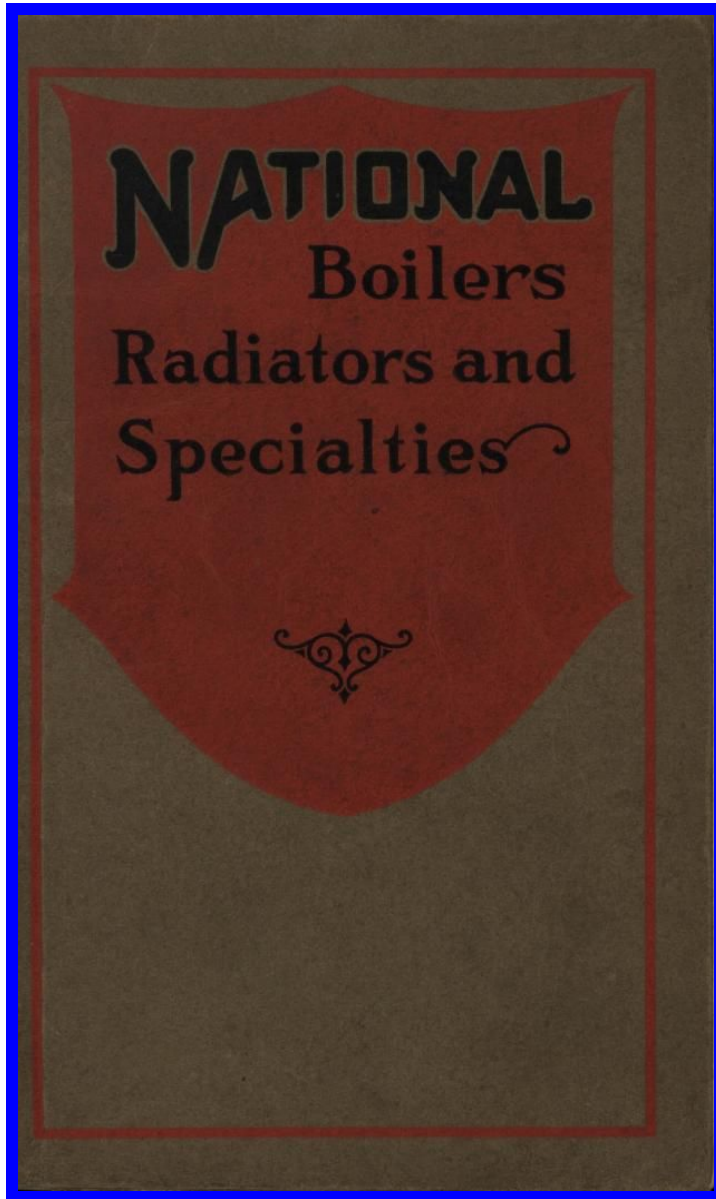
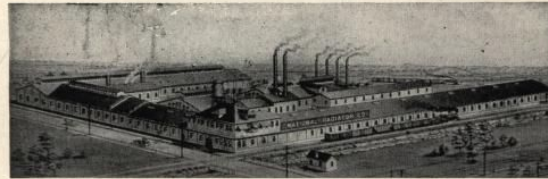


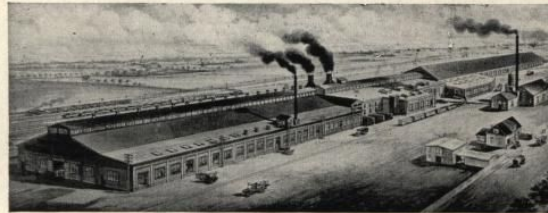
# STEAM & HOT WATER BOILERS 1840-1930



## Plants in Which National Heating Materials Are Made



JOHNSTOWN, PA., PLANT



TRENTON, N. J., PLANT



NEW CASTLE, PA., PLANT

THIS CATALOG NO. 26  
PLANNED AND PREPARED BY THE  
ADVERTISING DEPT. OF THE NATIONAL RADIATOR COMPANY  
FEBRUARY, 1920

1920

NATIONAL NOVUS SECTIONAL BOILERS



No. 6-20-W

Twenty Series Sectional Water Boilers

| No. of Boiler | Rating See Note | List Price Complete | †Lgth. of Boiler Inches | No. of Secs. | Grate Area Sq. Ft. | Average Firepot Sq. Ft. | Size Foundation Inches | Outlets Inches |
|---------------|-----------------|---------------------|-------------------------|--------------|--------------------|-------------------------|------------------------|----------------|
| 5-20-W        | 1100            | \$212.00            | 27¾                     | 5            | 3.24               | 4.15                    | 22½x27¾                | 2-3            |
| 6-20-W        | 1370            | 248.00              | 33½                     | 6            | 4.02               | 5.18                    | 22½x33½                | 2-3            |
| 7-20-W        | 1600            | 284.00              | 39¼                     | 7            | 4.80               | 6.22                    | 22½x39¼                | 3-3            |

Height to top of outlet, 54 inches. Width of boiler, 28 inches.  
 Size of smoke pipe, 10 inches.  
 †Add 12 inches to length, to allow for smoke hood.  
 Arranged for pipe coil for heating water for domestic purposes.  
 Additional measurements, pages 24 and 25.  
 For price list repairs, see pages 97 and 101.  
 Assembling chart, see pages 102 and 103.  
 Covering, see page 104.

This is a revision of table on Page 13 of Catalog No. 26. It is gummed. To avoid errors, please paste to page indicated.

