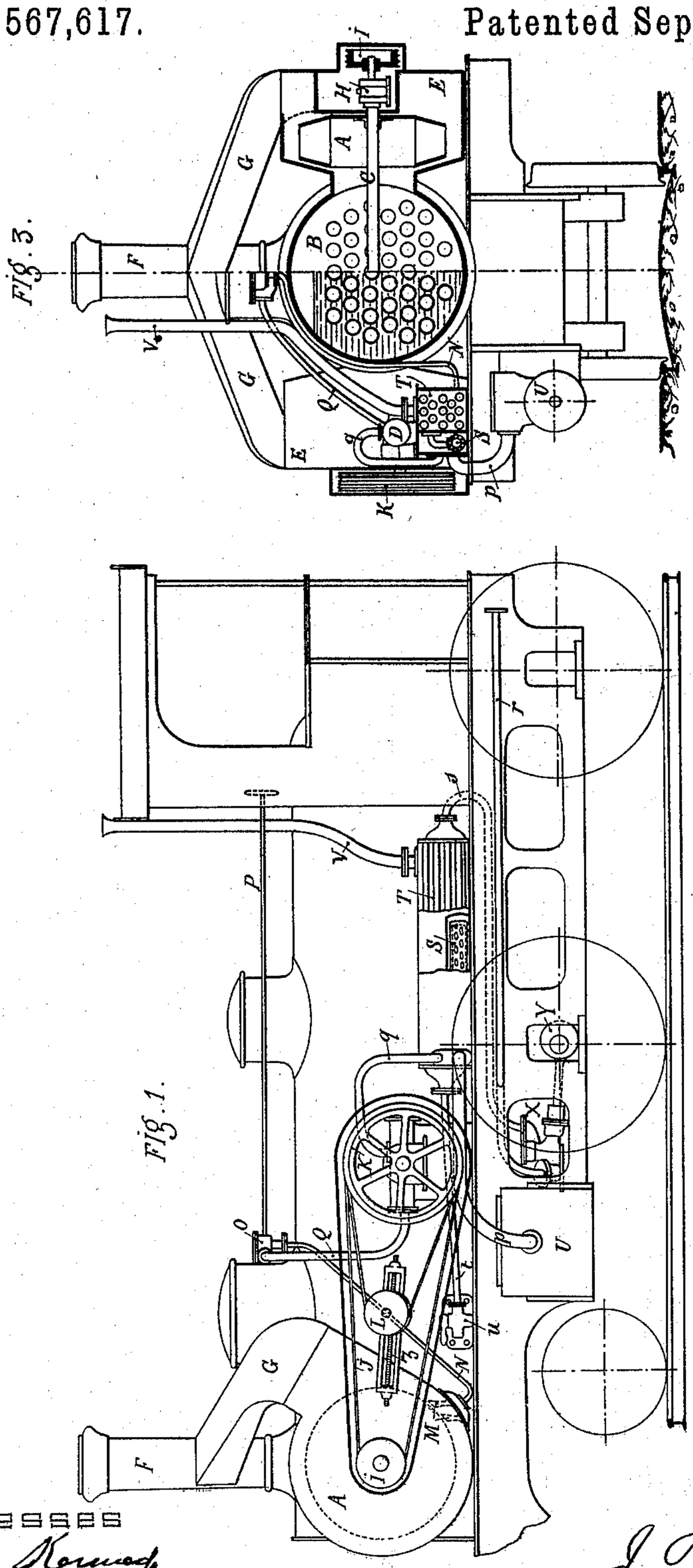
(No Model.) 2 Sheets—Sheet 1.

J. P. SERVE.

LOCOMOTIVE.

No. 567,617. Patented Sept. 15. 1896.



Witnesses
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F. S. Elmore.

Inventor
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By P. Dodge Atty

(No Model.) 2 Sheets—Sheet 2.

