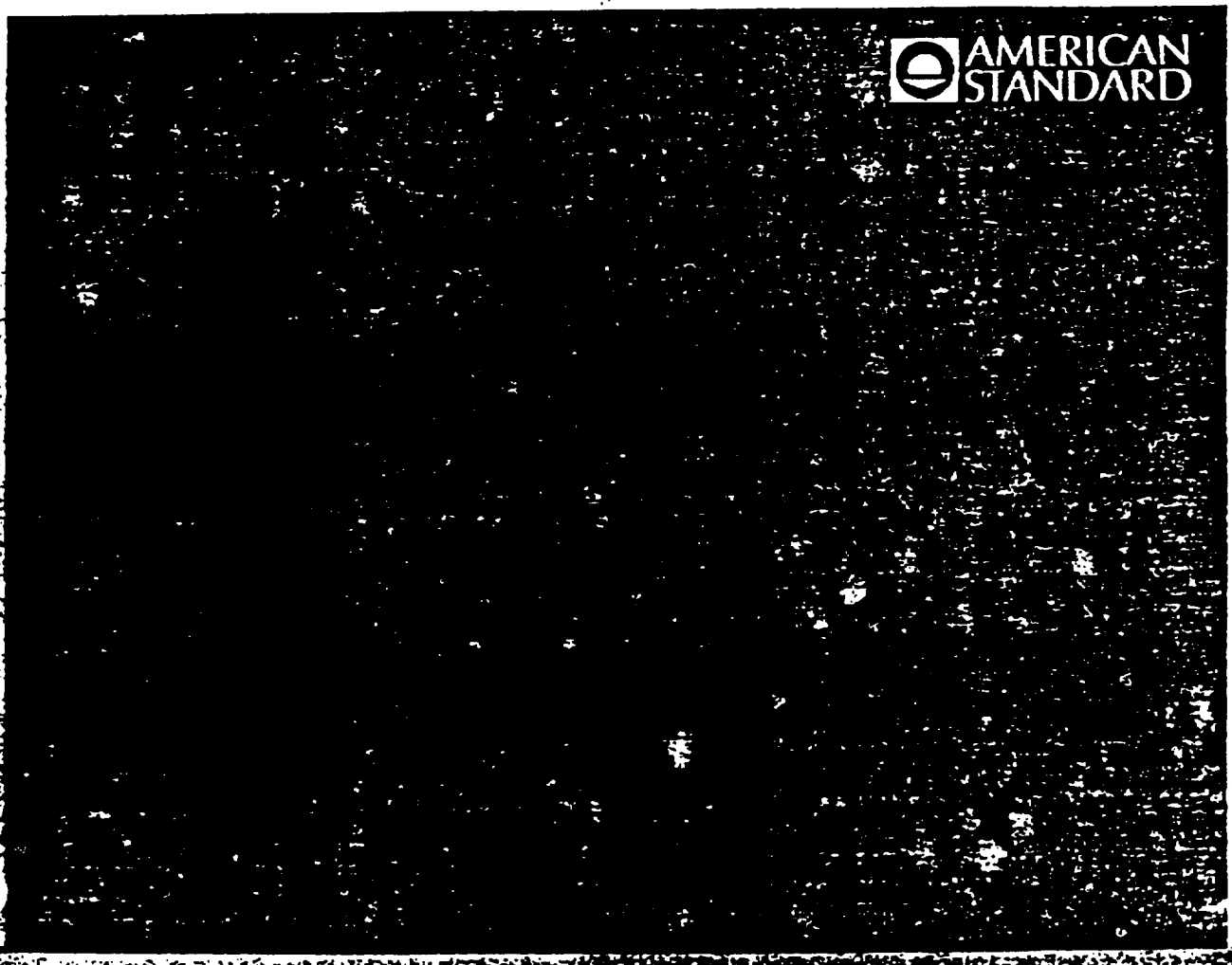
PFA-5

FORCED DRAFT BOILERS

PLAINTIFF'S EXHIBIT

ASI-164



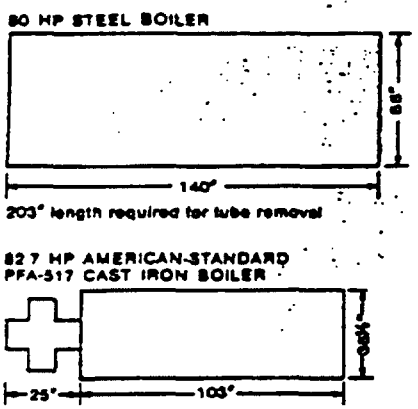
SOME FACTS

The PFA-5 boiler utilizes the most up-to-date technology in cast iron boiler designs for schools, apartments, motels, and churches, or wherever dependable heating service is a must.

