AMERICAN-Standard

HEATING PLUMBING

ERECTING DIRECTIONS

OPERATING INSTRUCTIONS

PARTS LIST

AMERICAN

SEVERN BOILER

COAL, OIL AND STOKER

AMERICAN RADIATOR & Standard Sanitary

CORPORATION

PITTSBURGH 30, PA.

ARSS 1168 (15-M-6-48)

PLAINTIFF'S EXHIBIT
ASI-571

JACK

SEVERN BOILER

by

AMERICAN-Standard

INSTALLATION–OPERATION AND MAINTENANCE MANUAL

FOR

COAL, OIL AND STOKER

AMERICAN-Standard

First in heating ... first in plumbing

08468

SECTIONS MUST BE ASSEMBLED ACCORDING TO ARRANGEMENTS LISTED BELOW TO INSURE PROPER OPERATION OF BOILER AND THAT JACKET OPENINGS MATCH WITH CONNECTING SECTIONS

CODE LETTERS

F—FRONT SECTION
C—8" CENTER SECTION
CX—8" CENTER CONNECTING SECTION
NC—4" CENTER SECTION
BO—BACK SECTION

ARRANGEMENT OF SECTIONS

Boiler Number	Regular	*Special Order
17	F-CX-BO	F-CXT-BO
21	F-NC-CX-BO	F-NC-CXT-BO
25	F-CX-C-BO	F-CXT-C-BO
29	F-NC-CX-C-BO	F-NC-CXT-C-BO
33	F-C-CX-C-BO	F-C-CXT-C-BO
37	F-NC-CX-C-CX-BO	F-NC-CX-C-CXT-BO

*INCLUDES CENTER CONNECTION SECTION (CXT) WITH FLANGED CONNECTION FOR TANKLESS TYPE WATER HEATER WHICH CAN BE ASSEMBLED IN BOILER WITH HEATER OPENING ON EITHER SIDE AS DESIRED.

IMPORTANT

If water condition should be encountered in the basement, or where it has been necessary to water-proof the basement floor, boiler should be mounted on a concrete or hollow tile base, preferably to a height of at least 3".

DRAIN TAPPING

Drain tapping is located on face of back section at lowest point practical for completely draining all the water from boiler. Connect drain cock with this tapping. Do not connect drain cock to return pipe line.

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

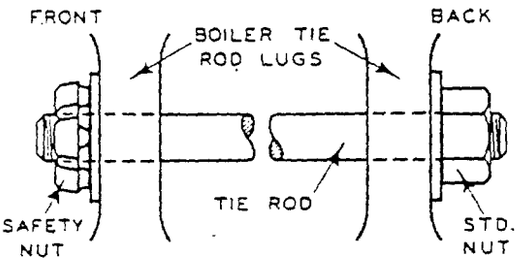
NOTICE
MR. STEAMFITTER!

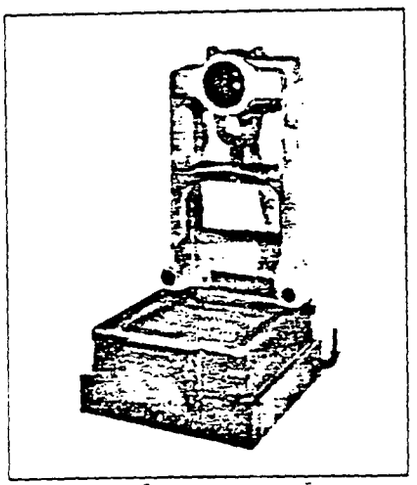
Use regular steel nuts and flat washers for assembling boiler. Apply oil or grease freely to tie rod threads while assembling sections to prevent stripping of threads on rod.

After drawing up boiler, remove steel tie rod nuts at front and replace with SAFETY NUTS.

Lubricate nuts well and tighten with FINGERS ONLY.

FAILURE TO OBSERVE THIS
MAY RESULT IN DAMAGE TO BOILER





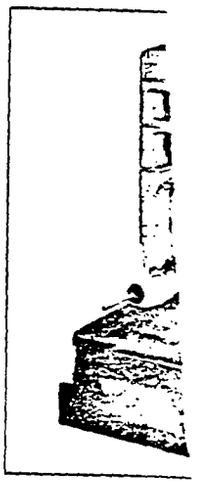
FRONT SECTION IN PLACE
No. 1

1. Remove ashpit door with hinge. Level base in final position. When locating base be sure to provide at least 25" between side of base and nearest wall if large size internal water heater is to be installed. In case small heater is to be used, 13" clearance is sufficient. Place front section on base and support with prop. Bolt section to base front. Insert bolts from firebox side of section. Make nuts finger tight and back off two threads. Attach draft pouch to rear panel.

