

(No Model.)

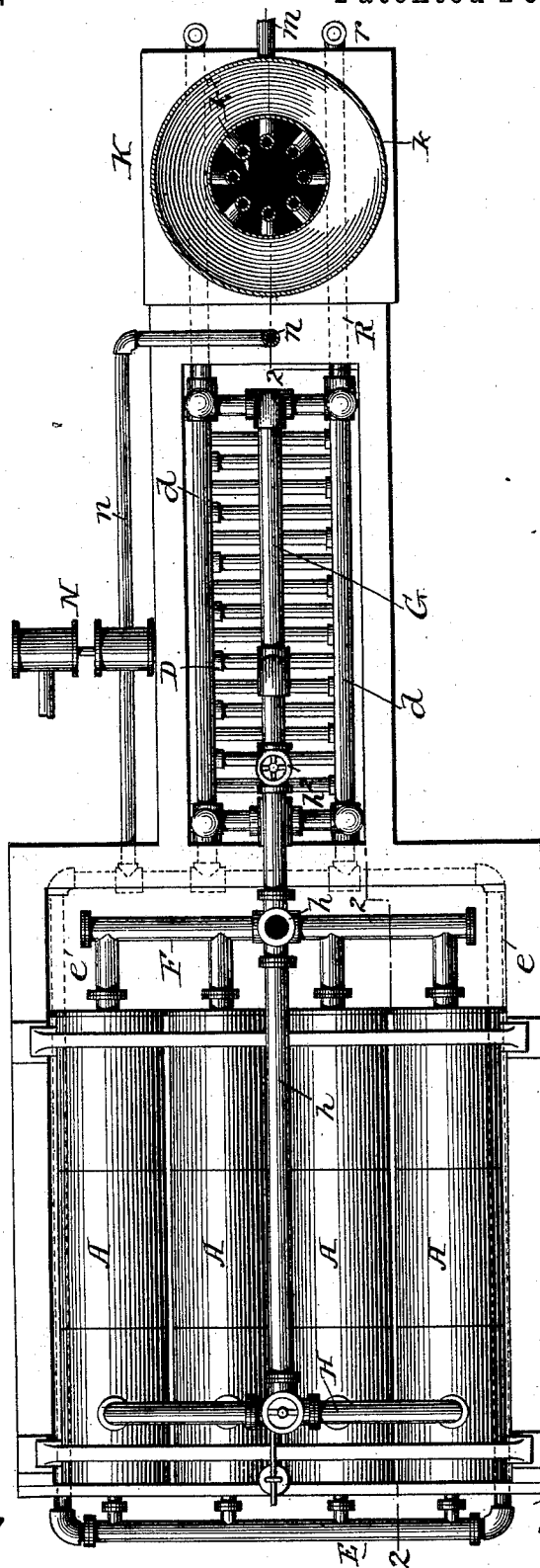
2 Sheets—Sheet 1.

J. POLLOCK.
STEAM BOILER.

No. 469,270.

Patented Feb. 23, 1892.

Fig. 1.