Designed specifically for forced draft applications, the PFA-5 requires less height and area and provides increased efficiency over conventional boilers of comparable output. This means more boiler for the available boiler dollars.

18 different sizes are available, ranging from 620 MBH to 3,431 MBH gross output.

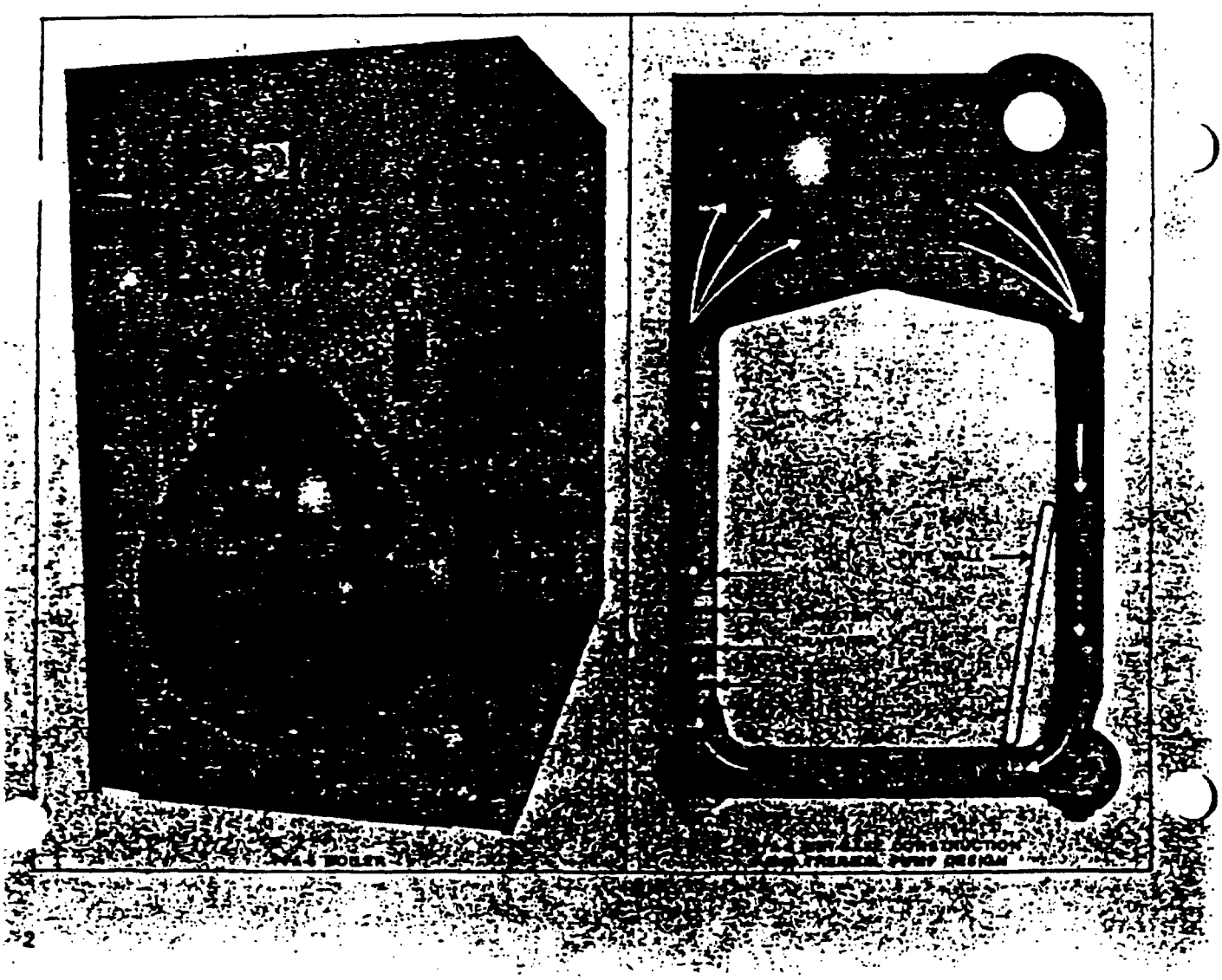
Drawings below illustrate the saving of floor space compared with conventional boilers.



CONSTRUCTION

Compact, lightweight, wet-base design of the PFA-5 eliminates the need for erecting a separate base. Wet-base construction provides heat-absorbing surfaces to completely surround the combustion space.