2. Clean nipples and nipple ports with kerosene or gasoline and apply good lubricating oil. DO NOT USE RED LEAD, PAINT OR CEMENT. Drive nipples squarely into section using block of wood and hammer or preferably an aluminum headed hammer if available. Gauge large nipple with nipple gauge in both directions. Cutout in gauge must rest on nipple with legs of gauge touching finished face of section. Use rule for small nipples. Nipples should project $\frac{1}{16}$" more than half their length and project equally all around. TILTED OR COCKED NIPPLES CAUSE LEAKS.



GAUGING OF NIPPLE
No. 2



ASSEMBLING

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For No. 21 and l
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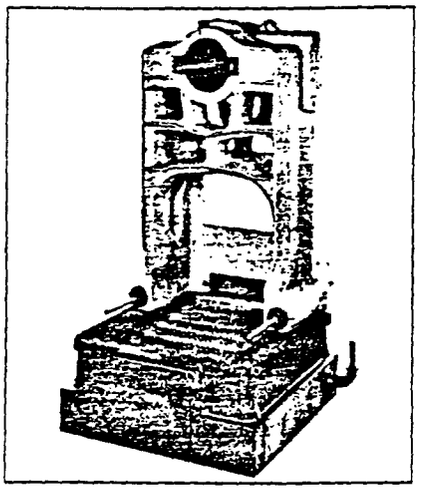
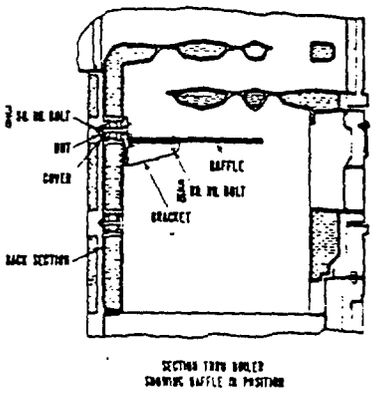


ASSEMBLING CENTER SECTIONS
No. 3



(OIL BOILERS ONLY)
No. 4

3. From arrangement of section (See table inside front cover) select next section according to code letter on section.

Paint ground joint of each section with red lead before adding next section. NEVER ASSEMBLE MORE THAN ONE SECTION AT A TIME, except in case of No. 17 boiler which is assembled without draw-up blocks. Sections for No. 17 boiler are drawn up by use of tie rods through lugs on Front and Back sections.

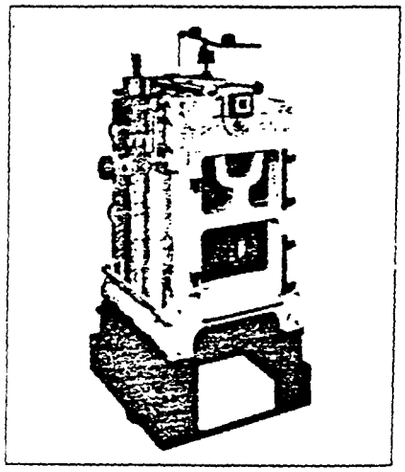
For No. 21 and larger boilers, insert long tie rod through 1" tapping near top and short tie rods through 1" tappings near bottom of front section. Use flat steel washers at bottom and 10" block at top. This block should be in a horizontal position in recess provided on section. On center section use 10" assembly block across upper and large washers across lower nipple openings.

Drive sections in place with heavy block of wood, striking blows as squarely as possible over nipple ports. DRAW UP EVENLY ON ALL TIE ROD NUTS STARTING WITH LOWER TIE RODS. Tighten nuts alternately until sections make contact at ground joints. APPLY OIL TO TIE ROD THREADS WHILE ASSEMBLING.

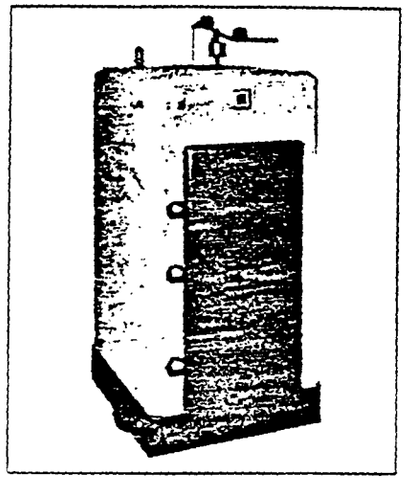
Back section is drawn up by running long tie rods through lower lugs on side of boiler and short rods through lugs on top of boiler. Place regular washers under nuts and draw up evenly on all 4 rods. Attach coil hole covers to back section if water heater is not used in firebox. On oil burning boilers 17, 21, 25 attach combustion chamber baffle as shown in Fig. 4.