NATIONAL NOVUS SECTIONAL BOILERS



No. 6-25-W

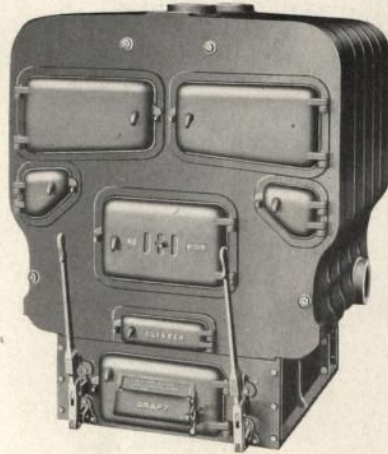
Twenty-five Series Sectional Water Boilers

| No. of Boiler | Rating See Note | List Price Complete | †Lgth. of Boiler Inches | No. of Secs. | Grate Area Sq. Ft. | Average Firepot Sq. Ft. | Size Foundation Inches | Outlets Inches |
|---------------|-----------------|---------------------|-------------------------|--------------|--------------------|-------------------------|------------------------|----------------|
| 5-25-W        | 1825            | \$316.00            | 33                      | 5            | 4.95               | 6.13                    | 28x33                  | 2-4            |
| 6-25-W        | 2225            | 374.00              | 40                      | 6            | 6.11               | 7.64                    | 28x40                  | 2-4            |
| 7-25-W        | 2650            | 435.00              | 47                      | 7            | 7.27               | 9.15                    | 28x47                  | 3-4            |
| 8-25-W        | 3050            | 477.00              | 54                      | 8            | 8.43               | 10.65                   | 28x54                  | 3-4            |

Height to top of outlet, 57¼ inches. Width of boiler, 36½ inches.  
 Size of smoke pipe, 12 inches.  
 †Add 14 inches to length, to allow for smoke hood.  
 Arranged for pipe coil for heating water for domestic purposes.  
 Additional measurements, pages 24 and 25.  
 For price list repairs, see pages 97 and 101.  
 Assembling chart, see pages 102 and 103.  
 Covering, see page 104.

This is a revision of table on Page 15 of Catalog No. 26. It is gummed. To avoid errors, please paste to page indicated.

NATIONAL NOVUS SECTIONAL BOILERS



No. 6-31-W

Thirty-one Series Sectional Water Boilers

| No. of Boiler | Rating See Note | List Price Complete | *Lgth. of Boiler Inches | No. of Secs. | Grate Area Sq. Ft. | Average Firepot Sq. Ft. | Size Foundation Inches | Outlets Inches |
|---------------|-----------------|---------------------|-------------------------|--------------|--------------------|-------------------------|------------------------|----------------|
| 6-31-W        | 3250            | \$499.00            | 44½                     | 6            | 8.55               | 12.62                   | 33½x42½                | 2-5            |
| 7-31-W        | 3825            | 559.00              | 52                      | 7            | 10.24              | 15.12                   | 33½x49¾                | 3-5            |
| 8-31-W        | 4400            | 620.00              | 59½                     | 8            | 11.93              | 17.62                   | 33½x57¼                | 3-5            |
| 9-31-W        | 4975            | 680.00              | 67                      | 9            | 13.62              | 20.11                   | 33½x64¾                | 3-5            |

Height to top of outlet, 61 inches. Total width, 51 inches.

Size of smoke pipe, 15 inches.

\*Add 13 inches to length of boiler for smoke hood.

Additional measurements, pages 24 and 25.

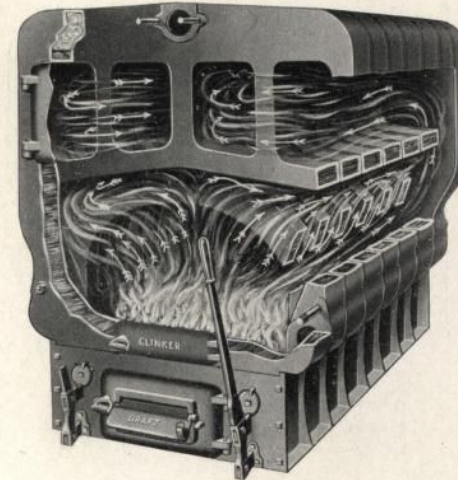
For price list repairs, see pages 97 and 101.

Assembling chart, see pages 102 and 103.

Covering, see page 104.

This is a revision of table on Page 17 of Catalog No. 26. It is gummed. To avoid errors, please paste to page indicated.

NATIONAL NOVUS SECTIONAL BOILERS



No. 8-36-W

(Sectional View)

Thirty-six Series Sectional Water Boilers

| No. of Boiler | Rating See Note | List Price Complete | †Lgth. of Boiler Inches | No. of Secs. | Grate Area Sq. Ft. | Average Firepot Sq. Ft. | Size Foundation Inches | Outlets Inches |
|---------------|-----------------|---------------------|-------------------------|--------------|--------------------|-------------------------|------------------------|----------------|
| 6-36-W        | 4400            | \$620.00            | 49                      | 6            | 11.50              | 14.69                   | 41½x47½                | 2-5            |
| 7-36-W        | 5300            | 715.00              | 57½                     | 7            | 13.75              | 17.61                   | 41½x56                 | 3-5            |
| 8-36-W        | 6200            | 810.00              | 66                      | 8            | 16.00              | 20.54                   | 41½x64½                | 3-5            |
| 9-36-W        | 7100            | 904.00              | 74½                     | 9            | 18.25              | 23.46                   | 41½x73                 | 3-5            |
| 10-36-W       | 8000            | 999.00              | 83                      | 10           | 20.50              | 26.38                   | 41½x81                 | 3-5            |

Height to top of outlet, 70 inches. Total width, 56 inches.

Size of smoke pipe, 16 inches.

†Add 14 inches to length to allow for smoke hood.

Arranged for pipe coil for heating water for domestic purposes.

Additional measurements, pages 24 and 25.

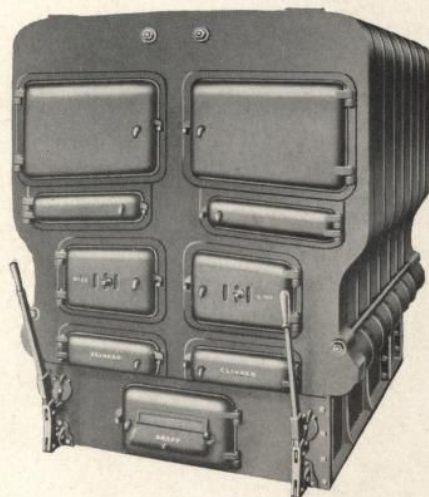
For price list repairs, see pages 97 and 101.

Assembling chart, see pages 102 and 103.

Covering, see page 104.

This is a revision of table on Page 19 of Catalog No. 26. It is gummed. To avoid errors, please paste to page indicated.

