

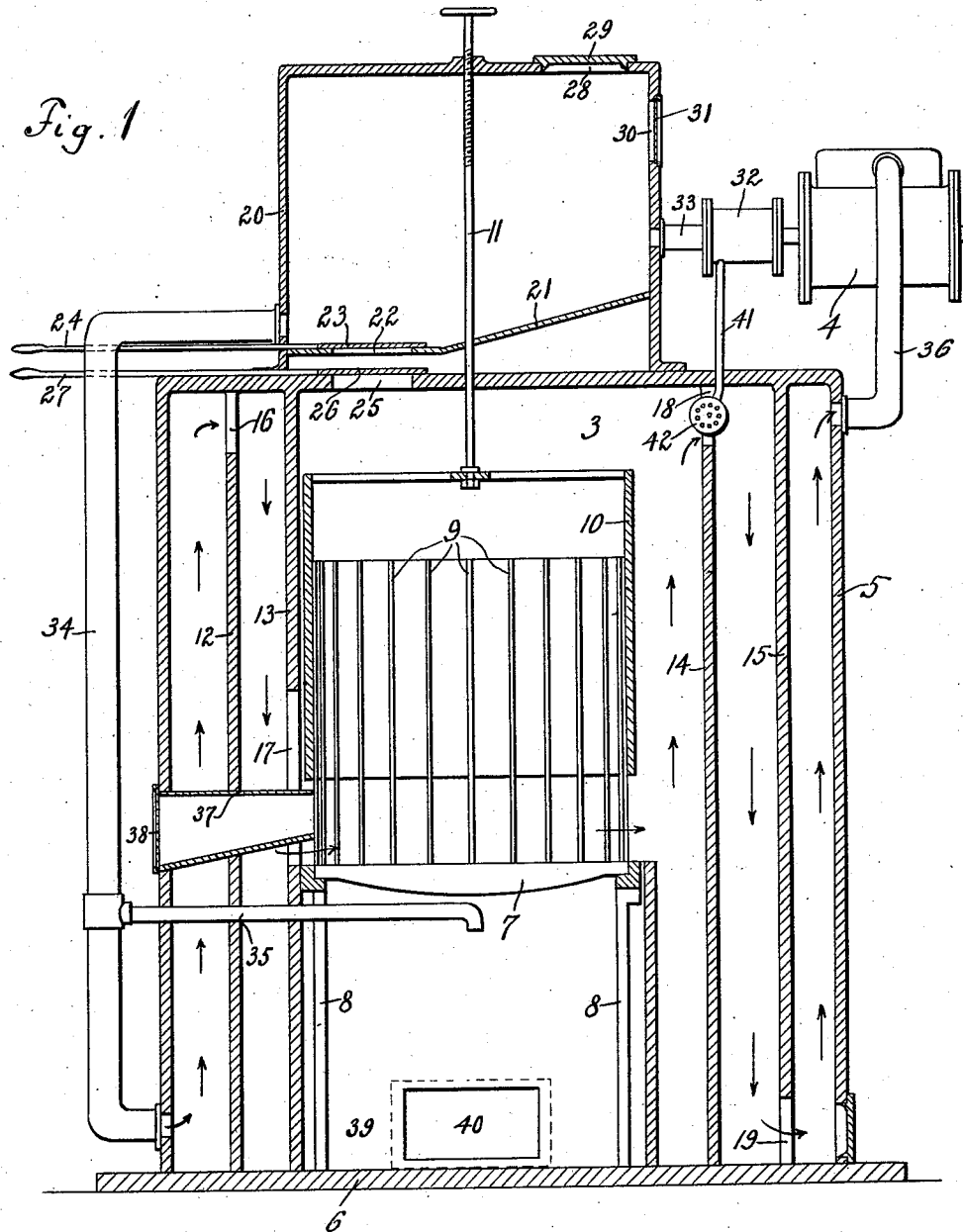
J. KUHAJDA.
HOT AIR ENGINE.

APPLICATION FILED OCT. 6, 1910. RENEWED OCT. 17, 1911.

1,010,153.

Patented Nov. 28, 1911.

