March 10, 1936. W. N. NICHOLLS ET AL 2,033,534

FUEL ECONOMIZER

Filed April 5, 1934

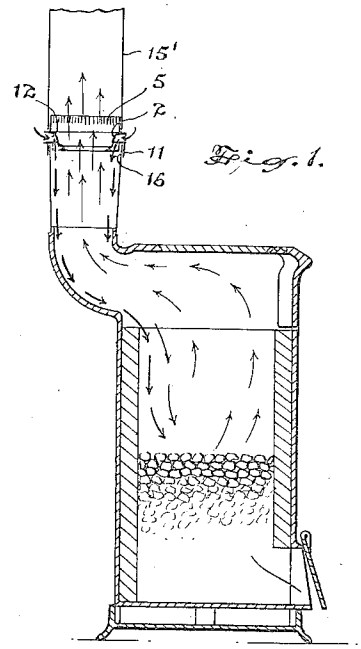


Fig. 1.

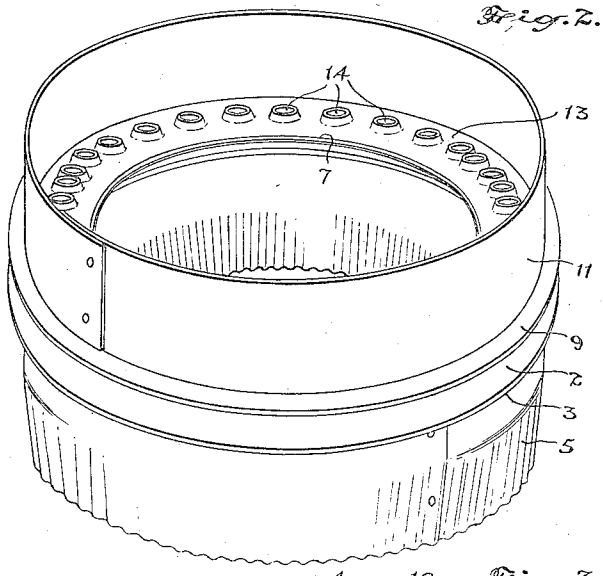


Fig. 2.

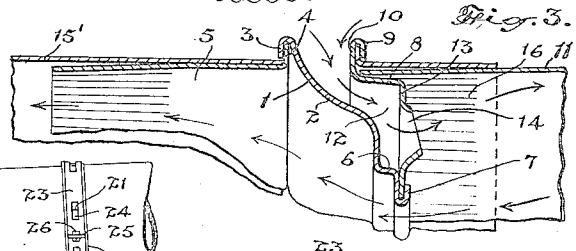


Fig. 3.

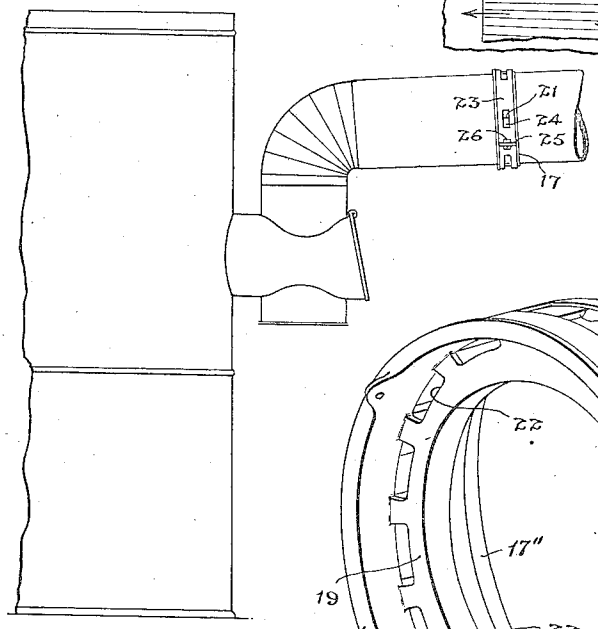


Fig. 5.