NATIONAL NOVUS SECTIONAL BOILERS



No. 8-48-W

**Forty-eight Series Sectional  
Water Boilers**

| No. of Boiler | Rating See Note | List Price Complete | **Lgth. of Boiler Inches | *No. of Secs. | Grate Area Sq. Ft. | Average Firepot Sq. Ft. | Size Foundation Inches | Outlets Inches |
|---------------|-----------------|---------------------|--------------------------|---------------|--------------------|-------------------------|------------------------|----------------|
| 6-48-W        | 8700            | \$1220.00           | 59 $\frac{1}{4}$         | 6             | 18.23              | 22.50                   | 54x57 $\frac{1}{2}$    | 2-6            |
| 7-48-W        | 10375           | 1403.00             | 69 $\frac{3}{4}$         | 7             | 21.78              | 26.87                   | 54x68                  | 2-6            |
| 8-48-W        | 12050           | 1586.00             | 80 $\frac{1}{4}$         | 8             | 25.33              | 31.25                   | 54x78 $\frac{1}{2}$    | 3-6            |
| 9-48-W        | 13725           | 1769.00             | 90 $\frac{3}{4}$         | 9             | 28.87              | 35.62                   | 54x89                  | 3-6            |
| 10-48-W       | 15400           | 1952.00             | 101 $\frac{1}{4}$        | 10            | 32.48              | 40.00                   | 54x99 $\frac{1}{2}$    | 3-6            |
| 11-48-W       | 17075           | 2136.00             | 111 $\frac{3}{4}$        | 11            | 37.97              | 44.38                   | 54x110                 | 4-6            |

Height to top of outlet, 80 inches. Width of boiler, 67 inches. Size smoke pipe, 20 inches.

Arranged for pipe coil for heating water for domestic purposes.

\*\*Add 20 inches to length to allow for smoke hood.

\*Sections are in halves.

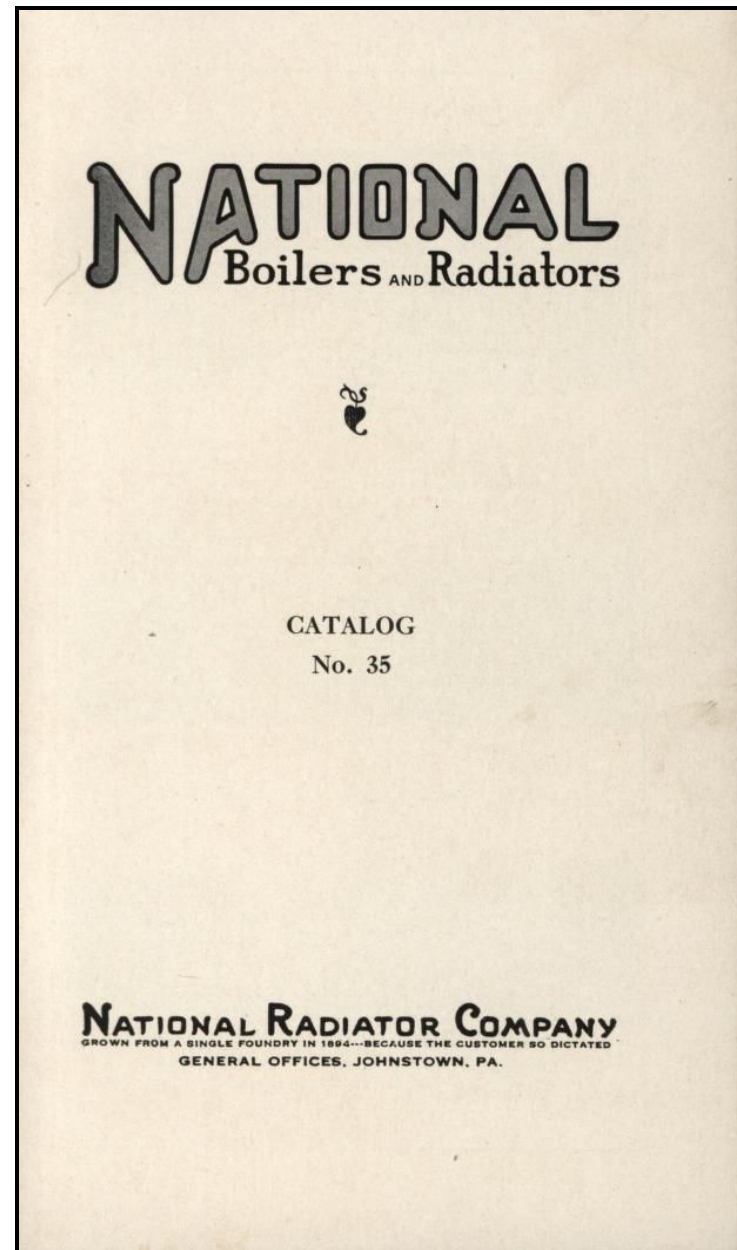
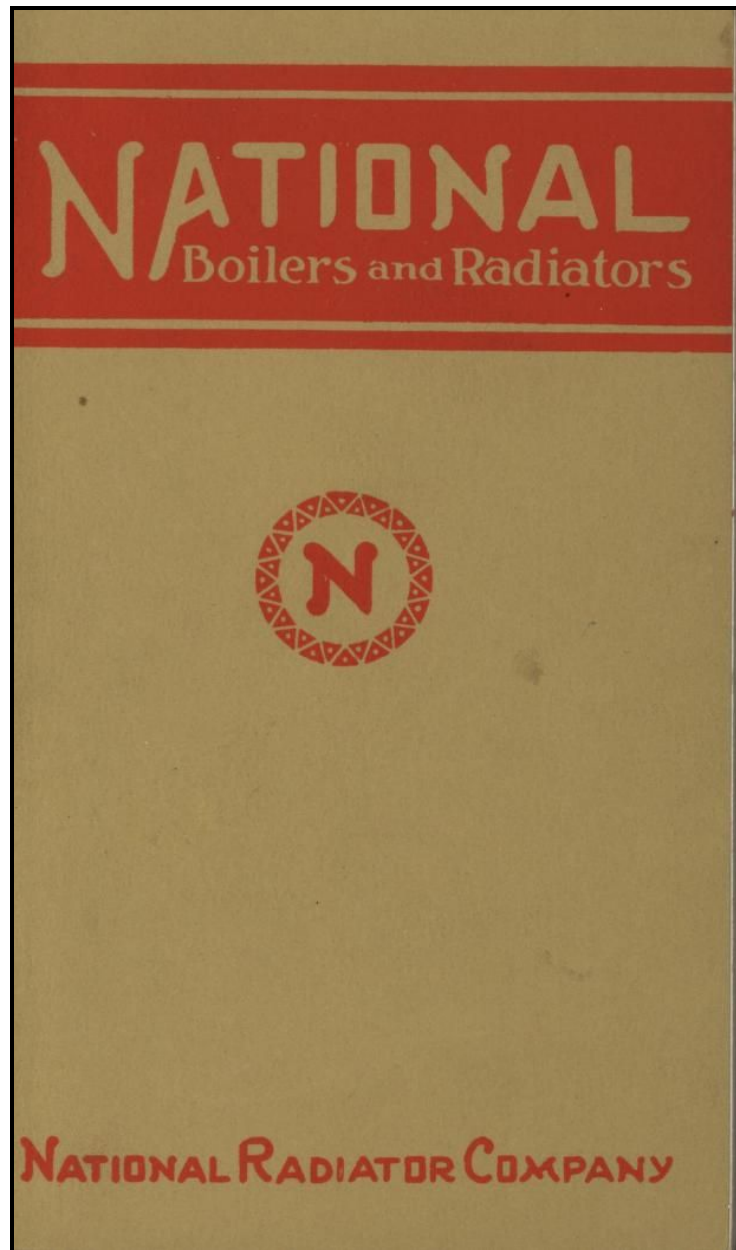
Additional measurements, pages 24 and 25.

