

G. DE GRAHL.
 APPARATUS FOR CONTROLLING THE ARTIFICIAL BLAST IN LOCOMOTIVES.
 APPLICATION FILED DEC. 28, 1911.

1,063,430.

Patented June 3, 1913.

2 SHEETS—SHEET 1.

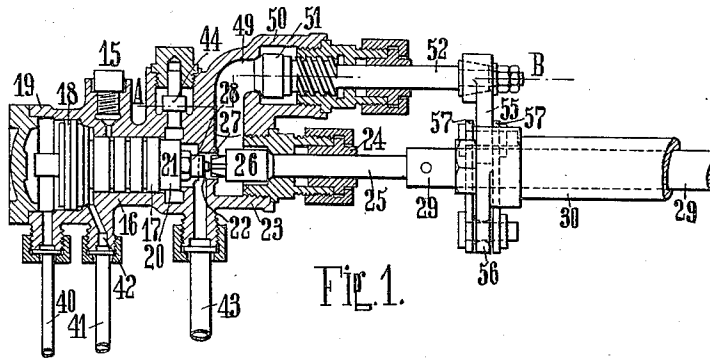


Fig. 1.

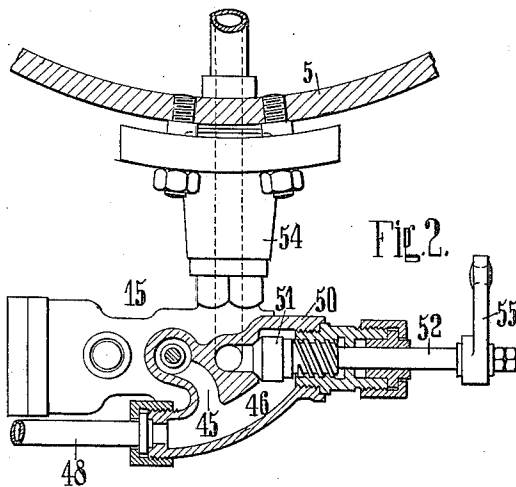


Fig. 2.

Witnesses:
W. D. Roche
E. D. Cromelin

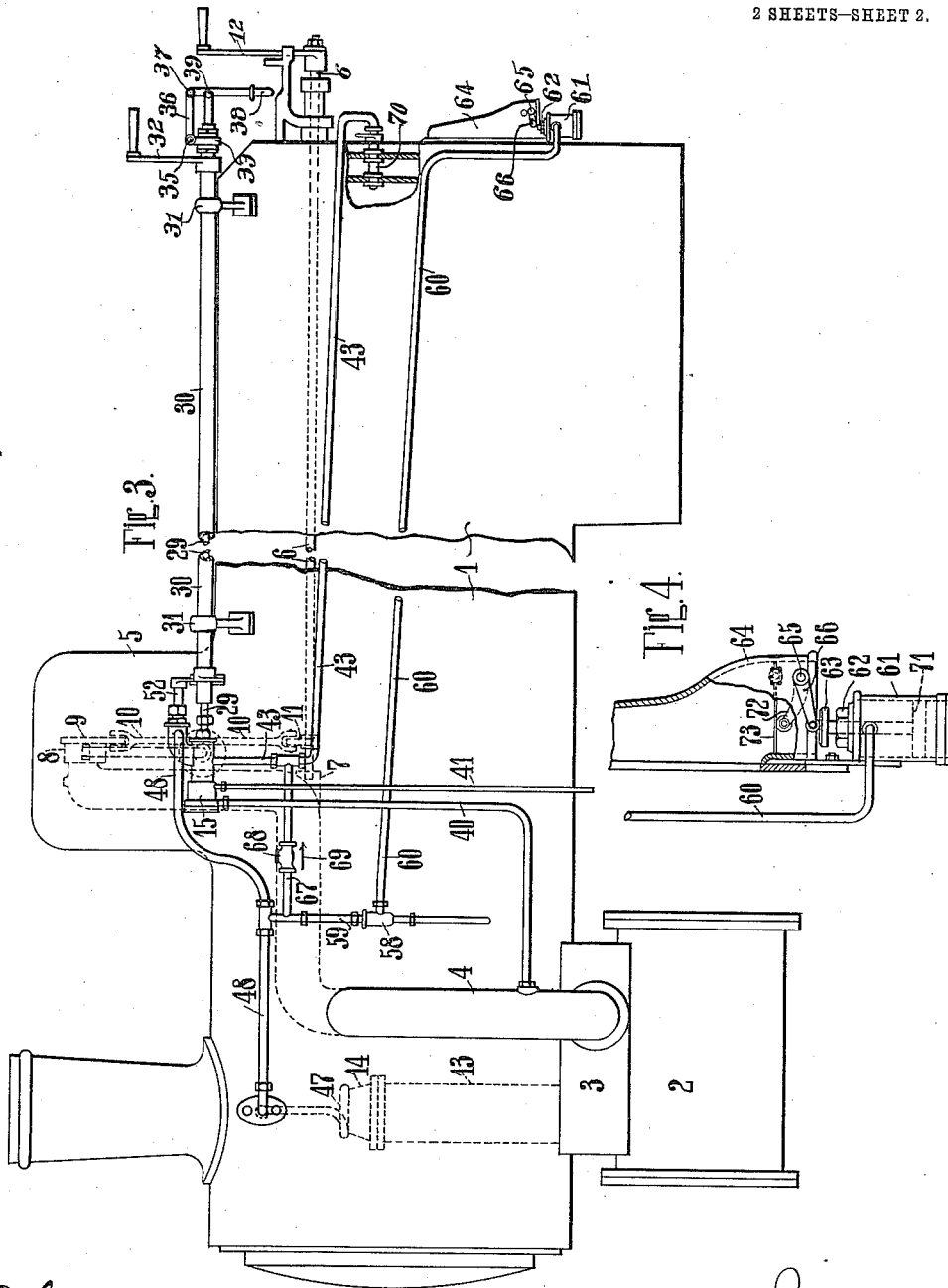
Inventor
Gustav de Grahl
by B. Singer
Att'y

