2 Sheets—Sheet 1.

L. SHOOK.

PRECIPITATOR FOR STEAM-ENGINE BOILERS.

No. 192,194. Patented June 19, 1877.

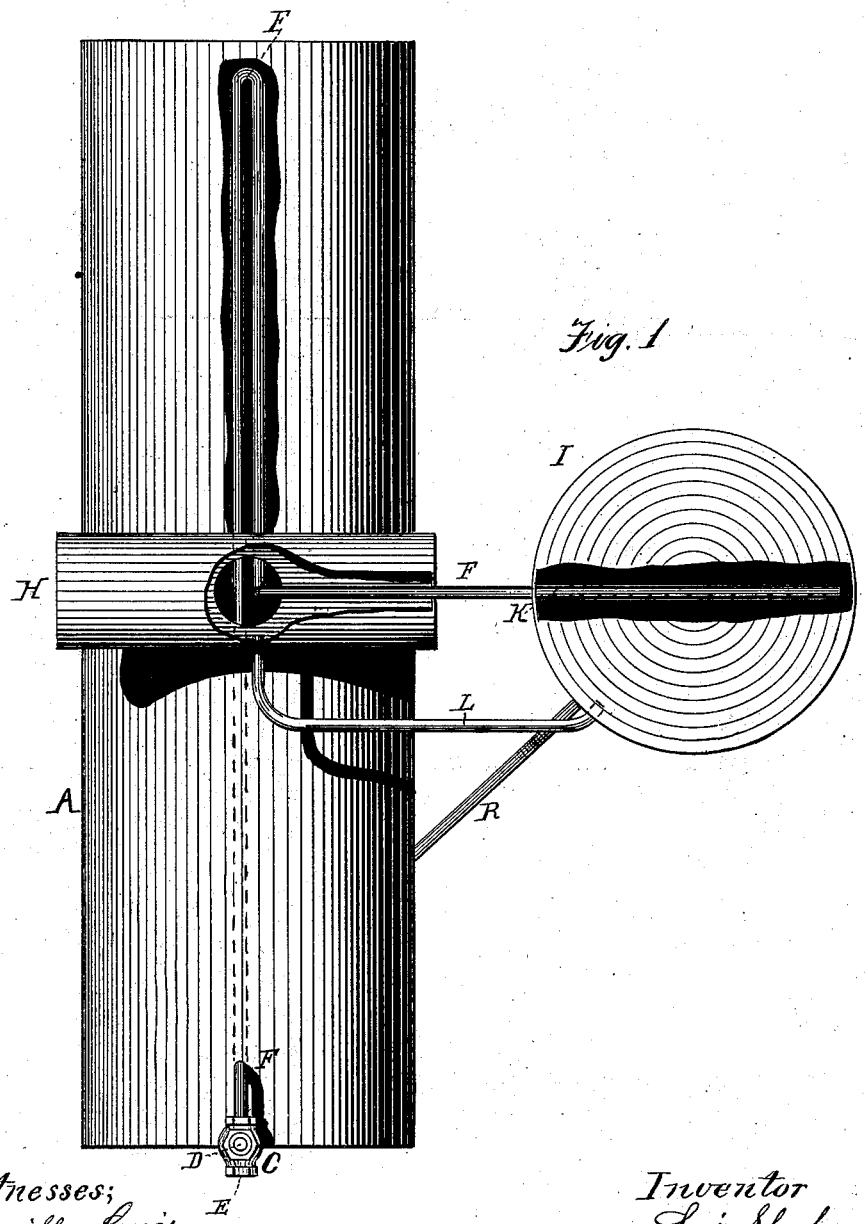

Fig. 1

Witnesses;
Granville Lewis
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by his Attys.
Cox & Cox

