

(No Model.)

C. T. JOHNS, M. C. BAKER & C. D. EVERETT.

HEATING APPARATUS.

No. 390,172.

Patented Sept. 25, 1888.

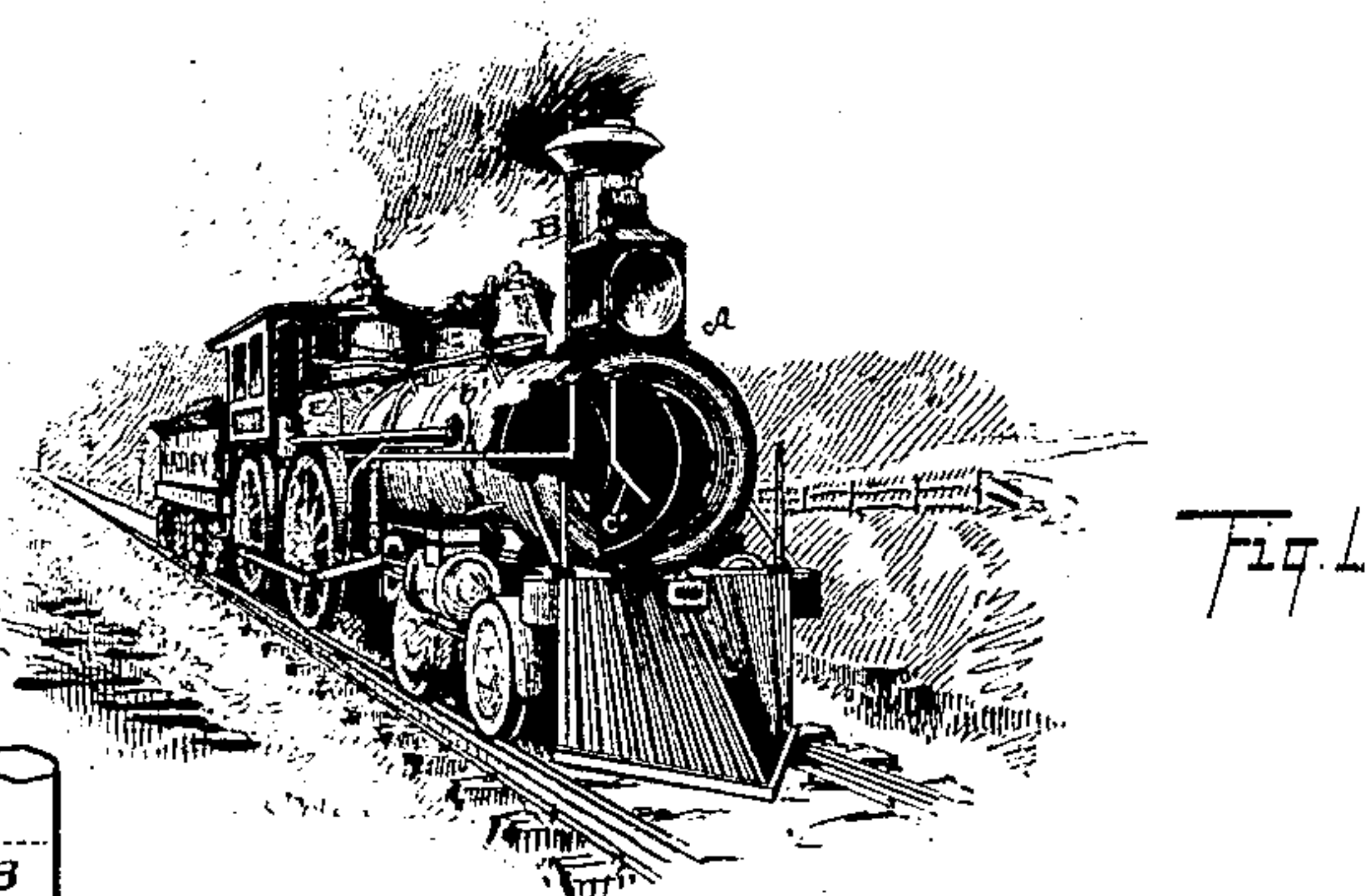


Fig. 1.