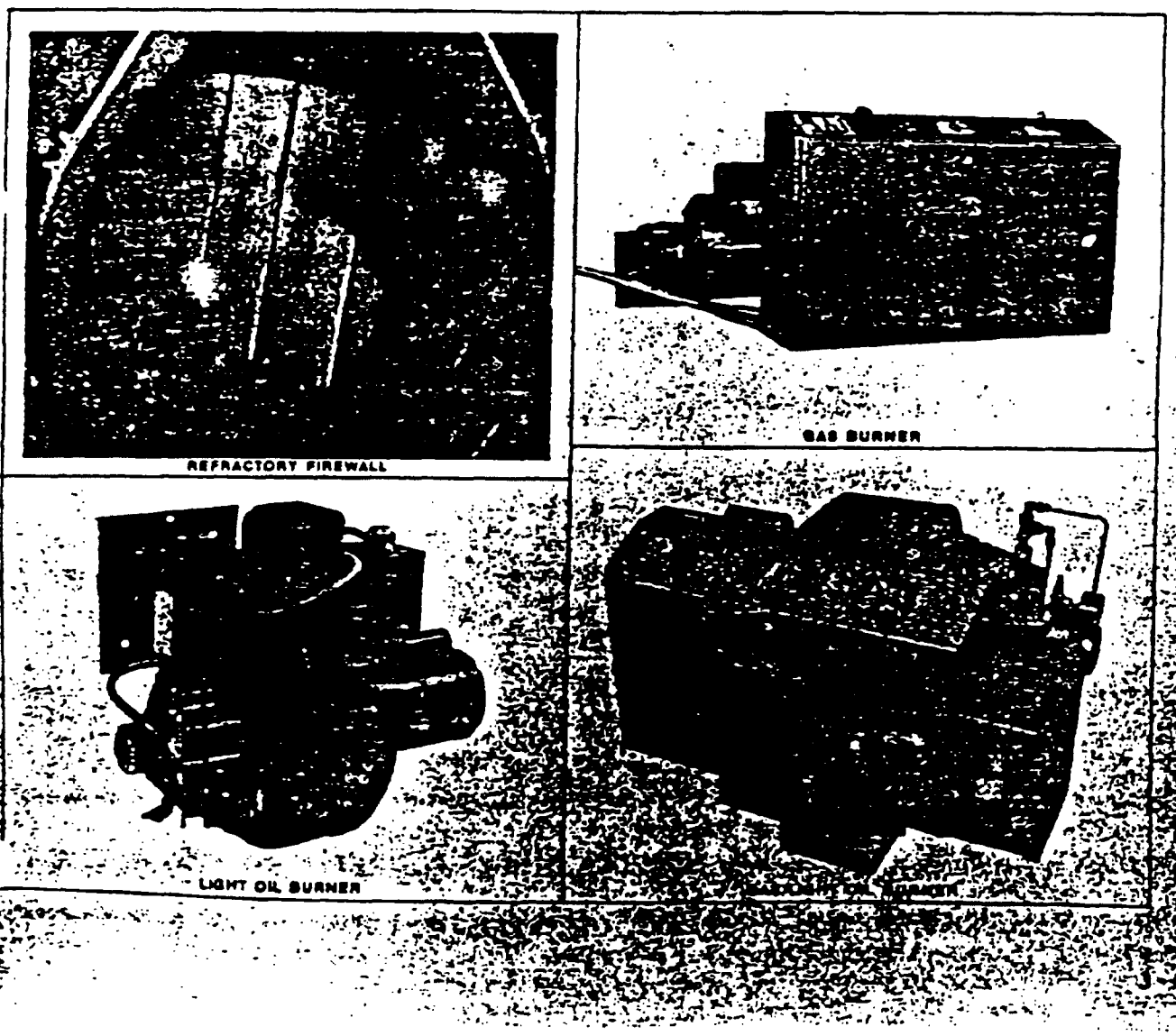
In addition to the advantages of forced draft firing, external draft devices such as high chimneys and mechanical draft equipment are no longer needed.



More effective circulation in the PFA-5 produces the highest tankless heater ratings. Each heater can provide up to 8 GPM of continuous flow of hot water at 100° rise. Actually superior internal circulation of the PFA-5 permits utilizing the entire boiler output for hot water service.

A refractory firewall serves as a built-in thermal pump to improve internal circulation. Because of the built-in firewall, heat transfer is greater on one side of the boiler. This modification produces an upward flow on the side where the heat transfer is greater, and a downward movement on the side where heat transfer is lower. The end result is a superior circulation enabling rapid release of dry steam.

The versatility of the PFA-5 is also evident in the variety of firing methods available. Light oil burners, gas burners or combination gas/light oil burners can be provided to take advantage of any fuel economically available in any particular area. Basic unit design makes possible an operating efficiency of over 80% for all fuels, compared to that of about 75% for boilers of ordinary design.



REFRACTORY FIREWALL

GAS BURNER

LIGHT OIL BURNER

INSTALLATION

Pressure relief door, located on the back section, contains a sight glass which allows viewing of burner flame characteristics. There is also a tapped 1/8" hole for measuring combustion pressure.

