. Then immediately close the top valve and submerge the end of the pet cock in cup of hot-water solution. A vacuum is at once created in the gage glass which causes the solution in the cup to rush in.

4. Keep the pet cock immersed and operate the top valve, slightly opening and closing, alternately expelling and drawing in the solution until all grease, oil, or other matter adhering to the inside of the glass is cut out. Then close pet cock and open both water-gage valves.

It is necessary to have 1 lb. pressure of steam or more on the boiler before commencing this operation, which need not occupy more than 10 min. The result is a clean glass without the risk of breakage and probable renewal of gaskets, which is frequently the case when removing the glass for cleaning.

CLEANING STEAM BOILERS

After a steam or vapor boiler has been in operation for a short time, grease, oil, scale, core sand and other foreign matter will accumulate in the boiler, which will invite various kinds of trouble and can only be eliminated by thorough cleaning.

The following method of cleaning a steam boiler has been successfully used and is recommended by many boiler manufacturers.

1. Close all radiator supply valves and where used remove the thermostatic member of all return line valves, or if boiler is valved close both supply and return. Blow down the boiler through bottom blowoff under a pressure of at least 5 lb. Where a skimming opening is tapped in boiler near water line connect a pipe with gate valve to skimmer opening and skim oil and grease from boiler.

2. Remove the safety valve and put acid vinegar (Acetic acid) in the boiler as follows:

Boilers up to	1000	sq. ft.,	capacity—	3	gallons
" " "	2000	"	"	4	"
" " "	4000	"	"	5	"
" " "	6000	"	"	7	"

Replace the safety valve and operate the entire plant for at least 30 hr.

3. Again remove the safety valve in the absence of a skimmer opening and connect a pipe with gate valve to the outside on convenient drain. This pipe to be not less than size of safety valve.

With water in boiler at proper level and valve in top blow-off pipe closed, build a very hot coal fire creating a pressure of 5 to 10 lb. Open top blow-off valve and let water and steam pass through the blow-off line to drain—keep up a pressure between 5 and 10 lb.—and carefully supply water constantly into boiler so as to keep gage glass filled to top—keep this up without interruption for 6 to 8 hr. During the last 2 hr. fill boiler full of water allowing the hot water to flow through, and out of top blow-off pipe to drain.

4. Close the water-feed valve and let steam and water flow through top blow-off line until water level in boiler is at top of gage glass—close the gate valve in top blow-off line and with at least 10 lb. steam pressure—draw fire quickly and open the bottom blow-off valve, and entirely drain the boiler. Allow the boiler to cool—replace if any thermostatic-members in return line valves—replace safety valve—close bottom blow-off valve and fill boiler with fresh water to proper level.

Sometimes one blowing off will not give the desired results in which case the operation must be repeated or continued until the boiler is thoroughly free from all foreign matter.

With plants using vacuum and boiler feed pump the return to pump should be closed off and all condensation passed to drain for at least a week and then the boiler should be cleaned as above.

To avoid all this expense and trouble, some heating contractors do not allow any return water from a new system to enter the boiler during the time temporary heat is on and while the men are working on the job. The valve on the return main is closed, a plug removed from a tee just outside the return valve and the feed-water valve cracked open enough to maintain the water in the boiler up to the water line under close watching by one of the steam fitters. At night the fire is banked, the plug in the return replaced and the return valve opened. With a banked fire practically no grease enters the boiler from the system during the night.

TABLE 52. SAFETY VALVE SIZES FOR STEAM HEATING BOILERS

Safety Valve			Rated Capacity of Boiler	
Diameter, In.	Area, Sq. In.	Discharge Capacity, Lb. per Hr.*	Steam Radiation, Sq. Ft.	Steam, Lb. per Hr.
¾	0.4418	130	520	130
1	0.7854	230	920	230
1¼	1.2272	360	1,440	360
1½	1.7671	515	2,065	515
2	3.1416	920	3,680	920
2½	4.9087	1,435	5,740	1,435
3	7.0686	2,070	8,280	2,070
3½	9.6211	2,810	11,250	2,810
4	12.5660	3,675	14,700	3,675
4½	15.9040	4,650	18,600	4,650

*Capacity of safety valve based on 33⅓ per cent over-pressure, valve set to relieve at 15 lb. per sq. in.
Note.—For the purpose of these computations 240 heat units or 0.25 lb. of steam per hr. shall be considered as the equivalent of a square foot of steam radiation.