

C. F. HARRIS.
ATTACHMENT FOR LOCOMOTIVES OR OTHER BOILERS.
APPLICATION FILED JUNE 13, 1908.

959,134.

Patented May 24, 1910.

2 SHEETS—SHEET 1.

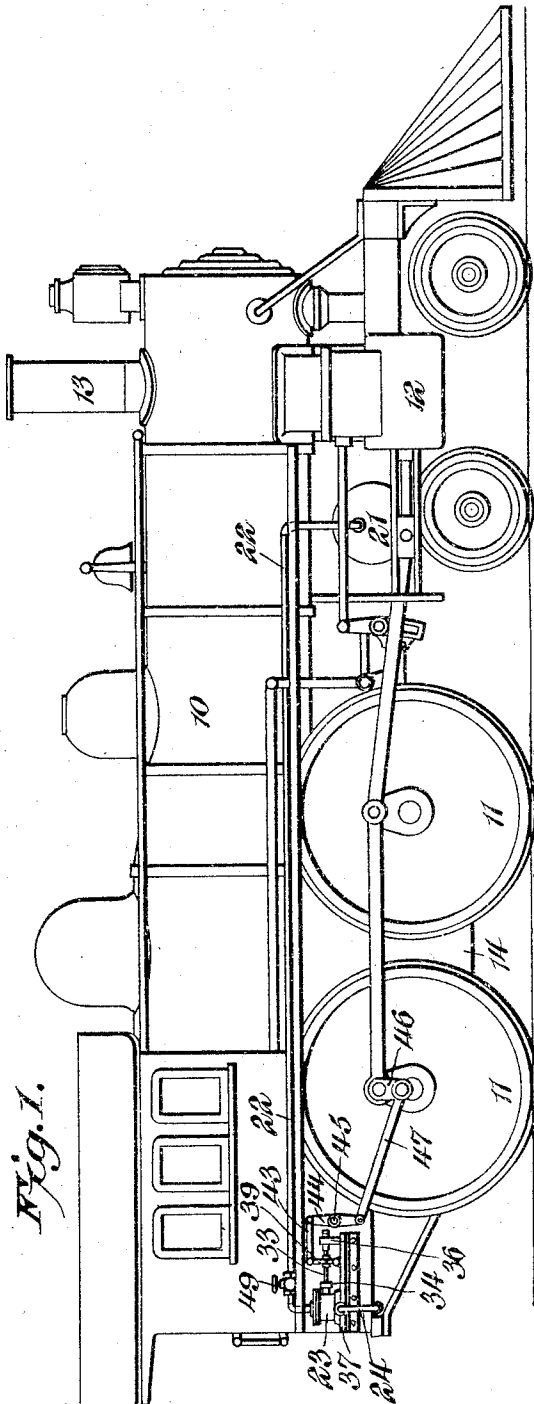


Fig. 1.

Witnesses

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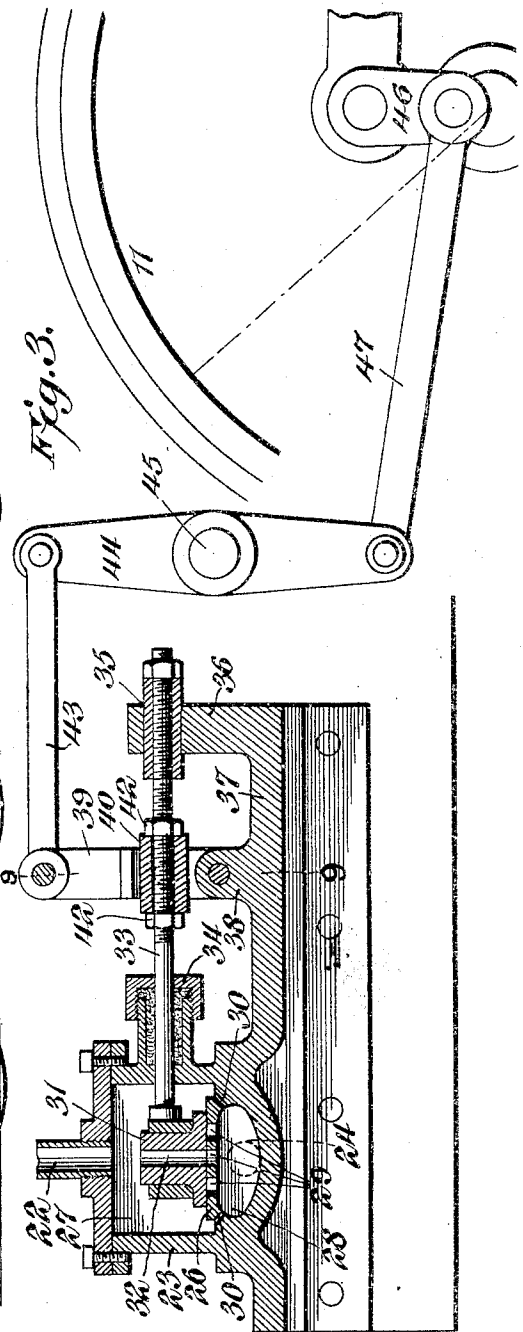