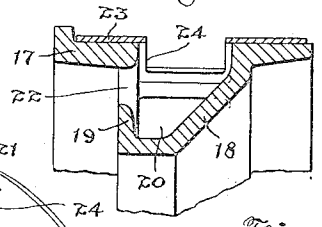


Fig. 6.

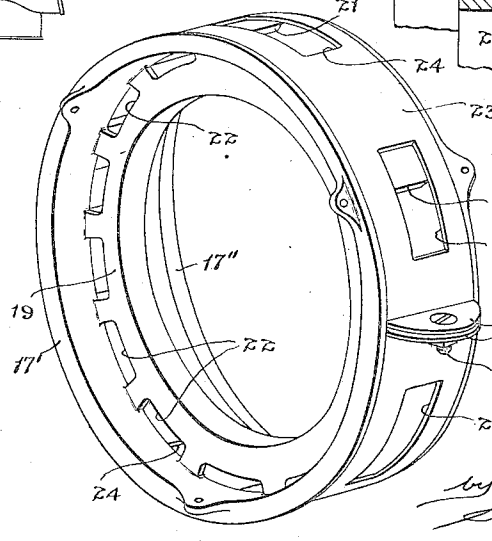


Fig. 4.

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FUEL ECONOMIZER

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6 Claims. (Cl. 110—58)

The principal objects of this invention are to effect a material saving in the consumption of fuel for a desired production of heat and to provide a device of extremely simple construction which may be applied practically instantaneously to the smoke pipe of any stove or furnace without requiring any alteration of the standard equipment.

A further and important object is to provide a device which may be installed without the requirement of special tools or expert workmen and which will be extremely low in cost.

A still further object is to provide a device which operates effectively without adjustment.

The principal feature of the invention consists in the novel construction of a ring member to be inserted into the smoke flue having an annular chamber open to the atmosphere and provided with a plurality of openings adapted to direct a flow of air along the inner wall of the flue toward the fire to be preheated and mix with the combustible gases generated in and arising from the fire to effect their combustion.

In the accompanying drawing, Figure 1 is a vertical sectional view of a small "heater" showing a device constructed in accordance with the present invention installed in the smoke flue and diagrammatically illustrating the flow of air and gases.

Figure 2 is an enlarged perspective view of the device showing the underside of the ring of nozzle openings for directing jets of air inwardly into the flue.

Figure 3 is an enlarged detail sectional view of the "economizer" ring shown in a horizontally arranged flue.

Figure 4 is a perspective view of a modified construction of "economizer" ring particularly designed for use on furnace flues.

Figure 5 is an elevational view of a furnace flue showing the device shown in Figure 4 applied thereto.

Figure 6 is an enlarged sectional detail of the ring shown in Figure 4.

Numerous forms of devices have been proposed which direct air into the flue to mix with the gases flowing therethrough, but the present device differs materially from these both in the volume of air directed inwardly and the manner in which it is directed along the inner wall of the flue toward the fire.

In the construction illustrated in Figures 1, 2 and 3, a ring 1 of sheet metal is formed in cross section with a double curved portion 2 having an inturned flanged edge 3 embracing the out-turned flange 4 of a cylindrical section of pipe 5. The inner portion of the curved ring is formed with an angled shoulder 6 which terminates in a return flange 7.

A sheet metal ring 8 is formed with a return flange 9 on its outer edge which embraces an out-turned flange 10 of a cylindrical pipe section 11. The ring 8 is dished inwardly from the flange 9 and extends substantially at right angles to the pipe section 11 and the inward edge is embraced by the return flange 7 of the ring 1.

The two rings thus secured together form an annular chamber 12 which is open to atmosphere completely around the periphery.

The right angled portion 13 of the ring 8 is formed with a plurality of circular openings 14, the walls of which are preferably sloped outwardly toward the outer pipe section 11 and thus direct streams of air in an angled direction toward the inner wall of the flue.