2 Sheets—Sheet 2.

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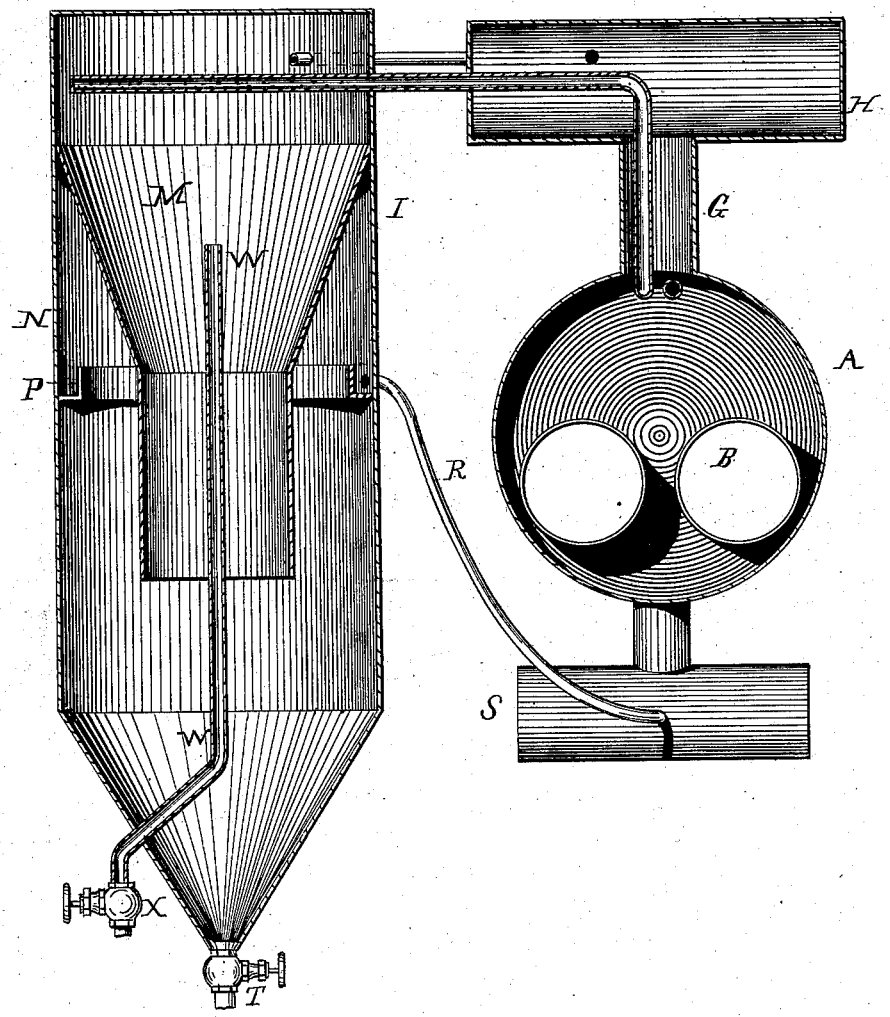
Fig. 2.



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UNITED STATES PATENT OFFICE.

LEVI SHOOK, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF HIS RIGHT TO JAMES REES, OF SAME PLACE.

IMPROVEMENT IN PRECIPITATORS FOR STEAM-ENGINE BOILERS.

Specification forming part of Letters Patent No. **192,194**, dated June 19, 1877; application filed April 13, 1877.

To all whom it may concern:

Be it known that I, LEVI SHOOK, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Precipitators for Steam-Engine Boilers, of which the following is a specification, reference being had to the accompanying drawings.

The invention relates to an improvement in precipitators for steam-boilers; and consists in the mechanism hereinafter specifically designated, the object being to furnish a suitable device for separating the water from all mineral, animal, and vegetable matter contained in it, and to afford a ready means for the discharge of such substances.

Figure 1 is a plan view of a device embodying the elements of the invention. Fig. 2 is a central vertical transverse section of same.

In the accompanying drawings, A represents the steam-boiler, provided with the furnace B, and at its upper forward end the inlet *c*, which is furnished with the cap D and valve E, for regulating the flow of water. To the end, opposite the inlet of the coupling C, is secured one end of the pipe F, the other end, extending rearward a short distance, curves downward, entering the boiler A, and again extends rearward near the upper inner surface of the same until it reaches a point in close proximity to its rear end, when it makes a short turn, and passes forward in juxtaposition to the portion extending rearward to about the center of the boiler, and then protrudes upward, passing through the tube or pipe G to the steam-chamber H; thence it extends horizontally through the same into and across the chamber of the precipitator I, where its end is closed and its bottom and sides provided with perforations K, for the purpose hereinafter designated.

The steam-chamber H is situated above the boiler, and is connected with it by the pipe G, and to the precipitator by the pipe L, which extends from one side of the steam-chamber through the exterior casing of the precipitator at a point just opposite the perforations of the pipe F.

Below the perforations K and mouth of the pipe L the precipitator is furnished with an interior casing, M, which deflects downward and inward for a portion of its length, and then depends vertically downward, its lower portion being parallel to the surface of the precipitator just opposite it.

