

HOW TO CARE
FOR YOUR
HEATING PLANT



AMERICAN RADIATOR COMPANY

DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

40 West 40th Street

New York

HOW TO CARE
FOR YOUR
HEATING PLANT



AMERICAN RADIATOR COMPANY

DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

40 West 40th Street

New York

IMPORTANT

This book contains instructions for getting the best results from your heating apparatus.

Please note the name of your heating contractor in space below, and then hang up the book in a convenient place for handy reference.

* * *

Note Here Name of Your Heating Contractor /

Name

Address

Phone No.

Call on the heating contractor who installed and guaranteed your plant, regarding any question or difficulty that might develop. The manufacturer guarantees all products against defects in fabrication, but their correct installation, and computation of proper sizes, etc., is the responsibility of the contractor to whom the work is entrusted.

INDEX

	<i>Pages</i>	
CHIMNEYS	25 to 27	
DAMPER CONTROL—AUTOMATIC—ADJUSTMENT OF ..	19 to 22	
DAMPER HAND CONTROL	23-24	
FIRING INSTRUCTIONS		
ANTHRACITE COAL	4 to 6	
SOFT COAL (WITH ORDINARY TYPE OF BOILERS) ..	6 to 9	
SOFT COAL (SMOKELESS BOILERS— WITH OXIDIZER)	10-11	
COKE	11	
GENERAL INSTRUCTIONS—ALL FUELS	12 to 14	
ILLUSTRATIONS OF VARIOUS BOILER PARTS REFERRED TO IN INSTRUCTIONS		16, 17, 18
IMPORTANT DETAILS REQUIRING ATTENTION	14 to 19	
MISCELLANEOUS		
ARCO WATER REGULATOR	31	
LENGTHENING THE LIFE OF HEATING BOILERS ..	27	
SPRING ATTENTION	28	
FALL ATTENTION	29	
WHEN BOILER IS NOT TO BE USED		
DURING WINTER	30	
BLOWING OFF STEAM BOILERS	30	

Firing Instructions

ANTHRACITE COAL

Starting the Fire:

Start the fire with kindling, then cover entire grate with a thin layer of coal. When this is well ignited fill firepot with coal to level of fire door in the front, and bank fuel up at the rear. Always maintain a deep fuel bed for most economical results.

Severe Weather:

Keep firepot full of coal and run heater by Arco Automatic Steam Regulator, or Automatic Water Regulator (if so equipped). These control the dampers (see pages 16, 17 and 18). When tending the boiler also thoroughly clean the grate by shaking until glowing coal drops into ash pit.

Mild Weather:

Keep two to six inches of ashes between live coals and grate. Fill firepot as mentioned above and set automatic regulator or hand control to keep fire subdued. Run poker or slicing bar through slice door (see page 16) over the grate at times, instead of stirring up the fire by shaking the grate. As weather grows colder, reduce amount of ashes on the grate.

Night Firing:

In very cold weather when house should be kept warm all night, clean grate so it is covered with clear-burning, red-hot coals late at night. Then fill firepot full of fuel. Full pot and

deep fire burn least coal—plenty for night heating and some left to commence early in the morning, when the resulting comfort is best appreciated. Heat is most needed at time of getting up and starting the day.

Turn off radiators in rooms where heat is not wanted. The regulator will automatically control the dampers so that just the proper amount of steam or hot water is supplied to the radiators which are turned on. Or in the case of water boiler not equipped with automatic regulator, set hand control to maintain required degree of heat.

Early Morning Fire:

If fire is low on mild weather mornings, first open draft damper in ashpit (see page 16) and allow fire to brighten up before adding fuel. Then spread a thin layer of fresh coal and set drafts for brisk fire. After well started, add usual fuel charge. Do not shake or slice much at this time.

In severe weather, if boiler has been attended to as directed in Night Firing, draft can be turned on early in the morning and boiler run awhile before adding coal. It will usually be found best to shake the fire at this time, increase the draft and let boiler thoroughly heat up the whole house before feeding the usual fuel charge. A large quantity of cold fuel naturally cools the fire and requires some time to become well ignited.

A fire well cared for, and normal attention given to the control of the boiler to suit weather conditions, will amply reward by fuel saving and heating comfort.

Sizes of Coal to Use:

For an average draft, the most satisfactory results will be obtained with stove size anthracite. If a strong draft is available

better results will be obtained with a smaller sized coal or by firing with large size coal a proportionate amount of chestnut or pea coal. Should it be desired to burn buckwheat or pea coal, it is well to have a supply of larger sized coal on hand for use when building new fires.

After building a new fire with buckwheat or pea coal, the fuel bed should be increased in thickness, by the addition of small charges, until level with the fire door. When firing fuel of this type, the bright fuel should be pushed to the rear of the boiler, leaving a hollow in which to throw the fresh fuel. This method will leave glowing coal exposed to ignite gases of distillation.

