

FR7
NITEL GARY
521-113-02
A-7 BOILER

by

AMERICAN-Standard

INSTALLATION-OPERATION
AND
MAINTENANCE MANUAL

FOR
HAND FIRED AND
AUTOMATICALLY FIRED
BOILERS

AMERICAN-Standard

First in heating . . . first in plumbing

BP-13005 Rev. 6-61

PLAINTIFF'S
EXHIBIT

ASI-535

07778

NOTICE

MR. STEAMFITTER!

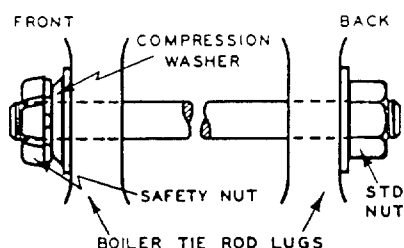
Use regular steel nuts and flat washers for assembling boiler. Apply oil or grease freely to tie rod threads while assembling sections to prevent stripping of threads on rod.

After drawing up boiler, remove steel tie rod nuts at front of boiler and place sheet metal **COMPRESSION WASHERS** on rods with open (cupped) side against regular washer.

Place **SAFETY NUTS** on front end against compression washers and leave regular steel nuts on back end of tie rods.

Lubricate nuts well and tighten with **FINGERS ONLY**.

**FAILURE TO OBSERVE THIS
MAY RESULT IN DAMAGE TO BOILER**



IMPORTANT!

See instructions Page 4 on proper setting of boiler for oil or stoker installation.

When boiler sections have been assembled, it is essential that boiler be tested before platework, jacket or piping is installed.

BEFORE FIRE IS STARTED IN BOILER, plug all boiler tappings and fill entirely with cold water.

To protect and safeguard the accuracy of steam or water gauge supplied, **DO NOT INSTALL GAUGE UNTIL AFTER TESTING OF BOILER OR SYSTEM.**

Testing pressure should be at least 10 pounds but should not exceed 50 pounds.

EXAMINE BOILER CAREFULLY, INSIDE AND OUTSIDE, to insure against leaks through concealed breakage caused in shipping and handling.

After making certain that there are no leaks, remove plugs for boiler trim and other connections.

This precaution is for your protection and will simplify handling of necessary replacements and adjustment claims.

DRAIN TAPPING

Back of boiler is provided with drain tapping at lowest water space practicable, as per A.S.M.E. Heating Boiler Code. This tapping must be used to drain boiler entirely.

DO NOT PLACE DRAIN COCK IN RETURN PIPING LINE. Installer should provide suitable drain connection before assembling jacket to boiler.

EXTERNAL HEATER TAPPINGS

Boilers are provided with two 3" tappings on Back Section below water line for external water heater. Knockouts must be removed from rear jacket panel if these tappings are used.

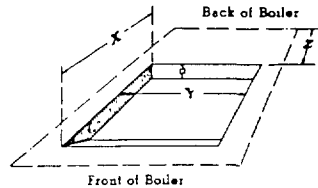
CAUTION—WATER BOILERS

The expansion tank should not be set in a cold or an exposed place. If the pipe leading to or from the tank freezes, serious damage may result. If valve of any description is installed in the piping leading to or from the expansion tank **BE SURE THAT IT IS OPEN WHILE THE BOILER IS IN OPERATION.**

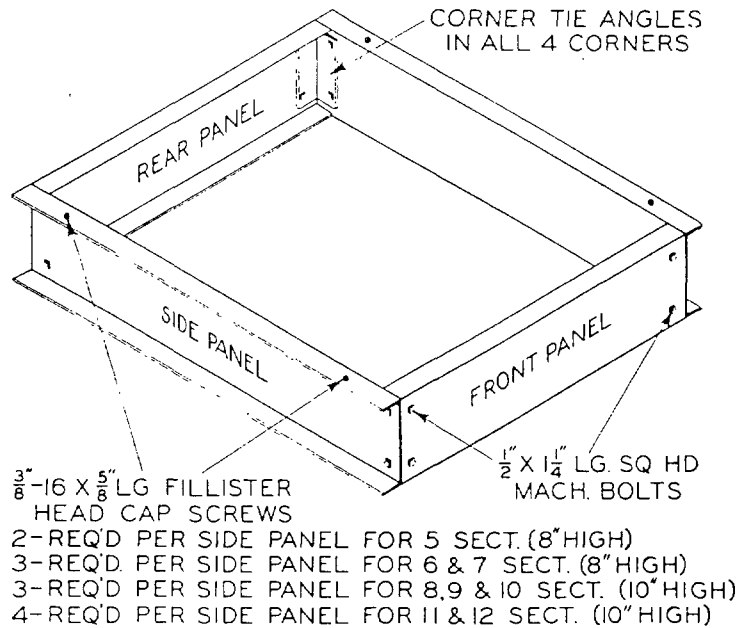
USE THIS BOOK

FOR REFERENCE WHEN ERECTING BOILER,
ORDERING PARTS AND FOR OPERATION

ASHPIT DIMENSIONS



NUMBER OF SECTIONS	DEPTH OF ASHPIT	DIMENSIONS		
		"X"	"Y"	"Z"
5	12	33-1/2	41	4
6	12	41	41	4
7	12	48-1/2	41	4
8	12	56	41	4
9	12	63-1/2	41	4
10	12	71	41	4
11	12	78-1/2	41	4
12	12	86	41	4



STEEL PEDESTAL BASE SEE PAGE 10 FOR
DETAILS AND DIMENSIONS

Sections must be assembled according to the arrangements listed below to insure proper operation of boiler and that jacket openings match with connecting sections.

CODE LETTERS

FX - Front Connecting

CX - Center Connecting

FC - Front Center

RC - Rear Center

C - Center

RCX - Rear Center Connecting

EX - Back Connecting

STEAM BOILER NUMBERS			ARRANGEMENT OF SECTIONS FROM FRONT OF BOILER											
HAND FIRED	AUTOMATICALLY FIRED OIL	STOKER	1	2	3	4	5	6	7	8	9	10	11	12
A-705-S	A-705-SO	A-705-SC	FX	C	C	C	HX							
A-706-S	A-706-SO	A-706-SC	FX	C	CX	C	RC	BX						
A-707-S	A-707-SO	A-707-SC	FX	C	C	CX	C	RC	EX					
A-708-S	A-708-SO	A-708-SC	FX	FC	C	CX	C	RC	RC	BX				
A-709-S	A-709-SO	A-709-SC	FX	FC	CX	C	C	CX	RC	RC	BX			
A-710-S	A-710-SO	A-710-SC	FX	FC	CX	C	C	CX	C	RC	RC	EX		
A-711-S	A-711-SO	A-711-SC	FX	FC	FC	CX	C	C	CX	RC	RC	RC	EX	
A-712-S	A-712-SO	A-712-SC	FX	FC	FC	CX	C	C	CX	C	RC	RCX	RC	EX

WATER BOILER NUMBERS			ARRANGEMENT OF SECTIONS FROM FRONT OF BOILER											
HAND FIRED	AUTOMATICALLY FIRED OIL	STOKER	1	2	3	4	5	6	7	8	9	10	11	12
A-705-W	A-705-WO	A-705-WC	FX	C	C	C	BX							
A-706-W	A-706-WO	A-706-WC	FX	C	CX	C	RC	BX						
A-707-W	A-707-WO	A-707-WC	FX	C	C	CX	C	RC	BX					
A-708-W	A-708-WO	A-708-WC	FX	FC	C	CX	C	RC	RC	BX				
A-709-W	A-709-WO	A-709-WC	FX	FC	CX	C	C	CX	RC	RC	BX			
A-710-W	A-710-WO	A-710-WC	FX	FC	CX	C	C	CX	C	RC	RC	EX		
A-711-W	A-711-WO	A-711-WC	FX	FC	FC	CX	C	C	CX	RC	RC	RC	EX	
A-712-W	A-712-WO	A-712-WC	FX	FC	FC	CX	C	C	CX	C	RC	RCX	RC	EX

NOTE: - "X" in code designates 4" tapping.

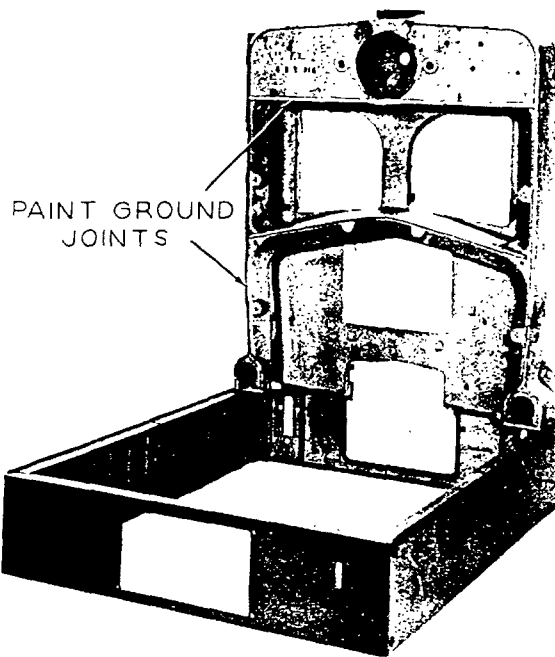


Fig. 1

1. **IMPORTANT** - In setting up boiler for Oil or Stoker Firing, it is necessary that adequate clearance and combustion space be provided for proper functioning of the particular oil burner or stoker to be installed. Where necessary, boiler should be raised by bricking up base or pitting to provide required head room or clearance between boiler crownsheet and oil burner or stoker retort.

