(No Model.) 2 Sheets—Sheet 1.

G. H. PERRY & W. S. HANCOCK.

LOCOMOTIVE CIRCULATING EXHAUST ATTACHMENT.

No. 561,429. Patented June 2, 1896.

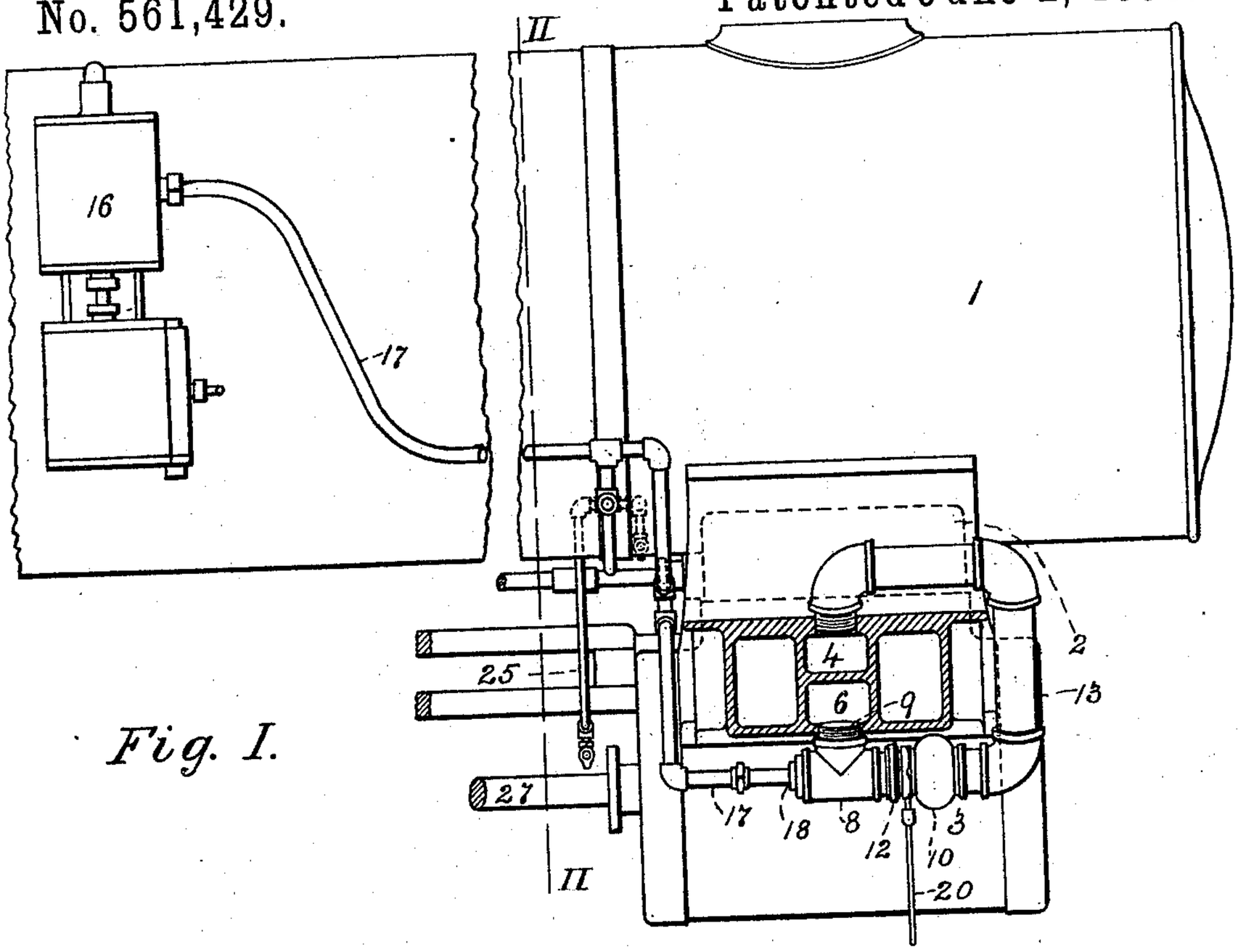

Fig. I.

