

Sept. 27, 1927.

1,643,902

J. A. PHELAN

FURNACE FRONT

Filed March 21 1927

2 Sheets-Sheet 1

Fig. 1.

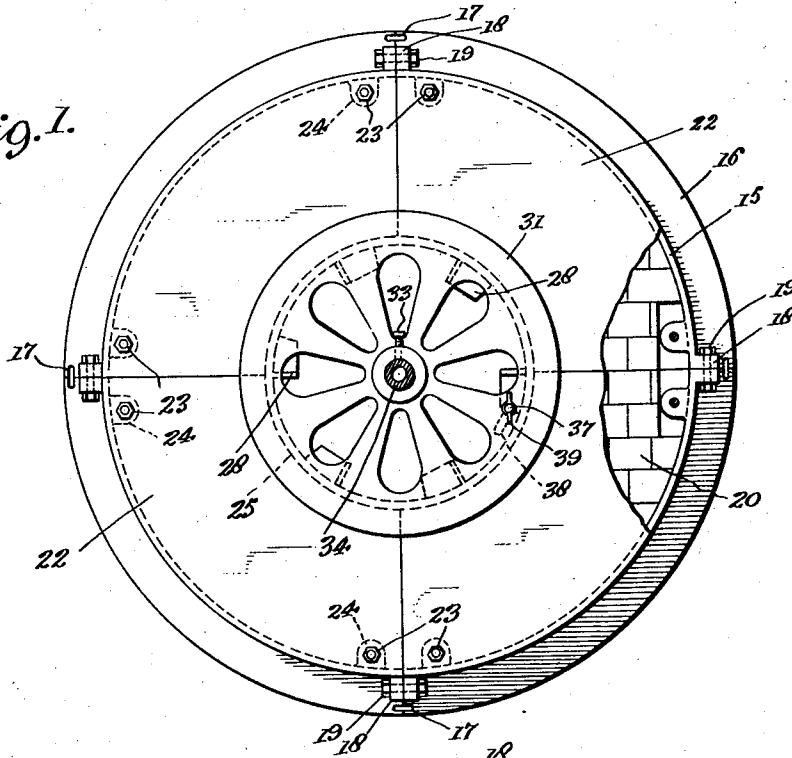
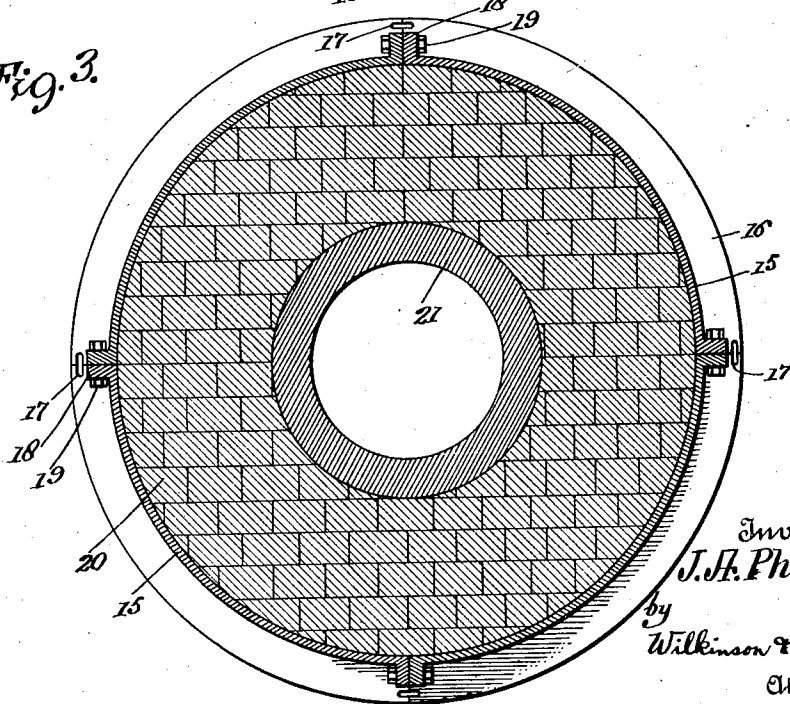


Fig. 3.



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Fig. 2.

