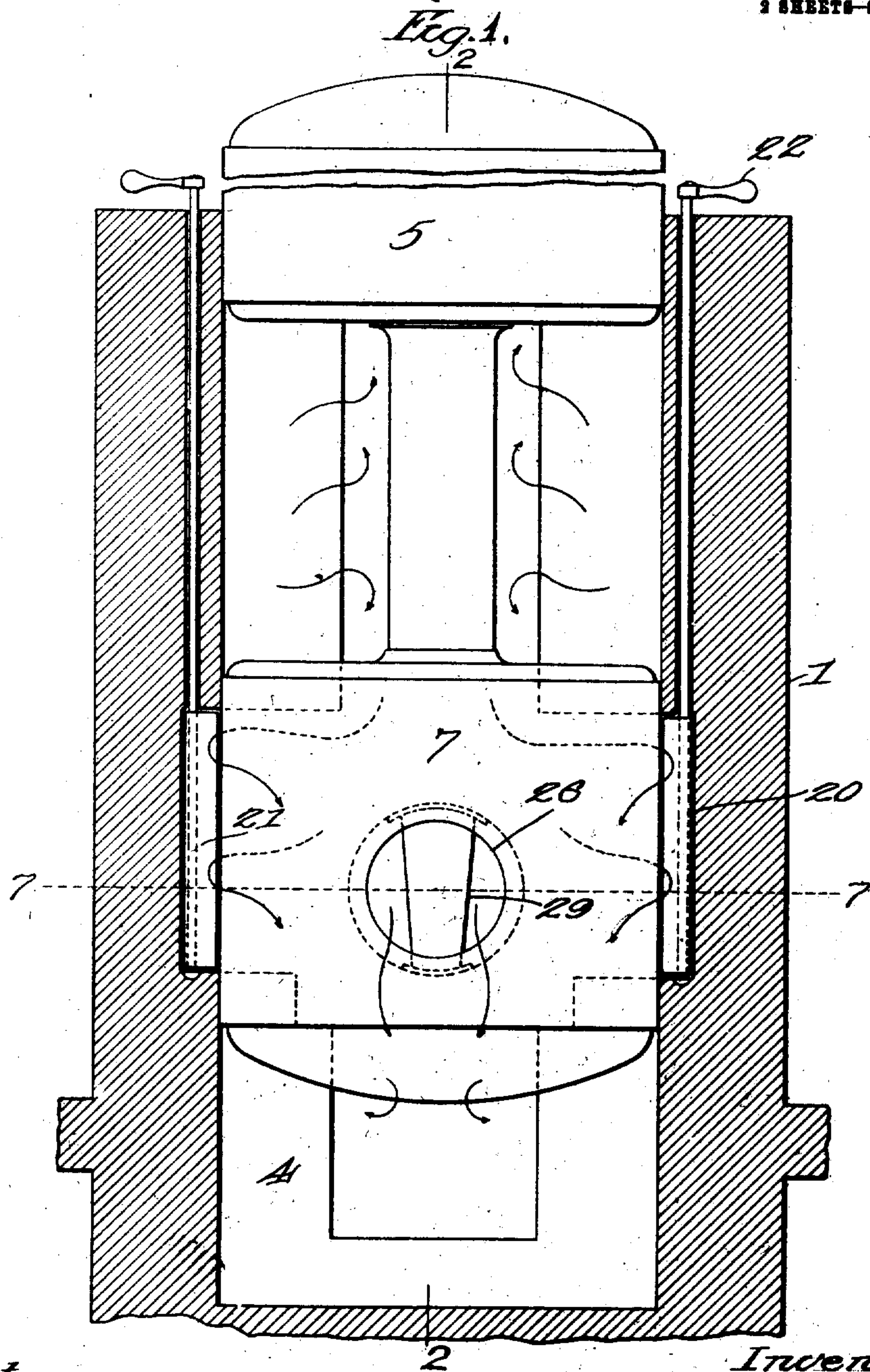


T. SUZUKI.  
 VERTICAL BOILER.  
 APPLICATION FILED APR. 9, 1909.

973,720.

Patented Oct. 25, 1910.

