

# I. N. Wilfong Steam Boiler.

No. 91,294.

Patented Jun. 15, 1869

Fig. 6.

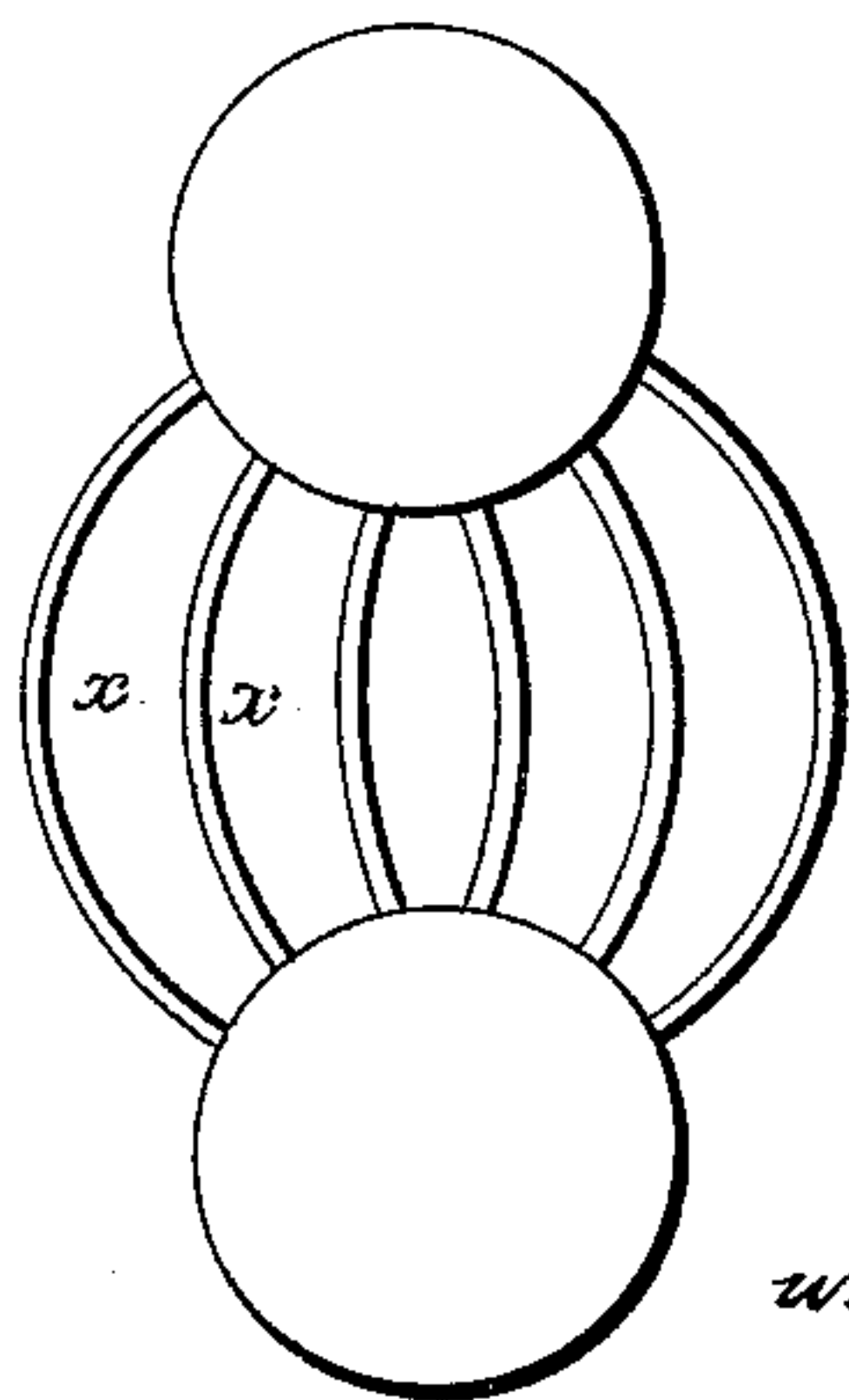


Fig. 1.

