P. H. Watson,

Steam-Boiler Fire-Tube.

No. 10,194. Patented Nov. 1, 1853.

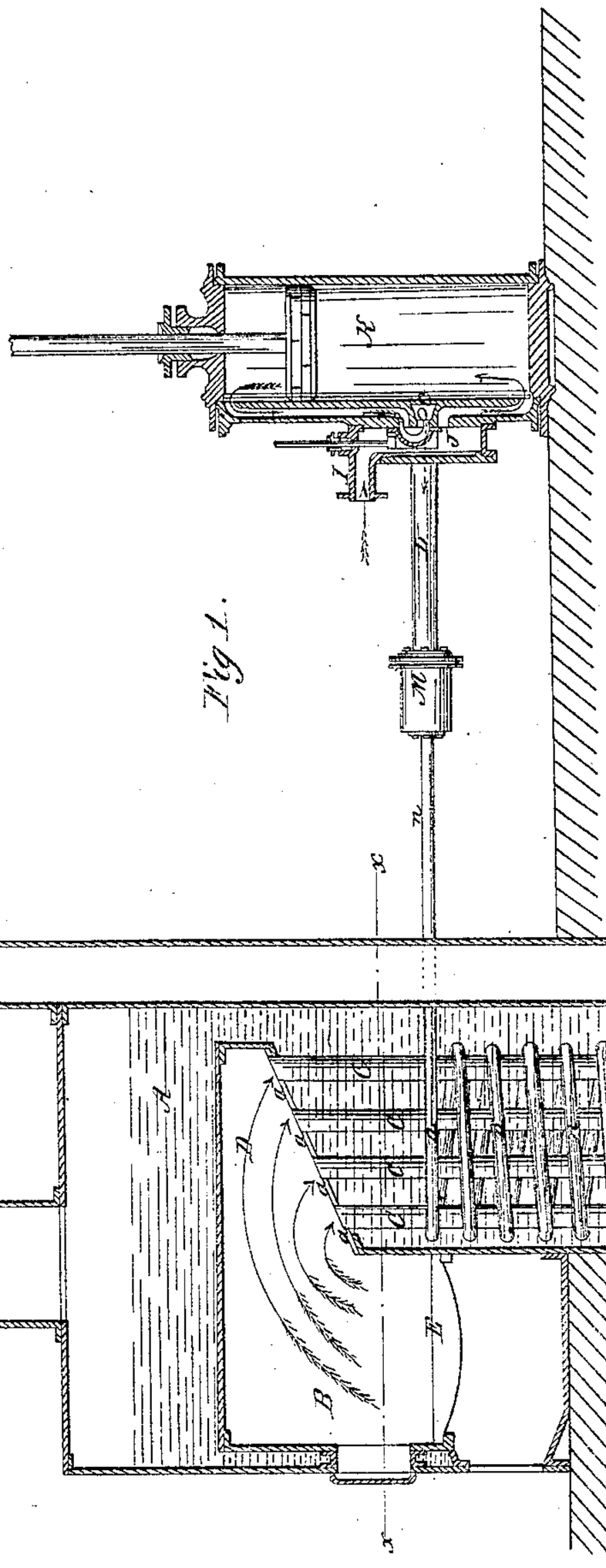

Fig. 1.

