J. BONTYA.

LOCOMOTIVE DRAFT APPARATUS.

APPLICATION FILED FEB. 23, 1918.

1,296,040.

Patented Mar. 4, 1919.

4 SHEETS—SHEET 1.

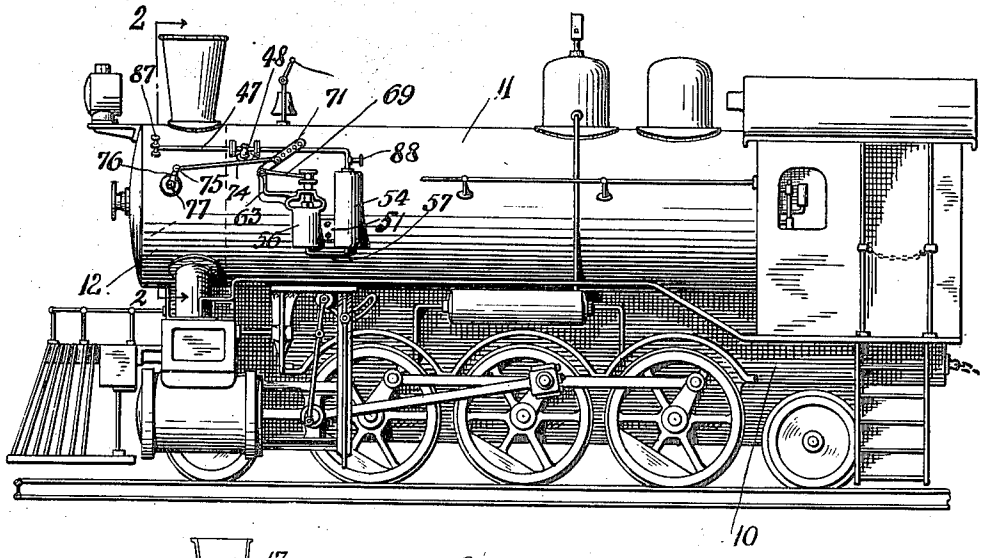


Fig. 1.

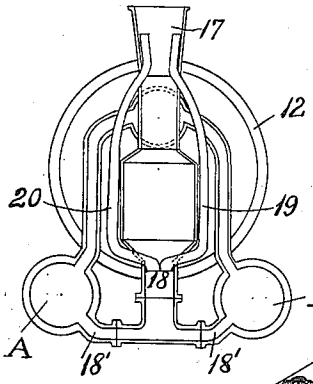


Fig. 5.

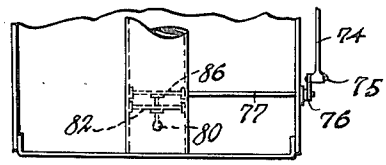


Fig. 8.

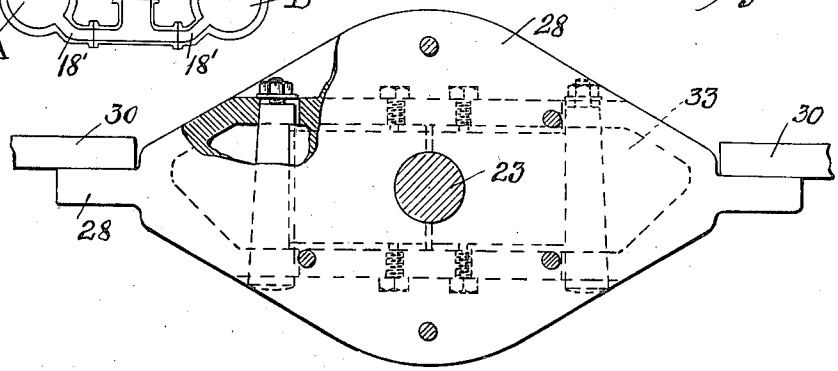


Fig. 4.

