

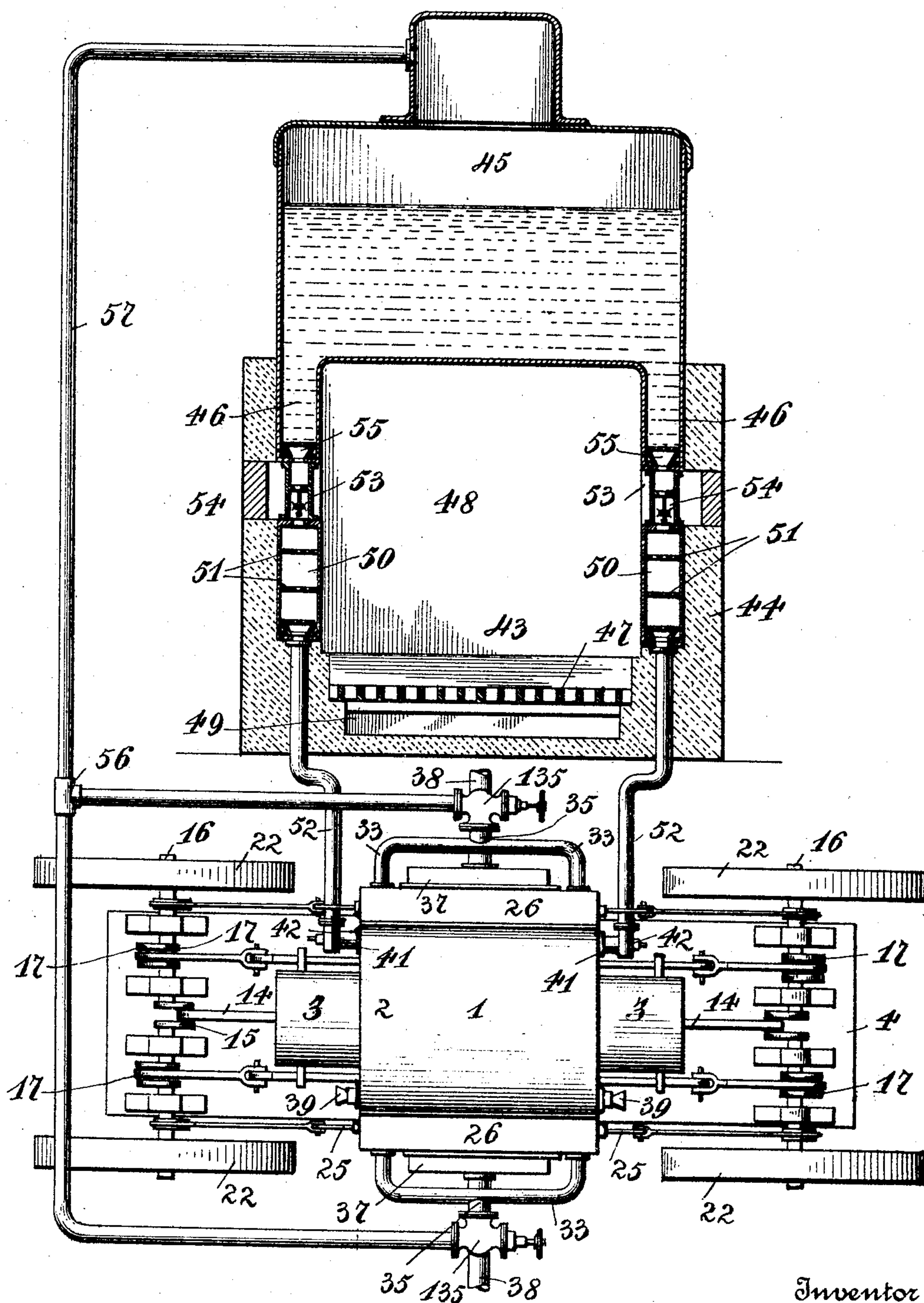
No. 779,538.

PATENTED JAN. 10, 1905.

C. FERRO, SR.

MOTOR.

APPLICATION FILED JULY 21, 1904.



Inventor

Witnesses
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MOTOR.

SPECIFICATION forming part of Letters Patent No. 779,538, dated January 10, 1905.

Application filed July 21, 1904. Serial No. 217,553.

To all whom it may concern:

Be it known that I, CHARLES FERRO, Sr., a citizen of the United States, residing at Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Motors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in motors, and more particularly to steam and hot-air engines.