For price list repairs, see pages 97 and 101.

See page 23 for information on piping.

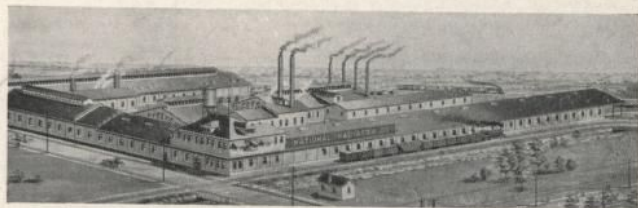
Assembling chart, see pages 102 and 103.

Covering, see page 104.



1926

## Plants in Which National Heating Materials Are Made



Johnstown, Pa., Plant

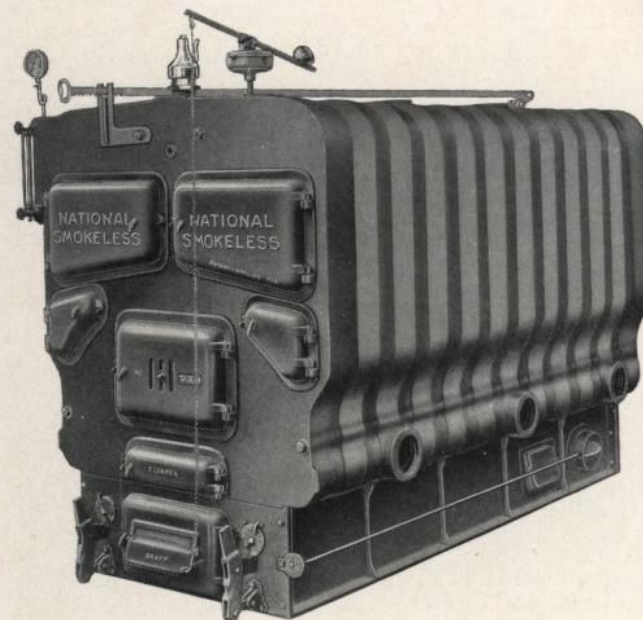


Trenton, N. J., Plant



New Castle, Pa., Plant

## NATIONAL SMOKELESS BOILERS



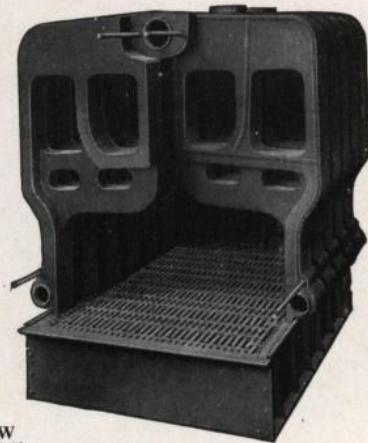
### Smokeless Steam Boiler

Patents Granted

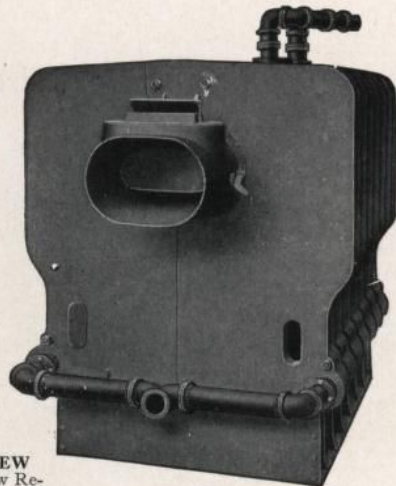
**T**HE National Up-Draft Smokeless Boiler, attached to the proper size flue, will furnish more perfect combustion than has yet been secured in any Low Pressure Heating Boiler. It will comply with any Smoke Ordinance and will reduce Fuel Bills very materially. Being made of cast iron, it will last as long as the building itself.

