No. 759,486. PATENTED MAY 10, 1904.

H. SWOYER.

LOCOMOTIVE GRATE SHAKER.

APPLICATION FILED AUG. 4, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. 2.

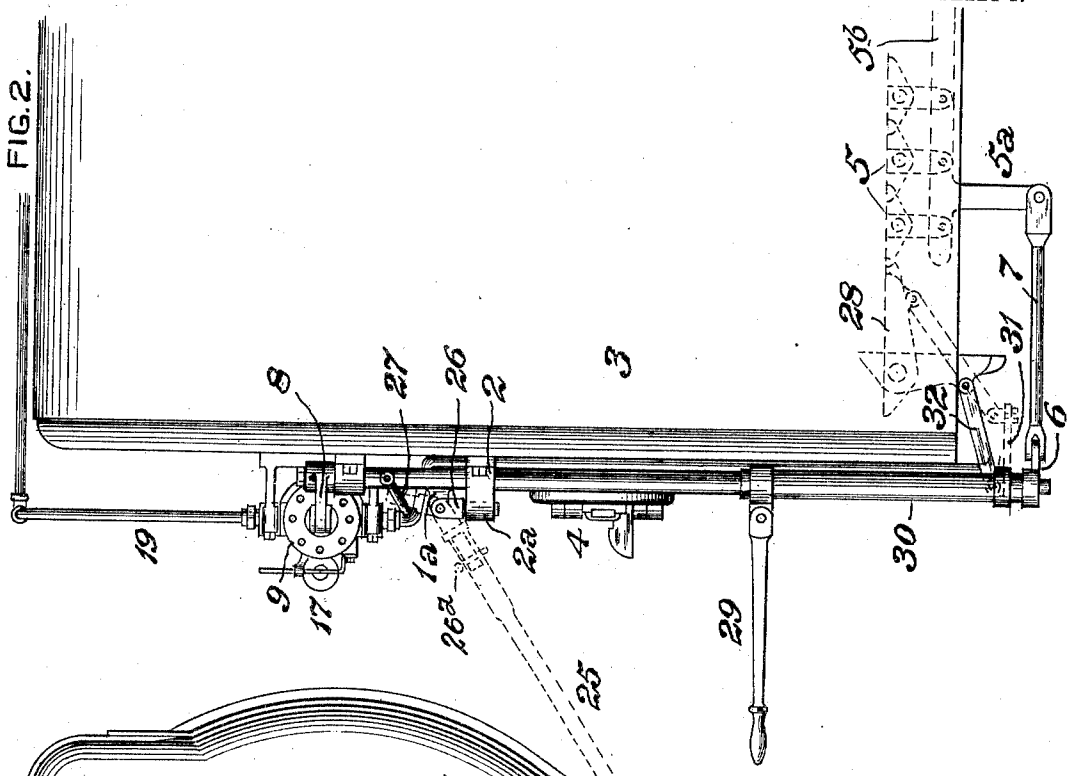
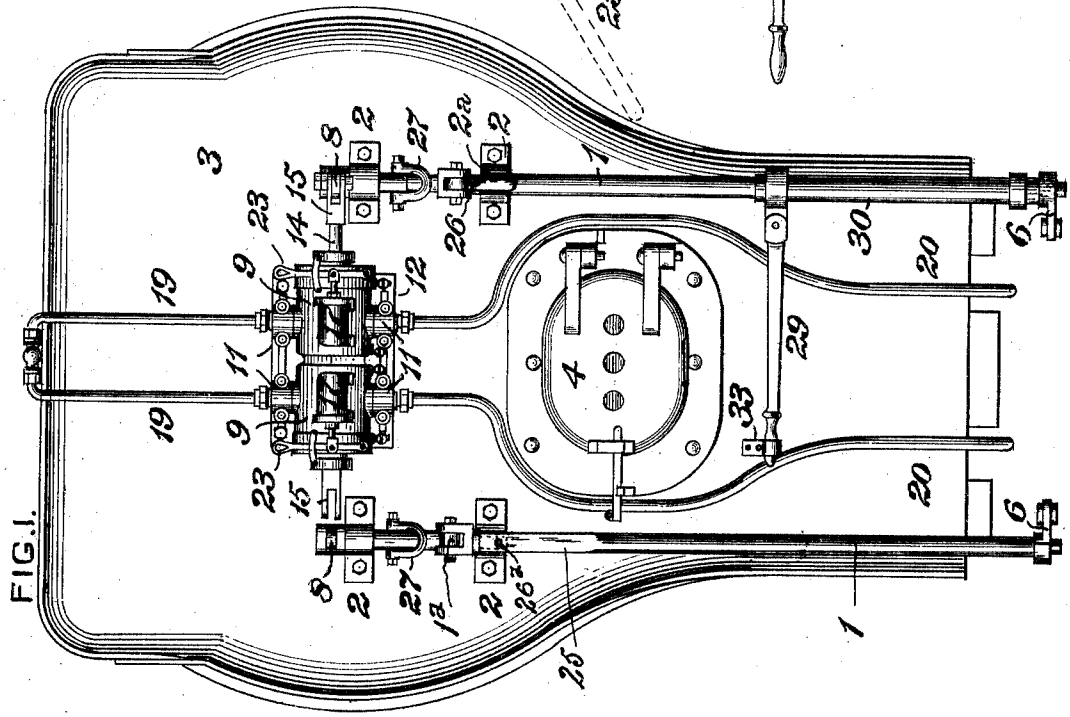