G. DE GRAHL.
 APPARATUS FOR CONTROLLING THE ARTIFICIAL BLAST IN LOCOMOTIVES.
 APPLICATION FILED DEC. 28, 1911.

1,063,430.

Patented June 3, 1913.

2 SHEETS—SHEET 2.



Witnesses:
Ed. C. Romelin.

Inventor:
Gustav de Grahl
by B. Singer
Atty

UNITED STATES PATENT OFFICE.

GUSTAV DE GRAHL, OF ZEHLENDORF, NEAR BERLIN, GERMANY.

APPARATUS FOR CONTROLLING THE ARTIFICIAL BLAST IN LOCOMOTIVES.

1,063,430.

Specification of Letters Patent.

Patented June 3, 1913.

Application filed December 28, 1911. Serial No. 668,263.

To all whom it may concern:

Be it known that I, GUSTAV DE GRAHL, a subject of the German Emperor, and residing at Zehlendorf, near Berlin, Germany, have invented certain new and useful Improvements in Apparatus for Controlling the Artificial Blast in Locomotives, of which the following is a specification.

My invention relates to devices for regulating the artificial draft in the furnaces of steam boilers, in which the closure member controlling the admission of steam to the nozzles of the fire-box is placed into its open position as soon as the engine is started, whereby the main draft is produced, but can be closed by hand as soon as steam is shut off from the engine and the main draft is stopped. Such devices are known in which, when the steam engine and consequently the main draft is stopped, the admission of steam to the steam nozzles can be stopped without the supply of steam to the auxiliary blast having to be interrupted.

Now a primary object of my invention is to provide a device of the type described such that while the engine is working, only little steam passes to the steam nozzles of the fire-box and consequently only a weak veil of steam is produced in the firebox, whereas when the engine is stopped the supply of steam to the steam nozzles is opened, so that a more powerful steam veil operates in the fire-box.

One illustrative embodiment of my invention as applied to a locomotive boiler is represented by way of example in the accompanying drawings, wherein:—

Figure 1 is a longitudinal section showing part of my apparatus, Fig. 2 is a horizontal section taken on the line A—B in Fig. 1, Fig. 3 is a side elevation of a locomotive boiler provided with the apparatus, and Fig. 4 shows the lower part of the door with the cataract and the valve, partly in vertical section, partly in side elevation.