Fig. 3.

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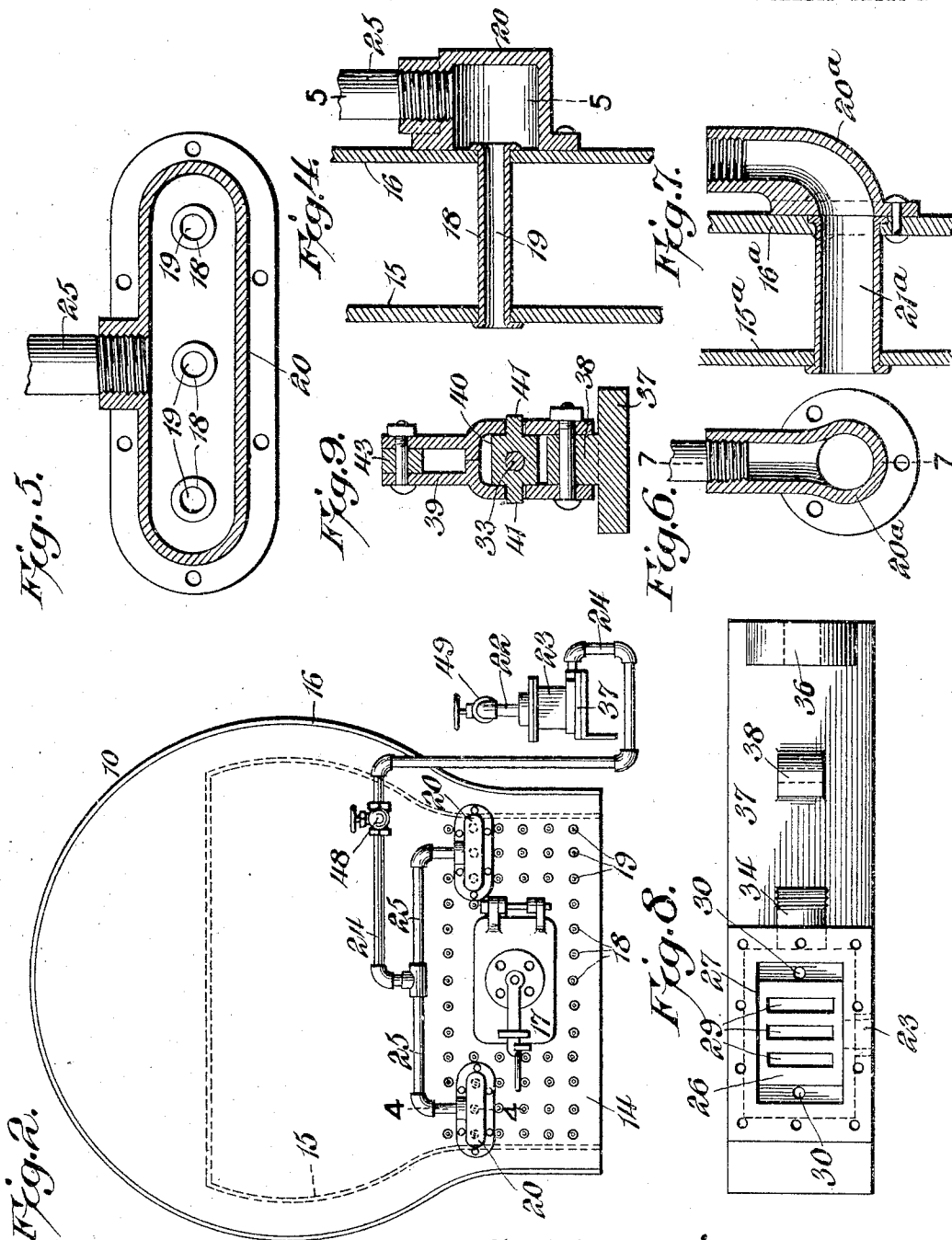


