

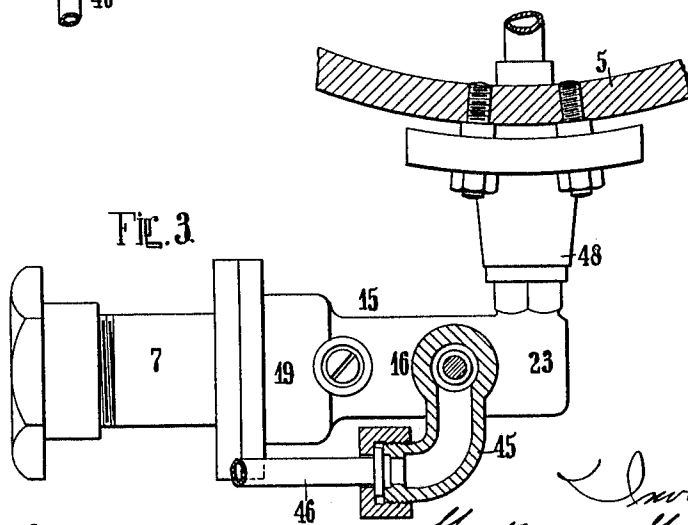
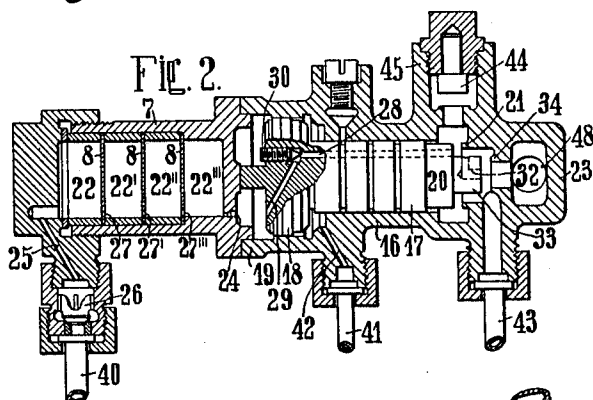
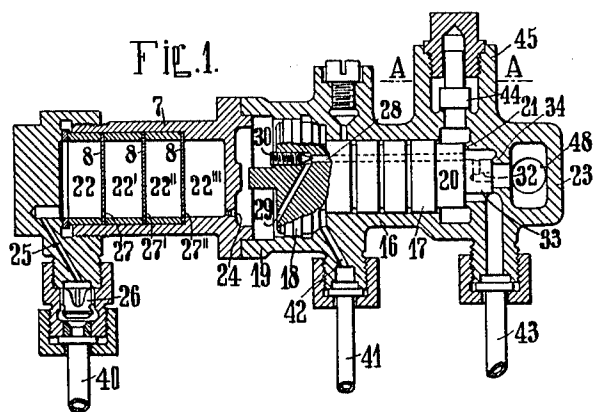
G. DE GRAHL.
 APPARATUS FOR CONTROLLING THE ADMISSION OF STEAM TO THE AUXILIARY BLAST OF
 BOILER FURNACES.

APPLICATION FILED JUNE 13, 1912.

Patented Sept. 24, 1912.

2 SHEETS—SHEET 1.

1,039,273.



