(No Model.) 2 Sheets—Sheet 1.

R. R. McGREGOR & G. W. & W. A. WADDINGTON.

STEAM AND HOT WATER BOILER.

No. 514,376. Patented Feb. 6, 1894.

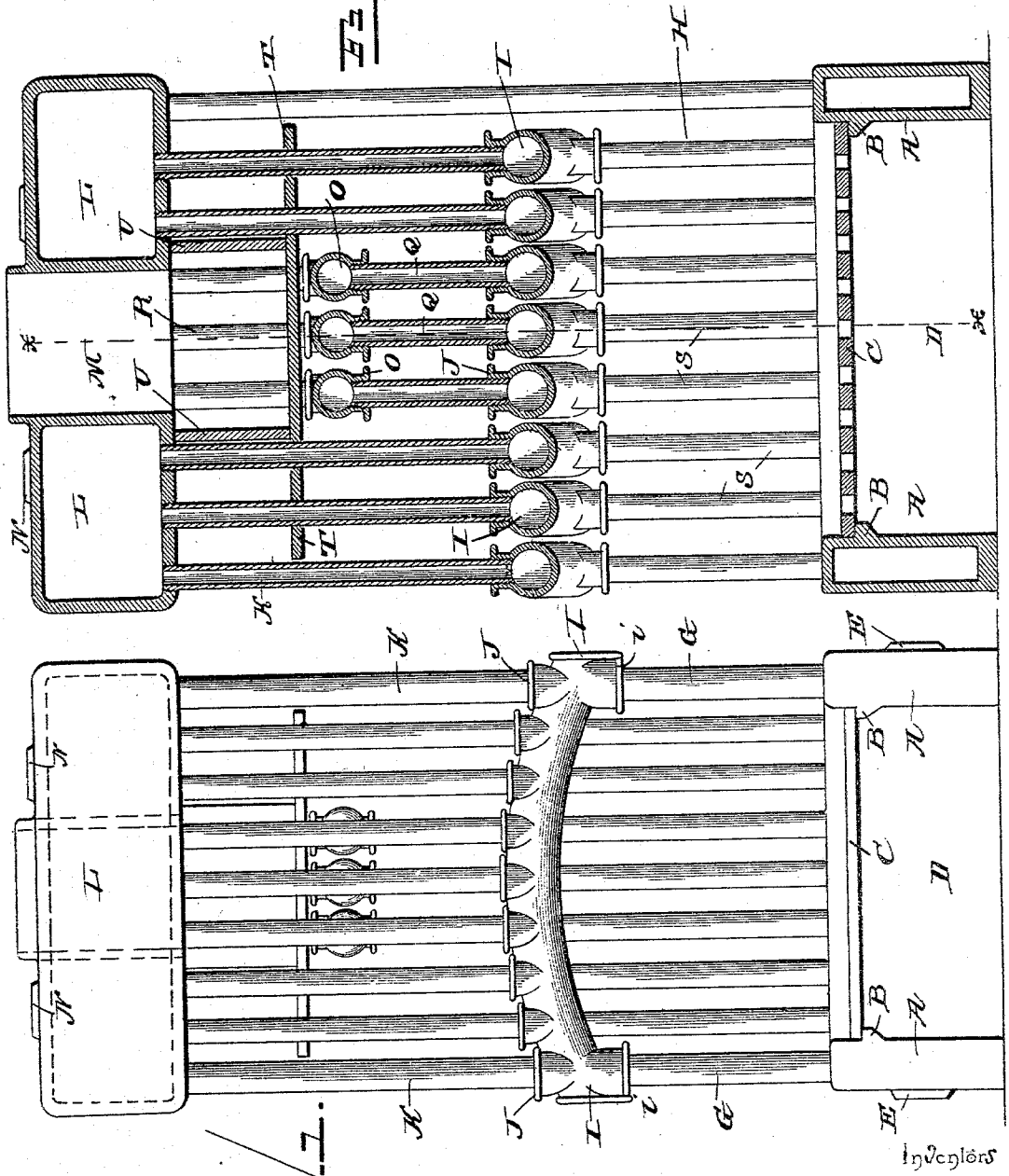

Fig. 2.