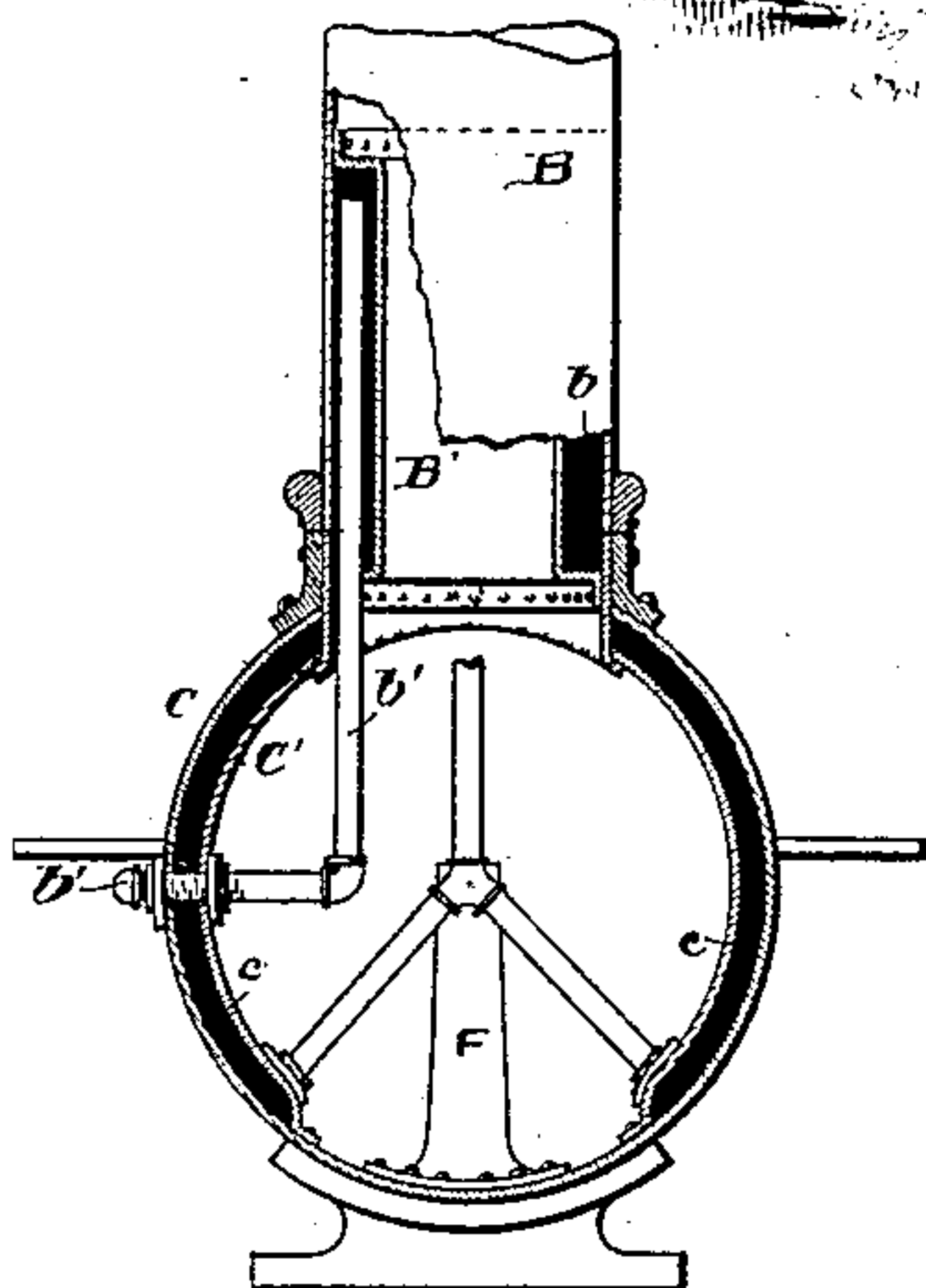
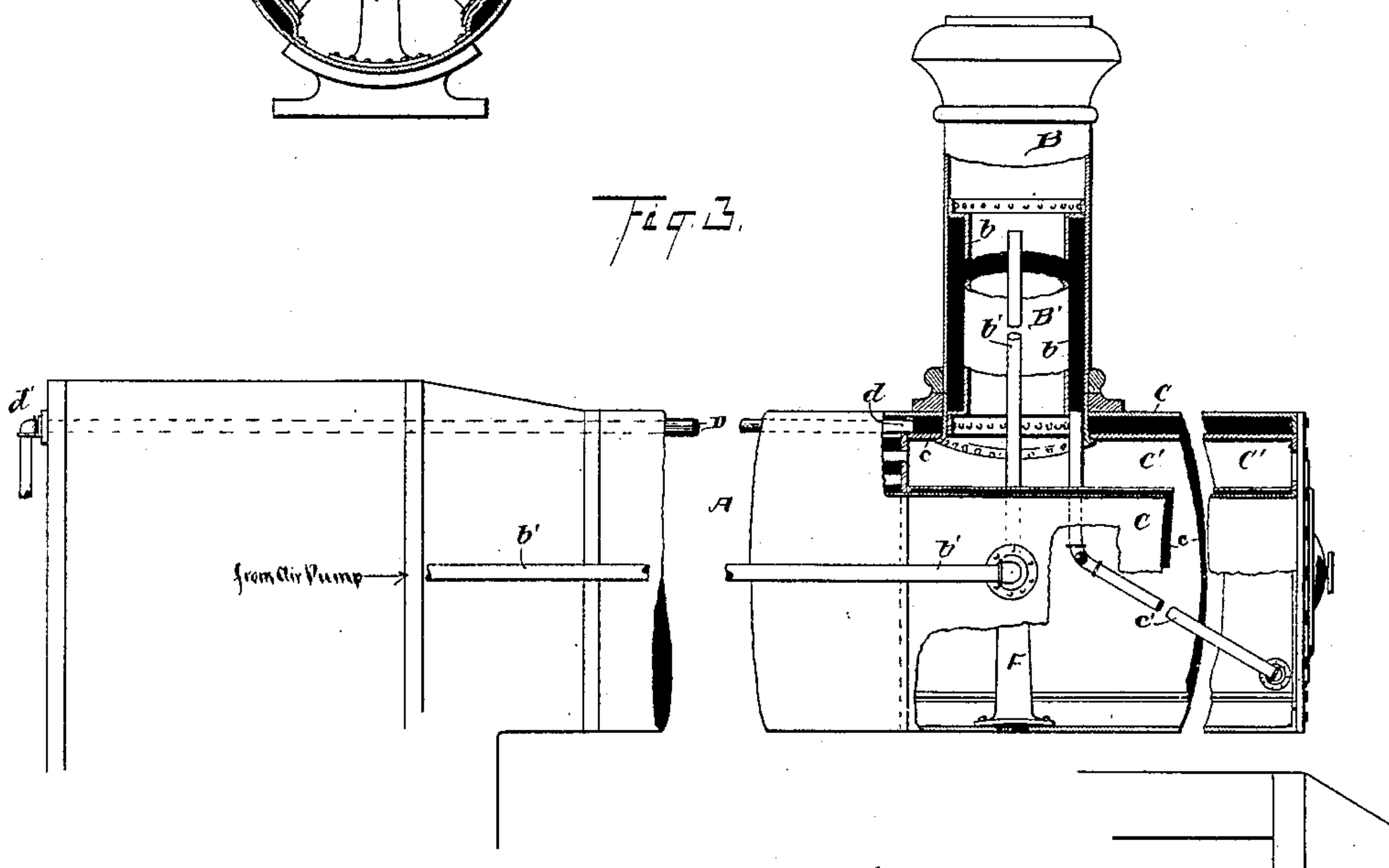


