E. KOHAN.

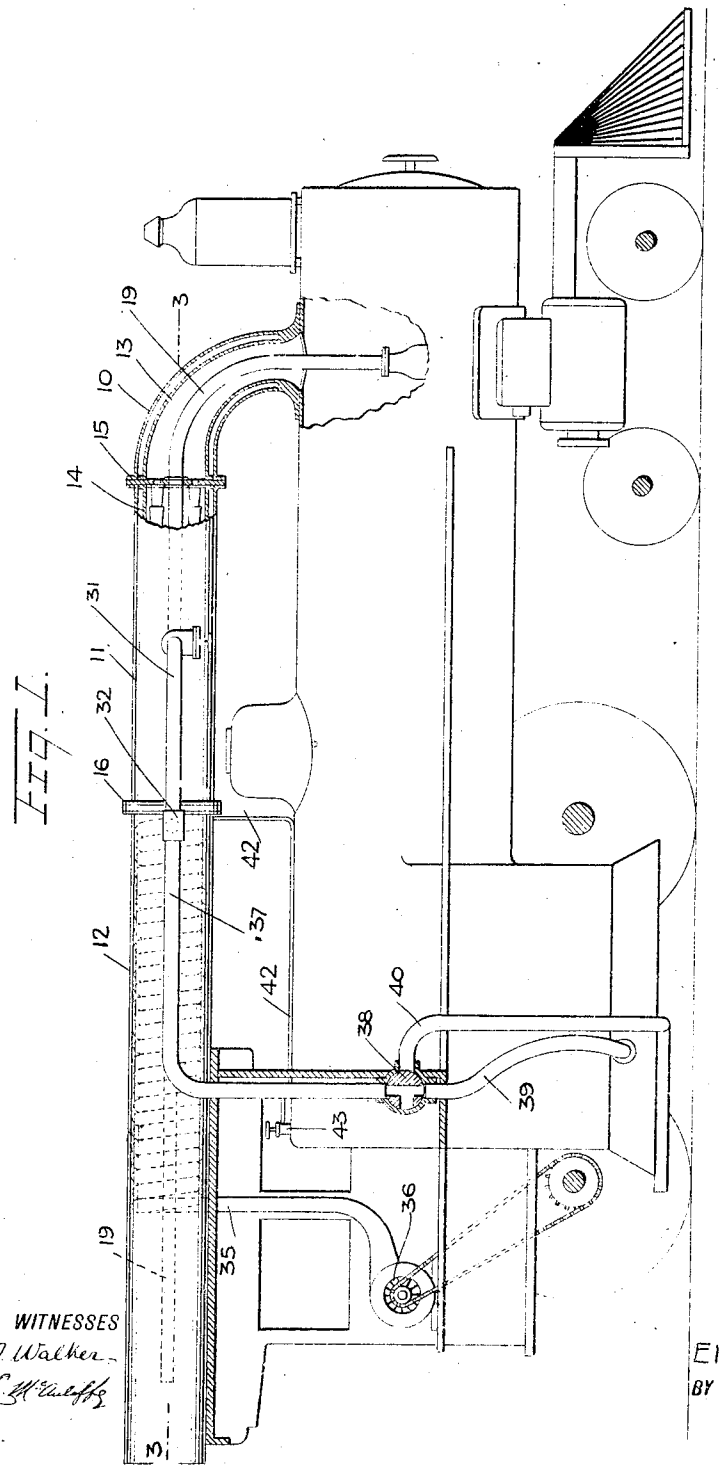
SMOKE PREVENTING DEVICE AND ECONOMIZER FOR LOCOMOTIVES.

APPLICATION FILED APR. 25, 1912.

1,053,044. Patented Feb. 11, 1913.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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3 SHEETS—SHEET 2.

Fig. 2.

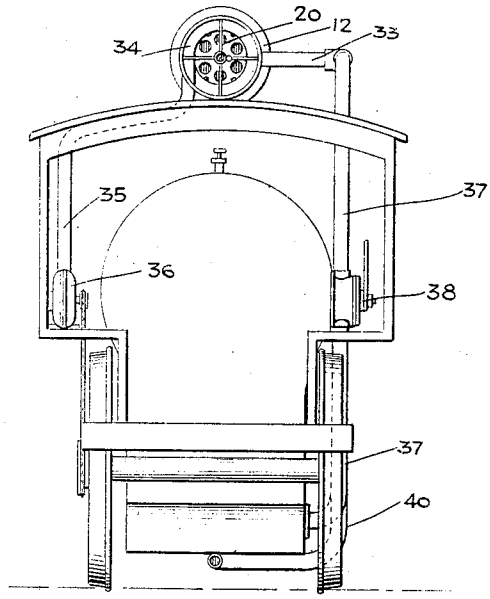


Fig. 5.