Referring to the drawing, 1 designates the locomotive boiler and 2 the cylinder of the steam engine whose steam chest 3 is connected by a pipe 4 with the dome 5. The shaft 6 extends through the upper part of the locomotive boiler and is journaled at 7 at its inner end. Steam can be admitted to the pipe 4 at 8 (Fig. 3) by a slide valve 9. This slide valve is pivotally connected by a rod 10 with a lever 11 fast on the shaft 6 carrying the regulator lever 12. The

steam chest 3 is also connected by a pipe 13 with the blast 14.

The apparatus 15 (Fig. 3) comprising the valves according to my invention is mounted laterally on the boiler. This apparatus comprises a valve box, in whose cylindrical portion 16 the piston 17 is slidable. This piston runs out at one end into the piston 18 which is larger in diameter than the piston 17 and is slidable in the part 19 of the valve box. The other end of the piston runs out into a valve disk 20 whose seat is at 21. The part 16 of the box is connected by way of the passage 22 with the part 23 of the box, in whose stuffing-box 24 the rod 25 is movable longitudinally. This rod is provided with the valve disk 26 whose seat is at 27. The projection 28 of the valve disk 20 can act, when displaced axially, on the valve disk 26 and lift the latter from its seat, and has such a diameter that when in the position shown in Fig. 1 it almost completely closes the passage 22.

The rod 25 is connected with the rod 29 on which is provided a hollow shaft 30 revoluble but axially non-displaceable in the journals 31. A lever 32 is fast on this shaft and a ring 33 is free to rotate thereon between two nuts. A lever 36, to which a lever 38 is pivotally connected at 37, is pivotally connected to the ring 33 at 35. The rod 29 is pivoted at 39 to the lever 38.

The pipe 40, connected with the pipe 4 leading to the steam chest, opens into the part 19 of the valve box. The pipe 41 connected with the duct 42 is an air-relief pipe which allows air to issue from the part 19 of the valve box when the piston 18 moves to the right (Fig. 1). The pipe 43 opening into the passage 22 is connected with the steam nozzles 70 of the fire-box. The part 16 of the valve box is connected by way of the non-return valve 44 with the duct 45, 46. The branch 46 of this duct is connected to a pipe 48 leading to the auxiliary blast 47. The part 23 of the valve box is connected by the bend 49 with the socket or valve box 50 containing a valve disk 51 which can be screwed against its seat by turning a rod 52, whereby the socket 49 is shut off from the branch 46.

The pipe 54, connected with the steam space of the boiler and particularly with the dome 5, opens into the part 23 of the valve box. A lever 55 is fast on the rod 52 and a lever 56 on the hollow shaft 30. These two

levers are pivotally connected by two straps or links 57, and are provided with spherical projections. Similarly, the holes in the levers for the pivots are spherical, so that every rotatory motion of the shaft 30 is imparted to the rod 52, but the latter can move axially relatively to the shaft 30 when the valve disk 51 is to be moved out of its closed position into its open position, or reversely.

58 designates an injector connected by the steam pipe 59 with the pipe 48 leading to the auxiliary blast. Connected to the casing of the injector is the pipe 60 which opens into the upper part of the cataract-cylinder 61. Movable in the latter is a piston 71 whose rod runs out through the stuffing-box 62 into a plate 63. The shaft 65, on which the lever 66 is secured, is journaled in the fire-door 64. The end of this lever is lifted by the plate 63 when the piston rises in the cylinder 61. The shaft 65 acts by means of the lever 72 fast on it on the air-valves 73 mounted to rock in the fire-door when the door is rotated when the piston 71 rises and opens the air valves, so that air can pass through the fire-door from the outside into the fire-box. The pipe 59 is connected with the pipe 43 by a pipe 67. Connected in the latter is the non-return valve 68 able to open in the direction of the arrow 69.