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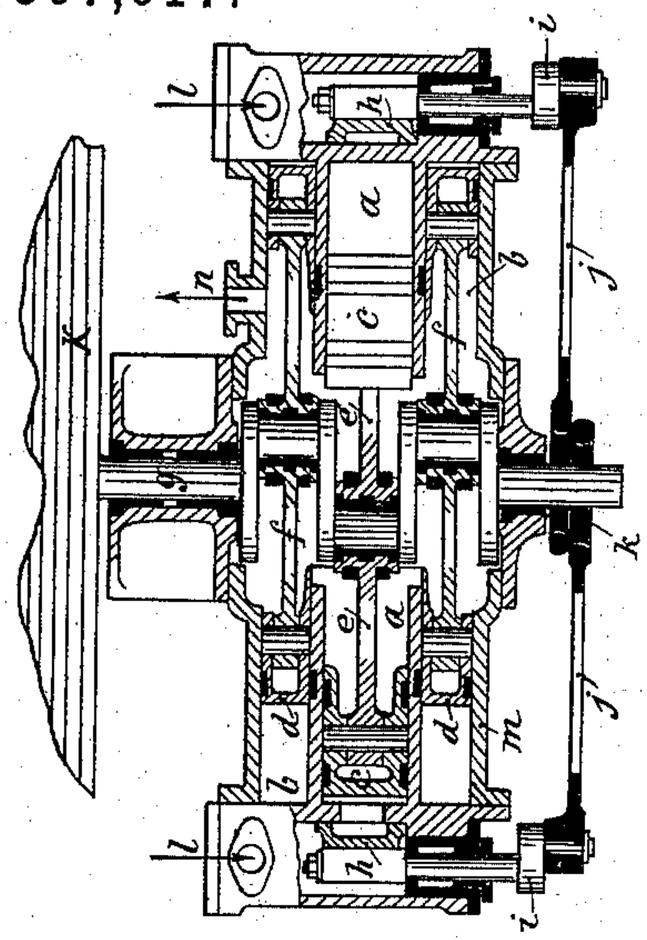

Fig. 4.

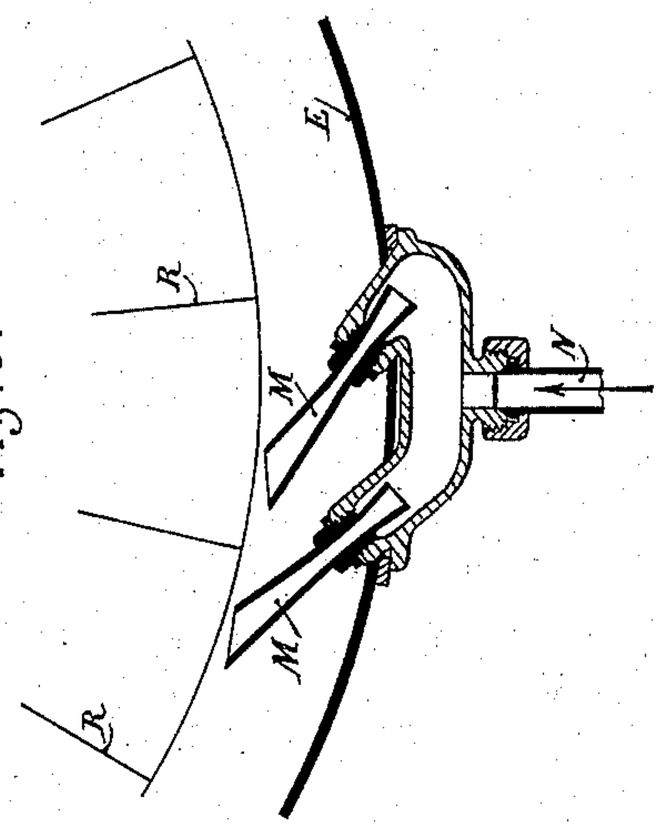

Fig. 5.