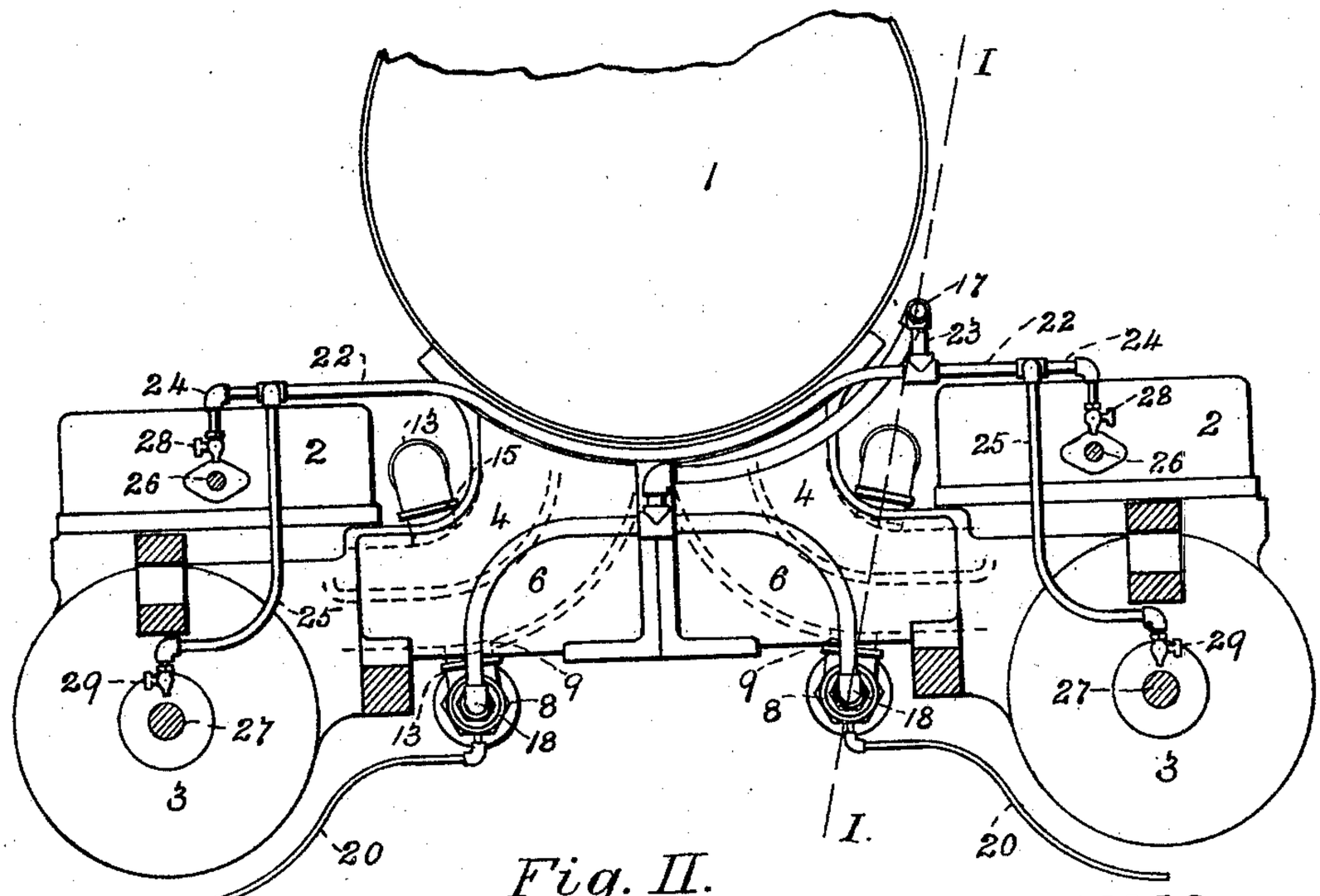

Fig. II.

WITNESSES

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Jas. W. White

INVENTORS

G. H. Perry.

W. S. Hancock.

BY Knight Bros.

