

Sept. 24, 1935.

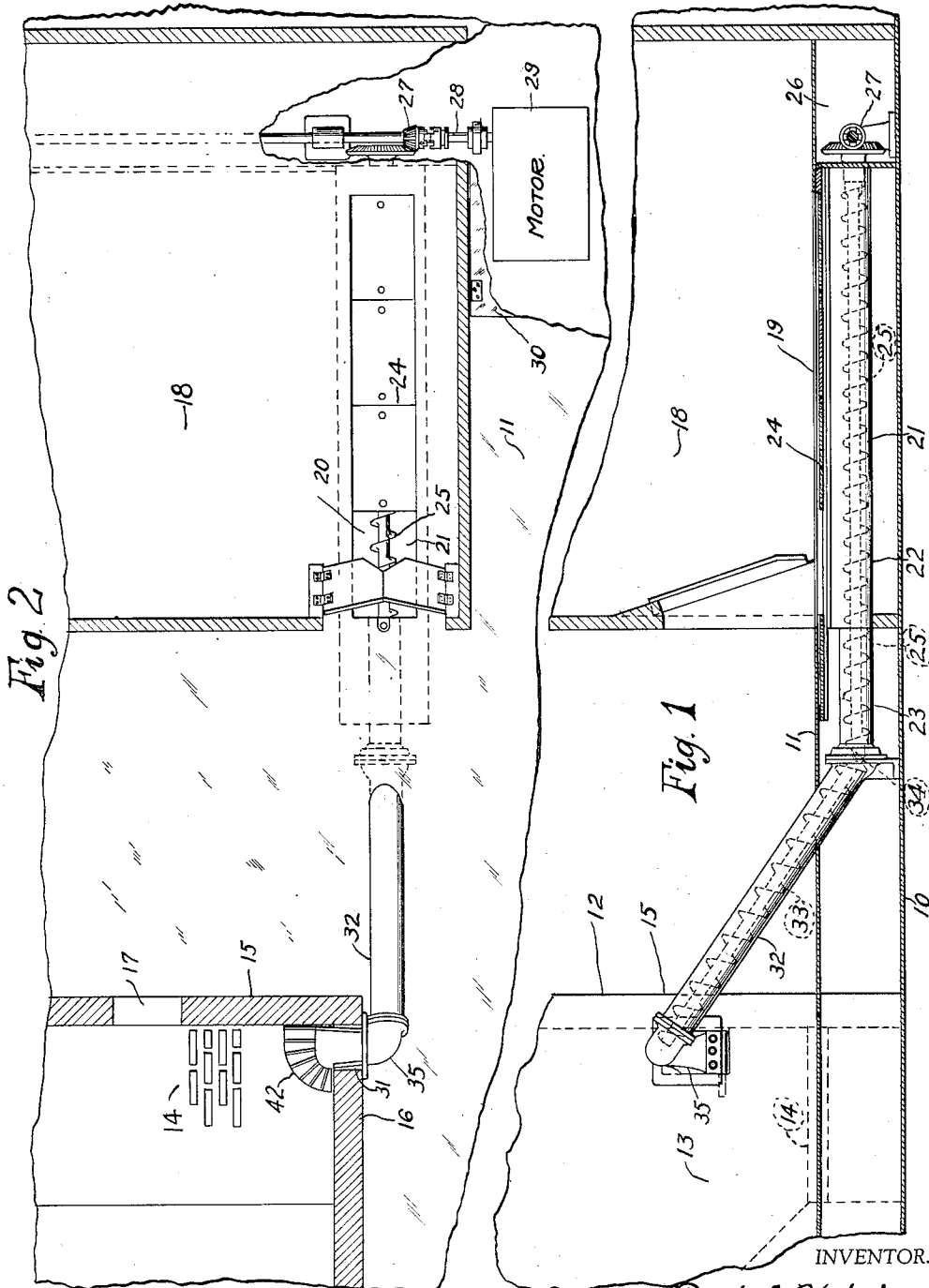
P. A. KETCHPEL

2,015,526

STOKER

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3 Sheets-Sheet 1