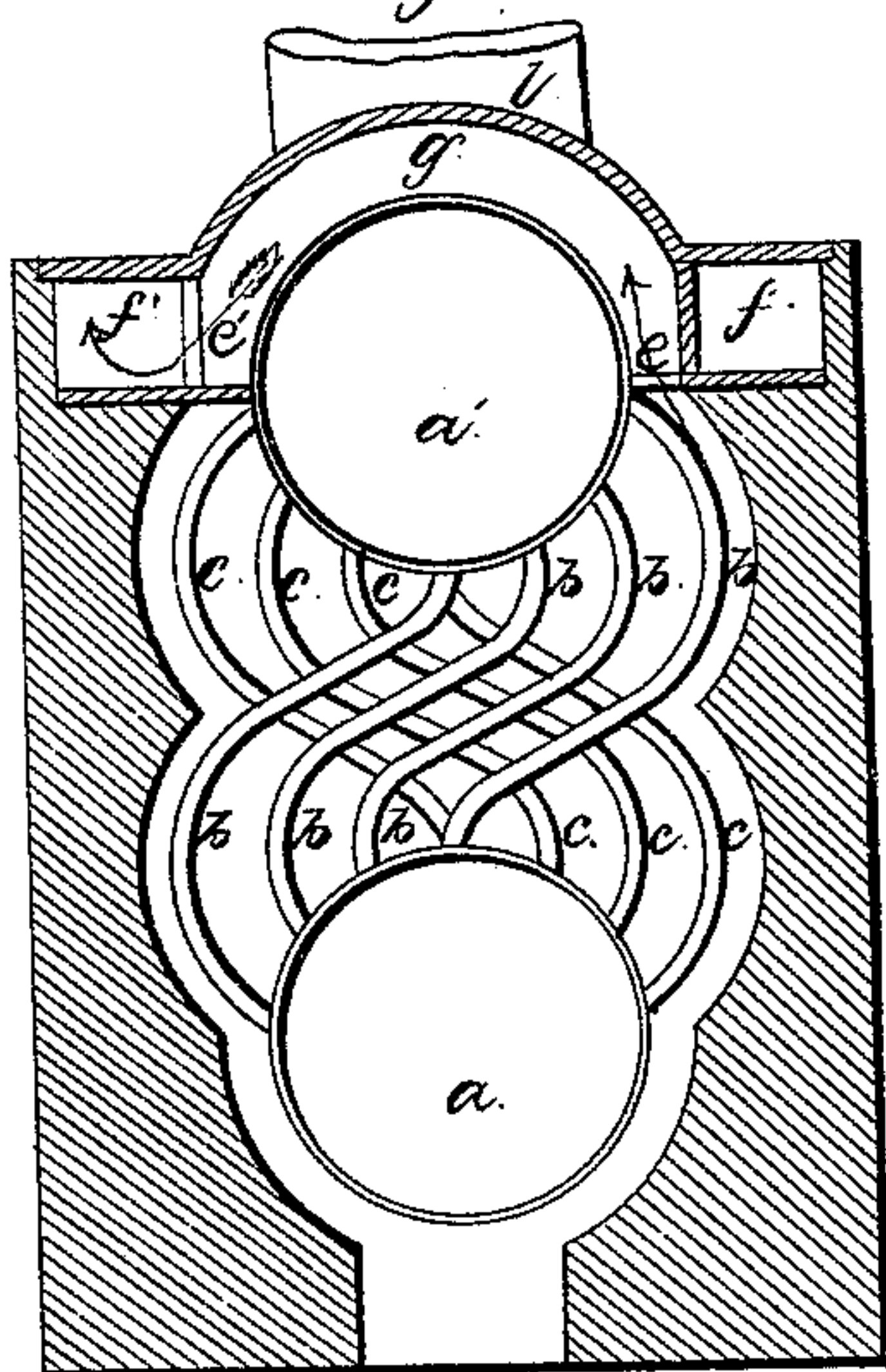


Fig. 7.