ATTORNEYS

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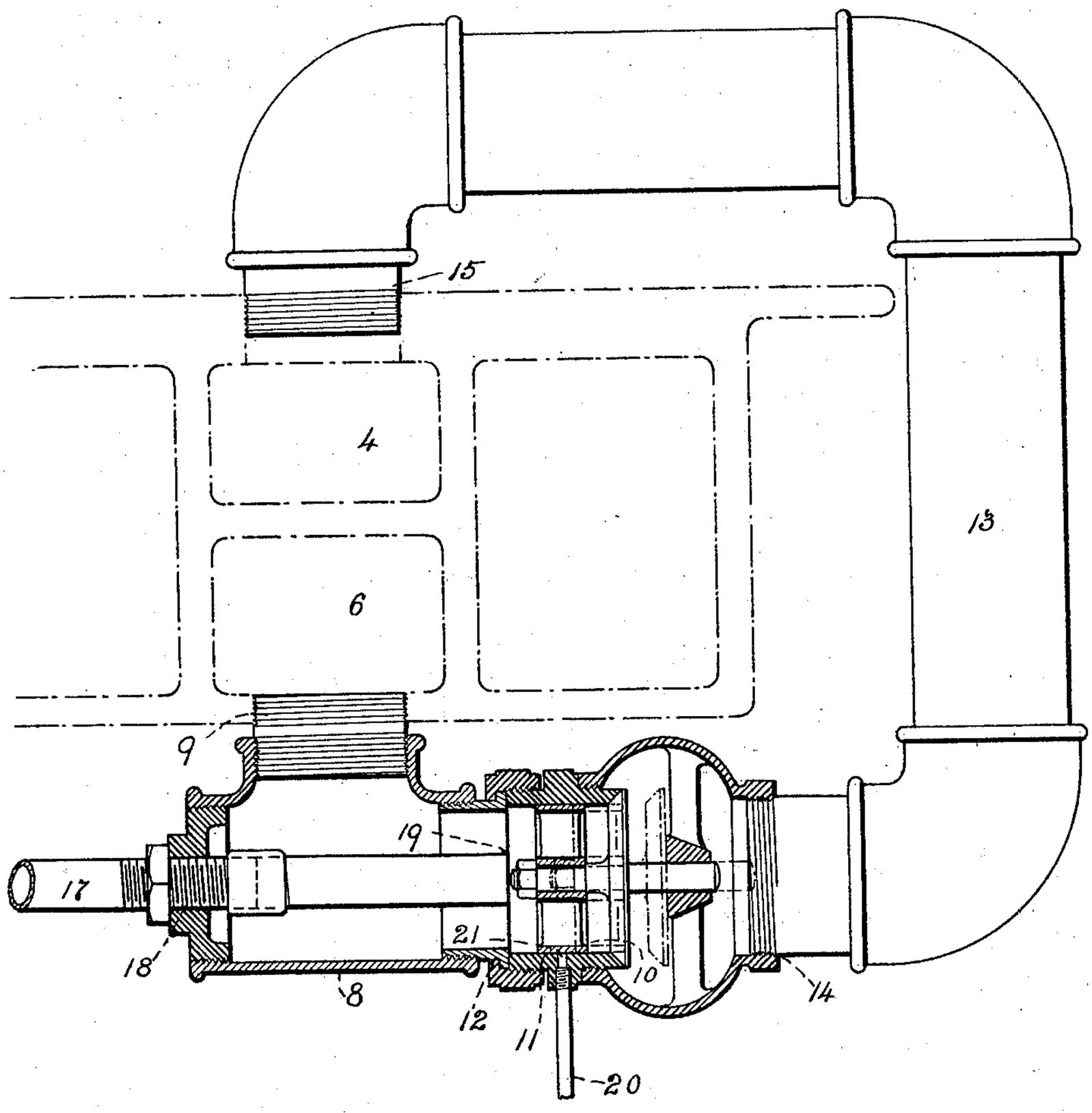

Fig. III.