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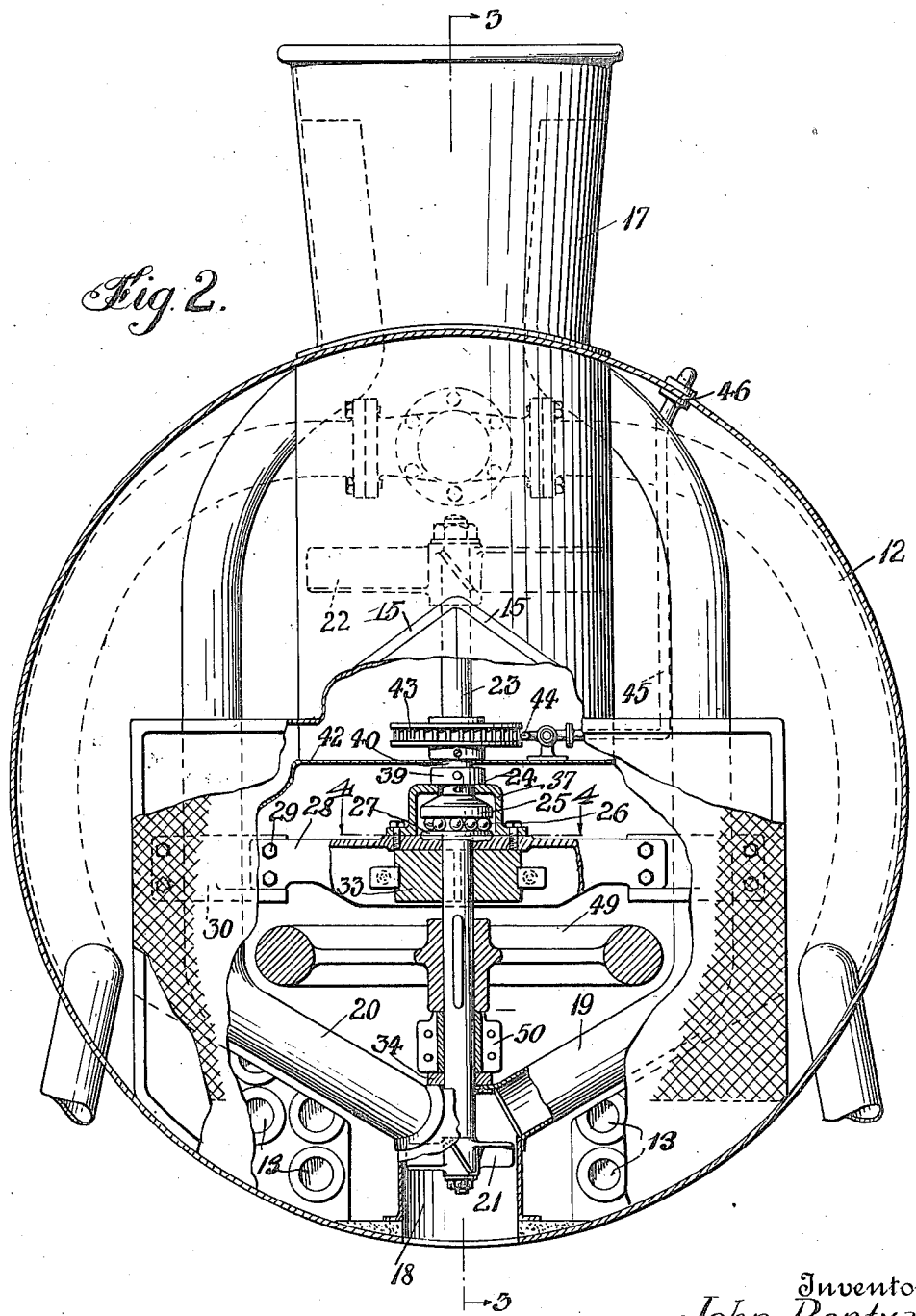
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4 SHEETS—SHEET 2.

Fig. 2.