All controls and burners are front-mounted on the boiler, to facilitate installation, maintenance and adjustment. Front burner plate also incorporates a shutter-type sight glass.

The versatile design of the PFA-5 boiler offers real economies in assembly time and handling... and can be ordered and shipped in the form best suited to meet any installation conditions.

Available in three basic forms, the PFA-5 boiler can be shipped as:

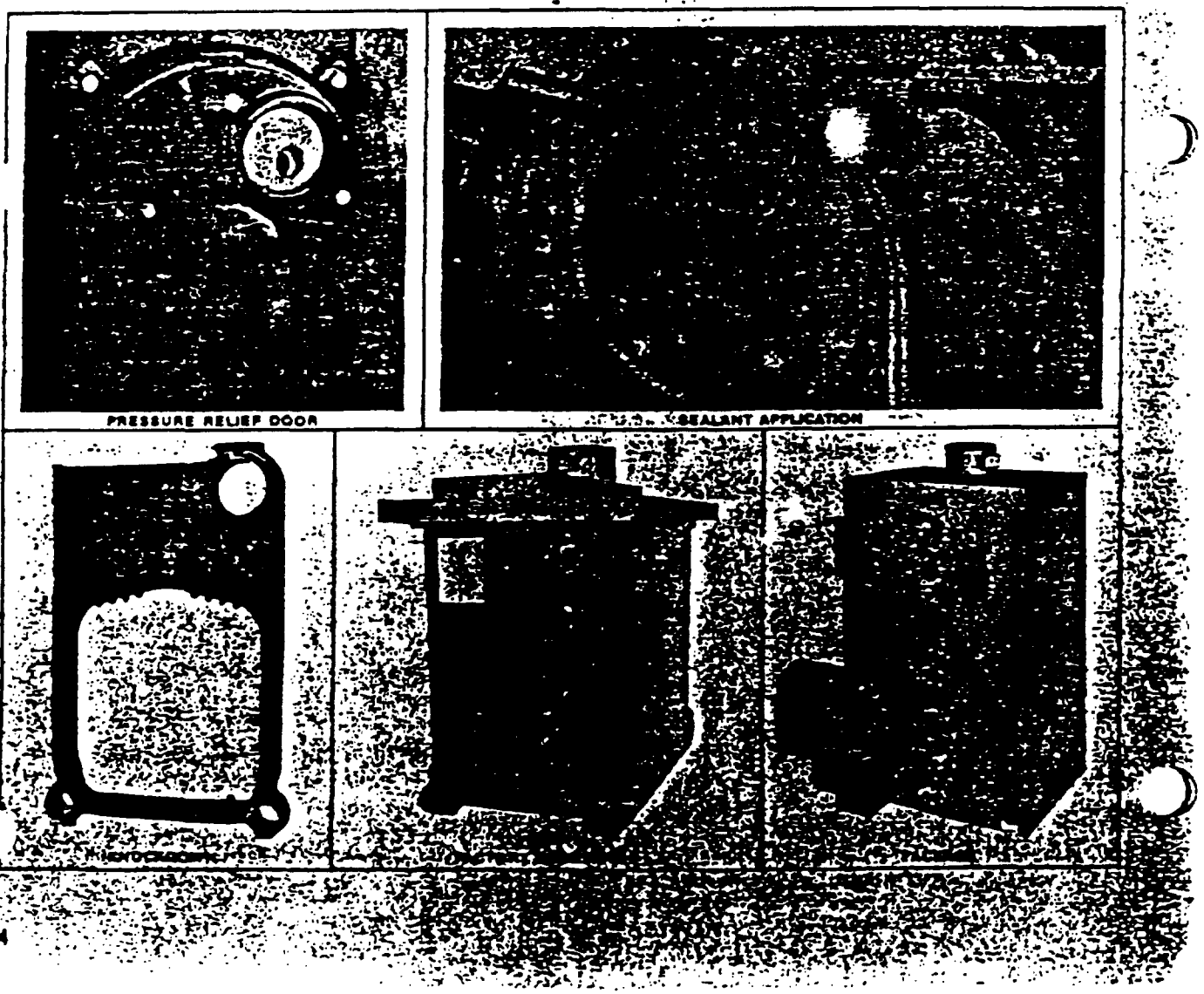
Knockdown—sections and related parts are shipped loose for easy handling through restricted building openings. Final assembly is completed at the job site.

Factory Assembled—sections including sealed canopy are assembled at the factory with jacket and burner shipped separately for semi-field assembly. The PFA-5 shipped in this manner requires crane unloading and handling at installation site. However, it is the [illegible]ly recommended form of shipment to eliminate risk of damage to jacket and burner.

