

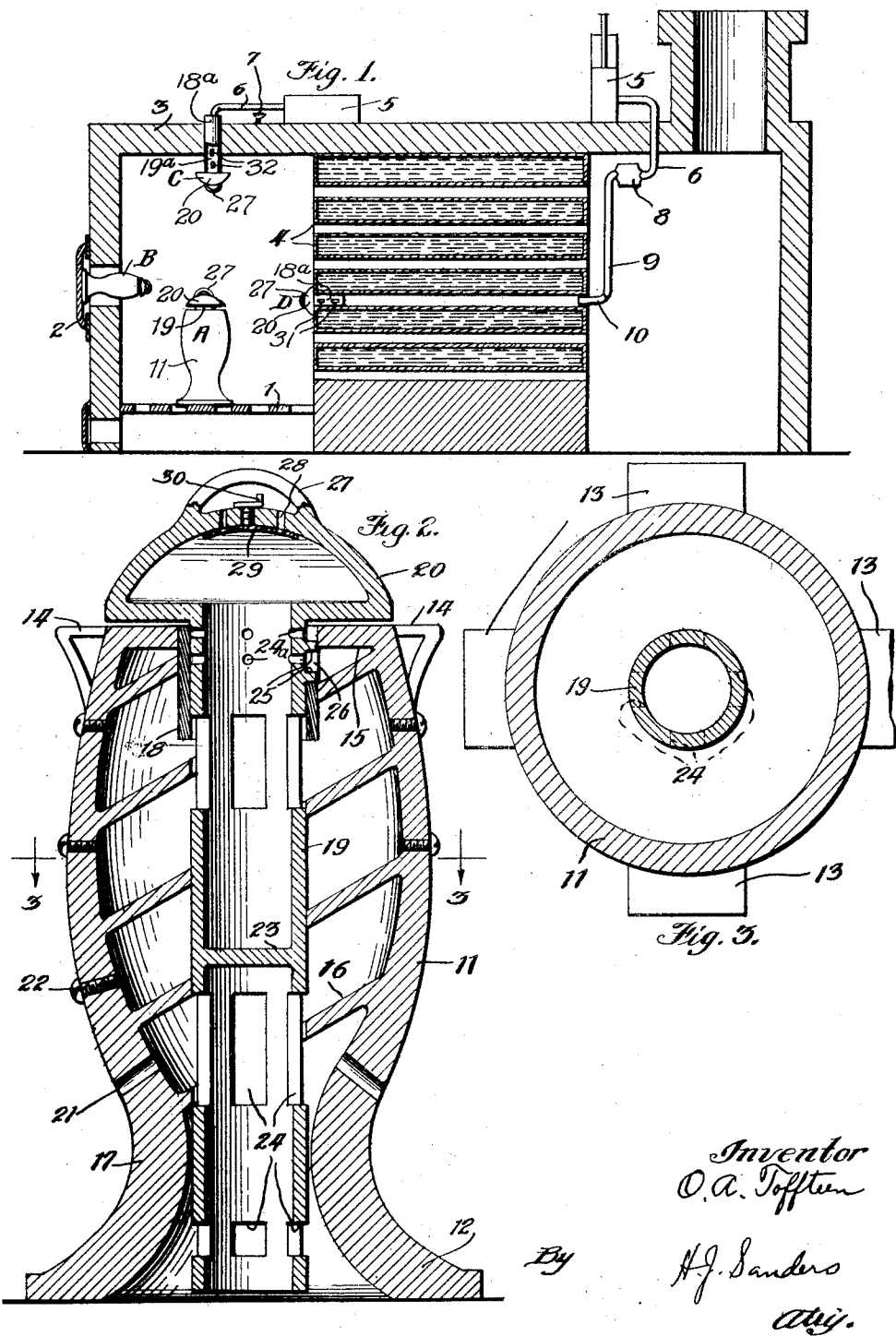
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FUEL SAVING DEVICE

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UNITED STATES PATENT OFFICE.

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FUEL-SAVING DEVICE.

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To all whom it may concern:

Be it known that I, OLOF A. TOFFTEEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Fuel-Saving Devices, of which the following is a specification.

This invention relates to improvements in fuel saving devices for heating plants including hot air furnaces, hand fired stoves, and steam boilers of high and low pressure. Slight modifications of the device are afforded to accommodate it to the particular type of heating medium to which it may be applied. The invention may be applied to the grate, or to the door, or to any of the walls of the fire pot of low pressure boilers or furnaces, or in the flues of high pressure boilers.