For Stoker Installation it is recommended that Minimum Setting Height be in accord with the data shown in the Technical Manual published by the Stoker Manufacturers Association.

OPTIONAL STEEL PEDESTAL BASE - Two heights of steel pedestal bases are available for optional use in elevating oil boilers to obtain more clearance between the boiler crownsheet and oil burner. The 8" steel base is used for 5, 6 and 7 section boilers. The 10" steel base is used for 8 section and larger boilers.

When provided, the steel base must be assembled by the installer. Each of the two side channels have two or more $\frac{3}{8}$ " tapped holes in one flange only. **THIS FLANGE MUST BE AT TOP** when base is assembled.

Bolt a corner angle piece to each end of the Front and Rear Channels between flanges. Angles must be flush at each end. Leave bolts slightly loose. Place the end channels between the side channels and bolt corners. Use $\frac{1}{2}$ " bolts and lock washers as provided for entire base assembly. See Page 2.

See that all corners are square and that sides and ends are in the same plane, then draw all nuts up uniformly tight. Assemble $\frac{3}{8}$ " Fillister Head Cap Screws provided, in all of the tapped holes in the top flange of the side channels. Level base in final position with regard to chimney before mounting cast iron base.

2. **CAST IRON BASE** - Bolt side base panels together (except for 5 section boiler) with $\frac{1}{2}$ " x $1\frac{1}{2}$ " bolts provided. Tighten nuts only moderately. 6 through 10 section boilers have two piece sides, 11 and 12 section boiler have three piece sides.

Assemble the bolted side panels to the Front and Back base panels with the ribs inside. Use $\frac{1}{2}$ " x $1\frac{1}{2}$ " bolts and tighten nuts only moderately. See that all corners are square and that bolted side panels are in proper alignment before tightening nuts on all bolts, then level base in final position with regard to chimney. See Fig. 1.

BASE FOR AUTOMATICALLY FIRED BOILERS - Cover plates are provided for unused openings in the base. Before starting assembly of sections, installer should attach large connecting arm opening cover plates to the front base panel and small cover plates with straps to the back base panel. Close the draft opening in the back base panel with sheet steel cover plate and four screws provided.

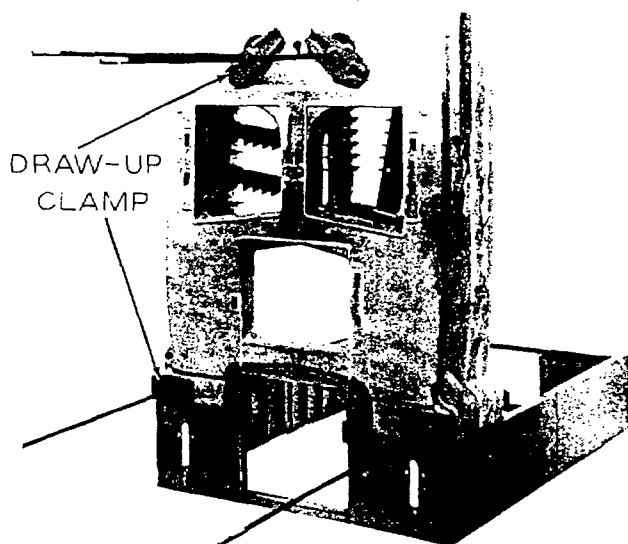


Fig. 2

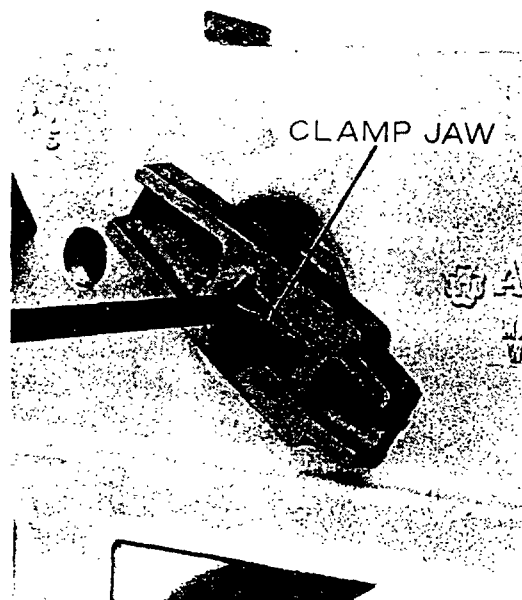


Fig. 3

3. ASSEMBLY OF SECTIONS - Center the front section on base and support with prop. Important! The two $3/8$ " tapped holes in the front section at either side of the clinker grate opening must be in line with the elongated holes in the front base panel. Clean nipples and nipple openings with Kerosene or gasoline and apply good lubricating oil. DO NOT USE PAINT OR RED LEAD. See Fig. 1.

Drive nipples squarely into approximate final position using block of wood and hammer or preferably an aluminum headed hammer if available. See Page 6 for instructions regarding nipples and use of nipple setting gauge.

Paint ground joints of each section with red lead before adding next section.

From arrangement of sections (see table on Page 3), select next section according to code letters on section. IMPORTANT - SECTIONS MUST BE ASSEMBLED IN PROPER ORDER AND FACED CORRECTLY. Word FRONT on FC section and word REAR on RC and RCX sections indicates how these sections are to be faced in relation to front of boiler. Sections marked C or CX are reversible in boiler.

Clean nipple openings and place sections on nipples in front section.

To facilitate assembly, it is advisable to enter the upper nipple first in its port, then enter the lower nipples in their respective ports.

Place nut and flat washer on one end of each of two tie rods and insert tie rods from the rear, one in each of the two holes on either side of the upper nipple port.

Place plain assembling block together with nut and washer on each of the two remaining rods and insert, from the rear, one through each of the lower nipple ports and tappings in the front section. See Fig. 2.

Place large draw-up clamp on each of the upper rods and small draw-up clamp on each of the lower rods. Insert loose jaws in clamps and tap lightly with hammer to insure tight grip on rods. Fig. 3 shows clamp and jaw in position for drawing up sections.

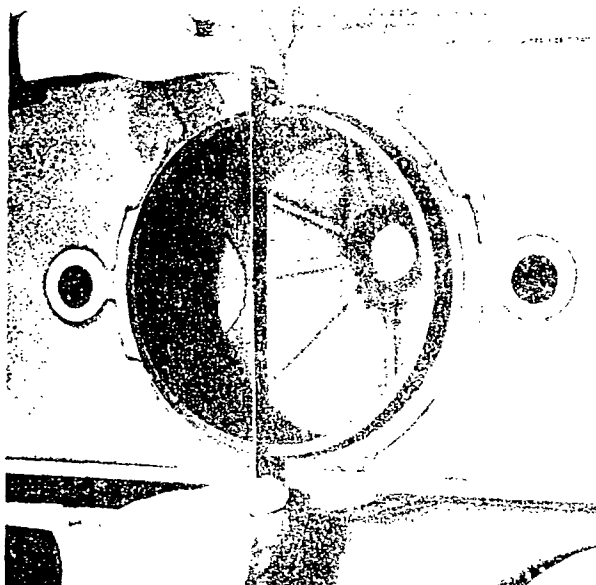


Fig. 4

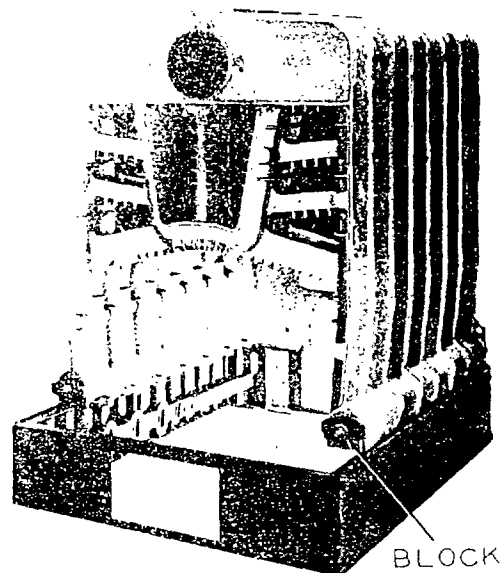


Fig. 5

4. Drive section in place with heavy block of wood, striking blows as squarely as possible over nipples. Draw-up evenly on all tie rod nuts starting with lower tie rods. Tighten nuts alternately until sections make contact at ground joints.

Continue assembling sections in their respective order. NEVER ASSEMBLE MORE THAN ONE SECTION AT A TIME.