The use of buckwheat and pea coal is economical but requires a very good draft. The grates should be carefully shaken only until the first live coals fall through them, in order to avoid excessive fuel waste.

SOFT COAL

(WITH ORDINARY TYPE OF BOILERS)

Starting the Fire:

Start the fire with kindling, and cover entire grate with a thin layer of coal. When fuel is burning briskly add coal in small amounts. In this manner the fuel bed is gradually built up, and when the fuel is thoroughly coked, the boiler is ready for recharging.

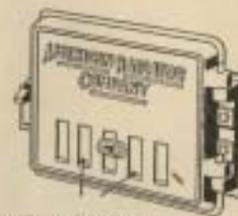
Recharging:

Soft coal should never be fired over the entire fuel bed, but should always be so distributed as to leave a portion of the glow-

ing coked coal exposed to ignite the gases of distillation. By this method, together with proper air supply, dense smoke from the chimney will be eliminated and more efficient operation obtained.

When recharging a boiler, then, it will be necessary to push the glowing coked coal to the rear, leaving only a thin layer covering the front grates, thus forming a hollow in which to throw the fresh fuel. It is recommended that the fuel bed be carried as deep as the size of the fuel and the available draft will permit, in order to have as much coked fuel as possible which, as outlined, shall ignite the gases driven off from the soft coal. A deep fuel bed also insures long firing periods.

Immediately after firing, air should be admitted over the fuel bed, by opening the secondary air slots in the fire door. If too much air is admitted the gases driven from the soft coal will be cooled below the ignition temperature and smoke will be generated. Open slots only as far as necessary to obtain a smokeless combustion of the gases above the fuel bed.



SLOTS IN FIRE DOOR

The fire is best cleaned when it is low. To remove clinkers, push fuel first to one side and then to the other. If the fuel used is of the caking variety it will fuse into a solid mass and may be broken up by stoking, about one hour after firing, the time interval depending on the operating conditions. Care should be taken when stoking not to raise the ash into the fire as clinkers will be formed. The stoking bar should be kept as near grate as possible and only raised sufficiently to break up the fuel.

Severe Weather:

Keep firepot full of coal and run heater by Automatic Steam Regulator (or Automatic Water Regulator, if so equipped). These control the dampers (see pages 16, 17 and 18). When tending the boiler thoroughly clean the grate by shaking until glowing coal drops into ash pit.

Mild Weather:

Keep two to six inches of ashes between live coals and grate. Fill firepot full of fuel and set automatic regulator or hand control to keep fire subdued. Run poker or slicing bar through slice door (see page 16) over the grate at times, instead of stirring up the fire by shaking the grate. As weather grows colder, reduce the amount of ashes on the grate.

Night Firing:

In very cold weather when house should be kept warm all night, clean grate so it is covered with clear-burning, red-hot coals late at night. Then fill firepot full of fuel. Full pot and deep fire burn least coal—plenty for night heating and some left to commence early in the morning, when the resulting comfort is best appreciated. Heat is most needed at time of getting up and starting the day.

Turn off radiators in rooms where heat is not wanted. The regulator will automatically control the dampers so that just the proper amount of steam or hot water is supplied to the radiators which are turned on. Or, in the case of water boiler not equipped with automatic regulator, set hand control to maintain required degree of heat.

Early Morning Fire:

If fire is low on mild weather mornings, first open draft damper in ashpit (see page 16) and allow fire to brighten up

before adding fuel. Then spread a thin layer of fresh coal and set drafts for brisk fire. After well started, add usual fuel charge. Do not shake or slice much at this time.

In severe weather, if boiler has been attended to as directed in Night Firing, draft can be turned on early in the morning and boiler run awhile before adding coal. It will usually be found best to shake the fire at this time, increase the draft and let boiler thoroughly heat up the whole house before feeding the usual fuel charge. A large quantity of cold fuel naturally cools the fire and requires some time to become well ignited.

A fire well cared for and normal attention given to the control of the boiler to suit weather conditions, will amply reward by fuel saving and heating comfort.

Sizes of Coal to Use:

For an average draft, the most satisfactory results will be obtained with lump or egg size coal. The smaller sizes down to No. 2 washed nut may also be used, but will require a strong draft. The size fuel which will give satisfaction in the greatest number of instances is 3 x 6 inch egg. This size allows free access of air to the burning coal. When burning soft coal it will be necessary to clean the flues of the boiler more frequently in order to obtain most economical operation.

Soft coal burns more rapidly and with less draft than anthracite but will require more frequent attention. Soft coal burns unevenly and when fired in thin layers will form holes in the fire, which reduces the draft. Deep fuel bed should be carried.