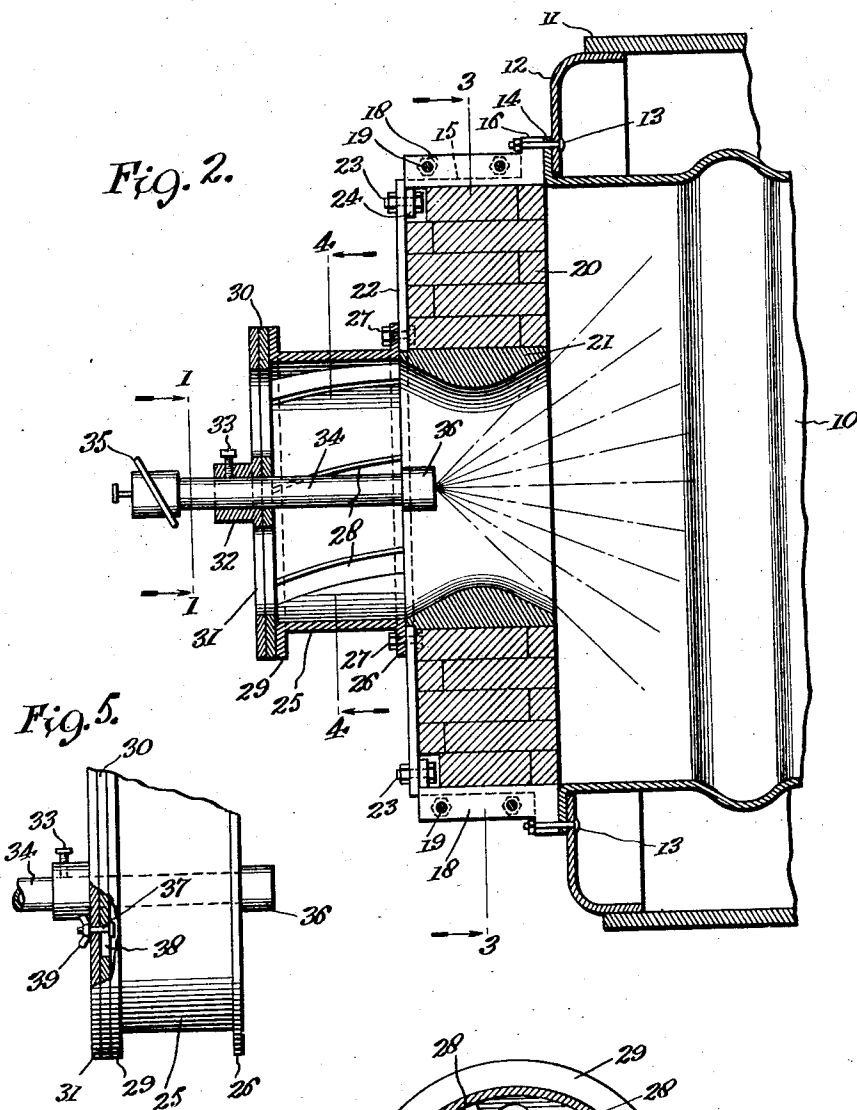


Fig. 5.

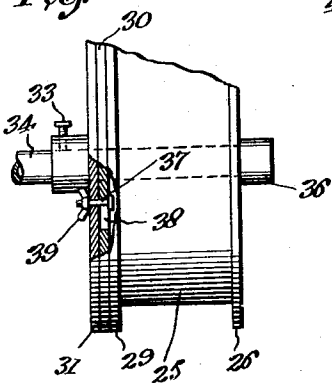
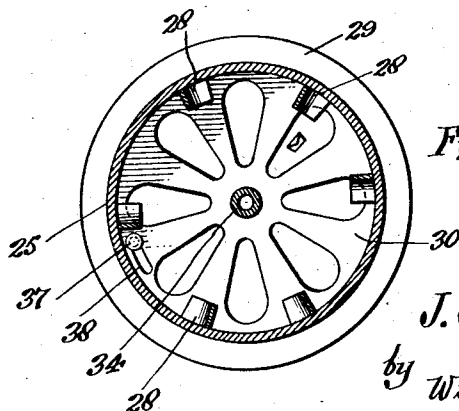


Fig. 4.



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UNITED STATES PATENT OFFICE.

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FURNACE FRONT.

Application filed March 21, 1927. Serial No. 177,181.