2 SHEETS-SHEET 1.



Witnesses:

C. H. Crawford  
 L. Lang

Inventor:

Toraburo Suzuki  
 By *Reinger*  
 Atty.

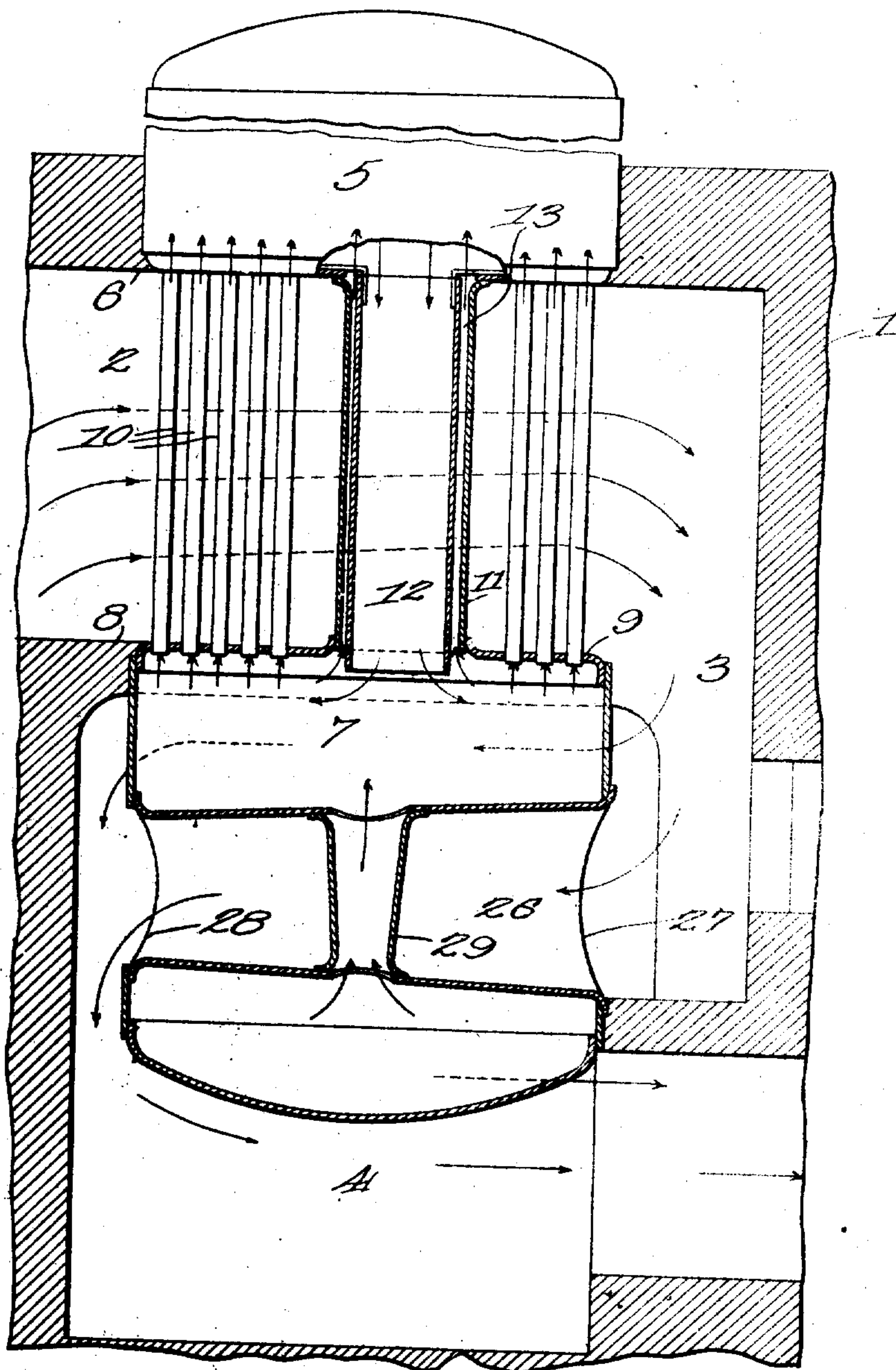
973,720.

T. SUZUKI.  
VERTICAL BOILER.  
APPLICATION FILED APR. 9, 1909.

Patented Oct. 25, 1910.