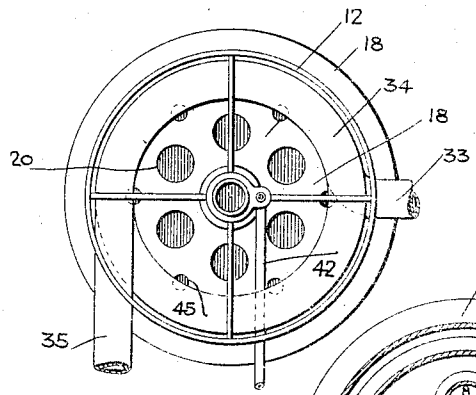
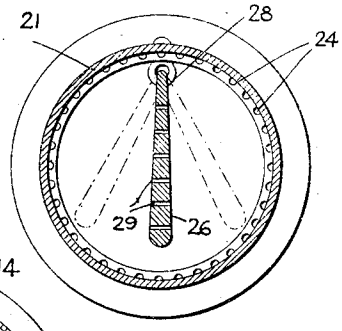


Fig. 7.



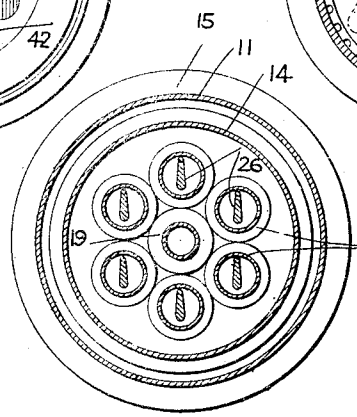


Fig. 6.

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3 SHEETS—SHEET 3.

