

No. 608,218.

Patented Aug. 2, 1898.

J. C. PARKER.
STEAM GENERATOR.

(Application filed Aug. 20, 1897.)

(No Model.)

Fig. II.

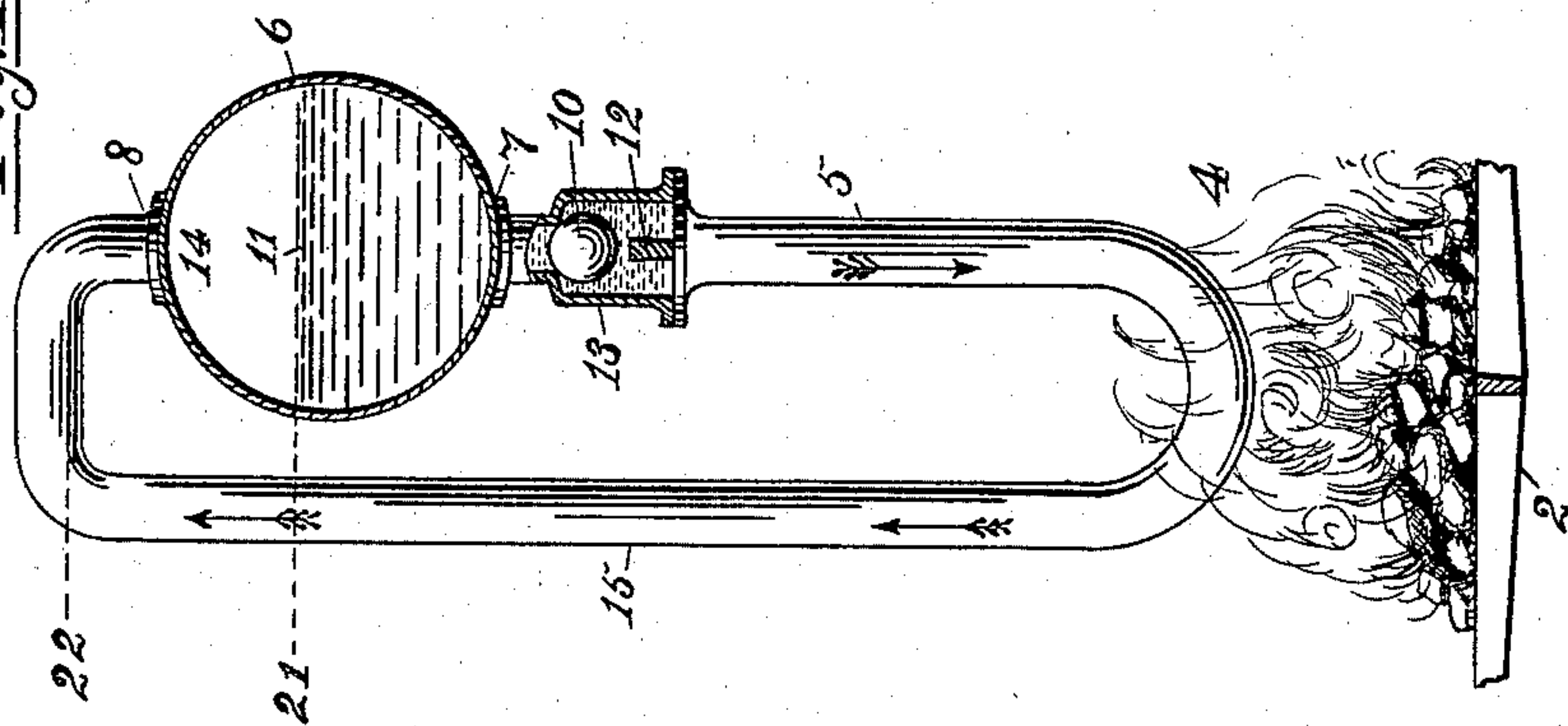
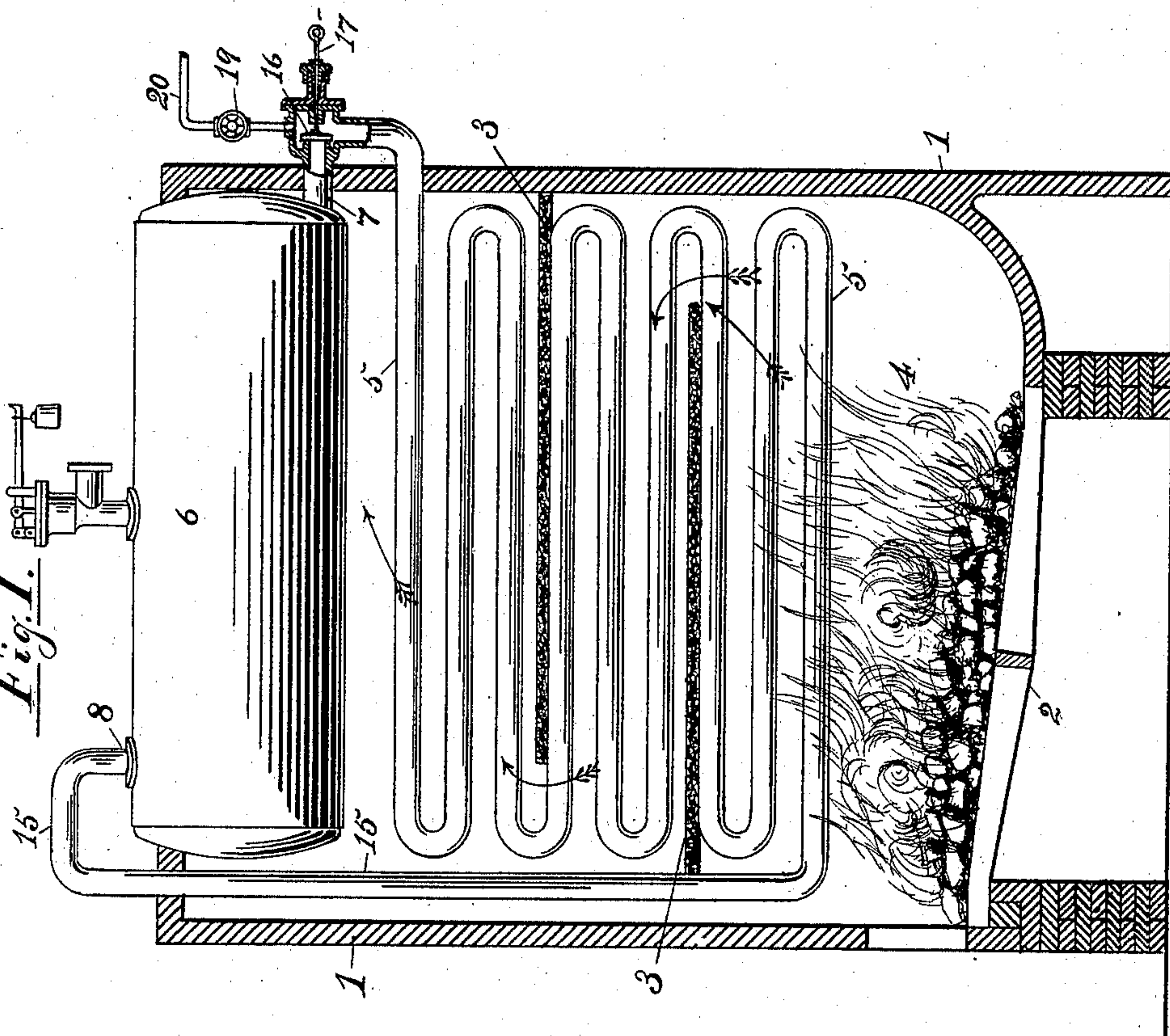