Fig. 2.

Fig. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

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CLEVELAND, OHIO, ASSIGNORS OF TWO-FIFTHS TO SYLVESTER T.
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HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 390,172, dated September 25, 1888.

Application filed April 22, 1887. Serial No. 235,771. (No model.)

To all whom it may concern:

Be it known that we, CHARLES T. JOHNS, MARTIN C. BAKER, and CHARLES D. EVERETT, all of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Heating Apparatus; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

Our invention relates to improvements in heating apparatus connected with locomotive-engines for supplying heated air to the cars, in which a heater is located in the smoke-pipe of the engine, the object being to utilize the heat of the exhaust-steam.

A heater is located in the smoke-box of the engine to utilize the waste heat escaping from the boiler-tubes. These heating-chambers are supplied with air by means of an air-pump substantially the same as used for air-brakes, the air being forced successively through the aforesaid heating-chambers, and from thence is conducted through one or more pipes that extend through the steam-space of the boiler, to the end that the air is heated in passing through these latter pipes when the train is not in motion.

A further object is to so arrange the aforesaid heating apparatus that it will be substantially out of sight and out of the way, and will not interfere with the function of the engine. In view of the extra danger incurred by passengers where railway-cars are heated by stoves or with steam, it is desirable that such heating be done by means of hot air. We have therefore devised a heating apparatus, illustrated in the accompanying drawings.

Figure 1 is a view in perspective of a locomotive-engine having our improved heating apparatus attached, a portion of the outer wall being broken away to show the internal arrangement of the smoke-box. Fig. 2 is an elevation in transverse section through the smoke-box. Fig. 3 is a side elevation, partly in section, the central portion of the boiler being broken away to reduce the size of the drawing.

A represents a locomotive-engine that, in the main, may be of any ordinary variety in use. The smoke-pipe B has a heater connected therewith for utilizing the heat of the exhaust-steam. This heater may be of any approved construction; but for various reasons we prefer the construction shown, to wit: The smoke-pipe shown is made of two thicknesses of metal plates, B and B', separated, perhaps, two inches, more or less, and connected at top and bottom, so as to inclose an air-tight annular heating-chamber, *b*, the internal dimensions of which should be substantially as an ordinary smoke-pipe. With such construction a smooth surface is had along the inside of the pipe, that is preferable to the uneven surface of a coil of pipes, the more exposed portions of the latter being soon worn away by attrition, and the interstices of the coil being soon filled with cinders and ashes.