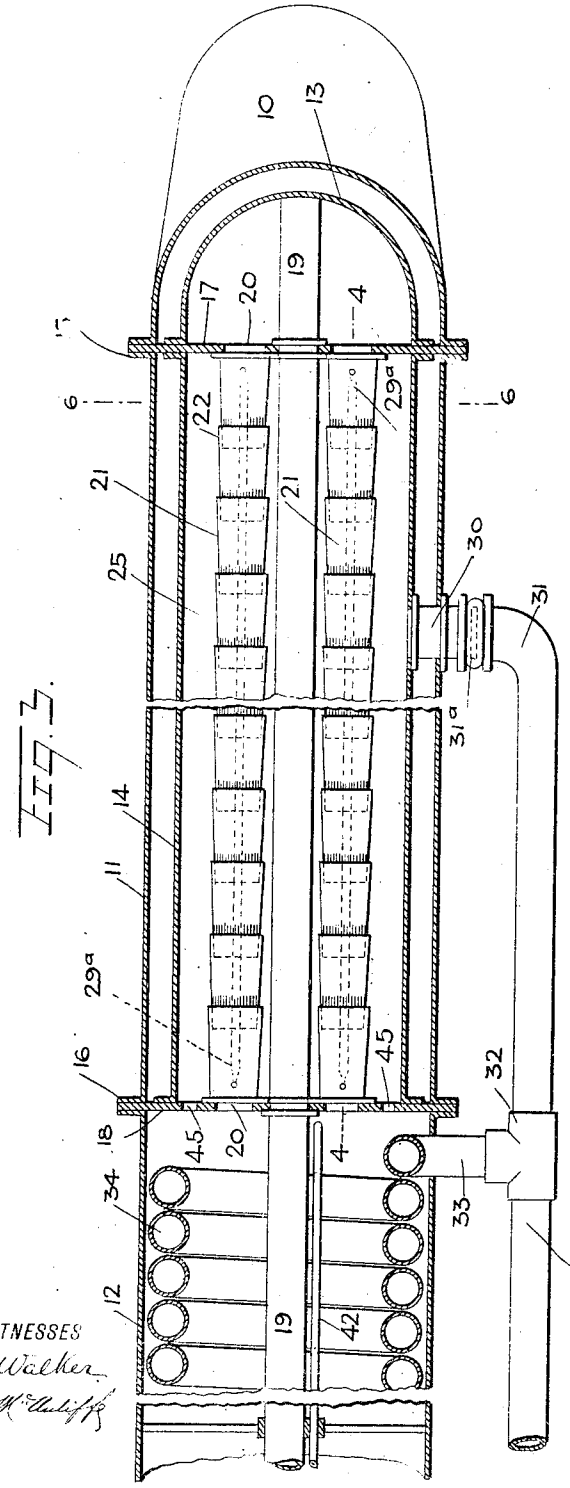

Fig. 3.

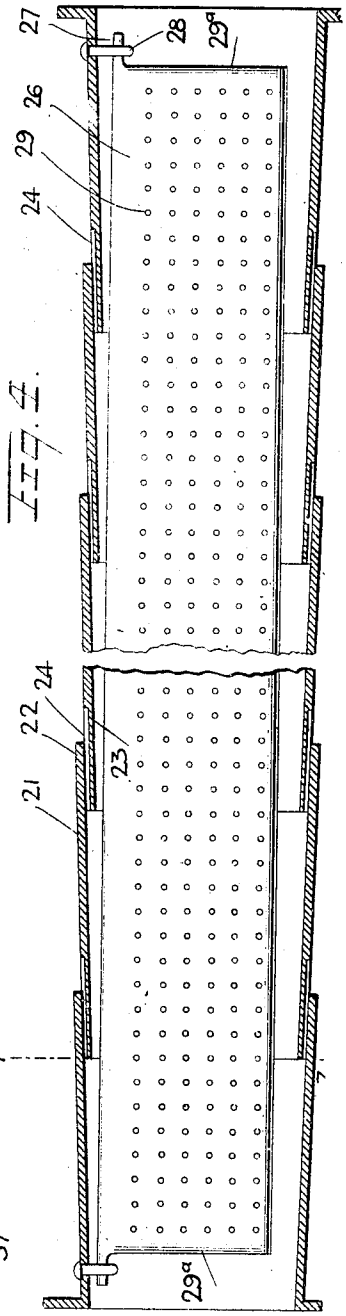

Fig. 4.

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UNITED STATES PATENT OFFICE.

ELIASAR KOHAN, OF PORT EWEN, NEW YORK.

SMOKE-PREVENTING DEVICE AND ECONOMIZER FOR LOCOMOTIVES.

1,053,044. Specification of Letters Patent. Patented Feb. 11, 1913.

Application filed April 25, 1912. Serial No. 693,215.

To all whom it may concern:

Be it known that I, ELIASAR KOHAN, a subject of the Czar of Russia, and a resident of Port Ewen, in the county of Ulster and State of New York, have invented a new and Improved Smoke-Preventing Device and Economizer for Locomotives, of which the following is a full, clear, and exact description.

An object of my invention is to provide a novel means for causing a secondary combustion to consume and utilize the heat from the unconsumed particles that pass from the firebox of the locomotive to the smoke-stack. As is well known, the gases and other products that are discharged to the smoke-stack of a locomotive immediately after firing with fresh coal, are comparatively cool and contain a large proportion of unconsumed fine particles of coal, particularly when firing with soft coal. On the other hand, when the fire is burning fully and the combustion reaches its highest point in the furnace, the products discharged to the smoke-stack are very hot. With my invention I provide elements formed and arranged to take up the heat from the gases and products when at their highest point of heat, and I utilize the heat thus conserved to aid in producing a secondary combustion in a smoke pipe of novel form. The heat developed by my apparatus I utilize for heating a fluid, preferably atmospheric air, and the heated fluid is in turn utilized for any available purpose in connection with a locomotive or train. In the preferred arrangement, I employ the heated air for promoting combustion in the firebox.

The distinguishing features of my invention, and the important structural elements characterizing the preferred embodiment which is illustrated as an example, will be more particularly explained in the specific description hereinafter to be given.