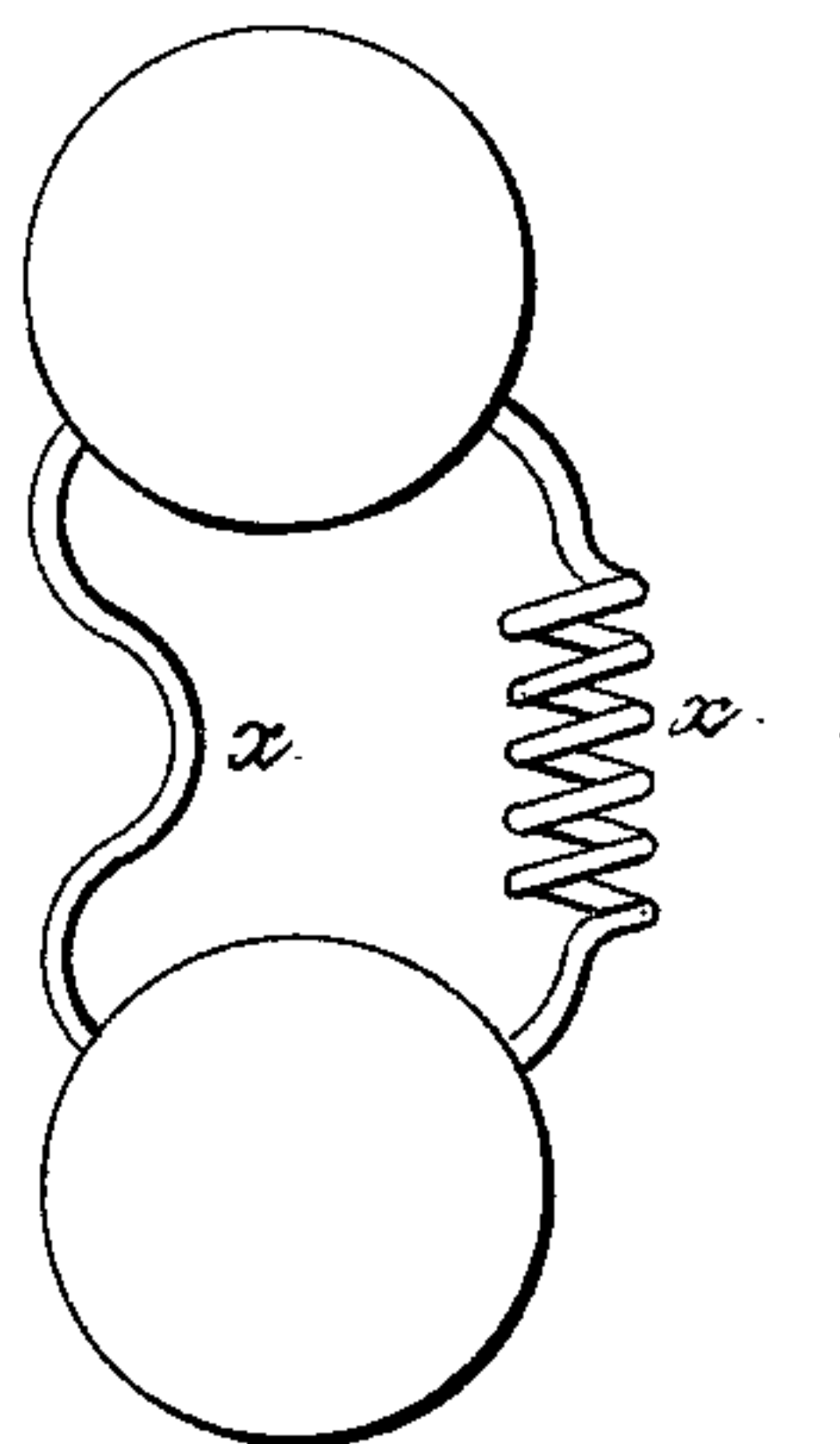


Fig. 2.

