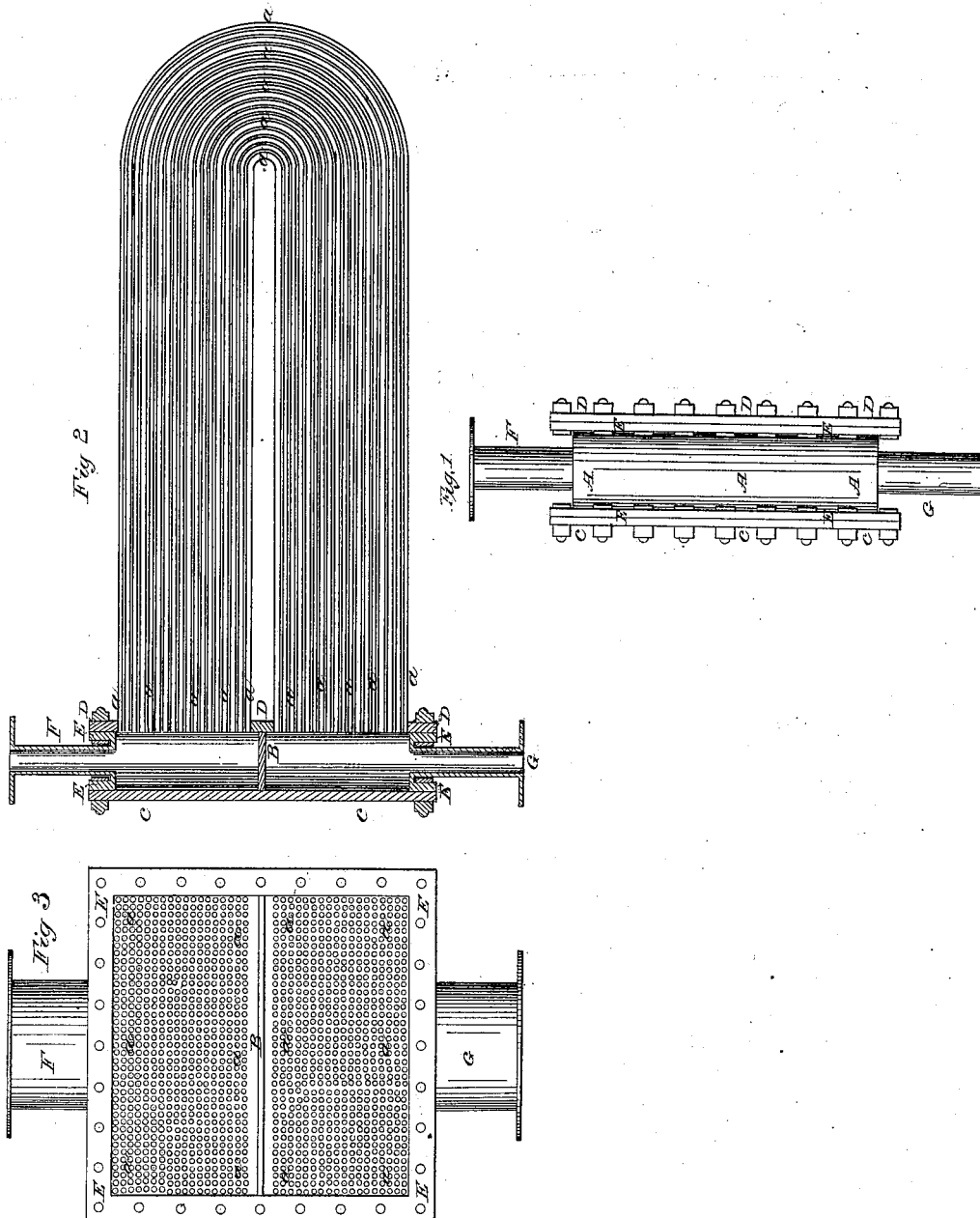


*D. Treadwell,
Steam Condenser.*

No. 1,534.

Patented Mar. 31, 1840.



Witnesses:

*Nathan Rice
Joel Eastman*

Inventor:

Danl Treadwell

UNITED STATES PATENT OFFICE.

DANIEL TREADWELL, OF CAMBRIDGE, MASSACHUSETTS.

CONDENSING APPARATUS OF STEAM-ENGINES.

Specification of Letters Patent No. 1,534, dated March 31, 1840.

To all whom it may concern:

Be it known that I, DANL. TREADWELL, of Cambridge, in the county of Middlesex and Commonwealth of Massachusetts, engineer, have invented a new and useful Improvement in Steam-Engines and Methods of Condensing Steam Generally, called an "Improved Condenser," of which the following is a full and exact description.

