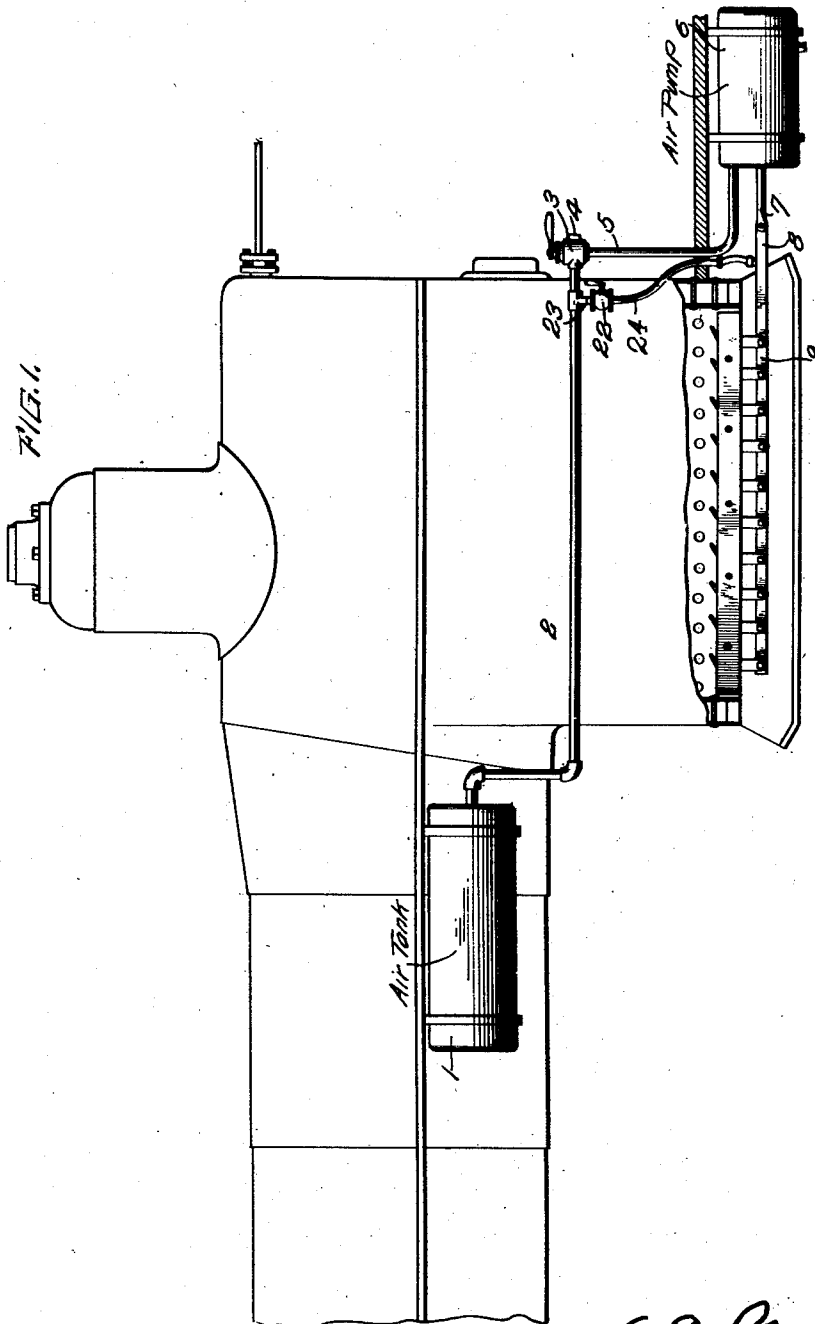


A. E. SHULTZ.
AIR FEEDING AND AIR OPERATED GRATE.
APPLICATION FILED APR. 23, 1914.

1,107,121.

Patented Aug. 11, 1914.