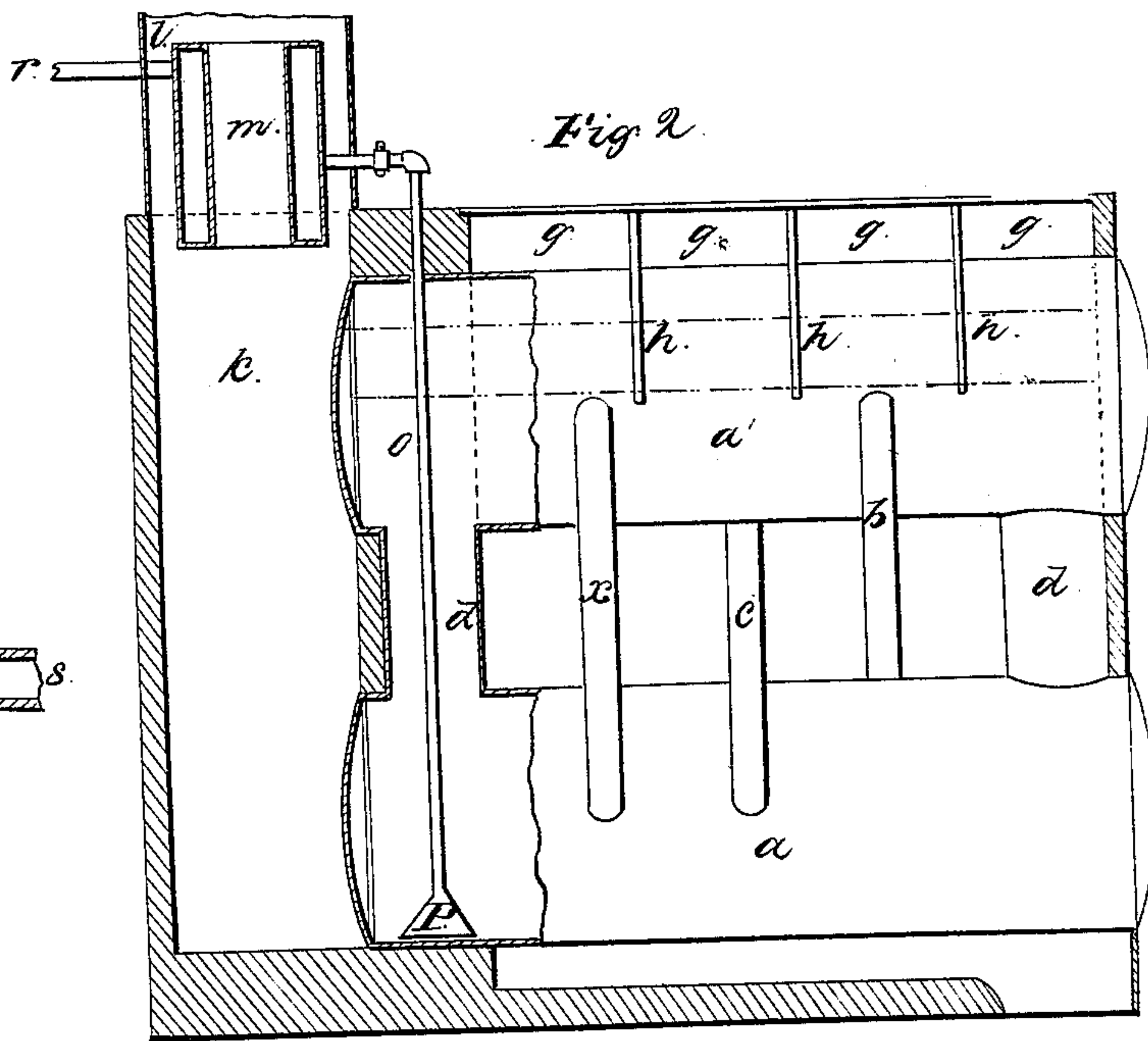


Fig. 5.