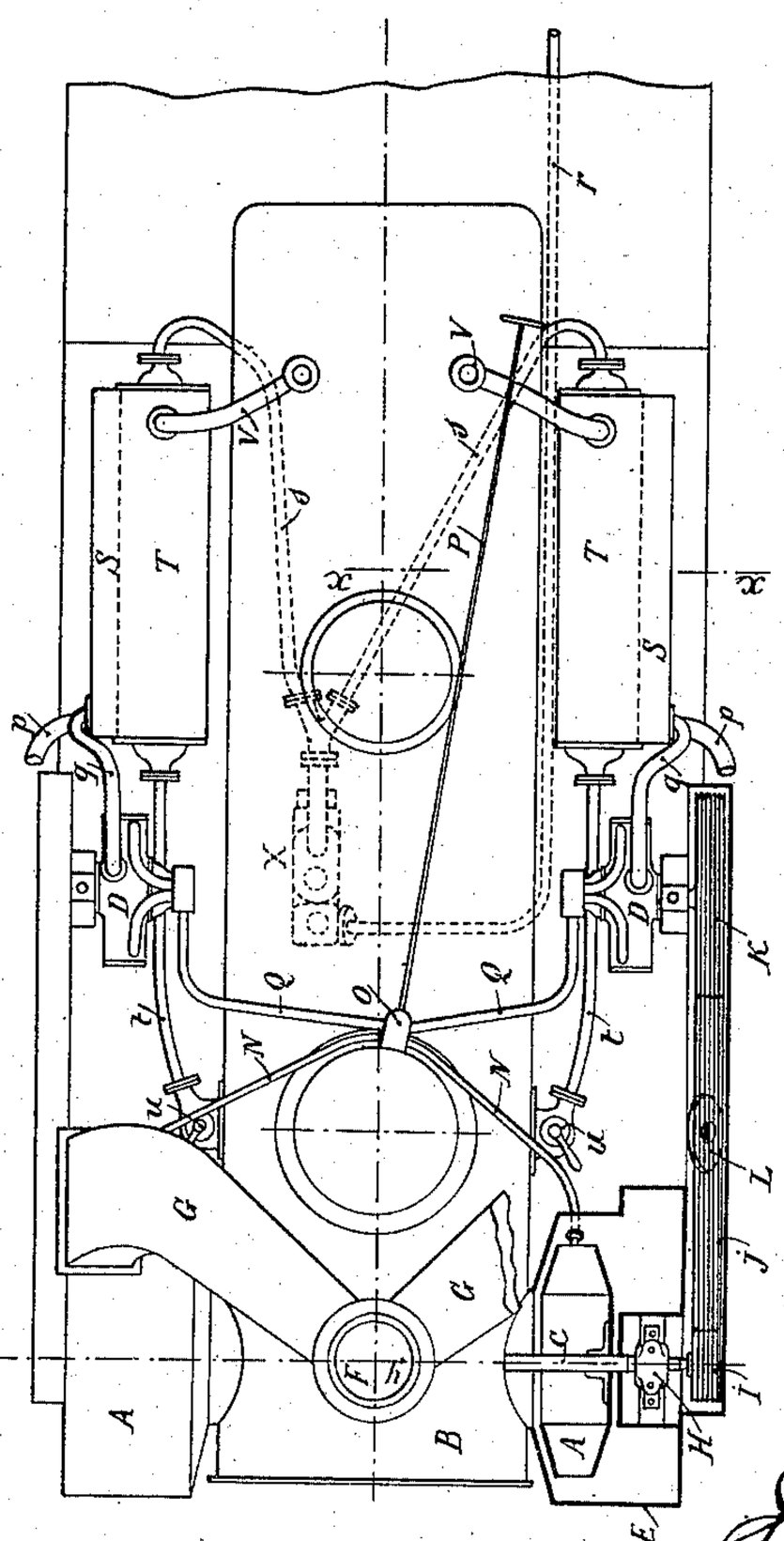

Fig. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

JEAN PIERRE SERVE, OF LYONS, FRANCE.

LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 567,617, dated September 15, 1896.

