USE THIS BOOK

FOR REFERENCE WHEN ERECTING BOILER, ORDERING PARTS AND FOR OPERATION

NOTICE

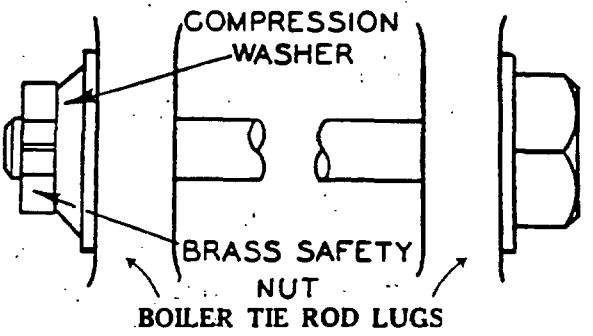
MR. STEAMFITTER!

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

After drawing up boiler, remove steel tie bolt nuts and place sheet metal COMPRESSION WASHERS on bolts with open (cupped) side against regular washer.

Place BRASS SAFETY NUTS on bolts against compression washers. Lubricate nuts well and tighten with FINGERS ONLY.

FAILURE TO OBSERVE THIS
MAY RESULT IN DAMAGE TO BOILER



IMPORTANT!

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. Subject to at least ten or fifteen pounds pressure.

Where local water supply pressure does not exceed sixty pounds, boiler may be connected direct to supply line.

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

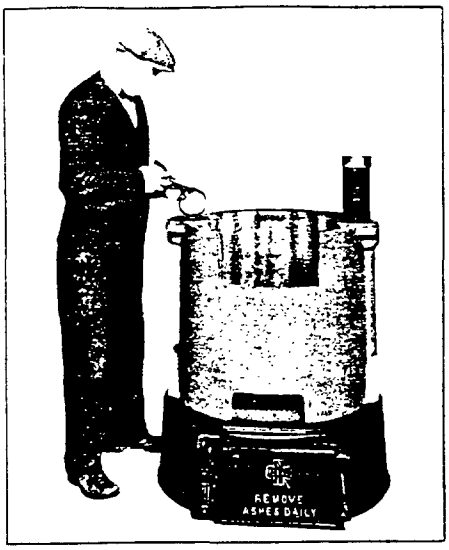
This precaution is for your protection and will simplify handling of necessary replacements and adjustment claims.

EXTERNAL HEATER TAPPINGS

Steam boilers are provided with 1½" tapping below water line for "EXCELSO" external water heater.

CAUTION—WATER BOILERS

Expansion tank should not be set in cold or exposed place. If pipe leading to tank freezes, the system will be sealed; this will likely cause breakage of boiler or radiators, because of pressure created by expanding water.



No. 1

1. Level base in final position with regard to chimney. Place firepot on base and engage pilot lugs on bottom with holes in top of base. Clean nipples and nipple openings with kerosene or gasoline and apply good lubricating oil. DO NOT USE PAINT OR RED LEAD.

Cut shows LONG extended nipple partly inserted in firepot. This type nipple used on STEAM BOILERS only.

CAUTION - STEAM BOILERS

Be Sure to Insert the Long Extended Nipple in Right Hand Side of Firepot

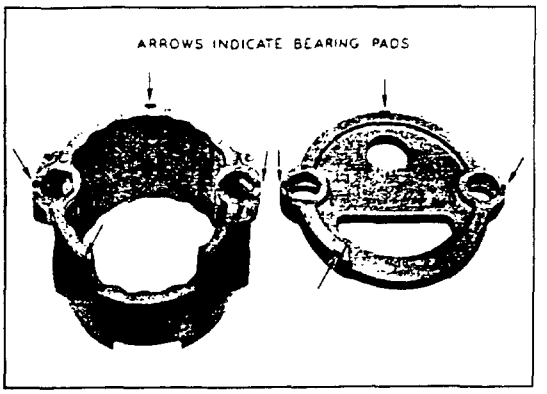
2. Drive nipples SQUARELY into nipple openings, using block of wood and hammer. Regular nipple (used on left hand side of Steam Boilers and on both sides of Water Boilers) must project above finished bearing pad on firepot (or section) one-half of its length. Extended nipple, which is used only on right hand side of Steam Boilers, must project same distance above finished bearing pad as regular nipple.

Use rule or gauge to insure that nipples project outside of opening equally all around. Most nipple leaks are caused by tilted or cocked nipples.

Place a roll of boiler putty about ½" in diameter around the top of the firepot just inside of the rib. Putty should be placed around outside of nipples as shown. Do not allow putty to cover any of the bearing pads on top of firepot. Install coil hole cover plates and brackets if water heater is not used in firepot.



No. 2



No. 3

3. Cut shows top view of firepot and intermediate section. Intermediate section is not used with Nos. 222, 252 and 282 boilers.

Location of bearing pads is indicated by arrows. It is VERY IMPORTANT that all of these pads contact with part assembled above.

This is accomplished by carefully following directions in pulling down dome with tie bolts as directed in OPERATION No. 5.

CAUTION-STEAM BOILERS

Boilers Having Intermediate Sections -- Be Sure to Insert the Short Extended Nipple in Right Hand Side of Section -- See Cut Below

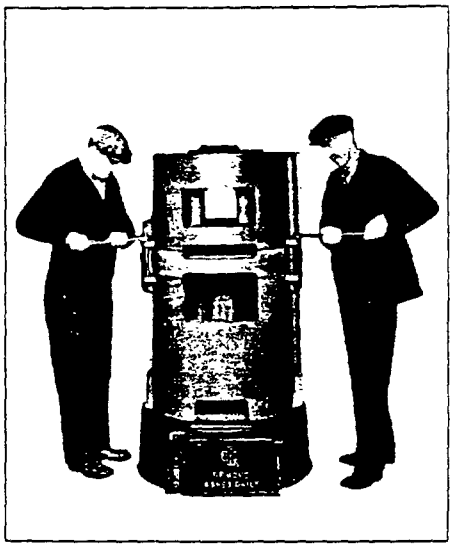
4. Clean and oil nipple openings in intermediate section or dome (depending on assemblage) and place same in position on nipples in firepot. Note—(Intermediate Section must be assembled with bearing pads to top).

Drive section to approximate final position with heavy block of wood, striking directly over nipple openings on alternate sides to insure nipples remaining straight and forming perfect joints.

Cut shows SHORT extended nipple partly inserted in intermediate section. This type nipple used on RIGHT SIDE of Steam Boilers only. Drive nipples in place as directed in OPERATION No. 2.



No. 4



No. 5

5. If boiler has intermediate section, place roll of boiler putty around inside of rib as outlined for firepot, before placing dome in position.

Do not allow putty to cover any of the bearing pads on top of section.

See that dome rests LEVEL on nipples of intermediate section or firepot.

Oil threads and insert connecting bolts with regular flat steel washer top and bottom.

Place nuts and pull all four bolts up hand tight before using wrench.

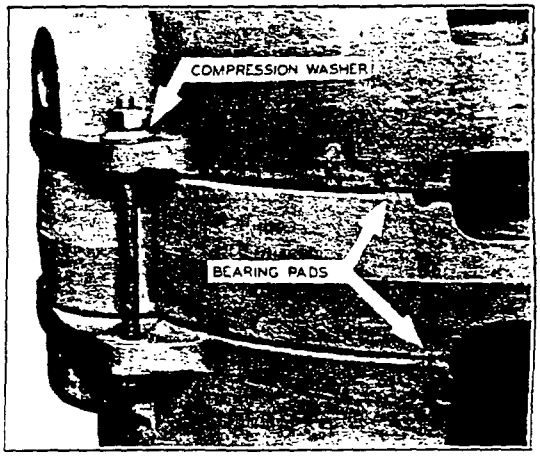
IMPORTANT

Pull both FRONT BOLTS down 1/3 turn together, then pull both REAR BOLTS down 1/3 turn together. Alternate from front to rear bolts until dome contacts with bearing pads of section below.