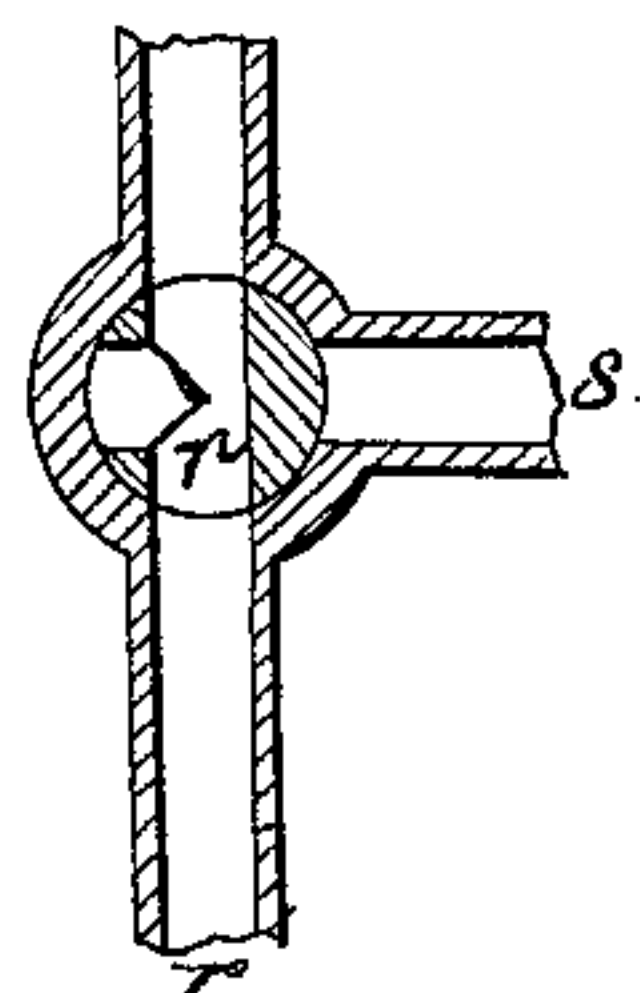


Fig. 4.

