

1,045,577.

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SMOKE CONSUMING APPARATUS.
APPLICATION FILED NOV. 29, 1911.

Patented Nov. 26, 1912.

2 SHEETS—SHEET 1.

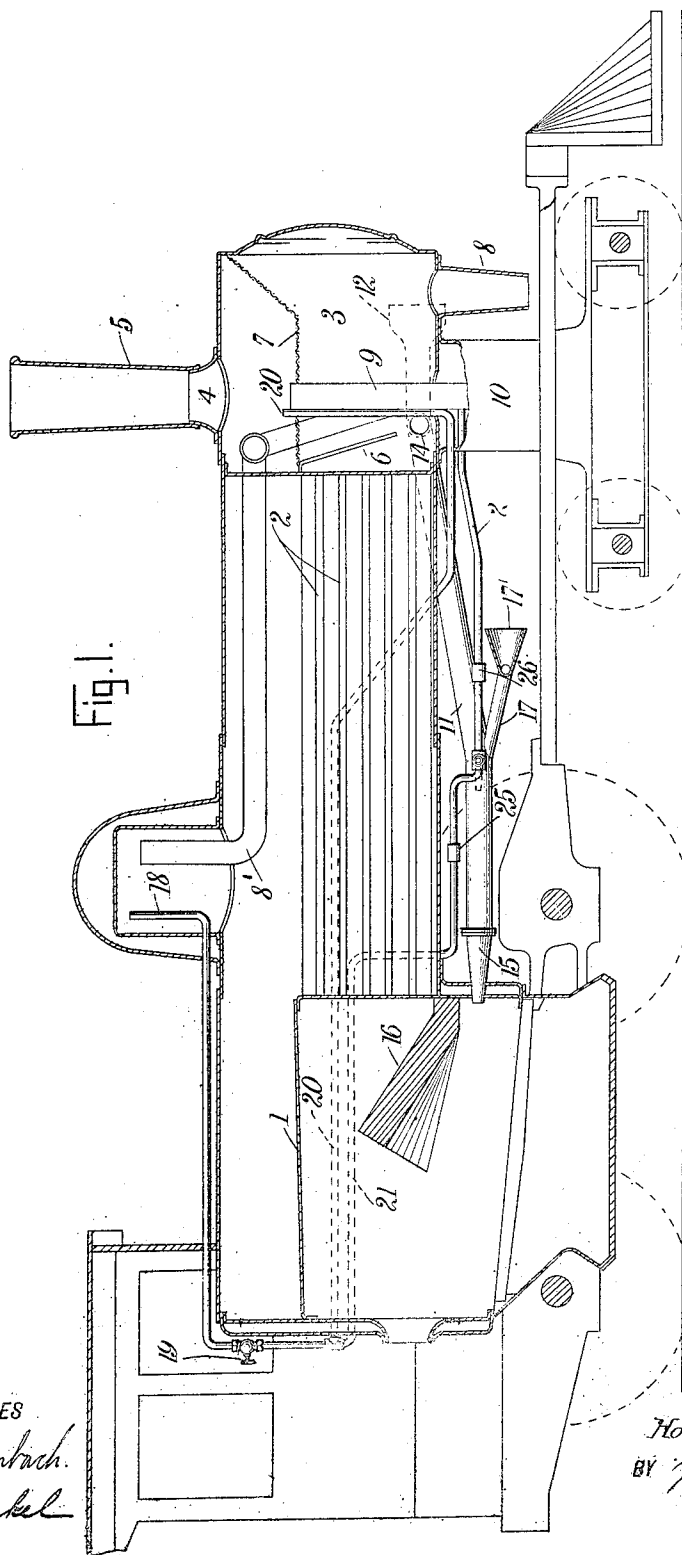


Fig. 1.