FIG. 1.



WITNESSES.

James C. Herron.

S. R. Bell.

INVENTOR

Harry Swoyer,

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 2 SHEETS—SHEET 2.

FIG. 3.

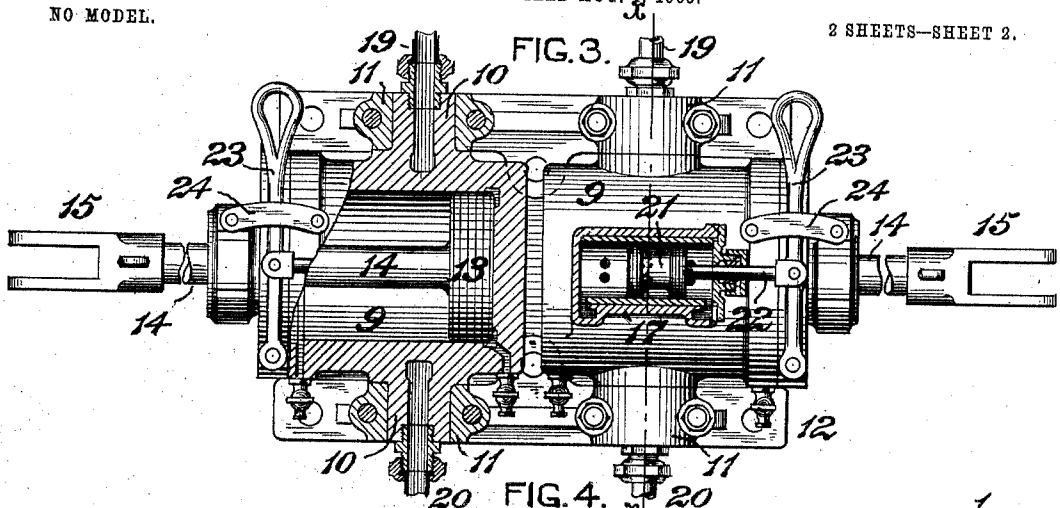


FIG. 4.