Package—a completely assembled package, including jacket and burner. Package shipment also requires crane unloading and handling at the job site. Extreme caution must be exercised with this method of shipping, due to possible damage to jacket and burner while in transit.

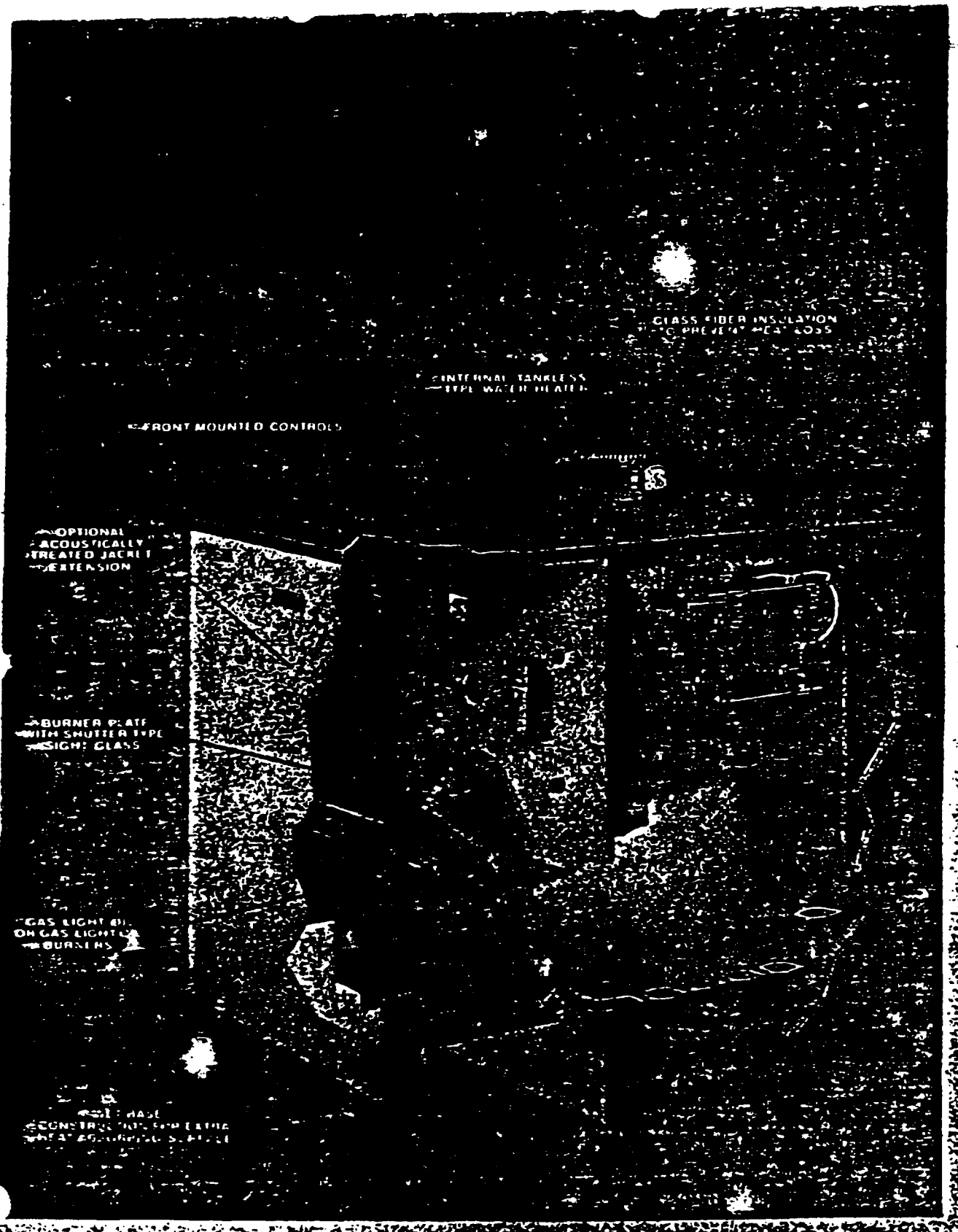
Gas-tight sealing, which is imperative for forced draft boilers, is achieved with the application of an elastic sealant. The sealant is applied into the grooves of each section with a caulking gun, to insure proper sealing of section joints and canopy connection. This method of sealing (patent pending) saves installation time compared to the ordinary asbestos-rope gasketing method.

The superior airtight seal maintains its integrity over years of service, while ordinary methods with less resilient materials may often develop leaks.