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Fig. 5

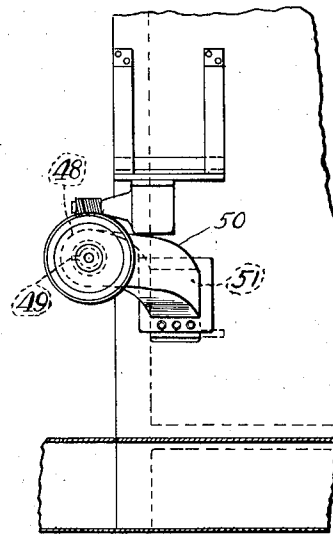
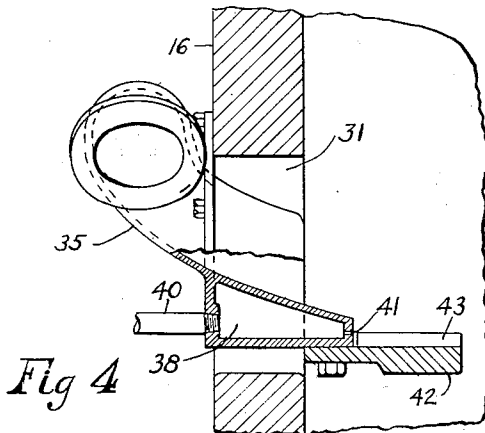
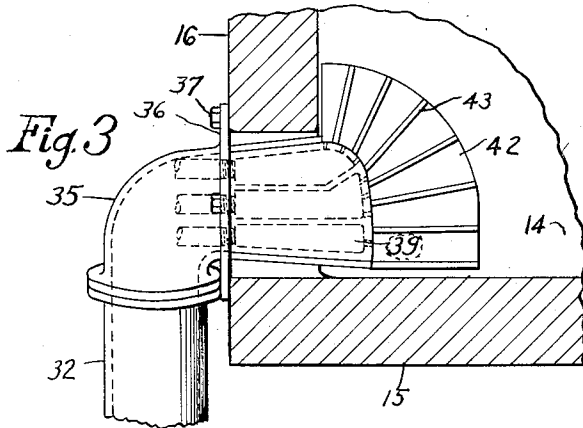
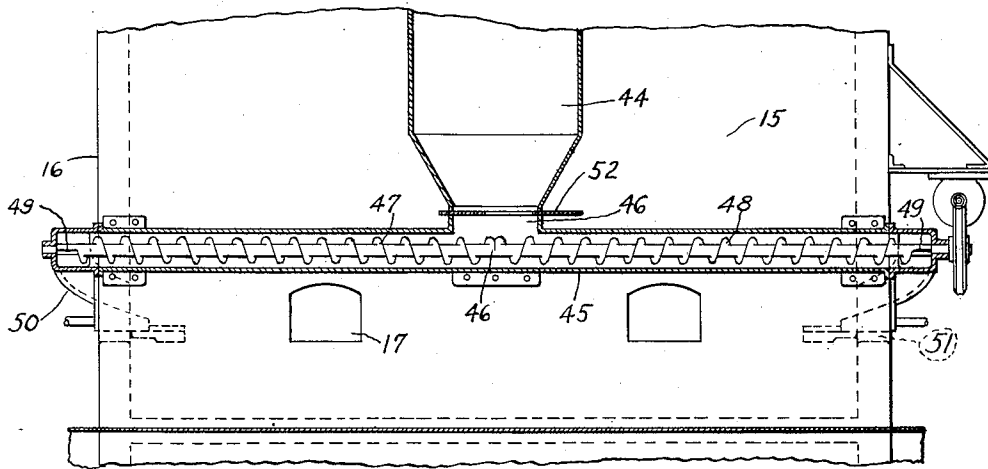