2 SHEETS—SHEET 1.



WITNESSES

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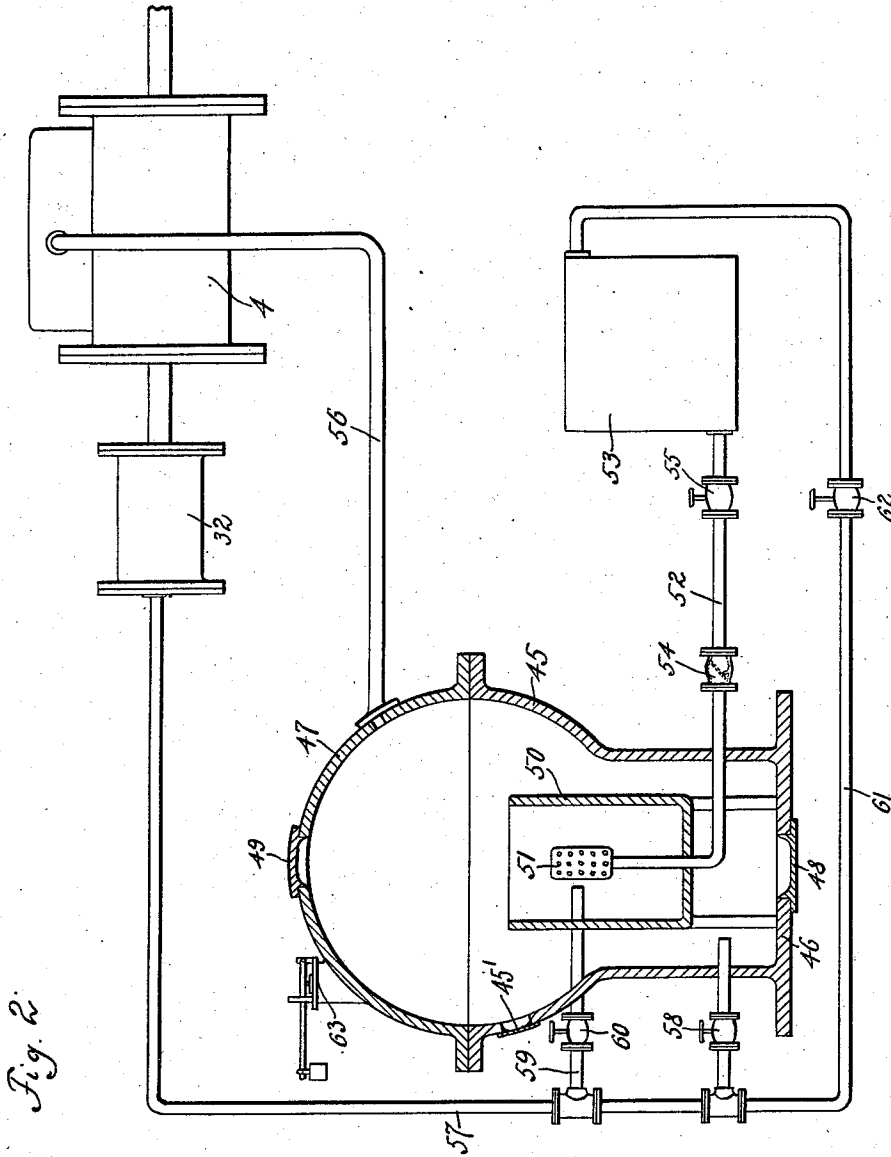


Fig. 2.

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HOT-AIR ENGINE.

1,010,153.

Specification of Letters Patent. Patented Nov. 28, 1911.

Application filed October 6, 1910, Serial No. 585,675. Renewed October 17, 1911. Serial No. 655,224.

To all whom it may concern:

Be it known that I, JOSEPH KUHAJDA, a subject of the King of Hungary, and a resident of the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Hot-Air Engines, of which the following is a specification.

The present invention relates to hot-air engines, and more particularly to that class in which the products of combustion mix with the air that is used to work the engine.

One of the objects of the invention is to provide a heater for engines of this character which shall be simple and durable in construction, and of such shape that the air will be caused to mingle with the products of combustion, to be conducted as such mixture to the cylinders of the engine.

Another object of the invention is to provide a heater for air engines which shall be very economical in consumption of fuel, and which can be charged with fuel without loss of heat to the device.

With these and other objects in view, which will more fully appear as the nature of the invention is better understood, the same consists in the construction, combination and arrangement of parts hereinafter fully described, pointed out in the appended claims and illustrated in the accompanying drawings, it being understood that various changes may be made in the size and proportion of the several parts and minor details of construction without departing from the spirit or sacrificing any of the advantages of the invention.

Two of the many possible embodiments of the invention are illustrated in the accompanying drawings, in which:—

Figure 1 is a vertical central section through the heater, the engine cylinder being shown diagrammatically; and Fig. 2 is a similar section through a modified device.