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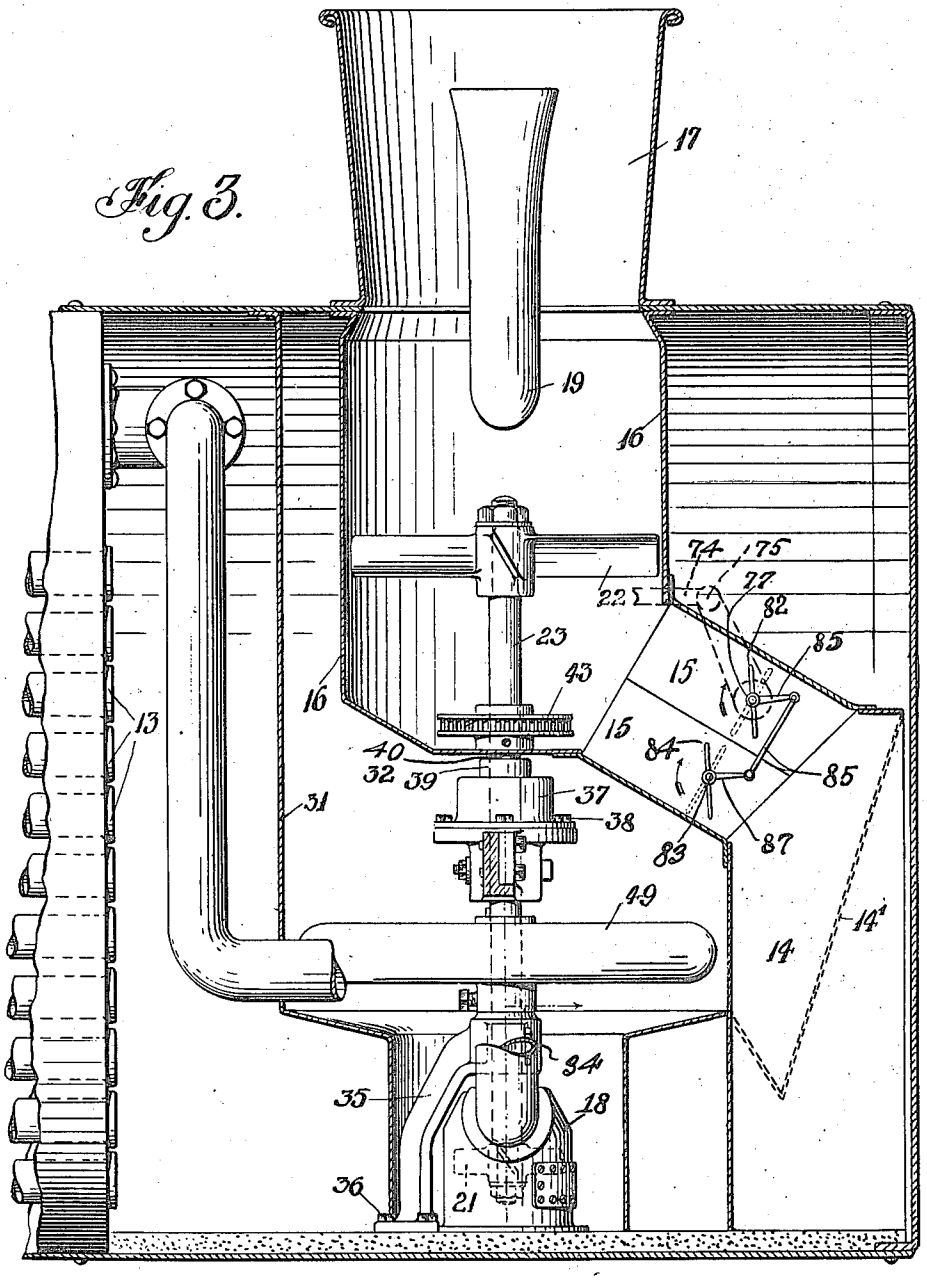
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4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