Fig. 6

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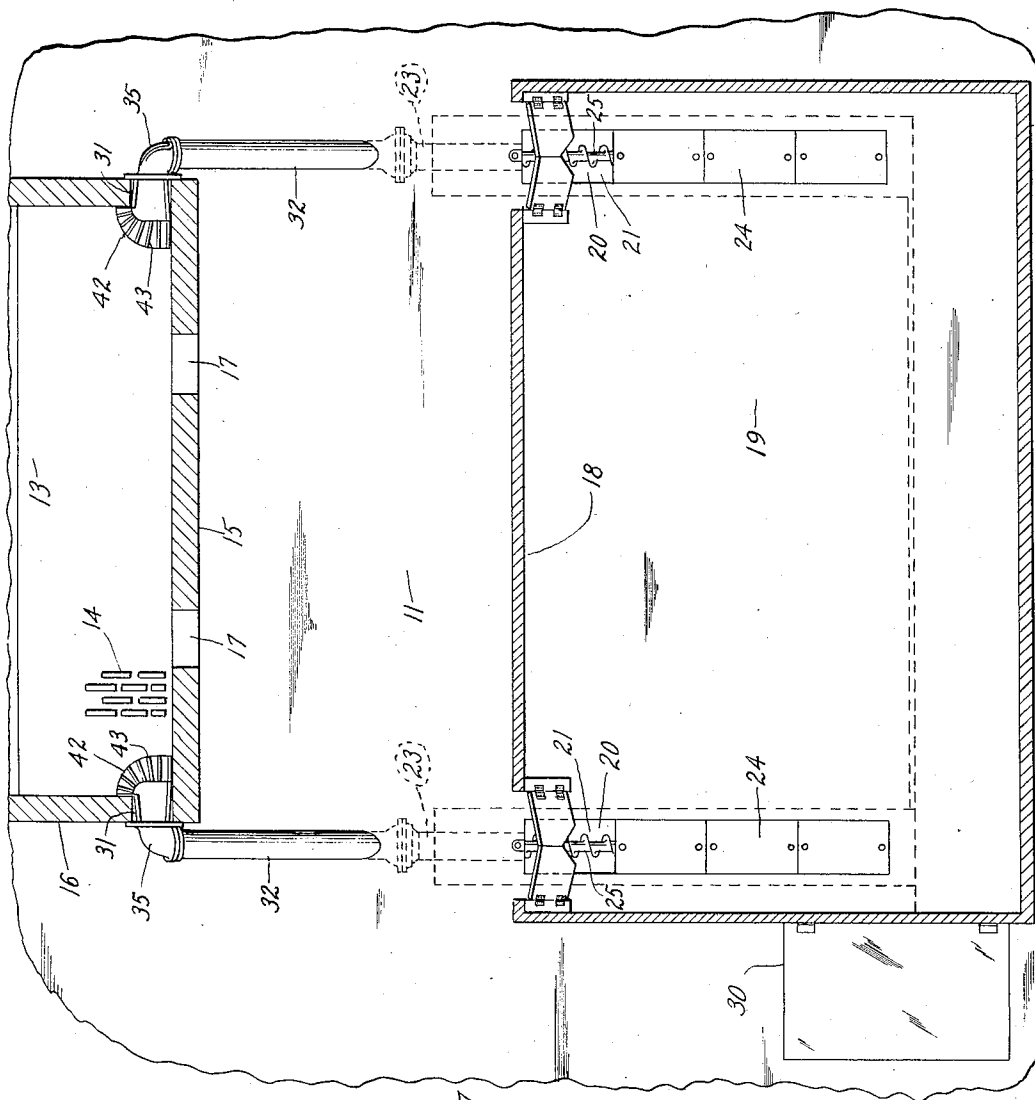


Fig. 7

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STOKER

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a corporation of Delaware

Application November 2, 1931, Serial No. 572,610

4 Claims. (Cl. 110-101)

This invention relates to improved stoking mechanism for firing furnaces, particularly furnaces of the type in which the firebox grate is comparatively wide with respect to the depth thereof, and more particularly to stoking mechanism for firing furnaces of marine boilers.

In marine service it is common practice to use furnaces of the type having comparatively wide but short firebox grates. Furnaces of this type are provided with a number of openings spaced apart along the front, through which fuel is delivered to the firebox. In manual firing of such furnaces it is impossible to maintain an even distribution of fuel over the fire since it is physically impossible for the fireman to fire through the several openings simultaneously. In manual firing it is the practice to cover the live fire with a large excess of green coal and when it has burned through add another large excess of green coal. There is as a result a great fluctuation in boiler pressure and a large loss of efficiency. Repeated opening of the firebox door for hand firing furthermore admits an excess supply of cold air over the fire with consequent decrease in efficiency of fuel combustion.

Furnaces of the type described are extremely difficult to fire by mechanical means and it is an object of this invention to provide a simple and efficient mechanical stoking arrangement which will maintain an even and continuous distribution of fuel over the entire firebox.

It is a further object of this invention to provide a mechanical stoking arrangement, in furnaces of the type described, which will permit efficient delivery of fuel thereto without interfering with the hand firing and the inspection, cleaning and repair of the boiler and furnace.

Other and further objects and advantages of the invention will be apparent from the description when viewed in the light of the accompanying drawings, in which

Fig. 1 is a side elevation of the invention as applied in a marine installation with portions of the fuel bunker and furnace room shown in section;

Fig. 2 is a partly diagrammatic fragmentary plan view showing the invention as applied on the left side of the furnace and fuel bunker with portions of the fuel bunker and furnace room shown in section;

Fig. 3 is a detail view of the fuel distributing arrangement of Figures 1 and 2;

Fig. 4 is a detail view of an elbow for delivering fuel to the furnace;

Fig. 5 is a modified form of the stoking arrangement;

Fig. 6 is a detail view of the fuel delivery elbow of the modification shown in Fig. 5, and

Fig. 7 is a plan view of the structure shown in Fig. 1.

