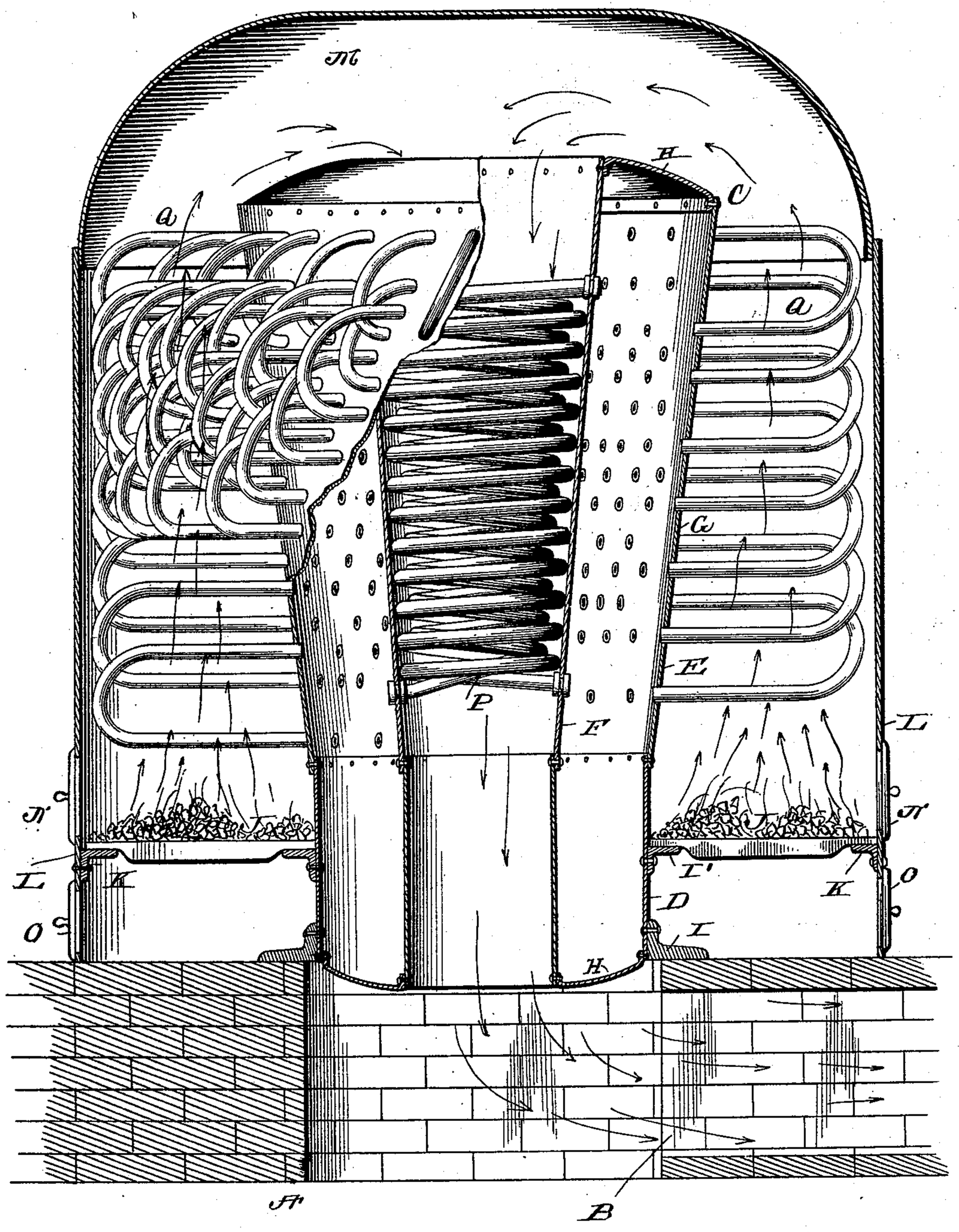
(No Model.)

E. P. McGERR.

STEAM BOILER.

No. 539,635. Patented May 21, 1895.



Witnesses

John D. Bruce

Thos. E. Robertson

Inventor

Edward P. McGerr

By T. J. W. Robertson

Attorney

UNITED STATES PATENT OFFICE.

EDWARD P. McGERR, OF JERSEY CITY, NEW JERSEY.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 539,635, dated May 21, 1895.

Application filed November 1, 1894. Serial No. 527,649. (No model.)

To all whom it may concern:

Be it known that I, EDWARD P. McGERR, a citizen of the United States, residing at Jersey City, in the county of Hudson, New Jersey, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification, reference being had therein to the accompanying drawing.

This improvement relates to that class of boilers known as water tube boilers, and is designed to provide a boiler of this class which shall be simple in construction, durable and economical in use, and rapid in forming steam.

To these ends the invention consists in the peculiar construction hereinafter described, the novel points of which are definitely pointed out at the end hereof.

The accompanying drawing shows a vertical central section of a boiler constructed according to my improvement with part thereof in elevation.