NATIONAL NOVUS SECTIONAL BOILERS

**Forty-eight Inch Sectional Boiler  
FOR HEAVY DUTY**

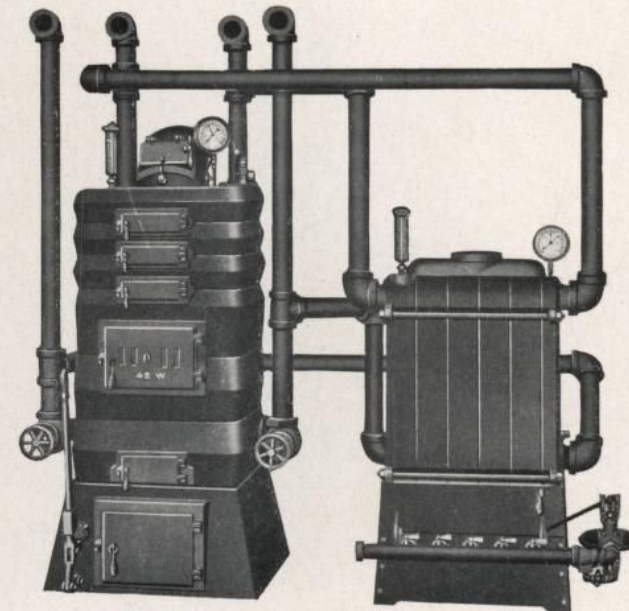


**REAR VIEW**  
With Three Half-  
Sections Removed



**REAR VIEW**  
Showing how Re-  
turn Connections  
must be Yoked  
Together

NATIONAL RADIUM GAS BOILERS



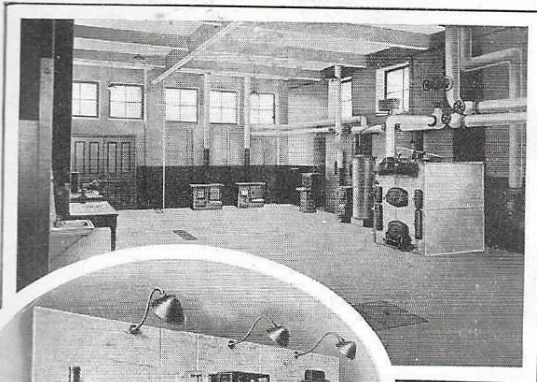
**Combination Gas and Coal Heating**

Gas and coal boilers can be conveniently yoked together and operated either separately or as one unit for heating purposes. By such an arrangement, both boilers can be utilized in extremely cold weather, or the coal boiler is ready for instant service in the event of any shortage in gas or reduction in gas pressure.

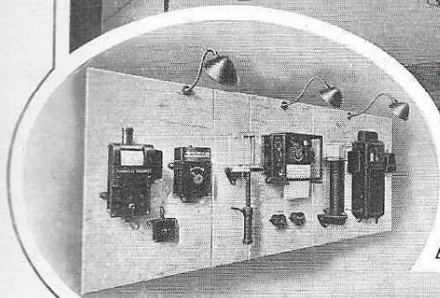


**Sylph-Oil Regulator**

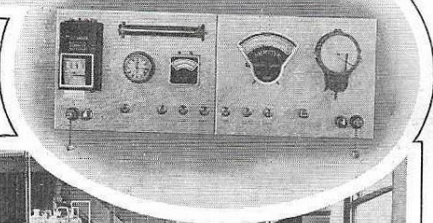
Regulates the supply of Preheated air for Up-Draft Smokeless Boilers. Can be regulated to close air intake in from one minute to any longer time required. Increases the efficiency and economy of Up-Draft Smokeless Boilers.



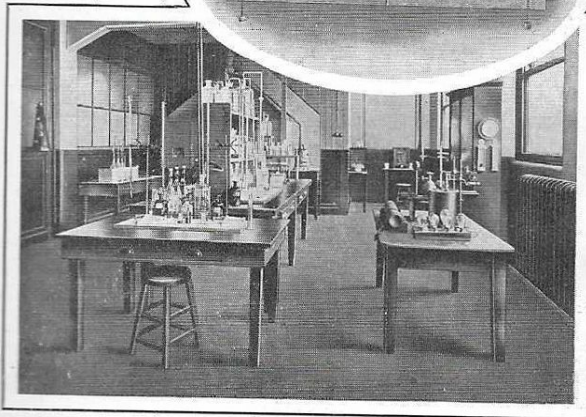
Physical  
Laboratory



Instrument  
Panel (Boiler)



Instrument  
Panel (Radiator)



Chemical Laboratory

# IDEAL MANUAL

No. \_\_\_\_\_

Presented to

*Mr. Holman*

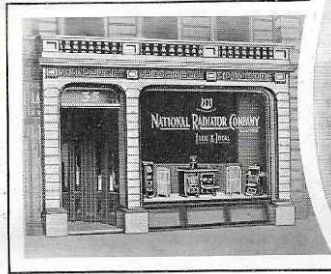
by

**NATIONAL RADIATOR COMPANY**  
LIMITED.

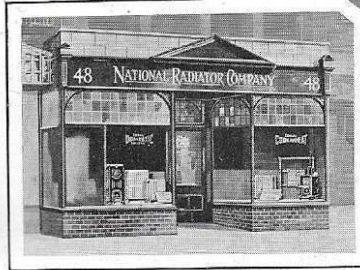
1930



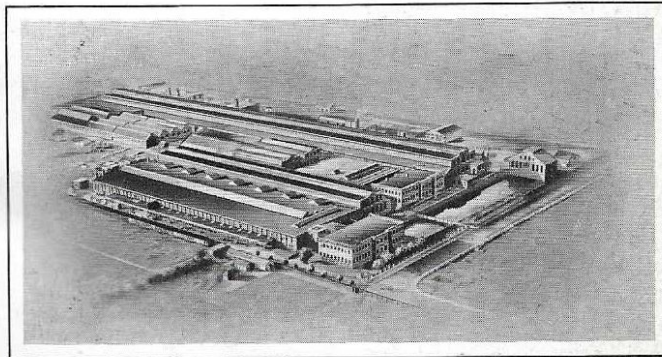
*London Showrooms*  
**IDEAL HOUSE**  
Great Marlborough Street W1



*Birmingham Showroom*  
35 Paradise Street



*Brighton Showroom*  
48 Grand Parade

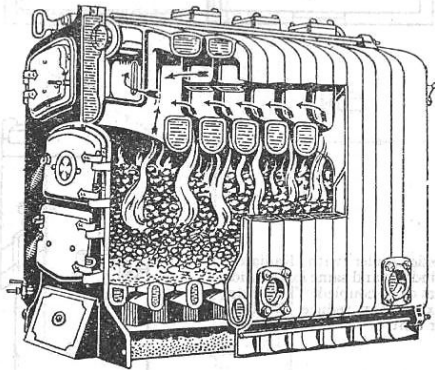


**IDEAL WORKS, HULL, YORKS.**  
*(Area 50 acres)*

## CHAPTER VI

### IDEAL BOILERS—continued

#### IDEAL BRITANNIA HOT WATER BOILERS



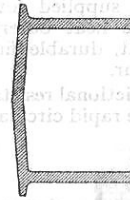
Cut view of No. 3K Series Ideal Britannia Boiler, showing flues and waterways.

#### Construction

The Ideal Britannia Boiler has been designed to meet the demand for an efficient and adaptable boiler of the Direct Draught type with a heavy metal line and consisting of sections assembled by means of three nipples.

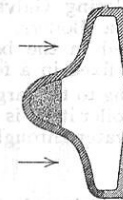
The ample areas of the waterways permit a free circulation of water within the boiler itself, and in the Nos. 2, 3 and 4 Series each section is cast complete with a water-cooled grate bar which cannot burn out. When the boiler is to be oil-fired sections can be supplied without the water-cooled grate bars. In this case loose grill bars can be fitted subsequently, should it be desired to change over to solid fuel.