One object of my invention is to provide means for mixing heated compressed air with the hot water and steam in a boiler.

Another object of my invention is to provide a combined steam-engine and air-compressor which will be simple in construction, durable in use, and efficient in operation.

With the above and other objects in view the invention consists of certain novel features of construction, combination, and arrangement of parts, as will be hereinafter more fully described, and particularly pointed out in the appended claims.

In the accompanying drawing the figure is a diagrammatic view of a motor, a steam-boiler, and the connections between the two.

Referring to the drawing by numeral, 1 denotes a combined steam-engine and air-compressor, which consists of a large steam-cylinder 2 and two smaller compressed-air cylinders 3, which are mounted at each end of the steam-cylinder 2 and are in communication therewith. Said cylinder 2 is mounted horizontally upon a suitable base 4. Pitmen 14 are each connected to a piston in each cylinder 3, and at the opposite end said pitmen are each connected to a crank 15, provided upon the center of a transverse shaft 16, which is journaled in suitable bearings provided upon the base 4. Each of the said shafts 16, which are disposed at opposite ends of the base, are provided with cranks 17, set at a suitable angle to the crank 15 in order to prevent a dead-center.

Fly-wheels 22 are keyed to the opposite ends of the shafts 15. Steam is admitted into each

end of the valve-casing 26 through branch pipes 33, which are united to form a steam-pipe 35, in which a controlling-valve 135 of any suitable construction is provided.

In the accompanying drawing I have illustrated a steam-boiler furnace 43, which comprises a casing 44, in which a steam-boiler 45 is suitably mounted and provided with two legs or depending portions 46. Beneath said boiler is the usual fire-box grate 47, which separates the fire-box 48 from the ash box or chamber 49. In the fire-box 48, adjacent to each of its sides, are air-heating devices 50, which are here shown in the form of rectangular boxes having one or more perforated partitions 51. The outer end of said devices 50 are connected by pipes 52 to the connections 41 of the cylinder, and the opposite or inner ends of said devices are connected by pipes 53, in which suitable check-valves 54 are provided, to perforated pipe-sections or nozzles 55, which are located in the legs 46 of the boiler 45, below the water-line of the latter. The steam-pipes 34 upon each side of the engine are united, as shown at 56, to a pipe 57, which opens into the steam-space of the boiler 45.

It will be seen that when the combined engine and air-compressor is in operation the air compressed by the same will be forced through the pipes 52 into the air-heating box 50, in which it will be thoroughly heated. The air from said box passes through the pipe 53 into the perforated pipes or nozzles 55, which discharge it in small jets in the water contained in the boiler. As the heated air rises in the water it raises the temperature of the same and mixes with the steam in the top of the boiler, from which it is drawn off through the pipe 57 and pipes 34 to the engine.

From the foregoing description, taken in connection with the accompanying drawing, the construction, operation, and advantages of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the prin-

ciple or sacrificing any of the advantages of this invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is--

1. In a motor, the combination of a boiler, a fire-box extending into the boiler, water-legs at opposite sides of the fire-box and extended from the boiler, air-heaters under the
10 water-legs and communicating with the fire-box, perforated partitions in the air-heaters, a check-valve above the partitions in the air-heaters, a perforated nozzle above each check-
15 valve and within each water-leg, a perforated nozzle at the lower end of each air-heater, and means for forcing compressed air through said air-heaters into the boiler below the water-line, substantially as described.

2. In a motor, the combination of a boiler
20 having water-legs at the sides of the fire-box, air-heaters under the water-legs, perforated partitions in said air-heaters, perforated nozzles, one at each end of each air-heater, an air-compressor, and means for forcing compressed air into said air-heaters and for forcing
25 said heated air from the air-heaters into

the boiler below the water-line, substantially as described.

3. In a motor, a boiler, a fire-box extending into the boiler, water-legs extending from the
30 boiler at the sides of the fire-box, air-heating devices under the water-legs and communicating therewith, perforated partitions in said air-heating devices, a check-valve in each of said heating devices, a perforated nozzle at
35 the discharge end of said heating devices and in communication with the boiler below the water-line, an inlet-nozzle at the opposite end of said heating devices, an air-compressor, pipes leading from said compressor to said air-
40 heating devices, and means for forcing compressed air into the heating devices, and through said heating devices into the boiler, substantially as described.

In testimony whereof I have hereunto set
45 my hand in presence of two subscribing witnesses.

CHARLES FERRO, SR.

Witnesses:

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