Referring now more particularly to Fig. 1 of the drawings, the numeral 3 indicates the heater for the engine, and the numeral 4 diagrammatically the working cylinder of the same. This working cylinder is obviously provided with a valve gear, controlling the admission and exhaust of the air into and from the same. The heater comprises a closed box-like receptacle 5 of any suitable material, which is placed upon and fastened to a bed plate 6. In this receptacle is centrally arranged the grate 7, resting

upon the standards or feet 8, which grate is, preferably, arranged in a horizontal position and supports vertical grate bars 9, arranged in a circle. The vertical grate bars are surrounded by a shiftable tubular member 10, attached to a rod 11, for a purpose hereinafter to be described. The box-like receptacle is divided by partitions 12, 13, 14 and 15 into a plurality of compartments, which communicate with each other through the openings 16, 17, 18 and 19 in the partitions 12, 13, 14 and 15, respectively. Upon the top of the receptacle 5 is built a closed fuel receptacle 20, provided with a slanting bottom 21, having an opening 22 therein which is normally closed by a cover 23, adapted to be operated by the rod 24 from the outside of the receptacle. An opening 25 is arranged in the top of the box-like receptacle 5, normally closed by the cover 26, which is provided with an operating rod 27, also to be operated from the outside of the receptacle. The fuel, such as coal, is filled into the fuel receptacle 20, through an opening 28 in its top portion, which opening is normally closed by a cover 29, held upon the fuel receptacle in any suitable manner. The fuel receptacle is provided with a window 30, covered by transparent material 31, whereby the level of the fuel therein can be easily ascertained. Air is furnished into the compartments of the receptacle 5 and also to the grate 7 by a pump 32, which is actuated by the main engine and delivers the air through a connection 33 to the fuel receptacle 20, wherefrom it flows through a pipe 34 to the bottom of the left-hand compartment in the receptacle 5. A pipe 35 branches out from the pipe 34 and leads to the grate 7. The right-hand compartment of the box 5 is connected by a pipe 36 with the air chamber of the cylinder 4. In order to watch the process of combustion in the air heater, a tubular member 37 leads from the outer wall of the chamber 5 to the vertical grate bars 9, and is covered at its outer end by a transparent plate 38. Access can be had to the ash pit 39 through a covered opening 40 in the box 5.

Means may be provided for cleaning the grate bars 7 without opening or detaching any of the covers or doors, but, as these means do not form an essential part of the invention, the same are not shown.

The operation of the device is as follows: The space between the grate bars 7 and 9

having been charged with coal, the cover 40 of the ash pit is detached and the valve gear of the cylinder 4 brought into a position, whereby the interior of the receptacle 5 communicates through the exhaust thereof with the atmosphere. The fire is then started, and the piston in the cylinder 4 is reciprocated by hand until fresh air is forced by the pump 32 through the pipes 34 and 35 into the receptacle 5, after which the cover of the opening 40 may be put into its proper place. The cold air contained in the chamber 5 will pass in the direction of the arrows through the grate bars 9 to the supply pipe 36, and in this course will be heated and mingle with the products of combustion. If the pump 32 is of proper dimensions, the air will leave through the passage 36 in a compressed and heated state, and be thus in the proper condition to act upon the piston in the cylinder 4. The air which is delivered through the pipe 35 to the grate bars 7 is obviously necessary to sustain the combustion, which will be of a varying nature owing to the fact that the receptacle 5 is only intermittently in communication with the atmosphere through the exhaust pipe of the cylinder 4. In order to burn the particles of hydrocarbon still suspended in the products of combustion, a secondary air supply is led through a pipe 41, which terminates in a perforated hollow member 42, to the opening 18 in the partition 14 of the receptacle 5. The combustible material in the products of combustion is at this place still in its incandescent state. A supply of fresh air, mixed at this point with the same, will cause a complete combustion of combustible gases and the particles of carbon suspended therein. The tubular member 10 serves to regulate the amount of air passing through the grate bars 9. The fuel receptacle 20 is filled, while the engine is in operation, through the opening 28, when the supply therein is exhausted. The grate 7 may be charged with fuel, while the engine is in operation, by uncovering the openings 22 and 25 in the bottom of the receptacle 20 and in the top of the receptacle 5, respectively.

A modification of the device is illustrated in Fig. 2 of the drawings, in which, instead of solid fuel, liquid fuel is made use of. The heater consists in this case of a casing 45 of any suitable material and provided at its bottom portion 46 and cover portion 47 with doors 48 and 49, respectively, for a purpose hereinafter to be specified. In this casing is arranged a receptacle 50, open at its upper end. A burner 51 of any suitable form is arranged in the receptacle 50, and connected by means of a pipe 52 with the liquid fuel container 53. In this pipe 52 is inserted a check valve 54 and a needle valve 55, the latter being for the purpose to regulate the ad-

mission of the supply of liquid hydrocarbon to the burner 51. The air chamber of the engine cylinder 4 is connected by a pipe 56 with the casing 45. Fresh air is forced into the casing 45 by means of the pump 32, actuated by the main engine, through a pipe 57, controlled by a valve 58. A branch pipe 59 leads from the pipe 57 to the interior of the receptacle 50 and is controlled by a valve 60. A pipe 61 branches out from the pipe 57 and leads to the top of the liquid fuel receptacle 53; this latter pipe being controlled by a valve 62. A safety valve 63 may be arranged upon the casing 45.