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

Figure 1 is a side elevation of my improved device applied to a locomotive, parts being shown in section; Fig. 2 is a rear elevation of a locomotive equipped with my device; Fig. 3 is an enlarged horizontal section on the line 3—3 in Fig. 1; Fig. 4 is a longitudinal vertical section on the line 4—4 in Fig. 3; Fig. 5 is a rear end view of my device detached from the locomotive, parts of the fluid-circulating pipe being broken away; Fig. 6 is a cross section on the line 6—6 in Fig. 3; and Fig. 7 is a cross section on the line 7—7 in Fig. 4.

In carrying out my invention, a smoke conductor is mounted on the locomotive to take the place of the usual stack, the conductor in the illustrated form consisting of an elbow section 10 and two alined and connected sections 11 and 12, that range rearwardly on top of the locomotive, said conductor in practice being supported from the locomotive in any suitable manner. The elbow 10 is preferably formed with double walls, the inner wall 13 being properly supported concentric with the outer wall to form an intervening air space for heat insulation, and similarly the adjacent section 11 is formed with an inner wall 14 spaced from the outer wall to form an intervening space. The section 11 is united to the elbow 10 and to the section 12 by a suitable flange coupling 15, 16, and between the flanges of the said couplings disks 17, 18, are clamped, the disks thus forming the ends of the pipe section 11, to which the elbow delivers. The exhaust pipe 19 of the locomotive extends centrally through the elbow 10 and the conductor sections 11 and 12, and terminates, as shown in Fig. 1, a short distance from the outlet end of the rear section 12, which causes a draft through the smoke pipe and the locomotive furnace. The disks 17, 18 are formed with a series of openings 20, and communicating with said openings are an annular series of separate smoke pipes 21 which are made up of separate tapering sections, of which the rear enlarged end 22 of one section receives the smaller front end 23 of the next section, as best shown in Fig. 4, and the smaller front ends of each section are formed exteriorly with peripheral grooves 24 for the inlet of air from the surrounding air chamber 25 which is supplied with air from a high pressure fan, as hereinafter explained. It will be seen that with the described construction, the draft caused by the exhaust steam discharged from the exhaust pipe 19 will cause the smoke and products of combustion from the furnace to pass through the elbow 10 and through the annular series of individual smoke pipes 21 to the rear section 12 of the smoke conductor.

Within each individual smoke pipe 21 I provide means to take up the heat from the hot gases that pass through said pipes, and in the preferred form the said means consists of an elongated slab 26 of refractory material which is suspended by its end projections or journals 27 from any suitable hanger devices 28, so that the slabs 26 are thus given a pendulous character, so that they will have a tendency to sway and be vibrated laterally by the vibrations of the locomotive when in motion, the vibrations of the slabs being designed to better insure a contact of the slabs with the hot gases passing through the pipes 21, and to a similar end, the slabs are provided with numerous transverse foraminations 29. Desirably the slabs 26 are tapered at the ends, as shown at 29^a in Fig. 3, whereby to present no abrupt end surfaces to the gases.

The space 25 surrounding the various smoke pipes 21, and which space extends from the elbow 10 to the discharge section 12 of the smoke conductor, is supplied with air from an inlet nipple 30 which connects with a pipe section 31, but has communication through a coupling 32 with the outlet 33 of a coiled pipe 34 having its convolutions in the section 12 of the smoke conductor, the inlet end 35 of the coiled pipe 34 being connected with a high pressure fan 36. In practice, the fan will be supported on the tender, or otherwise in the most convenient place. Merely for the purpose of example, I have shown the fan mounted on the locomotive, but it is to be understood that this is only for the purpose of convenient illustration.

From the union 32 a second branch 37 leads to a two-way valve 38, from which valve a pipe 39 leads to the ash box of the locomotive, and a second pipe 40 to the atmosphere, or to any other point, as, for instance, for heating purposes. To provide for a forced draft when the locomotive is at rest, a live steam pipe 42 connects at any suitable point 43 with the boiler, and extends within the pipe section 12 adjacent to the exhaust pipe 19. The air discharged from the nipple 30 to the space 25 surrounding the individual smoke pipes 21, is under pressure and finds entrance to the individual smoke pipes 21 through the annular series of grooves or passages 24 formed in each tapering pipe section. The air from the said chamber 25 furthermore finds outlet to the pipe section 12 through an annular series of holes 45 that are formed in the forward disk 18.