SOFT COAL

(SMOKELESS BOILERS — WITH OXIDIZER)

Starting the Fire:

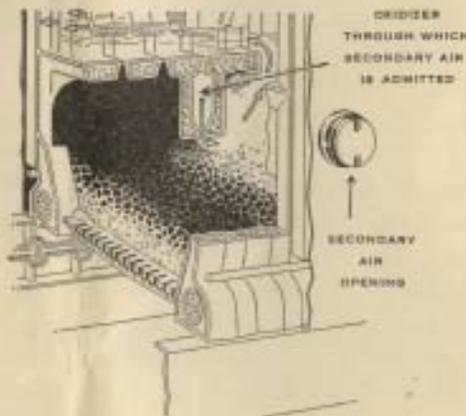
Start the fire with kindling, and cover entire grate with a thin layer of coal. When fuel is burning briskly add coal in small amounts. In this manner the fuel bed is gradually built up, and when the fuel is thoroughly coked, the boiler is ready for recharging.

Recharging:

When recharging smokeless boilers equipped with an Oxidizer, push glowing coal to the rear of the boiler underneath the Oxidizer, leaving only a thin layer on the front grates. A sufficient quantity of fresh coal to provide a good coal bed should now be fired in the boiler but care should be taken to leave a space of at least three inches beneath the Oxidizer.

Never fire fresh coal behind the Oxidizer.

Secondary air must now be admitted from both sides of the boiler until a smokeless combustion of the gases is obtained.



Secondary Air:

After adding fresh fuel, considerable combustible gas rises from the fuel bed, and if sufficient air for its complete combustion cannot be supplied through the grates (primary air), air must be admitted through fire door slots and secondary air openings at the side of the boiler (see illustration page 10). The amount of secondary air to be supplied will vary with the type of coal used and the rate of combustion.

The addition of too much secondary air is harmful rather than beneficial. The correct adjustment of fire door slots and side dampers depends upon so many variables that no set rules can be given. However, the following may be helpful:

In mild weather keep secondary air openings closed, whereas, for average winter weather, openings should be partially opened. In extreme winter weather when the boiler is running at a high rate, it is advisable to keep them half open all the time. At all times immediately after firing, the secondary air openings should be opened full for about one hour, the time depending upon the rate of combustion.

Additional Care:

Follow in general the directions given under "Soft Coal with ordinary type of boilers," page 6, for attention in mild and severe weather, early morning firing, etc., and also follow detailed instructions that are furnished with the boiler.

COKE

Coke as manufactured is suitable and can be used in IDEAL Boilers with good results. It has little ash and gives uniform, steady heat. Due to its lighter weight for an equivalent volume,

as compared to anthracite, the attention period will be shorter unless a boiler is provided with a larger firebox.

Particular care must be exercised when burning coke to see that no air leaks exist where boiler base sits on floor and where boiler proper sets on base, also that all doors fit properly, and that draft damper (in base) (see illustration page 16) closes tightly so that air supply to fire can be completely controlled.

Less shaking of grates is required and draft requirements are less than those of anthracite.

Always carry firepot full. A shallow fire results in quick combustion and the formation of clinkers.

Otherwise proceed as with anthracite coal.

GENERAL FIRING INSTRUCTIONS (All Fuels)

1. Carry deep or high fire—keep pot full. Let the coals come up to feed-door, and higher, as it slopes back. Do not nag the fire by frequent feeding in driblets, or frequent poking or shaking throughout the day. Feed, shake or clear grate at regular intervals.

2. When shaking or firing, Choke Damper (inside smoke-hood or smoke-pipe) should be open. Check-Draft Damper or Cold Air Check, and Draft Damper (in base) should be closed. (See illustrations page 16.) These precautions will concentrate the draft upon fire-door and prevent escape of dust and gas into the cellar.

3. To increase or lessen the pressure of a steam boiler or to increase the temperature of the water in a water boiler that is equipped with automatic regulation, move the weights on the regulator arm (see pages 16, 17 and 18), so that the draft

damper closes at the pressure or temperature desired. A little experimenting will show you the correct location of weights. Correct automatic damper control is of greatest importance in obtaining economical operation. (See pages 19 to 22.)

4. Do not leave fire door (see page 16) open in order to check fire (in mild weather or at night). Correct adjustment of the damper or hand control will regulate the fire to supply just the right amount of heat needed.

5. Do not let ashes bank up under the grate in ash-pit. Our bars are hardy, but it is possible to warp them by carelessness. Removing ashes once a day is the best rule, even if but little has fallen into pit.

6. Keep boiler surfaces and flues clean. Soot causes boiler to require more fuel than when surfaces are clean. (Also see page 27, "Lengthening the Life of Heating Boilers.")

7. Fire should be cleaned regularly, especially in cold weather. Do not slice or poke fire from top; use fire door for removing large clinkers. Do all cleaning through clinker door, or by shaking or dumping grate. (See page 16 for illustration of parts.)

8. If the fire does not burn evenly over the entire grate or 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 all slate and clinkers with slice bar and hoe, through slice or clinker door. (See page 16 for location of doors.)

Then add a thin layer of fresh coal and do not feed the full charge of fuel until this is burning briskly.