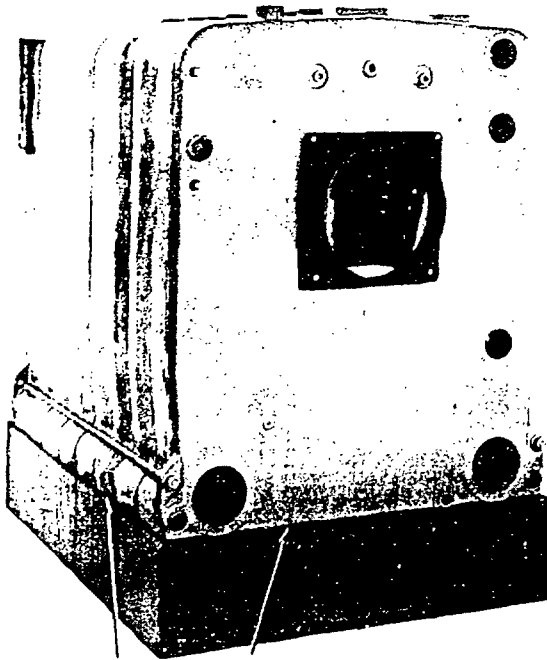
NOTE: - AVOID DAMAGING THE TIE ROD THREADS WHEN ATTACHING DRAW-UP CLAMPS AND WHILE DRAWING UP SECTIONS. APPLY OIL OR GREASE FREELY TO TIE ROD THREADS WHILE ASSEMBLING SECTIONS TO PREVENT STRIPPING OF THREADS ON ROD.

Special nipple setting gauge is provided for larger nipple. Gauge nipple in both directions to insure that same is driven squarely and to proper depth into nipple opening. Outout in gauge must rest on nipple, with legs of gauge touching finished face of section, when nipple is properly driven. See Fig. 4.

Use rule or suitable gauge for smaller nipples, to insure that same are properly driven and project equally all around. Nipples must project 1/16" inch more than half their length outside of finished face of section.

It is important that nipples be driven as directed, to insure tight joints. Most nipple leaks are caused by tilted or cocked nipples.

5. HAND FIRED BOILER - After all sections are assembled except the Back, bolt front and rear halves of grate connecting arms together (except for 5 and 6 section sizes) with 1/2" x 1-3/4" bolts, lock washers and nuts provided. Insert grate connecting arms through openings in front and slots in rear base panels. BE SURE that connecting arms with links are to FRONT ON LEFT SIDE AND TO REAR ON RIGHT SIDE, when facing boiler from front. See Fig. 5.



GROUT WITH CEMENT

Fig. 6

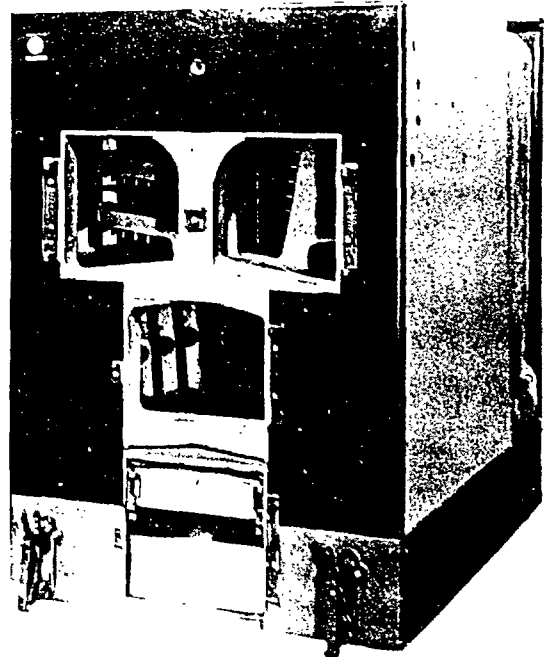


Fig. 7

6. Remove upper and lower tie rods with draw-up clamps and assembling blocks. Place Back on base and engage nipples. Insert tie rod in each of the two upper cored holes and through the lugs on each side of the Front and Back Sections.

Place regular steel nuts and flat washers on rods and draw nuts up evenly on all four rods until Back and next to Back sections are tight at ground joints.

7. AFTER SECTIONS ARE ASSEMBLED COMPLETE: Remove steel tie rod nuts at front of boiler and place sheet metal compression washers on rods with open (cupped) side against regular washer. See that upper rods do not project more than $1/4$ " beyond face of Front and that lower rods project equally at front and rear. Place safety nuts on front end of tie rods against compression washers. Lubricate nuts well and tighten with fingers only; failure to observe this may result in damage to boiler. See Page 1

By use of pinch bar adjust the entire boiler assembly on its base as found necessary to enter two $3/8$ " x 1" hex. head cap screws with flat washers into the front section tappings through the two elongated holes in the front base panel.

See that the boiler assembly is against the front base panel and then draw both cap screws up tight.

8. HAND FIRED BOILER - Grate bars must be installed through the door openings in the front. Two narrow $5-9/16$ " grate bars are provided for all sizes of hand fired boilers, one each for the front and back sections.

Install the first narrow grate bar on the trunnions of the back section. Hold the grate bar in a slanting position so that the shaking arm trunnion can be inserted in the rear loop of the connecting bar, then engage the grate bar with the trunnions on the section.

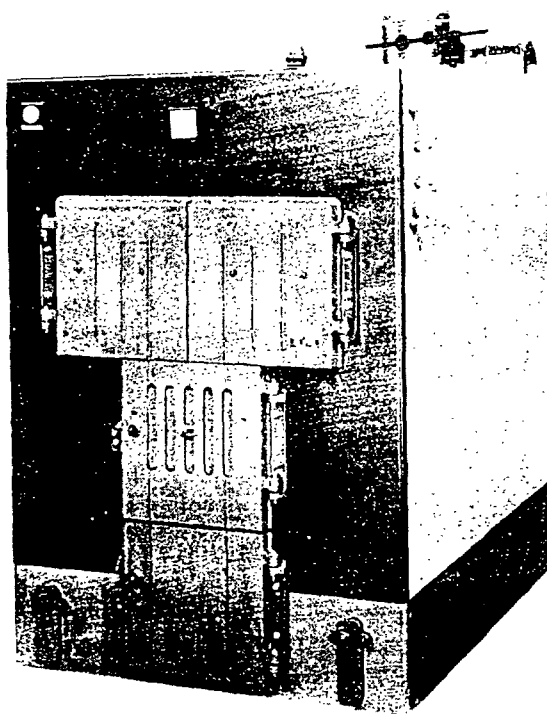


Fig. 8

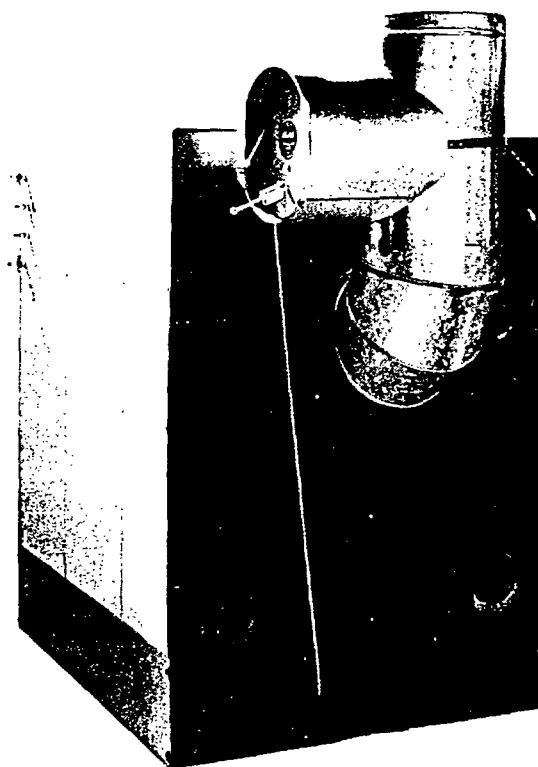


Fig. 9

Proceed in like manner to install all of the wide, 7-1/4" grate bars, and finally, the remaining narrow grate bar at the front.

9. Assemble angle lever plates and ashpit door hinge and catch to the front base panel. Use 5/16" square head bolts and lock washers for the plates. Use 3/8" square head bolts for the hinge and for the catch. Attach the angle lever and link assemblies to the angle lever plates and the grate connecting arms using the drilled rivets and cotter pins provided.

10. Assemble the clinker grate at the front by placing the lower lugs in the pockets formed between the section and the base panel and raising the grate until the upper lugs on the grate can be inserted behind the projecting lugs in the front panel opening. See Fig. 7.

11. Paint ground seat on face of back section with red lead and attach smoke collar with 3/8" hex. cap screws provided. Attach the draft pouch assembly to the back base panel with 1/4" bolts provided. See Fig. 6.

Attach flow and return piping lines and insert all bushings and plugs in sections. **IMPORTANT** - See instructions for testing boiler on Page 1.

12. **OIL FIRED BOILERS** - Refractory crownsheet baffles are provided for the 5 section boiler only. The baffles are assembled by entering the boiler through the door opening in the front section. Either baffle may be placed first as far back as possible, with the straight or bottom edge resting on lugs located at either side of the back and next to back sections. Rest the upper rear end on the cast-on lug located on the center face of the back section.

