May 30, 1939. B. GOERG 2,160,803

HEATING APPARATUS

Filed March 31, 1938 5 Sheets-Sheet 1

Fig. 1.

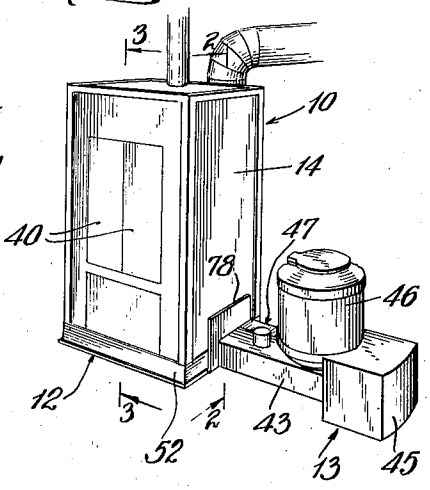


Fig. 2.

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May 30, 1939. B. GOERG 2,160,803

HEATING APPARATUS

Filed March 31, 1938 5 Sheets-Sheet 2

Fig. 3.

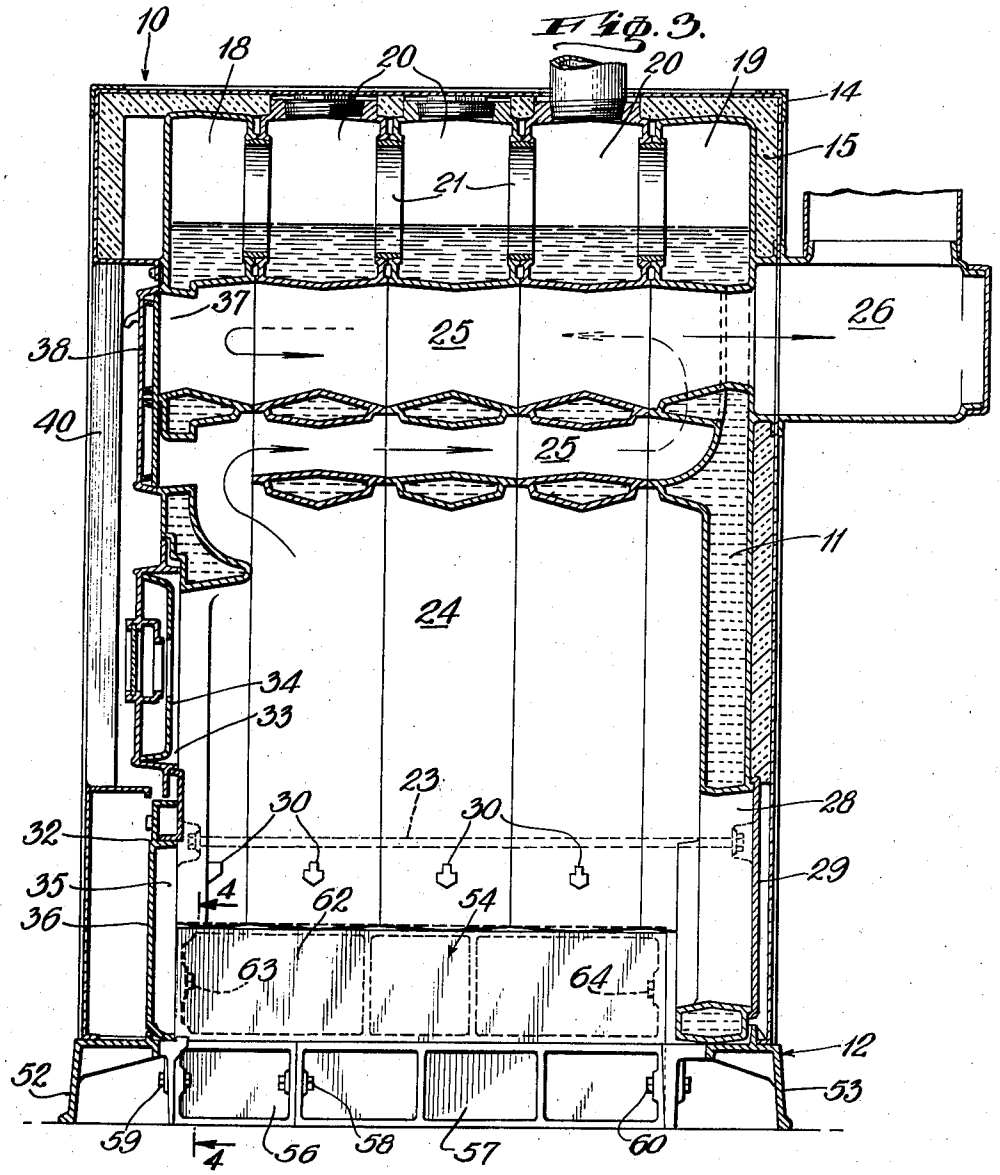
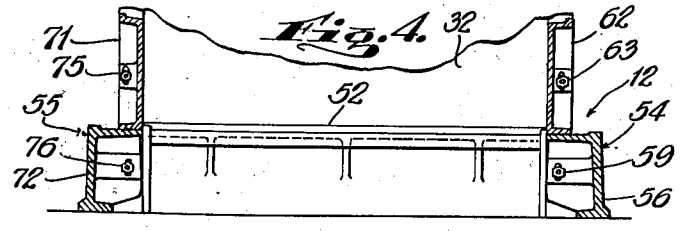


Fig. 4.



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May 30, 1939. B. GOERG 2,160,803

HEATING APPARATUS

Filed March 31, 1938 5 Sheets-Sheet 3

Fig. 5.

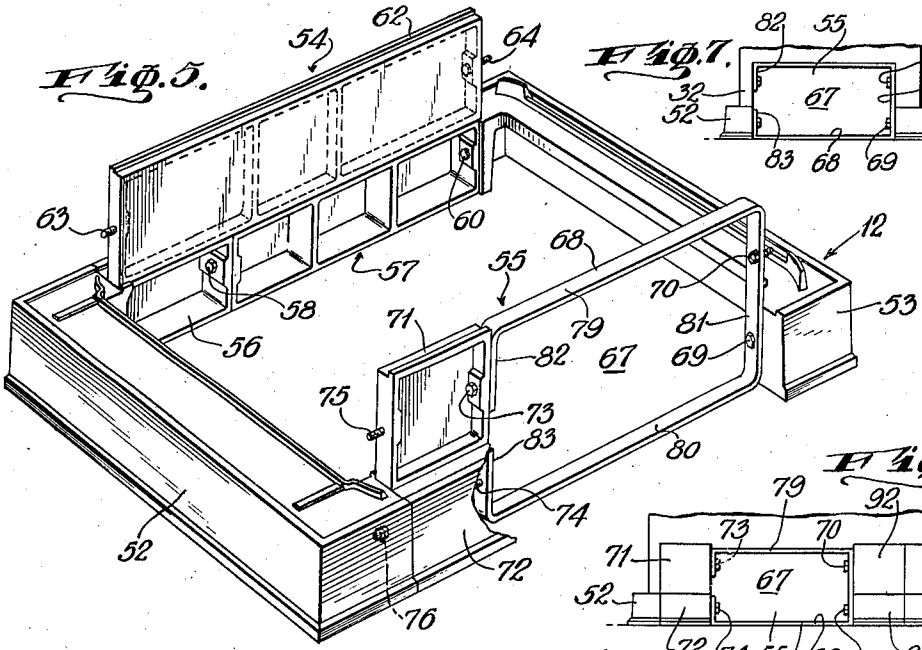
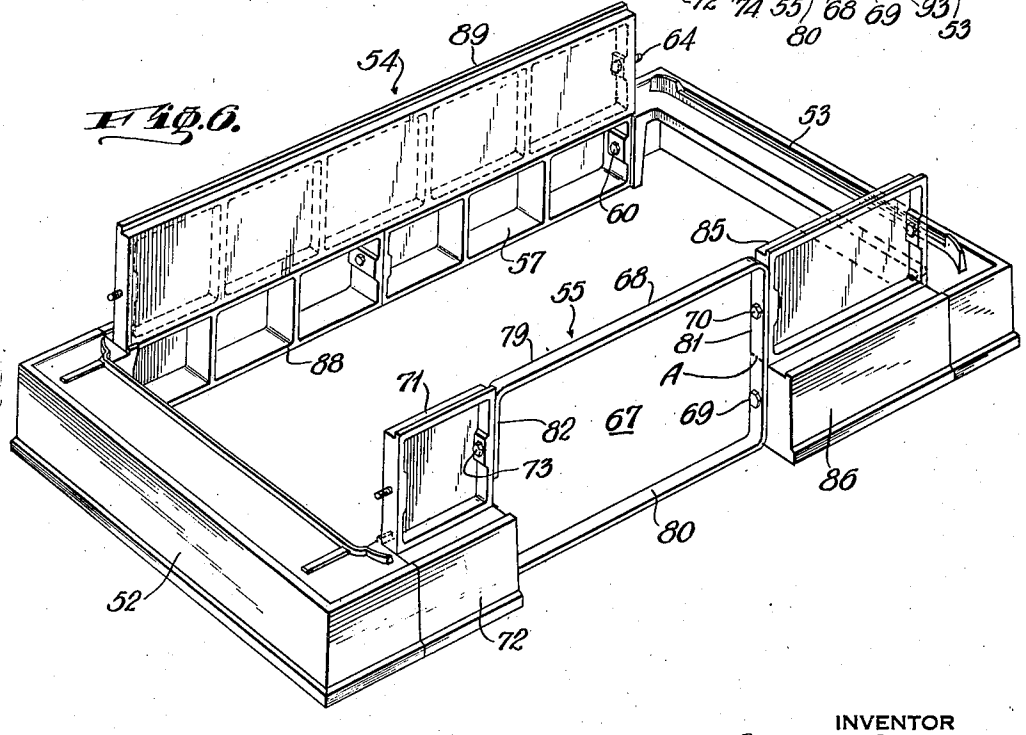