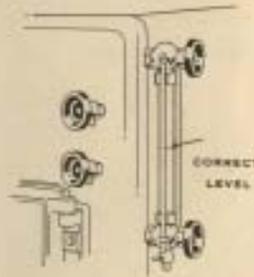
9. If hard clinkers lodge between the grate bars, do not force the shaking. Dislodge the mass with a poker or slicing bar.

Important Details Requiring Observation and Attention

STEAM BOILERS

Waterline:

It is extremely important that, in the case of a steam boiler, the gauge glass show the correct water level. Whenever the gauge glass is less than half full, water should be added by opening the valve on the city water supply line. If additional water must be added while boiler is in operation *do not* fully open the supply valve—add water slowly. If the waterline is permitted to disappear from the gauge glass, cracked sections may result.



Boiler Water:

Note condition of water in gauge glass. If discolored and oily, boiler should be cleaned by the use of some *good boiler cleaner* (see page 30) (best done by steamfitter). A dirty boiler cannot give economical and satisfactory results.

WATER BOILERS

In the case of a gravity hot water heating system, the system should be filled with water to about 1/3 of the gauge glass on the expansion tank. This is done in the following manner:

Be sure that all radiator air vents are closed, and then partly

open valve of city water supply line. Beginning with the ground floor, open the air vent of a radiator until the radiator is filled with water. Treat all other radiators in a similar manner. After all radiators have been properly vented and filled, continue to add water until level reaches about 1/3 of the gauge glass on the expansion tank (located at highest point of system). If the boiler is equipped with an altitude gauge, it is not necessary to watch the expansion tank gauge glass; merely continue to add water until altitude gauge indicator reaches the proper mark.



After the system has been in operation for a few days the venting process should be repeated, as water, unless it has been previously boiled, always contains varying amounts of air.

If pressure type system is used, make certain it is functioning properly and that relief valve discharges at proper pressure. (See manufacturer's instructions.)

SMOKEPIPE

Be sure smokepipe connections are tight and that its joint with the chimney is sealed.

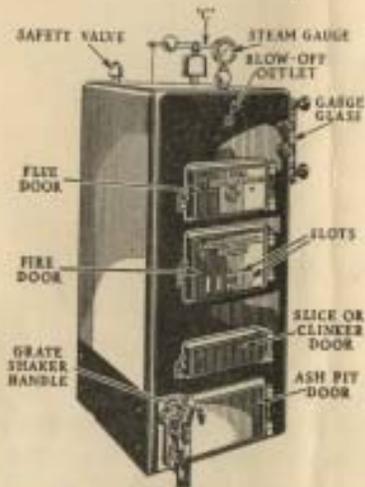
Be sure that smokepipe enters the chimney proper, but does not extend too far as such a condition will cut off part of the chimney flue area and decrease the draft. See paragraph, "The Chimney," page 25.

AUTOMATIC DAMPER REGULATOR

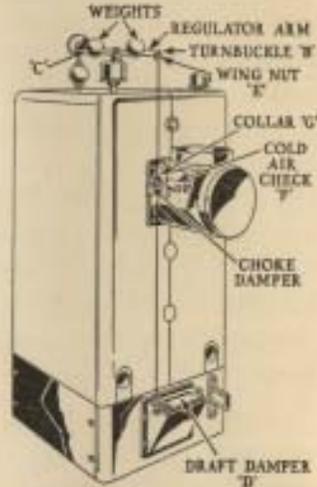
Make certain that automatic damper regulator is functioning properly. (See "Adjustment of Arco Automatic Regulators," page 19, for instructions.)

HOW TO CARE FOR YOUR HEATING PLANT

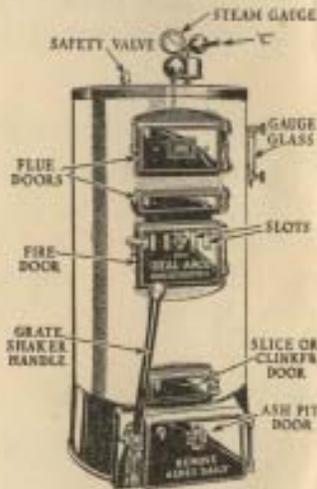
In order to make it easy to identify the various parts of boilers referred to in this booklet, they have been indicated on illustrations below:



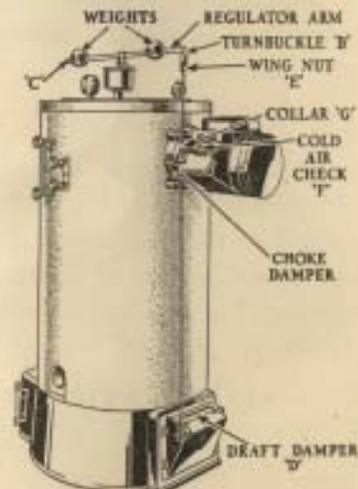
Ideal Redflash Boiler—front view



Ideal Redflash Boiler—rear view



New Ideal Arco Boiler—front view



New Ideal Arco Boiler—rear view



ILLUSTRATION "A"
Ideal Water Tube 23" Boiler
with Automatic Damper
Control

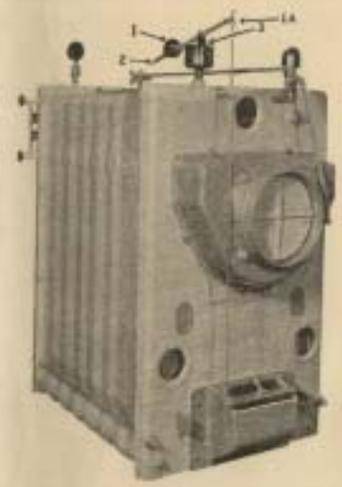


ILLUSTRATION "B"
Ideal Water Tube 29" Boiler
with Automatic Damper
Control

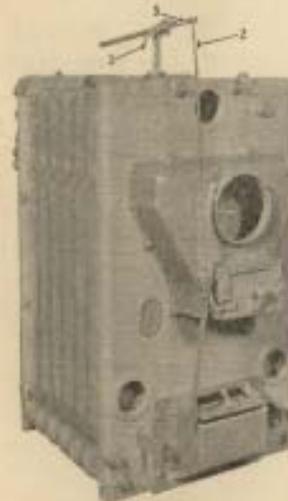


ILLUSTRATION "C"
Ideal Water Tube 23" Boiler
with Hand Damper Control

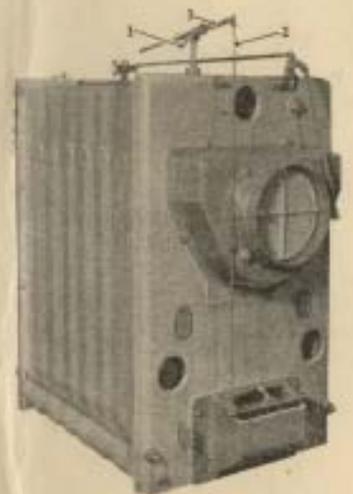


ILLUSTRATION "D"
Ideal Water Tube 29" Boiler
with Hand Damper Control

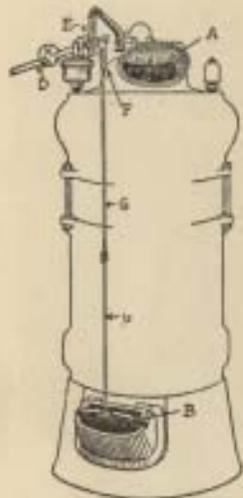


FIG. 1

Old Arco Round Boilers with Automatic Damper Control

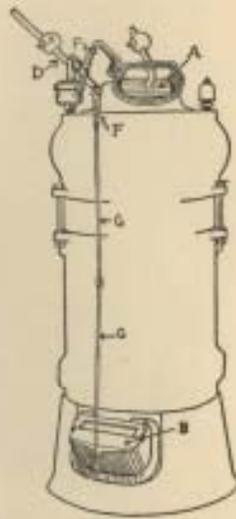


FIG. 2

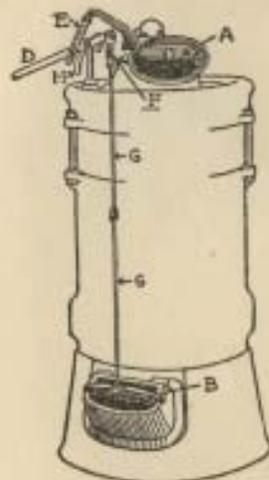


FIG. 3

Old Arco Round Boilers with Hand Damper Control

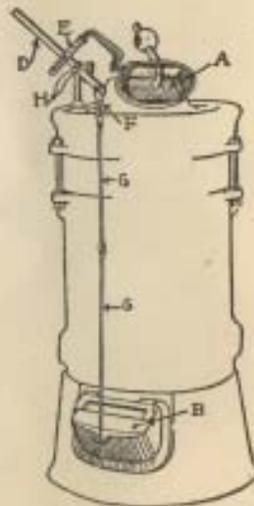


FIG. 4

LEAKAGES

Examine boiler for air leaks. Note if base of boiler where it rests on floor has been properly cemented. Ascertain if space between sections and base have been properly sealed with boiler putty. Be sure that doors fit tight to frame. This is important. Probably best done by heating contractor.

Burning Coal Fast and Slow

Proportionate to the number of radiators turned on or off, the heat supplied by the boiler must vary from a minimum to a maximum, or in other words, the rate of burning coal must fluctuate between fast and slow and adjust itself to the heat demand. In order to do this all jacketed and unjacketed steam boilers, and most jacketed water boilers are controlled by an Arco Automatic Steam or Water Regulator, which operates the base draft damper and cold air check (see illustration pages 16, 17 and 18) thereby increasing or decreasing the draft. If one or more radiators are turned off the regulator immediately checks the draft and the rate of combustion is decreased and vice versa.

Adjustment of Arco Automatic Regulators

Ideal Redflash and New Ideal Arco Round Boilers

To obtain proper operation of the automatic regulator it should be correctly adjusted.