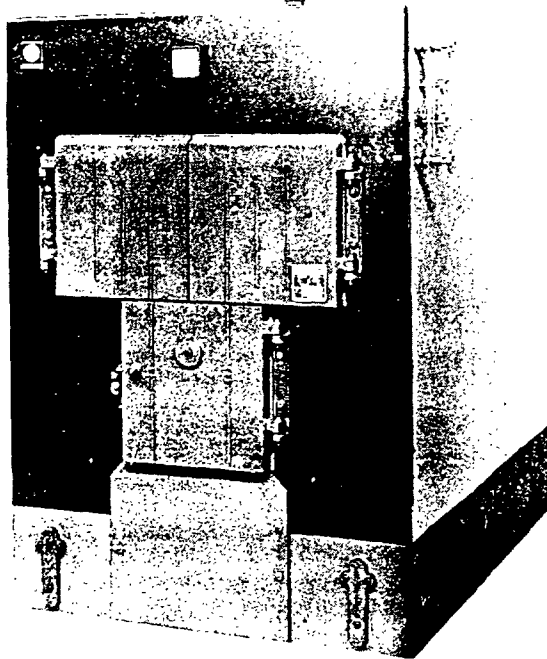


Fig. 10

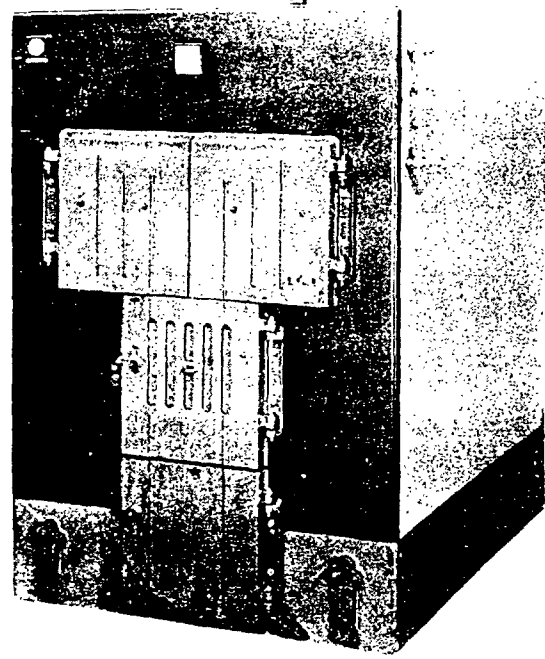


Fig. 11

Place the remaining baffle on the side lugs as directed for the first baffle and raise the upper edge approximately to the crown sheet. Raise the upper edge of the first baffle and interlock the two upper edges as the baffles are lowered together.

Four upper and two bottom hot flue baffles are provided for five to eight section oil boilers inclusive. The baffles with rectangular ends are used in the two upper and two intermediate outside flues on each side. The baffles with the angular shaped ends are used in lower outside flues. The hot flue baffles should be installed with ends at the joint line (high point) of the NEXT TO FRONT section. Baffles should rest on the short projections cast on each end. See Page 20.

13. Putty outside of sections at joints with boiler putty also at joint between front section and front base panel. Grout between bottom of sections and base and between base and floor with a mixture of one part of Portland cement and three parts of asbestos cement.

14. ASSEMBLY OF JACKET - Attach left lower front panel and right lower front panel using 1/4-20" x 1/2" washer head jacket screws. Do not draw screws up tight.

15. Assemble four special hexagon jacket studs, as provided, in 3/8" tappings on face of back section. Remove knockouts as required for pipe connections and controls from both halves of the rear jacket panel.

Attach the right hand half (viewing from front) of the rear panel, then the left hand half to the jacket studs using 1/4-20" x 1/2" washer head screws. Insert jacket screws in all holes of the joint, at center.

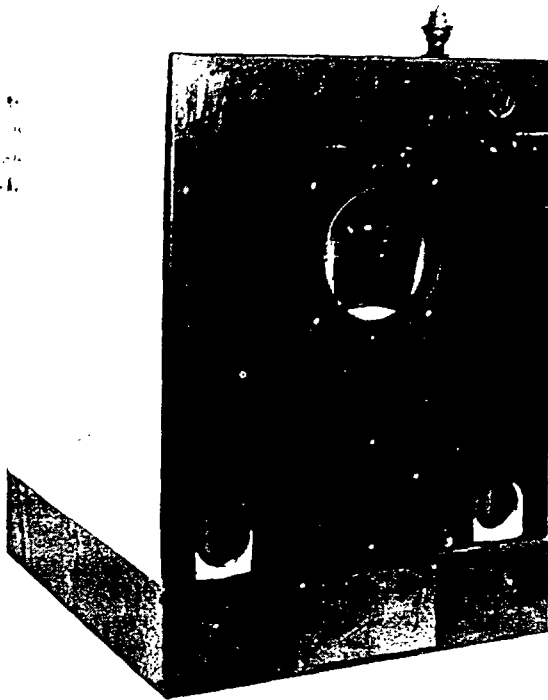


Fig. 12

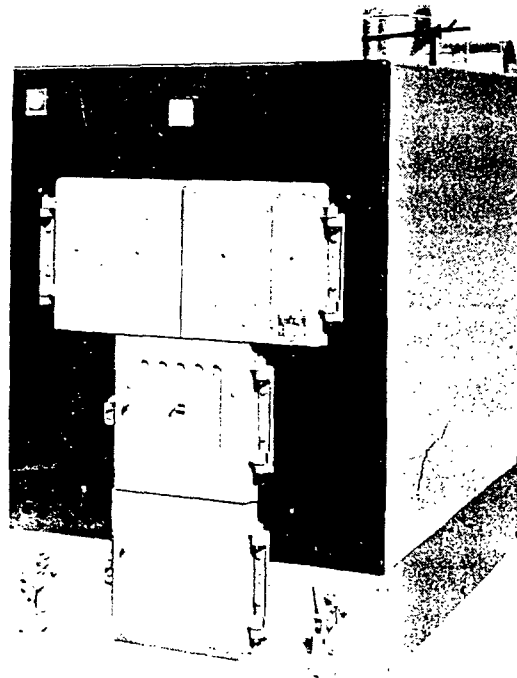


Fig. 13

16. JACKET SCREWS - Except as noted, jacket is assembled with #10 x 1" Sheet metal screws throughout. Screws should be inserted in all holes of adjacent panels as assembly progresses. DO NOT DRAW SCREWS UP TIGHT UNTIL JACKET IS FULLY ASSEMBLED.

17. Place right front side panel in position with offset at bottom, back of the top edge of the base side. STEAM BOILERS ONLY - Remove knockout pieces for gauge glass and try cock fittings before assembly. See that front panel is outside of the projecting lug on corner of the front base panel, then attach side panel to front panel. See Fig. 7

18. Assemble right hand intermediate panel (except for five section boiler) then the right hand rear side panel.

19. Place the upper front panel in position and insert sheet metal screw in the remaining hole of the right front side panel. Assemble the left front side panel and remaining left side panels same as directed for the right hand side jacket panels.

20. Assemble the top jacket panels in the following order. Right hand front, right hand intermediate, except for 5 section boiler, then right hand rear. Assemble the left hand top panels in the same order using #10 x 1" sheet metal screws except for the center joint where #10 x 1/4" sheet metal screws are provided.

After jacket is completely assembled, all screws should be drawn up uniformly tight.

21. Attach door hinges and catches and make only moderately tight. Lug on back of hinge or catch must rest on lower inside edge of pocket. Doors should lift over catches easily and seat firmly against section when closed. Correct adjustment is obtained by tapping hinge plate (near top) on inner side in case door binds on catch. Catch for cleanout doors may be moved up slightly, if required, to facilitate fitting.

If door does not engage catch properly, tap outer side of hinge plate near top. Ashpit door hinge can be tapped up or down as required. Tighten bolts after adjustments are completed.

22. STEAM BOILERS - Install pressure and vacuum gauge, water column trim, automatic regulator and safety valve. In case of territory where one 3" or two smaller safety valves are provided it will be necessary to remove the knockout from the rear jacket panel opposite the uppermost 3" tapping on the back for safety valve installation. No. 269 Low Water Cutoff is available for optional use on steam boilers.

Fig. 8, shows hand fired steam boiler, assembled complete.

Fig. 9, shows hand fired steam boiler (rear view) complete with Barometric draft control installed in vertical smoke pipe.

Fig. 10, shows oil fired, steam boiler assembled complete.

Fig. 11, shows stoker fired, steam boiler assembled complete.

Fig. 12, shows rear view of automatically fired (oil or stoker) steam boiler assembled complete.

23. WATER BOILERS - Install combination altitude gauge and thermometer and hand control post assembly. The latter is installed with 1" x 3/4" bushing (provided) in the 1" tapping on top of the back section. Install relief valve, See Table on Page 20 for location.

Fig. 13, shows hand fired, water boiler, assembled complete, with hand controlled regulation.