The purpose of the device primarily is to effect the introduction of pre-heated air to the fire pot to cause, as nearly as possible, complete combustion of the fuel, thus increasing the efficiency of the heating plant and economizing fuel. The device comprises a manually adjustable element, any adjustment of which may be readily effected while the device is in use. Simplicity in construction, efficiency in operation and cheapness of manufacture are objects attained.

With the foregoing and other objects in view the invention consists in the combination and arrangement of parts to be hereinafter fully described, pointed out in the appended claims and illustrated in the accompanying drawing which forms a part of this application and in which—

Fig. 1 is a longitudinal sectional view through a heating plant illustrating the application of the fuel saving device.

Fig. 2 is an enlarged longitudinal sectional view of the preferred form of the device.

Fig. 3 is a cross section taken on line 3—3 of Fig. 2.

Like reference characters denote corresponding parts throughout the several views.

In Fig. 1 several methods of applying the fuel saving device to a heating plant are illustrated. The type A may be employed when it is desired to arrange the device upon the grate 1; or the type B may be employed should it be desired to apply the device

to the door 2 of the plant; or the type C may be employed should it be desired to apply the device to the top wall 3, or to a side wall, of the plant; or the type D may be employed should it be desired to dispose the device in the flues 4 of the heating plant of a high pressure boiler.

The difference between the several types of the fuel saving devices are only such as tend to facilitate its application to the particular part of the plant selected and one or more types may be employed at one and the same time if desired. When the types C or D are employed air may be forced into the device by means of a pump 5 and air pipes 6, a gas burner 7 or other heating unit serving in the C type to heat the air pipe 6 previous to air entry into the device proper, and in the type D an air reservoir or air tank 8 and coils of pipe 9 are provided in addition to the air pipe 6. The end 10 of the pipe coil 9 is fitted into one of the flues of the high pressure boiler, the fuel saving device D being arranged in the same flue at the opposite end thereof so that the pre-heated air is fed into the device and released therefrom into the fire pot in a manner to be hereinafter fully described.

The types A and B, the latter being of smaller size but otherwise the same throughout, are illustrated in Fig. 2. This device comprises an outer shell or casing 11 preferably in the shape of an ordinary vase or urn, the flared base 12 being provided with feet 13 when the device is disposed upon the grate 1 to prevent it from being easily overturned when fuel is introduced into the fire pot or when the grate is shaken. This shell is provided at its upper end with the handles 14 and said upper end is partially closed by the end wall 15. The shell is open at its base to admit air and it is formed interiorly with a spiral passage formed by a spiral vane 16 which begins at substantially the contracted portion 17 of the shell and continues to the end wall 15; the spiral vane 16 is arranged about the inwardly extending tube 18 and the piston 19 which is of hollow cylindrical formation and which extends longitudinally through the shell, the upper end of said piston extending out through the opening in the end wall 15 and being integral with the head or cap 20.

Between the walls of the spiral vane 16 the shell is formed with a plurality of perfo-

5 rations 21 threaded interiorly to receive the screws 22 that normally close said perforations, said screws being removable to permit cleaning of the shell, freeing it of ashes, dust and other accumulations when desired. Referring again to the piston 19 the same is formed with a central transverse partition 23 and with a plurality of perforations 24 in its peripheral wall above and below said partition, said piston being formed also with two spaced lugs 25 adjacent the head 20, said lugs normally being received in a slot 26 formed in the upper end of the tube 18. The piston fits snugly but removably and slidably inside the tube 18 and when it is desired to partially remove the piston from said tube it may be withdrawn by means of the head 20 until both lugs are free of the slot in the tube and then by turning the piston slightly the lugs may be rested upon the outer end of said tube 18 thereby preventing the piston from accidentally slipping back into complete telescoped position within the tube and shell.

25 The head 20 is provided with a bail 27 which may be engaged by a fire poker, or other tool, to raise the piston; and said head, further, is formed with a plurality of perforations 28 normally closed by a damper 29, having a handle 30. In the form of the device, types C and D the outer shell or casing 11 is dispensed with and an outer tube 18^a encompasses a piston 19^a and adjustably supports the same through friction, said tube being formed with perforations 31 which may be caused to register with perforations 32 in the peripheral wall of the piston 19^a.

40 In operation, air coming up through the grate 1, or through the damper in the door 2, or from the pump 5 enters the base 12 of the shell, or in the types C and D it enters the tube 18^a at its base. The air is heated by the combustion of the fuel in the heating plant and it passes through the spiral air passage of the shell 11, through the perforations in the piston 19 and finally out through the damper holes 28 or out through the apertures 24^a between the head 20 and wall 15 into the fire pot; or the air in types C and D passes through the piston and out through the head perforations or through perforations in the tube 18^a when the same are in register with perforations in the periphery of the piston. The air in its travel is heated to a very high temperature before being released in the fire pot and when released it greatly facilitates combustion of the fuel, as is well known.