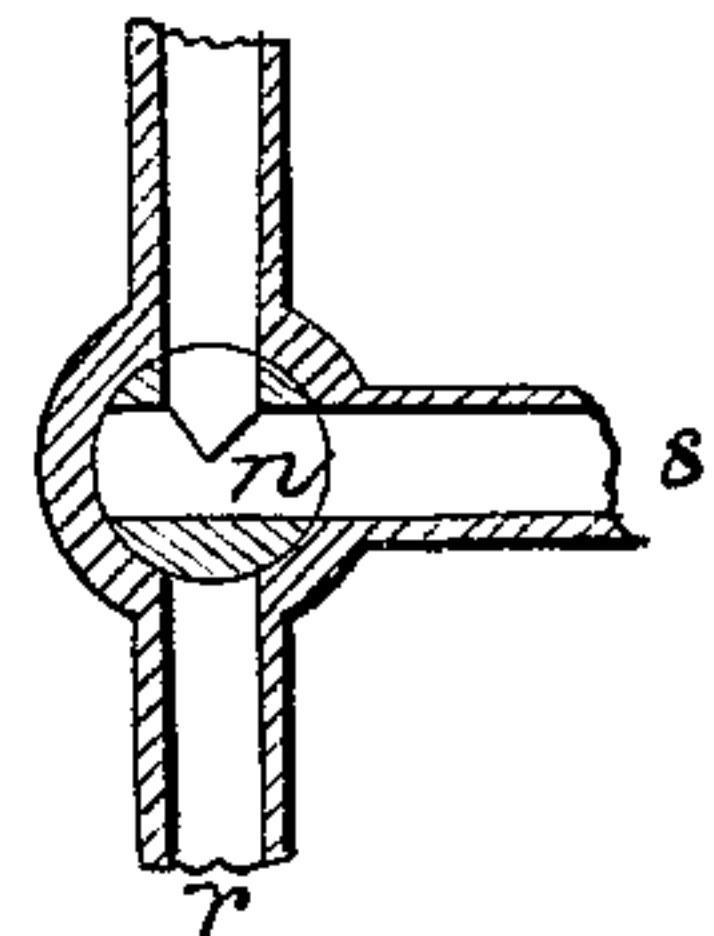
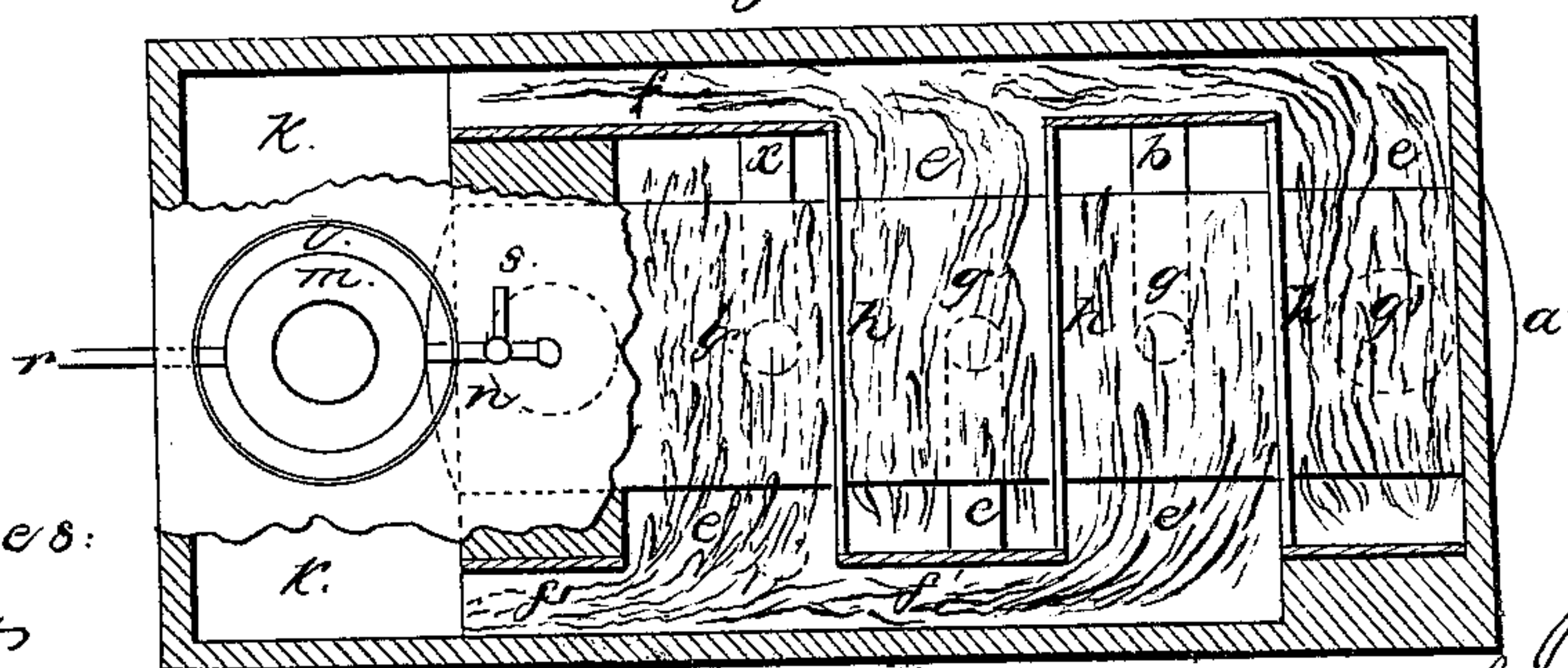


Fig. 3.