Fig. 7.

Fig. 8.

Fig. 6.



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May 30, 1939. B. GOERG 2,160,803

HEATING APPARATUS

Filed March 31, 1938 5 Sheets-Sheet 4

Fig. 9.

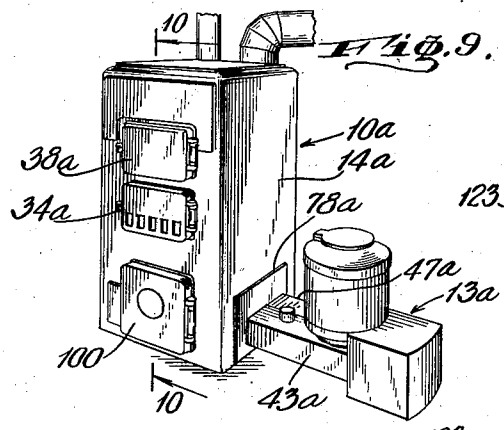


Fig. 13.

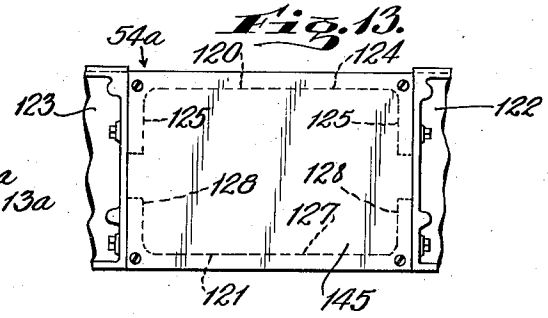


Fig. 11.

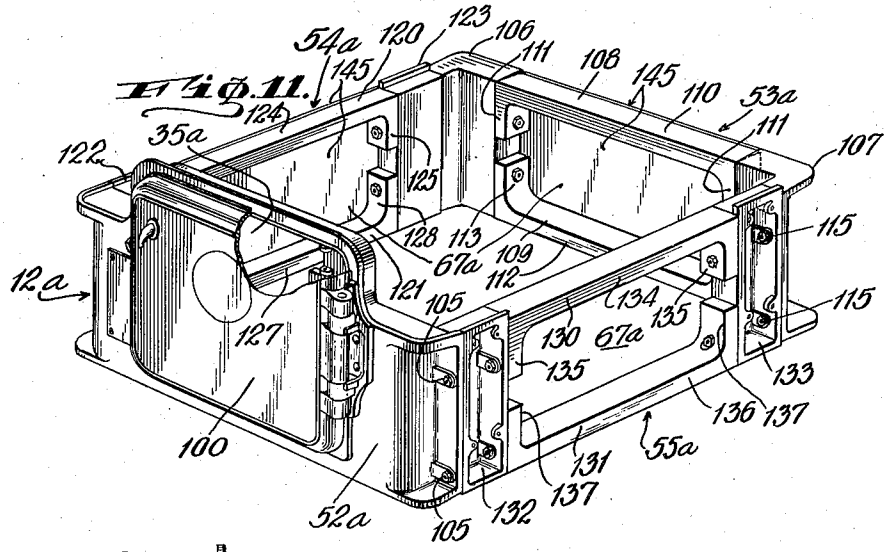
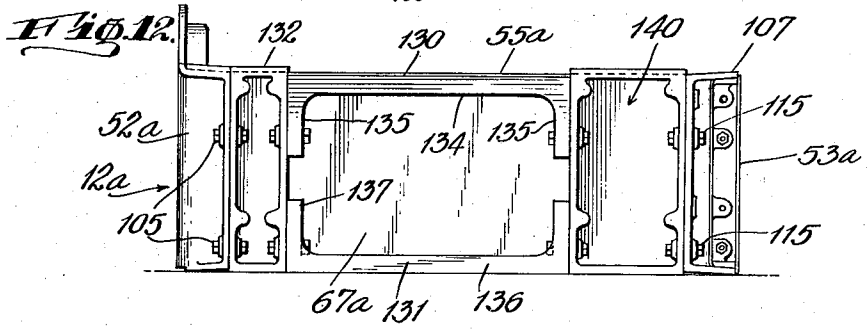


Fig. 12.



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May 30, 1939. B. GOERG 2,160,803

HEATING APPARATUS

Filed March 31, 1938 5 Sheets-Sheet 5

Fig. 10.

