March 3, 1959 F. FALLA 2,875,735

COMBINED COMBUSTION APPARATUS FOR BAGASSE AND VAPOR GENERATOR

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Fig. 1

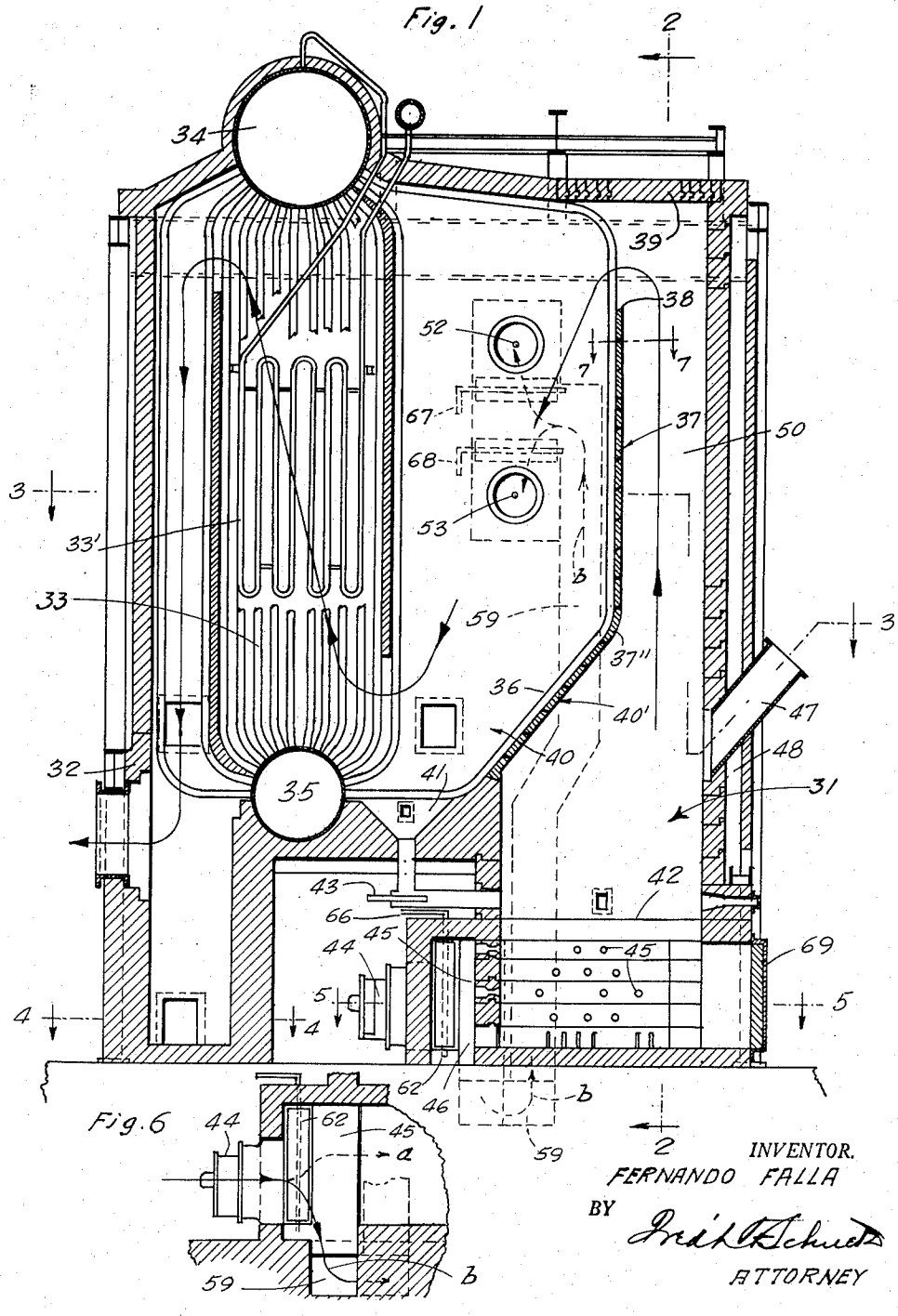


