L. PRAT.

LOCOMOTIVE DRAFT DEVICE.

APPLICATION FILED DEC. 4, 1917.

1,410,718.

Patented Mar. 28, 1922.

2 SHEETS—SHEET 1.

Fig 1

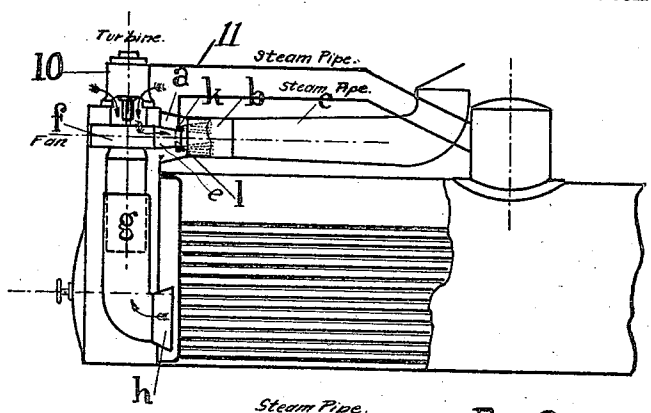


Fig 2

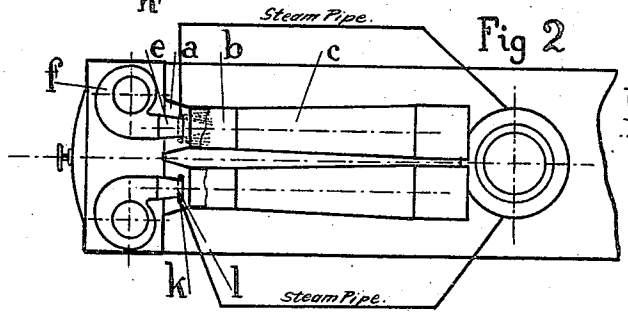


Fig 9

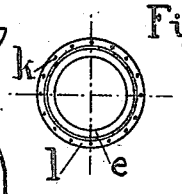


Fig 3

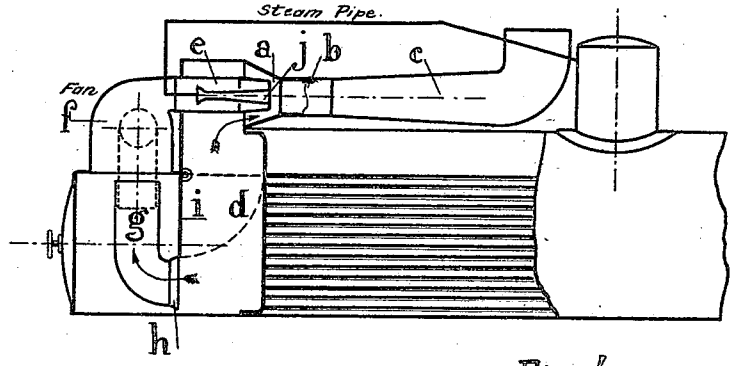
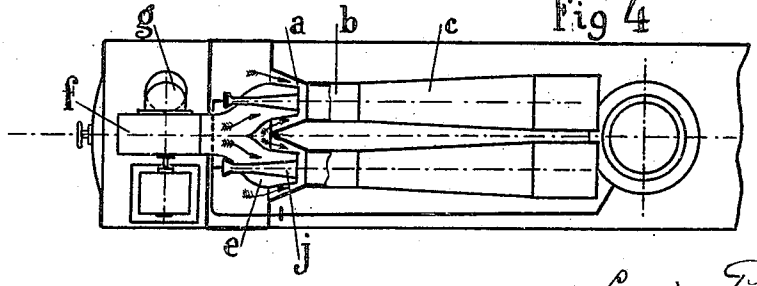


Fig 4



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2 SHEETS—SHEET 2.