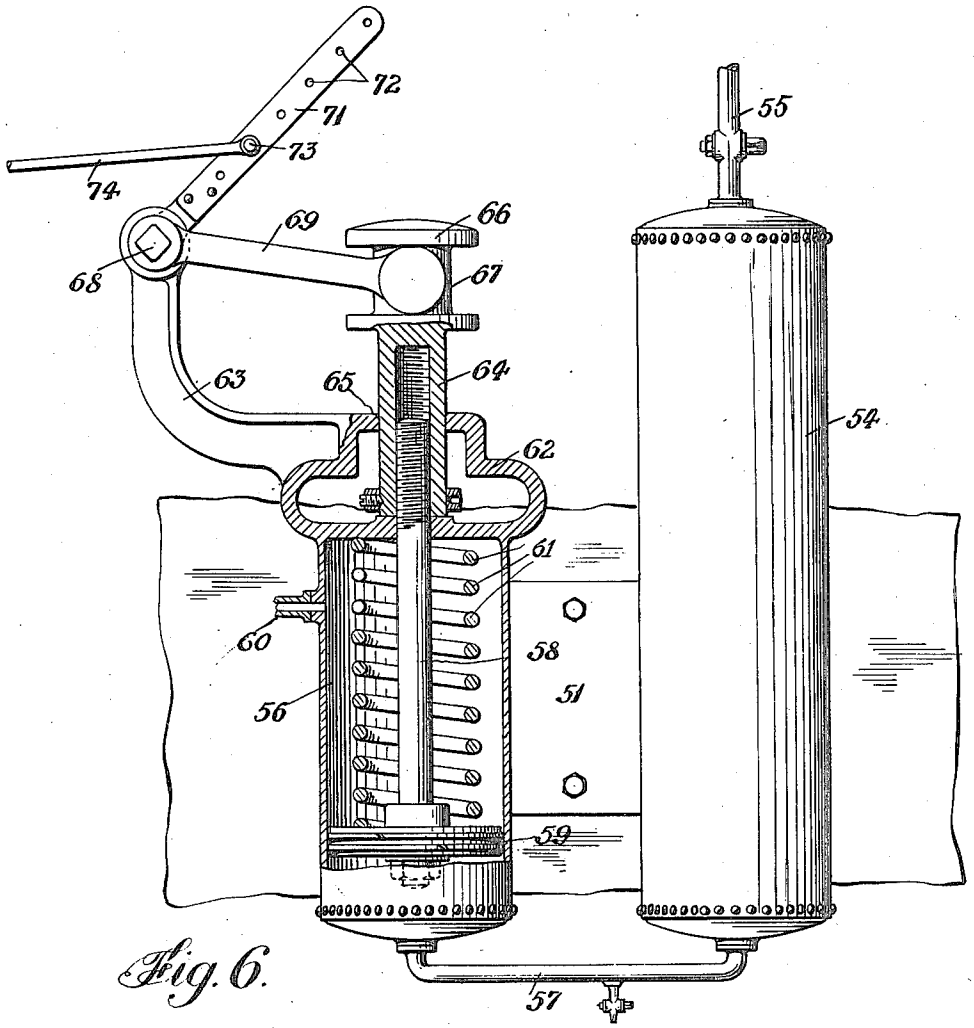


Fig. 6.

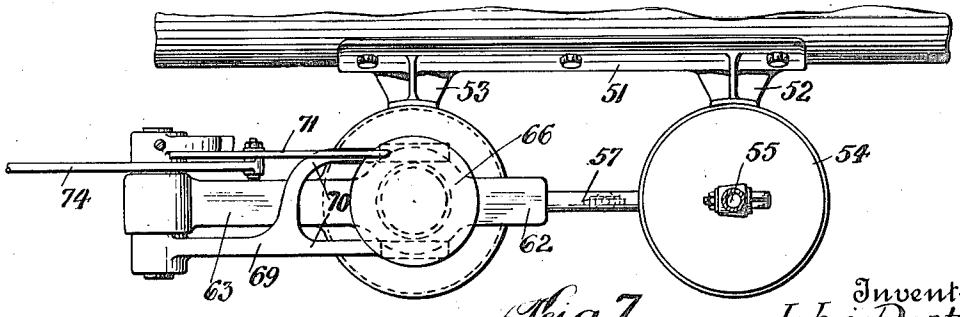


Fig. 7.