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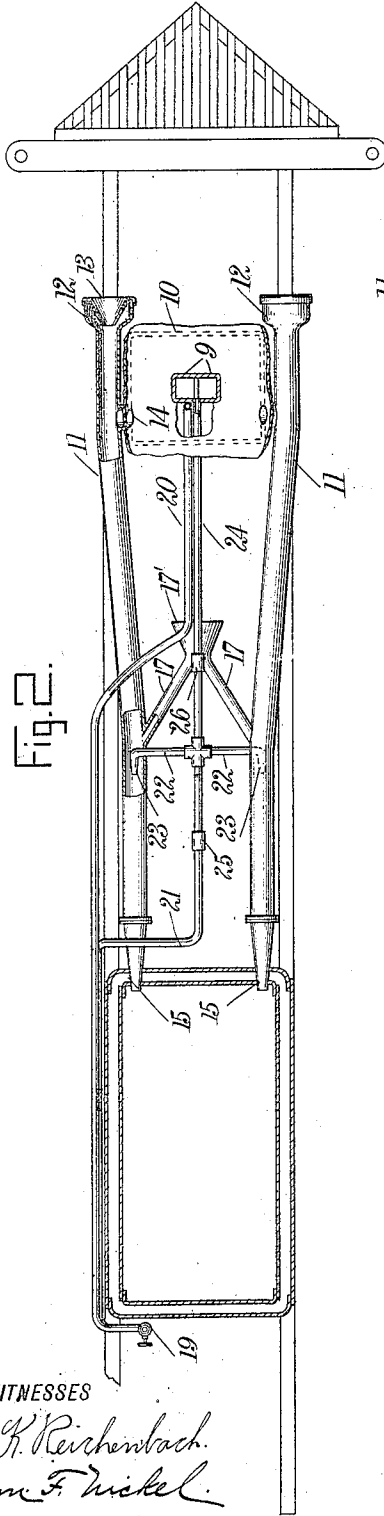


Fig. 2.

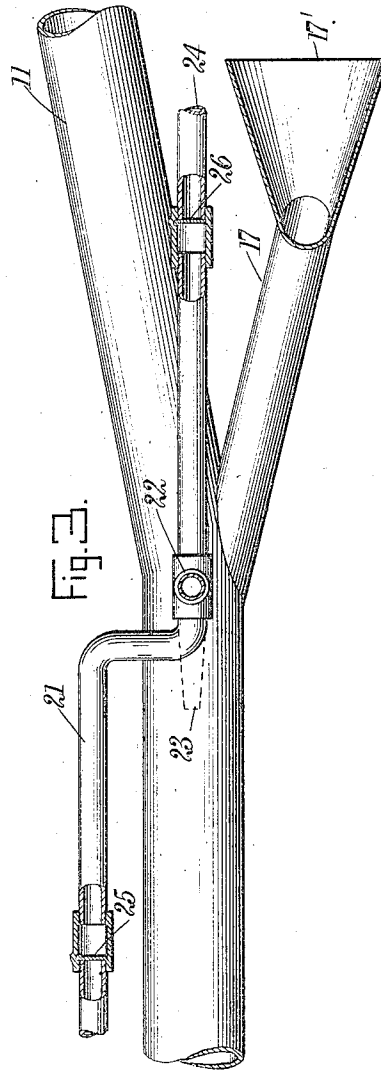


Fig. 3.

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UNITED STATES PATENT OFFICE.

HOMER NELSON MARTIN, OF NEW YORK, N. Y.

SMOKE-CONSUMING APPARATUS.

1,045,577.

Specification of Letters Patent.

Patented Nov. 26, 1912.

Application filed November 29, 1911. Serial No. 663,013.

To all whom it may concern:

Be it known that I, HOMER N. MARTIN, a citizen of the United States, and a resident of the city of New York, Morris Park, borough of Queens, in the county of Queens and State of New York, have invented a new and Improved Smoke-Consuming Apparatus, of which the following is a full, clear, and exact description.