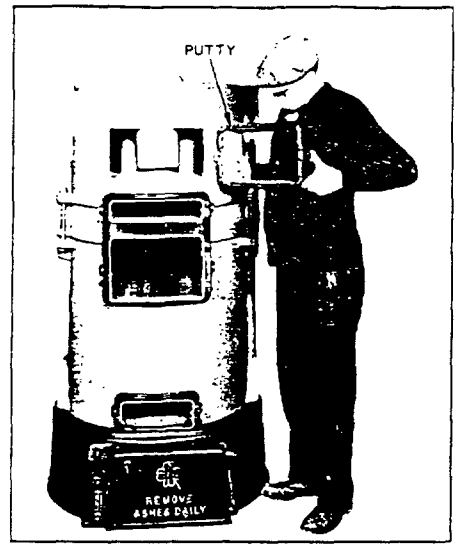
6. Cut shows part view of boiler with intermediate section. Front bearing pads are indicated. If dome has been pulled down as directed in Operation No. 5, front bearing pads will contact slightly ahead of bearing pads on nipple hubs and possible damage to boiler and nipples avoided.

Remove nuts from tie bolts and add sheet metal compression washers, open or cupped side down, against regular washers.

Place brass safety nuts on bolts against compression washers. Lubricate nuts well and tighten with FINGERS ONLY. Failure to do this may result in damage to boiler.



No. 6



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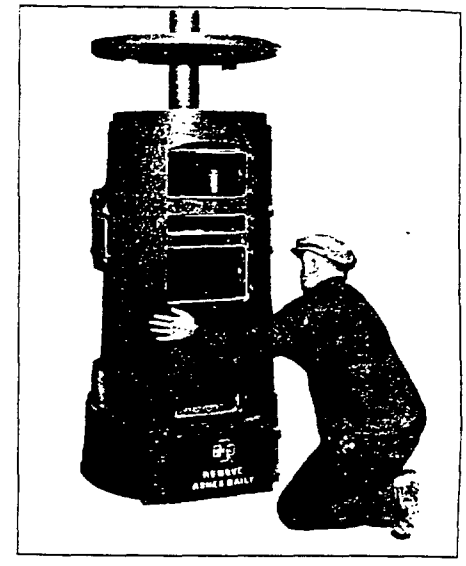


No. 8

7. Remove doors from frames and fill channels around frames with boiler putty. Attach frames and make bolts only moderately tight. Tighten bolts evenly to avoid distortion of frames.

8. Try front jacket panel on boiler. Cut shows method of placing front panel over door hinges and then swinging panel into position over door catches.

See that panel rests squarely on base and that frames line up with openings in jacket. Proper adjustment can be obtained by tapping frames lightly with hammer.

Remove front jacket panel and tighten door frames in final position with bearing pads at bolts resting squarely against boiler.

Replace doors on frames. Doors should lift over catches easily and seat firmly when closed. If frame has been distorted from tightening bolts unevenly door will not seat properly and will require loosening of bolts which are too tight. Complete all adjustments and remove doors.

Bolt smokehood frame in position. Side marked "TOP" indicates proper setting.

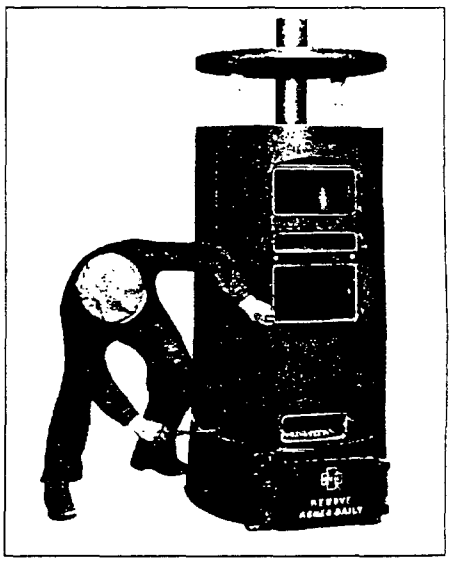
Boiler is now ready to seal with putty. Press putty into all open joints between sections, around door frames, smokehood frame and draft pouch. Putty around firepot at base. All joints should be well filled and made smooth to prevent leakage of air and gases. It is important that this operation be done properly. Install front jacket panel.

NOTE: JACKET TOP AND INSULATION MUST BE IN PLACE BEFORE CONNECTING SUPPLY PIPE. Jacket top will not interfere with installation of jacket if supported above boiler as shown.

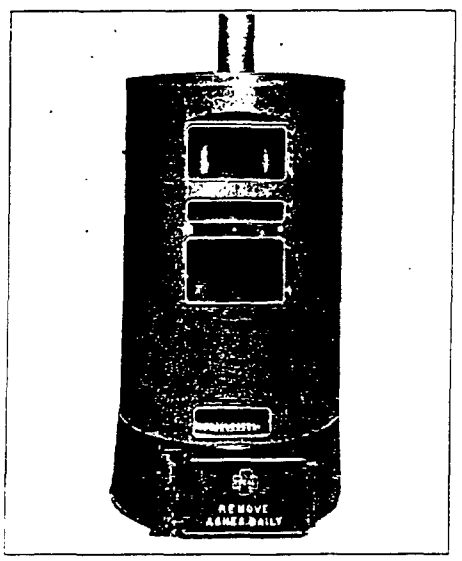
9. After front jacket panel is installed, follow with left panel. Engage joint locking device and insert jacket screw at bottom. Install right panel — REMOVE KNOCKOUTS FOR GAUGE GLASS AND TRI-COCK FITTINGS ON STEAM BOILERS.

Draw panels together in back and insert upper jacket screw under smokehood collar. Insert lower jacket screw.

Lock joints at top with jacket clips.

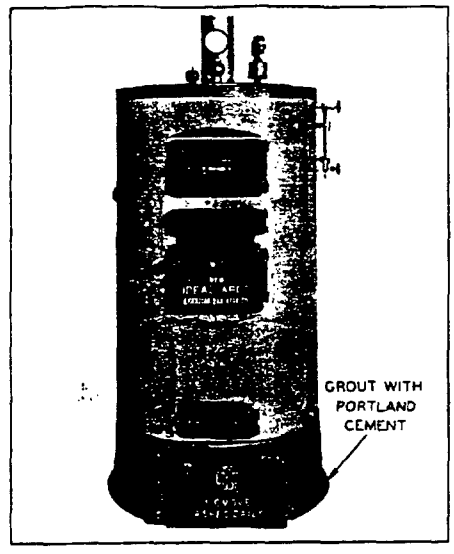


No. 9



No. 10

10. Screw bushings for trimmings into dome and fit insulation and top. Cut shows jacket completely assembled.



No. 11

11. Attach doors, smokehood and boiler trim.

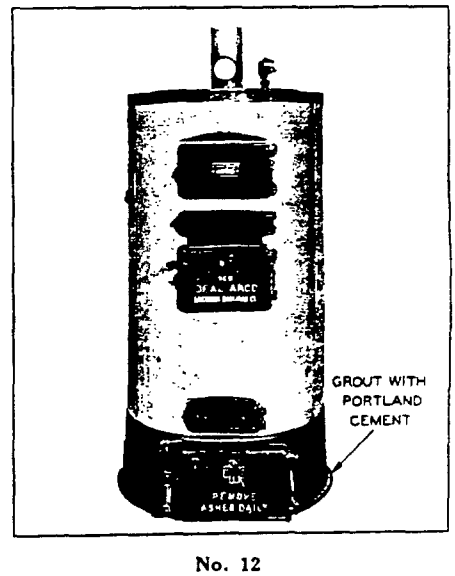
STEAM BOILERS: Place sheet metal jacket washers on gauge glass fittings and tri-cocks before screwing into boiler. Automatic steam regulator is connected to bushing by means of ½" nipple packed in steam trim box.

If "Excelso" external heater tapping is not to be used, attach cover cap by pushing same over head of plug.

Grout between bottom of base and floor with PORTLAND Cement.