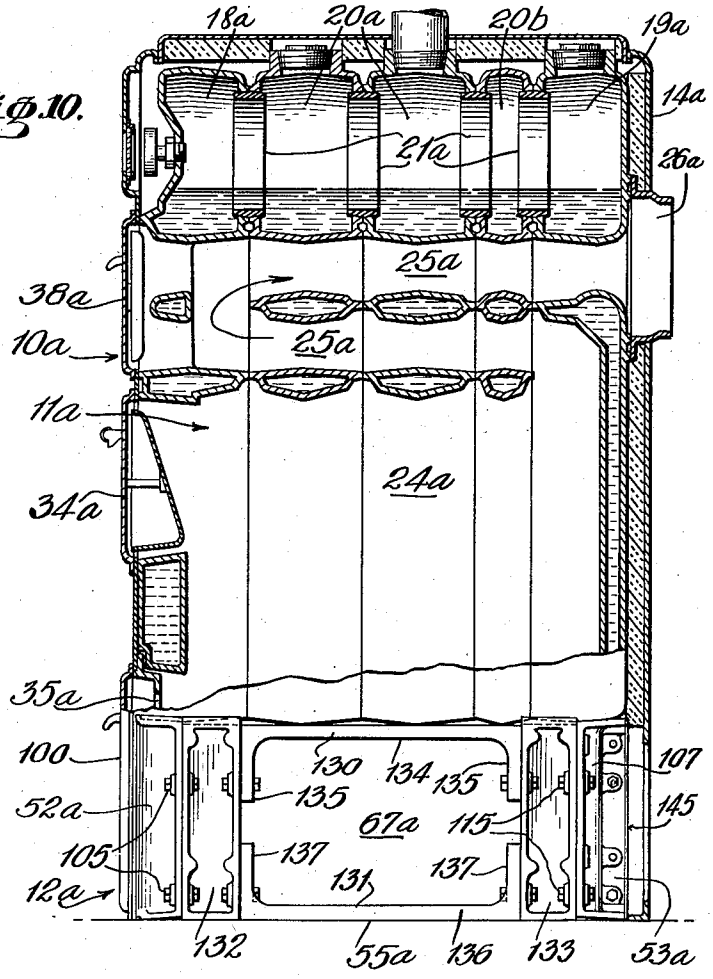
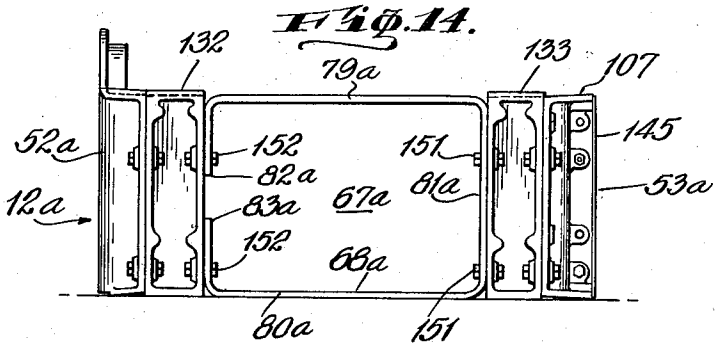


Fig. 14.



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Patented May 30, 1939 2,160,803

UNITED STATES PATENT OFFICE

2,160,803

HEATING APPARATUS

Bernard Goerg, Scarsdale, N. Y., assignor, by mesne assignments, to American Radiator & Standard Sanitary Corporation, New York, N. Y., a corporation of Delaware

Application March 31, 1938, Serial No. 199,179

19 Claims. (Cl. 110—1)

My invention relates to heating apparatus, and more particularly to a supporting base construction for use with stoker-fired boilers.

The invention consists in the novel construction and combination of parts, to be more fully described hereinafter, and the novelty of which will be particularly pointed out and distinctly claimed.

In the accompanying drawings, to be taken as a part of this specification, I have fully and clearly illustrated two preferred embodiments of my invention, in which drawings:

Fig. 1 is a perspective view illustrating one preferred embodiment of a stoker-fired boiler furnace constructed in accordance with my invention;

Fig. 2 is an enlarged transverse vertical sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a longitudinal vertical sectional view taken on the line 3—3 of Fig. 1, with the stoker retort and the ceramic refractory surrounding the retort removed in order to show the base construction more clearly;

Fig. 4 is a fragmentary vertical section on the line 4—4 of Fig. 3;

Fig. 5 is an enlarged detail perspective view showing the assembled supporting base construction of the preceding views as a separate unit detached from the boiler;

Fig. 6 is a view similar to Fig. 5 and showing the base construction of the preceding views as changed for use with a larger size boiler;

Fig. 7 is a diagrammatic view illustrating the lower part of one side of a furnace unit adapted for stoker firing; the base being shown as modified for use with a minimum size of boiler;

Fig. 8 is a view similar to Fig. 7 and showing a boiler and base construction larger in size than that shown in Figs. 1 to 5 inclusive and smaller than that shown in Fig. 6;

Fig. 9 is a perspective view similar to Fig. 1 and showing a modified form of stoker-fired boiler furnace constructed in accordance with the present invention;

Fig. 10 is a vertical longitudinal sectional view showing the boiler of Fig. 9 in vertical section and a modified form of supporting base unit in side elevation with the stoker omitted, the general plane of the section being indicated by the line 10—10 of Fig. 9;

Fig. 11 is an enlarged detail perspective view showing the modified form of assembled base unit which appears in Fig. 10;

Fig. 12 is a side elevation of the assembled base unit of Fig. 11 and illustrating the manner in which the size of the unit may be readily changed for use with larger size boilers;

Fig. 13 is a fragmentary side elevation of that side of the base unit of Fig. 11, which is opposite to the opening used for receiving the fuel feed tube of the stoker; and

Fig. 14 is a side elevational view similar to Fig. 12 and illustrating a modified form of yoke construction which provides the opening in the side of the base for receiving the fuel feed tube of the stoker, the yoke construction being the same as that which is shown with the base illustrated in Figs. 1 to 8 inclusive.

Referring now in detail to the construction illustrated and first to the embodiment of my invention which is illustrated in Figs. 1 to 8 inclusive, the reference numeral 10 indicates in general, a stoker-fired boiler furnace which comprises a vertical sectional boiler 11, a fabricated unitary supporting base 12 upon which the boiler is supported, a mechanically operated coal stoker 13, and a sheet metal jacket 14 surrounding the boiler 11 and separated therefrom by one or more layers of heat insulating material 15.

In so far as the broader aspects of my invention are concerned, the boiler 11 may be of any suitable construction and may be filled with any desired heating fluid. In Figs. 1, 2 and 3, I have disclosed a steam boiler of the vertical sectional type which comprises a front cast-metal hollow section 18, a rear cast-metal hollow section 19, and a plurality of intermediate cast-metal hollow sections 20. I have chosen to show a boiler having three intermediate sections 20; but it will be readily appreciated that the number of intermediate sections used will vary, depending upon the required size or length of the boiler.

The boiler sections 18, 19 and 20 are arranged in vertical side-by-side relation and the hollow interior spaces of the several sections are communicatively connected at their tops and bottoms, respectively, by the usual nipple connections 21 and 22. As is well known, the hollow interior spaces of the boiler contain the heating fluid, which in the embodiment shown, is steam and water, and the nipple connections provide for communication between sections and thus assure collection of the steam from all of the sections and circulation of the water between sections. The several sections are rigidly held in their assembled relation by the nipple connections 21 and 22 and by the usual tie rods 23.

As is well known, the boiler sections are so formed as to provide a combustion chamber 24 open at the bottom and connected at its top with

one end of a plurality of connected flue or gas passes 25, through which the combustion gases flow serially from the chamber 24 to the usual smoke outlet box 26. The box 26 is shown as being located at the rear and top of the furnace, and is adapted to be connected in the usual manner to a chimney (not shown).

As will appear more fully hereinafter, the boiler 11 operates efficiently when fired by a mechanically operated coal stoker. However, it is of interest to note that the particular boiler shown is also so constructed that it may be fired by a number of other types of fuel burning equipment. For example, the burner 11 may be fired by a gun type oil boiler (not shown). For this reason, the rear boiler section 19 is provided with an opening 28 in the center and lower part thereof, through which the burner may extend. In the stoker-fired installation in which the present invention is embodied, this opening 28 is shown as being closed by a cast-metal plate 29. Also, the boiler 11 is so constructed that it may be fired by an oil burner of the wall-flame type, if desired. To this end, the sides of the several sections of the boiler are provided with spaced inwardly-projecting ledge portions 30 which are adapted to support the usual hearth and ring of the wall-flame burner (not shown).

The lower front part of the front section 18 of the boiler 11 is here shown as being closed by a cast-metal front frame 32 which is bolted to the front section 18, and which is provided with an opening 33, and a door 34, closing the opening 33 for the purpose of inspecting the condition of the fire in the combustion chamber, and also for the purpose of removing clinkers, ash, etc., from the retorts of certain types of stokers. The lower part of the frame 32 is provided with an opening 35 which is closed by a detachable plate 36, and the purpose of the latter opening is to adapt the furnace for front firing by a gun-type oil burner or for receiving parts of a stoker in some types of installations.