PRESSURE RELIEF DOOR

SEALANT APPLICATION


GLASS FIBER INSULATION
INTERNAL TANKLESS
FRONT MOUNTED CONTROLS
OPTIONAL
ACOUSTICALLY
TREATED JACKET
EXTENSION
BURNER PLATE
WITH SHUTTER TYPE
SIGHT GLASS
GAS LIGHT
ON GAS LIGHTED
BURNERS

Assembly of boiler sections is easily accomplished with the aid of a hydraulic draw-up tool. This easy-to-use tool allows assembly to be completed in one-third the normal installation time. Ten tons of hydraulic pressure assure that sections are drawn up, iron to iron, eliminating any chance of cocked nipples, which generally cause the majority of installation problems.

Professional start-up of boilers provides on-site fire-testing under actual operating conditions. Other boilers are simply fire-tested at the factory, under simulated conditions.

One-year service is included in the trade price of gas and gas/light oil burner units. This service is optional for oil-fired units.



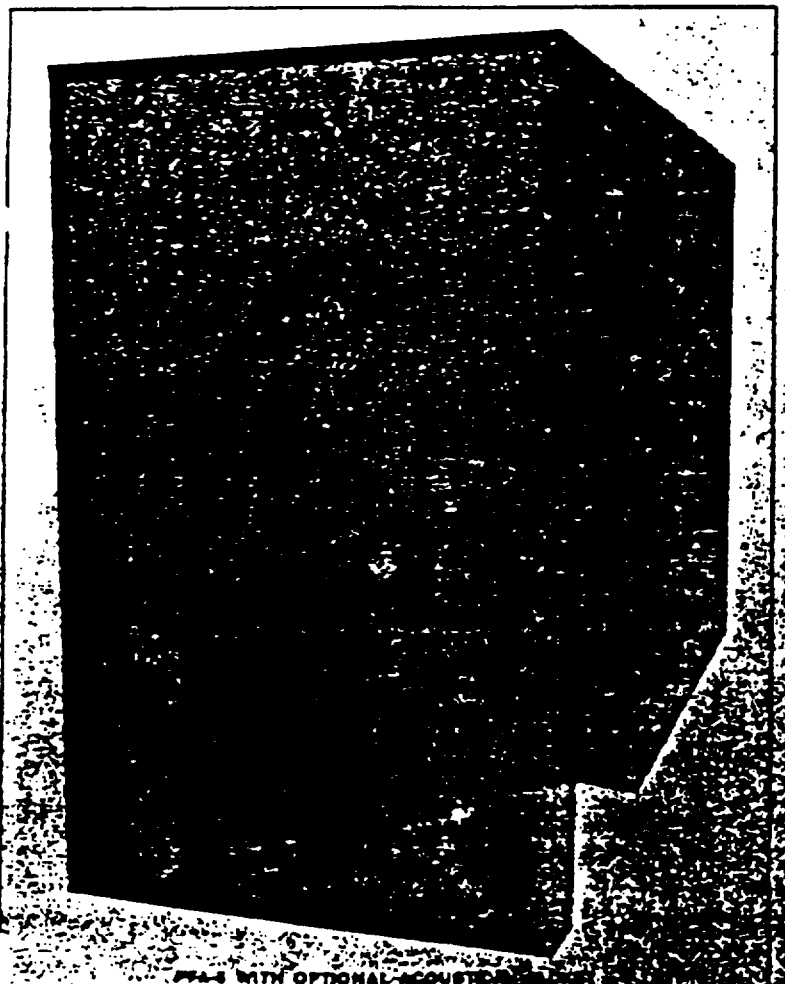
HYDRAULIC ASSEMBLY

OPTIONAL EQUIPMENT

Acoustically treated jacket extensions, with removable front panel for access to burners and controls, are optional.

Optional equipment is available to meet special requirements including:

Factory Mutual
Factory Insurance Association
Hi-Lo Fire Control
Modulated Fire Control
and various other controls to meet local requirements.



PFA-5 WITH OPTIONAL ACOUSTICAL JACKET

ADVANTAGES

PFA-5 advantages over steel boilers

Less space required for comparable heating—almost 50% less in comparison to even the most compact steel packaged boilers.

No thermal shock problems to worry about.

No tubes to replace or reroll for leaks ...and elimination of space requirement for tube removal.

Cast iron is a corrosion-resistant material which can be molded into the most efficient heat transfer forms.

Components are easier to replace.

50 psi working pressure is standard.

PFA-5 advantages over other cast iron boilers

Ease of assembly on job site.

Lower in height.

Lower pressure drops incurred.

Rapid steam release.

Efficient section design produces dry steam—eliminates operational problems caused by wet steam.

Easier to clean.

Vertical flue design.

Exclusive thermal pump (patent pending) provides better circulation and heating.

Lighter weight for ease of handling.

Sets up in fraction of time normally required for other boiler models.