2 SHEETS-SHEET 2.

Fig. 2.



Witnesses:

C. H. Crawford  
H. Lang

Inventor:

Tozaburo Suzuki  
By W. B. Singer  
Atty.



# UNITED STATES PATENT OFFICE.

TOZABURO SUZUKI, OF SUNAMURA, JAPAN.

## VERTICAL BOILER.

973,720.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Application filed April 9, 1909. Serial No. 488,919.

*To all whom it may concern:*

Be it known that I, TOZABURO SUZUKI, a subject of the Emperor of Japan, residing at No. 401 Jibeishinden, Sunamura, in the county of Minami-Katsushika, in the Province of Tokyo, Japan, have invented a new and useful Improvement in Vertical Boilers, of which the following is a specification.

This invention relates to improvements in vertical boilers of that character comprising a steam chamber and a water chamber inclosed in a boiler structure.

The invention consists in the provision of passages in the water chamber for the products of combustion and the construction of the water chamber to the end that the greatest possible efficiency of heat may be obtained.

The invention will be more fully described in connection with the accompanying drawings and will be more particularly pointed out in and by the appended claim.

In the drawings:—Figure 1 is a vertical sectional view. Fig. 2 is a vertical sectional view on line 2—2 of Fig. 1.

Like numerals of reference designate similar parts throughout the different figures of the drawings.

As shown in the drawings the usual surrounding boiler structure is indicated as a whole at 1, and is provided with a main or inlet passage 2, preferably horizontally disposed, which delivers to an extension or as shown a downward passage 3. An ingress passage 4 delivers to the stack or other suitable outlet (not shown) for the products of combustion. A steam chamber 5 is disposed in the structure 1, in a manner to intersect the main passage 2, or the upper wall 6 thereof, so that the products of combustion flowing through said passage will play upon the lower wall of said chamber. A water chamber 7 is disposed in the structure 1 in a manner to intersect the lower wall 8 of the passage 2 so that the products of combustion will play upon the upper wall 9 of the chamber 7. Said chambers 5 and 7 are connected by tubes 10 which extend across said passage 2 and in the path of the products of combustion passing there-

through, in a manner to be effectively acted upon. If desired the chambers 5 and 7 may also be connected by a relatively large tube 11 provided with an inner tube 12 disposed in a manner to form an annular chamber 13 therebetween, extending throughout the length of the tube 11. The water in the chamber 13 will be heated much more rapidly and will rise more quickly than the water in the tube 12 and this will result in a more rapid evaporation of the water in the chamber 13 which action will effectively enhance water circulation.

In the form shown, the water chamber 7 is provided with a single combustion flue 26. As shown the flue 26 is constructed in a manner to retard the flow of the products of combustion therethrough so that the contents of the chamber 7 will take up or absorb as much as possible of the heat thereof but such retardation of the progress or flow of the products of combustion is not sufficient to interfere with an effective draft. As shown the flue 26 is gradually reduced in size from its intake end 27 to its outlet end 28 and may be conical in form as shown. In order to further increase the heating action a water tube 29 may be disposed in the path of the products of combustion passing through the flue 26. The tube 29 is in the form of an inverted truncated cone so that the water will be retarded at the entrance and may freely flow through the larger end as it is more rapidly heated. The larger upper end of the tube 29 also presents a greater area to the water above the same and the weight thereof will tend to retard upward flow through the tube 29 but the heat to which this tube is subjected will off-set any retardation caused by the weight of water above said tube.

I claim:—

A vertical boiler comprising in combination, a boiler setting provided with a main passage for the products of combustion, a steam chamber intersecting the upper wall of said passage, a water chamber intersecting the lower wall of said passage and being provided with a combustion flue below said passage having an enlarged intake end and

a relatively reduced outlet end; water tubes connecting said chambers and extending across and into the path of the products of combustion traveling through said main passage, a downwardly directed extension passage connecting said main passage with said combustion flue, an egress passage for the delivery end of said combustion flue, and

an auxiliary passage connecting said extension passage with said egress passage.

In testimony whereof I affix my signature in presence of two witnesses.

TOZABURO SUZUKI.

Witnesses:

UJIACHI SCHIWARA,  
GENJI KURIBARA.