My invention relates to smoke consuming apparatus designed to be applied preferably to locomotives and traction engines in general, and the object thereof is to devise means for taking a part of the smoke before the same is discharged from the stack, and mixing it with air, to be returned into the fire-box, whereby all the particles of carbon and other inflammable substances which are suspended in the smoke and other gases, can be completely consumed before the smoke is discharged through the stack into the surrounding atmosphere.

Reference is to be had to the accompanying drawings forming a part of this specification, in which the same characters of reference indicate the same parts in all the views.

Figure 1 is a longitudinal sectional view of a locomotive to which my improved smoke consuming apparatus is applied; Fig. 2 is a top plan thereof, the fire-box of the locomotive and the smoke chamber in front being shown in section; and Fig. 3 is a longitudinal sectional view of part of the flue by means of which my smoke consuming apparatus is controlled.

On the drawings, the fire-box of the locomotive or other engine is indicated at 1, and from this box extend heating flues 2, toward the front of the locomotive, these flues communicating with the smoke chamber 3, forward of the boiler, this smoke chamber 3 having an outlet 4, which communicates with the stack 5. The chamber 3 also contains a deflector plate 6, in front of the forward ends of the flues 2, and a screen 7, so that the hot gases passing from the fire-box through the flues will strike the deflector plate 6, before passing upward through the screen 7 and out through the stack 5.

8 is a spout arranged in the bottom of the smoke chamber 3, and extending downward to permit large cinders and the coarse dust which are deposited on the floor of the smoke chamber, to be cleaned out of the smoke chamber.

The numeral 9 represents the exhaust pipes leading from the valve chests on the cylinders at either side of the locomotive; and 10 represents a hollow standard on which the front end of the boiler is supported, through which the exhaust pipes 9 extend. The exhaust steam passing through the flues 9 streams out through the stack 5 and induces the draft into the fire-box 1, and through the flues 2, in the usual way.

Steam is supplied to the steam cylinders on either side of the locomotive by means of a main steam pipe 8', one end of which protrudes into the steam dome on top of the locomotive above the level of the water in the boiler, and the other end of which is branched to supply steam to both the cylinders when the locomotive is running. This pipe is controlled by the usual throttle valve.

Carried by the framework of the locomotive and arranged on each side of the boiler beneath the same are a pair of air flues 11, which terminate in enlarged mouths 12, in which are placed funnels 13, these funnels having their reduced ends within the enlarged mouths 12, and are secured at their enlarged ends to the edges of the mouths 12 of the flues 11, as shown in Fig. 2. Each of the pipes 11 communicates by means of passages 14, with the side of the smoke chamber 3, near the bottom; and 15 are nozzles at the rear ends of the flues 11, which discharge into the forward end of the fire-box 1. The fire-box 1 adjacent its forward end its provided with a brick arch 16, arranged above the level of the nozzle 15, so that the contents of the flues 11 have to pass beneath and over this arch before they can pass into the flues 2.

The numeral 17 represents a pair of pipes, each of which communicates at one end with the side of one of the flues 11, and which unite at their outer ends in a funnel-shaped mouth 17', which is carried below the level of the flues 11, as shown in Figs. 1 and 3, and these pipes serve to supply air to the flues 11, when the locomotive or other engine is standing still, and a draft of air is induced through the pipes 17 under these conditions, by means of steam jets in the pipes 11, which are produced in a manner presently to be described.