Fig. 6

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Fig. 2

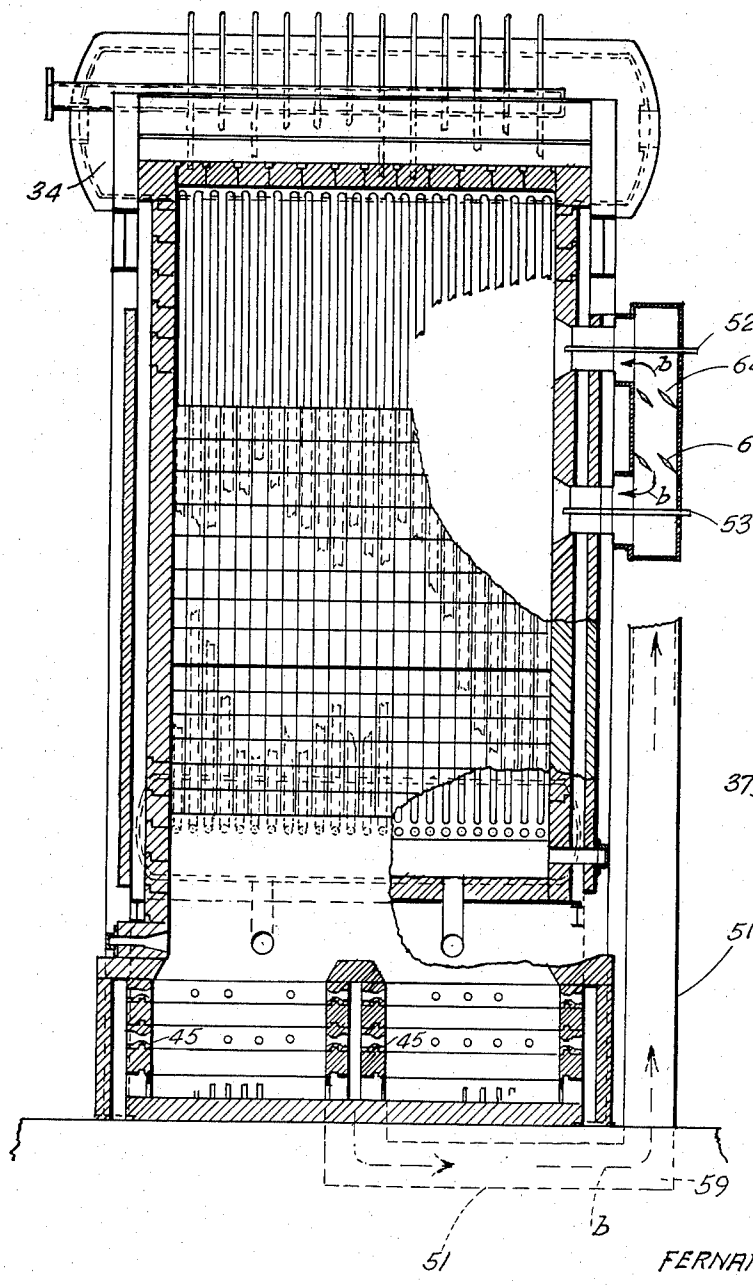


Fig. 7

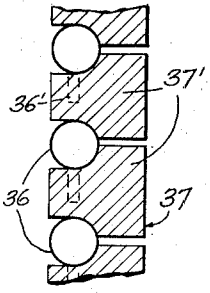
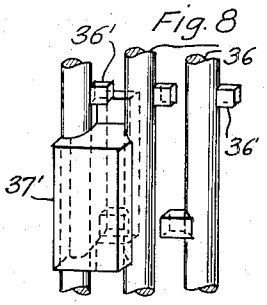