The operation of the device is as follows: In starting the operation of the engine, the latter is turned by hand, whereby compressed air will be forced to the liquid container 53, to the interior of the casing 45 and the receptacle 50. In opening the door 49, the gas may be lighted through a door 45'. In closing the door 49 and adjusting the valves 58 and 60 in such a manner that the pressure in the casing 45 is somewhat lower than in the liquid fuel receptacle 53, the cold air, forced into the casing 45, will be heated, mingled with the products of combustion and conducted to the engine cylinder in the manner described in connection with Fig. 1 of the drawings. During the operation of the engine the walls of the receptacle 50 will become incandescent, and heat thereby effectively the air coming in contact therewith.

What I claim is:—

1. In a hot-air engine, the combination with a closed receptacle having a heater therein, of a fuel container arranged upon said receptacle and being adapted to communicate with said heater, an air pump communicating with said receptacle through said container, and a power cylinder having an air chamber connected with said receptacle in such a manner that said receptacle communicates with the atmosphere only through said air chamber.

2. In a hot-air engine, the combination with a closed receptacle having a heater therein, of a fuel container arranged upon said receptacle, an air pump communicating with said receptacle and the ash pit of said heater through said container, and a power cylinder having an air chamber connected with said receptacle in such a manner that said receptacle and the ash pit of said heater communicate with the atmosphere only through said air chamber.

3. In a hot air engine, the combination with a closed receptacle having a heater therein, comprising a support with a horizontal grate resting thereon and vertical grate bars arranged in a circle around said horizontal grate, of a shiftable tubular member surrounding said vertical grate bars, a fuel container arranged on said receptacle

and being adapted to communicate with said heater, an air pump communicating with said receptacle through said container, and a power cylinder having an air chamber
5 connected with said receptacle in such a manner that said receptacle communicates with the atmosphere only through said air chamber.

4. In a hot air engine, the combination
10 with a closed receptacle having a heater therein, comprising a support with a horizontal grate resting thereon and vertical grate bars arranged in a circle around said horizontal grate, of a shiftable tubular
15 member surrounding said vertical grate bars, a fuel container arranged on said receptacle and being adapted to communicate with said heater, an air pump communicating with said receptacle and the ash pit of
20 said heater through said container, and a power cylinder having an air chamber connected with said receptacle in such a manner that said receptacle communicates with the atmosphere only through said air chamber.
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5. The combination with a closed receptacle divided into a plurality of compartments communicating with each other, of a heater in one of said compartments, comprising a support with a horizontal grate
30 resting thereon and vertical grate bars arranged in a circle around said horizontal grate, a shiftable tubular member surrounding said vertical grate bars, a fuel container arranged on said receptacle and being adapted
35 to communicate with said heater, an air pump communicating with said receptacle through said container, and a power cylinder having an air chamber connected with said

receptacle in such a manner that said receptacle communicates with the atmosphere only through said air chamber. 40

6. In a hot air engine, the combination with a closed receptacle having a heater therein, comprising a support with a horizontal grate resting thereon and vertical
45 grate bars arranged in a circle around said horizontal grate, of a shiftable tubular member surrounding said vertical grate bars, a fuel container arranged on said receptacle and being adapted to communicate with said heater, an air pump communicating with said receptacle through
50 said container, a power cylinder having an air chamber connected with said receptacle in such a manner that said receptacle communicates with the atmosphere only through said air chamber, and means for conducting a supply of fresh air to the products of combustion passing to said power cylinder for
60 causing a complete combustion of combustible gases and the particles of carbon suspended therein.

7. The combination with a closed receptacle, of a support therein, horizontal grate bars resting upon said support, vertical grate bars arranged in a circle around said horizontal grate bars, and a shiftable cylindrical member surrounding said vertical
65 grate bars to regulate the amount of air passing through said vertical grate bars.

Signed at New York, in the county of New York and State of New York, this 29th day of Sept., A. D. 1910.

JOSEPH KUHAJDA.

Witnesses:

SIGMUND HERZOG,
PAUL P. ADOLPH.