Fig. 2.

Witnesses

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ATTACHMENT FOR LOCOMOTIVE OR OTHER BOILERS.

959,134.

Specification of Letters Patent.

Patented May 24, 1910.

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To all whom it may concern:

Be it known that I, CHARLES F. HARRIS, a citizen of the United States, residing at Altoona, in the county of Blair and State of Pennsylvania, have invented a new and useful Attachment for Locomotive or other Boilers, of which the following is a specification.

The primary object of the present invention is to provide means for producing more complete combustion in a locomotive or other boiler and thereby materially reducing or entirely eliminating smoke.

A further object is to provide a very simple and compact structure that can be cheaply manufactured, and can be readily applied to practically any type of locomotive, the parts moreover being such that they are not exposed to high temperature and consequently will not burn out or occupy any of the space within the fire box.

The preferred form of construction is illustrated in the accompanying drawings, wherein: Figure 1 is a side elevation of the locomotive showing the mechanism in place thereon. Fig. 2 is a view of the rear end of the boiler showing the mechanism applied thereto. Fig. 3 is a vertical sectional view on an enlarged scale through the air controlling means. Fig. 4 is a detail sectional view on an enlarged scale on the line 4—4 of Fig. 2. Fig. 5 is a sectional view on the line 5—5 of Fig. 4. Fig. 6 is a detail sectional view through a slightly modified form of nozzle. Fig. 7 is a sectional view on the line 7—7 of Fig. 6. Fig. 8 is a plan view of the valve casing with the top thereof removed. Fig. 9 is a detail sectional view on the line 9—9 of Fig. 3.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

The locomotive may be of any desired type. In the embodiment disclosed, it comprises a horizontal boiler 10 mounted on driving wheels 11, which are connected in the usual manner to engines 12, the same exhausting into the stack 13 for the purpose of creating forced draft. The boiler includes a furnace or fire box 14, consisting of inner walls 15 and outer walls 16. A door 17 gives access to the interior of the furnace or fire box in the usual manner. The inner and outer walls 15 and 16 are connected by stay bolts, and in the form of construction shown in Figs. 2, 4 and 5, these stay bolts,

which are designated 18, are hollow, being provided with longitudinal bores 19.

Located on opposite sides of the door 17 and covering the outer ends of certain of the stay bolts, are air chambers 20, which communicate with said stay bolts, and form in connection therewith, nozzles. The locomotive is provided with the usual air reservoir 21, and leading from said reservoir, is a supply pipe 22 communicating with a valve casing 23 carried by the locomotive. From this valve casing leads a discharge pipe 24 that has branches 25 connected to the chambers 20. Referring more particularly to Figs. 3—8, it will be noted that the valve casing 23 has an interior horizontal partition 26 constituting a valve seat, said partition dividing the interior of the casing into an upper air chest 27 and a lower chamber 28. The pipe 22 communicates with the upper chest, and the pipe 24 leads from the lower chamber. The partition 26 is provided with three vertically disposed ports 29 and two inclined ports 30, these various ports thus constituting means of communication between the upper chest 27 and the lower chamber 28.