Fig. 8



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Fig. 4

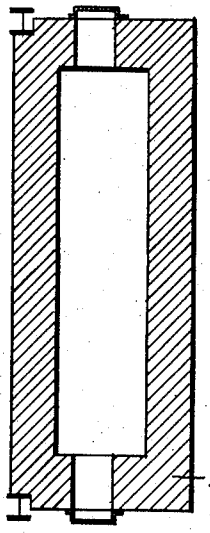


Fig. 5

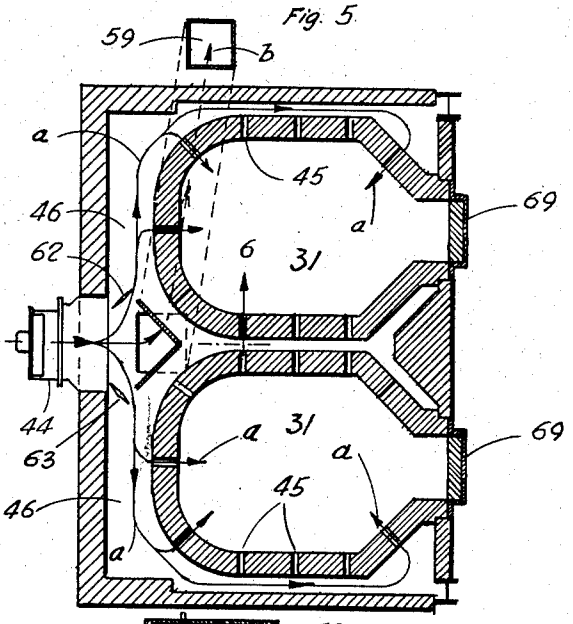
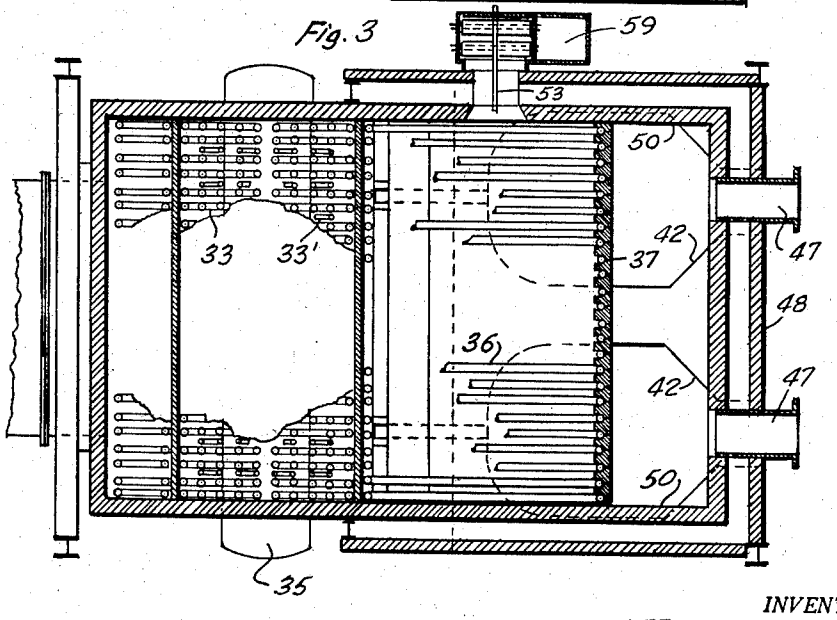


Fig. 3



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2,875,735

COMBINED COMBUSTION APPARATUS FOR BAGASSE AND VAPOR GENERATOR

Fernando Falla, Millburn, N. J.

Application May 25, 1955, Serial No. 511,021

3 Claims. (Cl. 122—2)

The invention relates to the type of combustion apparatus having one unit suitable for the burning of bagasse and another unit for burning fuels such as oil, natural gas, etc., and particularly to furnace apparatus which embodies a vapor generator section. While broadly such combination of units of the aforesaid nature associated with a steam boiler unit is known, it is an object of my invention to provide a simplified design thereof, more especially by embodying therein a novel combined water tube and refractory wall arrangement which is common to both units and by which not only is the total extent of wall construction materially decreased but, as well, the depth of the entire installation.

A further object of the invention is so to construct said common wall that one face thereof will serve to deflect the thermal radiations back to the hearth to enhance combustion of the bagasse; and to afford by its opposite face an inclined wall surface of a hopper-like compartment which receives and collects unburned material (bagacillo) carried over by the high velocity combustion gases from the bagasse-burning unit.

A still further object of the invention is to associate with the hopper-like compartment a steam-aspirated system for returning such "bagacillo" to the bagasse furnace above the hearth thereof.

Still another object of the invention is to provide for a source of combustion air common to both units.

The invention has for an object, also, to provide a novel arrangement of restricted, elongated throat section above the hearth of the bagasse furnace, into which the raw bagasse is discharged, said section being provided with an upper outlet opening for delivery of the combustion gases to the associated boiler section.

The nature of the invention, however, will best be understood when described in connection with the accompanying drawings, in which:

Fig. 1 is a longitudinal section through the novel combustion apparatus.

Fig. 2 is a transverse section, taken on the line 2—2, Fig. 1 of the drawings, looking in the direction of the arrows, and with portions broken away.

Fig. 3 is a horizontal section taken on the line 3—3, Fig. 1 of the drawings, looking in the direction of the arrows, and with portions broken away.

Figs. 4 and 5 are horizontal sections, taken respectively on the lines 4—4 and 5—5, Fig. 1 of the drawings, and looking in the direction of the arrows.

Fig. 6 is a fragmentary horizontal section, on an enlarged scale, taken on the line 6—6, Fig. 5 of the drawings, and looking in the direction of the arrows.

Fig. 7 is a fragmentary horizontal section, on an enlarged scale, and taken on the line 7—7, Fig. 1 of the drawings.

Fig. 8 is a fragmentary view, in isometric projection, illustrating the manner of attaching refractory wall blocks to vapor-generating tubes.