A-7 BOILER

INSTRUCTIONS FOR ATTACHMENT AND OPERATION OF DRAFT CONTROL FOR HAND FIRED BOILERS

AUTOMATIC REGULATOR FOR STEAM BOILERS

1. Face regulator with the screw in the rocker toward front of the boiler.
IMPORTANT - Use wrench on hexagon portion of regulator for installing or adjusting after the installation.
2. Insert regulator lever in the rocker with notch on top and short end toward back of boiler. Tighten screw to engage notch in the regulator lever.
3. Attach "S" hooks to rear end of regulator lever and to draft door.
4. Install the Reverse Acting Barometric Draft Control in the smoke pipe according to the installation instructions furnished. The control lever must be kept within reasonable working alignment of the "S" hook on the automatic regulator lever.
5. Place counterweights at long end of regulator lever, near center temporarily.
6. Engage end of draft chain with "S" hook on regulator lever. Engage "S" hook on draft door in link of chain which will hold draft door slightly more than half open when the long end of the regulator lever is held down. Cut chain to length after allowing 5 or 6 links for draft door adjustment.
7. Engage end of the cutoff length of chain with "S" hook on the regulator lever. Assemble the cylindrical counterweight to the operating lever of the Barometric control
8. Connect "S" hook with eye of Barometric control lever and raise the weight until the free end of the control lever permits the gate to close, then engage the "S" hook with a suitable link in the short chain so that the gate remains closed when the front end of the regulator lever is held down by the two counterweights, BUT REQUIRES ONLY SLIGHT EFFORT TO RAISE.
9. Counterweights are adjusted on regulator lever to suit temperature requirements. After boiler is fired and pressure rises to approximately 2 Lbs. as indicated by steam gauge, front end of regulator lever should rise, thereby closing draft door.

To obtain more heat, move counterweights further from regulator.

To obtain less heat, move counterweights closer to regulator.

See instructions enclosed with the Barometric Draft Control for adjustment.

See Page 13 for installation of draft control in horizontal smoke pipe.

HAND CONTROL FOR WATER BOILERS.

1. Attach hand control post with graduated projection toward the back of the boiler.
2. Attach regulator lever to post with bolt in square pocket provided on head of the post and threaded clamp handle. Notch in lever should be toward back of boiler.
3. Pull front end of lever down and lock in place with clamp. Attach "S" hook to rear end of lever and engage with end of draft chain.
4. Attach "S" hook to draft door and engage a link in the chain which will hold the door slightly more than half open. Cut chain to length after allowing 5 or 6 links for draft door adjustment.

HAND CONTROL FOR WATER BOILERS - CONTINUED

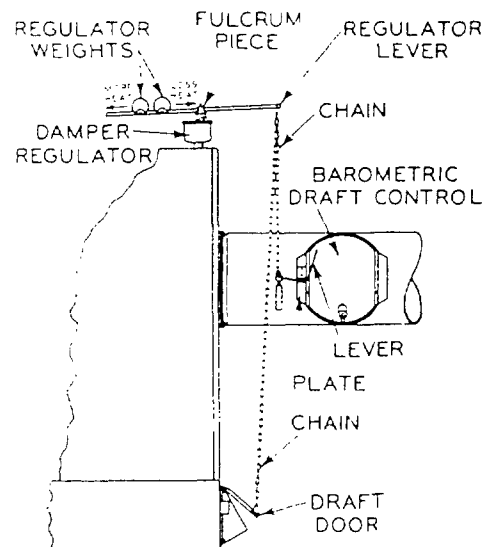
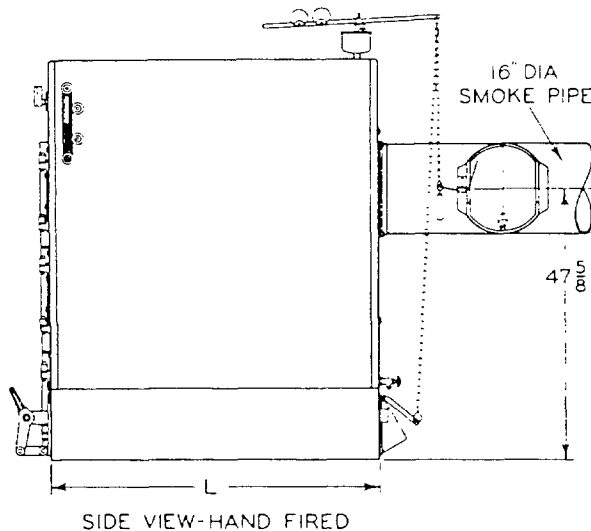
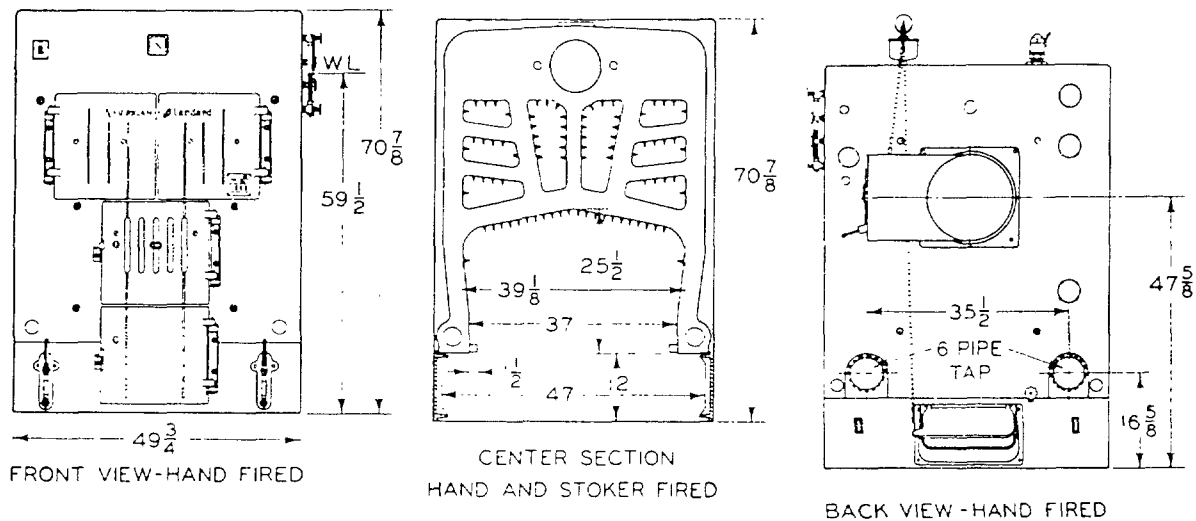
5. Connections to Barometric Draft Control are made same as outlined for steam boiler. Adjust hand control to suit temperature requirements.

To obtain more heat, loosen clamp and push rear end of lever up to increase draft opening.

To obtain less heat loosen clamp and pull rear end of lever down to decrease draft opening.

Tighten clamp after regulating draft.

BOILER DIMENSIONS



FILLING SYSTEM

CAUTION: Never start boiler unless it is properly filled. Steam boilers should be filled until water is visible approximately half way up in the water gauge glass. After boiler is in operation make-up water should be added slowly.

Fill open hot water system $1/3$ height of expansion tank. Remove rim and glass from the Altitude and Temperature gauge and set movable pointer under the automatic pointer, then replace rim and glass.

When filling a closed hot water system, the pressure must not exceed 50 Lbs. If it does, it must be relieved immediately and the relief valve failure investigated and corrected, otherwise pressure may build up and cause damage to heating system.

ATTENTION TO BOILER WHILE IN OPERATION

Keep water in steam boiler approximately half way up in the water gauge glass.

Keep open water system filled to $1/3$ of expansion tank as indicated by the moving hand being even with the stationary hand on the Altitude gauge. PRESSURE MUST NOT EXCEED 50 LBS. on any system. IF IT DOES, IT MUST BE RELIEVED IMMEDIATELY AND THE CAUSE OF FAILURE INVESTIGATED AND CORRECTED, OTHERWISE PRESSURE MAY BUILD UP AND CAUSE DAMAGE TO HEATING SYSTEM.

Clean boiler surfaces at regular intervals. Keep radiators and convectors clean.

Do not draw water from boiler while in use. When adding water while boiler is in operation, do not open supply valve fully but add water slowly.

On Steam boilers - at the start of each heating season and once or twice during season try SAFETY VALVE to be sure it is in working condition. To do this fasten wire or cord to lever of valve and pull lever - standing a safe distance away from valve.

If a hot water radiator is hot at the bottom but not at the top, it indicates that air has accumulated inside and should be vented. To vent radiator: Hold small cup under air vent (located near top of radiator), open vent until water escapes and then close.

If much water is added to system, it is advisable to heat system to a high temperature and vent again. This will make less venting necessary during the winter.

Where an expansion tank is used, make sure that neither the tank nor its drain pipe is exposed to freezing temperatures. If valve of any description is installed in the piping leading to or from the expansion tank BE SURE THAT IT IS OPEN WHILE THE BOILER IS IN OPERATION.

ATTENTION TO BOILER WHILE NOT IN OPERATION

At end of heating season clean boiler surfaces thoroughly and remove ash and unburned fuel from grate and ashpit. Spray flue and firebox surfaces with light lubricating or crankcase oil using gun with extended stem so as to reach all corners.

Leave boiler doors and dampers open to permit air circulation through boiler. Clean and remove smokepipe where feasible and oil door hinges.

With steam boilers, at end of season add sufficient water to fill boiler to top of water column and leave it that way until fall, when water should be drained again to proper level. If at this time boiler water is dirty, drain water, flush out boiler, and refill with clean water to prescribed water level.

On water boilers keep system filled with water. In other words, leave water alone. It is advisable in fall to drain a little water to remove sludge but not more than necessary.