2 SHEETS-SHEET 1.



Witnesses

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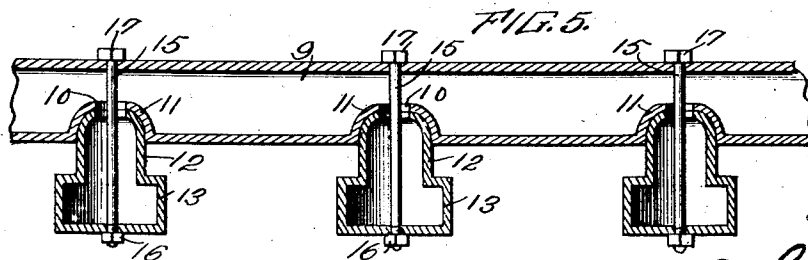
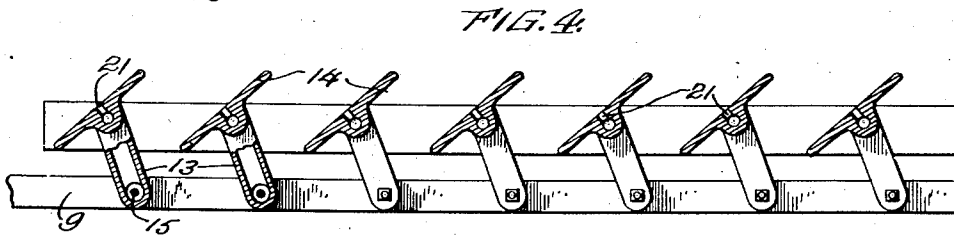
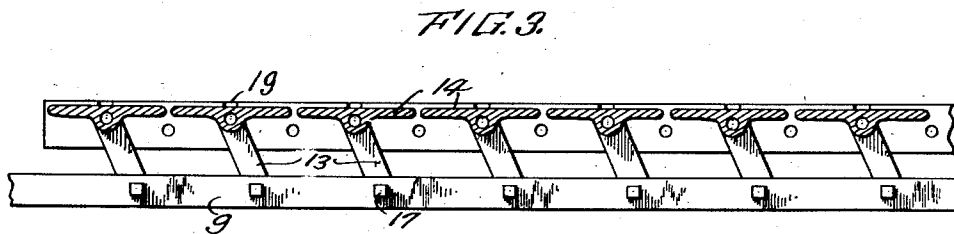
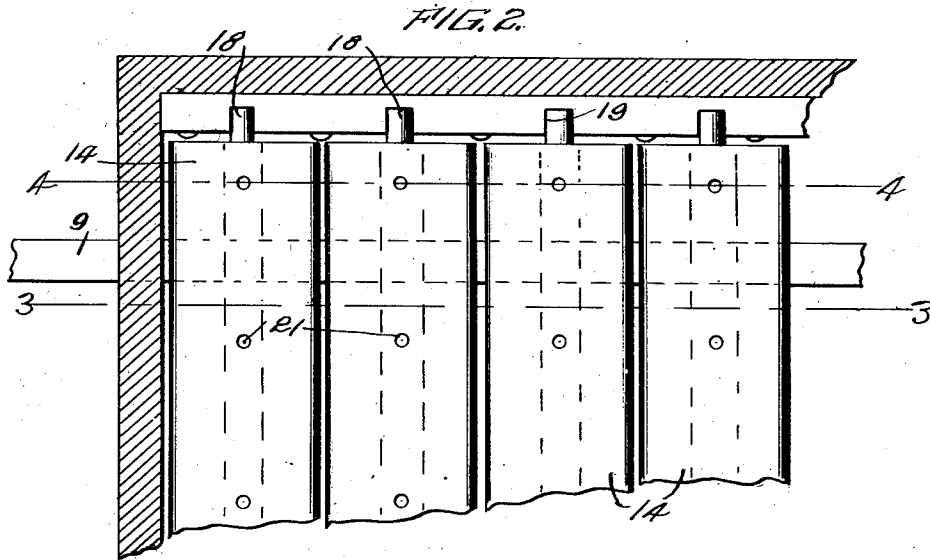
Attorneys

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2 SHEETS-SHEET 2.



Witnesses

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UNITED STATES PATENT OFFICE.

ALBERT E. SHULTZ, OF PINNERS, VIRGINIA.

AIR-FEEDING AND AIR-OPERATED GRATE.

1,107,121.

Specification of Letters Patent.

Patented Aug. 11, 1914.

Application filed April 23, 1914. Serial No. 834,032.

To all whom it may concern:

Be it known that I, ALBERT E. SHULTZ, citizen of the United States, residing at Pinners, in the county of Norfolk and State of Virginia, have invented certain new and useful Improvements in Air-Feeding and Air-Operated Grates; and I 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 appertains to make and use the same.