Fig 5

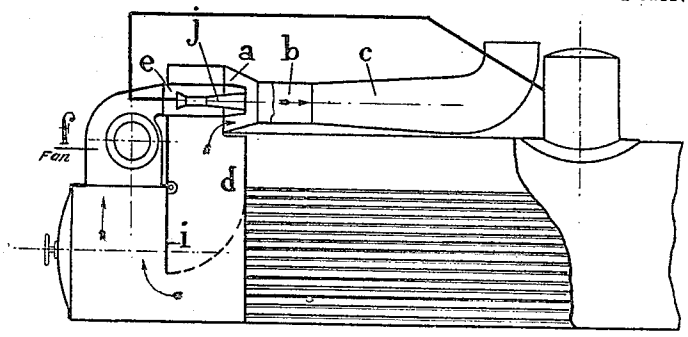


Fig 6

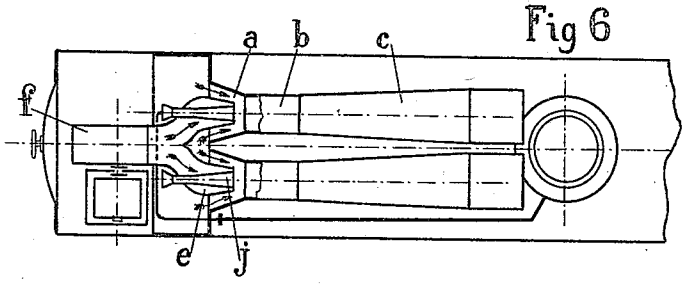


Fig 7

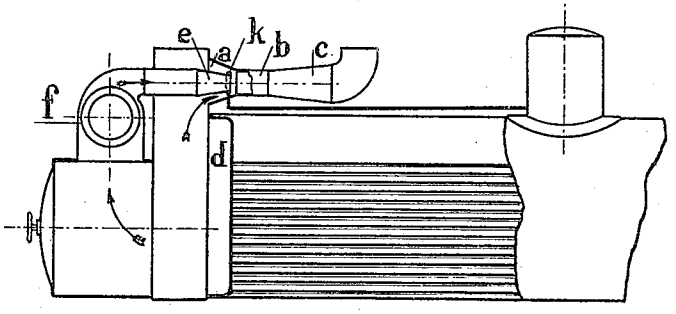
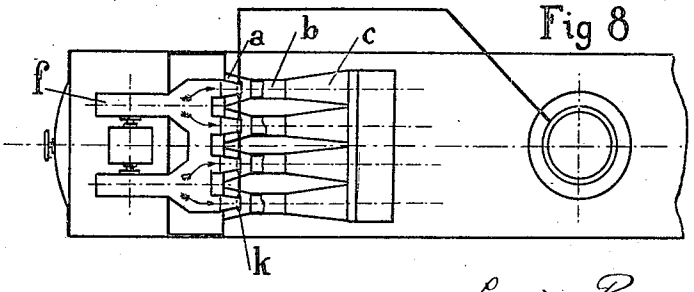


Fig 8



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UNITED STATES PATENT OFFICE.

LOUIS PRAT, OF PARIS, FRANCE.

LOCOMOTIVE DRAFT DEVICE.

1,410,718. Specification of Letters Patent. Patented Mar. 28, 1922.

Application filed December 4, 1917. Serial No. 205,418.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, LOUIS PRAT, a citizen of the Republic of France, and a resident of Paris, France, have invented certain Improvements in Locomotive Draft Devices, (for which I have filed applications in France Nov. 15, 1916, Patent No. 483,463, and in Switzerland Dec. 29, 1916, No. 88,423,) of which the following is a specification.

This invention relates to means for inducing draught in the boilers of locomotive, portable and semi-portable engines and other apparatus in which the space available for the smoke stacks is restricted.

In apparatus of this kind the usual method is to increase or ensure the draught by means of a jet of exhaust steam, during normal working, (or even of live steam under certain circumstances) which presents considerable disadvantages; (1.) In the first place, the efficiency obtained is poor, as is always the case with steam blowers; (2.) The necessity of obtaining a powerful draught calls for a sufficiently high steam pressure, and since, where the exhaust is used for creating the draft this pressure is exactly the back pressure on the piston, the draught can only be obtained at the expense of the efficiency of the locomotive; (3.) Inasmuch as the steam which supplies the blower is derived from the exhaust of a reciprocating engine the draught is not constant but fluctuates in accordance with the strokes of the piston; (4.) With a steam-turbine locomotive, as it is almost essential to work as a condensing engine, no exhaust steam is available and consequently a blower worked merely by live steam is the only kind possible in this case; (5.) However well arranged the steam blower may be, the draught in the fire-tubes of the boiler is irregular. The efficiency of the upper tubes is always appreciably better than that of the lower tubes, and it has been found that by plugging up the lower tubes in the proportion of fifteen per cent of the total number, the production of steam is only reduced by one per cent.

The object of the present invention is to obviate these defects, and I have illustrated certain embodiments thereof in the accompanying drawings wherein each view is diagrammatic and shows parts broken away and parts in section, and in which: Fig. 1 is a side elevation in section showing the boiler and smoke stack of a locomotive provided with one embodiment of the invention, and Fig. 2 is a top plan view of same. Figs. 3 and 4 are similar views of a second embodiment; Figs. 5 and 6 of a third embodiment; Figs. 7 and 8 of a fourth embodiment; Fig. 9 shows a detail view of an injection ring of auxiliary steam.

The smoke stack is formed of a pipe, comprising an inwardly tapering portion *a*, situated next the smoke box *d*, with which it is connected, a mixing chamber *b*, and an outwardly flaring portion *c*.

Concentric with the portion *a* is the outlet *e* of a fan *f*, whose intake pipe *g* terminates in a trumpet shaped mouth *h* (Figs. 1 and 2 and Figs. 3 and 4), which faces the lower tubes of the boiler. The fan is driven by a steam turbine 10, which may be supplied with steam from any suitable source, such as with live steam drawn from the boiler of the locomotive as through the pipe 11.