The preferred form of the invention, illustrated in Figures 1 to 4 inclusive, will be described as applied in a marine installation, though it will be obvious that the invention is also applicable in other furnace installations.

The bottom wall of the hull of a vessel is shown at 10, and the deck of the furnace room at 11. The furnace is designated generally by the numeral 12 and comprises the firebox 13, grates 14, front wall 15 and sidewalls 16. Spaced at intervals along the front wall 15 of the furnace are the usual hand firing openings 17, the number depending on the width of the furnace.

The fuel bin is shown at 18 and is provided with the floor 19 constituting a continuation of the deck 11. The floor 19 is provided on each side with a longitudinal opening 20. Located between the fuel bin floor 19 and the bottom wall 10 of the vessel and communicating with the fuel bin 18 through the opening 20 is the open mouth trough member 21, forming the rearward portion of the fuel transfer conduit 22. The forward portion of the fuel transfer conduit 22 is formed by the tubular conduit section 23, constituting an extension of the trough member 21. Slide plates 24 are slidably mounted in the marginal edges of the floor 19 bordering the opening 20, so that they may be moved to uncover or cover the opening 20 in a manner to control the delivery of fuel to the trough member 21.

Conveyor screw 25 is mounted in the transfer conduit 22 for advancing fuel forwardly there-through. Rearward of the trough member 21 and extending transversely beneath the fuel bin floor 19 is formed the compartment 26. Housed within the compartment 26 is the gearing 27 and drive shaft 28 for operating the conveyor screw 25. The drive shaft 28 is operated by the motor 29, mounted at one side of the fuel bin and beneath the deck 11. Access to the motor 29 and the compartment 26 may conveniently be had through the door 30 in the deck 11.

The furnace 12 is provided with the opening 31 through the sidewall 16 adjacent the front wall 15, at a suitable height above the level of the grates 14 for scattering fuel in aerial paths there-over. Riser conduit 32 extends upwardly and

forwardly from the forward end of the transfer conduit 22 and communicates at its upper end with the opening 31. Conveyor screw 33 mounted in the riser conduit 32 is universally
5 connected with the transfer conveyor screw 25, as at 34, and delivers fuel to the opening 31.

The upper end of the riser conduit 32 terminates in the inwardly and downwardly curving elbow 35. The elbow 35 is provided with the
10 flange 36 for attachment to the marginal edges of the furnace wall bordering the opening 31, by suitable means, as bolts 37. Formed with the elbow 35 adjacent the bottom of its delivery end is the chamber 38. The chamber 38 is divided
15 into any desirable number of compartments 39, and pressure fluid is delivered to the compartments 39 from a suitable source, as from the boiler, through the pipes 40. The pipes 40 connecting with the compartments 39 may be controlled by valves. Pressure fluid is emitted from
20 the compartments 39 through any suitable number of jet openings 41. A quadrant shaped distributor plate 42 extends forwardly from the lower forward end of the elbow 35, and carries
25 diverging ribs 43 on its upper surface for spreading the fuel over the firebed.

The invention has been described with reference to that portion of the fuel bin and furnace to one side of its longitudinal center line, but
30 it will be understood that the other side is similarly equipped with fuel conveying and distributing means so that the stoking arrangement on the one side of the furnace and fuel bin is the exact counterpart of the stoking arrangement on
35 the other side thereof.

By admitting fuel to and distributing it from the corners of the firebox, a more complete utilization of the effective grate area is obtained. The corners of the firebox are never as effective
40 heat producing areas as the other parts of the firebox since they are difficult to fire properly; therefore by utilizing these less effective heat producing areas to accommodate means for introducing the fuel into the firebox, the more effective
45 parts of the firebox area may be maintained unobstructed by fuel delivery and distributing mechanism. With the present improved arrangement for delivering fuel to furnaces of the type described, the amount of coal
50 particles and cinders carried into the flue is minimized, since the greatest part of the fuel is projected at an angular direction with respect to the direction of the draft.

Each of the conveying and distributing systems
55 delivers fuel to and scatters it uniformly over a half of the grate area. By delivering the fuel through the sides of the furnace in the direction of its longest dimension, it is possible to uniformly distribute fuel over the grate with a minimum
60 number of delivery points.