C represents the shell of the smoke-box, the same being usually an extension of the boiler-shell. To and inside the plate C we secure a plate, C', the latter being located a sufficient distance from the boiler-shell to form a heating-chamber, *c*, and may extend substantially the length of the smoke-box. A space along the bottom of the smoke-box where the exhaust-pipe F and the steam-pipe (not shown) pass, and where in modern practice a discharge-opening is sometimes made for cinders, is left unencumbered by the heating-chamber *c*, the plate C' having been cut short perhaps a fifth or a sixth of the circumference of the shell C. The opening made through the heating-chamber for connecting the smoke-box with the smoke-pipe should be about the same in diameter as the outer shell of the smoke-pipe to accommodate the pipes *b'* and *c'*, leading to and from the chamber *b*. The pipe *c'* branches and connects with the two lower and forward extremes of the chamber C, substantially as shown. The pipe *b'* leads up inside the chamber *b* to near the top of the latter. From the rear upper portion of the smoke-box heater a discharge-pipe, *d*, leads inside the boiler, and is connected with an enlarged pipe, D, located in the steam-space of the boiler, extending to the rear end of the latter,

where a reduced end or connection, d' , extends through the rear head of the boiler, where it is connected with suitable pipes (not shown) leading to the cars. One or more air-pumps, 5 E, the latter being usually of the variety used for air-brakes, furnish the air-supply. The pipe b' , that leads from the air-pump to the chamber b , may pass along the engine in such position as is considered most practicable, and, 10 after passing into the smoke-box, terminates as aforesaid. As the inlet b' discharges at the upper end of the chamber b , and the outlet-pipe c' is connected with the lower end of the chamber, a circulation of air through the 15 chamber b is insured, and the pipes c' and d are in like manner connected with opposite ends of the heating-chamber c , for the same purpose. The air-supply in passing through the chamber b is heated to a considerable de- 20 gree by means of the exhaust steam, and in such heated condition is passed to the chamber c . While the engine is laboring the heat passing through the boiler-tubes to the smoke-box is intense, and by applying this heat, 25 which would otherwise be wasted, for the purposes aforesaid, by means of the heating-chamber c , surrounding the effective portions of the smoke-box, it is found that the air-supply may be raised approximately to the tempera- 30 ture of the steam in the boiler, or even above, so that the pipe D in passing through the steam-space of the boiler is likely to be more of a help than hinderance to the steam-supply. When the engine stops, of course the exhaust- 35 steam ceases and the heat in the smoke-box is greatly reduced, and at such times the air-supply is heated for the time being by means of a tube, D, and such heat from the live steam can well be spared while the engine is stand- 40 ing, and would probably prevent steam from blowing off.

The modern practice is to make the smoke-box longer than formerly, which is of course an advantage in carrying out our invention. 45 The smoke-box might be extended still farther forward at a trifling expense if it was found necessary.

For light trains of perhaps one or two passenger-cars one heating-chamber, either b or c , would be of ample capacity; but as these 50 heating-chambers are entirely out of the way, and are operated by what would otherwise be waste heat, we recommend that both be built on the engine substantially as described, more especially as in case the air is excessively 55 heated for the purpose of heating cars such excessive heat may be returned to the boiler in the passage of the air through the tube D.

The system of pipes and connections suitable for conducting the air to the cars is well 60 known in connection with air-brakes, and of several well-known systems in distributing the air in the different cars either would answer our purpose well.

What we claim is— 65

1. The combination, with a locomotive-engine, of a heater in the smoke-pipe, a heater in the smoke-box, a pipe passing upwardly through the smoke-box for conveying air to the heater in the pipe, a pipe for discharging 70 the air in the heater in the pipe into the heater in the smoke-box, and a hot-air pipe connected to the heater in the smoke-box and passing rearwardly through the boiler, substantially as set forth. 75

2. The combination, with a locomotive-engine, of a heater in the smoke-pipe, a heater in the smoke-box, a pipe passing upwardly through the smoke-box and discharging into the heater in the smoke-pipe, a bifurcated or 80 branched pipe connecting the heater in the smoke-box with the heater in the smoke-pipe, and a hot-air pipe connected with the heater in the smoke-box and passing rearwardly through the boiler, substantially as set forth. 85

In testimony whereof we sign this specification, in the presence of two witnesses, this 18th day of April, 1887.

CHARLES T. JOHNS.

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Witnesses:

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