This is done as follows (see page 16 for illustration of parts).

Adjust turnbuckle "B" so that with the front end of the regulator arm "C" completely down, the base draft damper "D" is open about $1\frac{1}{2}$ ". Lock rod in this position with wing-nut "E."

Hold base draft damper "D" and cold air check damper "F" closed and adjust collar "G" on rod so that it is just touching cold air check lever—then fasten collar in place with lock screw.

When the regulator has been adjusted, it should function as follows:

With the front end of the regulator arm "C" completely down, the base draft damper "D" should be open and cold air check "F" closed. Now raise regulator arm at "C" until base draft damper "D" closes—at this point cold air check "F" should also be closed. By still further raising arm at "C," base draft damper will remain closed and cold air check "F" will continue to open.

In case of unusual draft conditions cold air check may be adjusted to open before base draft damper has closed but in most instances ample and rapid control will be obtained with the adjustment previously described.

In order to obtain a higher temperature in case of a hot water heating system or higher pressures for a steam boiler, it is merely necessary to move the weight toward the end of the regulator arm "C." Lower pressures and temperatures will be obtained if the weight is moved toward the post. Experience will soon teach the proper position for the weight or weights furnished with the boiler to maintain any desired pressure or temperature.

NOTE—To obtain most economic operation, care should be taken to properly seal, by putty or cement, space between base and floor, and boiler sections and base. See paragraph "Leakages," on page 19.

Ideal Water Tube Boilers

Steam boilers of these series are equipped with Arco Automatic Regulation (water boilers can be equipped at small extra

cost). There are, however, two different arrangements of control mechanism.

On the boiler shown in illustration "A" on page 17 the rods are connected to both draft damper and cold air check and permanently hooked up at time of installation. To control the draft set weight 1 at a point between end of regulator arm 2 and regulator 3 which experience indicates will maintain the desired pressure on steam boilers, or temperature, in the case of hot water boilers. If necessary to change regulation, move weight 1 towards end of regulator arm 2 for higher and towards regulator 3 for lower pressure or temperature.

On the Water Tube Boiler shown in illustration "B," page 17, the rods are connected to lower draft damper only, but the length can be adjusted by turning small screw 1A, moving rod as required and tightening screw.

The proper adjustment is obtained when the end of regulator arm 2 is completely down and the draft damper is in a full open position.

The weight 1 should then be set at a point between end of regulator arm 2 and regulator 3 which experience dictates will maintain proper conditions of pressure or temperature. To change regulation move weight 1 towards end of arm 2 for increase in pressure or temperature, and towards regulator 3 for a decrease.

Old Ideal Arco Round Boilers

All Arco Round Steam Boilers have Arco Automatic Regulation, and Water Boilers can be equipped at small extra cost.

Figures 1 and 2 on page 18 graphically illustrate the hook-up of the Arco Regulator and how it functions.

The regulator arm "D" is connected to the combination check and choke damper "A" by the slotted link "E" and to the draft damper "B" by the jointed rod "G."

Experience will soon teach the proper position for the ball on the regulator arm, in order to maintain desired conditions of pressure and temperature.

To obtain a higher temperature (or pressure for a steam boiler), move ball away from Arco Regulator; and vice versa for lower temperature or pressure.

It will be noted that the jointed rod "G" can be adjusted to the desired length by means of the turnbuckle "F."

The combination check and choke-damper "A" is connected to the regulator arm by means of a slotted link "E," provided with four holes which permit adjustment of the relative positions of damper "A," and draft-damper "B" by changing the connecting bolts from one hole to another in the slotted link "E."

When the unattached end of regulator arm is at its lowest possible position (see Fig. 1), adjustment should be made by means of the turnbuckle "F," to open wide draft-door damper "B."

The unattached end of regulator arm should then be gradually raised until draft-damper "B" just closes, at which point the slotted link "E" should be so adjusted that damper "A" begins to open.

With the unattached end of regulator arm in its highest position (see Fig. 2), draft-damper "B" should continue to remain closed and damper "A" should be fully opened.

In case of unusual draft conditions, damper "A" can be adjusted to start opening before draft-damper "B" has closed but in most instances ample and rapid control will be obtained with the adjustment already described, particularly if care is taken to prevent air leakage in ash-pit.

Care should be taken to see that draft-damper "B" is always tightly closed when damper "A" is opened to the fullest extent, Figure 2.

Hand Damper Control on Hot Water Boilers

IDEAL WATER TUBE BOILERS

All water boilers of this type have specially designed hand regulation which makes it a simple and easy task to adjust all dampers for proper control of fire. Arco Automatic Regulator may be attached at small extra cost.

One series of Water Tube Boilers has hand regulation as shown in illustration "C," page 17, and operates both the cold air check and draft damper. The other series is arranged as per illustration "D," on page 17, and adjusts the draft-damper only. The choke-damper in smoke-hood is controlled by a long rod with a handle in front of the boiler.