Application filed October 9, 1895. Serial No. 565,147. (No model.) Patented in France January 7, 1892, No. 218,482, and March 15, 1892, No. 220,144.

To all whom it may concern:

Be it known that I, JEAN PIERRE SERVE, engineer, a citizen of the Republic of France, residing at 17 Quai de Cuire, Lyons, in the Republic of France, have invented certain new and useful Improvements in Locomotives, (for which I have received Letters Patent in France, No. 218,482, dated January 7, 1892, and No. 220,144, dated March 15, 1892,) of which the following is a specification.

This invention relates to that class of locomotives in which the draft is effected mechanically by means of fans, for an arrangement of which kind I obtained a patent, No. 498,034, of May 23, 1893; but to my knowledge no real practical solution of the problem has been afforded up to the present date.

My invention has for its object to provide a locomotive effecting the object desired.

It consists in the combination of several peculiar arrangements comprising two fans placed on each side of the smoke-box and operated by two motors and two similar power-transmitting-cable devices, an arrangement for starting the ventilators, and two also similar feed-water heaters receiving the whole of the waste steam.

The invention will now be described in detail with reference to the accompanying drawings, in which—

Figure 1 is a side elevation, partly in section, of a locomotive provided with my improvements. Fig. 2 is a plan view of the same. Fig. 3 is a transverse section on the lines *x x y y* of Fig. 2. Fig. 4 is a horizontal section of the motor operating the fans, and Fig. 5 shows an arrangement for starting the fans.

As may be seen on the drawings, I employ two similar fans A A, placed at each side of the smoke-box B and mounted on a shaft C, which is driven at its two ends by means of cables operated by two similar steam-motors D D. These arrangements have for their object to effect an even symmetrical suction of the hot gases into the smoke-box, in order to obtain an equal distribution of these gases in the tubes, also to insure the working of the locomotive even if one of the motors be accidentally disabled, and, finally, to operate the fans by means of parts which cannot be deranged by the jarring of the locomotive.

The fans A are inclosed in a box or sheet-metal casing E, communicating with the chimney by means of curved pipes or passages G, and the shaft C, held in bearings or brackets H, has at its ends grooved pulleys I, over which the driving-cables J pass. Each driving-cable J is passed several times round the pulley I and over the fly-wheel K of the motor D, and runs over a pulley L, which serves to stretch it. This pulley L is held in a grooved support by means of a screw *z*, Fig. 1, which allows the tension of the cable to be regulated in such a way that the fan shall describe precisely the number of revolutions desired. The steam-motors D must occupy little space, supply a constant power, consume little steam, and be capable of being started immediately. I employ, preferably, with this object the motor shown in Fig. 4. It will be seen that this motor is composed of two opposite groups of concentric compound single-acting cylinders *a b*, the pistons *c d* of which operate by means of cranks *e f* the three opposite cranks of the driving-shaft *g*. These three cranks are placed in the same plane, so that in each group the annular piston *d* moves in an opposite direction to the internal piston *c*. This arrangement, which is a characteristic of the apparatus, insures the equilibrium of the power exerted on the motor-shaft, and thus avoids any deleterious jerking or jolting during the working. Circular oscillating valves *h*, placed on the ends of the cylinders for the purpose of economizing space, receive their movement of oscillation by means of cranks *i*, rods *j*, and eccentrics *k*. The valve *h* regulates the steam entering by the pipes *l* into the inner cylinders *a*, from whence it passes into the annular cylinder *b*, where it expands, and finally escapes into a lower passage, which brings it into the central part of the casing *m*, which is provided with a discharge-pipe *n*.