IF BOILER IS NOT USED DURING WINTER TIME IT MUST BE FULLY DRAINED (See Page 1)

ATTENTION TO FIRE ON HANDFIRED BOILERS

GENERAL RULES:

1. Give boiler regular attention especially in severe weather when boiler is operating under full load.
2. Observe firing instructions. Do not disturb fire by unnecessary frequent poking and firing in dribblets.
3. When attending to fire keep draft damper in base closed. Close ash door when opening fire door and vice versa.
4. Do not leave fire door or ashpit door open in order to check or increase fire. Correct adjustment of the dampers on boiler and Barometric draft control (See instructions furnished with control) will regulate fire to supply the amount of heat desired.

Where provided, move weight on regulator arm so that the draft door will open or close at the desired pressure or temperature. Moving weight toward front of boiler increases pressure or temperature.

5. Do not let ashes accumulate under the grate in ashpit, otherwise burned out grates and corroded base may result. Remove ashes daily.
6. If fire does not burn evenly over the entire grate and seems sluggish in starting up after grates have been well shaken, cleaning of the firebed is required. This is best done by allowing the fire to burn down until a thin layer of fuel is left on the grate. Shake well and remove slate and clinkers with poker and scraper.
7. If fire was neglected for some time and grate becomes covered with slate and clinkers massed together, the quickest way to get active fire is to break up the mass, dump through grate and build an entirely new fire.
8. If hard clinkers lodge between the grate bars do not force the shaking mechanism too hard. Dislodge the obstruction with poker and avoid breakage of parts. The possibility of material lodging between grates is greatly reduced if grates are not shaken to the dump position or limit of their movement. Ordinary shaking of fire can be accomplished by partial movement of the shaker handle.

FIRING INSTRUCTIONS:

To start fire, open draft damper; place kindling over entire grate and light. Add fuel in small quantities until fire is burning well. Then fill with fuel to a level about halfway up to fire door and bank up in rear. When this fuel is thoroughly ignited or coked, the fire is ready for full charging. When firing hard coal, shake gently, bank up slightly in rear and fill in fuel up to about level of fire door. When firing soft coal, break up fire if required, bank steeply in rear leaving only a thin layer in front. Fire fresh fuel only in the front part and leave glowing coke in rear exposed.

After firing, open air slots in fire door slightly when using hard coal and more when using soft coal. The slots can be closed again when charge has thoroughly ignited or turned into coke. Best setting is found by experience. Caking soft coal should be broken up by stoking about 1 Hour or more after firing, the time depending on operating conditions.

In mild weather, keep about 2 to 3 inches of ash on grate. As more heat is required, reduce thickness of ash layer. Always fire up to level of fire door or more. Shallow fires give poor combustion.

Shake grates only as required, unnecessary shaking wastes fuel. Grate can be locked in level position by catch on base front.

FUEL SIZE:

The size best suited for this boiler is stove size. Larger sizes can be used particularly with soft coal. Nut size fuel will be found generally satisfactory but still smaller sizes should only be used if a strong draft is available. The thickness of the fuel bed with such small sizes should be kept at about 6 inches. When firing small size fuel, always leave glowing coke exposed in rear of boiler to ignite combustion gases.

COMBINATION ALTITUDE AND TEMPERATURE GAUGE FOR WATER BOILERS

IMPORTANT - To avoid damage to gauge or possible impairment of its accuracy. DO NOT INSTALL UNTIL BOILER OR SYSTEM HAS BEEN WATER TESTED FOR TIGHTNESS.

Combination Gauge is used with water boilers and is connected into tapping at front of boiler. Gauge serves to indicate the following:

1. Temperature of water at the boiler.
2. Height of water level in feet above the gauge for OPEN SYSTEMS where expansion tank is used.
3. Water Pressure in pounds per square inch for CLOSED SYSTEMS where pressure is controlled by means of automatic relief or regulating valves WITH or WITHOUT use of air tight pressure or cushion tank.

IN CASE OF OPEN SYSTEM, where expansion tank is used it will be necessary to fill system with water up to 1/3 of the expansion tank as directed under "FILLING SYSTEM". The rim and glass in gauge should then be removed after loosening two screws or other means of holding rim in place.

It will be found that the automatic pointer on the ALTITUDE SCALE, which indicates HEIGHT IN FEET and PRESSURE IN POUNDS has moved up and indicates height of water level about the boiler in the expansion tank. The adjustable pointer (generally finished in color) should then be moved by hand UNTIL DIRECTLY UNDER AUTOMATIC POINTER.

Any loss of water within the system will be indicated by the AUTOMATIC POINTER receding to a smaller figure on the Altitude Scale at which time the water supply should be opened until the Automatic Pointer is again directly over the Adjustable Pointer.

After setting Adjustable Pointer, replace rim and glass and tighten screws.

CLEANING BOILERS

The grease used to lubricate the cutting tools during erection of new piping systems serves as a carrier for sand and dirt, with the result that a scum of fine particles and grease accumulates on the surface of the water in all new boilers, while heavier particles may settle to the bottom of the boiler and form sludge. These impurities tend to cause foaming, preventing the generation of steam and causing an unsteady water line.

This unavoidable accumulation of oil and grease should be removed by blowing-off the boiler as follows; If not already provided, install a surface blow connection of at least 1-1/4" nominal pipe size with outlet extended to within 18 inches of the floor or to sewer, inserting a valve in line close to boiler. Bring the water line to center of outlet, raise steam pressure, and while fire is burning briskly open valve in blow-off line. When pressure recedes, close valve and repeat process adding water at intervals to maintain proper level. As a final operation bring the pressure in the boiler to about 10 Lb., close blow-off, draw the fire or stop the burner, and open drain valve. After boiler has cooled, partly fill and flush out several times before filling it to proper water level for normal service. The use of soda or any alkali, vinegar or any acid is not recommended for cleaning heating boilers because of the difficulty of complete removal and the possibility of subsequent injury after the cleaning process has been completed.

Keep system in good repair. It is advisable to have it inspected by your heating contractor at least once a year.

GIVE BOILER SIZE and SERIES NUMBER WHEN
ORDERING REPAIR PARTS

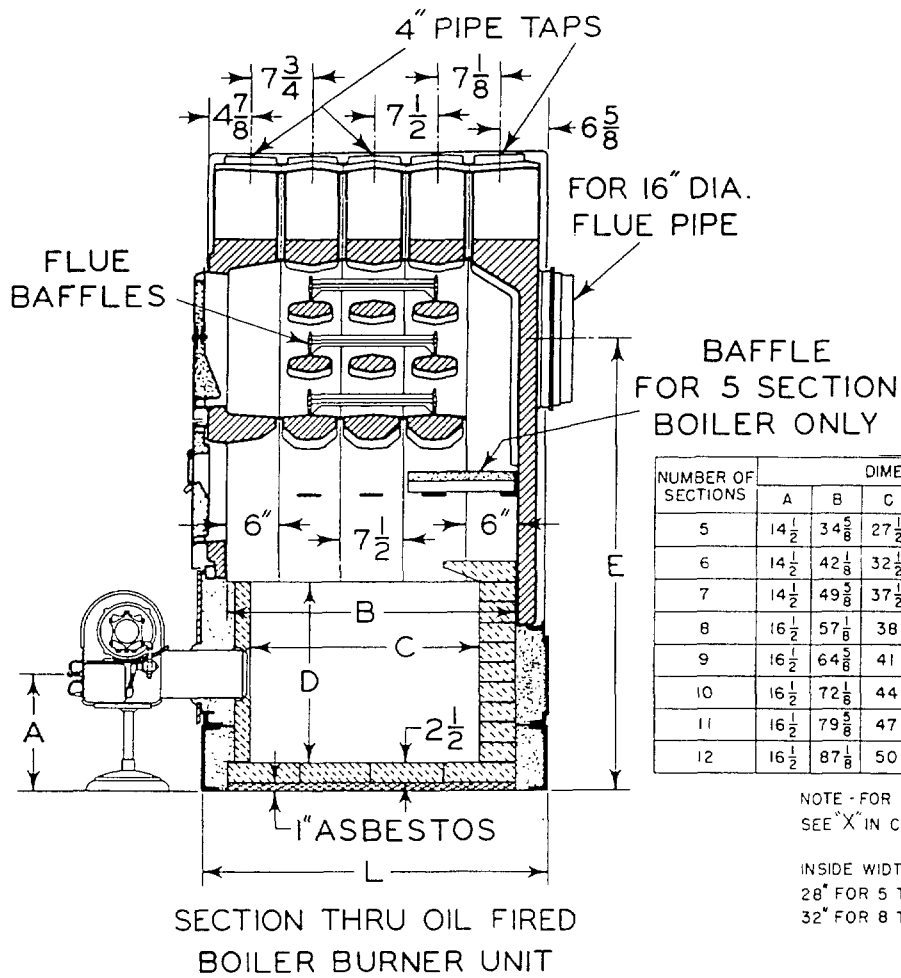
Fill hot water systems as follows:

Open all radiator valves, but keep vents at top of radiator closed. Fill open systems until hands on altitude gauge are even. If it is a closed system the water filling will stop automatically when proper pressure is reached. (Pressure should not exceed 50 pounds). Then, beginning with ground floor, vent each radiator as directed above. It may be necessary to add water during this operation to expel air from higher radiators.

If much water is added to system, it is advisable to heat system to a high temperature and vent again. This will make less venting necessary during the winter.