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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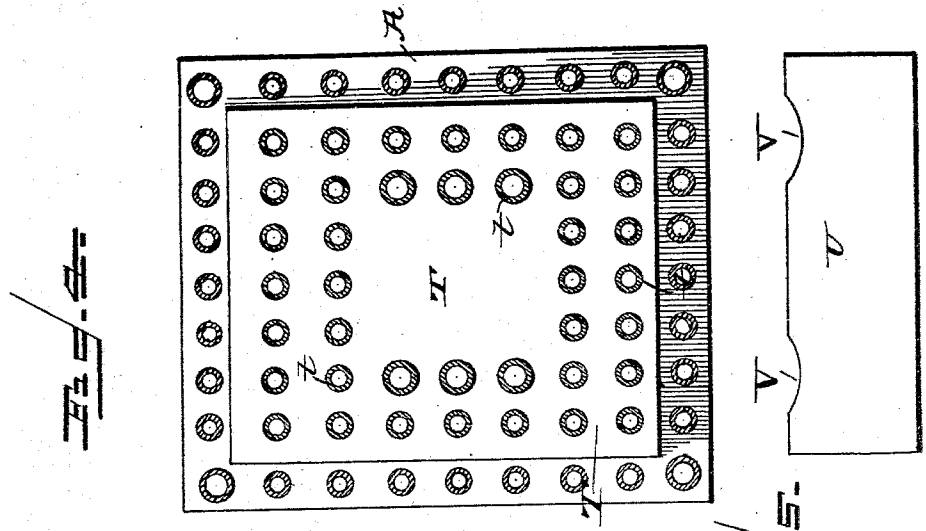

Fig. 3.

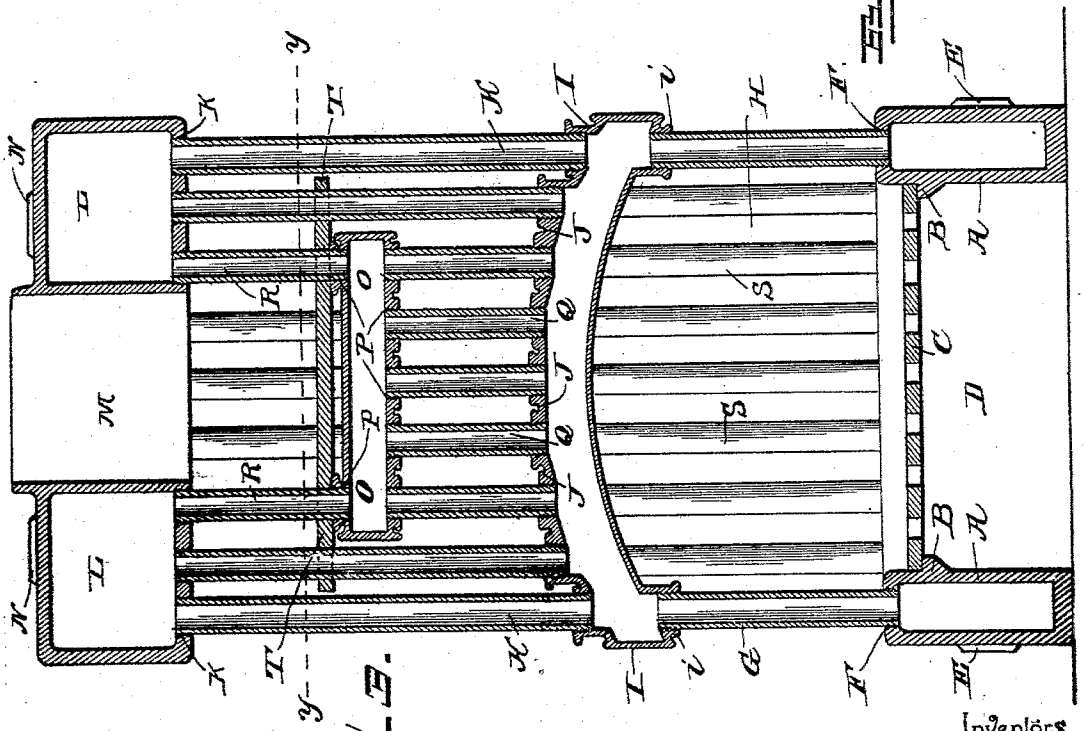

Fig. 2.