The upper part of the front boiler section 18 is provided with openings 37 which are aligned, respectively, with the flue or gas passes 25 and are adapted to be closed by suitable clean-out doors 38. The openings 37 and doors 38 provide access to the gas or flue passes 25 for the purpose of removing soot, fly ash, etc., as is well known. Access may be had both to the inspection door 34, and to the clean-out doors 38 by means of a pair of doors 40 provided in the upper front part of the enclosing jacket 14.

In so far as the present invention is concerned, the stoker 13 may be any one of a variety of types. I have shown here a conventional type of stoker comprising the usual retort or fire pot 42 arranged at the lower end of the combustion chamber 24 and centrally within the space defined by the upright walls of the fabricated base unit 12. As is usual, the stoker 13 also comprises a fuel feed tube 43 which has a rotary feed screw 44 mounted therein, and extends from the lower end of the retort 42 outwardly through an opening provided in the base unit 12. The usual operating mechanism for the screw 44 is arranged exteriorly of the furnace and is enclosed within a suitable casing 45 connected to the outer end of the feed tube. Any suitable type of fuel; for example, coal, may be supplied to the outer end of the tube 43 from a fuel hopper 46. The construction and operation of this type of stoker is well known to those skilled in the art. The screw 44 rotates within the feed tube 43 and feeds the coal from the bottom of the hopper 46 lengthwise of the tube and into the bottom of the retort 42 and thence upwardly through the retort. As the coal is fed upwardly through the retort, it becomes heated and ignited and is burned. Air for supporting combustion is supplied to the retort by a second tube 47 of the same size as and arranged parallel to the tube 43 and also extending through the opening in the side of the base 12.

Surrounding the retort 42, is a layer of refractory material of any suitable type; for example, grouting 48 which may be formed of small pieces of brick, cinders, or the like, with the spaces between particles filled with cement, and over the top of this grouting and around the upper end of the retort is provided a annular hearth 49 suitably formed by a layer 50 of refractory cement. It will be appreciated that the type of refractory material surrounding the retort and the shape of the hearth may vary with the type of stoker and the size and design of the boiler.

It is important to note that one of the principal problems in stoker-fired boiler installations is the provision of one or more openings in the side of the supporting base which are of sufficient height and breadth for accommodating those parts of the stoker which connect the retort inside of the furnace with the fuel supply and operating mechanism located outside of the confines of the furnace. The size requirements of these connecting stoker parts, such as the fuel tube 43 and the air supply tube 47, vary with the type of stoker selected and the number of connecting parts required. In some types of stokers, one or more additional connecting tubes may be required; for example, an additional tube may be required for removing the ash from the furnace, and this ash tube may extend through the same opening in the base as the fuel feed and air supply tubes; or it may extend through another opening in another side of the base. In other types of stokers, the fuel may be fed through one connecting tube from a bin located at one side of the furnace and the operating and air supply mechanism for the stoker may be located at the other side and connected to the feed tube and retort by additional tubes.

Another essential requirement for all types of stoker-fired boiler furnaces is that the base for the boiler should be secured together to form a rigid unit so that the boiler will be assured at all times of a secure setting. Rigidity of the base is particularly essential when the boiler is being assembled. A further problem to be considered is that the size of the boiler varies with the requirements of the particular installation. Therefore, the base must be capable of being readily adapted to different size boilers.

As will appear more fully hereinafter, I have provided an improved form of base construction for stoker-fired boilers, which satisfies all of the above-mentioned requirements as to its ready adaptation to the various types or stokers, and also one which provides a rigid and secure setting for the boiler supported thereby, and one whose size may be readily varied to suit the particular boiler with which it is installed. As stated, the base construction is preferably formed as a rigid fabricated unit 12, which supports at its upper edges, respectively, the front, rear and sides of the boiler 11, and which may be readily provided with the required number of openings in its upright sides for receiving the stoker parts connecting the retort inside of the

furnace with the other stoker parts located outside of the furnace.

The base unit 12 is shown in perspective in Fig. 5 as being rectangular in shape and comprising an upright front wall element 52 formed as a one-piece integral casting, and extending across and beneath the front of the boiler 11 and here shown as supporting the front cast-metal frame 32 (see also Fig. 3). The base unit 12 also comprises an upright rear wall element 53 formed as a one-piece integral casting and extending across and beneath the rear of the boiler and supporting on its upper surface the rear boiler section 19. Connecting the front and rear walls 52 and 53 are a pair of upright side walls 54 and 55, which extend beneath and support the two opposite sides, respectively, of the boiler and which are detachably secured at their ends, respectively, to the two sets of adjacent ends of the front and rear walls 52 and 53.

The connecting side wall 54 is here shown as comprising a pair of cast-metal panel sections 56 and 57 secured together in end-to-end relation by a bolt 58, and detachably secured at their outer ends, respectively, to the adjacent ends of the front and rear walls 52 and 53 by bolts 59 and 60. The panel sections 56 and 57 are of the same height as the front and rear wall elements 52 and 53. The side wall 54 also comprises a cast-metal panel section 62 which is supported by and extends along the upper surface of the panels 56 and 57 and between the rear boiler section 19 and the front frame 32. It will be noted that the front boiler section 18 and the intermediate boiler sections 20 do not extend down as far as the front frame 32 and rear section 19, the latter extending down and resting directly on the front and rear walls 52 and 53, respectively, for a reason which will be explained more fully hereinafter.

Thus, the panel 62 serves to close the rectangular space defined by the lower under surfaces of the front and intermediate boiler sections 18 and 20, the upper surfaces of the panels 56 and 57, the inside surface of the lower end of the front frame 32 and the inside surface of the lower end of the rear boiler section 19. The ends of the panel 62 are detachably secured to the frame 32 and rear boiler section 19 by bolts 63 and 64, respectively.

The connecting side wall 55 is shown as being provided with an opening 67 extending therethrough and adapted to receive the fuel feed tube 43 and air supply tube 47. The wall 55 comprises a yoke construction 68 defining the major portion of the opening 67 and secured at one side to the adjacent end of the rear wall 53 and to the lower part of the rear boiler section 19 by bolts 69 and 70, respectively, and at its other side to a pair or set of panel elements 71 and 72 by bolts 73 and 74 respectively; the latter panel elements being in turn connected to the adjacent lower end of the frame 32 and front wall 52 by bolts 75 and 76, respectively. The panel 72 is of the same height as the front and rear walls 52 and 53 and as the panels 56 and 57, and the panel 71 is the same height as the panel 62. The yoke 68 extends for the full height of the wall 55 so as to provide the maximum height of opening 67 for the stoker parts and the yoke is of sufficient width to accommodate two or more stoker connecting tubes, if necessary. As shown in Fig. 2, after the feed tube 43 is installed, the surrounding parts of the opening not occupied by the tube is closed by a plate 78 secured to the outside of the jacket 14.

The yoke 68 is here shown as comprising a single wrought metal strap bent to form three sides of the opening 67 and with the two ends of the strap at the fourth side. Functionally considered, the yoke comprises upper and lower tie elements 79 and 80 defining respectively, the upper and lower sides of the opening 67, and upright end attaching elements 81, 82 and 83 for securing the ends of the tie elements 79 and 80 to adjacent parts of the base unit. As shown, the element 81 forms one vertical side of opening 67 and the elements 82 and 83 are the two ends of the strap and are at the opposite vertical side of the opening 67. The elements 82 and 83 extend downwardly and upwardly, respectively, from the ends of the tie elements 79 and 80, as shown. Thus, the yoke provides the maximum height of opening for stoker parts in a base of a given height, and at the same time securely ties together the adjacent parts of the base.