Where an expansion tank is used, make sure that neither the tank nor its drain pipe is exposed to freezing temperatures. If valve of any description is installed in the piping leading to or from the expansion tank BE SURE THAT IT IS OPEN WHILE THE BOILER IS IN OPERATION.

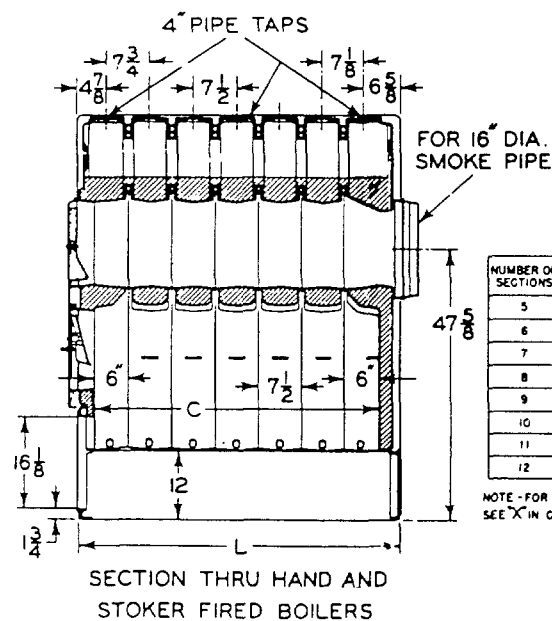
**GIVE BOILER SIZE and SERIES NUMBER WHEN
ORDERING REPAIR PARTS**



NUMBER OF SECTIONS	DIMENSIONS						NUMBER OF 4" FLOW TAPPINGS	NUMBER OF 6" RETURN TAPPINGS
	A	B	C	D	E	L		
5	14 $\frac{1}{2}$	34 $\frac{5}{8}$	27 $\frac{1}{2}$	22 $\frac{1}{2}$	55 $\frac{5}{8}$	42 $\frac{1}{2}$	2	2
6	14 $\frac{1}{2}$	42 $\frac{1}{8}$	32 $\frac{1}{2}$	22 $\frac{1}{2}$	55 $\frac{5}{8}$	50	3	2
7	14 $\frac{1}{2}$	49 $\frac{5}{8}$	37 $\frac{1}{2}$	22 $\frac{1}{2}$	55 $\frac{5}{8}$	57 $\frac{1}{2}$	3	2
8	16 $\frac{1}{2}$	57 $\frac{1}{8}$	38	25 $\frac{1}{2}$	57 $\frac{5}{8}$	65	3	2
9	16 $\frac{1}{2}$	64 $\frac{5}{8}$	41	25 $\frac{1}{2}$	57 $\frac{5}{8}$	72 $\frac{1}{2}$	4	2
10	16 $\frac{1}{2}$	72 $\frac{1}{8}$	44	25 $\frac{1}{2}$	57 $\frac{5}{8}$	80	4	2
11	16 $\frac{1}{2}$	79 $\frac{5}{8}$	47	25 $\frac{1}{2}$	57 $\frac{5}{8}$	87 $\frac{1}{2}$	4	2
12	16 $\frac{1}{2}$	87 $\frac{1}{8}$	50	25 $\frac{1}{2}$	57 $\frac{5}{8}$	95	5	2

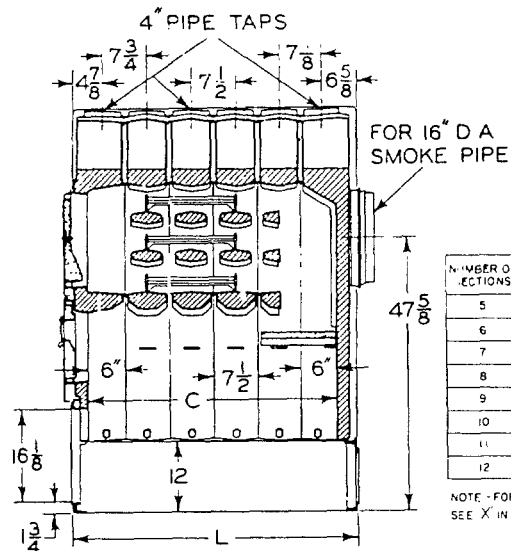
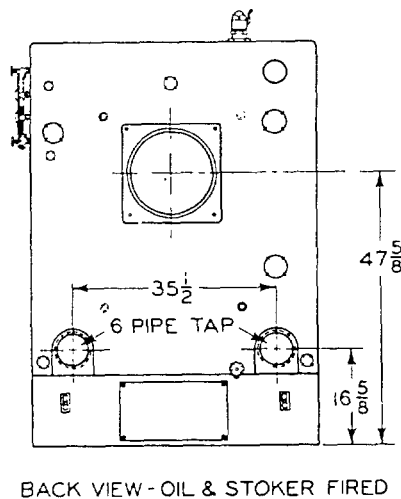
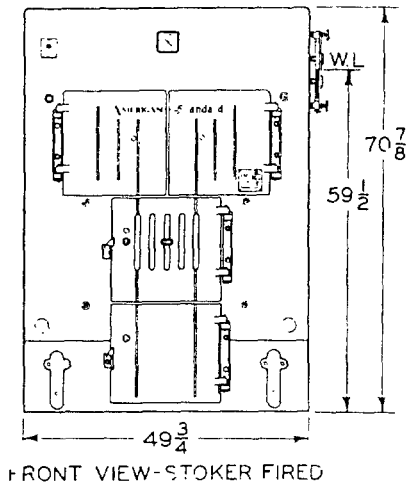
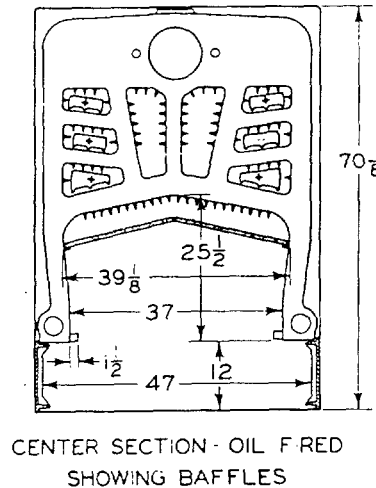
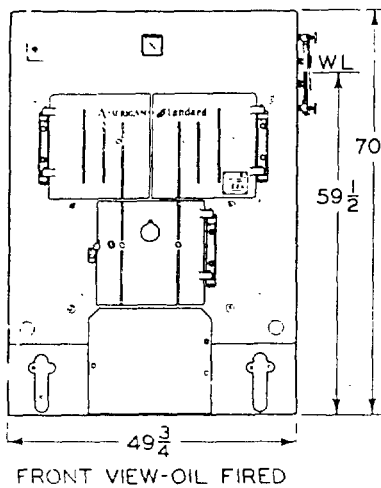
NOTE - FOR FLOW TAPPING LOCATIONS
SEE "X" IN CHART - ARRANGEMENT OF SECTIONS

INSIDE WIDTH OF COMBUSTION CHAMBERS -
28" FOR 5 THRU 7 SECTIONS
32" FOR 8 THRU 12 SECTIONS



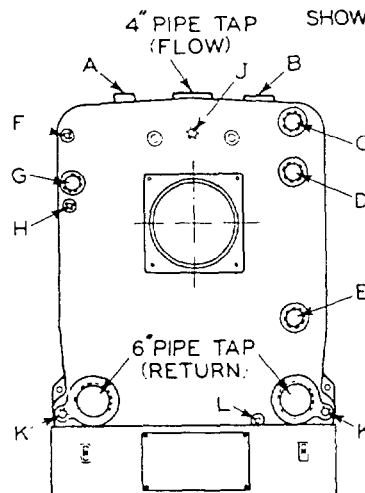
NUMBER OF SECTIONS	DIMENSIONS		NUMBER OF 4" FLOW TAPPINGS	NUMBER OF 6" RETURN TAPPINGS
	C	L		
5	34 $\frac{5}{8}$	41 $\frac{1}{2}$	2	2
6	42 $\frac{1}{8}$	49	3	2
7	49 $\frac{5}{8}$	56 $\frac{1}{2}$	3	2
8	57 $\frac{1}{8}$	64	3	2
9	64 $\frac{5}{8}$	71 $\frac{1}{2}$	4	2
10	72 $\frac{1}{8}$	79	4	2
11	79 $\frac{5}{8}$	86 $\frac{1}{2}$	4	2
12	87 $\frac{1}{8}$	94	5	2