Witnesses:

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ISAAC N. WILFONG, OF PHILADELPHIA, PENNSYLVANIA.

*Letters Patent No. 91,294, dated June 15, 1869.*

## IMPROVEMENT IN STEAM-GENERATORS.

The Schedule referred to in these Letters Patent and making part of the same.

Be it known that I, ISAAC N. WILFONG, of Philadelphia, in the county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a vertical transverse section of the improved boiler;

Figure 2, a longitudinal section; and

Figure 3, a sectional plan.

Figures 4 and 5 show the connection between the feed-water heater and boiler, and

Figures 6 and 7 different ways of bending the tubes.

The improved steam-boiler consists of two parallel cylinders, *a* and *a'*, connected by curved tubes *b b b b* and *c c c c*, in addition to the straight tubes *d d*, which are usually used for this purpose.

The curves of these tubes are such that their ends will enter the shell of the cylinders *a* and *a'* at or nearly at right angles with a tangent line drawn through the point of junction with the cylinder, as shown at *w*, fig. 6.

The tubes are set in rows transversely across the boiler, and may be bent in different ways, as shown at *x*, in figs. 2, 6, and 7; but it is preferable to bend them, as shown in fig. 1, where *b b b b* start at the left of the lower cylinder, cross over to the right, and there enter the upper cylinder. *c c c c* take a contrary direction.

Nearly on a level with the centre of *a'* are partitions *e* and *e'*, for the purpose of intercepting the heat, and to cause it to pass over the top cylinder *a'* into the flues *f* and *f'*, through the passages *g* and *g'*, which are formed by the annular partitions *h h h* around the upper half of *a'*.

In fig. 3 is shown how the passages *g* and *g'* alternate, *g* communicating with the right side of the furnace and the left flue *f'*, and *g'* connecting the left side of the furnace with the right flue *f*.

The products of combustion pass from the flues *f* and *f'* into the smoke-chamber *k*, and from thence through the chimney *l*, but here they meet with the feed-water heater *m*, which may be a vessel of either tubular, flue, or other well-known construction, con-

nected, by suitable means, with the pump of the engine, and also with the boiler, in such a manner that the feed-water has to pass through it before entering the boiler.

By referring to figs. 4 and 5, it will be observed that the feed-pipe *r* is also used as a blow-off pipe, by means of the "three-way cock" and branch *s*.

Fig. 4 shows the cock in position for blowing off, and fig. 5 for feeding.

The feed-pipe *o*, fig. 2, passes to the bottom of the boiler, and terminates there in an open funnel, *p*.

The advantages of the curved tubes are, that less injury results from their expansion, greater length, and consequently more heating surface are obtained, and their being exposed to more heat than the straight tubes *d d*, causes the water to circulate rapidly.

By the passages and partitions across the top cylinder, and by the feed-water heater, a large amount of heat is saved, and by using the feed-pipe at the same time as a blow-off pipe, the cost of construction is reduced.

I do not limit myself to the number of tubes in one row, nor to the number of rows in a boiler. For marine purposes, a hollow metal case, to hold water, may be substituted for the brick-work.

I do not claim as my invention the connection of the cylinders *a* and *a'*, by means of straight tubes, nor the idea of placing a feed-water heater in the chimney of a boiler; but

What I claim as my invention, is—

1. The arrangement of a series of curvilinear tubes, connecting to parallel cylinder boilers, substantially as described.

2. The passages *g g'*, formed by the partitions *h h h*, substantially as set forth.

3. The combination of the partitions *h h h*, passages *g g'*, and flues *f* and *f'*, with the cylindrical boilers *a* and *a'*, substantially as specified.

4. The arrangement of the heater *m*, pipe *r*, "three-way cock" *n*, branch *s*, and boilers *a* and *a'*, substantially as specified.

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Witnesses:

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