The heating surface in the firebox, for a height of 12 inches above the grate level, is arranged to give a perfectly flat face and thus prevent as far as possible the formation of lime deposit at the points where the heat is most intense, as will be seen from the sketch on page.111, showing the comparative construction of Ideal No. 3K Britannia Series and other types.



Ideal Britannia

Cross sections through legs of boilers, showing danger from localised incrustation through overheating of projecting surface.



Other types

The legs of the sections are extended to form the ashpit, so that no separate base is required, while their beaded edges are ground to ensure an absolutely tight firebox without the use of putty, and thus give perfect control of the draught. The flues are of ample area for free burning—a feature which makes these boilers particularly useful for horticultural and similar work.

The whole of the platework is fastened to extended rib surfaces, cast to receive it, eliminating the cored recesses provided for the purpose in earlier patterns of boilers.

The back section in the Nos. 3 and 4 Series has an expansion split, which ensures freedom in these larger boilers from the risk of fracture due to unequal expansion and contraction.

Ideal Britannia Boilers are provided with special "Noco" doors which have been designed to—

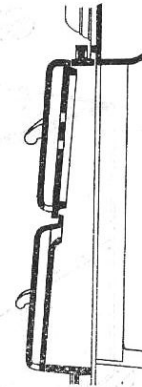
- Pre-heat the secondary air supply,
- Air-cool the baffle plates, and
- Give the stoker ample access for attention to grate.

The inner surface of the baffles is cast with vertical ribs.

As the result of numerous tests, the correct dimensions for the secondary air inlets have been determined, and it has been established that the double function of pre-heating the secondary air and air-cooling the baffles may be mutually accomplished very efficiently. The hot secondary air is particularly valuable when the fuel used is smaller than normal or when it is of a reactive nature which tends to produce carbon monoxide. It might be stated that coke supplies, both furnace and gas, are much softer and reactive in character than was the case a few years ago and the need for secondary air is consequently greater. The secondary air is also valuable when burning anthracite.

The proportions of secondary air relative to the primary air supply is such that a thermal loss does not occur at any practical rate of output.

The arrangement and area of the flues in Ideal Britannia Boilers give a travel of the gases sufficient to complete the absorption of a large proportion of the heat developed by the combustion of the fuel, and offer the minimum resistance to their passage, thus enabling the boilers to operate economically even under poor conditions of chimney draught.



Insulating Galvanised Steel Jackets can be supplied for all Britannia Boilers. They conserve most of the heat otherwise dissipated in the boiler room, make a very neat, durable finish, and are fixed in a few minutes by unskilled labour.

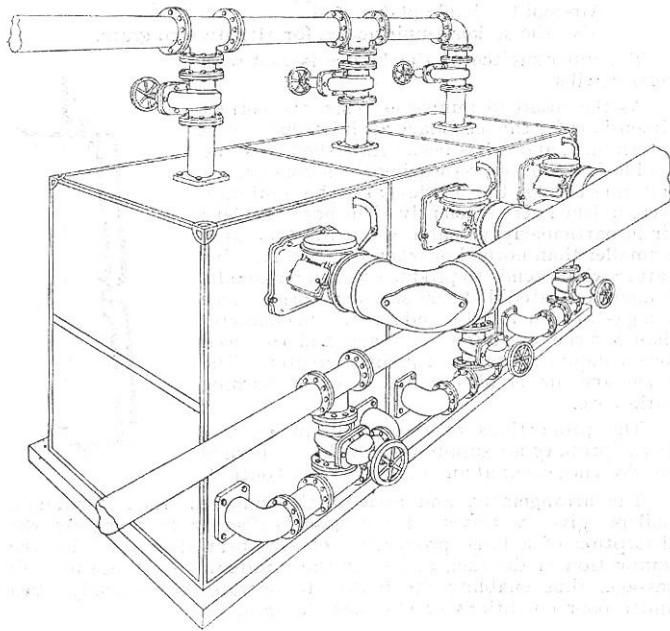
Owing to the large area of the top nipples the frictional resistance in the boiler itself is reduced to a minimum and the rapid circulation of the water through the system facilitated.

#### Durability

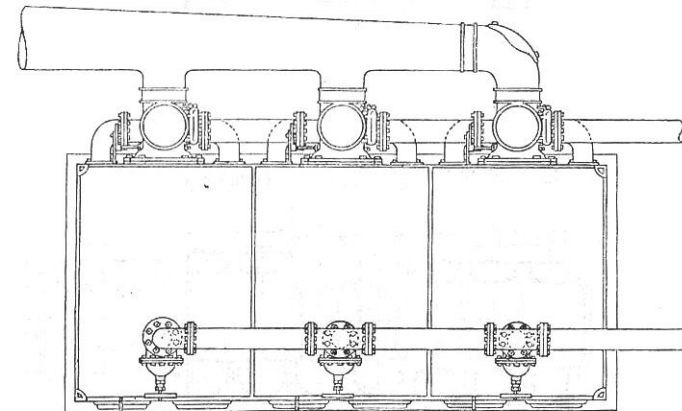
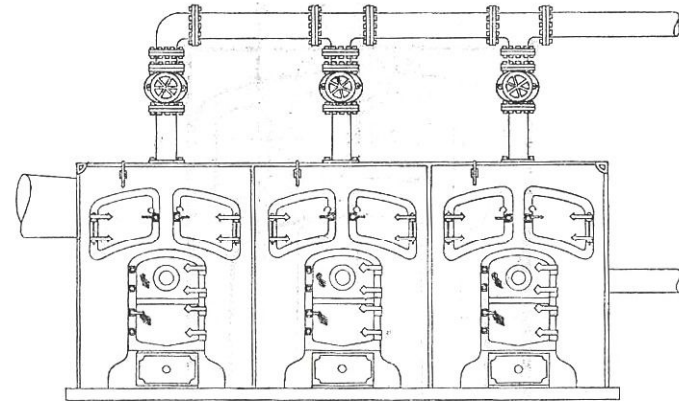
Ideal Britannia Boilers are eminently suitable for withstanding the greater static head pressures which are now likely to be encountered owing to the general increase in the height of modern buildings; 50 pounds or 120 feet may be regarded as a reasonable maximum static head for these boilers. Before leaving the Works all Ideal Boilers are subjected to a hydrostatic test pressure of 100 lbs. per square inch.