WITNESSES
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UNITED STATES PATENT OFFICE.

GEORGE H. PERRY AND WILLIAM S. HANCOCK, OF NEEDLES, CALIFORNIA.

LOCOMOTIVE CIRCULATING EXHAUST ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 561,429, dated June 2, 1896.

Application filed October 19, 1895. Serial No. 566,251. (No model.)

To all whom it may concern:

Be it known that we, GEORGE H. PERRY and WILLIAM S. HANCOCK, of Needles, in the county of San Bernardino and State of California, have invented certain new and useful Improvements in Locomotive Circulating Exhaust Attachments, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

Our invention relates to a device for connecting the exhaust-channel of a locomotive with the steam-channel when the steam is shut off, thus reducing wear on the valves and avoiding exhausting into the smoke-stack when a forced draft is not desired; also in passing the exhaust from the air-pump through the steam-exhaust channel, the various advantages of which will be set forth in detail; also in keeping the cylinder warm by the air-pump exhaust when main throttle is shut off, and in lubricating various parts with the condensed water and oil discharged from the air-pump, all of which, with other details, will be set forth more fully hereinafter; and our invention consists in certain features of novelty hereinafter described and claimed.

Figure I represents a view, part in side elevation and part in section, taken on line I I, Fig. II, showing the location of the return-exhaust and air-pump connection therewith. Fig. II represents a transverse section taken on line II II, Fig. I, looking to the right. Fig. III is an enlarged detail view showing return exhaust-pipe in connection with the return-valve, the valve being shown in section.

Referring to the drawings, 1 represents the boiler of a locomotive, 2 the steam-chest, and 3 the cylinders, with which portions of our improvements are connected. The steam-chests and cylinders being located on each side of the locomotive, it will be obvious that various parts of our device are also in duplicate and will be so considered even if spoken of singly.

4 represents the steam-supply channels which connect the boiler with the ports of the steam-chests, and 6 the exhaust-channels which connect the exhaust-ports of the steam-chests with the smoke-stack.

8 represents a T-coupling connected with the exhaust-channel at 9.

10 represents the return exhaust-valve, having its casing 11 connected by a coupling 12 with the forward end of the T-coupling 8.

13 represents the return exhaust-pipe, having its lower end connected at 14 with the return exhaust-valve 10, the upper end of said pipe being connected at 15 with the steam-supply channel 4.

16 represents the air-pump, and 17 the exhaust-pipe leading therefrom.

In the ordinary construction of locomotives the exhaust-pipe of the air-pump is connected directly with the smoke-stack, thus creating a forced draft in the smoke-stack whenever the air-pump is in operation, thus creating a forced draft on the fire and consuming fuel when the locomotive is at rest or running downgrade and a forced draft is not desired, said draft also causing an objectionable discharge of smoke and cinders from the stack while the engine is at rest at a station or other locality. To avoid the objections mentioned and to derive the advantages detailed farther on, I extend the air-exhaust pipe 17 by means of suitable pipes and connections into the T-coupling 8, said pipe entering the rear end of the coupling, as shown at 18, and extending to a point 19 in close proximity with the inner end of the valve 10.

20 represents a drain-pipe connected by a port 21 with the chamber of the valve 10, said drain-pipe serving to drain the condensed water gathering in the valve-chamber or T-coupling when the valve 10 is open.

22 represents a cross-pipe connected with the air-exhaust pipe 17 at 23, said cross-pipe having branches 24 25, which extend to a point just above the valve-stems 26 of the steam-chests and the piston-rods 27 of the cylinders, the lower ends of said branch pipes having petcocks 28 29 thereon.

As locomotives are ordinarily constructed, when steam has been shut off from the cylinders and the locomotive is running from its momentum the pistons, which, of course, continue to reciprocate in the cylinders, (to use a descriptive phrase,) acts as air-pumps, exhausting the air from the steam-channel 4 and forcing it out through the exhaust-channel 6 into the stack, with the result that a vacuum is at once formed in the steam-channel, thus forming an unequal pressure on the slide-valves in the steam-chests, causing said valves

to rock and to wear unevenly and destroy their usefulness.