Referring to the drawings, more particularly to Fig. 1

wherein there is disclosed a combined bagasse furnace 31 and a boiler setting 32 of a water tube boiler unit comprising the bank of vapor-generating tubes 33 which may include a superheater set 33' and upper and lower horizontal drums 34, 35, respectively, all of which is of well known construction. The unit is of conventional design except that an outer row 36 of the bank of tubes 33 is displaced somewhat laterally from the main body and partly encased with refractory material of a refractory wall structure 37, as is shown in detail in Fig. 7. This structure then constitutes the inner wall of the bagasse-burning furnace 31; and the blocks 37' thereof are secured to and carried by the tubes 36 through lugs 36' projecting from said tubes.

One refractory face is thus mounted against the cooler tubes and the other face is exposed to radiation from the combustion within and to the waste gases of said furnace 31 which is thereby maintained at maximum temperature. Over the opposite face the boiler tubes 36 remain exposed, in being but partly encased as is indicated more clearly in Fig. 7.

Furthermore, in accordance with the invention, provision is made to carry over the hot gases from the bagasse furnace into the generator section to heat said bank of tubes 33, as through the provision of an opening 38, for example, formed by not continuing the wall structure 37 to the top 39 of the generator unit, the flow being indicated by the arrows. These waste gases then serve in their travel through said boiler unit to generate the vapor.

Moreover, wall structure 37 at its lower end 37'' is inclined with the tubes inwardly of the generator unit to form substantially the bottom 40 thereof as a hopper wall. This wall is thus designed to guide partly burned or unburned material (bagacillo) to a collector 41 from which it may be returned over the hearth 42 of the bagasse furnace, as by steam-jet means 43, all of which is well understood in the art. Air for combustion of the bagasse is delivered in conventional manner from a blower 44 through tuyeres 45 communicating with a plenum air chamber 46, connected with the said blower.

It will be observed that in thus inclining the outer tube row to afford a support for the lower end 37'' of the shield wall 37 and at a like angle, a convenient and very satisfactory structural arrangement is afforded whereby there is defined not only the contour of the upper bagasse furnace throat structure and radiation reflecting surface 40, but as well the contouring of a lower portion 37'' of the boiler to a hopper-like section merging with the collector 40.

Bagasse is fed into the furnace and over the hearth 42 in the conventional manner through a chute 47 passing through the front wall structure 48 which is parallel to the upper portion of the shield wall structure 37 and constitutes the front of the apparatus. Side walls 50 complete the throat section for the bagasse furnace, as well as the boiler enclosure, said throat section flaring at the portion 40' toward the lower end and serving thereby to reflect back to the hearth thermal radiations, thus enhancing combustion of the bagasse.

Provision is made to deliver combustion air, flowing in the direction of arrows *a*, Fig. 5, as from the blower 44, to the bagasse furnace 31. This is effected through a plenum chamber 46 about said furnace and from then on through tuyeres 45 discharging below the hearth 42. However, there is another connection with said plenum chamber, for example, at the bottom thereof, where a duct 59 is provided. This extends upwardly at the side of the boiler unit—the air flow being indicated by the arrow *b*. The discharge of the duct, which branches at its entry to the boiler unit, is coaxial with liquid fuel

nozzles 52, 53, respectively, entering said ducts as is indicated in Figs. 1 and 2, for combustion of the fuel in the conventional manner.

I claim:

1. A bagasse-fired steam generator unit, comprising a rectangular setting enclosure of refractory front, rear and side vertical walls and a roof structure; a steam generator comprising two horizontal, parallel boiler drums disposed within the housing, one above the other, the bottom drum constituting a water drum and the upper one a steam drum; and substantially vertically disposed steam generating tubes interconnecting said drums; a bagasse burning furnace within the setting adjacent the steam generator, comprising a bottom hearth and formed in part by the said roof structure, the vertical side walls and the front wall, and by a rear wall of refractory material extending upwardly from the hearth to a short distance below said roof structure to afford an upper outlet from the bagasse burning furnace to the steam generator; further steam generating tubes laterally displaced toward the bagasse furnace rear wall and integrated therewith over its outer surface; and means for delivering heat to the space between the vertically disposed steam generating tubes and the laterally displaced steam generating tubes.

2. A bagasse-fired steam generator according to claim 1, wherein said means for delivering heat comprises burners projecting from the side walls into the space between the vertically disposed steam generating tubes and the laterally displaced steam generating tubes.

3. A bagasse-fired steam generator according to claim 1, wherein the lowermost portions of the laterally displaced steam generating tubes and associated refractory material are shaped in hopper-like form and are provided with bottom outlet for solids accumulated therein carried over with the combustion gases from the bagasse furnace; and means are provided at the bottom outlet for reinjecting unburned solids into the furnace hearth.

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