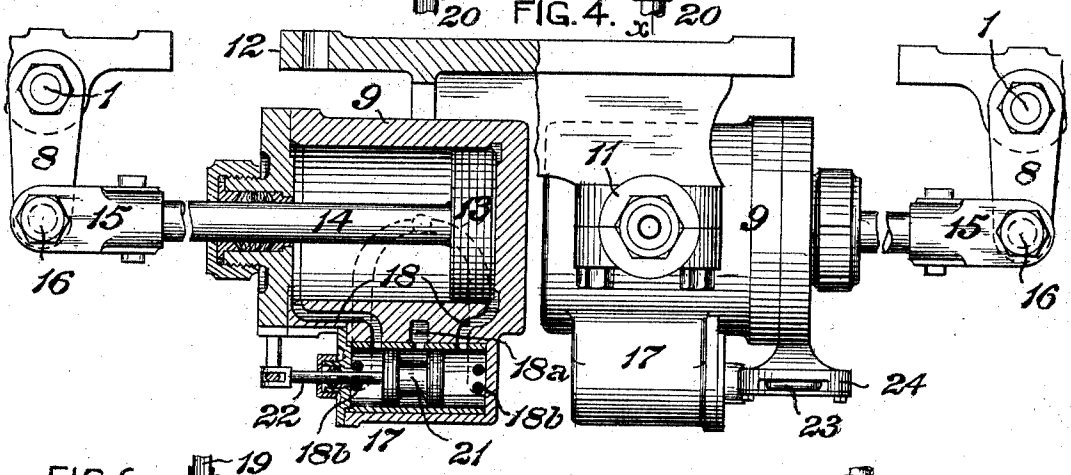


FIG. 6.

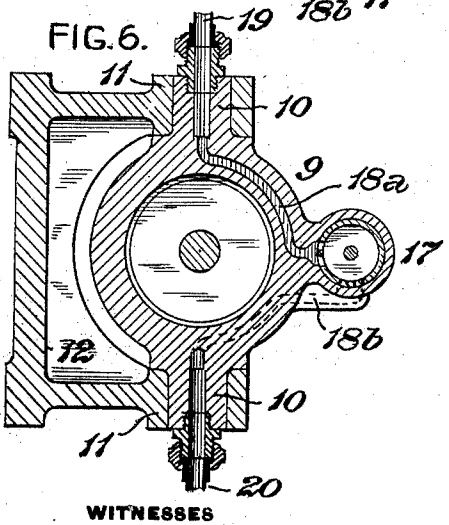
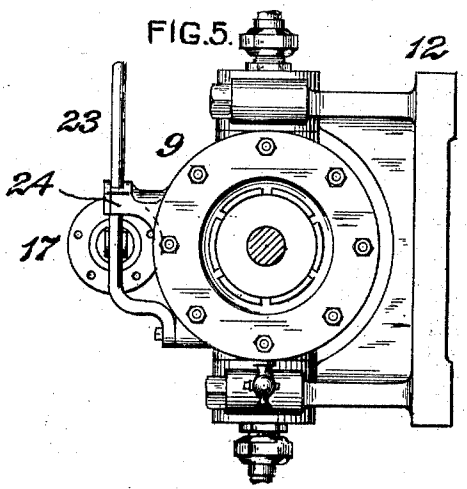


FIG. 5.



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No. 759,486. Patented May 10, 1904.

UNITED STATES PATENT OFFICE.

HARRY SWOYER, OF LOUISVILLE, KENTUCKY.

LOCOMOTIVE-GRATE SHAKER.

SPECIFICATION forming part of Letters Patent No. 759,486, dated May 10, 1904.

Application filed August 4, 1903. Serial No. 168,143. (No model.)

To all whom it may concern:

Be it known that I, HARRY SWOYER, of Louisville, in the county of Jefferson and State of Kentucky, have invented a certain new and useful Improvement in Locomotive-Grate Shakers, of which improvement the following is a specification.

The object of my invention is to provide an appliance of simple and inexpensive construction and ready applicability in locomotive-engines of the various constructions now in service whereby locomotive-grates of the rocking type may be shaken or rocked as from time to time required to clear them of clinkers and cinders and permit free access of air to the fuel, this operation being performed either by the action of steam or by an operator standing in the cab or on the foot-plate or deck of the locomotive or tender, as circumstances may render most advisable.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a rear view in elevation of a locomotive fire-box, illustrating an embodiment of my invention; Fig. 2, a partial side view of the same; Fig. 3, a view, partly in elevation and partly in section and on an enlarged scale, of the motor-cylinders; Fig. 4, a plan view, partly in section, of the same, showing the shaker shafts and arms; Fig. 5, an end view of a motor-cylinder; and Fig. 6, a vertical transverse section through the same, taken on the line $x\ x$ of Fig. 3.

My invention is specially designed for use in connection with rocking grates of locomotive-boilers and is herein exemplified as applied in a boiler of such type in which it has been for some time past and is now regularly operated in practical service. It will, however, be obvious that its application is not in anywise limited to locomotive-boilers and that it may be employed without variation of structure or operative principle in stationary and marine boilers which are provided with rocking grates.