With the described construction, the slabs 26 will become highly heated during the period when the products of combustion from the furnace are heated to the highest degree, and therefore, when the cooler gases containing a large proportion of combustible particles arrive in the individual smoke pipes 21 and contact with the highly heated slabs at a time when the furnace is freshly coaled, there will be present within the smoke pipes sufficient atmospheric air to support combustion, said air passing inward to the smoke pipes 21 through the passages 24. The arrangement of the tapered sections of the pipes 21 and the inlet grooves 24 will cause an injector action and not interfere with the draft through the locomotive furnace. In addition to the atmospheric air that the combustible particles meet within the smoke pipes 21, additional air will be supplied to the products discharged from the pipes 21 to the pipe section 12. Said air will have entered under pressure to the pipe section 12 through the holes 45. The heat developed in the pipe section 12 serves to highly heat the air under pressure in the coils 34, and said air will pass partly to the chamber 25 and partly to the pipe 37, the valve 38 and the pipe 39, and be delivered in a highly heated condition to the ash box of the furnace for supporting combustion. The air from the pipe 37 may by proper manipulation of the valve 38, be directed to the pipe 40 and thence to the atmosphere or any other point, to be utilized for any purpose.

In practice, the pipe 31 is suitably valved, as indicated in dotted lines at 31^a in Fig. 3, to give the proper discharge to the space 25. By my improved device, the discharge of smoke is prevented and the heat ordinarily wasted in being discharged from a smoke stack is utilized effectively so that economy is promoted in the operation of the locomotive.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A smoke-preventing device and economizer for locomotives, comprising a smoke conductor, an exhaust pipe extending within said conductor and discharging adjacent to one end of the conductor, a series of individual smoke pipes in said conductor, an air chamber surrounding the said smoke pipes and communicating with the interior at various points along the length of the said pipes, heat-absorbing elements within said smoke pipes, an air supply pipe communicating with the air chamber surrounding the mentioned smoke pipes, and having connections to deliver air from said air pipe to a point adjacent to the firebox of the locomotive, and means for forcing air through said air pipe.

2. In a smoke-preventing device and economizer for locomotives, the combination with a smoke conductor having a discharge section and a section intermediate between the ends of the smoke pipe, and provided with a series of individual smoke pipes, a cham-

ber surrounding said smoke pipes and communicating both with the interior of the smoke pipes and with the discharge section of the conductor, an exhaust pipe extending lengthwise of the smoke conductor and discharging adjacent to the outlet end of the conductor, an air pipe having convolutions within the discharge section of the conductor, means for forcing air through said air pipe, a connection between the air pipe and the chamber surrounding the smoke pipes, and an additional air discharge connected with said air pipe for delivering air therefrom to a desired point.

3. In a device of the character described, a smoke conductor, an exhaust pipe ranging longitudinally thereof, said smoke conductor having at a point between its ends a chamber, a series of separate smoke pipes extending through said chamber and in communication therewith at points along the length of the smoke pipes, an air pipe coiled within the conductor at a point beyond the mentioned chamber, connections between said air pipe and the said chamber, and an outlet leading from the said chamber to the conductor at a point beyond said chamber.

4. The combination with a locomotive of a smoke conductor, an exhaust pipe ranging longitudinally of the said conductor, an air pipe having a coil within the conductor, means for forcing air through said pipe, smoke pipes, a chamber formed in said conductor and surrounding the smoke pipes, heat-absorbing elements in said pipes, the said pipes having air inlets leading from the said chamber to the interior of the smoke pipes, connections between the said air pipe and the chamber in which the smoke pipes are located, and connections between said air pipe and the ash box of the locomotive.

5. The combination with a locomotive of a smoke conductor, an exhaust pipe ranging longitudinally thereof, disks located in said conductor a distance apart to form a longitudinal chamber, said disks having registering openings, smoke pipes extending from one disk to the other at said openings, said smoke pipes having air inlets leading from said longitudinal chamber to the interior of said smoke pipes, one of said disks furthermore having additional openings forming outlets from the said chamber to a point in the conductor beyond said chamber, an air pipe having a coil within the conductor beyond the smoke pipes, connections between said air pipe and the said chamber, and between the said air pipe and the ash box of the locomotive, and a fan for forcing air through said air pipe.

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

ELIASAR KOHAN.

Witnesses:
ELISAWETA KOHAN,
I. GINGBURG.