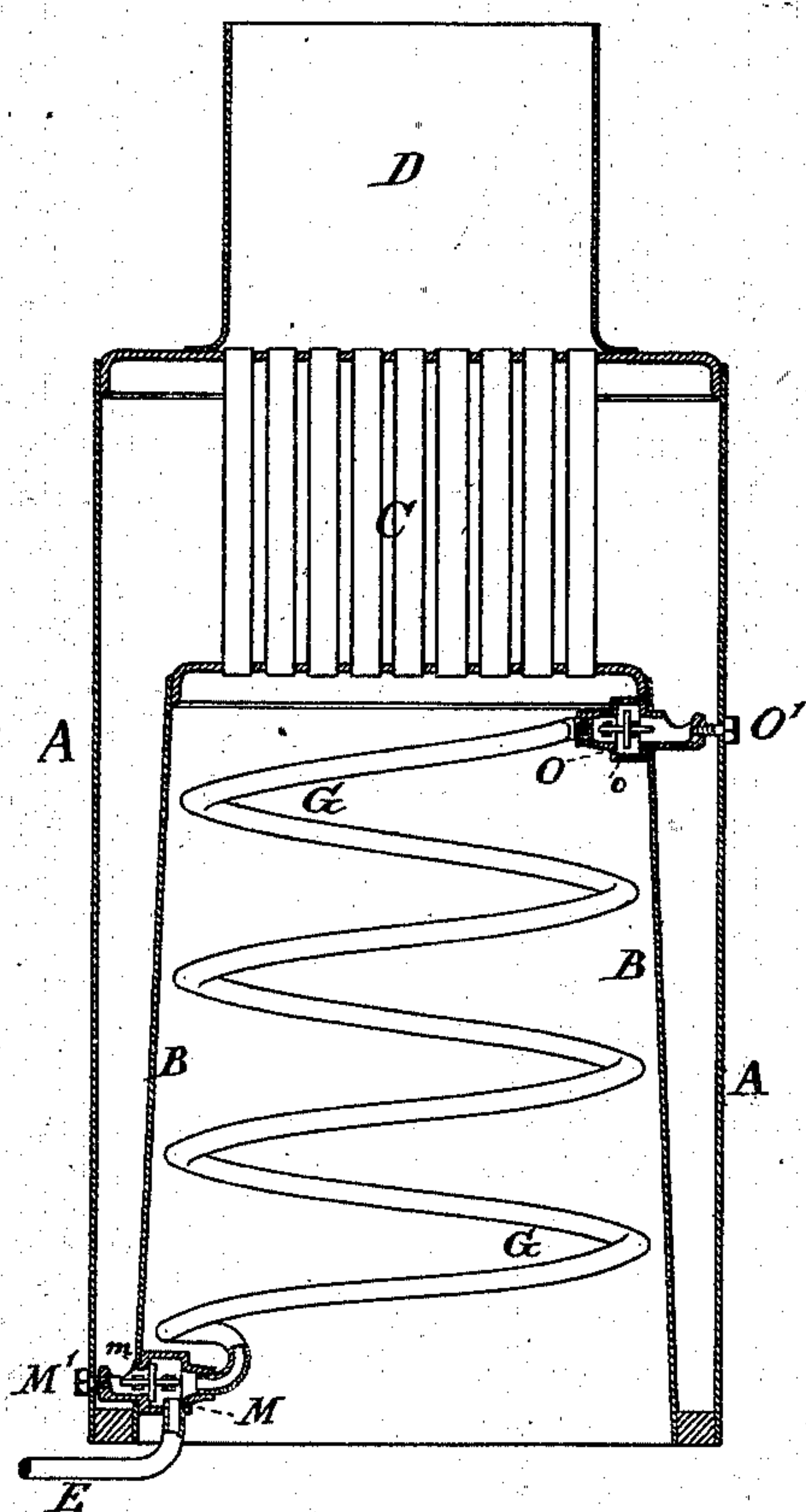


**R. J. GOULD.**  
**Steam-Boilers.**

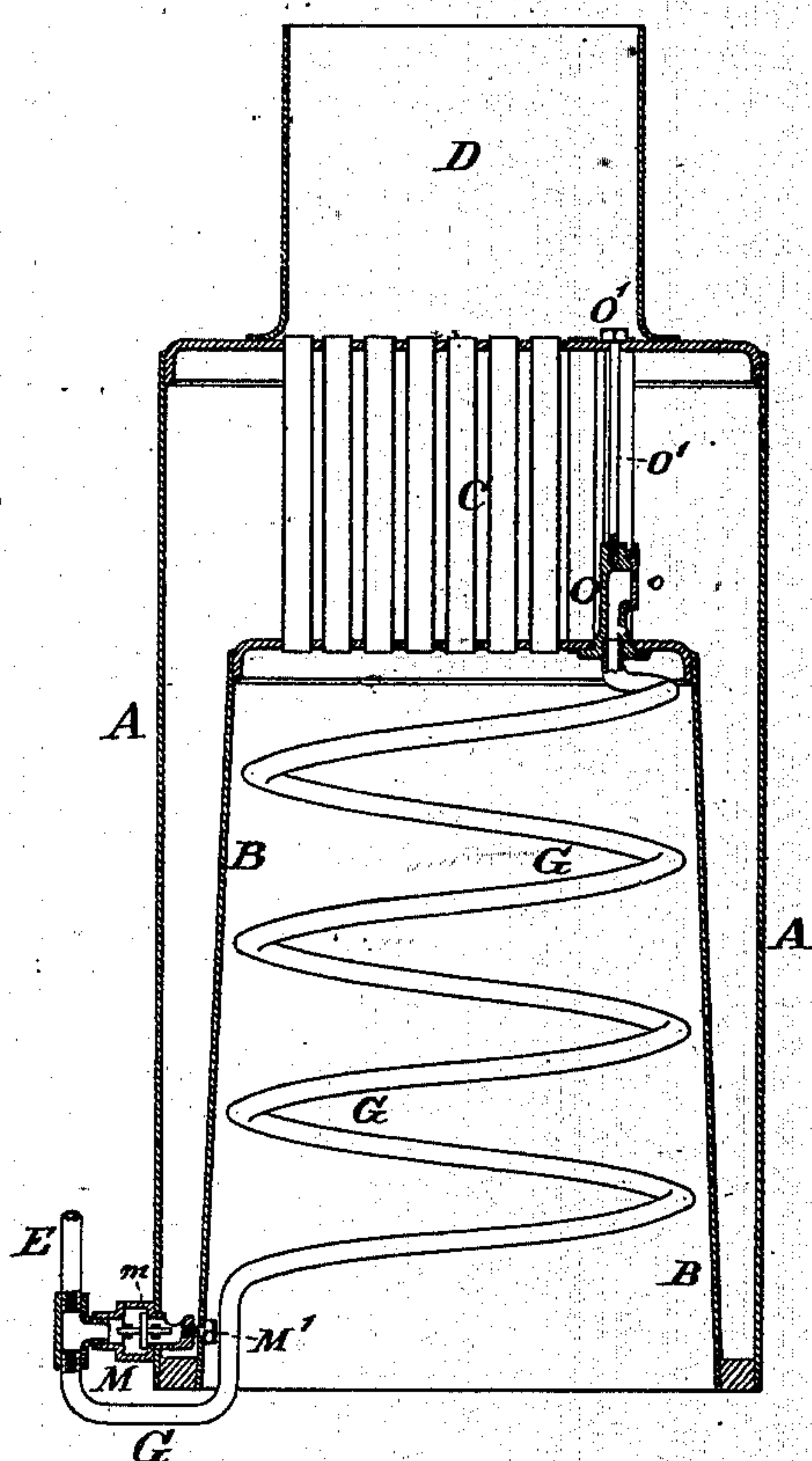
No. 146,331.

Patented Jan. 13, 1874.

*Fig. 1.*



*Fig. 2.*



Witnesses:

*Arnold Körnemann*  
*Wm C. Dey.*

Inventor:

*R. J. Gould,*  
*by his attorney*  
*J. D. Stetson,*



# UNITED STATES PATENT OFFICE.

ROSCOE J. GOULD, OF NEWARK, NEW JERSEY.

## IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **146,331**, dated January 13, 1874; application filed December 1, 1873.

*To all whom it may concern:*

Be it known that I, ROSCOE J. GOULD, of Newark, Essex county, New Jersey, have invented certain Improvements relating to Steam-Boilers, of which the following is a specification:

I employ one ascending pipe, leading up within a furnace, in which water is caused to actively circulate, either by the force of the feed-pump or by other means, during the whole period while the fire is in the furnace. I render available the irregularities in the action of the force in an apparatus so arranged, to induce a vigorous circulation in the absence or insufficiency of other inciting causes.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a central vertical section through the boiler, with an elevation of the ascending pipe shown in a helical form. Fig. 2 is a corresponding section, showing important modifications in the details.

Similar letters of reference indicate corresponding parts in both figures.