After boiler is assembled and drawn up tightly, remove tie rod nuts in front and replace with safety nuts, as directed in "Mr. Steamfitter" notice on page one. Lubricate safety nuts and make hand tight only. Failure to do so may result in damage to boiler.

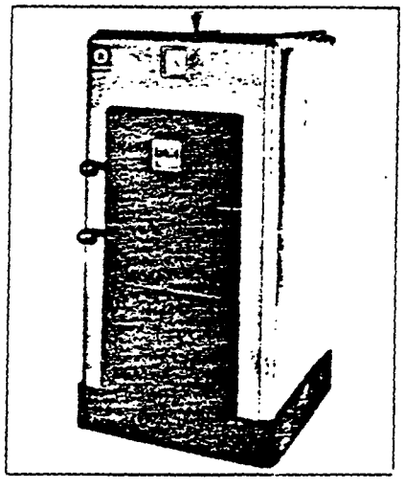
Tighten nuts which hold front section to base front. Plug tappings, fill boiler with water and subject to not less than 10 or more than 30 lbs. pressure. Inspect boiler inside and outside for leakage to insure against breakage in handling and shipping. To safeguard accuracy of gauge supplied with boiler DO NOT INSTALL GAUGE UNTIL AFTER TEST OF BOILER. Connect supply and return piping. Putty outside of sections at joint with boiler putty. 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.



ASSEMBLED BOILER
(STEAM)
No. 5



COAL BOILER
(STEAM)
No. 6



OIL BOILER
(STEAM)
No. 7

4. Attach gauge to boiler. Attach water column trim to steam boiler and install gauge glass reflector at rear of water glass by snapping over hexagon nuts. Nuts must be adjusted so that hexagon corners are parallel with side of jacket. Plug unused tappings on steam or water boiler. Paint ground seat on back section with red lead and attach smokehood or collar. Match grind of smokehood with grind of back section when tightening smokehood bolts. Attach water heater if used.

Attach front jacket panel but do not tighten jacket screws. Screw jacket studs into tappings at upper corners of back section and attach back jacket, starting with R.H. half (seen from front of boiler), then lower center strip and then L.H. half. Insert jacket screws but do not tighten. Place side jacket panels in position and then top panel. Before attaching jacket panels remove knockouts opposite used tappings.

Stoker Boilers—Installer must provide cutout in jacket side panel if side fired installation is required.

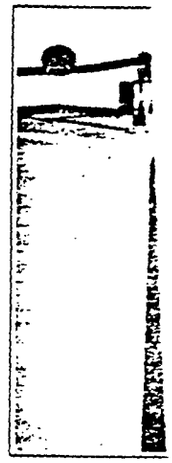
Attach door hinges and catches but tighten bolts only moderately. Lock doors into position with hinge pins. Doors should lift easily over catches and close tightly. Adjust doors by tapping hinge and catch lightly. After adjustment tighten hinge and catch plate bolts and jacket screws.

Oil Boilers—Attach the front base plate to the base with the three machine screws provided. To install Oil Burner, remove and discard the sheet steel cover plate which is attached to the Front Base Plate. Attach the mounting bracket in the upper holes of the Front Base Plate, using the screws provided. Install burner as per instructions accompanying same.

Attach safety valve on steam boilers and damper regulator on handfired boilers. Adjust regulator as per instructions on Page 5.

On water systems locate expansion tank so as not to be exposed to freezing. Fill system up to ½ of expansion tank. On closed system fill until relief valve relieves. This must be at less than 30 lbs. If necessary adjust valve setting. Remove rim and glass from gauge and set movable pointer under automatic pointer. Replace rim and glass.