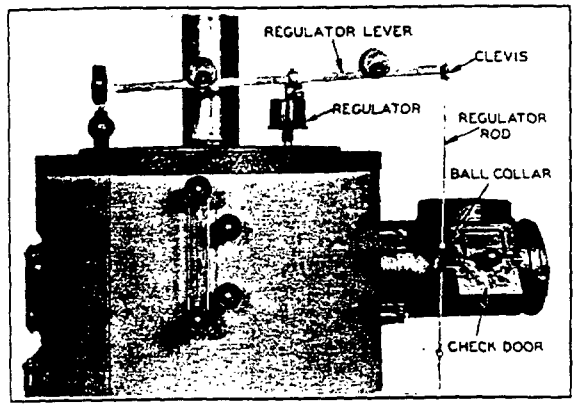
Cut No. 11 shows steam boiler assembled complete.

Cut No. 12 shows water boiler assembled complete.



No. 12

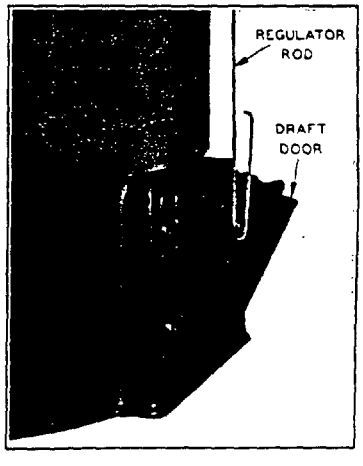
INSTRUCTIONS FOR ATTACHMENT AND OPERATION OF AUTOMATIC DRAFT CONTROL



Cuts showing attachment of draft control for either steam or water boilers — cut at upper left shows installation from regulator to cold air check door — cut at lower right shows lower end of regulator rod attached to draft door.

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 with notch on top; end with hole to rear. Tighten screw in rocker arm so that it engages notch in regulator lever
3. Attach clevis to rear end of regulator lever with flat head pin.
4. Attach loop or hook end of jointed regulator rod to draft door (on base) and run plain end thru eye of lever on cold air check damper (on smokehood).
5. Place ball collar on regulator rod and insert rod in clevis.
6. Adjust counterweight on regulator lever so that front end of lever is held down.
7. Adjust regulator rod so that door on base has approximately the same opening on both sides or slightly more than half open. Tighten set screw in clevis.
8. Hold draft and cold air check doors closed as shown and adjust ball collar on regulator rod so that it is a trifle above eye on cold air check door lever. Tighten set screw.
9. 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. This will short circuit draft and check fire.

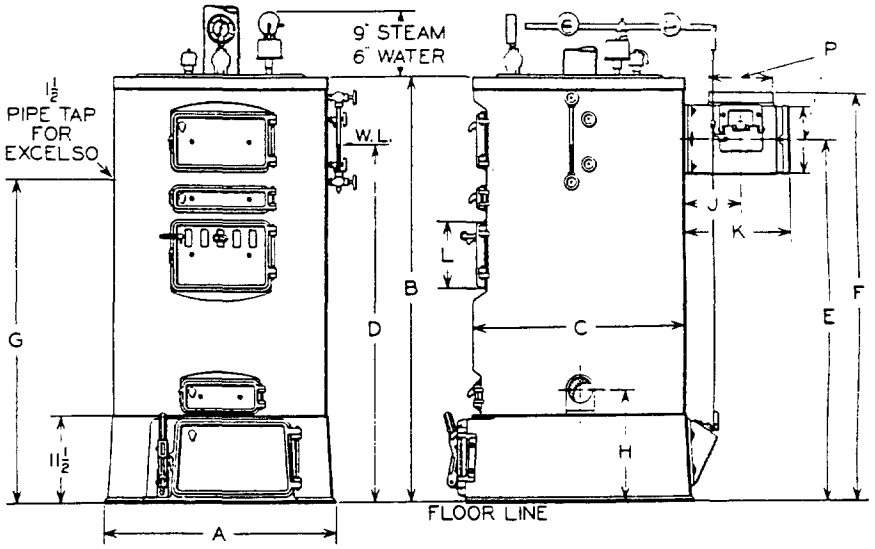


To obtain more heat, move FRONT WEIGHT further from regulator.

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.



BOILER NUMBERS

Dimension	222	223	252	253	282	283
A	32¼	32¼	35	35	39	39
B	55¼	60	56⅝	61⅝	58⅝	63¾
C	29¾	29¾	32½	32½	36½	36½
D	47	51¾	48½	53½	50⅜	55½
E	44½	49¼	45⅜	50⅜	47	52⅛
F	51	55¾	51⅞	56⅞	55	60⅛
G	39¼	44	40¼	45¼	41⅛	46¼
H	14½	14½	15¼	15¼	15¼	15¼
J	8	8	8¼	8¼	9	9
K	14¾	14¾	15	15	17¼	17¼
L	8½x13	8½x13	8½x13	8½x13	8½x13	8½x13
P	9	9	9	9	12	12
Outlets	1-4"	1-4"	1-5"	1-5"	1-5"	1-5"
Inlets	2-3"	2-3"	2-4"	2-4"	2-4"	2-4"
Distance from Floor Line to Top of Flow Tapping Boss	55⅛	60	56⅝	61⅝	58½	63⅝

Note: D—Indicates Height of Water Line.
L—Indicates Size of Fire Door Opening.
P—Indicates Diameter of Smoke Pipe.

No. 222-252-282 Boilers consist of Base. Firepot and Dome Sections.
No. 223-253-283 Boilers consist of Base. Firepot, Intermediate and Dome Sections.

STEAM BOILER

Fill boiler with water until 2 to 2½ inches shows in gauge glass. After fire is started in boiler the water will rise due to expansion caused by increase in temperature.

This level should be maintained while boiler is in operation. Never draw water from boiler while in use. Boiler should not be operated when water does not show in gauge glass, otherwise damage may result.

WATER BOILER

Keep entire system filled with water up to one-third of expansion tank. This insures complete circulation of water and safeguards against breakage. Expansion tank should not be set in cold or exposed place. If pipe leading to tank freezes, serious damage may result. Never draw water from system while in use.

NOTE—IMPORTANT: If closed type water system is used make sure relief valve is adjusted and operates below 30 pounds pressure, otherwise pressure may build up in system and cause damage.

STEAM AND WATER BOILERS FUEL RECOMMENDATIONS

Kind	With Average Chimney Draft	With Strong Chimney Draft
Hard Coal	Stove, Small Egg	Stove, Chestnut, Pea
Coke	Egg	Egg, Chestnut, Pea
Soft Coal	Lump, Egg	No. 2 Washed Nut, Mine Run

FIRING

Fill boiler or system with water as directed. Place kindling on grates and light. Add fuel in small quantities until fire is burning well. Continue to add fuel gradually until entire grate is covered to approximately half the depth of the fire pot.

Type of fuel largely determines height of fuel line in firepot for best results.

If hard coal or coke is used firepot may be filled up to approximately center of fire door. If good clean egg or lump soft coal is used fuel level can be carried up to fire door ledge. Cheaper grades of soft coal containing considerable slack cannot be fired as high as the better grades. Best results will be acquired by keeping fuel line as high as found practical.

Fire should receive attention at regular intervals. When boiler is operating under average heating requirements, grates should be shaken once each day unless weather is mild in which case grates may be shaken only as required to sustain fire.

At regular attention interval, observe the following:

1. Open pipe (choke) damper in smokehood fully.
2. Close draft and check draft doors.
3. Release catch which holds grates in level position.
4. Shake grates until fire shows in ashpit.
5. Engage grate locking catch and add fuel.

After fuel is added to fire, open slide damper in fire door. For hard coal or coke use of this damper is not so essential as when burning soft coal. The additional air admitted thru this damper is required in order to burn the volatile gases which form when fresh fuel is added. Length of time which damper should be open depends upon fuel and rate at which fire is burning. Regulation of this damper must therefore be found by practice to obtain best results.

Use of pipe (choke) damper in smokehood depends upon chimney and type of fuel used. This damper is provided to reduce draft thereby placing an additional check on fire if needed.

When using soft coal do not close this damper entirely until fuel is partly burned and practically smokeless.

Where poor chimney conditions prevail, it may be necessary to have choke damper open wide at all times. Best results in setting this damper will be found by practice.

The Automatic Regulator, with counter weights adjusted as directed under "Instructions for Attachment and Operation of Automatic Draft Control" (page 6) will control fire without further attention.