From the above, it will be apparent that I have produced a rigid fabricated base unit which provides a secure setting for the boiler 11. All of the parts are secured together to form the rigid unit by the several bolts. The base shown is for a particular size of boiler with the stoker connecting parts extending through an opening in the right-hand connecting side wall 55, as viewed from the front of the boiler. If, instead, it is desired that the stoker be connected through the connecting side wall at the left, the walls 54 and 55 can be readily substituted one for the other. Also, if it is desired that the fuel be fed in from one side of the boiler and the operating and air supply mechanism for the stoker be located at the other, another side connecting wall, constructed the same as the wall 55, can be readily substituted for the connecting side wall 54. This latter arrangement can also be provided in case it is desired to provide an ash-removal tube (not shown) at the side of the furnace opposite to the fuel hopper.

I have shown in Figs. 1 to 5 inclusive, a base suitable for a boiler of a certain size. In the type of boiler shown, its size or capacity can be changed by adding or subtracting intermediate boiler sections 20, and thereby varying the length of the boiler. The boiler shown comprises three intermediate sections and the length of the side connecting walls 54 and 55 is suitable for that length boiler. In a longer or shorter boiler, the side connecting walls 54 and 55 of the base will be made correspondingly longer or shorter. The length of the front and rear walls 52 and 53 will remain the same for all sizes of vertical sectional boilers as the width of such boilers does not vary.

In the base construction shown, the length of the side connecting walls 54 and 55 can be readily varied to suit the particular boiler with which it is installed. In Fig. 6 of the drawings, I have shown how the length of these side connecting walls can be readily increased with little additional cost, to accommodate a longer boiler; for example, a boiler having five intermediate sections. In the side wall 55, the same set of panels 71 and 72 and the same yoke 68 are used as in Fig. 5, and in addition, another set of upper and lower panels 85 and 86 are interposed between the element 81 of the yoke and the adjacent lower end of the rear boiler section 19 and the adjacent end of the rear wall 53. The set of panels 85 and 86 are secured at one side

by the bolts 69 and 70 to the element 81 of the yoke and at its other side to the rear section 19 and rear wall 53 by similar bolts (not shown). In Fig. 6, the other side wall 54 has also been increased in its length by an amount required for the two additional intermediate boiler sections. The panel 57 of Fig. 5 is also used in the wall 54 of Fig. 6; but instead of the panel 56, a longer panel 88 has been substituted. Also a correspondingly longer panel 89 has been substituted for the panel 62 of Fig. 5.

In each of the base constructions shown in Fig. 5 and Fig. 6, the bolts which secure the parts of the wall 55 together and to the front and rear walls 52 and 53, frame 32 and section 19 are all horizontally arranged. In Fig. 6, the bolts used for connecting the front wall 52, panel 72, yoke 68, panel 86 and rear wall 53 are all aligned. Similarly, the bolts securing the frame 32, panel 71, yoke 68, panel 85 and rear boiler section 19 are also horizontally aligned. It will be appreciated that this construction and arrangement of panels and securing bolts makes possible the fact that the length of the side wall 55 may be readily varied to accommodate boilers of any desired length. On account of this arrangement of securing bolts and the openings in the parts through which the bolts extend, either the set of panels 71 and 72, or the set of panels 85 and 86, or both sets, may be omitted and the yoke bolted directly to the adjacent end of the wall 52 or 53; or, if desired, either the set of panels 71 and 72 or the set of panels 85 and 86 may be replaced by other sets of panels of different breadth.

In Fig. 7 of the drawings, I have shown diagrammatically one side of a base construction modified for a minimum length of vertical sectional boiler. In Fig. 7, the side 55 of the base is shown. It will be noted that there are no sets of panels in the wall 55, and the upright securing element 81 of the yoke 68 is secured directly to the rear wall 53 and rear section 19 as in Fig. 4, and the securing elements 82 and 83 are secured directly to the front frame 32 and front wall 52, respectively.

In Fig. 8, the base shown is for a longer boiler than the base of Fig. 5 and for a shorter boiler than the base of Fig. 6. The side wall 55 of Fig. 8 comprises the set of panels 71 and 72 and the same yoke 68 of the preceding views and includes in addition, a set of panels 92 and 93 of the same size as the set of panels 71 and 72 of Figs. 5 and 6.

In Figs. 7 and 8, the side connecting wall, not shown, which is opposite to the wall 55, may be formed in the same manner as the wall 55, or, such side wall, not shown, may be formed in the same manner as the corresponding side walls 54 of Figs. 5 and 6; i. e., with an upper panel of proper length for the boiler supported, which is similar to the panels 62 and 89, and with a pair of lower panels, one of which may be the same as the panel 57 and the other of which corresponds to the lower panels 56 and 88 of Figs. 5 and 6 and varies in length with the boiler supported.

The provision of upper and lower sets of panels in the side wall 54 and the upper and lower panels in the side wall 55 is made necessary on account of the particular construction of the boiler 11, shown in Figs. 1 to 4 inclusive, in which we have elected to embody our invention. As stated previously, the boiler 11 is so constructed that it may be also used with other types of firing equipment. When the boiler 11 is used for oil firing or hand firing, the front and rear walls 52 and 53 of the base are omitted and the frame 32 and rear section 19 rest directly on the basement foundation prepared for the boiler. The several lower panels 72, 86, 93, 88 and 57 and the yoke 68 are omitted and the panel 62 or a similar panel is provided at each side of the boiler for closing the rectangular space between the under surfaces of the front and intermediate boiler sections and the basement foundation, and between the lower part of the front frame 32 and the lower part of the rear boiler section 19. As explained, when the boiler 11 is used for stoker firing, this rectangular space is not usually of sufficient height to accommodate the fuel, air, and ash tubes in the sides of the base, so therefore, the front and rear walls 52 and 53, and the several lower panels of the walls 55 and 56 are provided which increase the height of the boiler the required amount. The opening 67 extends for the full height of the base. The yoke 68 advantageously provides the necessary size of opening 67 and the front and rear walls 52 and 53 and the several lower panels form what may be termed a sub base which provides the required height of base.

It might be noted at this point that in certain stoker-fired installations, it might be desired that one or more of the stoker connecting tubes extend through the front of the furnace. In such a case, the connecting stoker tube or tubes may be inserted through the opening 35, an opening of the required size may be provided in the plate 36 for this purpose. It is also to be noted that certain stokers do not require a high base opening, such as is provided by the yoke 68. In the latter case, members 52, 53, 72, 86, 88 and 57 can be omitted and only members 71, 85 and 89 used. The element 81 of the yoke 68 can be cut at the point indicated at A and only the top half of the yoke used to tie together the panels 71 and 85 and the lower parts of the frame 32 and the rear section 19. In other words, the sub-base may be omitted and the frame 32 and rear section 19 made to rest directly on the basement foundation as described above in connection with an oil-fired installation. As the jacket 14 rests on the sub-base in Figs. 2 and 3, it can then rest on the floor without additional changes in the construction.

In Figs. 9 to 13 inclusive, I have shown a second preferred embodiment of my invention, wherein is illustrated a modified form of my improved fabricated base unit as incorporated in a modified form of boiler furnace 10a. The boiler furnace comprises a vertical sectional boiler 11a, a fabricated rigid base unit 12a upon which the boiler is supported, and a mechanically operated stoker 13a of the same type as that previously described. The rear and sides of the boiler are enclosed in a sheet-metal jacket 14a of suitable design. The front of the boiler forms the front of the furnace 10a. A door 34a provides for inspection of the fire and removal of clinker and ashes, and a door 38a for the removal of soot from the flue passages.

The boiler 11a comprises a hollow cast-metal front section 18a, a hollow cast-metal rear section 19a and hollow cast-metal intermediate sections 20a and 20b. It will be observed that the width of the intermediate section 20b is one-half of the width of each of the intermediate sections 20a. The reason for this is to provide for a wide flexibility in boiler sizes. For example;

the next larger size of boiler from that shown in Fig. 10, would be one having three full size intermediate sections 20a and no small size sections 20b, and the next smaller size of boiler would be one having only two full size intermediate sections 20a. In other words, the half section 20b provides for a size of boiler in between boilers composed of only full size intermediate sections.