The pipe section 5 is crimped inwardly at the end remote from the flange 4 to slip into the ordinary flue pipe section 15' and the pipe section 11 is adapted to slip over the crimped end 16 of the adjacent flue pipe section. The normal pipe joint is thus only separated the space necessary for the introduction of the pair of rings which form the annular air chamber, a distance of about one half inch, consequently the device may be assembled into a flue without requiring any cutting.

The flow of gases through the flue creates a vacuum under the perforated ring section 13 and air is drawn into the annular chamber and through the openings 14, the walls of which direct these jets of air along the inner wall of the flue toward the fire. The momentum of this indraught of air carries it toward the fire in an annular sheath between the flue and the central core of outflowing hot gases. This sheath of air is heated by its contact with the flue and the heat of the centre core of burning gases and penetrating practically to the fire surface it mingles with the gases released from the fuel and ensures practically complete combustion thereof thereby preventing the escape of heat generating gases and effecting remarkable economy.

In the form of the invention, illustrated in Figures 4, 5 and 6 a cast metal ring 17 is formed with an inwardly sloping wall 18 and a right angularly arranged wall 19 enclosing an annular air chamber 20. Elongated rectangular openings 21 are formed in the outer cylindrical wall of the ring 17 admitting air to the chamber 20 and narrow elongated openings 22 pierce the wall 19 ad-

jacent to the outer edge, the latter openings directing the inflow of a sheath of air along the inner wall of the flue toward the fire.

The member 17 is here shown formed with flanges 17' and 17'' which are adapted to receive the ends of the flue pipes in a snug fit and a sheet metal ring 23 encircles the ring 17 and is provided with openings 24 corresponding with the openings 21. The ring 23 is formed with outturned flanged ends 25 which are drawn together by a bolt 26. This ring may be adjusted to regulate the size of the openings 21 and the inflow of air so that the amount of air may be regulated to suit the local variable conditions that may exist.

It will be understood from this description that a device such as described will cost very little and it is easily and quickly installed and it produces most remarkable results in a wide range of types and sizes of stoves and furnaces using all grades of oil and solid fuels.

What we claim as our invention is:

1. A fuel economizer comprising a pair of metal rings secured together at their inner peripheries and flaring outwardly forming an annular chamber open at the outer side, and pipe lengths secured to each of said rings at their outer peripheries, one of said rings having perforations spaced therearound, and the other ring being curved toward said perforations to deflect the incoming air in a smooth continuous unbroken flow directly into said perforations whereby the velocity of flow of the air through said perforations is enhanced.

2. A device as claimed in claim 1 in which the perforations present walls which slope outwardly toward the surrounding pipe in angular relation to the axis of the pipe to direct jets of air toward and along the inner wall of the pipe.

3. A device as claimed in claim 1 in which the perforated ring is arranged within the periphery of and between said pipe lengths in substantially right angular relation to the axes thereof and the other ring diverges outwardly therefrom in a curved formation, said rings forming an annular constriction between said respective pipe lengths and said perforated ring being offset to accommodate the diverging portion of the other ring, thereby reducing the maximum overall length of the device.

4. A fuel economizer comprising a section having an annular chamber in its periphery intermediate of its length open at the outer side and holes through one side of the annular chamber, the other side of the annular chamber being imperforate, a pipe length secured to said section adjacent the perforated side and of a size to fit over a flue pipe, and a pipe length secured to said section adjacent the imperforate side and of a size to fit into an adjacent pipe length.

5. A fuel economizer comprising a tubular structure to be arranged in a smoke flue and having a pair of closely spaced annular walls projecting inwardly and connected together at their inner peripheries and forming therebetween a narrow annular air channel open to atmosphere to direct an annular stratum of air inwardly, one of the annular walls being adapted for disposition closest to the zone of combustion and being provided with a circumferential series of openings to project streams of air from said narrow channel into the smoke flue toward the source of combustion.

6. A fuel economizer as claimed in claim 5 in which said circumferential series of openings are disposed with their axes diverging in the direction of the zone of combustion whereby the streams of air emanating therefrom are impinged on and spread out against the wall of the smoke flue to thereby form a thin circumferential air stratum moving toward the fire zone.

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