This invention relates to improvements in grates of that character which supply air from beneath the bed of fire for the purpose of supplying a draft, and an object of the invention is to provide improved means for supplying the air to the grate.

A further object of the invention is to provide means for producing artificial draft, whether the air for the draft be drawn from the tank of the locomotive or from some other source.

A further object of the invention is to provide an air feeding grate such as can be readily installed in the fire boxes at present used, and at the same time, make use of an improved form of grate rocking rod for supplying the air to hollow grate bars.

With these and other objects in view, the invention consists in certain constructions, combinations and arrangements of parts as will be hereinafter more fully described and claimed.

In the accompanying drawings wherein similar reference characters designate corresponding parts: Figure 1 is a view of the rear end of a locomotive boiler, showing the fire box in section and having the subject matter of the present invention applied thereto, Fig. 2 is an enlarged top plan view of a portion of the grate when in closed position, Fig. 3 is a vertical longitudinal section through a portion of the grate when in closed position, Fig. 4 is a view similar to Fig. 3, but in open position, and Fig. 5 is a detail horizontal sectional view through one of the joints connecting one of the hollow grate bars with the hollow grate bar rocking rod.

The general aim of the present invention is to provide a grate having hollow grate bars which are rocked by means of a hollow rocking rod which may be actuated by any form of pump or other means. An air tight

connection is provided between the hollow rocking rod and the hollow bars, this connection being of such construction as will readily admit of the removal of one grate bar without disassembling the entire grate.

Referring to the drawings, particularly Fig. 1, there is seen the usual air tank 1 which may supply air under pressure from any suitable source (not shown). Leading from the air tank is an air line 2 which communicates with the three-way valve 3 which is provided with a port 4, the purposes of which will be described hereinafter, and is also connected to an air pipe 5 which leads to any improved form of air engine 6. The air engine 6 need not be described specifically in this application, as no claim is made therefor, but is of such construction as will reciprocate a piston rod 7, to the outer end of which is pivotally connected the solid end 8 of a grate bar rocking rod 9.

By referring to Fig. 5, it will be seen that this rocking rod is hollow and is provided with a plurality of openings 10 which are formed in cups 11 which are formed on one of the vertical sides of the rocking rod. These cups 11 are shaped to conform to the inner end of a tube 12 which extends from the casing 13, rigid with a grate bar. As seen in Figs. 3 and 4, these grate bars are hollow so that there is afforded an uninterrupted air passage between the interior of the hollow grate bar and the interior of the hollow rocking rod 9. It is to be understood that each of the grate bars 14 is provided with one of the casings 13 and the attaching tube 12. In order that an air tight connection may be provided between the cup 11 and tube 12, there is provided a bolt 15 for each of said cups having a head 16, said bolt passing through the tube 12 through the rounded portion thereof, through the opening in the cup 11 and through to the outside of the rod 9 where there is provided a nut 17 which may be bound to tighten the structure sufficiently to prevent the escape of air, but loose enough to allow the round end of the tube 12 to rotate in the cup 11. By referring to Fig. 5, it will be seen that the opening through the cup 11 and the rounded end of the tube 12 is larger than the bolt 15, so that said bolt does not operate to interfere materially with the passage of air.

By referring to Fig. 2, it will be seen that the grate bars, which are hollow, are provided on the ends thereof with trunnions 18 which are received by the sockets 19 which are found on the ordinary side bars 20, found in the usual fire box construction. Therefore, it will be apparent that the installation of my invention in the ordinary locomotives, will not require any change of the fire box. It will further be noted by referring to Fig. 2 that the tops of the grate bars are provided with openings 21, these openings being so spaced that adjacent four of the openings will form a square, that is, the distance between the openings which are formed in any one grate bar, is equal to the distance between corresponding openings in adjacent grate bars. The object of such construction is to provide a uniform distribution of the air over the grate so that when air is supplied to the fire, the same will be distributed evenly.