IN



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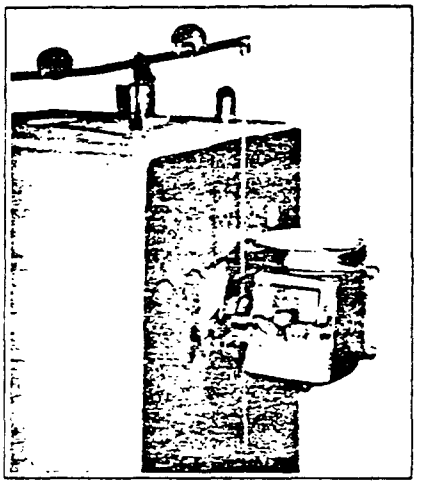
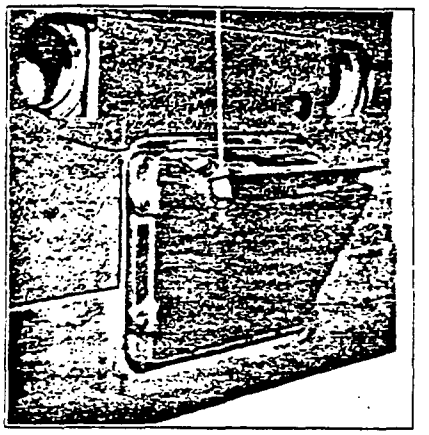
INSTRUCTIONS FOR ASSEMBLING AND OPERATING AUTOMATIC DRAFT CONTROL





1. Face regulator with rocker arm to rear of boiler. Note: Use wrench on hexagon end for turning or adjusting regulator. Never use regulator lever.
2. Insert regulator lever so that notches are on top and hole in lever points to rear. Tighten screw in rocker arm so that it engages with notch. The notch nearest the rear is for "Steam" and the other notch for "Water".
3. Attach clevis to rear end of regulator lever so that threaded part points towards the smokehood. Use flat headed pin with flat head pointing towards smokehood.
4. Place weight on front end of regulator lever so that this end is held down. Screw upper short rod into clevis so that it projects above clevis approximately $\frac{3}{8}$" on steam boilers. For water regulator it should project 3".
5. Insert threaded end of lower (long) rod through eye in draft door lever, place ball collar below eye and screw nuts on rod. Attach flat end of rods to intermediate lever on smokehood with long rod next to cold air check door as shown. Lock rivet in position with cotter pin. Turn regulator until upper rod is approximately vertical.
6. Move rear end of regulator lever down until cold air check door opens $\frac{1}{16}$". Then, with regulator lever in this position, adjust lower ball collar and nuts at draft door so that the draft door is just cracked open (about thickness of knife edge.) Tighten lock nuts on rod.
7. Release rear end of regulator lever so that front end drops to its lowest position. Draft check door must be closed now and draft door in base must be open.
8. Counterweights are adjusted on regulator lever to suit temperature requirements. Before starting fire in boiler set weights so that front end of regulator lever is held down but requires only slight effort to raise.

After fire is started in boiler and temperature rises to approximately 180 degrees on water boilers as indicated by combination altitude gauge and thermometer or approximately 2 lbs. pressure on steam boilers as indicated by steam gauge, regulator lever should raise, thereby closing draft door. Further rise in temperature will cause regulator lever to raise higher and open cold air check door on smokehood.

To obtain more heat, move FRONT WEIGHT further from regulator.

To obtain less heat, move FRONT WEIGHT closer to regulator.

REAR WEIGHT acts as a counter balance and after setting does not require changing while regulator is operating within the ordinary temperature range.

If higher temperatures are desired than can be obtained by shifting front weight to extreme front of regulator lever, then rear weight should be shifted closer to regulator and in extreme cases it may be removed and placed on front with other counter weight.

BLOWING OFF STEAM BOILERS

Oil, grease or grit in new systems may cause steam boilers to foam. In such a case, blow off boiler under pressure. Repeat blowing off until boiler water and water column glass are clean.

To blow off, connect 1½" pipe with valve to blow off tapping on back of boiler (upper L.H. side seen from front) and run pipe to suitable drain. Close flow and return valves if available or all radiator valves. Fill boiler with water to top of gauge glass. Build hot fire in boiler or start burner and when steam pressure is over 10 lbs. but below 15 lbs. open blow off valve and regulate valve to maintain pressure in boiler. Feed in water as required to maintain full gauge level in boiler. Continue for about 2 hours. Then drain water to proper level and remove blow off piping.

If water supply has not sufficient pressure proceed as above but open blow off valve fully and let pressure drop to zero. Then close valve, fill up water and repeat several times. At end of blow off build up 10 lb. pressure, shut off burner or quickly draw fire and blow water out through bottom drain opening. Refill to proper level, AFTER BOILER HAS COOLED. Do not use soda, alkali, vinegar or any acid for cleansing the boiler. In severe cases, the use of "Vinco" is recommended (sold by all branches of American Radiator & Standard Sanitary Corporation). Use 3 lbs. of Vinco for 350 sq. ft. radiation or less and 1 lb. more for each additional 150 sq. ft.