To increase temperature, loosen threaded handle 1 and push up vertical rod 2 and tighten in place. To get less heat loosen threaded handle 1 and pull down vertical rod 2.

Experience will soon teach the proper position of operating lever (3) for all conditions.

OLD ARCO ROUND BOILERS

Figs. 3 and 4 on page 18 illustrate the hand draft control of these boilers. Arco Automatic Control may be added at small cost.

The operating lever "D" is connected to the combination damper "A" by the slotted link "E" and to the draft-damper "B" by the jointed rod "G."

To obtain a higher water temperature, pull down end of operating lever "D," and for lower temperature vice-versa. Experience will soon teach the proper settings of operating lever "D" for all conditions.

ADJUSTMENT. It will be noted that the jointed rod "G" can be adjusted to the desired length by means of the turnbuckle "F."

The combination check and choke-damper "A" is connected to the operating lever by means of a slotted link "E," provided with four holes which permit adjustment of the relative positions of combination damper and draft-damper, by changing the connecting bolt from one hole to another in the slotted link.

When the unattached end of operating lever "D" is at its lowest possible position (see Fig. 3), adjustment should be made by means of a turnbuckle "F," to open wide draft damper "B."

The free end of operating lever "D" should then be gradually raised until draft-damper "B" just closes, at which point the

slotted link "E" should be so adjusted that damper "A" just begins to open.

With the end of operating lever "D" in its highest position (see Fig. 4), draft-damper "B" should continue to remain closed and damper "A" be fully opened.

In case of unusual draft conditions, damper "A" can be adjusted to start opening before draft-damper "B" closes, but in most instances ample and rapid control will be obtained with the adjustment already described, particularly if care is taken to prevent air leakage in ash-pit.

Care should be taken to see that draft-damper "B" is always tightly closed when damper "A" is opened to the fullest extent.

The Chimney

The chimney has been frequently referred to as the pulse of the heating system and it may be said that there is hardly any one part of the plant which contributes so much to the success or failure of the installation as the chimney. In view of the chimney's importance, the following fundamentals are briefly outlined:

Three requirements must be met to achieve success: (1) Uniform, smooth and unobstructed interior surface. (2) Proper area and height. (3) Freedom from leaks from top to bottom.

The size and height of the chimney recommended by the boiler manufacturer should always be complied with as nearly as possible.

(a) The top of a chimney should extend at least three feet above flat roofs and at least two feet above the ridge of a peaked roof. It should not be located adjacent to buildings or trees higher than itself as eddies may be formed, which might tend to eliminate the draft.

(b) Chimneys built inside the house are not subject to as large a heat loss as outside chimneys, and are therefore more efficient. Chimneys built into outside walls should have thicker walls in order to decrease the heat loss.

(c) The chimney walls should never be less than 8 inches thick unless the flues are lined the full length with fire clay flue lining, and proper precautions have been taken to adequately protect nearby inflammable materials.

(d) The chimney should be constructed as straight as possible to avoid offsets. Offsets mean increased resistance and reduce the chimney efficiency. Soot, mortar, etc., may accumulate in offsets and bends and greatly reduce its working area. Where offsets are unavoidable they should be made gradual.

(e) All joints in the brickwork and lining must be carefully filled with mortar or cement so that the inner chimney surface is smooth. It has been found that cemented chimneys give better results than those using mortar.

(f) The draft in a chimney is spiral and therefore round chimneys or those as nearly square as possible are most effective.

(g) No other equipment should be connected to a chimney to which a heating boiler is connected. In this respect the chimney may be likened to a person trying to smoke a cigarette if the paper has been punctured.

(b) Do not let the boiler smokepipe extend into the chimney as this impairs the draft. Smokepipe should be flush with inner chimney wall.

(i) Provision should be made for a soot pocket at the base of every flue, which is accessible by means of a good fitting clean-out door. The top of the door should be placed close to the smokepipe connection.

(j) The chimney top should not be capped by any device which will make the area of its outlet less than the area of the flue.

(k) Avoid leaks around smokepipe where it joins boiler and chimney. All joints should be carefully sealed with boiler putty or asbestos cement.

Of Vital Importance to All Boiler Owners

Lengthening the Life of Heating Boilers

A well-designed heating boiler will, under normal conditions, last a great many years. It must, of course, be given proper care and attention, which means periodic and thorough cleaning, regular removal of ashes, keeping all parts in good working order, maintaining proper water line and never forcing the fire beyond the intended limits.

There is, however, an enemy of all heating boilers with which owners must contend, and that is corrosion, which acts principally during the summer or idle period, when boiler is cold.

Cast iron boilers resist the ravages of corrosion to a much greater degree than all others, but there are certain conditions under which corrosion or rust may gain headway.

It is therefore important that boilers should be kept clean by removing regularly all soot and scale from flues and other interior surfaces, and keeping the outside of boiler free from dust, dirt and foreign matter.