#### Batteries of Boilers

Although the return openings are regularly provided on the sides of the sections, these openings can readily be furnished on the face of back section in line with lower nipple holes, in order that a battery of two or more boilers may be fixed close together, thereby securing the utmost economy in floor space. The following diagrams show three No. 410K Ideal Britannia Boilers with a total B.T.U. rating of 2,712,000 and occupying only 100 sq. ft. of floor space.

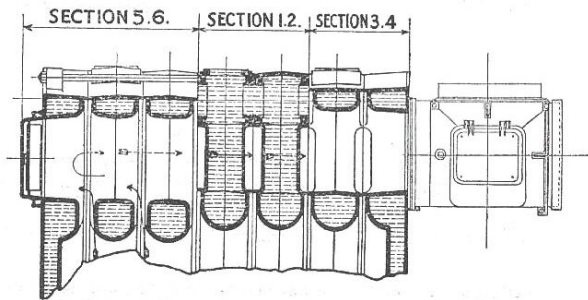
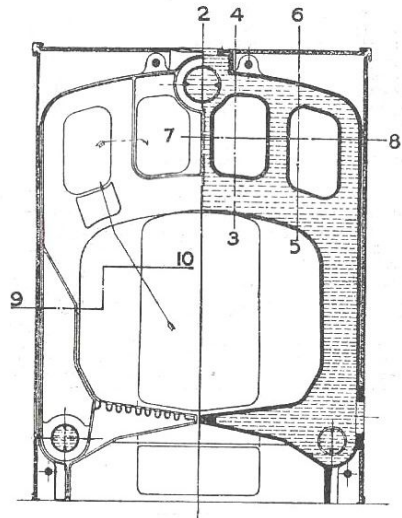


#### Ideal Britannia Boilers

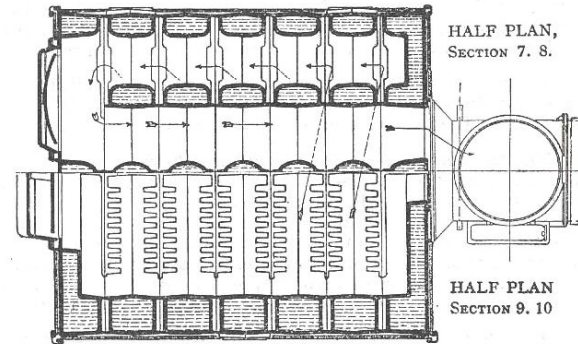
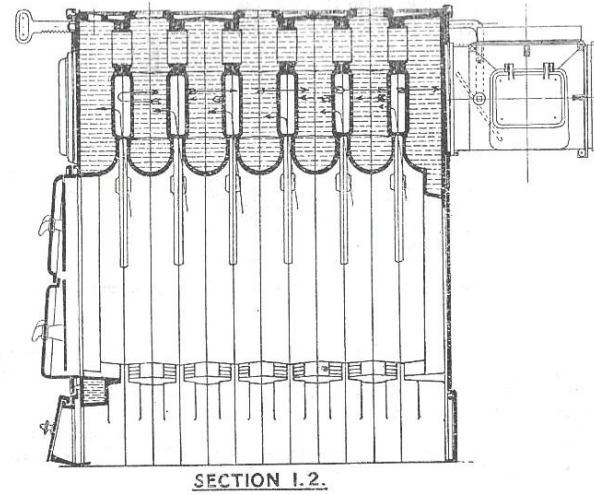


Battery of 3 No. 410K Ideal Britannia Water Boilers, with listed capacity of 2,712,000 B.T.U. per hour, occupying approximately 100 sq. ft. floor space.

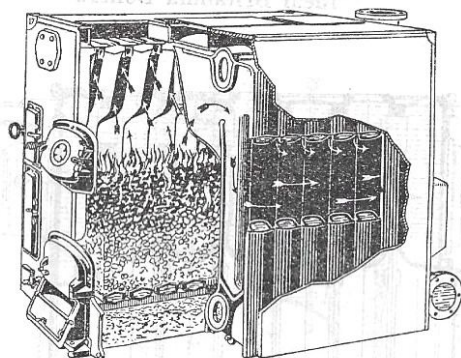
Ideal Britannia Boilers



Ideal Britannia Boilers



## IDEAL "H" SERIES BOILERS For Hot Water and Steam



Cut view of Ideal No. 3 "H" Series Boiler, showing flues and waterways.

The "H" Series Boilers, as the above illustration clearly shows, are designed with side flues, a feature which, under reasonable chimney draught conditions, ensures the greatest possible absorption of the heat developed by the combustion of the fuel. The combustion gases in their downward travel through the side flues meet sufficient resistance to ensure that even with careless control, the fuel cannot burn at an excessive and wasteful rate.

### Construction

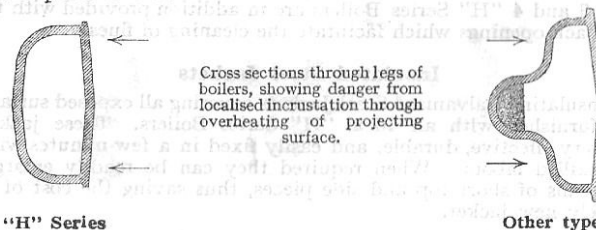
Each section of Ideal "H" Series Boilers is made in halves, so that all parts, even of the largest boilers, are easily handled and will pass through the smallest doorway. Each half section forms a part of the ashpit and water-cooled grate, as well as of the firebox, and no separate base or brickwork setting is required.

All sizes of Ideal "H" Series Boilers are equally suitable for water or steam—a valuable feature where stocks are carried, especially abroad, as the investment required is reduced to a minimum.

The half sections are cast complete with water-cooled grate bars, which not only provide additional heating surface, but last as long as the boiler itself, as they cannot burn out. At the same time they greatly reduce the formation of clinker and consequent waste of fuel, besides preventing loss of time and labour in its removal. If desired, the water-cooled bars can be omitted, provision being made at the same time for the subsequent application of loose grill bars. The foregoing meets the condition where a boiler is to be oil fired.

The direct or fire surface of Ideal "H" Series Boilers is flat and the cross sectional area of the waterway in contact with the fire is ample, thus securing the greatest quantity of water per unit of heating surface in the firebox, as well as freedom from local overheating where lime deposit may be expected, and particularly

in the case of boilers attached to large installations containing a considerable volume of water. The risk of fracture due to lime deposit is thus reduced to a minimum.