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UNITED STATES PATENT OFFICE.

JOHN BONTYA, OF TRENTON, NEW JERSEY.

LOCOMOTIVE DRAFT APPARATUS.

1,296,040. Specification of Letters Patent. Patented Mar. 4, 1919.

Application filed February 23, 1918. Serial No. 218,889.

To all whom it may concern:

Be it known that I, JOHN BONTYA, a subject of the King of Hungary, residing at Trenton, in the county of Mercer and State of New Jersey, have invented new and useful Improvements in Locomotive Draft Apparatus, of which the following is a specification.

This invention relates to steam locomotives and the principal objects of the same are: (1) to provide for this type of engine installations for accelerating and forcing fuel combustion, the same including an arrangement of draft passages or exits combined with draft producing devices, which may be operated either by the blasts or exhausts of steam, by live steam from the boiler, or by an independent source of steam supply; and (2) to provide a governing apparatus, dependent for its operation upon the steam pressure of the boiler, for automatically actuating mechanism adapted substantially to open and close the passage through which the products of combustion pass on their way to the stack.

With these and other objects in view, the invention resides in the details of construction and in the combination and arrangement of parts hereinafter described and shown in the accompanying drawings, forming a material part of this specification, and in which:—

Figure 1 is a view in side elevation of a locomotive, showing in particular the devices carried upon the outside of the boiler.

Fig. 2 is a vertical cross sectional view through the smoke-box, taken approximately in the direction of the line 2—2 of Fig. 1, parts being shown in section, and parts being broken away.

Fig. 3 is a vertical sectional view, taken approximately in the direction of the line 3—3 of Fig. 2.

Fig. 4 is a top plan view in the nature of a diagram, taken in the direction of the line 4—4 of Fig. 2, parts being shown in section.

Fig. 5 is a diagram, illustrating in particular the connections through which the blasts or exhausts of steam from the cylinders are passed to the exit installations within the smoke-box.

Fig. 6 is an enlarged view in side elevation, parts being in section, of the steam actuated apparatus for controlling the draft gates, the same being located upon the outside of the boiler.

Fig. 7 is a top plan view of the steam actuated apparatus for controlling the draft gates, this view showing how the apparatus is supported upon the boiler.

Fig. 8 is a fragmental plan view, showing in particular the connections for operating the draft gates.

With more particular reference to the accompanying drawings, the numeral 10 (Fig. 1) is employed to denote the fire-box, 11 to denote the boiler, and 12 to denote the smoke-box. 13 (Fig. 3) indicates the usual flues through which the air and products of combustion pass from the fire-box 10 (or combustion compartment) to the smoke-box 12, and thence are drawn into the chamber 14 located in the lower forward end thereof. A cinder screen 14′ suitably partitions off the upper portion of chamber 14, which communicates through a rectangular passageway 15 with the lower partitioned off portion or extension 16 of the smoke stack 17. In this manner I arrange installations by which the draft and products of combustion, as they issue from the flues 13, may be drawn into and expelled through the stack 17.

Entering through the bottom of the smoke-box 12 (Fig. 2), preferably opposite the lower portion 16 of the stack, is an exhaust pipe 18, which connects in any suitable manner with the steam exhaust pipes 18′ leading from the cylinders A and B. After extending upwardly a short distance, this exhaust pipe 18, as best shown in Fig. 2, divides into the diverging branches 19 and 20, which continue upwardly through the stack 17 on opposite sides thereof, where they discharge the blasts or exhausts of steam to accelerate and force, in an obvious manner, the draft through the flues 13 and installations, as above described.