50 The quantity of air admitted into the fire pot can be regulated by adjusting the piston 19 relative to the tube 18 or shell 11 and this piston adjustment is readily made by means of a hand poker by an attendant. One end of the poker is placed in engagement with

the bail 27 and the same, and the piston, adjusted toward or away from the base, or the head 20 may be turned to permit insertion of the lugs 25 after they have been withdrawn from the slot 26.

What is claimed is:—

1. A fuel saving device comprising a hollow perforate member having a spiral passage therein, and an adjustable element carried by said hollow member and formed with perforations adapted to register with said spiral passage.

2. A fuel saving device comprising a hollow perforate member provided with a spiral vane affording a spiral passage, an adjustable piston carried by said hollow member and formed with perforations adapted to register with said spiral passage, an apertured head formed on said piston, and a damper in said head.

3. In a fuel saving device for heating plants, an outer shell having a spiral air passage therein, a hollow piston telescopically engaging said shell, and a damper for said piston whereby the flow of air therethrough and through said shell may be regulated or prevented.

4. In a fuel saving device for heating plants, a hollow open ended member, a spiral air passageway in said member, an adjustable hollow piston extending longitudinally of said member and through said passageway, and a damper in said piston whereby the flow of air therethrough and through said hollow member may be regulated.

5. In a fuel saving device for heating plants, a perforate open ended shell, screw plugs removably disposed in the shell perforations, a spiral air passageway arranged in said shell, a hollow partitioned perforate piston telescopically arranged in said shell, a perforated head for said piston disposed outside said shell, a damper for opening and closing said head perforations, and a handle for said head.

6. A fuel saving device of the class described comprising a perforate hollow casing, a spiral vane in said casing, a sleeve projecting into one end of said casing, an apertured piston slidably projecting through said sleeve and surrounded by said vane, an apertured head on said piston positioned above said casing, and means within said head for regulating drafts therethrough.

7. A fuel saving device of the class described comprising an apertured casing, a spiral vane integrally formed therein affording a spiral passage, a hollow apertured piston slidably mounted in said casing and projecting through the vane, a partition in said piston, an apertured head integrally formed on the upper end of said piston above the casing, a handle on said head, a damper within said head for controlling

the apertures therein, and means for manually operating said damper.

8. A fuel saving device of the class described comprising an apertured casing having a spiral passageway therein, and an apertured piston slidably engaged in said casing.

9. The combination with a casing having a spiral vane formed therein, of an apertured piston movably disposed within said casing and projecting through the vane, and means within said piston for regulating the drafts through said casing and through the piston.

10. A fuel saving device of the class described comprising a casing having a plurality of apertures therein, means for removably plugging said apertures, a spiral vane formed in said casing, handles formed on said casing to facilitate handling of the same, a sleeve projecting into said casing and having a guide groove therein, an apertured piston projecting through said sleeve and projections on said piston positioned to project into the groove of said sleeve, a partition formed within said piston, an apertured head on the upper end of said piston above said casing, a handle on said head, and a damper in said head for controlling the openings therein.

11. In a fuel saving device of the class described, the combination with an apertured outer member, of an apertured piston slidably engaged therein, an apertured head formed on said piston, and means within said head for controlling the draft there-through.

12. A fuel saving device of the class described comprising a hollow apertured casing opened at both ends, a vane formed in said casing, and an apertured member mov-

ably projecting through said casing and through the vane formed therein.

13. A fuel saving device of the class described comprising an apertured casing having a spiral vane formed therein, an apertured partitioned piston projecting into the casing, an apertured head formed on said piston above said casing, and means formed on said piston adapted to hold the same in an adjusted position.

14. The combination with a fire box of a heating plant, of a hollow apertured casing open at both ends and removably positioned upon the grate of said fire box, a spiral vane formed in said casing, an apertured partitioned piston slidably disposed within said casing and projecting through the vane, an apertured head formed on said piston, and means within said apertured head for controlling the flow of air therethrough.

15. A fuel saving device of the class described comprising a pair of apertured interfitting members, one of said members being provided with a spiral passageway adapted to be positioned to register with the apertures in the remaining member.

16. A fuel saving device of the class described comprising a casing having an apertured spiral passageway therein, and a draft regulating means movably positioned within said casing.

17. In a fuel saving device of the class described comprising a spirally partitioned housing, a piston movably projecting into said housing, and a partition formed in said piston, said piston having apertures therein on opposite sides of said partition.

In testimony that I claim the foregoing as my own I have hereto affixed my signature.

OLOF A. TOFFTEEN.