In Figures 5 and 6 is illustrated a modified form of the invention in which fuel is delivered from a bin (not shown) to a hopper 44 located at the front of the furnace midway between the side-
65 walls 16. A tubular conveyor conduit 45 extends horizontally along the front wall 15 of the furnace and is provided with an opening communicating with the bottom of the hopper 44. A screw conveyor 46 is rotatably mounted in the
70 conduit 45 and is provided with the oppositely inclined flights 47 and 48. The flight 47 is arranged to convey fuel to the left side of the furnace and the flight 48 is arranged to convey fuel to the right side of the furnace. The screw
75 flights 47 and 48 are provided at their opposite

ends with the blade-like ends 49 for pushing the fuel at right angles to the direction of the conduit. The conduit 45 terminates at each end in a downwardly and inwardly curving elbow 50
5 arranged to deliver fuel to the furnace through the openings 51 in the sidewalls of the furnace adjacent the front wall 15. A slide gate 52 at the bottom of the hopper 44 is provided so that the amount of fuel delivered to the conduit 45
10 may be conveniently regulated and controlled to deliver more or less fuel to one side than the other. In operation fuel is delivered to the conduit 45 from the hopper 44 and is conveyed to the
15 elbows 50 by the screw conveyor 46. It passes through the elbows 50 into the firebox 13 and is scattered over the fire in the same manner as described in the preferred form of the invention.

I claim:

1. In combination with a furnace having a front wall, sidewalls and a grate surface of 20 greater width than depth, a fuel bunker, a single fuel admission opening in each of said sidewalls adjacent said furnace front wall, a pair of fuel transfer conduits at opposite sides beneath and communicating with the fuel bunker, a pair of
25 riser conduits extending upwardly and forwardly from the forward ends of said transfer conduits to points adjacent the tops of said openings, each of said riser conduits terminating in a downwardly and inwardly curving elbow, each of said el-
30 bows extending into a respective opening, a screw in each of said transfer conduits advancing fuel to said riser conduits, a screw in each of said riser conduits for elevating fuel to said elbows, and a fuel distributing plate arranged at each of
35 said openings to receive the fuel dropped by gravity through said elbows.

2. In combination with a furnace having a front wall, sidewalls, a firebox and a grate surface of greater width than depth, a fuel bunker,
40 a single fuel admission opening in each of said sidewalls adjacent said furnace front wall a sufficient distance above the level of the grate to permit scattering fuel in aerial paths thereover, means for delivering fuel from said bunker
45 to said openings including a pair of transfer conveyors receiving fuel from the bunker and extending forwardly therefrom, a pair of elevating conveyors extending upwardly and forwardly from said transfer conveyors to the upper
50 portion of said openings, each of said elevating conveyors terminating at its upper end in a downwardly and inwardly curving elbow, each of said elbows extending into a respective opening, and a quadrant shaped
55 distributor plate in each of the front corners of said firebox at the delivery end of each elbow.

3. In combination with a furnace having sidewalls, a front wall and a grate surface of greater width than depth, a source of fuel supply, a
60 single fuel admission opening in each of said sidewalls adjacent said front wall, mechanical means for conveying fuel from the source of supply to said openings, said means including a pair of conveying elements, each receiving fuel from
65 the source of supply and delivering toward its respective opening in a sidewall, downwardly and inwardly curving elbows each receiving fuel from the discharge end of its respective conveying element and delivering to its respective open-
70 ing, and a fuel distributing member at each of said openings receiving fuel from its respective elbow and scattering the fuel over the firebed, each distributor member including a chamber
75 formed beneath the bottom wall of the down-

wardly and inwardly curved elbow, a pressure fluid lead communicating with such chamber, and a wall at the delivery end of said elbow provided with jet openings leading from said chamber and
5 arranged to issue blasts of pressure fluid over the firebed.

4. In combination with a furnace having side walls, a front wall and a grate surface of greater width than depth, a source of fuel supply, a single
10 fuel admission opening in each of said side walls adjacent said front wall, mechanical means extending across said front wall for conveying fuel from the source of supply to said openings, said means including a pair of conveying elements,
15 each receiving fuel from the source of supply and delivering toward its respective opening in a side

wall, downwardly and inwardly curving elbows each receiving fuel from the discharge end of its respective conveying element and delivering to its respective opening, and a fuel distributing member at each of said openings receiving fuel
5 from its respective elbow and scattering the fuel over the firebed, each distributor member including a chamber formed beneath the bottom wall of the downwardly and inwardly curved elbow, a pressure fluid lead communicating with such
10 chamber, and a wall at the delivery end of said elbow provided with jet openings leading from said chamber and arranged to issue blasts of pressure fluid over the firebed.

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