Operating in the exhaust pipe 18 just below the divergence of the branches 19 and 20 (Fig. 2) is a rotor 21, and in the lower portion 16 of the stack just beyond the junction of the square passageway 15 therewith is a fan 22, (Fig. 3). Rotor 21 and fan 22 are both fast on a vertical shaft 23, upon which is secured intermediate its length as at 24 (Fig. 2) a fitting 25 suitably mounted upon anti-friction rollers or balls 26, engaged upon the annularly grooved plate 27, provided on the cross piece or bridge 28. At its opposite ends the cross piece 28 is bolted to brackets as 30, which are preferably supported from the walls 31 (Fig. 3) in any suitable rigid man-

ner, the said walls partitioning off the compartment 32 from smoke-box, in order to protect the shaft 23 and associated parts from the products of combustion.

In this manner the shaft 23 is supported for rotation, the same also being journaled to hold it in operative position in the adjustable bearing 33 secured to the cross piece or bridge 28, and in a bearing 34 formed in the head of the bracket 35, which is bolted as at 36 to the inner bottom of the smoke-box. The fitting 25 as well as the supporting anti-friction rollers or balls are incased by a housing 37 which is secured by screw bolts as 38 upon the top side of the plate 27, formed with the cross piece 28. Secured to the shaft 23 above the housing 37 is a disk 39 formed with an integral sleeve 40 which projects through a suitable opening or bearing provided in the bottom wall 42 in the lower portion 16 of the stack, the same being designed as a further means of holding the shaft 23 in position.

The shaft 23, which, obviously, has as its purpose the rotation of fan 22, whereby to induce a strong draft through the passage 15, is adapted to be rotated in two ways: first, by the action of the blasts of steam on the other rotor 21, and secondly, by means of a steam turbine 43, secured upon said shaft above the bottom wall 42. The live steam for operating this turbine 43 issues from the nozzle 44 of the steam pipe 45, which enters the smoke-box preferably as at 46 (Fig. 2), and which is connected on the outside of the smoke-box (Fig. 1) to a steam pipe 47, which receives the steam from a main supply pipe 48 from the boiler.

When, in the event of building a fire in the fire-box, there is no steam or insufficient steam in the boiler to operate the turbine, the exterior steam pipe 47 may be connected with a source of steam supply independent of the engine, so that the turbine may be operated as before to produce the desired draft for inducing a vigorous fire quickly. A fly wheel 49 mounted upon the shaft 23 over the collar 50, suitably supported upon the head of the bracket 35 (Figs. 2 and 3), serves to regulate and steady the rotation of the said shaft 23, in the usual way.

We now come to the apparatus for automatically opening and closing, approximately, the passage 15, for the control of the draft system. Bolted upon the outside of the boiler, as best shown in Fig. 7, is a plate 51 formed with a pair of vertical brackets 52 and 53. Supported by the bracket 52 is a tank 54, which receives its supply of steam through a pipe 55 from the main steam pipe 48. Supported by the bracket 53 is a cylinder 56 in communication through a pipe 57 with the tank 54. Arranged centrally in this cylinder is a piston rod 58 fixedly carrying a piston 59, which is normally held in close proximity to the exit end of pipe 57 by means of a spiral spring 61, coiled around the said piston rod and engaged between the top side of said piston 59 and the top end of the cylinder 56. This spring 61 is made of such weight and resiliency as to successfully resist in an obvious manner before compressing a certain predetermined pressure consisting of the condensed steam in tank 54, said condensed steam being forced, through the pipe 57 against the piston 59, by the pressure of the live steam entering from the boiler. Near its top end, the cylinder 56 is provided with a suitable outlet 60, in order to provide for the escape of any steam or condensation that may be forced past the piston 59.