The present invention relates to furnace fronts, and more particularly to a construction of furnace front for oil burning furnaces.

5 An object of the present invention is to provide a furnace front containing brickwork and which so supports the brickwork and adjacent parts that an increased space is provided within the furnace and the rivets
10 and plates at the forward end of the furnace are protected from cold air and a larger amount of admixture of gas and air is provided in the combustion chamber of the furnace.

15 Another object of the invention is to provide a furnace front of this character by the use of which the natural draft of air through the furnace front may be completely controlled, and wherein the draft of air
20 is given a circumferential or spiral flow through the flame, so as to meet variable draft conditions through the furnace.

The invention further aims at the provision of a furnace front constructed of a
25 number of parts which are interchangeable, so that the parts may be easily removed or substituted in case of breakage in handling and wherein the parts are of simple construction which may be readily cast or
30 otherwise constructed; and wherein the same may be economically produced.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended
35 hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views,

40 Figure 1 is a front elevation partly broken away, of a furnace front constructed according to the present invention, the oil feeding pipe of the burner shown in section on the line 1—1 in Figure 2;

45 Figure 2 is a vertical longitudinal section taken centrally through the same, as applied to one form of boiler;

Figure 3 is a transverse section taken on the line 3—3 through Figure 2, showing the brickwork of the furnace front and the supporting structure for the same;

50 Figure 4 is a transverse section taken on the line 4—4 of Figure 2, showing the air regulating and feeding cylinder through which the burner tube projects; and

Figure 5 is a side elevation of the air feeding device, showing the means for securing the air controlling shutter in adjusted position.

Referring to the drawings, 10 designates 60 a boiler of any approved form, and which has an outer shell or casing 11 joined to the inner or main section 10 of the boiler by a front ring 12 of plate form fitted to the outer shell 11, and secured by studs 13 to a
65 flange 14 turned outwardly from the forward end of the inner shell of the boiler.

The furnace front of this invention is adapted to be mounted in front of the ring plate 12, and over the open end of the boiler
70 10. The furnace front comprises an outer ring 15 made in sections, as shown particularly in Figures 1 and 3. The sections of the ring 15 are shown as four in number, and are preferably identical, so that they
75 may be interchanged with one another and with other sections without requiring specially constructed sections for each portion of the ring. The ring 15 is provided with an attaching flange 16 at its inner end
80 adapted for contact with the flange 14 of the boiler 10 and provided with elongated slots 17 adapted to receive the studs 13 there-through, the slots 17 admitting of adjustment of the flange 16 against the boiler 10
85 and to take up inequalities in the circumferential spacing of the studs 13. The sections of the outer ring 15 are provided with abutting transverse flanges 18, disposed upon the opposite ends of the ring sections, and adapted to be clamped together by bolts
90 19 or the like, to complete the outer ring 15.

The outer ring 15 carries therein a wall 20 built up of brick, and which is reinforced at the central portion of the wall 20 by an inner
95 ring 21 of cast metal or the like. The ring 21 is slightly longer than the outer ring 15, and provides the central air and fuel passage through the furnace front. The ring 21 is preferably thickened or reinforced intermediate its ends, as shown in Figure 2, and the reinforcement is of such construction that the interior wall of the ring 21 flares at opposite ends and is constricted intermediate the ends of the ring. The wall 20 of
100 brick completely fills the space between the two rings 15 and 21 and is adapted to close the front of the furnace or boiler 10. A front plate 22 of ring form fits about the outer end of the inner ring 21, and lies
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against the outer face of the brick wall 20. The front plate 22 is secured by bolts 23 to inwardly extending lugs 24, which are carried upon the outer ring 15, the brick wall 20, being recessed or cut away to accommodate the lugs 24, and the inner ends of the bolts 23.