In the boiler shown, the sections 18a, 19a, 20a and 20b are arranged in vertical side-by-side relation, as in the previously described modification, and the hollow interior spaces of the several sections are joined, as before, by nipple connections 21a at the top and by the usual nipple connections (not shown) at the bottom, which nipple connections provide for the accumulation of steam from all sections and for the circulation of water between sections. The rear section 19a of the boiler terminates at its lower ends at substantially the same level as the front section 18a and intermediate sections 20a and 20b. The several sections of the boiler are so formed as to provide a combustion chamber 24a open at the lower end thereof, and a series of connected flue passages 25a which receive at one end the gaseous products of combustion from the chamber 24a and discharge such combustion gases at the other end into a conventional smoke pipe 26a.

The stoker 13a is of the same construction as the stoker 13 described previously. Although I have not actually shown in this modification the retort inside of the furnace, it will be appreciated that the retort will be arranged centrally within the base unit 12a and in open communication with the combustion chamber 24a, the same as the retort 42 of the previously described construction. It is important to note that the problems outlined previously in connection with the installation requirements of various types of stokers, and the requirements of different sizes of boilers, are solved by the rigid fabricated base unit 12a of this modification, the same as the unit 12 previously described.

In Figs. 9 to 13 inclusive, the rigid fabricated base unit 12a is shown as being constructed in the form of a rectangle and as comprising an upright front wall 52a, an upright rear wall 53a and upright side connecting walls 54a and 55a, arranged, respectively, at opposite sides of the furnace and detachably secured at their ends to the adjacent ends of the front wall 52a and rear wall 53a. In the construction shown, the front boiler section 18a is supported by the front wall 52a and by the directly adjacent portions of the side walls 54a and 55a. The rear boiler section 19a is supported by the rear wall 53a and also the directly adjacent parts of the side connecting walls 54a and 55a, and the intermediate sections 20a and 20b are supported by the intermediate portions of the side connecting walls 54a and 55a respectively.

In Fig. 9 of the drawings, I have shown the fuel feed tube 43a and air supply tube 47a of the stoker 13a as entering the base of the furnace at the right hand side, as viewed from the front thereof, the same as the feed tube 43 and air tube 47 of the previously described modification. It will be appreciated as the description proceeds, that the modified form of base unit 12a is so constructed that, if desired, the required feed tube 43a and air tube 47a may be inserted through any one of four walls of the base. Also, the base unit 12a is so constructed that it can be readily adapted for installations where the stoker operating mechanism is located at either one of the four sides of the furnace and the feed and air tubes or other connecting stoker parts may be located at either of the remaining three sides.

In Fig. 11, the base unit is shown in perspective, and it will be observed that an opening 67a for receiving one or more connecting stoker parts is provided in each side connecting wall 54a and 55a and in the rear wall 53a. It will also be noted that I have provided the usual opening 35a in the front wall 52a, which is closed by a door 100. The opening 35a may also be used for the reception of stoker connecting parts, if desired. In the latter case, the door 100 will be removed and a plate (not shown) with an opening large enough to receive the stoker part substituted for the door 100.

The front wall 52a is shown as comprising an integral casting extending across and beneath the front of the furnace and attached at its ends by bolts 105 to the adjacent ends of the two side connecting walls 54a and 55a, respectively. The rear wall 53a comprises a pair of cast-metal corner members 106 and 107 and a pair of yoke members 108 and 109 arranged in opposed relation to one another and defining the upper and lower sides of the opening 67a through the rear wall. The yoke member 108 is formed as a one-piece casting and comprises a longitudinally-extending upper tie member 110, and a pair of upright end attaching elements 111 bolted, respectively, to the corner members 106 and 107. Similarly, the lower yoke member 109 is formed as a one-piece casting and comprises a lower tie element 112, and a pair of end attaching elements 113 bolted, respectively, to the corner members 106 and 107. The other sides of the corner members are secured respectively to the adjacent ends of the walls 54a and 55a by bolts 115. It is to be noted at this point that as the boiler 11a is of the vertical sectional type, provision need not be made for varying the length of the front and rear walls, the variations in sizes of this type of boiler being provided by varying the length of the boiler and not by varying its width.

The side connecting wall 54a shown in Fig. 11, comprises a pair of opposed upper and lower yoke members 120 and 121 defining, respectively, the upper and lower sides of the opening 67a therein, and a pair of upright panel members 122 and 123 arranged, respectively, between the two ends of the yoke members and the adjacent ends of the front and rear walls 52a and 53a respectively. The upper yoke member 120 is formed as a one-piece casting and comprises an upper tie element 124 and a pair of upright end attaching elements 125 bolted, respectively, to the adjacent sides of the panel members 122 and 123. Similarly, the lower yoke member 121 is in the form of a one-piece casting and comprises a lower tie element 127 and upright end attaching elements 128 bolted respectively, to the panel members 122 and 123. The sides of the panel members 122 and 123 which are opposite the yoke members are bolted, respectively, to the ends of the front and rear walls 52a and 53a.

The remaining side connecting wall 55a also comprises a pair of opposed upper and lower yoke members 130 and 131 defining, respectively, the upper and lower sides of the opening 67a therein, and a pair of panel members 132 and 133, arranged, respectively, at the ends of the yoke members and between the latter and the adjacent ends of the front and rear walls 52a and 53a.

The upper yoke member 130 is also formed as an integral casting and comprises a longitudinally-extending upper tie element 134 and a pair of upright end attaching elements 135 bolted respectively to the adjacent sides of the panel members 132 and 133. The lower yoke member 131 is also formed as an integral casting and comprises of a longitudinally-extending tie element 136 and a pair of end attaching elements 137 bolted, respectively, to the adjacent sides of the panel members 132 and 133. The sides of the panel members 132 and 133 which are opposite the ends of the yoke members are secured, respectively to the adjacent ends of the front and rear walls by the bolts 105 and 115.

It is of interest to note that the construction and arrangement of the side walls 54*a* and 55*a* are identically the same, and that the yoke members 108, 109, 120, 121, 130, and 131 are also of the some construction and size. The base unit 12*a* shown in Fig. 11 is of a size suitable for supporting the boiler unit of Fig. 10; that is, a boiler unit having two full size intermediate sections 20*a* and one half size intermediate section 20*b*. As in the previously described modification, provision is made for lengthening the side connecting walls 54*a* and 55*a* so as to support boilers having a larger number of intermediate sections, and for shortening the side connecting walls 54*a* and 55*a* so as to support boilers having a fewer number of intermediate sections. Each of the panel members 122, 123, 132 and 133 in the two side connecting walls of Fig. 11 is of a size corresponding to a half size intermediate section 20*b* of the boiler. Therefore, if it is desired to support a boiler having only two full size intermediate sections 20*a* and no half size intermediate sections 20*b*, one of the panels will be omitted from each side connecting wall 54*a* and 55*a* and the base unit 12*a* thus formed will be of a proper size to support such a boiler. On the other hand, if it is desired to support a boiler having one full size intermediate section 20*a* and one half size intermediate section 20*b*, then, both of the panels of each connecting side wall will be omitted and the yoke members 120, 121, 130 and 131 of the side walls will be bolted directly to the adjacent ends of the front wall 52*a* and the rear wall 53*a*; the several connecting bolts and the holes through which they extend being so arranged that such connection can readily be made.

If it is desired to support a longer boiler than that shown in Fig. 10, then a panel section will be provided in each of the side connecting walls which is longer than those shown in Figs. 10 and 11. For example; in Fig. 12, I have shown in side elevation, a side connecting wall 55*a* having a larger panel member 140 occupying the space of the panel 133 of Figs. 10 and 11. The panel 140 is of a size corresponding to a full size intermediate section 20*a*. It will be appreciated that the other side connecting wall (not shown) of Fig. 12 will have a panel similar in size to the panel 140. From the above, it will be apparent that the length of the side connecting walls 54*a* and 55*a* of the base unit 12*a* may be readily changed by adding, subtracting and substituting panel members of different sizes, so as to support a variety of sizes of boilers.