"H" Series

Other types

### Compactness

As the measurements show, Ideal "H" Series Boilers are very compact and provide the maximum capacity per unit of floor space; they are also exceptionally low in height. It will also be observed that having regard to the power of the boilers, the flow and return openings are very low, this advantage being increased by placing the flow outlet at the back, making these boilers particularly suitable for use in shallow basements or in boiler rooms of restricted height and area.

When the boilers are used for steam heating, this construction gives a low water line, while the steam space provided is ample for the volume required.

### Perfect Control of the Fire

The legs of the sections are extended to form the ashpit, thus obviating the necessity for a separate base, while the edges of all sections, where they meet to form the fire chamber, are beaded and faced, securing absolutely airtight joints without the use of putty.

Automatic regulation of the draught can be arranged by means of the Ideal Damper Regulators, which are made both for water and steam boilers.

### Convenient Smoke Flue Connections

Ideal "H" Series Boilers are regularly provided with a smokehood for connection to chimney above the floor level, but the design of the larger sizes makes them specially suitable for use with underground or trench flues (see pages 118 and 119). When so arranged, the openings at back are closed and a sliding floor damper with a clean-out cover and frame is provided.

### Easy Firing, Regulation and Cleaning

In all Ideal "H" Series Boilers the fire and cleaning doors are of ample proportions, while the larger sizes of the Nos. 3 and 4 "H" Series can be fitted with an additional firing door on top if it is desired to bring in the fuel above the boiler.

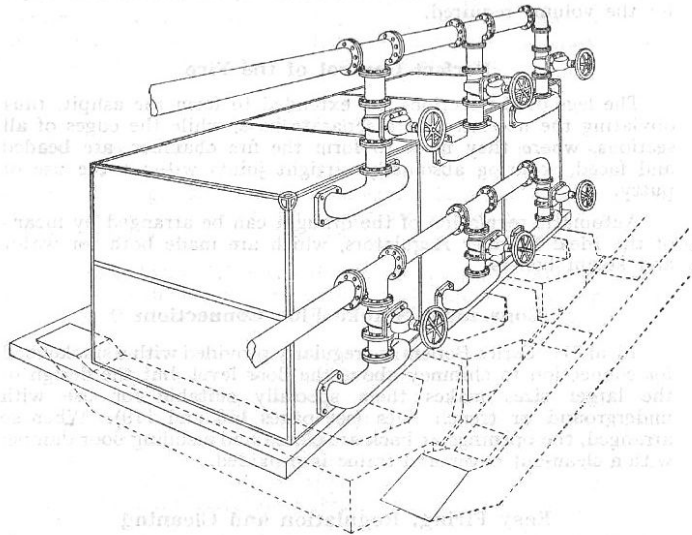
All fire and flue surfaces are readily accessible for cleaning through the doors at front and back. The Nos. 1 and 2 "H" Series Boilers can be cleaned by means of a flue scraper; the Nos. 3 and 4 "H" Series Boilers are in addition provided with top and back openings which facilitate the cleaning of flues.

#### Insulated Steel Jackets

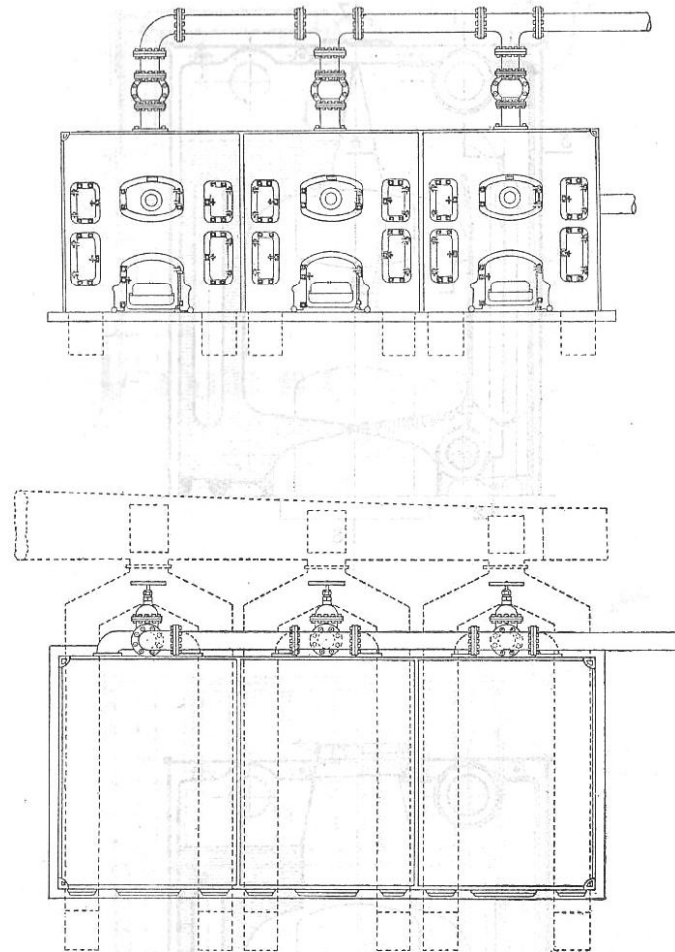
Insulating Galvanised Steel Jackets covering all exposed surfaces are furnished with all Ideal "H" Series Boilers. These jackets are very effective, durable, and easily fixed in a few minutes without skilled labour. When required they can be readily enlarged by means of short top and side pieces, thus saving the cost of an entirely new jacket.

#### Batteries of Boilers

Owing to variations in weather conditions and heating requirements, the economy of distributing the total power required for heating a large building over a battery of boilers is now generally recognised, as it is often necessary to use only one-half or two-thirds of the maximum output. The Ideal "H" Series Boilers are particularly well adapted for this class of work, as will be seen from the diagrams, which show three No. 4-H-13 water Boilers with a total B.T.U. rating of 4,395,000, the floor space occupied being only 100 square feet.



#### Ideal "H" Series Boilers



Battery of 3 No. 4-H-13 Water Boilers with trench flues. Listed capacity 4,395,000 B.T.U. per hour. Boilers occupy approximately 100 sq. ft. floor space. For similar installations for steam, the boilers should have flow headers at both front and back, suitably connected together.