GENERAL RULES FOR BOILERS

1. Give fire regular attention, especially in severe weather when boiler is operating under full load.
2. Observe firing instructions.
3. Do not smother fire with fresh fuel and close dampers tight.
4. Do not overshake or poke fire in mild weather.
5. Do not leave fire door open in order to check fire. Correct adjustment of Automatic Regulator and Choke Damper in smokehood will regulate fire to supply amount of heat desired.
6. Remove ashes daily. If ashes are allowed to accumulate in ashpit, warped or burned out grates may result. If accumulation of ashes is allowed to remain in ashpit, same will absorb moisture and cause corrosion of metal parts with which ashes may come in contact.
7. Keep boiler surfaces and flues clean. Soot and dust are insulators and prevent boiler surfaces from absorbing and delivering full amount of heat to radiators.
8. If fire does not burn evenly over the entire grate and seems sluggish in starting up after grates have been well shaken, a thorough cleaning is required. This is done by allowing fire to burn down until a thin layer of fuel is left on grate; shake well and remove slate and clinkers left on grate with poker and scraper.
9. If fire has been neglected for some time and grate becomes covered with slate and clinkers massed together, quickest way to get active fire is to break up mass and dump grate. Then build an entirely new fire.
   Occasionally this clinker mass will hold together and may be removed thru fire door in one or more pieces. If this can be accomplished, building of new fire may be avoided.
10. If hard clinker or piece of coal lodges between the grate bars, do not force shaking mechanism too hard. Dislodge the obstruction with the poker and avoid breakage of parts.
11. The liability 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 part movement of the shaker handle.
12. At beginning of heating season open drain cock and permit sufficient water to run from system to remove sludge accumulation at bottom of boiler. Refill boiler as directed under "Operation and Care" before starting fire.

WHEN BOILER IS NOT IN USE

(Summer Months)

1. Remove smokepipe, clean thoroughly and replace in the fall, making all joints tight with boiler putty or asbestos cement.
2. Clean all flues; remove soot and ashes from boiler and at base of chimney.
3. Oil all door hinge bearings, damper bearings and regulation parts.
4. Leave doors partially open all summer to avoid sweating and rusting of interior surfaces.
5. On water boilers—keep system filled with water as directed under "Operation and Care." On steam boilers—fill boiler with water until water runs out of safety valve. Note: Safety valve lever should be held up when boiler is nearly full to avoid over filling.

WHEN BOILER IS NOT IN USE

(Winter Months)

If boiler is not to be used during winter, draw off all the water in the entire system. If water is permitted to freeze in boiler or radiators, breakage may result. If further instructions are needed, consult your heating contractor or the American Radiator Company.

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BLOWING OFF STEAM BOILERS

Oil, grease or grit in a new system causes a Steam Boiler to foam, prevents proper generation of steam, and produces an unsteady water line. Therefore, it is necessary to BLOW OFF THE BOILER, UNDER PRESSURE, to clear the system of oil or any foreign matter in Radiators, Mains and Boiler.

This should be done WITHIN A SHORT TIME AFTER THE BOILER IS INSTALLED and in operation. If one blowing off does not result in a CLEAN WATER GAUGE GLASS, proper generation of steam and a steady water line, the boiler should be blown off a second, and if necessary, a third and fourth time. The following method for cleaning Steam Boilers under pressure will be found helpful.

WHEN WATER SUPPLY PRESSURE IS AVAILABLE

Remove safety valve from boiler. Connect a pipe at least 1½" in diameter to safety valve tapping, extending the pipe to the outside of the building or some suitable drain.

Close off all the Radiator Valves connected with the system, or if the main flow and return pipes are equipped with Gate Valves, these valves may be closed in place of closing the radiator valves. Fill the boiler with water to the top of the gauge glass. With a hot fire in boiler, blow hot water and steam out through safety valve tapping and pipe referred to above. Maintain as much steam pressure as possible in boiler up to fifteen pounds, as indicated on steam gauge. Carefully supply makeup water to the boiler. Continue the blowing for about two hours. Then close off the Water Feed Valve and drain the water through the draw-off down to the proper water line in the boiler.

Remove the Blow-off Pipe and replace the Safety Valve, open the Radiator Valves or the Gate Valves on the flow and return pipes, as the case may be, and then the heating outfit is ready for operation with the boiler thoroughly cleaned inside.

WHEN WATER SUPPLY PRESSURE IS NOT AVAILABLE

Remove safety valve from boiler and insert nipple and tee fitting. Replace safety valve in top of tee and use side opening of tee for blow-off line.

Connect a pipe at least 1½" in diameter, provided with a gate valve, to the blow-off opening in tee and run it to the nearest drain.

Close all Radiator Valves and boiler Return Valve. Fill the boiler with water to the top of the gauge glass. With the valve in the blow-off line closed, start wood fire and build up steam pressure from five to ten pounds. Open valve in blow-off line and close it when pressure has dropped to zero.

Carefully supply fresh water to the boiler to maintain the proper level and continue to repeat the above process for two to four hours.

At the end of this time draw fire quickly and with at least ten pounds pressure, drain boiler through bottom draw-off.

Remove the Blow-off Pipe, Nipple and Tee Fitting, and replace the Safety Valve.

Allow boiler to cool, then refill with water to proper level and open Radiator Valves and boiler Return Valve before starting fire.

At times, one blowing off will not give the desired results, so that this process must be continued until the boiler is thoroughly cleansed.

COMPLETE BOILER CONSISTS OF:

1 FIREPOT SECTION
1 INTERMEDIATE SECTION (For No. 223-253-283 Boilers Only)
1 DOME SECTION
1 BASE CRATE
1 BOX PLATE CASTINGS
1 BOX TRIM (STEAM OR WATER)
1 JACKET CRATE
1 BUNDLE FIRE TOOLS (3 Pieces)
1 SMOKEHOOD CRATE (No. 282 and 283 Boilers Only)

GIVE BOILER SIZE AND SERIES NUMBER WHEN ORDERING REPAIR PARTS

BASE CRATE

1	Base, Complete with Grate Bars
1	Grate Connecting Arm
1	Angle Lever
1	Angle Lever Bracket
1	Connecting Arm Catch
1	Ashpit Door, Hinge and Catch Plate
1	Draft Pouch Complete, consists of: Pouch, Frame and B-Fly Draft Door (Inside and Outside Half)
1	Smokehood Frame
1	Smokehood Complete (22″ and 25″ Boilers Only) consists of: Smokehood with Check Draft Frame, B-Fly Door (Inside and Outside Half), Balance Weight, Lever, Choke Damper and Cap
1	Shaker Handle
1	Regulator Lever
1	Regulator Rod (2-Piece, Jointed)

PLATE BOX

1	Slice Door Frame with Slice Door, Baffle, Hinge and Catch Plate
1	Upper Cleanout Door Frame with Cleanout Door, Baffle, Series Plate, Hinge and Catch Plate
1	Fire Door Frame with Fire Door, Baffle, Slide Damper, Hinge and Catch Plate (For No. 222-252-282 Boilers)
1	Combination Fire and Lower Cleanout Door Frame with Fire Door, Baffle, Slide Damper, Hinge and Catch Plate, Lower Cleanout Door, Baffle, Hinge and Catch Plate (For No. 223-253-283 Boilers.)
4	Tie Bolts with Hex Nuts: 5/8 x 4″ for No. 222-252 and 282 Boilers 5/8 x 9 1/4″ for No. 223-253 & 283 Boilers
8	5/8″ Std. Flat Steel Washers
1	Bag (4) Compression Washers and (4) Brass Safety Nuts
1	Bag Bolts, Coil Hole Covers and Sundry Small Parts
1	Flue Brush
...	Lbs. Putty

SMOKEHOOD CRATE

(28″ Boilers Only)

1	Smokehood Complete, consists of: Smokehood with Check Draft Frame, B-Fly Door (Inside and Outside Half), Balance Weight, Lever, Choke Damper and Cap

STEAM TRIM BOX

1	Automatic Steam Regulator
1	Set Water Column Trimmings
1	Pop Safety Valve and Bushing
1	Steam Gauge
1	Water Seal and Nipple
2	Regulator Weights
1	2 x 1/2″ Bushing } For
1	1/2″ Nipple } Regulator
...	Nipples—3″ Regular
...	Nipples—4″ Regular
...	Nipples—3″ Extended for Firepot
...	Nipples—4″ Extended for Firepot
...	Nipples—3″ Extended for Interm. Sect.
...	Nipples—4″ Extended for Interm. Sect.
1	Regulator Rod Clevis and Ball Collar
2	Jacket Washers for Gauge Cocks
2	Jacket Washers for Tri-Cocks

WATER TRIM BOX

1	Automatic Water Regulator
1	Combination Altitude Guage and Thermometer
1	Extension—for Gauge
2	Regulator Lever Weights
1	2″ x 1 1/2″ Bushing
1	2″ Rad. Plug
2	1/2″ Flush Plugs
2	3/4″ Flush Plugs
...	Nipples—3″ Regular
...	Nipples—4″ Regular
1	Regulator Rod Clevis and Ball Collar

DRAINING BOILER

If boiler is not used during winter, entire system should be drained. When boiler piping is installed, fitter should connect return line to boiler with pipe same size as return tapping in boiler.