Witnesses:
W. H. Tucker
C. Everett Hancock

Inventor:
Gustav de Grahl
 by *B. Singer* Atty

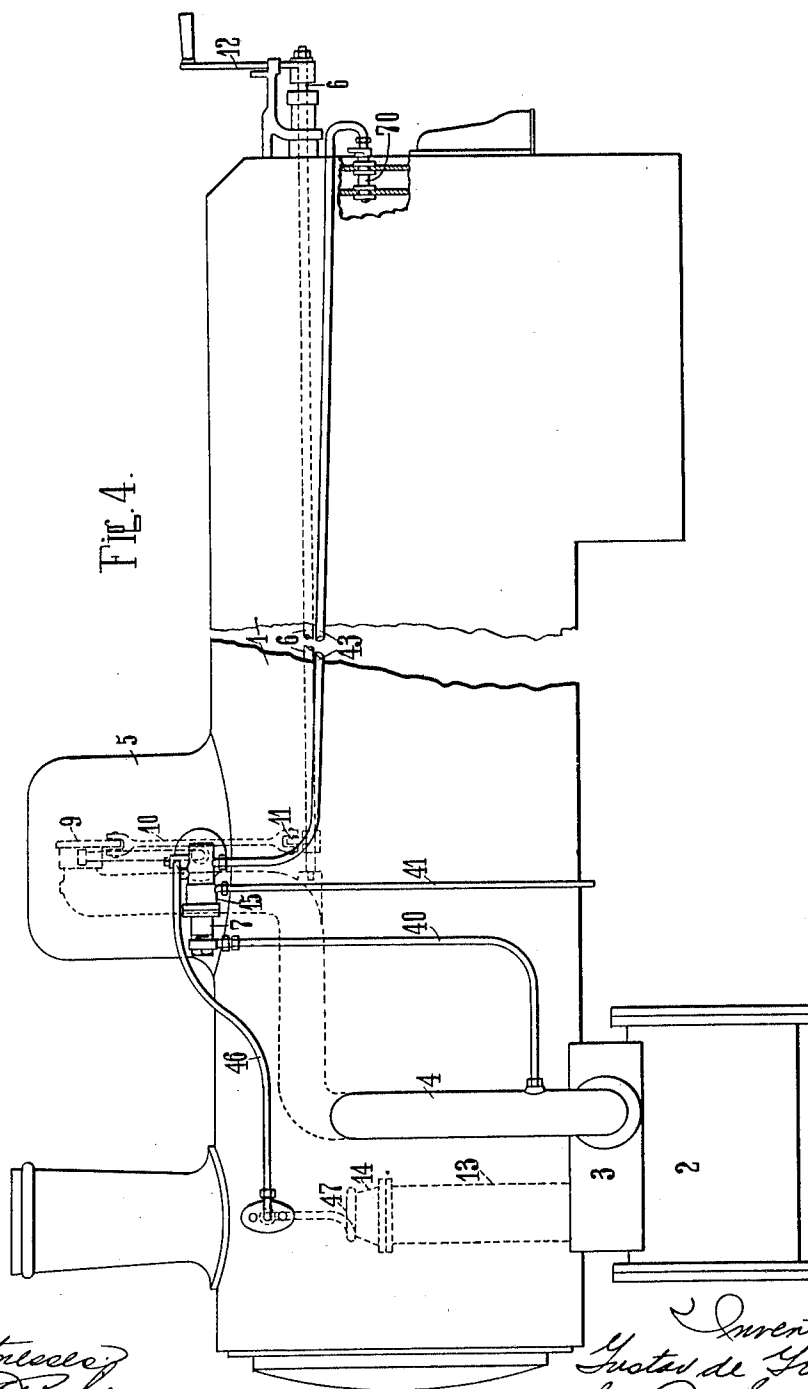
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UNITED STATES PATENT OFFICE.

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

APPARATUS FOR CONTROLLING THE ADMISSION OF STEAM TO THE AUXILIARY BLAST OF BOILER-FURNACES.

1,039,273.

Specification of Letters Patent.

Patented Sept. 24, 1912.

Application filed June 13, 1912. Serial No. 703,438.

To all whom it may concern:

Be it known that I, GUSTAV DE GRAHL, a citizen of the Empire of Germany, and residing at Zehlendorf, near Berlin, Germany, have invented certain new and useful Improvements in Apparatus for Controlling the Admission of Steam to the Auxiliary Blast of Boiler-Furnaces, of which the following is a specification.

My invention relates to those means for regulating the artificial draft of furnaces, particularly of locomotive boilers, in which a closure member controlling the supply of steam to an auxiliary blast is driven into its closed position when the engine is started and the main blast is thus produced, but is shut off from the engine and the main blast is thus stopped.

A primary object of my invention is to provide the auxiliary blast which, when the engine is started, is automatically shut off only after the action of the main blast has fully developed, is automatically operated only for a definite period after the engine is stopped and is subsequently automatically shut off. One illustrative embodiment of my invention is represented by way of example as applied to a locomotive boiler in the accompanying drawing, wherein:—

Figures 1 and 2 are longitudinal sections showing my apparatus in two different positions of the said closure member, Fig. 3 is a horizontal section taken on the line A—A in Fig. 1, and Fig. 4 is a side elevation showing a locomotive provided with my improved apparatus.

Referring to the drawings, 1 designates the locomotive boiler and 2 the cylinder of the steam engine whose steam chest 3 is connected by the live steam pipe 4 with the dome 5 and by the exhaust pipe 13 with the blast 14. The shaft 6 of the regulator lever 12 has fast on it a lever 11 pivotally connected with the rod 10 which operates the slide valve 9 controlling the admission of steam to the pipe 4.