Operating on the partition 26 is a slide valve 31 having a port 32 therethrough that moves into and out of register with the different ports 29. Connected to this valve is a stem 33 that passes through a packing box 34 and has a sliding bearing 35 at its outer end, the bearing being formed by an up-standing lug 36 on a casting 37 forming a part of the valve casing. This casting 37 furthermore has an up-standing ear 38 to which is pivoted the lower end of a yoke 39. A block 40, pivoted, as shown at 41, in the yoke, has the valve stem 33 passing therethrough, said valve stem being adjustable in the block, but being normally held against movement therein by means of holding nuts 42. The upper end of the yoke 39 has a link connection 43 with the upper end of a lever 44, fulcrumed between its ends, as shown at 45. A return crank 46, associated with the rear driving wheel, has a pitman connection 47 with the lower end of the lever 44. It will thus be evident that as the drive wheel rotates, the valve 31 will be reciprocated, and thus the port 32 brought into and out of register successively with the different ports 29.

The above described mechanism is so arranged that the port 32 of the valve will reg-

ister with one of the ports 29 about the time an exhaust takes place through the stack 13 from the cylinders. By adjusting the return crank 46, this registering action may take place just after, just before or simultaneously with the exhaust, as may be desired or found most suitable. Whenever the port 32 aligns or registers with one of the ports 29, it will be evident that air under pressure flowing from the reservoir 21 to the pipe 22, will pass through the pipe 24 and be projected into the fire box over the fire. This action takes place with the exhaust, and the fresh air thus directed over the fire commingles with the gas and smoke, producing a combustible vapor that will readily burn, thus reducing or entirely eliminating the smoke that would otherwise be emitted from the stack. The amount of air admitted can be readily regulated by a valve 48 and another valve 49 located in the pipe 22 can be employed for cutting off supply of air entirely from the mechanism.

There are many advantages for the particular structure disclosed. In the first place, it will be noted that all the mechanism is disposed entirely outside the fire box so that no space within the same is occupied, and there is no danger of burning out any of the parts, as would be the case if placed in direct contact with the fire. Moreover the structure is exceedingly simple and occupies but little space so that it may be readily applied to a locomotive without altering or interfering with the various mechanisms placed thereon. There are many advantages for the intermittent supply of air. In the first place, there is not the drain upon the air reservoir that there would be if a comparatively great body of air was at all times being passed into the fire box. Moreover the air being intermittently admitted will not materially affect the heating capacity of the fire. In fact better combustion is secured, and the greatest need of the air is at the time the exhaust into the stack lifts the fire. However, a small amount of air is at all times admitted to the ports 30 so that when the locomotive is at a standstill, a sufficient amount of air will still be admitted to effect proper combustion.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion and minor details of construction, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention. For instance, where locomotives are equipped with solid stay bolts, the structure disclosed in Figs. 6 and 7 may be employed. In this case, the inner and outer walls of the furnace or fire box are designated 15^a and 16^a. The air chamber 20^a

is riveted or otherwise secured to the outer wall and the space between the inner and outer sheets is bridged by a suitable tube 21^a.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a locomotive including a boiler having a furnace, a stack, and an engine that exhausts into the stack, of means independent of the exhaust and operated by and with the engine to periodically admit drafts of air into the furnace.

2. The combination with a boiler having a furnace and a stack, of an engine having exhaust mechanism that delivers into the stack, means for directing drafts into the furnace, and means separate from the exhaust mechanism and automatically operated by the engine for controlling the drafts.

3. The combination of a locomotive including a boiler having a furnace, a stack, and an engine including a cylinder and a valve mechanism for controlling the admission of steam to the cylinder and the exhaust therefrom through the stack, of a fluid supply pipe communicating with the furnace, and automatically actuated means operated by and operatively connected with the engine for periodically increasing and diminishing the supply of fluid from the pipe to the furnace.

4. The combination with a locomotive including a boiler having a furnace, a stack and an engine that exhausts into the stack, and propelling mechanism for the locomotive, of an air reservoir carried by the locomotive, an air supply pipe connecting the reservoir and the furnace, a valve located in the pipe, and means connected to the propelling means of the locomotive to effect the operation of the valve.