This pipe should have tee fitting or similar arrangement facing downward with plug at lowest point, so that water can be drained from boiler to lowest possible level. If water in boiler is allowed to freeze, boiler and piping may crack or break.

OIL BOILERS

Oil Burning Boilers are shipped less Grate Bars, Connecting Arm, Catch, Angle Lever, Bracket, Regulator, Weights, Regulator Lever and Rods, Poker, Flue Scraper, and Shaker Handle.

Cover Plates for Connecting Arm and Angle Lever Bracket Openings included with Base.

NOTE: All parts for this boiler have been carefully inspected and packed. In case of shortage, make sure that all parts have been removed from shipping container and examine packing material thoroughly. If part cannot be found, report shortage to your dealer, giving boiler size, series number, date, inspector's number and packer's number. (See Parts List on Page 12 and Packer's Check Ticket on this Cover.)

PACKER'S CHECK TICKET

BOILER SIZE_____

SERIES No._____

DATE _____

INSPECTED BY _____

PACKED BY_____

GIVE BOILER SIZE AND SERIES NUMBER WHEN ORDERING REPAIR PARTS

AMERICAN RADIATOR COMPANY

Offices in All Principal Cities

REVISED 11-33

NEW
IDEAL ARCO BOILER

22-25-28 INCH

SECTIONAL CONSTRUCTION

FOR ALL FUELS

ERECTING DIRECTIONS

OPERATING INSTRUCTIONS

PARTS LIST

AMERICAN RADIATOR COMPANY

OFFICES IN ALL PRINCIPAL CITIES

FORM B. P. 2005 1M 11-33 WM. J. KELLER, INC.

NEW
IDEAL ARCO BOILER

18-20-22 INCH

ONE-PIECE CONSTRUCTION

FOR ALL FUELS

ERECTING DIRECTIONS

OPERATING INSTRUCTIONS

PARTS LIST

AMERICAN RADIATOR COMPANY

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FORM B. P. 2060

14180

USE THIS BOOK

FOR REFERENCE WHEN ERECTING BOILER, ORDERING PARTS, AND FOR OPERATION

IMPORTANT!

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. Subject to at least ten or fifteen pounds pressure.

Where local water supply pressure does not exceed sixty pounds, boiler may be connected direct to supply line.

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

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

DRAINING BOILER

If boiler is not used during winter, entire system should be drained. When boiler piping is installed, fitter should connect return line to boiler with pipe same size as return tapping in boiler.

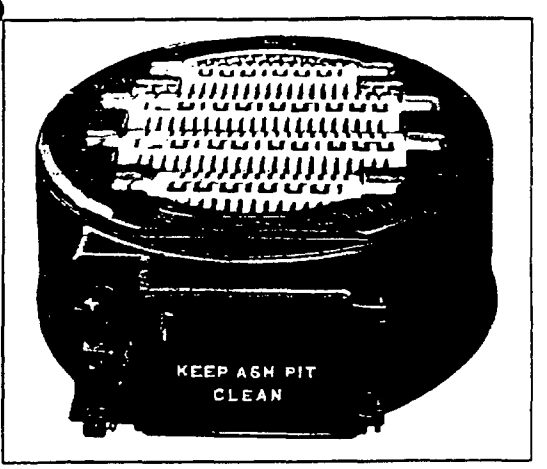
This pipe should have tee fitting or similar arrangement facing downward with plug at lowest point, so that water can be drained from boiler to lowest possible level. If water in boiler is allowed to freeze, boiler and piping may crack or break.

EXTERNAL HEATER TAPPING

Boilers are provided with 1½" tapping below water line for "EXCELSO" external water heater.

CAUTION—WATER BOILERS

Expansion tank should not be set in cold or exposed place. If pipe leading to tank freezes, the system will be sealed; this will likely cause breakage of boiler or radiators, because of pressure created by expanding water.



No. 1

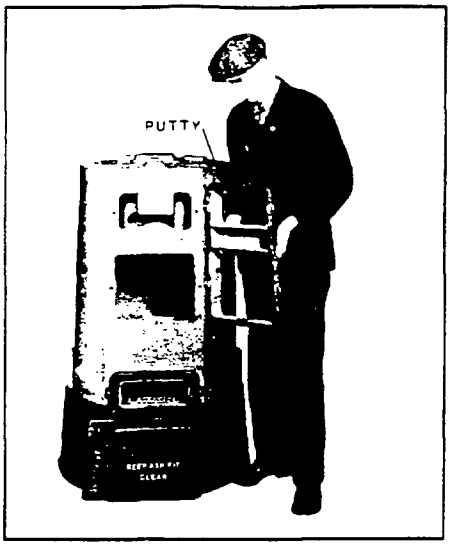
1. Level assembled base in final position with regard to chimney.

2. Place body casting on base. Locate by means of bead on top of base and cutouts in bead for return tapping bosses.

Install coil hole cover plates, if hot water coil is not used in firepot.



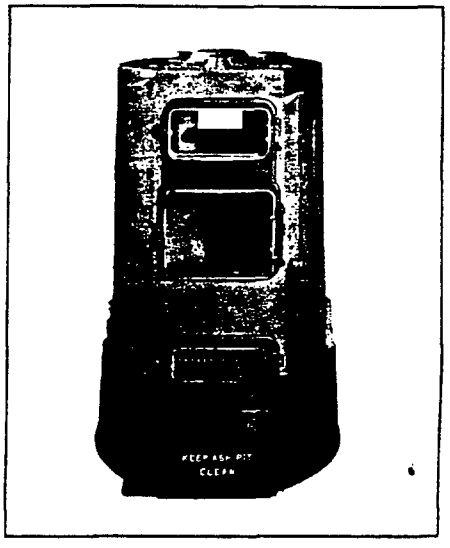
No. 2



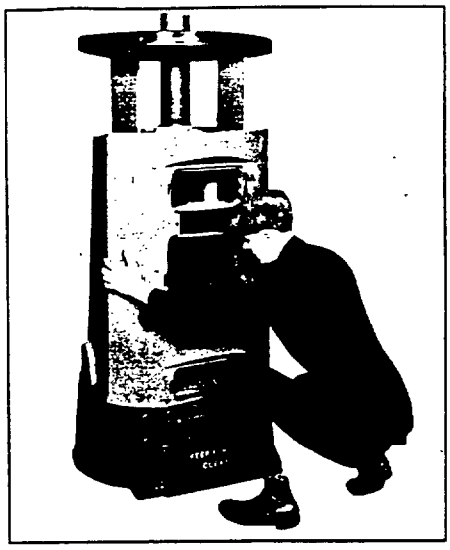
No. 3

3. Remove doors from frames and fill channels around frames with boiler putty. Attach frames and make bolts only moderately tight. Tighten bolts evenly to avoid distortion of frames.

Cut No. 4 shows door frames attached.



No. 4



No. 5

5. Try front jacket panel on boiler. Cut shows method of placing front panel over door hinges and then swinging panel into position over door catches.