As stated previously, I have shown in Figs. 9, 10 and 11, a base unit supporting a boiler furnace wherein a stoker having a fuel-feed tube 43*a* and an air tube 47*a* is used. The tubes 43*a* and 47*a* are shown as extending through the opening 67*a* in the side connecting wall 55*a*, and the parts of the opening not occupied by the tube are closed by a plate 78*a* secured to the outer side wall of the jacket 14*a* (see Fig. 9). Also, I have described above a base unit 12*a* having an opening 67*a* in the side connecting wall 54*a* and a similar opening 67*a* in the rear wall 53*a*, and have described a front wall 52*a* having a door-closed opening 35*a*. These additional openings 67*a* and 35*a* are provided so that the base unit may be readily adapted for use with a variety of types of stokers and installations wherein the stoker may be located at another side of the boiler from that shown or wherein one or more additional stoker connecting parts or tubes may be used. If the front wall opening 35*a* is not used, it may be closed by the door 100, as stated before. If the openings 67*a* in the other side connecting wall 54*a* and in the rear wall 53*a* are not used, they may be closed by sheet metal plates 145 suitably bolted to the yoke members defining the respective openings. In Fig. 13, I have shown a fragmentary side elevation of the side connecting wall 54*a* with the plate 145 bolted thereto.

It will be observed that each of the pairs of yoke members defining the several openings through the two side connecting walls 54*a* and 55*a* and the rear wall 53*a* are formed as one-piece castings. If desired, a yoke member of the type shown in Figs. 1 to 8 inclusive, might be used in the base unit 12*a* instead of the cast-metal yokes shown. As an example, I have shown in Fig. 14, a side elevation of the base unit 12*a* wherein a yoke 68*a* formed from a single strap of wrought metal, is used. As shown, the strap is bent to form an upper tie member 79*a*, a lower tie member 80*a* and end attaching element 81*a* at one side and a pair of end attaching elements 82*a* and 83*a* at the other side. The end attaching element 81*a* is secured to the adjacent panel member 133 by the bolts 151 and the end attaching elements 82 and 83 are secured to the panel member 132 by bolts 152.

What I claim and desire to secure by Letters Patent of the United States is as follows:

1. A fabricated supporting base for stoker-fired boilers comprising a front wall member; a rear wall member; and a connecting side wall member extending between and connected to the front and rear wall members; said connecting side wall member having an opening therein adapted to receive parts of a stoker, and said side wall member including separable upright panel elements and a U-shaped yoke member arranged with the base of the U extending lengthwise of the wall and defining one side of the opening and with the legs of the U arranged upright at opposite sides of the opening and detachably secured to adjacent wall parts.

2. A fabricated supporting base for stoker-fired boilers comprising a front wall member; a rear wall member; and a connecting side wall member extending between and connected to the front and rear wall members; said connecting side wall member having an opening therein adapted to receive parts of a stoker, and said side wall member including a U-shaped yoke member arranged with the base of the U extending lengthwise of the wall and defining one side of the opening, and with the legs of the U at opposite sides of the opening, and a pair of upright panels disposed respectively between the legs of the U and the front and rear wall members; and means for detachably securing the panels to the legs of the U and to the front and rear wall members.

3. A fabricated supporting base for stoker-fired boilers comprising an upright front side member having an opening therethrough and a closure member for said opening, and a plurality of additional upright side members so arranged with respect to one another and to said front side member as to define a hollow interior space adapted to receive a stoker part; means for securing the adjacent parts of said side members together to provide a rigid base structure adapted to support a boiler upon its upper surfaces; one of said additional side members including yoke means defining an opening therethrough adapted to receive parts of a stoker; said yoke means including top and bottom elements defining the upper and lower sides of said stoker opening and upright end securing elements at the ends of said top and bottom elements; and means for detachably securing said upright end securing elements to the adjacent upright parts of said base.

4. A fabricated supporting base for stoker-fired boilers comprising an upright front side member having an opening therethrough and a closure member for said opening, and a plurality of additional upright side members so arranged with respect to one another and to said front side member as to define a hollow interior space adapted to receive a stoker part; means for securing the adjacent parts of said side members together to provide a rigid base structure adapted to support a boiler upon its upper surfaces; one of said additional side members including yoke means defining an opening therethrough adapted to receive parts of a stoker; said said yoke means including top and bottom elements defining the upper and lower sides of said stoker opening and upright end securing elements at the ends of said top and bottom elements; said one additional side member also including an upright panel arranged between one upright end element of said yoke means and the adjacent one of said upright side members; and means for detachably securing said panel at one side thereof to said adjacent one of the side members and at the other side thereof to said adjacent one of the end securing elements of said yoke means.

5. A fabricated supporting base for stoker-fired boilers comprising an upright front side member having an opening therethrough and a closure member for said opening, and a plurality of additional upright side members so arranged with respect to one another and to said front side member as to define a hollow interior space adapted to receive a stoker; means for securing the adjacent parts of said side members together to provide a rigid base structure adapted to support a boiler upon its upper surfaces; one of said additional side members including yoke means defining an opening therethrough adapted to receive parts of a stoker; said yoke means including top and bottom elements defining the upper and lower sides of said stoker opening and upright and securing elements at the ends of said top and bottom elements; said one additional side member also including an upright panel arranged between one upright end element of said yoke and the adjacent one of said side members; and means for detachably securing said panel at one side thereof to said adjacent side member and at the other side thereof to an adjacent upright end element of said yoke means; said last-named securing means being so constructed and arranged that said panel may be omitted entirely and said adjacent upright end element of said yoke means secured directly to said adjacent one of said side members, or so that another panel of different width may be substituted for the first panel.

6. A fabricated supporting base for stoker-fired boilers of varying sizes comprising a plurality of upright side members arranged to define an enclosed space therebetween adapted to receive stoker parts, and having their adjacent ends secured together to provide a rigid unit upon which the sides of the boiler are adapted to be supported; two of said side members extending in the same general direction and being arranged at opposite sides of the space and being composed of detachably secured upright panel parts which are adapted to be removed so as to vary the length dimension of said side members and adapt the base for supporting boilers of different dimensions measured in the direction of extent of said two side members; at least one of said two side members having an opening therethrough for receiving parts of a stoker, the upper and lower sides of said opening being defined respectively by upper and lower tie elements extending in the direction of extent of said one side member and detachably secured at their opposite ends to the adjacent parts of said base.

7. A fabricated supporting base for stoker-fired boilers comprising a plurality of upright side members arranged to define an enclosed space therebetween which is adapted to receive stoker parts and the side members having their adjacent ends secured together to provide a rigid unit upon which the sides of the boiler are adapted to be supported; two of said side members extending in the same general direction and being arranged at opposite sides of the enclosed space and each having respectively an opening therein disposed opposite to the opening in the opposite side member; the opening in at least one of said two side members being adapted to receive stoker parts and being defined at its upper and lower sides respectively by upper and lower tie members extending lengthwise in the direction of extent of said one side member and detachably secured at their opposite ends to adjacent parts of said base.

8. A fabricated supporting base for stoker-fired boilers comprising a plurality of upright side members arranged to define a hollow interior for receiving a stoker part; means for securing together the adjacent ends of said side members to provide a rigid supporting base structure for a boiler; one of said side members including yoke means defining an opening and including top and bottom elements defining respectively the upper and lower sides of said opening, and upright end securing elements; an upright detachable panel forming a part of said one side member and arranged between said yoke means and the adjacent end of an adjacent side member; a first bolt for detachably securing one upright side of the panel to an end securing element of said yoke means and a second bolt for detachably securing the opposite upright side of the panel to said adjacent end of the adjacent side member; said first and second bolts and the adjacent parts of the base to which they are secured being so constructed that said panel may be omitted entirely from said one side member and the yoke means secured directly to said adjacent side member by one of said bolts.