This condenser is shown in the annexed drawing which makes part of this specification.

Figure 1 exhibits the head of the condenser as seen upon its side. In Fig. 2 the condenser is seen in section, and Fig. 3 shows the head with the back plate C removed.

The head of the condenser forms two contiguous cavities, made by four equal sides of cast iron A, A, A, the space inclosed by which is divided by the partition B, and closed at its ends by the plates C and D firmly secured by screw bolts to the flanges E, E, which make part of the casting A, A.

F, is a pipe of an oblong or oval form connected with the eduction or exhaust pipe of the steam engine. G is another like pipe communicating with the air pump of the engine. Both of these pipes make part of the casting A, A, as seen at Fig. 1.

a a a a, &c., are small pipes or tubes passing from the plate D, to which they are soldered or otherwise well secured by both their ends, one end of each pipe being soldered to the plate D where it covers the condenser head above the partition B, and the other end to the same plate, where it covers the condenser head below the partition B, each pipe being bent or curved, as shown in Fig. 2. In Fig. 3, the ends of the pipes are shown as they open into the cavities of the condenser head. I prefer copper or brass as the material for the pipes, and I likewise make the plate D, of a composition of copper and tin in the proportions which form gun metal, the plate C and other parts of the walls of the condenser head being of cast iron. These several parts may, however, be formed of other metals than those here specified.

The condenser, formed upon the plan and according to the directions above given, is to be placed in a vessel which communicates by its bottom with a fountain or pump, by which a constant supply of cold water may be furnished, so as to surround and cover

the whole condenser. Or instead of placing the whole condenser into a vessel of cold water, said vessel may be so formed that the plate D, shall constitute one of its ends; in which case the pipes or tubes only will be surrounded by the cold water. This water as it becomes heated by condensing the steam must be suffered to flow from the top of the vessel while a further supply of cold water enters the bottom. Under these conditions the condenser being made to communicate by the pipe F with the eduction or exhaust pipe, of the engine, and by the pipe G with the air pump of the same, will be found to operate as follows:

The steam during the motion of the engine constantly flowing from the cylinder to the exhaust pipe, passes from thence to the upper cavity of the condenser head and from thence through the whole course of the several pipes *a a a a*, &c., to the lower cavity of the condenser head. During its passage through these cavities and pipes, the walls of which are kept as cold as practicable, by the surrounding water, its heat both sensible and latent is in a great degree communicated to the walls of the cavities and pipes, and from them to the cold water surrounding them. The steam is thus condensed to water; which, together with the air which may have been combined with it, is delivered by the pipe G to the air pump, by which it is discharged to any convenient receptacle, from which it may be again used for supplying or replenishing the boiler as it becomes exhausted.

Instead of using pipes bent or curved, as shown in the drawings, a series of straight pipes may be used having one end of each pipe soldered or connected with and opening to the condenser head, while the other end is made tight or closed up. With this form of pipe the partition B, must be removed, or a passage for the steam must be made through it, and the position of the condenser head must be such that the closed ends of the pipes shall be above the horizontal level of the ends opening into the condenser head, that the water of the condensed steam may be discharged to the air pump. I do not consider this form as equal in useful effect to that herein first specified.

It will be found that with a condenser constructed as first above named a quantity of steam sufficient to form about one gallon of water may be condensed by each hundred

square feet of surface of pipe, the temperature of the steam before condensation being 212 degrees Fah.

5 In claiming Letters Patent for the condenser as herein described, I would not be understood as intending my claim to embrace the general principle of condensing by an effusion of water upon the condensing vessel, nor for making said condensing vessel of numerous pipes or tubes instead of
10 one simple cavity, but

My invention, for which I claim Letters Patent, consists in—

15 Forming the condenser with curved pipes, as herein particularly described, which pipes pass from, and return to, the same plate by which they are supported and which plate covers the two cavities into one of which the steam passes from the exhaust
20 pipe of the engine, and the other receives the water formed by the condensed steam, this form of construction having the follow-

ing advantages: 1st, all the pipes are supported by the same body; 2d, they are all opened to be cleaned by a removal of the
25 back plate; 3d, they are free to expand and contract without causing their ends to move; 4th, the outside of the pipes are open and exposed, so that they can be cleaned without removing any part on which their
30 support depends; 5th, they are, by means of being secured by soldering to the plate, placed nearer together than in any other form of fixture.

In testimony of all which I the said
35 DANL. TREADWELL hereto subscribe my name, in presence of the witnesses whose names are hereto subscribed, on this sixteenth day of March, eighteen hundred and forty.

DANL. TREADWELL.

Witnesses:

HENRY HONE,
ARTHUR L. McINTIRE.