NOTE - FOR FLOW TAPPING LOCATIONS.
SEE "X" IN CHART - ARRANGEMENT OF SECTIONS



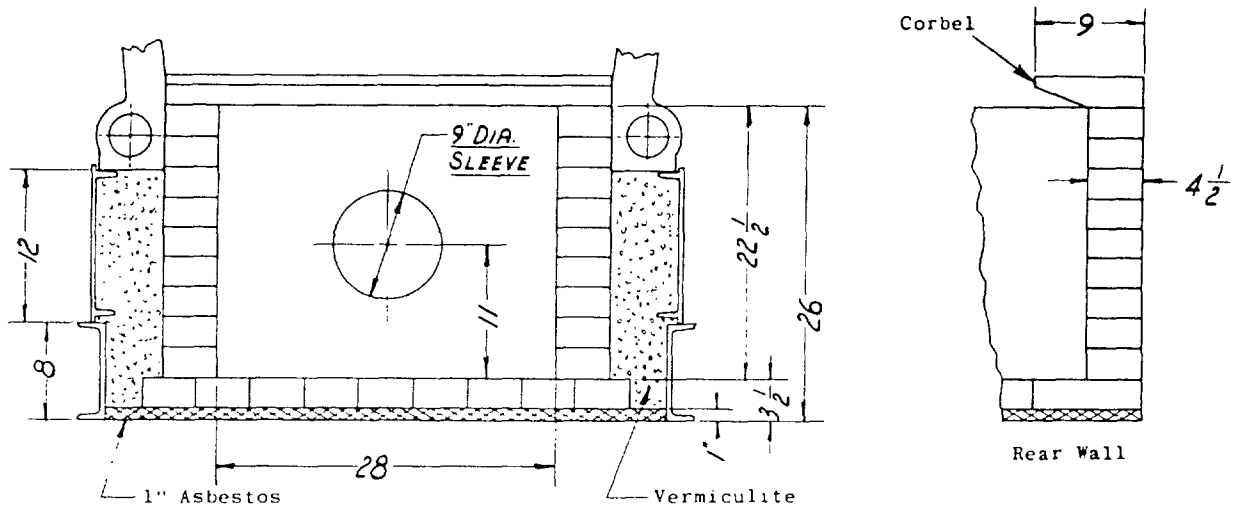
NUMBER OF SECTIONS	DIMENSIONS C L	NUMBER OF 4" FLOW TAPINGS	NUMBER OF 6" RETURN TAPINGS
5	34 1/2 41 1/2	2	2
6	42 1/2 49	3	2
7	49 1/2 56 1/2	3	2
8	57 1/2 64	3	2
9	64 1/2 71 1/2	4	2
10	72 1/2 79	4	2
11	79 1/2 86 1/2	4	2
12	87 1/2 94	5	2

NOTE: FOR FLOW TAPPING LOCATIONS SEE 'X' IN CHART - ARRANGEMENT OF SECTIONS



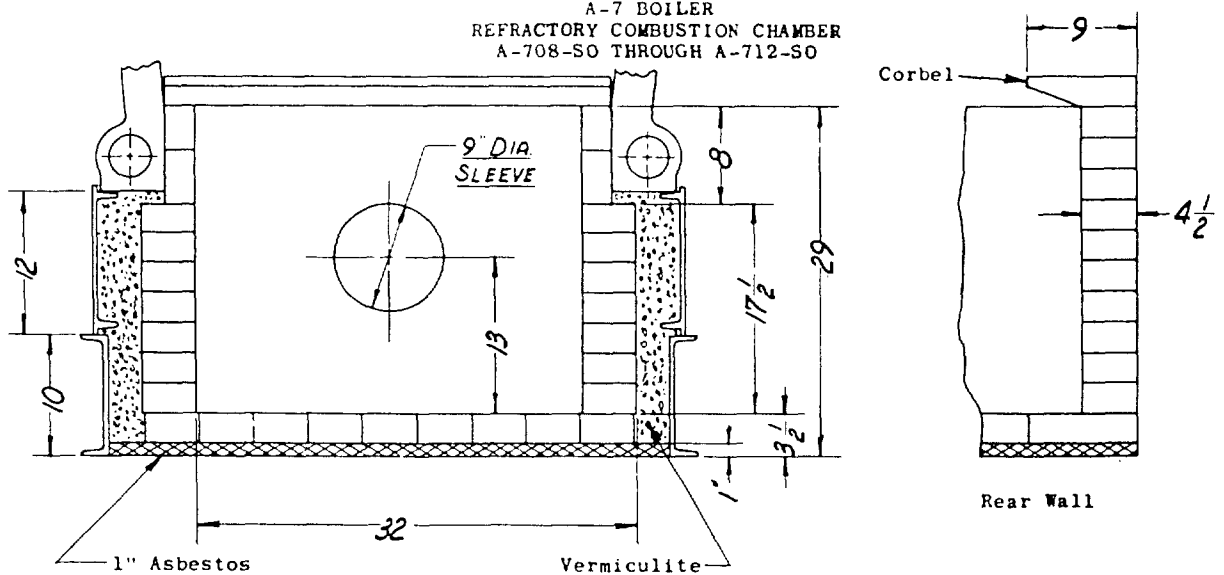
APPLICATION OF CONTROLS FOR AUTOMATICALLY FIRED BOILERS			
LOCATION ON BOILER	SIZE OF PIPE TAP	STEAM BOILERS	WATER BOILERS
A	"	DAMPER REG. HAND FIRED BOILER	NOT USED
B	2"	POP SAFETY VALVE	RELIEF VALVE
C	3"	BLOW OFF OR POP SAFETY VALVE	WATER HEATER EXTERNAL TYPE
D	3"	WATER HEATER EXTERNAL TYPE	WATER HEATER EXTERNAL TYPE
E	3"	WATER HEATER EXTERNAL TYPE	WATER HEATER EXTERNAL TYPE
F	3"	STEAM PRESSURE LIMIT CONTROL	WATER TEMPERATURE LIMIT CONTROL
G	2 1/2"	LOW WATER CUT OFF	NO USE
H	3"	WATER TEMP CONTROL DOMESTIC HOT WATER	WATER TEMP CONTROL DOMESTIC HOT WATER
J	1/2"	INSPECTION OR BLOW OFF TAPPING	INSPECTION OR BLOW OFF TAPPING
K	1 1/2"	INSPECTION OR WASH OUT TAPPING	INSPECTION OR WASH OUT TAPPING
L	1"	DRAIN TAPPING	DRAIN TAPPING

A-7 BOILER
REFRACTORY COMBUSTION CHAMBER
A-705-SO THROUGH A-707-SO



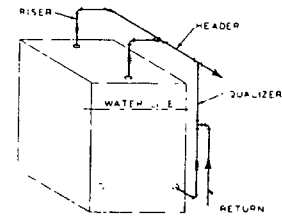
A-705 Chamber Length - 27-1/2" (Inside)
A-706 Chamber Length - 32-1/2" (Inside)
A-707 Chamber Length - 37-1/2" (Inside)

A-7 BOILER
REFRACTORY COMBUSTION CHAMBER
A-708-SO THROUGH A-712-SO

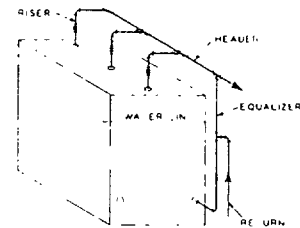


A-708 Chamber Length - 38" (Inside)
A-709 Chamber Length - 41" (Inside)
A-710 Chamber Length - 44" (Inside)
A-711 Chamber Length - 47" (Inside)
A-712 Chamber Length - 50" (Inside)

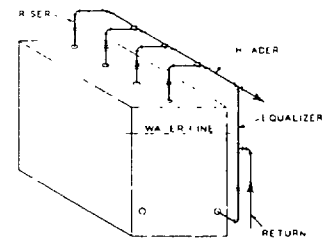
BOILER SIZE	BOILER RISERS	HEADER	EQUALIZER
A-705	4"	5"	2"
A-706	4"	5"	2"
A-707	4"	5"	2½"



BOILER SIZE	BOILER RISERS	HEADER	EQUALIZER
A-708	4"	5"	2½"
A-709	4"	6"	3"
A-710	4"	6"	3"

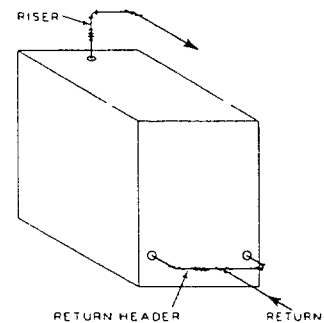


BOILER SIZE	BOILER RISERS	HEADER	EQUALIZER
A-711	4"	6"	4"
A-712	4"	6"	4"

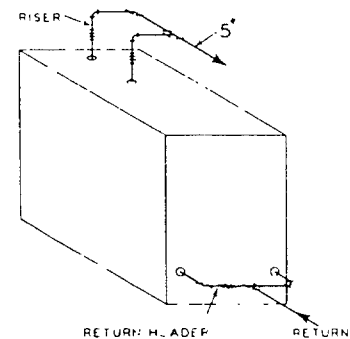


MINIMUM PIPING RECOMMENDATIONS
AUTOMATICALLY FIRED STEAM BOILERS

BOILER SIZE	BOILER RISERS	RETURN HEADER	RETURN HEADER
A-705	3"	3"	3"
A-706	4"	4"	4"
A-707	4"	4"	4"
A-708	4"	4"	4"
A-709	4"	4"	4"



BOILER SIZE	BOILER RISERS	RETURN HEADER	RETURN HEADER
A-710	3"	5"	4"
A-711	4"	5"	4"
A-712	4"	5"	4"



MINIMUM PIPING RECOMMENDATIONS
FOR FORCED CIRCULATION
AUTOMATICALLY FIRED WATER BOILERS



Plumbing and Heating Division
AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
40 WEST 40TH STREET, NEW YORK 18, N.Y.