ATTENTION TO BOILER WHILE IN OPERATION

Keep water in steam boiler up to center of water gauge glass.

Keep water systems filled to ⅓ of expansion tank (as indicated by moving hand being even with stationary hand on altitude gauge). ON A CLOSED HOT WATER SYSTEM THE PRESSURE MUST NOT EXCEED 30 LBS. 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.

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 safe distance away from valve.

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 ash pit. 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 thru 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 INSIDE OF FRONT COVER).

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 driblets.

3. When attending to fire, open choke damper in smokehood and 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 will regulate fire to supply the amount of heat desired.

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

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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 choke and 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.

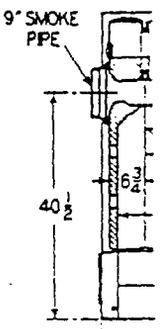
After firing, open air slots in fire door slightly when using hard coal and more when using soft coal. The slots can be closed again when charge has thoroughly ignited or turned into coke. Best setting is found by experience. Caking soft coal should be broken up by stoking about 1 hr. or more after firing, 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. The choke damper in the smokehood can be used to check fire. Do not close choke damper fully immediately after firing, particularly with soft coal.

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 8". When firing small size fuel, always leave glowing coal exposed in rear of boiler to ignite combustion gases.



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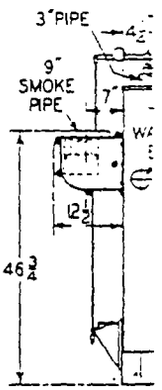

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Boiler Assemblage Number
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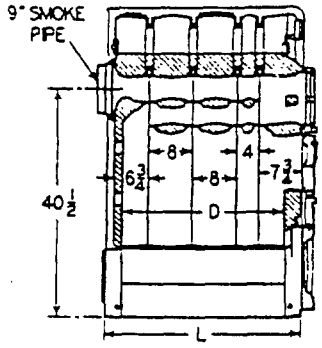
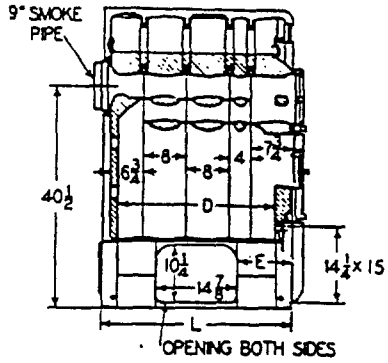
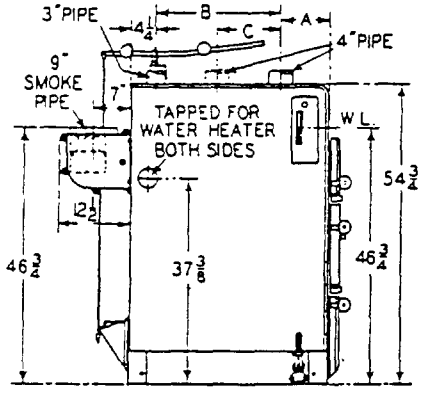


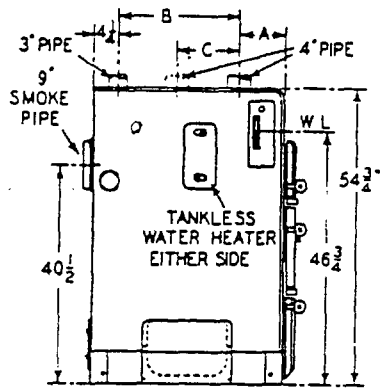
SECTION THRU BOILER
(OIL FIRED BOILERS)



SECTION THRU BOILER
(STOKER FIRED BOILER)



SIDE VIEW
(HAND FIRED BOILER)



SIDE VIEW
(STOKER FIRED BOILER)

DIMENSIONS FOR COAL, OIL AND STOKER BOILERS

Boiler Assemblage Number	Number and Size of Tappings		Boiler Dimensions— (Steam and Water)					
	Flow	Return	A	B	C	D	E	L
17	1-3" 1-4"	2-3"	11¼	7¼	—	17	4¼	23¼
21	1-3" 1-4"	2-3"	15¾	7¼	—	21	6¼	27¼
25	1-3" 1-4"	2-3"	11¾	15¼	—	25	8¼	31¼
29	1-3" 1-4"	2-3"	15¾	15¼	—	29	10¼	35¼
33	1-3" 1-4"	2-3"	19¾	15¼	—	33	12¼	39¼
37	1-3" 2-4"	2-3"	15¾	23¼	16	37	14¼	43¼