See that panel rests squarely on base and that frames line up with openings in jacket. Proper adjustment can be obtained by tapping frames lightly with hammer.

Remove front jacket panel and tighten door frames in final position with bearing pads at bolts resting squarely against boiler.

Replace doors on frames. Doors should lift over catches easily and seat firmly when closed. If frame has been distorted from tightening bolts unevenly, door will not seat properly and will require loosening of bolts which are too tight. Complete all adjustments and remove doors.

Fill channel around smokehood frame with boiler putty and bolt frame in position. Side marked "TOP" indicates proper setting.

Boiler is now ready to seal with putty. Press putty into all open joints, around door frames, smokehood frame and draft pouch. Putty around body at base. All joints should be well filled and made smooth to prevent leakage of air and gases. It is important that this operation be done properly.

STEAM BOILERS—Screw fittings for gauge cocks and tri-cocks into boiler. See instruction tag in trim box.

WATER BOILERS—Insert plugs in gauge cock and tri-cock tappings.

NOTE: JACKET TOP AND INSULATION MUST BE IN PLACE BEFORE CONNECTING SUPPLY PIPE. Jacket top will not interfere with installation of jacket if supported above boiler as shown.

6. Install front jacket panel. Follow with left panel.

REMOVE KNOCKOUT IF "EXCELSO" EXTERNAL HEATER TAPPING IS TO BE USED ON STEAM BOILERS. IF TAPPING IS NOT USED, INSERT PLUG IN BOILER.

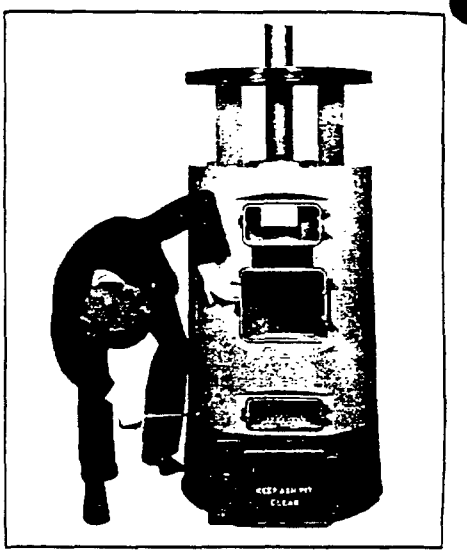
REMOVE KNOCKOUTS FROM REAR OF JACKET IF HOT WATER COIL IS TO BE USED IN FIREPOT.

Engage joint locking device and insert jacket screw at bottom.

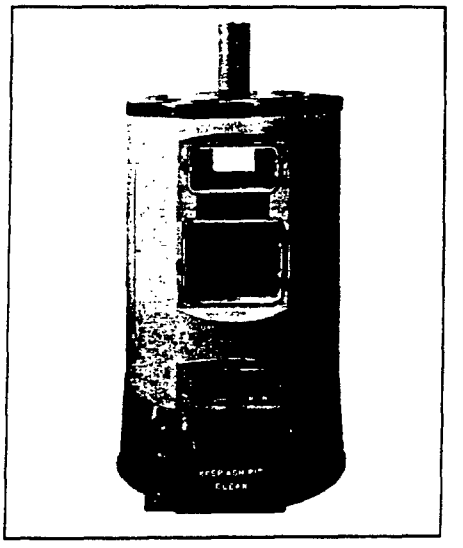
Install right panel. REMOVE KNOCKOUTS FOR GAUGE GLASS AND TRICOCK FITTINGS ON STEAM BOILERS.

Draw panels together in back and insert upper jacket screw under smokehood collar. Insert lower jacket screw.

Lock joints at top with jacket clips.

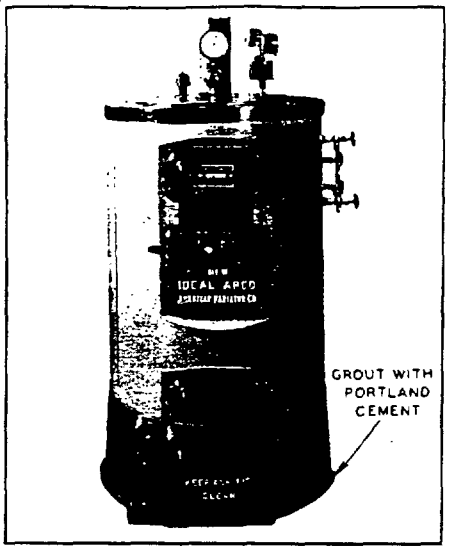


No. 6



No. 7

7. Screw bushings for trimmings into body and fit insulation and top. Cut shows jacket completely assembled.



No. 8

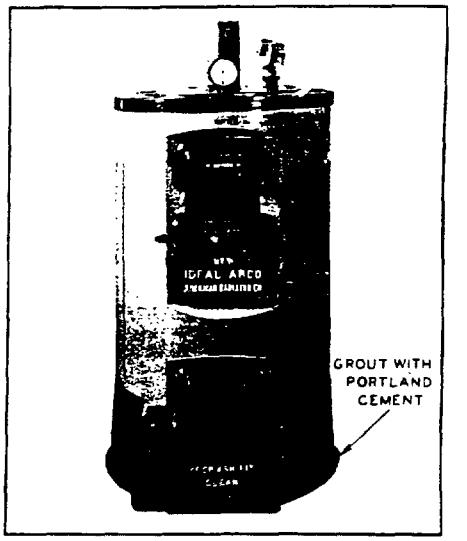
8. Attach doors, smokehood and boiler trim.

STEAM BOILERS: Place sheet metal jacket washers on gauge glass fittings and tri-cocks before screwing into boiler. Automatic steam regulator is connected to bushing by means of $1/2$" nipple packed in steam trim box.

Grout between bottom of base and floor with PORTLAND Cement.

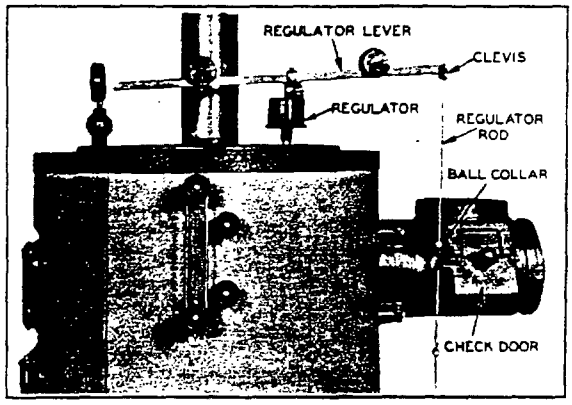
Cut No. 8 shows steam boiler, assembled complete.

Cut No. 9 shows water boiler, assembled complete.



No. 9

INSTRUCTIONS FOR ATTACHMENT AND OPERATION OF AUTOMATIC DRAFT CONTROL



Cuts showing attachment of draft control for either steam or water boilers — cut at upper left shows installation from regulator to cold air check door — cut at lower right shows lower end of regulator rod attached to draft door.

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 with notch on top; end with hole to rear. Tighten screw in rocker arm so that it engages notch in regulator lever
3. Attach clevis to rear end of regulator lever with flat head pin.
4. Attach loop or hook end of jointed regulator rod to draft door (on base) and run plain end thru eye of lever on cold air check damper (on smokehood).
5. Place ball collar on regulator rod and insert rod in clevis.
6. Adjust counterweight on regulator lever so that front end of lever is held down.
7. Adjust regulator rod so that door on base has approximately the same opening on both sides or slightly more than half open. Tighten set screw in clevis.
8. Hold draft and cold air check doors closed as shown and adjust ball collar on regulator rod so that it is a trifle above eye on cold air check door lever. Tighten set screw.
9. 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.