The above-described apparatus operates as follows:—When starting the engine the regulator 12 is turned into the open position, in which the slide valve 9 admits steam to the pipe 4. Consequently, steam is supplied to the steam chest and thence into the cylinder, and after it has done work there passes as exhaust steam through the pipe 13 to the blast 14, whereby the main blast is simultaneously started. Live steam from the pipe 4 passes through the pipe 40 into the part 19 of the valve box. Steam also enters through the pipe 54 into the part 23 of the valve box. As the piston 18 has a larger diameter than the piston 17, the steam in the part 19 will push the pistons 18, 17 into the position shown in Fig. 1, when the valve disk 20 is seated on its seat 21 and the part of the valve box to the left of the non-return valve disk 44 is shut off from the steam pipe 54, because the valve disk 51 is also seated. The part 21 of the valve disk 20 is, however, situated in the passage 22 and almost completely closes the same, so that only little steam can pass through the pipe 43 to the steam nozzles 70 of the fire-box and, accordingly, a steam veil having only a weak action is produced. When the engine is stopped, *i. e.* when the steam is shut off from the engine by closing the valve 9 and, accordingly, when the main draft is also stopped, the steam pressure in the part 19 of the valve box disappears. Consequently, the steam pressure in the part 23

of the valve box will push the piston 21 to the left, whereby the passage 22 is liberated by the part 28 and more steam is admitted to the steam nozzles 70, so that a more powerful steam veil is produced in the fire-box.

Should it be found desirable, when traveling, *i. e.* when the piston 18 is in the position shown in Fig. 1, to operate the auxiliary blast as well as to supply a large quantity of steam to the nozzles, it is only necessary to remove the valve disk 51 from its seat by rotating the shaft 30 by means of the lever 32, whereupon the steam entering through the pipe 54 passes through the elbow 49 into the branch 46 and thence into the pipe 48 leading to the auxiliary blast. A portion of the steam flows out of the pipe 48 through the pipe 67 and the non-return valve 68 into the pipe leading to the nozzles 70. Steam simultaneously passes through the pipe 59 to the injector and causes the cataract-piston to rise in the cylinder 61, the shaft 65 to rotate, and the air-valve in the fire-door to open.

I claim:—

1. In apparatus for controlling the artificial draft in furnaces of locomotives the combination with the valve box 15 having a steam supply chamber 23, said valve box being larger in diameter at one end than at the other, having steam operated pistons 17 and 18, the latter 18 being larger in diameter than the former and slidable in the larger part 19 of the valve box, said larger part 19 being connected with the steam chest 3 of the steam engine, the first named piston 17 being slidable in the smaller part of the valve box, steam nozzles 70, an auxiliary blast 47, a pipe 43 connecting the said valve box 15 with said nozzles, another pipe 48 connecting the said valve box 15 with said auxiliary blast 47, a passage 67 connecting the former pipe 43 with the latter pipe 48 in said passage a non-return valve 68 opening toward the pipe 43 leading to the steam nozzles, a valve disk 20, connected with the smaller piston 17, said valve disk being adapted to shut off steam from the pipe 48 leading to the auxiliary blast and simultaneously to close almost completely the steam admission to the said steam nozzles as soon as the engine is started.

2. In apparatus for controlling the artificial draft in furnaces of locomotives the combination with the valve box 15 having a steam supply chamber 23, said valve box being larger in diameter at one end than at the other, having steam operated pistons 17 and 18, the latter 18 being larger in diameter than the former and slidable in the larger part 19 of the valve box, said larger part being connected with the steam chest 3 of the steam engine, the first named piston 17 being slidable in the smaller part of the

valve box, steam nozzles 70, an auxiliary blast 47, a pipe 43 connecting the said valve box 15 with said nozzles, another pipe 48 connecting the said valve box 15 with said auxiliary blast 47, a passage 67 connecting the former pipe 43 with the latter pipe 48 in said passage, a non-return valve 68 opening toward the pipe 43 leading to the steam nozzles 70, a valve disk 20 connected with the smaller piston 17, said valve disk being adapted to shut off steam from the pipe 48 leading to the auxiliary blast and simultaneously to close almost completely the steam admission to the said steam nozzles as soon as the engine is started, another valve 51 for connecting and disconnecting said steam supply chamber 23 with the pipe leading to the auxiliary blast.

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

GUSTAV DE GRAHL.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."