The numeral 18 represents a steam pipe leading from the steam dome on top of the locomotive, in which its extremity is bent

above the top of the water in the boiler. This steam pipe extends backward into the cab and contains a controlling valve 19, convenient to the engineer or fireman. Below the valve 19 the pipe 18 communicates with a pair of pipes 20 and 21, the former extending forward along the outside of the locomotive and downward under the same into the hollow standard 10, where it is bent upward along one of the exhaust flues 9, having its extremity above the screen 7, the exhaust flues 9 being practically of the same height. The other pipe 21 extends along the side of the locomotive and downward beneath the same to midway between the flues 11, adjacent the nozzles 15, and is then bent forward and joined at its forward end to a coupling from which project two pipes 22, which extend into the flues 11, just to the rear of the points of communication of the pipes 17 therewith, and terminate in rearward-bent nozzles 23, these nozzles 23 serving to blow steam into the flues 11, to produce a draft therethrough when the locomotive or other engine is standing still, as above described. Beyond the branch pipes 22 is a pipe 24, forming a continuation of the pipe 21, and communicating at its forward end with both of the exhaust steam pipes 9, as shown in Fig. 2. The pipe 21 has a flap valve 25 therein which opens only toward the front of the locomotive, as shown in Fig. 3, this valve being located to the rear of the pipes 23; and the pipe 24 has a valve 26 therein forward of the pipes 22 and the nozzles 23, and this valve opens only in a rearward direction.

In operation, supposing the engine to be running forward, the valve 19 will be closed to prevent any steam from passing through the pipe 18. The smoke will pass from the fire-box 1, through the flues 2, past the plate 6, and through the screen 7, to be discharged through the stack 5. Owing to the forward motion of the locomotive, however, air will rush in through the funnels or nozzles 13 in the mouths 12 of the flues 11, and this current of air will suffice to draw some of the smoke through the passages 14 into the flues and discharge the same through the nozzles 15, beneath the arch 16 of the fire-box 1. Air will also pass in through the flaring mouth 17 of the pipe 17, to assist the draft through the flues 11, and some of the steam passing out through the exhaust flues 9 from the cylinders, will blow through the pipe 24, past the valve 26 and through the pipes 22 and nozzles 23, to increase the draft of air through the flues 11 still further. No steam, however, will pass back into the pipe 21, because the valve 25 will prevent this. This valve 25 thus causes all the steam passing backward through the pipe 24 to blow out through the nozzles 23, and if it were not for the presence of the valve 25 in ques-

tion, some of the steam from the pipe 24 would pass into the pipe 21 and around by way of the pipe 20 and out through the chimney 5; and the pipe 21 and the pipe 20 would thus form in effect a tap or leak which would greatly lower the efficiency of the nozzles 23, if it would not make their operation impracticable. As a result, much of the smoke and gases having unconsumed particles of carbon and other combustible materials therein will be returned into the fire-box, passing beneath the arch 16 and over the top of the same through the ends of the flues 2. In so doing it will meet the draft of fresh air over the top of the fire and through the grate thereof, that is induced by the exhaust steam blowing out through the flues 9 and the stack 5, and the particles of carbon and other inflammable materials suspended in the smoke will be consumed before the smoke is discharged, so that, when the smoke leaves the stack, it will be practically clean and free from cinders and soot; and at the same time coarse dust and large cinders which are carried by the smoke forward through the flues 2, will strike the plate 6 and screen 7, and fall upon the floor of the smoke chamber 2, to be cleaned out through the spout 8.

When the locomotive is standing still, the smoke can be purified by turning the valve 19 to open position. This will permit steam to pass forward through the pipe 21, past the valve 25 into the pipes 22, and through the nozzles 23. Air will be drawn in by the effect of the nozzles 23, through the pipes 17, and this flow of air will induce a current through the entire lengths of the flues 11, drawing smoke through the passages 14, as before, and discharging it through the nozzles 15, into the fire-box 1. No steam, however, will pass forward into the pipe 24, because of the valve 26, which will close, owing to the pressure of the steam in the pipe 21, forward, and it is of course understood at this time no steam is passing from the valve chests of the cylinders of the locomotive through the pipe 9, so that there is no pressure of the steam upon the forward side of the valve 26, to prevent it from closing in the manner required. It will be of course understood that when the valve 19 is opened to allow steam to blow through the pipe 21 into the nozzles 23, some steam will also pass through the pipe 20 and out through the stack 5 to create the necessary draft for the fire.