Witnesses
W. E. Niff
B. S. Simmons

Inventor
James Pollock
by J. A. Watson
Attorneys

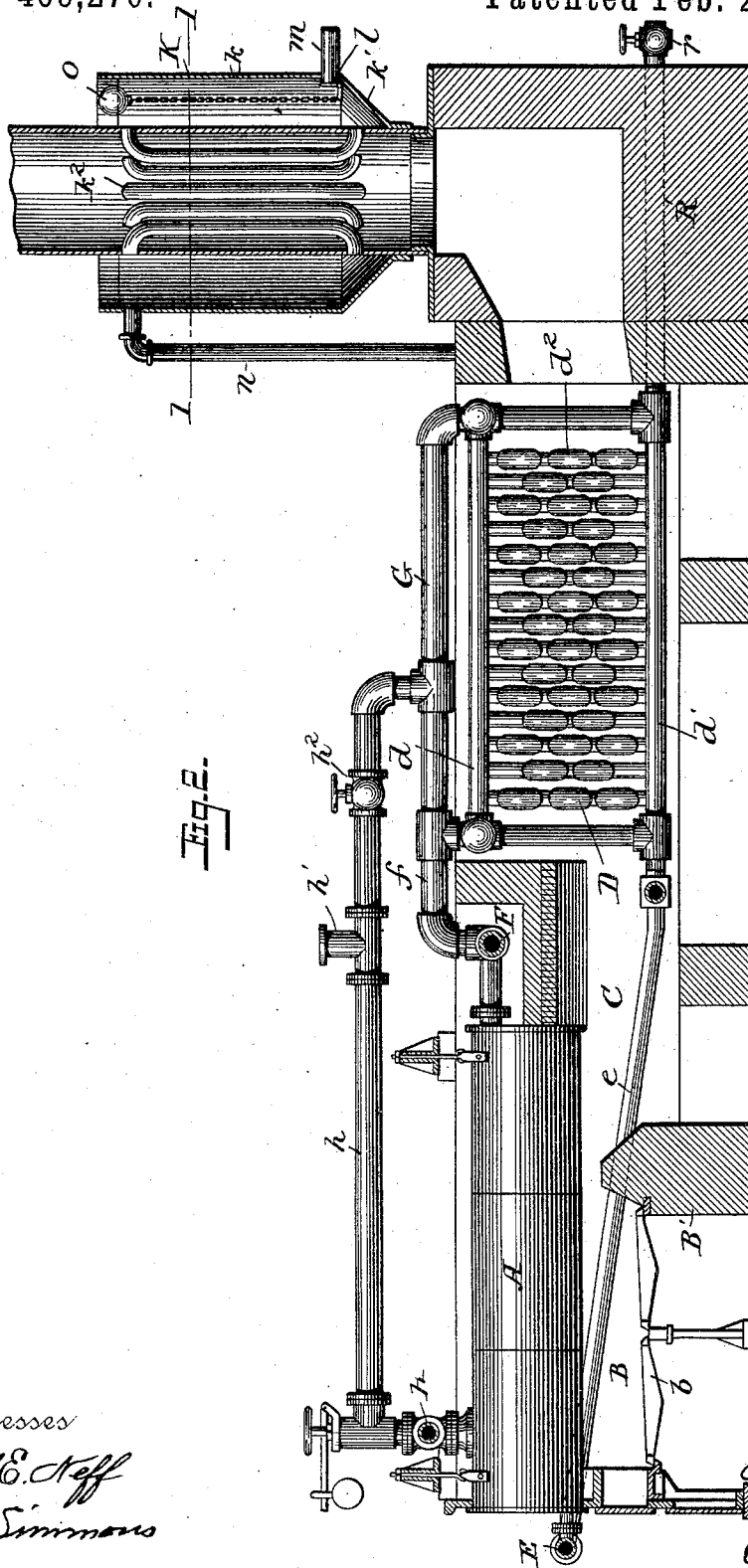
(No Model.)

2 Sheets—Sheet 2.

J. POLLOCK.
STEAM BOILER.

No. 469,270.

Patented Feb. 23, 1892.



Witnesses
Will E. Jeff
B. S. Simmons

Inventor
James Pollock
by
J. A. Watson
Attorneys

UNITED STATES PATENT OFFICE.

JAMES POLLOCK, OF WILKES-BARRÉ, PENNSYLVANIA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 469,270, dated February 23, 1892.

Application filed November 9, 1891. Serial No. 411,372. (No model.)

To all whom it may concern:

Be it known that I, JAMES POLLOCK, a citizen of the United States, residing at Wilkes-Barré, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

My invention relates to steam-boilers; and it consists in certain improvements in the construction and arrangement of steam-generating boilers and feed-water heaters, which will be fully described hereinafter in connection with the accompanying drawings, in which—

Figure 1 is a plan view of my improved steam-generator, showing the feed-water heater in horizontal section on the line 1 1 of Fig. 2; and Fig. 2 is a vertical sectional view on the line 2 2 of Fig. 1.

The object of my invention is to produce a steam-generating apparatus in which economy of construction will be accompanied by the highest efficiency in proportion to the amount of fuel used and also in which the steam may be safely superheated and delivered in a dry state to the engines or pumps for which it is intended.

In carrying out the invention I place a water-tube boiler within the flue of one or more cylinder-boilers and suitably incase it, so that the hot gases from the furnace must pass around and between the water-tubes. The upper portion of the water-tube boiler is considerably above the water-line of the main boilers, so that the upper tubes, which are subjected to the highest degree of heat, may be utilized for superheating the steam which is generated in the lower part of the water-tube boiler. This superheated steam is preferably passed through a connecting-pipe to the steam-space of the main boilers, where it mixes with and increases the temperature of the main-boiler steam. The main boilers are connected with each other and also with the water-tube boiler both above and below the water-line, so that the water will stand at the same elevation in each and the steam may circulate freely between the superheating-spaces of the tube-boiler and the steam-space of the main boilers.

Referring to the drawings, A A indicate cylinder-boilers arranged side by side in a battery and suitably supported. Beneath the

boilers is a furnace B, having grate-bars *b* and a back wall *B'*, behind which is a combustion-chamber C. At the rear of the combustion-chamber and in the flue common to all the boilers is located the water-tube boiler D. This latter boiler may be of any desired form.