9. A fabricated supporting base for stoker-fired boilers comprising an upright front side member

having an opening therethrough and a closure member for said opening, and a plurality of additional upright side members so arranged with respect to one another and to said front side member as to define a hollow interior space adapted to receive a stoker part; means for securing the adjacent parts of said side members together to provide a rigid base structure adapted to support a boiler upon its upper surfaces; one of said additional side members including a longitudinally-extending top tie member and a longitudinally-extending bottom tie member defining respectively the upper and lower sides of an opening through said one side member for receiving stoker parts, and an upright side panel structure filling the space between one end of said tie members and the adjacent end of an adjacent upright side member; and means for detachably securing the panel structure at one side to said tie members and at its opposite side to said adjacent end of the adjacent upright side member.

10. A fabricated supporting base for stoker-fired boilers comprising an upright front side member having an opening therethrough and a closure member for said opening, and a plurality of additional upright side members so arranged with respect to one another and to said front side member as to define a hollow interior space adapted to receive a stoker part; means for securing the adjacent parts of said side members together to provide a rigid base structure adapted to support a boiler upon its upper surfaces; one of said additional side members including a pair of upright end panel structures secured respectively to the adjacent ends of adjacent side members and a longitudinally-extending top tie member and a longitudinally-extending bottom tie member extending between the adjacent upright sides of said panel structures and defining respectively the upper and lower sides of an opening through said one side member for receiving stoker parts; and means for detachably securing together said adjacent ends of adjacent side members, said panel structures, and said tie members.

11. A fabricated supporting base for stoker-fired boilers and comprising upright front and rear members spaced apart and supporting respectively the front and rear portions of the boiler, upright side members spaced apart and supporting respectively the sides of the boiler; the side members being so arranged that they respectively join together the adjacent ends of the upright front and rear members to define a hollow interior space adapted to receive parts of a stoker; means for securing the adjacent ends of all of the upright members to provide a rigid base unit; one of said side members having an opening therethrough and comprising a longitudinally-extending top tie member and a longitudinally-extending bottom tie member defining respectively the upper and lower sides of such opening, and a side panel filling the space between the adjacent end of the adjacent upright member and the tie members; and means for detachably securing one upright side of the panel member to said tie members and for securing the opposite upright side of said panel member to the adjacent end of said adjacent upright member.

12. A fabricated supporting base for stoker-fired boilers comprising a plurality of upright side wall members arranged to define an enclosed space therebetween adapted to receive stoker parts and the side wall members having their adjacent ends secured together to provide a rigid unit upon which the sides of the boiler are adapted to be supported; one of said side wall members having an opening therethrough adapted to receive parts of a stoker and said opening being defined at its upper and lower sides respectively by upper and lower tie members extending lengthwise in the direction of extent of said one wall member; said one wall member including a pair of upright panels disposed respectively at the opposite ends of said tie members and filling the spaces between the latter and the adjacent wall members; and means for detachably securing together the ends of the tie members, the panels and the adjacent wall members.

13. A fabricated supporting base for stoker-fired boilers comprising front and rear wall members adapted respectively to support the front and rear sides of the boiler and a pair of connecting side wall members extending respectively between the two sets of adjacent ends of the front and rear wall members and adapted to support respectively the remaining side walls of the boiler; said wall members defining an enclosed space adapted to receive stoker parts and the wall members having their adjacent ends secured together to provide a rigid base unit; said rear wall member having an opening therethrough adapted to receive parts of a stoker and comprising a pair of corner members arranged respectively at the ends thereof and to which the adjacent ends of the connecting side wall members are secured, and upper and lower tie members extending lengthwise in the direction of extent of the rear wall member and defining respectively the upper and lower sides of said opening, the ends of said tie members being detachably secured respectively to the adjacent parts of said corner members.

14. A fabricated supporting base for stoker-fired boilers of varying sizes comprising front and rear wall members adapted to support respectively the front and rear sides of a boiler and a pair of connecting side wall members extending respectively between the two sets of adjacent ends of the front and rear wall members and adapted to support respectively the remaining sides of the boiler; said wall members defining an enclosed space adapted to receive stoker parts and the wall members being secured together at their adjacent ends to define a rigid base unit; said rear wall member having an opening therethrough adapted to receive stoker parts and comprising a pair of corner members arranged respectively at the ends thereof and upper and lower tie members defining respectively the upper and lower sides of said opening and detachably connected at their ends to the corner members; said connecting side wall members being composed of detachably secured upright panel parts which are adapted to be removed and replaced by other panel parts so as to provide for varying the length dimensions of said connecting side wall members and thereby adapt the base for supporting boilers of different dimensions measured in the direction of extent of said connecting side members.

15. A fabricated supporting base for stoker-fired boilers comprising front and rear wall members adapted to support respectively the front and rear sides of a boiler and a pair of connecting side wall members extending respectively between the two sets of adjacent ends of the front and rear wall members and adapted to support the remaining sides of the boiler; the wall members defining an enclosed space for receiving

stoker parts and being detachably secured together to provide a rigid base structure; said front wall member having an opening therein and including a closure member for said opening; said rear wall member having an opening therein adapted to receive parts of a stoker and the rear wall member comprising a pair of upright corner members arranged respectively at the ends of the rear wall member, and upper and lower tie elements defining respectively the upper and lower sides of said last-named opening and detachably secured at their ends to the adjacent parts of said corner members.

16. A fabricated supporting base for stoker-fired boilers comprising front and rear wall members adapted to support respectively the front and rear sides of a boiler and a pair of connecting side wall members extending respectively between the adjacent ends of the front and rear wall members; said wall members defining an enclosed space adapted to receive stoker parts and being detachably secured together at their adjacent ends to provide a rigid base structure; said rear wall member and each of said connecting side wall members having openings therein adapted to receive stoker parts, and the upper and lower sides of each of said openings being defined respectively by upper and lower tie members detachably secured at their ends to the adjacent parts of the base; and detachable plate members for closing at least two of said openings.

17. A fabricated supporting base for stoker-fired boilers comprising a plurality of upright wall members arranged to provide an enclosed space therebetween which is adapted to receive parts of a stoker and the wall members being secured together to form a rigid unit adapted to support a boiler on the upper parts thereof; one of said wall members having an opening extending therethrough and adapted to receive a fuel-feed tube for a stoker, and said one wall member comprising a cast-metal top tie member defining the upper side of said opening and including depending attaching parts at its ends detachably secured to adjacent parts of said base, and a cast-metal bottom tie member defining the lower side of said opening and including upstanding attaching parts at its ends detachably secured to adjacent base parts.

18. A fabricated supporting base for stoker-fired boilers comprising a plurality of upright wall members arranged to provide an enclosed space therebetween which is adapted to receive parts of a stoker, and the wall members being secured together to form a rigid base unit adapted to support a boiler on its upper parts; one of said wall members having an opening extending therethrough and adapted to receive a fuel-feed tube for a stoker, and said one wall member comprising a rectangular shaped member formed from a single wrought metal strap including three continuous sides and a fourth side, said strap being arranged with two of its opposed continuous sides forming the top and bottom respectively of the opening and with its other continuous side and its fourth side arranged upright and opposite to one another and being detachably secured to adjacent base parts.

19. A fabricated supporting base for stoker-fired boilers comprising an upright front side member having an opening therethrough and a closure member for said opening, and a plurality of additional upright side members so arranged with respect to one another and to said front side member as to define a hollow interior space adapted to receive a stoker part; means for securing the adjacent parts of said side members together to provide a rigid base structure adapted to support a boiler upon its upper surfaces; one of said additional side members having an opening therein adapted to receive parts of a stoker, and comprising a yoke; said yoke including a tie element extending lengthwise of said one additional side member and defining one side of said last-named opening and a pair of upright end securing elements at the ends of said tie element; and means for detachably securing said upright end securing elements to the adjacent upright parts of said one additional side member.

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