The automatic device, shown in Fig. 4 arranged on the side of the boiler of the locomotive, comprises a valve-box (Fig. 1) in whose cylindrical portion 16 the piston-like closure member 17 is slidable. This piston runs out at one end into the piston 18 which is larger in diameter than the pis-

ton 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. Projecting from the valve-disk 20 is another valve-disk 33 whose seat is at 34. In front of the portion 19 of the valve-box is mounted the portion 7 which is divided into four chambers 22, 22', 22'', 22''' by the partitions 8, each chamber being connected with an adjoining one by a relatively narrow passage 27, 27', and 27''. The chamber 22''' is also connected with the interior of the portion 19 of the valve-box by means of the narrow hole 24. Into the chamber 22 opens the duct 25 which establishes a connection by way of the non-return valve 26 with the pipe 40 which opens into the steam pipe 4 connected to the steam-chest.

The portion 23 of the valve-box, connected with the portion 16 by way of the valve 33, is connected to the steam pipe 48, which again is connected with the interior of the boiler and, particularly, with the dome 5. The pipe 41 leading from the duct 42 is an air-relief pipe which permits the air to escape from the portion 19 of the valve-box when the piston 18 moves to the right as seen in Fig. 1. The pipe 43 opening into the portion 16 of the valve-box is connected with the steam nozzles 70 in the fire-box. The portion 16 of the valve-box is connected in addition with a short branch pipe 45 containing the non-return valve 44, and the pipe 46 leading to the auxiliary blast 47 is connected to this branch pipe. Inside the piston 17, 18 is a small longitudinal duct 28 which is adjustably connected with the duct 29, so that a connection is established between the space in front of the piston 18 and that in front of the piston 17. The connection between the two ducts 28 and 29 can be regulated by advancing or withdrawing the screw 30. Further, in the valve 33 is a duct 32 by which the steam pipe 48 is connected with the pipe 43 leading to the steam-nozzles when the differential piston 18, 17 is in its extreme right-hand position.

The above-described device operates as follows:—When starting the engine the regulator-lever 12 is turned into its open position, when the slide valve 9 admits steam to the pipe 4. Consequently, steam is admitted to the valve-chest and thence to the

cylinders. The steam from the pipe 4 leading to the steam-chest passes into the pipe 40, past the non-return valve 26 into the duct 25, through the chambers 22, 22', 22'' and 22''' and the hole 24 into the part 19 of the valve-box. As the pressure of the live steam is thereby reduced, when the engine is started the closure member is not immediately driven into the position shown in Fig. 1, but remains for a short time in the position shown in Fig. 2, when the steam pipe 48 is connected by way of the non-return valve 44 with the pipes 45, 46 leading to the auxiliary blast. Only after the portion 19 of the valve-box has gradually filled with steam, and the pressure therein has correspondingly increased, is the closure member driven into the position shown in Fig. 1. When steam is shut off from the engine and the main blast ceases, the excess pressure in the portion 19 of the valve-box disappears, and consequently the high steam pressure on the valve-disk 33 drives the closure member 17, 18 back into the position shown in Fig. 2, when the steam pipe 48 is connected both with the pipe 43 leading to the steam-nozzle and with the pipe 46 leading to the auxiliary blast. The pressure of the steam in the pipe 48, however, is transmitted through the ducts 28, 29 into the portions 19, 7 of the valve-box, and increases here so that after a time the closure member 17, 18 is again automatically returned into the position shown in Fig. 1 when the pipes leading to the auxiliary blast and to the steam-nozzles are again closed. A little steam, however, can pass through the duct 32 to the nozzles in the fire-box, and is sufficient to keep these nozzles cool. The non-return valve 26 prevents steam flowing from the portion 7 of the valve-box into the pipe 40 leading to the steam-chest. It is to be understood that the duct 32 also may be provided with a regulating device, so that the amount of steam passing from the portion 23 of the valve-box into the pipe 43 leading to the nozzles may be suitably varied.

I claim:—

1. In means for regulating the supply of steam to the auxiliary blast of locomotive boiler furnaces, the combination of a valve-box having a steam admission port at one end thereof connected to the boiler, an auxiliary blast port leading to the auxiliary blast normally in open relation with the steam-admission port, and a steam port at the other end of the valve-box connected to the steam-chest; a closure member movable in the valve-box for shutting off the auxiliary blast port from the steam-admission port, the admission port end of the closure member being smaller than the other end, throttling means in the valve-box between the steam port and the latter end of the closure member, the end of the valve-box in

front of the smaller end of the closure member being connected with the end thereof behind the larger end of the closure member.