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UNITED STATES PATENT OFFICE.

ROB ROY McGREGOR, GEORGE W. WADDINGTON, AND WILLIAM A. WADDINGTON, OF BLOOMINGTON, ILLINOIS.

STEAM AND HOT-WATER BOILER.

SPECIFICATION forming part of Letters Patent No. 514,376, dated February 6, 1894.

Application filed June 30, 1893. Serial No. 479,304. (No model.)

To all whom it may concern:

Be it known that we, ROB ROY MCGREGOR, GEORGE W. WADDINGTON, and WILLIAM A. WADDINGTON, citizens of the United States, residing at Bloomington, in the county of McLean and State of Illinois, have invented a new and useful Steam and Hot-Water Boiler, of which the following is a specification.

This invention relates to steam and hot water boilers; and it has for its object to provide certain new and useful improvements in that class of boilers which can be either employed for the generation of steam or for the heating and circulation of hot water for hot water heating systems.

To this end the main and primary object of the present invention is to provide an improved boiler which will secure efficient results while at the same time economizing on the fuel used, owing to an enlarged or increased fire surface as compared to the grate surface, and therefore providing means for presenting a large water area to the heating action of the fire.

With these and other objects in view which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a front view of a boiler constructed in accordance with this invention. Fig. 2 is a central vertical sectional view of the same, partly in elevation. Fig. 3 is a vertical sectional view on the line *x*—*x* of Fig. 2. Fig. 4 is a horizontal sectional view on the line *y*—*y* of Fig. 1. Fig. 5 is a detail elevation of one of the damper plates.

Referring to the accompanying drawings:—A represents a hollow rectangular water base or ring provided at inner opposite sides thereof with the supporting lugs B, on which rests the ordinary fire grate C, which carries the fire for heating the boiler, while directly below said grate and inclosed by the sides of the water base or ring is the ash pit D.

The hollow rectangular water base or ring A, is provided at opposite sides thereof with the pipe connections E, to which are adapted to be coupled the return pipes of the boiler for supplying the same with the requisite water, while at the same time keeping up the circulation therein especially for hot water heating. The said base or ring A, is further provided in its top edges with the threaded openings F, and the openings in the opposite side portions of the base or ring are adapted to receive the lower ends of the short vertical arch pipes G.

The arch pipes G, form the opposite inclosing side walls of the fire-box H, of the boiler, and are coupled at their upper ends to the opposite extremities of the transverse curved fire arches I. The transverse fire arches I, are arranged in a transverse series from the front of the boiler to the rear thereof, and form an inclosing header arch spanning the top of the fire box H, and presenting a large water area for the fire to come in contact with and thereby secure a rapid heating up of the water. The transverse fire arches I, are provided at their opposite ends with the lower coupling collars *i*, which receive the upper extremities of the arch pipe G, and are provided in their tops with a longitudinal series of coupling necks or collars J, extending from end to end thereof, and adapted to receive the lower ends of the main circulating pipes K.

The main circulating pipes K, which are secured to the top of the fire arches I, are coupled at their upper ends into the threaded openings *k*, into the bottom of the top steam or water dome L. The upper steam or water dome L, which is thus supported on the upper ends of the circulating pipes K, is provided with a central vertical smoke hole M, through which the smoke and other products of combustion pass in their way to the pipes and chimney of the usual inclosing jacket or casing, which it will of course be understood incases the boiler herein described. The dome L, is further provided in its top with the steam or water outlet N, with which the proper pipe connections are of course to be made.