Also that the tie-rods of sectional boilers (which extend through the boiler and hold the sections together) should have the nuts on the ends loosened, to relieve the tension created by corrosive action. To do this right, the tie-rod nuts should be removed, spring washers placed behind each nut, and then replace nuts and tighten with the fingers only, and without the use of a wrench.

In addition, we recommend the following periodic attention to all those owning heating boilers or responsible for their care and satisfactory operation.

Spring Attention

1. Keep flues and all other parts clean at all times, and when discontinuing use for the summer, carefully and thoroughly clean all flues, firebox or any part coming in contact with hot gases, removing all soot, scale, dirt, etc. One-eighth inch of soot wastes 25% of the fuel. Therefore it is advisable to have the boiler cleaned by your heating contractor with the special Arco Wand Boiler-Furnace Cleaner.

2. After cleaning flues, spray thoroughly with light lubricating oil, using oil gun with extended stem bent at end so as to facilitate reaching all corners and narrow places. Oil used need not be expensive—crankcase rejections will suffice. Oil all doors and door bearings, damper bearings, and regulator parts.

3. Steam boilers—allow old water to remain and add additional water sufficient to fill to safety valve. In the case of hot water boiler, leave water alone.

4. Leave fire doors, clean-out doors, and ashpit doors open. (See page 16 for illustrations.) Thoroughly clean smokepipe and remove accumulation at chimney base. Leave smokepipe off, if desired.

5. Make sure all tie-rod nuts are *tested and left loose*. If not already equipped, install spring washers under nuts of all tie-rods. (See section "Of Vital Importance to All Boiler Owners," page 27.) (These washers will be furnished at nominal cost by the American Radiator Company.)

Fall Attention

1. Draw off all water from system—flush out thoroughly to remove sediment and dirt. Flush out return lines as well as boiler. When system is clean, fill with fresh water to prescribed waterline, if steam or vapor system (see page 14). In the case of a hot water system, fill to proper level at expansion tank as instructed on page 14, "Water Boilers."

2. Carefully inspect all control devices and see that they are properly adjusted and are functioning. (See pages 19 to 22). Fuel is often wasted due to improper operation of automatic control apparatus. After an idle period, controls may stick or operate slowly due to corrosion of moving parts, accumulation of dust, or dry bearings.

The failure of air valves to function properly on a one-pipe steam heating system is frequently due to dirt accumulations in the delicate working parts. Therefore when radiators do not heat

properly, try cleaning them with "Airigater," a product designed specially for the purpose. Your heating contractor can furnish it.

3. Inspect boiler for air leaks. (See page 19.)

If Boiler Is Not to Be Used During the Winter

If a boiler is not used during the winter, it is advisable to drain it. A boiler not in use, containing water in cold weather, may freeze, causing breakage.

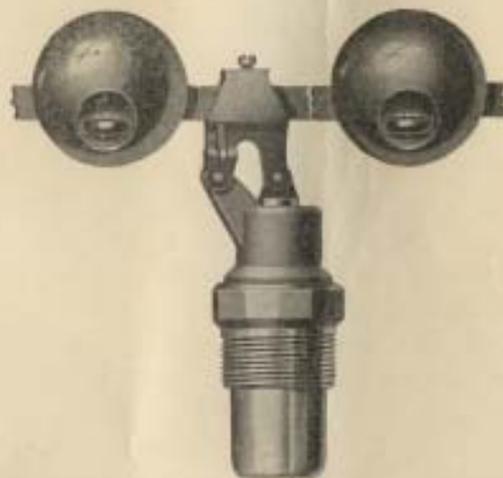
Cleaning Steam Boilers

After a steam boiler has been in operation for a time, grease, oil and other foreign matter will have accumulated in it and may lead to an improper generation of steam. Quite frequently, under such conditions, water is thrown into the steam mains and may cause pounding. A practical method of determining when the water in a boiler is free from disturbing impurities, is to drain a sample from the tri cock into a vessel and boil it over a gas plate or other hot fire. At the same time boil an equal quantity of boiler feed water. If a marked difference in the liberation of steam from the surfaces is observed, the boiler should be cleaned. Another indication of dirty boiler water would be the discharge of water and steam from a boiler under pressure (2 to 5 pounds), through the safety valve when its lifting lever is raised.

To obtain the most satisfactory results a **CLEAN BOILER** is **ABSOLUTELY NECESSARY**. The cleaning of your boiler is best done by your heating contractor. The use of some good boiler cleaning compound such as "Vinco" is recommended. It is essential to follow the instructions of the manufacturer, and in obstinate cases to obtain the recommendations of their laboratories.

ARCO WATER REGULATORS

For Damper Control on Hot Water Boilers



Arco Water Regulators automatically keep the water temperature in the boiler at the predetermined degree to furnish the necessary warmth to the rooms above, eliminate the care of adjusting drafts by hand, save fuel by preventing over-heating. They pay for themselves in a short time with the economies they effect, to say nothing of the convenience.

For full information and cost see your heating contractor.