In order to insure the immediate starting of the fans, even when the motors D are at the dead-point, I arrange in the interior of the boxes E, containing the fans, twyers or oblique pipes M, Figs. 1 and 5, communicat-

ing, by means of a pipe N, with the steam-cock O, arranged on the dome of the boiler. In this manner the moment the engineer opens the tap O, by means of a rod P, in order to allow steam to enter the pipes Q, which feed the two motors D, the steam penetrates also into the pipes N, and consequently into the oblique pipes M, and acts on the vanes R of the fans, the starting of which is thus insured. Any suitable means may be employed for shutting off this steam supply to the tubes N immediately the motors D are at work. In order to utilize the escape-steam conformably with my patent application of the 29th of August, 1893, Serial No. 484,276, I arrange at each side of the locomotives feed-heaters T, Figs. 1, 2, and 3. For this object the steam discharged from the motor-cylinder U by the pipe *p* and the steam discharged from the motor D by the pipe *q* enters into the feed-heater T, which may be provided with a compartment S, containing suitable material or devices for retaining the greasy matters contained in the steam, and the uncondensed steam passes into the atmosphere by a pipe V. On the other hand, the feed-water arriving from the tender by the pipes *r* is forced up by a pump X, placed under the locomotive and operated by means of an eccentric Y, mounted on one of the axles of the driving-wheel, as may be seen in Fig. 1. The water thus forced by the pump is conveyed through the pipes *s* into the pipes of the feed-heater T and passes out at the opposite end of these latter pipes, from whence pipes *t* conduct it into the boiler through valve-boxes *u*. It is evident that any other suitable means may be employed for bringing the water from the tender into the feed-heaters, and these feed-heaters may be arranged in any suitable manner, their object being solely to utilize the waste steam which is not employed in assisting the draft of the furnace.

Finally, it must be understood that I do not limit myself exactly to the forms and arrangements of the parts hereinbefore described and shown on the accompanying drawings in order to realize my invention. Thus I reserve the right to render the two fans A A independent of one another by mounting them each on a special shaft having a belt-driven pulley I. In this manner the two motors D are also independent, which has the advantage of preventing any slipping of the cables on their pulleys in case one of the motors should have a tendency to revolve faster than the other.

I declare that what I claim is—

1. In a locomotive with forced draft; the combination of two similar fans A to induce the draft, cables J for transmitting power to the shaft of said fans, motors D to drive said cables and adjustable pulleys L adapted to adjust the tension of said cables; whereby the speed of the fans may be changed, thus regulating the force of the draft, substantially as described and shown.

2. In a locomotive with forced draft; two similar fans A to induce the draft; cables J for transmitting power to the shaft of said fans; motors D to drive said cables; adjustable pulleys L adapted to adjust the tension of said cables; and oblique twyers M adapted to project steam under pressure onto the vanes of said fans at the moment of starting the engine in order to assist the starting of said fans, said twyers having means whereby the steam may be shut off therefrom when the fans have been started; in combination substantially as described and shown.

3. In a locomotive with forced draft; two similar fans A mounted on a shaft C traversing the smoke-box B; two devices for transmitting power to said shaft comprising cables J and adjustable tension-pulleys L; two similar motors D to drive said cables J; oblique twyers M to project steam onto the fan-vanes to assist in starting the said fans and having means whereby the steam may be shut off therefrom when the fans have been started; and two feed-water heaters T receiving steam from the discharge-pipes of both the engine-cylinders U and the fan-motors D, and discharging through a pipe V; in combination substantially as described and shown.

4. In a locomotive with forced draft; two similar fans A to induce the draft; two devices for transmitting power to said fans comprising cables J and adjustable tension-pulleys L; motors D to drive said cables; oblique twyers M to project steam onto the fan-vanes to assist in starting the said fans and having means whereby the steam may be shut off therefrom when the fans have been started; two feed-water heaters T receiving steam from the discharge-pipes of both the engine-cylinders U and the fan-motors D and discharging through a pipe V; and a single pump operated by an eccentric on one of the axles of the locomotive and forcing water from the tender into the tubes of said feed-heaters and from thence into the boiler; in combination substantially as described and shown.

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

JEAN PIERRE SERVE.

Witnesses:

JOSEPH MARIE DUMOVLIN MINGUET,

PIERRE ROUMIER.