Fig. I.



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UNITED STATES PATENT OFFICE.

JOHN C. PARKER, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO THE
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STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 608,218, dated August 2, 1898.

Application filed August 20, 1897. Serial No. 648,905. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. PARKER, a citizen of the United States, and a resident of the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Steam-Generators; and I hereby declare the following specification and the drawings therewith to be a full, clear, and exact description of my invention and the manner of applying the same.

My invention relates to that type of steam-generators, commonly called "water-tube boilers," wherein the water to be converted to steam is contained in a series of connected tubes or pipes exposed to the heat of the furnace, as distinguished from boilers in which the heat passes through tubes surrounded by water, and to a means for causing the circulation of water in the said tubes or pipes in one direction toward the most intense heat, downward when necessary or at any inclination.

My invention consists in placing in the said tubes or water connections to the tubes, starting in the water-space in a superimposed drum, an automatic check-valve that permits the water to flow from the drum to the said tubes and toward the fire, but not to return, so that circulation of the water, for reasons hereinafter explained, will be in one direction irrespective of its gravity level or the steam contained therein and in any desired course or angle upward or downward. It also consists in apparatus to produce this result.

The objects of my invention are to attain progressive heating and evaporation of the water from the point of the lowest to the highest temperature in a steam-furnace oppositely to the usual course of such circulation in tubulous boilers, to utilize in the fullest degree the heat from the fuel consumed, to attain a more simple and inexpensive construction of such boilers, and to control their operation.

Referring to the drawings, Figure I is a longitudinal section through a steam-furnace, showing in side view a steam-generator arranged to operate according to my invention. Fig. II is a diagram to illustrate the method of operation in a more simple manner.

In Fig. I, 1 is the furnace-wall, 2 the grates,

and 3 baffling-plates to direct the course of the flame and hot gases from the fire 4.

The steam-generating parts consist of the tubes 5, of which there are commonly a series placed side by side in several or multiple tiers and connected together to form a continuous pipe in the manner well known to the steam-fitter's art, and a steam-drum 6, with which these tubes connect at the top, one connection 7 being in the water-space and the other connection at 8 being in the steam-space 14 of the drum 6, as seen in Fig. I.

In place of the series of pipes connected together as described I may use one continuous pipe disposed, as shown in Fig. I of the drawings, so as to occupy the fire-space and gradually descend from the water-space of the steam-drum to the vicinity of the fire and thence to the steam-space of the steam-drum, as shown, this being but a matter of relative economy and utility in construction, not of invention.

Referring to the diagram Fig. II, I place in the downflow-pipe 5 a check-valve 10, in this case a buoyant ball-valve that permits without any considerable resistance the downward flow of the water 11 from the steam-drum 6, but prevents any return flow upward by the valve closing on its seat, as shown in the drawings. The downward or opening movement of the valve 10 is arrested by a cross-bar 12, and the chamber 13 is made sufficiently large to permit free passage of the water around the valve 10.

It will be understood that an automatic valve of any kind that closes in one direction will act the same as the ball-valve 10, which is chosen in the present case for simple explanation.

In Fig. I the pipes correspond to the downflow-pipe 5 in Fig. II, but are extended to provide heating-surface and may consist of any number of tiers or folds or be disposed in any other manner—in coils, for example—so long as they permit the water to gradually advance from the cooler toward the hotter portion of the fire-space, and thereby promote the evaporation of most of the contained water before it passes to the pipe 15 and is discharged into the steam-space 14.

The disk-valve 16, (shown in Fig. I,) one of

the commonest type, answers in its functions to the ball-valve 10 in Fig. II, closing inwardly and opening outward automatically by the flow of the water in the pipes or flues 5. I show this valve in Fig. I with a stem 17, which will indicate the position of the valve and enable an attendant to ascertain if it is shut, also will permit adjustment of the valve to control the rate of flow, if that be desirable or necessary.

The feed-water for the generator is preferably supplied at the top of the downflow-pipe 5 through the supply-pipe 20 and is regulated by a valve 19, as seen in Fig. I.

The operation of my improved steam-generator is as follows: The tubes 5 and the steam-drum 6 being filled with water up to the gravity-level 21, the fire 4 is started, and as soon as evaporation begins there is a tendency to produce an upward current in the pipes 5 and 15. As, however, no upward flow can take place in the pipes 5 because of the check-valve 10 or 16, the expanded water and steam mingled therewith will flow up the pipe or tube 15. Such flow will begin as soon as the gravity of the mingled steam and water in the pipe 15 is reduced enough in weight to compensate for the difference in water-level between the levels at 21 and 22, which distance can be increased or reduced by the shape of the pipe 15 as the resistance to flow thus offered may be desired. As soon as this upflow in the pipe 15 begins the valve 10 or 16 opens and the solid water passes down through the pipes 5, constantly approaching the hottest point of the furnace, the temper-

ature rising in proportion until partial evaporation takes place. In this manner it will be seen that by observing certain proportions and conditions well known in thermal science the decrease in the intensity of the heat and the increase in the temperature of the water are made to correspond or are so adapted in degree one to the other as to utilize a greater proportion of the heat consumed than if circulation of the water were left free to flow in either direction.

Having thus explained the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

In a steam-generator of the water-tube type, a steam-drum 6, a tubular passage-way 5 connected with the water-space of the said steam-drum, located in the fire-space, leading continuously downward from the coolest to the hottest portion of the said fire-space, and thence by direct connection 15 to the steam-space of the steam-drum, in combination with a check-valve in said tubular passage-way 5 opening outward from the steam-drum, whereby the water is compelled to circulate in one direction only, and always from the cooler toward the hotter portions of the fire as it leaves the water-space of the steam-drum, substantially as specified.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

JOHN C. PARKER.

Witnesses:

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H. SANDERSON.