To illustrate the principle of the invention, I have shown a boiler of the Dimmick and Smith type, in which are large upper and lower tubes *d d'* upon either side and smaller tubes *d²*, which cross and recross the flue-space in a zigzag course and connect the upper tubes *d* with the lower tubes *d'*. The boilers A communicate at their lower sides with a common water-tube E and at their upper sides with a common steam-pipe F. The pipe E communicates with the lower portion of the water-tube boiler through one or more pipes *e*, and the steam-pipe F communicates with the steam-drum G through a pipe *f*. If desired, the steam from the cylinder-boilers might be drawn through the pipes F *f* and the drum G, or I may provide in addition to these pipes a drum H, above and common to all of the cylinder-boilers and communicating through a pipe *h* with the drum G. The steam may then be drawn from the pipe *h* at a point *h'* between the steam-drums; but I prefer to draw the superheated steam through the steam-spaces of the cylinder-boilers, as above stated, in order to thoroughly commingle it with the steam in said boilers. This may be done by closing a valve *h²* in the pipe *h*.

With the boilers arranged and constructed as above described I have found that the steam from the main boilers will mingle with the dry and superheated steam from the tubular boiler and that the resulting product will be dry steam of a high temperature, which may be conducted through pipes to a considerable distance without the use of devices for trapping off the water of condensation and other water usually carried over by wet steam from the cylinder-boilers. This result is very important in mining operations, where the steam is produced upon the surface and conveyed to pumps and machinery at a distance below the surface, and also in town and city steam-heating plants, where steam is conveyed along streets to distant points.

To further utilize the heat and increase the efficiency of the boilers, I have invented a

feed-water heater to be used in connection with the smoke-stack. This heater K, as shown in the drawings consists of a casing *k*, surrounding the stack, which casing may be open at the top, and is joined to the stack at the bottom by a conical portion *k'*. From points near the top of the tank thus formed to points near the bottom thereof a series of water-tubes *k²* passes from the tank into the stack vertically down through the same and back to the tank. The feed-water enters the tank near the bottom through a pipe *m*, and is drawn off by the pump N through a pipe *n*, connected to the tank near its upper end, where the hot water issues from the pipes *k²*. This form of feed-water heater having vertical tubes within the stack, I have found to be very efficient. When the tank is open at the top, the height of water therein may be regulated by means of a float in any suitable manner. As shown, the float is connected by a chain or cord with a valve *p* upon the end of the pipe *m*. The pump or injector N may deliver the feed-water to the water-pipe *e*, as shown, or to any convenient portion of the boilers. The dirt from the boilers will accumulate in the lower pipes *d'* of the tubular boiler and may be blown off at the valves *r* of the pipes R. These pipes R are arranged in the line with the pipes *d'*, so that a rod or flue-cleaner may be inserted to clear out any dirt which may adhere.

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

1. A steam-generator consisting of a battery of cylinder-boilers, a water-tube boiler located within the flue of the cylinder-boilers and having its tube-surface partially above the water-line to form a superheater, pipes connecting the steam-space of the cylinder-boilers with the superheating-space of the water-tube boiler, pipes connecting the water-space of the cylinder-boilers with the lower

part of the water-tube boiler, and a steam-drum arranged to receive the steam from all of said boilers, substantially as described.

2. A steam-generator consisting of a battery of cylinder-boilers having a common water-pipe E and a common steam-pipe F, a water-tube boiler arranged within the common flue of said battery and having part of its tube-surface above the water-line to form a superheater, a steam-pipe in communication with said pipe F and the superheating-space of the water-tube boiler, and a pipe *e*, joining the pipe E with the lower part of the water-tube boiler, substantially as described.

3. A steam-generator consisting of one or more cylinder-boilers, a water-tube boiler within the flue of said cylinder-boilers and having part of its tube-surface above the water-line to form a superheater, water-pipes connecting the lower parts of all of said boilers, a steam-drum for the cylinder-boilers, and a pipe connecting the steam-space of said boilers with the superheating-space of the water-tube boilers, whereby the superheated steam may be drawn through and commingled with the steam in the cylinder-boilers, substantially as described.

4. The combination of the cylinder-boilers, the water-tube boiler within the common flue of the cylinder-boilers, the steam and water pipes connecting all of said boilers, respectively, above and below the water-line, the feed-water heater consisting of the casings surrounding the stack and the vertical tubes within the stack, and the pump for delivering the feed-water from the heater to the boilers, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES POLLOCK.

Witnesses:

WM. C. PRICE,
B. R. JONES.