In the operation of the invention thus far described, when it is desired to rock the grate bars, the three-way valve 3 may be moved to the proper position to admit air from the tank 1 to the air engine 6, so as to operate the piston 7 to oscillate the rod 9. Obviously, this will be accompanied by a rocking of the hollow grate bars. This structure is known to be old and no claim for the same is made in the present application. However, when it is desired to apply forced draft to the fire an air cock 22 can be opened, whereupon air will pass from the line or pipe 2 through the coupling 23 and into the flexible connection 24 which communicates with the hollow rocking rod 9. By the use of the two air cocks 3 and 22, it will be possible to agitate the fire bed and apply a forced draft thereto at the same time. It is also obvious that the forced draft and the movement of the grate bars, are independent of each other.

Should it become desirable to make a fire in the fire box of a locomotive which is being repaired, so that the same has no air in its tank, a coupling may be attached to the port 4 and the three-way valve 3 turned in such a position as to admit air to the pump 6 for agitating the fire. If it should be desirable to apply a forced draft to the fire, it will be possible to turn the three-way valve so as to store air in tank 1 or pass air directly through air cock 22 to the rod 9.

By the selection of proper air pressure, it will be possible to do away with the styles of forced draft which are at present in use, so that a saving of fuel will be effected, inasmuch as the present styles of forced draft suck a large percentage of fuel through the stack of the engine. By the use of the valves, it will be possible for the boiler attendant to control the draft, and therefore, the amount of heat generated, this invention

making it possible to dispense with the ordinary blow pipe and still have the fire under complete control of the attendant.

I claim:

1. A grate for fire boxes comprising a plurality of hollow perforated bars mounted for rotation, a hollow leg depending from each of said bars, a hollow rocking rod connected to each of said hollow legs, means for supplying air under pressure to the hollow rocking rod, and means for reciprocating said hollow rocking rod.

2. A grate for boilers comprising a plurality of hollow perforated grate bars rotatably mounted, a hollow rocking rod operatively connected to each of the grate bars, the interior of the rocking rod being in communication with the interior of each of the hollow grate bars, means for supplying air under pressure to the rocking rod, and means for reciprocating the rocking rod.

3. A grate for fire boxes comprising a plurality of rotatably mounted hollow perforated grate bars, hollow legs depending one from each of said grate bars, the lower end of each of said legs being rounded, a hollow rocking rod provided with recesses therein adapted to receive the rounded ends of the legs, means for holding the rounded ends of said legs against the corresponding recesses in the rocking rod, means for supplying air to the interior of the rocking rod, and means for reciprocating said rocking rod.

4. In a grate construction, a hollow perforated grate bar mounted for rotation, a hollow leg depending therefrom, a tube extending from the leg and having the ends thereof rounded and perforated, a hollow rocking rod provided with perforated recesses adapted to receive the rounded end of the tube, means passing through the tube engaging the leg through the ports of the tube and recess and through the rocking rod adapted to bind the rounded end of the tube to the hollow rocking rod, means for reciprocating the rocking rod, and means for applying air under pressure to the rocking rod.

5. In combination, hollow perforated rotatably mounted grate bars, a hollow rocking rod operatively connected to the grate bars and having the interior thereof in communication with the interior of the hollow grate bars, an air operated means for reciprocating the rocking rod, means for supplying air under pressure to the rocking rod, a three-way valve controlling the passage of air to the air operated reciprocating means, one of the ports of said valve being connected to said reciprocating means, the other port being operatively connected to the means for supplying air to the hollow rocking rod, and a valve controlling the passage of air to the hollow rocking rod.

6. In combination, a plurality of rotatably mounted hollow perforated grate bars, a hol-

low rocking rod adapted to partially rotate
said grate bars, the interior of the rocking
rod being in communication with the inte-
riors of the grate bars, pneumatically oper-
ated means for reciprocating the hollow
5 rocking rod, an air tank, an air pipe passing
from said tank to the pneumatically oper-
ated reciprocating means, a three-way valve
located in said pipe, a pipe line leading from
10 a point intermediate the three-way valve and
the tank to the hollow rocking rod, and a
valve located in the last named pipe.

7. A grate for fire boxes comprising a plu-
rality of rotatably mounted hollow perfo-

rated grate bars, a hollow rocking rod oper- 15
atively connected thereto adapted to par-
tially rotate the bars, and means for supply-
ing air under pressure to the rocking rod,
the interiors of the grate bars being in com-
munication with the interior of the rocking 20
rod.

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

ALBERT E. SHULTZ.

Witnesses:

W. H. WAKEFIELD,
JOHN L. FLETCHER.