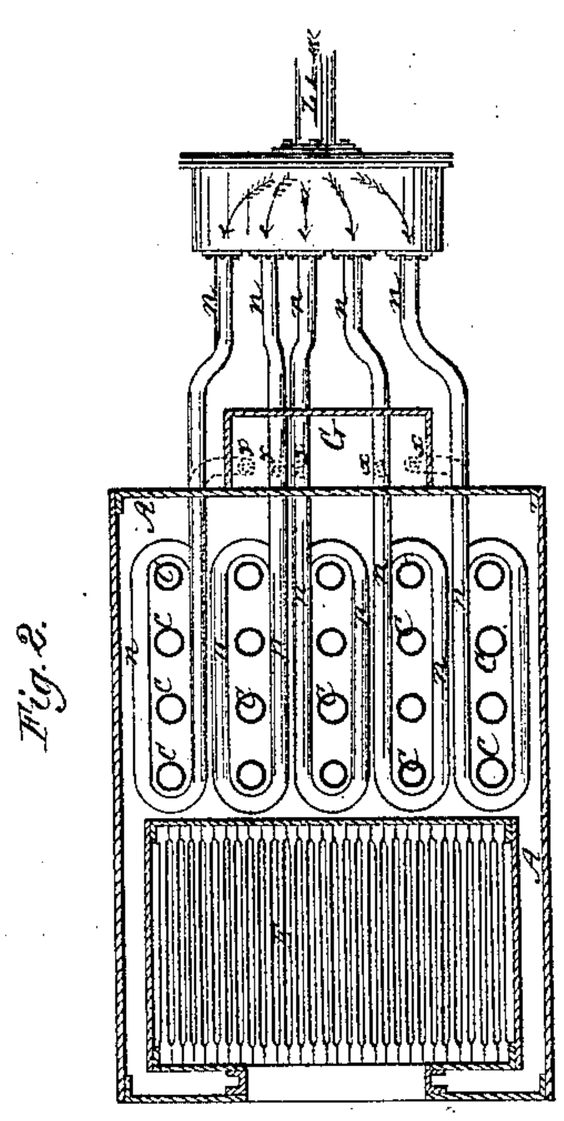

Fig. 2.

UNITED STATES PATENT OFFICE.

PETER H. WATSON, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENTS IN GENERATING AND CONDENSING STEAM.

Specification forming part of Letters Patent No. **10,194**, dated November 1, 1853; antedated May 2, 1853.

To all whom it may concern:

Be it known that I, PETER H. WATSON, of the city of Washington, in the District of Columbia, have invented certain new and useful improvements in steam boilers and engines with a view to the more economical generation of steam and the recovery of the heat from the exhaust-steam, of which the following is a clear, full, and exact description, reference being had to the accompanying drawings, which form part of this specification, and in which—

Figure 1 represents in section an upright steam-boiler with the furnace near the top and having drop-flues; also, a steam-engine with a pipe leading from the exhaust-port to conduct the exhaust-steam downward through the lower part of the boiler, where the water is cool, to impart its heat thereto; Fig. 2, a horizontal section of the boiler at the line *x x* of Fig. 1.

In the accompanying drawings, A represents the boiler; B, the fire-box; C, a series of drop-flues leading from the inclined under side, *a*, of a heating-chamber, D, behind the grates E. The inclined bottom *a* of the chamber D facilitates the passage of the smoke and flame into the flues and the discharge of the steam from the lower into the upper part of the boiler. The upper part of the flues C may be bent so as to stand at right angles to the bottom *a* to facilitate the entrance of the flame, &c., into them. The flues C terminate at the bottom of the boiler in a smoke-chamber, F, which leads into the chimney G. The height of the boiler for the best effect should be such that the water at its bottom would be so far below the furnace that it will not be heated to more than about 80° Fahrenheit. The feed-water is introduced at an aperture, *b*, near the bottom of the boiler.

The steam is taken from the dome through the pipe I to the steam-chest J of the cylinder K of the engine, and the exhaust-steam from the engine passes through the port *c* to the pipe L and into a chamber, M, whence it is conducted by pipes *n* into the boiler and down to the bottom thereof and through the same into a second chamber, N, into which whatever steam that has passed through the boiler without condensation will be collected and pass into the pipe O, which will conduct it to the condenser or discharge it into the atmosphere. If it should be preferred, the pipes might terminate as represented in red lines *x* in the bottom of the chimney.

Most of the heat will be abstracted from the exhaust-steam in its passage down the pipes *n*, which should be made of copper, brass, or other good conductor of heat, and in like manner most of the heat of the smoke and gases will be abstracted, and all of it thus abstracted will pass into the water, which in the lower part of the boiler is always kept cool by the rapid ascension of the heated particles.

Instead of condensing the exhaust-steam through tubes *n* coiled among the drop-flues, it may be conducted through sheet-flues or through a series of chambers in the lower part of the boiler, and instead of the drop-flues being made in tubes they may be sheet-flues; or either the steam or smoke ducts, pipes, tubes, or flues may be made of any convenient form or arrangement, as this branch of my invention does not consist in any special form or arrangement of those parts, but consists in conducting the heated vapor or gases downward through the lower part of a deep boiler, where the water is cool, for the purpose of transferring the heat into the water of the boiler.

As the water of condensation that collects at the lower ends of the tubes *n* is always warm, it should be used to feed the boiler.

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

1. The method of recovering the heat of the exhaust-steam by passing it through the comparatively-cool water in the lower portion of the boiler, substantially as set forth.

2. The arrangement of the upper end of the drop-flues C in an inclined plate, *a*, to facilitate the entrance of the smoke into the flues and the passage of the steam from beneath the inclined plate into the upper part of the boiler, substantially as herein set forth.

In testimony whereof I have hereunto subscribed my name.

P. H. WATSON.

Witnesses:
PETER HANNAY,
A. E. H. JOHNSON.