It is obvious that the above arrangement of flues will permit the smoke to be purified at all times, provided there is steam in the boiler; and it makes no difference whether the locomotive or other traction engine is in motion or not, the arrangement of flues in question will cause enough of the smoke to be returned into the fire-box to

enable it to be purified by consuming the soot and cinders in the manner set forth; and while I have shown my smoke consuming system as applied to a locomotive, it is
 5 obvious that the principle of diverting the smoke after passing through the boiler, and returning it to the fire-box to enable the process of combustion to be completed, may be applied to a stationary engine as well,
 10 as I can easily arrange the nozzles 23 in combination with air flues 11 communicating with a smoke chamber 12, beneath the stack 5, to provide for the return of the smoke to the fire-box, whether the engine
 15 is movable or stationary.

I wish to have it understood that I may make whatever slight changes in the shape, size and arrangement of the parts fairly fall within the scope and spirit of my invention.
 20 Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. Smoke consuming apparatus comprising a furnace, a stack or flue for discharging gases from said furnace, conduits arranged side by side for diverting a portion of said gases from said stack or flue and returning the same into said furnace, said conduits having open ends to admit air to
 25 the inside of the same, a funnel between said conduits, and flues leading from said funnel to each of said conduits to admit supplemental air to said conduits, said air serving to facilitate the return of said gases to the
 30 furnace.

2. Smoke consuming apparatus comprising a furnace for the boiler of an engine, a stack or flue for conducting gases therefrom, a conduit communicating with said
 40 fire-box and arranged to divert a portion of the gases from the flue and return the same to the furnace, a nozzle entering said conduit and discharging toward the fire-box, a pipe leading from the boiler, a valve in
 45 said pipe, a pair of branches connected to said pipe beyond the valve, one of said branches leading to the nozzle and the other to the stack or flue, a one-way operating valve in the branch leading to
 50 the nozzle, a pipe leading from one of the exhaust pipes of the valve chests to the said nozzle, and a one-way operating valve in said last-named pipe, said valves preventing steam from the last-named pipe
 55 from entering the branch leading to the

nozzle, and preventing steam from the branch leading to the nozzle from entering the last-named pipe, the last-named pipe serving to supply steam to the nozzle when the engine is moving, and the branch lead- 60
 ing to the nozzle serving to supply steam thereto when the engine is stationary.

3. Smoke consuming apparatus comprising a furnace for the boiler of an engine, a stack or flue for conducting gases there- 65
 from, a conduit communicating with said fire-box and arranged to divert a portion of the gases from the flue and return the same to the furnace, a nozzle entering said conduit and discharging toward the fire-box, 70
 a pipe leading from the boiler, a valve in said pipe, a pair of branches connected to said pipe beyond the valve, one of said branches leading to the nozzle and the other to the stack or flue, a one-way operating 75
 valve in the branch leading to the nozzle, a pipe leading from one of the exhaust pipes of the valve chests to the said nozzle, a one-way operating valve in said last-named pipe, said valves preventing steam from the last- 80
 named pipe from entering the branch leading to the nozzle, and preventing steam from the branch leading to the nozzle from entering the last-named pipe, the last-named pipe serving to supply steam to the nozzle 85
 when the engine is moving, and the branch leading to the nozzle serving to supply steam thereto when the engine is stationary, and means for admitting air to the conduit for diverting the gases to the fire-box when the 90
 engine is in motion.

4. Smoke consuming apparatus comprising a conduit for returning a portion of the smoke and gases passing from the fire-box to the smoke stack into the fire-box, said 95
 conduit being open at its front end to admit air into the same, a steam injector in said conduit for discharging steam toward the fire-box, and a forward-extending branch pipe having its outer end open and com- 100
 municating with the conduit adjacent said injector.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HOMER NELSON MARTIN.

Witnesses:

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 PHILIP D. ROLLHAUS.