In the practice of my invention a vertical shaker-shaft 1 (one shaft or a pair thereof, as the case may be) is journaled in bearings 2, which are secured to the back head of a fire-box 3, the axis of the shaker-shaft being located at such distance from the adjacent side of the fire-box 4 to be entirely clear of the door hinges and latch. The fire-box is provided with a grate 5, which may be of any suitable and preferred form of the rocking or shaking type and which, as it does not in and of itself form part of my present invention, is not herein at length set forth. In the instance exemplified and as is deemed preferable in connection with grates of comparatively large areas which are now generally in use two shaker-shafts located on opposite sides of the fire-door are employed, one of said shafts serving to actuate the bars of the forward half of the grate and the other to independently actuate the bars of the rear half. The two shaker-shafts and their operating mechanisms are, however, substantially similar in construction and operation, which will be understood from a description of either system of the pair.

An arm 6 is fixed upon the lower end of each of the shaker-shafts 1 and is coupled by a rod or link 7 to a downwardly-projecting arm 5^a on a longitudinal rocking bar 5^b, which is coupled in the ordinary manner to the grate-bars 5 of that portion of the grate—as, say, the rear half thereof—which is to be rocked by the shaker-shaft. The grate-bars of the other half of the grate are similarly connected to the corresponding lower arm 6 of the opposite shaker-shaft. Each shaker-shaft has fixed upon its upper end an arm 8, which is coupled, as presently to be described, to the piston-rod of a fluid-pressure motor-cylinder 9 by the reciprocation of the piston of which the shaker-shaft may be rocked or vibrated in its bearings and will thereby correspondingly rock the grate-bars to which it is connected.

The motor-cylinders 9 are provided on their upper and lower sides with vertical trunnions 10, which are journaled in bearings 11 on a supporting-plate 12, secured to the back sheet or head of the outside fire-box 3. Each cylinder is fitted with a properly-packed piston 13, secured upon a piston-rod 14, upon the outer end of which is keyed or otherwise secured a cross-head or clevis 15, which is coupled by a pin 16 to the upper arm 8 of the

adjacent shaker-shaft 1. A valve-chest 17 is formed upon or fixed to each of the motor-cylinders 9 and communicates with the ends thereof by induction and eduction ports 18 in the ordinary manner and also communicates, through exhaust-ports 18^b at each of its ends, with the atmosphere. Steam from the boiler is supplied to each of the valve-chests through a supply-pipe 19, which is governed by a suitable cock or valve, and communicates with a central supply-passage 18^a and is exhausted therefrom through the end exhaust-ports 18^b and through a connected discharge-pipe 20, leading to the ash-pan or to any other preferred point of discharge outside of the cab of the locomotive. Steam is admitted to and exhausted from the opposite ends of each of the motor-cylinders to effect the reciprocation of the piston thereof by a distribution-valve 21, which may be of any known and preferred construction and which is herein shown as of the piston type. The valves 21 are fixed upon valve-stems 22, the outer ends of which are coupled to operating-levers 23, which are pivoted on the motor-cylinders 9 and traverse between end stops in guides 24, fixed thereon. The distribution-valves are reciprocated by moving the operating-levers by hand, and the resultant admission and exhaust of steam to and from the motor-cylinders effects the reciprocation of their pistons at any desired rate of speed and the oscillation of the connected shaker-shafts and grate-bars. If desired, the distribution-valves may be automatically actuated by the movements of the cylinder or piston through the intermediation of valve-operating gear of any of the various constructions which are familiar to those skilled in the art.

Under certain conditions it may become desirable to shake the grates by the direct application of manual power, and for this purpose each shaker-shaft is provided with a short arm 1^a, to which a hand-lever 25 may preferably be attached by a stub 26 and be vibrated by an operator to correspondingly rock the shaker-shaft. The stub or locking-pin 26 is coupled to the arm 1^a, said stub when turned down engaging a socket 2^a on one of the bearings of the shaker-shaft, in which position it serves to hold the grate-bars which are coupled to said shaft in their central or normal operative position. When the grates are to be rocked by power applied in the motor-cylinders, the stub is turned up and hooked into a stirrup 27, pivoted to the shaker-shaft, and when the grates are to be rocked by hand the pin 16, by which the upper arm of the shaker-shaft is coupled to the piston-rod, is removed, as indicated at the left of Fig. 1, and the hand-lever 25, which is provided with a socket, is coupled to stub 26 and fastened thereto by pin 26^a.