At a point intermediate of or between the fire arches I, and the upper steam or water dome L, is arranged transversely a small se-

ries of short interior header drums O, all of which are parallel with each other. The said short header drums O, are provided at the top and bottom with threaded openings P, such openings being arranged at the bottom from end to end, while the openings at the top are located at each end of the drum, and said lower openings receive the upper ends of the lower header pipes Q. The lower header pipes Q, are coupled at their lower ends into intermediate coupling necks or collars J, of the central fire arches of the series, so that certain of said fire arches are in circulating connection with the interior header drums O, arranged directly thereabove. The top end openings of the header drums receive the lower ends of the upper header pipes R, which are coupled to the bottom of the upper steam or water dome, and by thus arranging the upper header pipes R, a rectangular escape space is located directly under the lower end of the smoke hole M, and into which passes all the smoke and other products of combustion before finding their escape through the said smoke hole.

The circulation is additionally maintained by the rear wall pipes S, connected at their lower ends to the rear top edge of the water base or ring and at their upper ends to the bottom of the dome L, and as clearly shown in Fig. 1 of the drawings the lower portion of said pipes S, form the rear wall of the fire box, which is entirely inclosed by water pipes and their connections, so as to present a large water area to the fire.

Directly above the short header drums O, is arranged a horizontal baffle plate T. The baffle plate T, is rectangular in shape and is provided with a number of pipe openings *t*, which receive the pipes R, and K, and the dispositions of said baffle plate which is imperforate with the exception of the openings *t*, directly over the short header drums, serve not only to hold the heat onto said header drums, but throws the same out toward the pipe sides of the boiler so that every part thereof will be subjected to the influence of the heat.

Transverse imperforate damper plates U, are adapted to be arranged on top of the baffle plate T, at opposite sides of the smoke hole and are provided with top openings V, at their upper edges for the escape of the smoke and other products of combustion, and said dampers are employed when hard coal is being burned, or for reducing the draft if found necessary.

From the foregoing it is thought that it will be apparent that the construction herein described provides a boiler having a practical and efficient arrangement of circulating pipes and circulating connections therefor whereby a rapid heating of the water is obtained, and we will have it understood that changes in the form, proportion and the minor details of construction, may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a boiler, the combination of a hollow rectangular water base or ring, a transverse series of separate and independent curved fire arches arranged above said base or ring, an upper steam or water dome having a central smoke hole, a series of short parallel header drums arranged intermediate of the upper dome and said fire arches, said header drums being of a shorter length than said fire arches, suitable pipe connections between the several parts, an imperforate horizontal baffle plate arranged above the short header drums below the dome smoke hole, and imperforate damper plates adapted to be arranged transversely on top of the baffle plate at opposite sides of the smoke hole and provided with top escape openings at their upper edges, substantially as set forth.

2. In a boiler, the combination of a hollow rectangular water base or ring adapted to inclose the fire grate and having openings in its top edges, a transverse series of curved fire arches arranged over the water base or ring and having lower end coupling collars at both opposite ends and a longitudinal series of upper coupling necks or collars, short arch pipes connecting the openings of the water base or ring with the lower opposite end coupling collars of the arches, an upper steam or water dome, circulating pipes connected at their lower ends to the upper coupling necks or collars of the fire arches and at their upper ends to the steam or water dome and short header drums joined in circulation with certain of said circulating pipes, substantially as set forth.

3. In a boiler, the combination of a hollow water base or ring, a transverse series of curved fire arches arranged above said water base or ring, an upper steam or water dome having a central smoke-hole, pipe connections between the base or ring and said fire arches and also the upper dome, a series of short parallel header drums arranged intermediate of the upper dome and said fire arches said short header drums being less in number than the fire arches and of a shorter length than the same, short, pipes connecting said short header drums with the upper dome and also with certain of the fire arches, circulating pipes connecting the fire arches with the upper dome, and a baffle plate arranged over the short header drums directly under said central smoke hole substantially as set forth.

4. In a boiler, the combination of a hollow rectangular water base or ring, a series of fire arches arranged above said base or ring, an upper steam or water dome, short header drums intermediate of the dome and said fire

arches, suitable pipe connections between the several parts, a horizontal baffle plate arranged directly over the short header drum below the smoke hole of the dome, and transverse damper plates adapted to be arranged on top of the baffle plate at opposite sides of the smoke hole, substantially as set forth.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

ROB ROY McGREGOR.
GEORGE W. WADDINGTON.
WILLIAM A. WADDINGTON.

Witnesses:
L. G. WHITMER,
F. D. MARQUIS.