In the drawing, A represents a brick base, having a flue B to carry off the products of combustion. Resting upon this base is the boiler C, consisting of a lower annular cylindrical portion D, to which is attached an upper portion in the form of an inverted hollow trunacted cone E, formed of two tapering shells F G connected together at top by a flanged head H. The two shells forming the annular cylindrical portion are also connected by a similar head.

The boiler may rest directly on the base, but I prefer to attach at its lower end a cast flange I, which rests on the brick base and thus supports the boiler. At a proper distance above this another flange I′ is secured to support the inner ends of the gate-bars J, which are arranged radially around the boiler, and their other ends are supported by a flange K, attached to an outer fire-proof jacket L, which surrounds the entire boiler. This jacket is of cylindrical form and covered with a canopy top M, which is air-tight and of any suitable fire-proof material, and to save heat, if of metal, it may be covered with any poor heat conductor. At suitable distances apart around this jacket are doors N for feeding the fire, and at O are shown other doors for removing ashes, &c.

Within the boiler are one or more coils of pipes P, connected at top and bottom with the inner shell as shown.

Arranged around the outer shell are several series of U-shaped tubes Q, and connected at both ends with the interior of the boiler by being expanded into the outer shell of the boiler, and are arranged so that the lower ends of the lowest series begin about two feet or so above the grate-bars, and the upper ends of the upper series extend above the water-line. They are set so as to incline at about twenty-two and one-half degrees from a vertical line. The bottom arms of the tubes are rather longer than the upper, so that the tubes set substantially horizontal.

The boiler is, of course, to be fitted with the usual attachments, such as steam and water gages, safety-valve, &c., but as there is nothing new claimed in these, it is unnecessary to describe or show them.

The operation is as follows: The boiler being filled with water to the proper level, and the fire started, the heated products of combustion rise through the large assemblage of tubes on the outside of the boiler, and pass over the top, down through the center, and out through the flue B, as shown by the arrows. As the heat rises it will naturally impinge against and cling to the inclined surface of the outer shell, and in going down the center the same effect is produced. The different rings of the coil of tubes inside the boiler are also struck successively by the descending heat as well as the inclined tubes on the outside of the shell, and this effect is intensified by the concentration of the heat as it rises on the outside of the boiler and descends on the inside, because the space decreases toward the top of the outside of the boiler and also on the inside toward the bottom. The heat is consequently concentrated about the surface of the inclined tubes and the inside coils, and thus greatly hastens the circulation of the water and the generation of steam, and the products of combustion, being by this time deprived of all the available caloric, pass off through the flue B. The heat thus strikes the lower end of the tubes, and the water in them begins to circulate and steam generation begins—the steam

rising to the top of the boiler toward the steam space, and the water, if any rises with it, dropping back to the water-level.

The mud, sediment, &c., which may settle in the bottom of the boiler may be blown off by the usual appliances.

I do not limit myself to a boiler in the exact shape shown in the accompanying drawing only. It may be inverted and used as an oil burner, and thereby become valuable as a marine boiler, or for other uses. If inverted, the heat should pass up through the center and then down the outside.

What I claim as new is—

1. A boiler provided with two tapering shells, having their smallest parts downward and set one within the other, an outer shell forming a fire-chamber, a canopy top to direct the products of combustion into the central inner shell, and a flue to carry them away, substantially as described.

2. A boiler provided with two tapering shells, having their smallest parts downward and set one within the other, an outer shell surrounding the fire-chamber, a canopy to direct the products of combustion toward the central inner shell, and a flue below the fire-chamber to draw down said products of combustion through said inner shell, substantially as described.

3. A boiler having a down-draft central passage and a coil of pipe of gradually decreasing diameter of coil arranged within the same having its upper and lower ends connected with the boiler near its top and bottom respectively, substantially as described.

4. A boiler having a tapering central down-draft passage and conical coils of pipes arranged within the same and having their upper and lower ends connected with the boiler near its top and bottom respectively, substantially as described.

5. In a boiler, the combination with inner and outer tapering shells, of a series of inclined tubes passing through the outer shell, and a series of coils inside the inner shell, both tubes and coils communicating with the space between the shells, substantially as described.

6. The combination in a boiler, of inner and outer tapering shells, an outer shell surrounding the fire-chamber, and a down draft flue for the same, arranged to concentrate the products of combustion as the heat thereof decreases, substantially as described.

7. The combination with a vertical boiler having a central passage through it, of a circular furnace surrounding said boiler, and a flue to draw the products of combustion down said central passage, substantially as described.

8. The combination in a boiler, of the inner and outer shells, the inclined tubes connected to the outer shell, the coils contained in the inner shell, the circular furnace surrounding the boiler, a jacket surrounding the entire boiler, and a flue to draw the products of combustion down the central passage, all substantially as described and shown.

In testimony whereof I affix my signature, in presence of two witnesses, this 30th day of October, A. D. 1894.

EDWARD P. McGERR.

Witnesses:

RICHARD J. O'NEILL,

DAVID BIRDSALL.