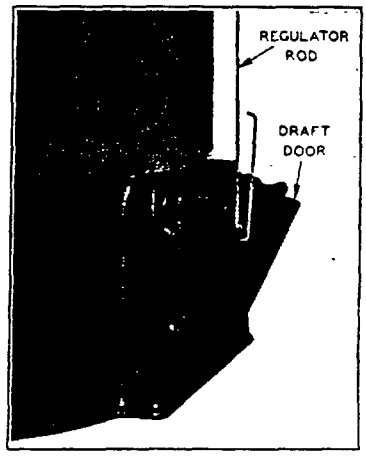
After fire is started in boiler and temperature rises to approximately 180 degrees on water boilers as indicated by combination altitude gauge and thermometer or approximately 2 lbs. pressure on steam boilers as indicated by steam gauge, regulator lever should raise, thereby closing draft door. Further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

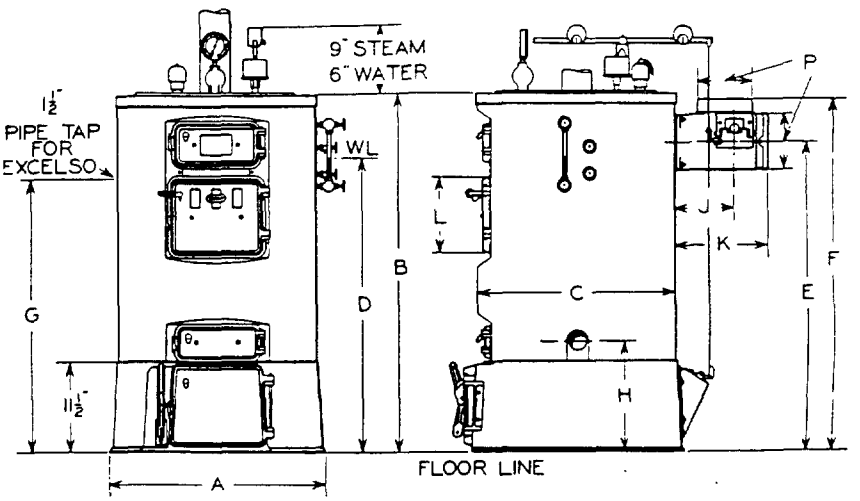
To obtain more heat, move FRONT WEIGHT further from regulator.

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.





BOILER NUMBERS

Dimension	181	201	221
A	26½	28½	31¼
B	46⅜	46⅜	47¾
C	24¼	26¼	29
D	38⅝	38⅝	38⅝
E	39½	39½	40
F	45	45	46½
G	36	36	35½
H	14½	14½	14½
J	6¼	6¼	7½
K	11¾	11¾	14¼
L	8¾ x 11½	8¾ x 11½	8¾ x 11½
P	7	7	9
Outlets	1-3	1-3	1-4
Inlets	2-3	2-3	2-3
Distance from Floor Line to Top of Flow Tapping Boss	46½	46½	48

Note: D—Indicates Height of Water Line.
L—Indicates Size of Fire Door Opening.
P—Indicates Diameter of Smoke Pipe.

STEAM BOILER

Fill boiler with water until 2 to 2½ inches shows in gauge glass. After fire is started in boiler the water will rise due to expansion caused by increase in temperature.

This level should be maintained while boiler is in operation. Never draw water from boiler while in use. Boiler should not be operated when water does not show in gauge glass, otherwise damage may result.

WATER BOILER

Keep entire system filled with water up to one-third of expansion tank. This insures complete circulation of water and safeguards against breakage. Expansion tank should not be set in cold or exposed place. If pipe leading to tank freezes, serious damage may result. Never draw water from system while in use.

NOTE—IMPORTANT: If closed type water system is used make sure relief valve is adjusted and operates below 30 pounds pressure, otherwise pressure may build up in system and cause damage.

STEAM AND WATER BOILERS FUEL RECOMMENDATIONS

Kind	With Average Chimney Draft	With Strong Chimney Draft
Hard Coal	Stove, Small Egg	Stove, Chestnut, Pea
Coke	Egg	Egg, Chestnut, Pea
Soft Coal	Lump, Egg	No. 2 Washed Nut, Mine Run

FIRING

Fill boiler or system with water as directed. Place kindling on grates and light. Add fuel in small quantities until fire is burning well. Continue to add fuel gradually until entire grate is covered to approximately half the depth of the fire pot.

Type of fuel largely determines height of fuel line in firepot for best results.

If hard coal or coke is used firepot may be filled up to approximately center of fire door. If good clean egg or lump soft coal is used fuel level can be carried up to fire door ledge. Cheaper grades of soft coal containing considerable slack cannot be fired as high as the better grades. Best results will be acquired by keeping fuel line as high as found practical.

Fire should receive attention at regular intervals. When boiler is operating under average heating requirements, grates should be shaken once each day unless weather is mild in which case grates may be shaken only as required to sustain fire.

At regular attention interval, observe the following:

1. Open pipe (choke) damper in smokehood fully.
2. Close draft and check draft doors.
3. Release catch which holds grates in level position.
4. Shake grates until fire shows in ashpit.
5. Engage grate locking catch and add fuel.

After fuel is added to fire, open slide damper in fire door. For hard coal or coke use of this damper is not so essential as when burning soft coal. The additional air admitted thru this damper is required in order to burn the volatile gases which form when fresh fuel is added. Length of time which damper should be open depends upon fuel and rate at which fire is burning. Regulation of this damper must therefore be found by practice to obtain best results.

Use of pipe (choke) damper in smokehood depends upon chimney and type of fuel used. This damper is provided to reduce draft thereby placing an additional check on fire if needed.

When using soft coal do not close this damper entirely until fuel is partly burned and practically smokeless.

Where poor chimney conditions prevail, it may be necessary to have choke damper open wide at all times. Best results in setting this damper will be found by practice.

The Automatic Regulator, with counter weights adjusted as directed under "Instructions for Attachment and Operation of Automatic Draft Control" (page 6) will control fire without further attention.

GENERAL RULES FOR BOILERS

1. Give fire regular attention, especially in severe weather when boiler is operating under full load.
2. Observe firing instructions.
3. Do not smother fire with fresh fuel and close dampers tight.
4. Do not overshake or poke fire in mild weather.
5. Do not leave fire door open in order to check fire. Correct adjustment of Automatic Regulator and Choke Damper in smokehood will regulate fire to supply amount of heat desired.
6. Remove ashes daily. If ashes are allowed to accumulate in ashpit, warped or burned out grates may result. If accumulation of ashes is allowed to remain in ashpit, same will absorb moisture and cause corrosion of metal parts with which ashes may come in contact.
7. Keep boiler surfaces and flues clean. Soot and dust are insulators and prevent boiler surfaces from absorbing and delivering full amount of heat to radiators.
8. If fire does not burn evenly over the entire grate and seems sluggish in starting up after grates have been well shaken, a thorough cleaning is required. This is done by allowing fire to burn down until a thin layer of fuel is left on grate; shake well and remove slate and clinkers left on grate with poker and scraper.
9. If fire has been neglected for some time and grate becomes covered with slate and clinkers massed together, quickest way to get active fire is to break up mass and dump grate. Then build an entirely new fire.
   Occasionally this clinker mass will hold together and may be removed thru fire door in one or more pieces. If this can be accomplished, building of new fire may be avoided.
10. If hard clinker or piece of coal lodges between the grate bars, do not force shaking mechanism too hard. Dislodge the obstruction with the poker and avoid breakage of parts.
11. The liability 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 part movement of the shaker handle.
12. At beginning of heating season open drain cock and permit sufficient water to run from system to remove sludge accumulation at bottom of boiler. Refill boiler as directed under "Operation and Care" before starting fire.

WHEN BOILER IS NOT IN USE

(Summer Months)

1. Remove smokepipe, clean thoroughly and replace in the fall, making all joints tight with boiler putty or asbestos cement.
2. Clean all flues; remove soot and ashes from boiler and at base of chimney.
3. Oil all door hinge bearings, damper bearings and regulation parts.
4. Leave doors partially open all summer to avoid sweating and rusting of interior surfaces.
5. On water boilers—keep system filled with water as directed under "Operation and Care." On steam boilers—fill boiler with water until water runs out of safety valve. Note: Safety valve lever should be held up when boiler is nearly full to avoid over filling.

WHEN BOILER IS NOT IN USE

(Winter Months)

If boiler is not to be used during winter, draw off all the water in the entire system. If water is permitted to freeze in boiler or radiators, breakage may result. If further instructions are needed, consult your heating contractor or the American Radiator Company.