It is obvious, by this form of construction, a chamber, N, is obtained between the casing M and sides of the precipitator, and, as the upper edge of the casing is secured in a water-tight manner to the inside surface of the precipitator, it is evident that water, to enter the chamber N, would have to pass downward and ride up under the casing M to a level with the upper edge of the boiler, thence flow into the channel P, from which it enters the pipe R, and passes downward to the mud-drum S, whence it flows upward into the steam-boiler. Opposite the upper portion of the vertical part of the casing M is provided the annular channel P, the inner wall of which is properly separated from and opposite to the inner surface of the exterior casing, the channel being open above. This serves as a conduit to lead the pure water to the pipe R.

The pipe R, which may be provided with a cock, enters the precipitator at a point above the level of the water-line in the boiler, and is employed to convey the water to the mud-drum, from which it passes to the boiler. The pipe R is thus placed for the reason that when the precipitator is being blown out or emptied the steam will take the place of the sediment, and thereby prevent the water flowing in from the boiler.

The lower end of the precipitator is in the form of an inverted cone, and is furnished with the vent T, the purpose of which will be set forth hereinafter.

In the vertical center of the precipitator is provided the pipe W, the upper end of which is open, and is about on a level with the upper surface of the steam-boiler. The other end of the said pipe extends downward and passes through the side of the cone-shaped end of the precipitator, where it is provided with a vent, X, which may be opened or closed, when desired.

Operation: Water being fed to the inlet C enters the pipe F, and flows backward and forward through the same in the upper por-

tion of the boiler A, where it becomes heated to about 280° Fahrenheit, thence it passes upward to the steam-chamber H, from which it flows into the precipitator, and is discharged in jets through the apertures K, during which steam passes through the pipe L from the chamber H and is emitted into the jets of water, this increases the temperature of the latter to from 310° to 330° Fahrenheit, and it is at this point that water will not sustain any mineral matter, but will buoy up all animal and vegetable substances. As a result the mineral matter is precipitated into the cone, and animal and vegetable substances are retained on the surface of the water in the interior of the inner casing, so that if the vent X be opened they will be blown off through the pipe W.

It is plain that many other modes of heating the water fed to the precipitator may be employed, and it is not intended to limit the invention to the devices shown for this specific purpose, since the object of the invention may be as readily effected if the water entering the precipitator is heated to the degree above indicated.

Now, it is obvious that with the weighty sediment in the bottom of the precipitator and the lighter matter within the casing M, the pure water will rise into the space between the interior and exterior casings, and overflow the channel P, and be thence led through the pipe R to the steam-boiler without being again mixed with the foreign matter, thus scales and incrustation on the surface of the boiler is prevented, as well as the burning of the same; at the same time the strength of the iron is retained.

When it is desired to discharge the vegetable matter floating within the casing M the vent X is opened, and it will readily pass out through the pipe W. The mineral substance is expelled by simply opening the vent T, when the pressure of steam will force out all matter within the precipitator.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A precipitator for steam-boilers, consisting of an inner casing for collecting the floating precipitation, and provided with a pipe and cock for drawing off such precipitation alone, in combination with an outer casing for containing the sunken precipitation, and also provided with a pipe and cock for drawing off such precipitation alone, all so arranged that the contents of either or both casings may be simultaneously or separately discharged, substantially as set forth.

2. A precipitator for steam-boilers, provided with an inner casing for collecting the floating precipitation, and encompassed by an exterior casing for collecting the sunken precipitation, substantially as set forth.

3. A precipitator for steam-boilers in which the water is superheated in a pipe led through the boiler, whence it is discharged through apertures in the end of the pipe, which conveys it into the precipitator, and is heated therein by a jet of steam to a degree at which all animal, vegetable, and mineral matter is precipitated, substantially as set forth.

4. A precipitator for steam-boilers, consisting of an inner and outer casing, provided with a pipe to draw the pure water between the casings from a point between the floating and sunken precipitation, substantially as set forth.

5. The combination of the precipitator or casing I, the interior casing M, and chamber N, substantially as shown and described.

6. The precipitator I, provided with the pipes R and L and pipe F, having the perforations K, in combination with the inner casing M, having pipe W, substantially as set forth.

7. The precipitator I, provided with the casing M, chamber N, and channel P, in combination with the pipe R, substantially as set forth.

In testimony that I claim the foregoing improvement in precipitators for steam-engine boilers as above described, I have hereunto set my hand this 9th day of April, 1877.

LEVI SHOOK.

Witnesses:

JAMES REED,

ANDREW HUMBERT.