The drop-grate 28 is raised and lowered, as from time to time required, by a hand-lever 29, pivoted to a sleeve 30, which is fitted to oscillate on one of the shaker-shafts, and carries an arm 31, coupled by a link 32 to the drop-grate. When the drop-grate is in normal or operative position, the hand-lever stands parallel with the back head of the fire-box and out of the way of the fireman, and its free end rests in a bracket 33, fixed on the fire-box, as shown in Fig. 1.

My invention enables a rocking grate to be expeditiously and effectively shaken by power-actuated mechanism whenever required and correspondingly relieves the fireman from the labor which is necessary in doing this work by hand. The mechanism is compact and inexpensive, and is applicable in position for operation on locomotive or other boilers without involving modification of or interference with the ordinary accessories thereof or change in the grates now employed.

I claim as my invention and desire to secure by Letters Patent—

1. In a grate-shaking appliance, the combination of a shaker-shaft journaled in bearings on a fire-box and having upper and lower arms, a fluid-pressure motor-cylinder having a piston, which is coupled to the upper arm of the shaker-shaft, a link by which the lower arm of said shaft is coupled to a plurality of rocking grate-bars, a pivoted drop-grate, a sleeve fitted freely on the shaker-shaft and coupled to the drop-grate, and a hand-lever coupled to said sleeve for raising and lowering the drop-grate by movement of the sleeve.

2. In a grate-shaking appliance, the combination of a shaker-shaft journaled vertically in bearings on the back head of a fire-box, upper and lower arms fixed on said shaft, a supporting-plate fixed on the fire-box and carrying vertical trunnion-bearings, a motor-cylinder having trunnions fitted in said bearings, a piston and rod in said cylinder, a connection coupling the piston-rod to the upper arm of the shaker-shaft, a distribution-valve controlling the supply and exhaust of motive fluid to and from the motor-cylinder, an operating-lever connected to the distribution-valve, and a rod or link coupling the lower arm of the shaker-shaft to a rocking grate.

3. In a grate-shaking appliance, the combination of a shaker-shaft journaled vertically in bearings on the back head of a fire-box, upper and lower arms fixed on said shaft, a motor-cylinder fixed on the fire-box, a piston and rod in said cylinder, a detachable connection coupling the piston-rod to the upper arm of the shaker-shaft, a distribution-valve controlling the supply and exhaust of motive fluid to and from the motor-cylinder, an operating-lever connected to the distribution-valve, a rod or link coupling the lower arm of the shaker-shaft to a rocking grate, and an arm fixed on the shaker-shaft and adapted for connection to a hand operating-lever.

4. In a grate-shaking appliance, the combi-

nation of a revoluble shaker-shaft journaled in bearings on a fire-box, one of said bearings being provided with a socket, upper and lower arms on said shaft, a fluid-pressure motor-cylinder supported on the fire-box, a piston in said cylinder coupled to the upper arm of the shaker-shaft, a link for connecting the lower arm of the shaft to a plurality of rocking grate-bars, a short intermediate arm fixed on said shaft, a stub coupled to said arm and adapted to engage the socket in said bearing and a hand-lever when not engaging said socket.

5. In a grate-shaking appliance, the combination of a revoluble shaker-shaft journaled in bearings on a fire-box, one of said bearings being provided with a socket, upper and lower arms on said shaft, a fluid-pressure motor-cylinder supported on the fire-box, a piston in said cylinder adapted to be coupled to the upper arm of the shaker-shaft, a link for connecting the lower arm of the shaft to a plurality of rocking grate-bars, a short intermediate arm fixed on said shaft, a stub coupled to said arm and adapted to engage the socket in said bearing, a stirrup on the shaft and adapted to receive said stub when not engaged in said bearing.

HARRY SWOYER.

Witnesses:
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E. S. HEDGCOCK.