By the use of our device as soon as the main throttle is closed and steam is shut off the pressure is released from the forward end of the valve 10 and the exhaust causes said valve to open. (See dotted lines, Fig. III.) The exhaust-air passes through said valve, through the pipe 13, and enters the steam-channel 4, instead of passing out through the smoke-stack, as in the ordinary construction, thus keeping up a constant circulation and even pressure on the slide-valves, said device also serving to keep the valves and cylinders warm and lubricated whether the engine is moving or at rest for the reason that the exhaust from the air-pump carries oil and steam into the T 8 whenever the air-pump is in operation, thus keeping up a circulation between the steam and exhaust channels even if the piston is not reciprocating.

The circulation described prevents the exhaust from passing out through the stack when steam is shut off, thus causing a saving in fuel which would otherwise be unnecessarily consumed by action of the forced draft.

We also create a large saving in oil by arranging the air-pump exhaust as shown, instead of wasting it by discharging it out of the stack and at the same time preventing a forced draft when the engine is at rest, as heretofore described.

When the engine is running under steam and the return-valve 10 is closed by pressure of steam in the pipe 13, the air-pump exhaust passes out with the steam-exhaust through the channel 6, thus creating an additional draft in the smoke-stack at the time most required.

The above-described device also serves to muffle the noise created by the air-pump exhaust discharging directly through the stack when the engine is at rest. There are other advantages derived from the use of our attachment, which will be obvious to any one skilled in the art; but mention of the same is not considered necessary in this description.

The cross-pipe 22 and branch pipes 24 25 convey condensed water and oil to the valve-stems 26 and the piston-rods 27, thereby providing a constant supply of lubricant for said parts.

We claim as our invention—

1. In combination with the steam and exhaust channels of an engine, the herein-described return-channel forming a connection between the same, and a valve automatically opening the said return-channel toward the steam-entrance connection simultaneously with the closing of the valve which governs the steam-channel, substantially as set forth.

2. In combination with the steam and exhaust channels of an engine, the herein-described return-channel forming a connection between the same, an automatically-operating valve in said channel, and a connection between the exhaust from an air-pump and the exhaust-channel, substantially as set forth.

3. In combination with the steam and exhaust channels of an engine, a return-channel forming a connection between the same, an automatically-operating valve located in said channel an air-pump, and a suitable connection between the air-pump and return-channel, whereby the air-pump exhaust may be discharged directly through the steam-exhaust channel or made to circulate from the steam-exhaust channel to the steam-supply channel by passing through the steam-chest of the engine, substantially as set forth.

4. In an engine, the combination of a steam-supply channel, a steam-exhaust channel, a pipe connecting said channels and a valve in said pipe adapted to be opened automatically by an excess of pressure on one side thereof when the steam from the steam-channel has been shut off from the other side, substantially as set forth.

5. In an engine, the combination of a steam-supply channel, a steam-exhaust channel, a pipe connecting said channels, a valve located in said pipe and adapted to be automatically moved to open and close the same, and a drain-pipe for said connecting-pipe having its port closed when said valve is in closed position, substantially as set forth.

6. In an engine the combination of a steam-supply channel, a steam-exhaust channel, a return exhaust-pipe connecting said channels, a valve in connection with said return exhaust-pipe, an air-pump and a pipe connecting the air-pump exhaust-port with the return exhaust-pipe, substantially as set forth.

7. In an engine the combination of a steam-supply channel, a steam-exhaust channel, a T-coupling connected with the steam-exhaust channel, a valve connected with one end of said coupling, a return exhaust-pipe connecting said valve with the steam-supply channel, an air-pump, and an air-pump exhaust-pipe connected at one of its ends with the air-pump exhaust-port, and having its opposite end secured to and extending through the T-coupling and ending in close proximity to the valve secured to the T-coupling, substantially as set forth.

GEORGE H. PERRY.
WILLIAM S. HANCOCK.

Witnesses:
R. R. CHEVALIER,
W. H. SHARP.