Referring to Fig. 1, A is the main body or outer shell of the boiler, and B the fire-box or inner shell. C indicates a series of vertical tubes, and D a chimney. The grate and other ordinary appurtenances, including stay-bolts and try-cocks, may be of the ordinary character. E is a feed-pipe, through which water is received at intervals from a pump, or analogous feeding device. (Not represented.) It flows into a small chamber in the casting represented, from whence it is prevented, by a delicately-mounted valve, *m*, from flowing directly into the water-space around the base of the furnace, and is compelled, in order to enter the boiler, to traverse upward through the pipe G, and enter the boiler by passing the delicately-mounted valve *o* near the top of the furnace. At this point it mingles with the water of the boiler, having become largely generated into steam in passing through the heated pipe. When the feed is for any reason shut off, the circulation thus induced stops, and another and entirely different one is initiated. The water in the pipe G, becoming

changed into steam, is lighter than the water outside in the space between A and B, so that there is a slight tendency of both the valves *m* and *o* to remain open, and the water to circulate steadily upward, entering the base of the pipe G by passing the valve *m*, and escaping from the top of the pipe G in a continuous current, increased in volume by the steam generated on the passage, and thus flowing steadily past the constantly-open valve *o*. But experience demonstrates that the tendency to this motion is too slight to be depended upon. The intense action going on in the generation of steam in the pipe G induces violent concussions or reactions, which tend at intervals to induce a backward motion through the lower portion of the pipe G, and the circulation is liable to be entirely arrested, and the pipe G to become overheated and destroyed. I render available the irregularity of the action in the pipe G to induce an intermittent circulation. Whenever there is a tendency to a backward action through the base of the pipe G, the valve *m*, being light and easily moved, closes and prevents such a motion. It thereby compels the vigor of the expansion of the steam to expend itself by inducing a motion through the pipe, and vomiting out steam and water freely past the valve *o*. The next contraction or tendency to regurgitation causes the delicately-mounted valve *o* to close, and a strong draft of dense water to be drawn in past the valve *m*, which, being light, opens easily to allow this. Thus a new supply of water is received in the base of the pipe G, and this, on ascending in the heated pipe, induces a continuation of the concussions and fluctuations in pressure, with, of course, a continuation of the circulation. Each valve is a disk, and may be of very light material, as it does not have to bear the full pressure of the steam, but only to resist the tendency of the motion of the water and steam in the wrong direction. It is mounted on a horizontal spindle, which moves with great freedom in the guides. The valves are mounted, respectively, in cast-iron casings or housings M O, which are fitted steam-tight against the inner faces of the fire-box or inner shell B by means of red lead, or other suitable joint. Each casting extends through an opening in the shell B, and is se-



cured by a bolt inserted through the proper point in the exterior shell A. It forms a passage through the shell B, and affords convenient provisions for access for repairs. The bolt which secures the lower casing, M, is marked M', and the bolt which secures the upper casing, O, is marked O'. It is easy to remove either of these casings by breaking the joint and moving it inward after unscrewing a single bolt. The chamber which receives the water from the pipe E is, in this form of the construction, provided in the inner end of the casing M.

In the modification shown in Fig. 2, the same general features are introduced with a slightly-differing arrangement. The valve *m* is, in Fig. 2, mounted in a chamber just outside of the outer shell, instead of inside of the inner shell; but the connections are such that the same general effect is produced. The dense water from the space between the shells is drawn past the valve *m*, and prevented from returning, as the pressure in the pipe G fluctuates under its intense heat when the feed is shut off, and the valve *m* remains firmly closed, to prevent any motion of the feed-water past it during all the period while the pump is feeding. The delivering-valve *o* is in this modification, Fig. 2, mounted somewhat above the crown of the furnace, and is represented as hinged near its upper edge, with a stop above the axis to prevent the valve from opening too wide under the strong upward current of

steam. It is important that it be always ready to close and prevent a back flow of water, while it is ready to open with a gentle force and deliver in large volumes, whenever the pressure in the pipe G is ever so little above that in the boiler. The water-level of the boiler may fluctuate considerably. It may even fall below the delivery from the upper end of the pipe G without materially detracting from the efficiency of my apparatus. It will induce an active circulation under all conditions when there is a bright fire in the furnace.

I claim as my invention—

1. The two valves *m o*, in combination with the pipe G, and arranged as represented relatively to the shells A B of the boiler, for the purposes specified.

2. The arrangement of the feed-pipe E, relatively to the pipe G, valves *m o*, and boiler-shells A B, substantially as and for the purposes herein set forth.

3. The castings M O, formed as represented, in combination with their inclosed valves *m o*, the confining-bolts M' O', the shells A B, and the connected pipe G, as herein specified.

In testimony whereof I have hereunto set my hand this 21st day of November, 1873, in the presence of two subscribing witnesses.

ROSCOE J. GOULD.

Witnesses:

WM. C. DEY,  
ARNOLD HÖRMANN.