2. In means for regulating the supply of steam to the auxiliary blast of locomotive boiler furnaces, the combination of a valve-box having a steam admission port at one end thereof connected to the boiler, an auxiliary blast port leading to the auxiliary blast normally in open relation with the steam-admission port, and a steam port at the other end of the valve-box connected to the steam-chest; a closure member movable in the valve-box for shutting off the auxiliary blast port from the steam-admission port, the admission port end of the closure member being smaller than the other end, throttling means in the valve-box between the steam port and the latter end of the closure member, said closure member having a duct connecting the end of the valve-box in front of the smaller end with the end thereof behind the larger end of the closure member.

3. In means for regulating the supply of steam to the auxiliary blast of locomotive boiler furnaces, the combination of a valve-box having a steam admission port at one end thereof connected to the boiler, an auxiliary blast port leading to the auxiliary blast normally in open relation with the steam-admission port, and a steam port at the other end of the valve-box connected to the steam-chest; a closure member movable in the valve-box for shutting off the auxiliary blast port from the steam-admission port, the admission port end of the closure member being smaller than the other end, throttling means in the valve-box between the steam port and the latter end of the closure member, said closure member having a constricted, narrow duct connecting the end of the valve-box in front of the smaller end with the end thereof behind the larger end of the closure member.

4. In means for regulating the supply of steam to the auxiliary blast of locomotive boiler furnaces, the combination of a valve-box having a steam admission port at one end thereof connected to the boiler, an auxiliary blast port leading to the auxiliary blast normally in open relation with the steam-admission port, and a steam port at the other end of the valve-box connected to the steam-chest; a closure member movable in the valve-box for shutting off the auxiliary blast port from the steam-admission port, the admission port end of the closure member being smaller than the other end, throttling means in the valve-box between the steam port and the latter end of the closure member, said closure member having a longitudinal narrow duct connecting the end of the valve-box in front of the smaller end with the end thereof behind the

larger end of the closure member, and means for regulating the section of said duct.

5 In means for regulating the supply of steam to the auxiliary blast and to the steam
nozzles of locomotive boiler furnaces, the
combination of a valve-box having a steam
admission port at one end thereof connected
to the boiler, an auxiliary blast port leading
to the auxiliary blast normally in open re-
lation with the steam-admission port, a
steam port at the other end of the valve-box
connected to the steam-chest, and a steam-
nozzle port leading to the steam nozzles;
a closure member movable in the valve-box
for shutting off the auxiliary blast port
from the steam-admission port, the admis-
sion port end of the closure member being
smaller than the other end and having a
duct for connecting the steam-admission
port with the steam-nozzle port in the closed
position of the closure member, throttling
means in the valve-box between the steam
port and the latter end of the closure mem-
ber, the end of the valve-box in front of
the smaller end of the closure member be-
ing connected with the end thereof behind
the larger end of the closure member.

6. In means for regulating the supply of
steam to the auxiliary blast of locomotive
boiler furnaces, the combination of a valve-
box having a steam admission port at one
end thereof connected to the boiler, an aux-
iliary blast port leading to the auxiliary
blast normally in open relation with the
steam-admission port, and a steam port at
the other end of the valve-box connected to
the steam-chest; a non-return valve for clos-
ing the latter port, a closure member mov-

able in the valve-box for shutting off the
auxiliary blast port from the steam-admis-
sion port, the admission port end of the
closure member being smaller than the other
end, throttling means in the valve-box be-
tween the steam port and the latter end of
the closure member, the end of the valve-
box in front of the smaller end of the closure
member being connected with the end there-
of behind the larger end of the closure
member.

7. In means for regulating the supply of
steam to the auxiliary blast of locomotive
boiler furnaces, the combination of a valve-
box having a steam admission port at one
end thereof connected to the boiler, an aux-
iliary blast port leading to the auxiliary
blast normally in open relation with the
steam-admission port, and a steam port at
the other end of the valve-box connected to
the steam-chest; a closure member movable
in the valve-box for shutting off the aux-
iliary blast port from the steam-admission
port, the admission port end of the closure
member being smaller than the other end,
a plurality of perforated partitions in the
valve-box between the steam port and the
latter end of the closure member, the end of
the valve-box in front of the smaller end of
the closure member being connected with
the end thereof behind the larger end of the
closure member.

In testimony whereof, I affix my signa-
ture 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."