BLOWING OFF STEAM BOILERS

Oil, grease or grit in a new system causes a Steam Boiler to foam, prevents proper generation of steam, and produces an unsteady water line. Therefore, it is necessary to BLOW OFF THE BOILER, UNDER PRESSURE, to clear the system of oil or any foreign matter in Radiators, Mains and Boiler.

This should be done WITHIN A SHORT TIME AFTER THE BOILER IS INSTALLED and in operation. If one blowing off does not result in a CLEAN WATER GAUGE GLASS, proper generation of steam and a steady water line, the boiler should be blown off a second, and if necessary, a third and fourth time. The following method for cleaning Steam Boilers under pressure will be found helpful.

WHEN WATER SUPPLY PRESSURE IS AVAILABLE

Remove safety valve from boiler. Connect a pipe at least 1½" in diameter to safety valve tapping, extending the pipe to the outside of the building or some suitable drain.

Close off all the Radiator Valves connected with the system, or if the main flow and return pipes are equipped with Gate Valves, these valves may be closed in place of closing the radiator valves. Fill the boiler with water to the top of the gauge glass. With a hot fire in boiler, blow hot water and steam out through safety-valve tapping and pipe referred to above. Maintain as much steam pressure as possible in boiler up to fifteen pounds, as indicated on steam gauge. Carefully supply makeup water to the boiler. Continue the blowing for about two hours. Then close off the Water Feed Valve and drain the water through the draw-off down to the proper water line in the boiler.

Remove the Blow-off Pipe and replace the Safety Valve, open up the Radiator Valves or the Gate Valves on the flow and return pipes, as the case may be, and then the heating outfit is ready for operation with the boiler thoroughly cleaned inside.

WHEN WATER SUPPLY PRESSURE IS NOT AVAILABLE

Remove safety valve from boiler and insert nipple and tee fitting. Replace safety valve in top of tee and use side opening of tee for blow-off line.

Connect a pipe at least 1½" in diameter, provided with a gate valve, to the blow-off opening in tee and run it to the nearest drain.

Close all Radiator Valves and boiler Return Valve. Fill the boiler with water to the top of the gauge glass. With the valve in the blow-off line closed, start wood fire and build up steam pressure from five to ten pounds. Open valve in blow-off line and close it when pressure has dropped to zero.

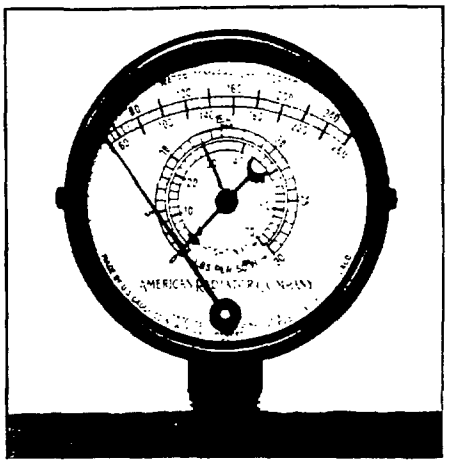
Carefully supply fresh water to the boiler to maintain the proper level and continue to repeat the above process for two to four hours.

At the end of this time draw fire quickly and with at least ten pounds pressure, drain boiler through bottom draw-off.

Remove the Blow-off Pipe, Nipple and Tee Fitting, and replace the Safety Valve.

Allow boiler to cool, then refill with water to proper level, and open Radiator Valves and boiler Return Valve before starting fire.

At times, one blowing off will not give the desired results, so that this process must be continued until the boiler is thoroughly cleansed.



COMBINATION ALTITUDE GAUGE AND THERMOMETER

This gauge is used with water boilers and should be connected into tapping provided on top of boiler. It serves the purpose of indicating the level of water in expansion tank and has fixed and movable hands which show the height of water in feet on the black circular scale marked "HEIGHT IN FEET."

After system is filled to proper level, the red fixed hand is then set at number of feet shown by the short black movable hand. This becomes the permanent water level.

Any loss by evaporation is indicated by the movable hand receding to a smaller number on the dial at which time the water supply valve should be opened until movable hand is again directly over the fixed hand.

TO SET THE RED FIXED HAND, LOOSEN THE TWO SCREWS WHICH SECURE THE RIM AND REMOVE RIM AND GLASS. AFTER SETTING, REPLACE RIM AND GLASS AND TIGHTEN SCREWS.

Pressure is indicated by the short black movable hand which in this case shows on the red circular scale marked "LBS. PER SQ. IN." If this hand indicates between twenty-five and thirty pounds and remains at that point, heating system should be carefully checked to insure that pressure is not building up beyond the safe working limit.

WATER BOILERS MUST OPERATE BELOW 30 POUNDS PRESSURE, OTHERWISE DAMAGE MAY RESULT.

On closed type pressure water systems, valves or parts must function properly so that water pressure in boiler never builds up over 30 POUNDS.

Temperature is indicated by the long black hand which shows on the black scale at top of dial marked "WATER TEMPERATURE DEGREES."

As water in system becomes heated this hand moves to the right, indicating temperature in degrees, FAHRENHEIT, to be maintained for varying conditions of weather.

COMPLETE BOILER CONSISTS OF:

1 BODY CASTING	1 BOX TRIM (STEAM OR WATER)
1 BASE CRATE	1 JACKET CRATE
1 FRONT DOOR CRATE	1 BUNDLE FIRE TOOLS (2 PIECES)

GIVE BOILER SIZE AND SERIES NUMBER WHEN ORDERING REPAIR PARTS

BASE CRATE

1	Base, Complete with Grate Bars
1	Grate Connecting Arm
1	Angle Lever
1	Angle Lever Bracket
1	Connecting Arm Catch
1	Ashpit Door, Hinge and Catch Plate
1	Draft Pouch Complete, consists of: Pouch, Frame and B-Fly Draft Door (Inside and Outside Half)
1	Smokehood Frame
1	Smokehood Complete, consists of: Smokehood with Check Draft Frame, B-Fly Door (Inside and Outside Half), Balance Weight, Lever, Choke Damper and Cap
1	Shaker Handle
1	Regulator Lever
1	Regulator Rod (2-Piece, Jointed)

FRONT DOOR CRATE

1	Slice Door Frame with Slice Door, Baffle Hinge and Catch Plate
1	Combination Fire and Cleanout Door Frame with Fire Door, Baffle, Slide Damper, Hinge and Catch Plate, Cleanout Door, Baffle, Series Plate, Hinge and Catch Plate
1	Bag Bolts, Coil Hole Covers and Sundry Small Parts

STEAM TRIM BOX

1	Automatic Steam Regulator
1	Set Water Column Trimmings
1	Pop Safety Valve and Bushing
1	Steam Gauge
1	Water Seal and Nipple
2	Regulator Weights
1	2 x 1/2" Bushing } For
1	1/2" Nipple } Regulator
2	1/2" Nipples } For
2	1/2" Couplings } Gauge Cocks
2	3/8" Nipples } For
2	3/8" Couplings } Tri-Cocks
1	Instruction Tag Form BP 2055
1	Regulator Rod Clevis and Ball Collar
2	Jacket Washers for Gauge Cocks
2	Jacket Washers for Tri-Cocks
...	Lbs. Putty

WATER TRIM BOX

1	Automatic Water Regulator
1	Combination Altitude Gauge and Thermometer
2	Regulator Lever Weights
1	2 x 1 1/2" Bushing
1	2" Rad. Plug
2	1/2" Flush Plugs
2	3/8" Flush Plugs
1	Regulator Rod Clevis and Ball Collar
...	Lbs. Putty

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PACKER'S CHECK TICKET

BOILER SIZE.....

SERIES No.....

DATE .....

INSPECTED BY .....

PACKED BY.....

GIVE BOILER SIZE AND SERIES NUMBER WHEN ORDERING REPAIR PARTS

AMERICAN RADIATOR COMPANY

Offices in All Principal Cities

REVISED 11-33

NEW
IDEAL ARCO BOILER

18-20-22 INCH

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FOR ALL FUELS

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OFFICES IN ALL PRINCIPAL CITIES

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