PFA-5 ratings

Boiler numbers[1]	Boiler H.P.	I=B=R gross output (Btu/h)	Piping and pickup factor steam	Piping and pickup factor water	Input I=B=R rating Btu/h steam	Input I=B=R rating Btu/h water	Sq. ft. steam	I=B=R Burner capacity light oil (gph)	I=B=R Burner capacity gas cu. ft./hr.	Gas pressure required[2] inches water column	Heating surface sq. ft.	Fireside volume cu. ft.	Pressure at fireside water column (inches water column)	Water content full (lbs.)	I=B=R vent diameter (inches)
PFA-504	18.5	620,000	1.333	1.15	465.1	539.1	1938	5.45	783	5.2	66	8.5	.244	581	10
PFA-505	23.4	786,000	1.333	1.15	589.6	683.5	2457	6.90	966	6.4	85	11.1	.244	700	10
PFA-506	28.4	950,000	1.333	1.15	712.7	826.1	2969	8.35	1169	6.8	104	13.7	.245	818	10
PFA-507	33.3	1,116,000	1.333	1.15	837.2	970.4	3486	9.80	1372	6.7	123	16.3	.245	937	10
PFA-508	38.2	1,282,000	1.330	1.15	963.9	1114.8	4016	11.20	1568	6.4	142	18.9	.248	1056	10
PFA-509	43.2	1,448,000	1.315	1.15	1099.8	1257.4	4582	12.65	1771	6.5	161	21.5	.246	1174	14
PFA-510	48.2	1,612,000	1.302	1.15	1238.1	1401.7	5159	14.00	1960	6.9	179	24.1	.247	1293	14
PFA-511	53.1	1,776,000	1.292	1.15	1374.6	1544.3	5728	15.55	2177	6.6	198	26.8	.247	1412	14
PFA-512	58.1	1,944,000	1.288	1.15	1509.3	1690.4	6289	16.95	2373	6.6	217	29.4	.248	1530	14
PFA-513	63.0	2,108,000	1.288	1.15	1636.6	1833.0	6819	18.40	2576	6.3	236	32.0	.248	1649	14
PFA-514	67.9	2,272,000	1.288	1.15	1764.0	1975.7	7350	19.85	2779	6.1	255	34.6	.249	1768	14
PFA-515	72.9	2,440,000	1.288	1.15	1894.4	2121.7	7893	21.25	2975	5.7	274	37.2	.249	1886	14
PFA-516	77.6	2,604,000	1.288	1.15	2021.7	2264.3	8424	22.70	3178	5.1	293	39.8	.250	2005	18
PFA-517	82.7	2,768,000	1.288	1.15	2149.1	2407.0	8954	24.15	3381	4.5	312	42.4	.250	2123	18
PFA-518	87.7	2,936,000	1.288	1.15	2279.5	2553.0	9498	25.60	3584	3.9	330	45.0	.251	2242	18
PFA-519	92.6	3,100,000	1.288	1.15	2406.8	2696.7	10028	27.00	3780	3.3	349	47.6	.251	2361	18
PFA-520	97.4	3,260,000	1.288	1.15	2531.1	2834.8	10548	28.45	3983	2.8	368	50.2	.252	2479	18
PFA-521	102.5	3,430,000	1.288	1.15	2663.0	2982.6	11096	29.90	4186	2.4	387	52.8	.252	2598	18

[1] Suffix "S" indicates steam boiler, "W" indicates water boiler.
Suffix "G" indicates gas-fired, "O" indicates oil-fired, "GO" indicates combination gas-oil fired.

[2] Minimum gas pressure required at std. gas train inlet for maximum burner input at sea level elevation on the most possible gravity gas with positive pressure of 0.10 inches water column in boiler flue gases.