Provided upon the top of the cylinder 56 is a head 62 formed at one side with an offset arm 63. Threaded upon the upper end of the piston rod 58 and movable therewith is a sleeve 64 slidably fitted in an opening 65 provided in said head 62. Formed on the upper end of this sleeve is a cylindrical head 66 having a wide annular channel 67. Fast upon a rock shaft 68, supported for movement in a bearing provided in the upper end of the arm 63, is a turning lever 69 formed with the forks 70, which terminate each in a vertical disk snugly engaged in the said channel 67. In this manner I arrange for the turning of the rock shaft 68 in accordance with the movement of the piston rod under the fluctuations of steam pressure, above a predetermined degree. Upon the opposite end of the rock shaft 68 is secured a lever 71, provided with a plurality of eyes as 72 for the suitable pivoting as at 73 of the connecting rod 74, the forward end of which is pivoted at 75 (Fig. 1) to the crank 76 of shaft 77, which extends through an appropriate opening in the smoke-box and then through the passageway 15 where it forms an axis for the gate valve or damper 82. Also extending across the passageway 15 in parallelism to the shaft 77, is a shaft 83 carrying a like gate valve or damper 84. When turned into alinement, these gate valves substantially close the passageway. As a means of operating the gate valve 84, in conjunction with the operation of the gate valve 82, a link 85 pivotally connects the arms 86 and 87 which project respectively from the shafts 77 and 83. Thus I arrange a pair of gate valves in the passageway 15 so as to check or regulate the draft therethrough, the closing and opening of these gate valves being accomplished respectively, by the upward and downward movements of the piston rod 58, which movements in turn are dependent upon the fluctuation of steam pressure, above a predetermined degree, as heretofore described.

A valve 87 arranged in the feed pipe 47, exterior of the smoke-box, provides means

for shutting off the steam supply for the turbine 43. Another valve 88, incorporated in the feed pipe 55, serves to cut off the steam supply for the tank 54, when desired.

Having thus described my invention, what I claim is:—

1. In combination with a steam locomotive including the boiler, smoke-box and stack thereof, an extension for said stack with a closed bottom depending in said smoke-box, a draft passageway forming a communication between said smoke-box and said depending stack extension, a cylinder exhaust steam pipe entering said smoke-box below said depending stack extension, branch connections extending from said exhaust pipe through said stack extension and discharging into said stack near its top end on opposite sides thereof, a rotatable shaft, a fan device carried thereby within the stack extension near the opening thereinto of said draft passageway, a rotor carried thereby within the exhaust pipe and adapted to be operated by the blasts of steam passing therethrough, valve devices for closing the draft passageway, and apparatus dependent upon the fluctuation of the steam pressure in the boiler above a pre-determined degree for controlling the operation of said valve devices.

2. In combination with a steam locomotive including the boiler, smoke-box and stack thereof, a depending compartment inside the smoke-box in direct communication with the stack, a spark screened passageway forming a communication between the smoke-box and said compartment, valve devices arranged in said passageway to control the draft therethrough, a cylinder exhaust steam pipe entering the smoke-box below said depending compartment, said exhaust pipe dividing into branches which discharge into said stack on opposite sides thereof, a vertical shaft journaled for rotation upon anti-friction devices, the opposite ends of said shaft extending one into said depending compartment and the other into said exhaust pipe below the branches of the same, a fan on the end of said shaft within the depending compartment for producing a draft, a rotor on the end of said shaft within the exhaust pipe for operating said shaft, means independent of the rotor for operating said shaft, and apparatus dependent upon the fluctuation of the steam pressure in the boiler above a predetermined degree for controlling the operation of said valve devices.

3. In a steam locomotive having a smoke-box, and stack therefor, a depending compartment in the smoke-box in direct communication with the stack, a draft passageway forming a communication between the smoke-box and the compartment, an exhaust steam pipe entering the smoke-box below said compartment, branch connections leading from the exhaust pipe and discharging into the stack above the compartment, a rotatable shaft having its opposite ends projecting one into the compartment and one into the exhaust pipe, a fan carried by said shaft in said compartment, a rotor on said shaft in said exhaust pipe, said rotor being adapted to rotate said shaft under the action of the exhaust steam blasts, a fly wheel carried by said shaft between the compartment and exhaust pipe, a steam turbine carried by said shaft in the compartment, means for directing a flow of steam against said turbine to accelerate the rotation of said shaft or to rotate the same when the exhaust steam acting on said rotor proves insufficient, and automatic means for regulating the draft through said passageway.

In testimony whereof I have signed my name to this specification.

JOHN BONTYA.