The front plate 22 is utilized for not only closing in the brick wall 20, but also for supporting an air cylinder or drum 25, which may be in the form of a casting provided at its inner end with an outwardly extending flange 26, secured by bolts 27 against the inner marginal portion of the front plate 22. The cylinder or drum 25 is provided with integrally cast spiral ribs 28 on its inner side adapted to impart a spiral or whirling motion to a draft of air which flows longitudinally through the cylinder or drum 25. The outer end of the drum 25 is provided with an outwardly extending flange 29, against which abuts a radially slotted shutter 30, and which in turn, is engaged by a second radially slotted plate 31, having a hub 32 which is secured by a set screw 33, or the like, upon an axially extending burner tube 34. The tube 34 has a controlling valve 35 and is suitably supported coaxially within the drum 25 and the inner ring 21. The tube 34 is provided with a suitable burner nozzle 36 upon its inner end, which is disposed preferably within the outer end of the ring 21. The shutter 30 and the plate 31 are relatively movable about the burner tube 34, as an axis, in order to bring the slots in the respective shutter and plate more or less into register, so as to admit the desired volume of air into the drum 25. When the shutter and plate are brought to the desired adjustment, such adjustment may be maintained by a clamping bolt 37 carried by the plate 31, and engaging in a slot 38 in the shutter 30. A winged nut 39 is carried by the bolt 37 at preferably the outer side of the structure, so that easy access may be had to the nut 39 for clamping the members in position as soon as the desired adjustment is obtained.

A furnace front as constructed above delivers to the full fire box area the heating gases of such intensity that steam generating properties of the furnace are immensely improved as compared with the other types of burner equipment. The assemblage and installation of this furnace front are simplified such that they can be readily removed, and replacement of parts may be quickly made so as to effect quick repairs, particularly important in marine work. This improved furnace front maintains the maximum steam pressure constantly during steaming period and provides efficiency in oil burners. When certain furnaces, in operation, are not required for any particular period, these furnace fronts may be closed

tightly to prohibit any cold air drafts to enter through or about the furnace front, so that the heat is retained and there is thus eliminated any undue strains and a considerable reduction in repair maintenance. The improved furnace front prevents rapid cooling of the highly heated areas, because of the presence of the extensive brick wall 20. This refractory material confines the heat and prevents its dissipation through the front wall. The retainer rings 15 and 21, which are of metal, are susceptible to receiving a high heat. The heated condition of these parts also tends to maintain the heated condition of the furnace and boiler and to consequently make them have an increased furnace and boiler efficiency.

When the shutter 30 and plate 31 are adjusted with their openings more or less in register, a natural draft of air is permitted to flow through the drum 25 and the blades or fins 28 impart a spiral or whirling motion to the air, as it passes through the drum 25, and into the inner ring 21. The air stream is reflected or converged into the gaseous spray delivered from the burner head 36, and is caused to thoroughly intermingle therewith not only by virtue of the deflection of the air into the spray, but also by virtue of the spiral or whirling motion imparted to the air stream, so that a thorough admixed mass of air and gas is delivered into the combustion chamber of the boiler 10. By merely releasing the winged nut 39, the register 30 and plate 31 may be relatively moved so as to close the openings into the drum 25. Such adjustment closes off all drafts through the furnace front, so that the sudden cooling of the heated surface areas within the furnace front and boiler 10 is prevented.

It will be obvious that many changes in the construction, combination and arrangement of parts could be made, which could be used without departing from the spirit of my invention, and I do not mean to limit the invention to such details, except as particularly pointed out in the claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:—

1. In combination with a boiler shell, a furnace front comprising a front wall of refractory material having a central opening, a metallic ring extending about the refractory wall, means to secure said ring to the boiler shell, an inner metallic ring mounted in the opening of the refractory front wall and projecting outwardly of the wall, a front plate attached removably to said outer ring and having a central opening received over the outer projecting end of the inner ring, a drum forming an extension of the opening through the inner ring and attached to said front plate, an air register

carried by the outer portion of the drum and a nozzle projecting through the drum.

2. In combination with a boiler shell, a furnace front comprising a brick wall having a central opening, an outer metallic sectional ring extending about said brick wall and having a flange extending against the boiler shell and connected thereto, means for removably securing the sections of the outer ring together, said outer ring having inwardly extending lugs, an inner ring lying in the central opening of the brick wall and extending outwardly of the brick wall, a

front metallic plate placed against the brick wall and extending over said lugs and secured thereto, the said front plate having a central opening received about the projecting end of the inner ring, a flanged drum forming an extension of the inner ring fitted thereagainst and against said front plate and removably secured to the front plate, an adjustable air register at the outer portion of the drum, spiral vanes in the drum, and a nozzle projecting through the drum and into the inner ring.

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