The fan when in operation draws in a portion of the smoke-box gases directly, through its intake pipe *g* and discharges them through the outlet *e*, the smoke stack *a*, *b* *c* forming an ejector which also aspirates from the smoke box *d*, the result being the production of a strong draught in the smoke stack under conditions, as regards efficiency, that are better than is the case with the usual steam blower. In fact, the energy stored up in the steam is utilized to drive the fan motor to the best advantage whereas when a blower is used the efficiency of the steam is very low.

The pipe *g* is preferably made telescopic (Fig. 1) to enable the trumpet shaped mouth *h* to be brought down to the desired level for drawing the gases from the lowest tubes. With the same end in view the fan intake may be provided with a damper *i* (Figs. 5 and 6) adapted to rotate on a horizontal axis as indicated by the curved dotted line in Figure 3, so that by altering its position the relative proportions of the gas aspirated by the ejector and that drawn in directly by the fan may be controlled.

The fan aspirates either axially, as *e. g.* Figs. 1 and 2 or tangentially as in the other figures and its axis may be vertical (as Figs. 1 and 2) or horizontal (as in the other figures.)

Two or more fans as shown in Figures 2

and 8 driven by the same motor or by different motors, may be employed instead of a single fan, if it be desired to obviate the risk of stoppages.

There may be employed in combination with the above described means for producing draught, an auxiliary device comprising a jet of live steam for preventing any failure of draught in case the fans are put out of action, which jet, however, may at times be caused to operate conjointly with the aspiration by the fans, in order for instance to increase the draught on up grades. The jets of live steam are delivered either through nozzles *j* situated in the axes of the discharge pipes *e* (see Figs. 4 and 6), or else through a series of holes *k* located in a ring *l* placed around these pipes (see Figs. 1 and 9). Said holes are better seen in Fig. 9 which is an enlarged cross section of the pipe *e* and ring *l*.

In a constructional form of the apparatus which possesses special advantages a plurality of smoke stacks, provided with injection pipes connected with one or more fans are employed, said smoke stacks being adapted to operate singly or together, when it is desired to use certain of the units as a standby or to strengthen the draught at certain times.

In Figs. 4 and 6 the single fan *f* is provided with two discharge pipes *e* and two smoke stacks.

Fig. 2 shews two fans *f* provided each with a single discharge pipe *e* and each discharging into a smoke stack *a*, *b*, *c*.

Finally, Fig. 8 shews two fans, each arranged to supply two smoke stacks, but adapted to deliver independently into several smoke stacks.

The advantage of this subdivision is that the length of the smoke stacks can be reduced, and they can therefore be installed in a smaller space, and, if necessary, vertically.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. In a locomotive a boiler having fire tubes or flues, a horizontal smoke stack extending backward over the boiler, said smoke stack comprising a convergent portion opening into a divergent portion through a constricted area, a rotary fan placed at the upper part of the fire tubes, a passage leading a portion of the smoke to the fan, an outlet from the fan opening into the constricted part of the convergent-divergent stack, and a smoke chamber in front of the boiler tubes leading the remainder of the smoke into the convergent portion of the stack.

2. In a locomotive a boiler having fire tubes or flues, a horizontal smoke stack extending backward over the boiler, said smoke stack comprising a convergent portion opening into a divergent portion through a constricted part, a rotary fan placed at the upper part of the fire tubes, a passage leading a portion of the smoke to the fan, an outlet from the fan opening into the constricted part of the convergent-divergent stack, a jet of steam also discharging into said constricted part, and a smoke chamber in front of the boiler tubes leading the remainder of the smoke into the convergent portion of the stack.

3. In a locomotive, a boiler having fire tubes or flues, two smoke-stacks extending horizontally backward over the boiler and each comprising a convergent portion leading into a divergent portion, a rotary fan placed at the upper part of the tubes and having an outlet divided into two branch nozzles opening into the constricted parts of said two smoke-stacks respectively, a passage leading a portion of the smoke to the fan, and a smoke chamber in front of the boiler tubes leading the remainder of the smoke around each of the branch nozzles of the fan into the respective smoke stacks.

4. In a locomotive, a boiler having fire tubes or flues, and a smoke chamber, a horizontal smoke stack extending backward over the boiler, said stack comprising a convergent portion opening into a divergent portion through a constricted area, a rotary fan placed at the upper part of the smoke chamber, and a pipe adapted to lead a portion of the smoke from the flues to the fans, said pipe being composed of telescopic sections adapted to hold the intake opening of the pipe at different levels opposite the exit openings of the flues.

5. In a locomotive having boiler tubes, a chamber in front of the boiler tubes into which they discharge, a smoke stack opening out of said chamber and extending backward over the boiler, said smoke stack comprising a convergent portion next said chamber opening into a larger divergent portion, a pipe made in telescoping sections within said chamber having a vertically adjustable receiving opening *h* opposite the boiler tubes and facing the same and extending upward to discharge into said smoke stack, and means associated with said pipe for forcing gases through the same into said smoke stack.

In testimony whereof, I affix my signature, in presence of two witnesses.

LOUIS PRAT.

Witnesses:

L. E. PARSONS,

ALBERT NUNES.