AMERICAN STANDARD

STANDARD

PFA-5

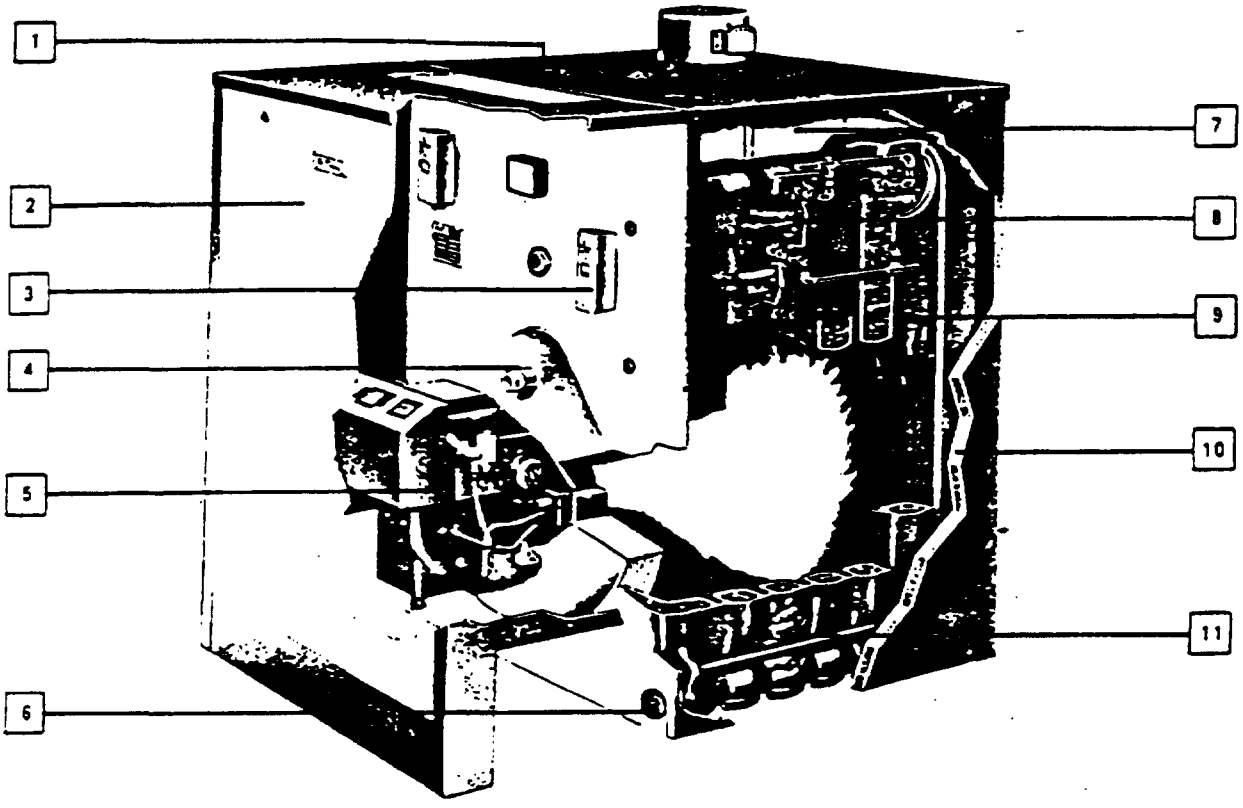
pressure fired (forced draft) for light oil, gas/light oil, and gas burners

hot water or steam

The PFA-5 is the latest development in large cast iron boiler technology. Designed specifically for forced draft firing, the boiler is available with light oil, gas, or combination gas-light oil burners and operates with an efficiency of over 80%.

Forced draft boilers in addition to increased operating efficiencies require much less space than conventional boilers of comparable size and eliminate the need for external draft devices such as a high chimney or mechanical draft equipment—the PFA-5 features: compact, light weight, wet base design; no separate base or combustion chamber; provision for multiple tankless heaters; eighteen sizes ranging from 620 MBH to 3,431 MBH gross output; and the availability of factory assembled section assemblies.

The PFA-5 is further enhanced by two exclusive innovations—the use of elastic compound for sealing and the use of a built-in thermal pump for improved internal circulation—which helps make this boiler a leader in both performance and dependability.



1 – jacket – smartly-styled of sturdy steel in sparkling brown and beige color combination.

2—optional acoustically treated jacket extension—matches jacket and has removable front panel for ready access to burner and control.

3—control—mounted on front of boiler for ease of maintenance and adjustment.

4—burner plate—designed for a compressed insulation seal between the burner plate and the front section. A round, shutter-type sight glass is incorporated into the burner plate for flame observation.

5—burners—three models available (light oil, gas/light oil, gas) for mounting on boilers. Burners are laboratory tested for clean, efficient firing in all PFA-5 boiler-burner units.

6—tappings—4" supply (top) and 3" return (bottom) located in both front and back sections

7—flue canopy—aluminized steel construction with reinforcing channels and welded seams. Access for cleaning canopy is provided through small doors in side of the canopy.

8—water heater—internal tankless type with finned copper tubing. Unique arrangement permits flexibility in meeting domestic hot water requirements ranging from 8 to 64 gpm.

9—boiler sections—are ruggedly constructed of cast iron and feature vertical flue design with large 7-inch top nipple port. Off-center location of nipple port speeds up circulation; projecting studs extract maximum heat from combustion gases. Sections ere water tested at 125 psi (2½ times rated capacity of relief valve). Accessible from left side for cleaning. Sections are sealed against combustion leakage with an elastic sealant.

10 – insulation – heavy glass fiber insulation prevents wasteful heat loss, keeps jacket cool.

11—wet base construction—provides extra heat-absorbing wet base. Waterways completely surround combustion space.

pressure relief door—(not shown)—located in back section. Provided for relief of excessive pressures in the combustion space. The door also contains a sight port for flame observation.