5. The combination with a locomotive including a boiler having a furnace, a stack and an engine that exhausts into the stack, of an air reservoir carried by the locomotive, an air supply pipe connecting the reservoir and the furnace, a valve located in the pipe, a crank associated with one of the drive wheels of the locomotive, and mechanism connected to the crank for operating the valve.

6. The combination with a locomotive including a boiler having a furnace, a stack and an engine that exhausts into the stack, of an air reservoir carried by the locomotive, a plurality of nozzles for delivering air into the furnace, an air pipe connecting the air reservoir and nozzles and including a valve casing, a slide valve operating in the casing and having an exposed stem, a lever connected to the stem, a return crank secured to one of the drive wheels, and a pitman connection between the crank and the lever.

7. The combination with a boiler furnace, 130

of an engine including a cylinder and a valve mechanism controlling the admission of steam to and exhaust from the cylinder, a crank operated by the engine, a fluid supply delivering to the furnace, a valve controlling the fluid supply, and a connection between the crank and the valve for effecting the automatic movement of the latter.

8. The combination with a locomotive having a cylinder, a valve for admitting steam to and exhausting it from the cylinder, a boiler, a fire box therein, and a supporting wheel, of a fluid supply delivering to the fire box, a valve controlling the fluid supply, and a crank connection between the wheel and valve for effecting the automatic movement of the latter.

9. The combination with a furnace, of means for delivering fluid thereinto including a port, a valve controlling the fluid supply, an engine, and automatic mechanism connected to the valve and engine and operated thereby to move the valve for periodically opening and closing the port.

10. The combination with an engine and a furnace therefor, of means for delivering air thereto, means for controlling the air supply, said last-mentioned means consisting of a valve casing member and a valve member operating therein, one of the members having a plurality of ports, the other member having a port movable into and out of register with the various ports, and means for operating the said controlling means by the engine for registering the said ports in timed relation to the exhaust of the engine.

11. The combination with an engine and a furnace therefor, of means for delivering air to the furnace, means for controlling the air supply, said means comprising a valve casing having a plurality of ports, a sliding valve having a port that moves into and out of register with the different casing ports, and automatic means for reciprocating said sliding valve actuated in correspondence with the movement of said engine so that the registration of the ports in the valve casing with the port in said valve is in timed relation to the exhaust of the engine.

12. The combination with an engine and a furnace therefor, of an air reservoir, a

valve casing, an air supply pipe from the reservoir to the casing, a discharge pipe leading from the casing to the furnace, said valve casing having a plurality of ports, a slide valve having a port that moves into and out of register with certain of the casing ports and leaves others always open, and means for automatically effecting the operation of the valve through the operation of said engine.

13. The combination in an engine having a fire-box, said box comprising spaced walls, of an air reservoir, a pipe leading from said reservoir, a valve in said pipe automatically actuated by the engine to intermittently increase and diminish the amount of air discharged through the pipe to the firebox, and tubular stay bolts passing through the double walls of the fire-box and communicating with the interior of the fire-box, said stay bolts being connected to the conducting pipe leading from the reservoir.

14. The combination of a furnace, an engine, means for delivering air to the furnace, a valve for controlling the supply of air, and a mechanism operatively connected with the valve and with the engine for positively reciprocating the same synchronously with the strokes of the engine.

15. The combination with a locomotive having a fire box, said box comprising spaced walls and tubular stay bolts connecting the same, a stack, driving wheels, and an engine connected to the driving wheels and exhausting into the stack, of an air reservoir mounted on the locomotive, a plurality of air chambers communicating with certain of the stay bolt bores, a pipe connecting the reservoir and the chambers and including a valve casing having a plurality of ports, a slide valve operating over certain of the ports, a return crank associated with one of the driving wheels, and connections between the crank and the valve for effecting the operation of the same.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CHARLES F. HARRIS.

Witnesses:

A. H. SLAYMAN,
MARK H. HARRIS.