G. W. WOOD.

CONTROLLING VALVE MECHANISM FOR FURNACE STOKERS.

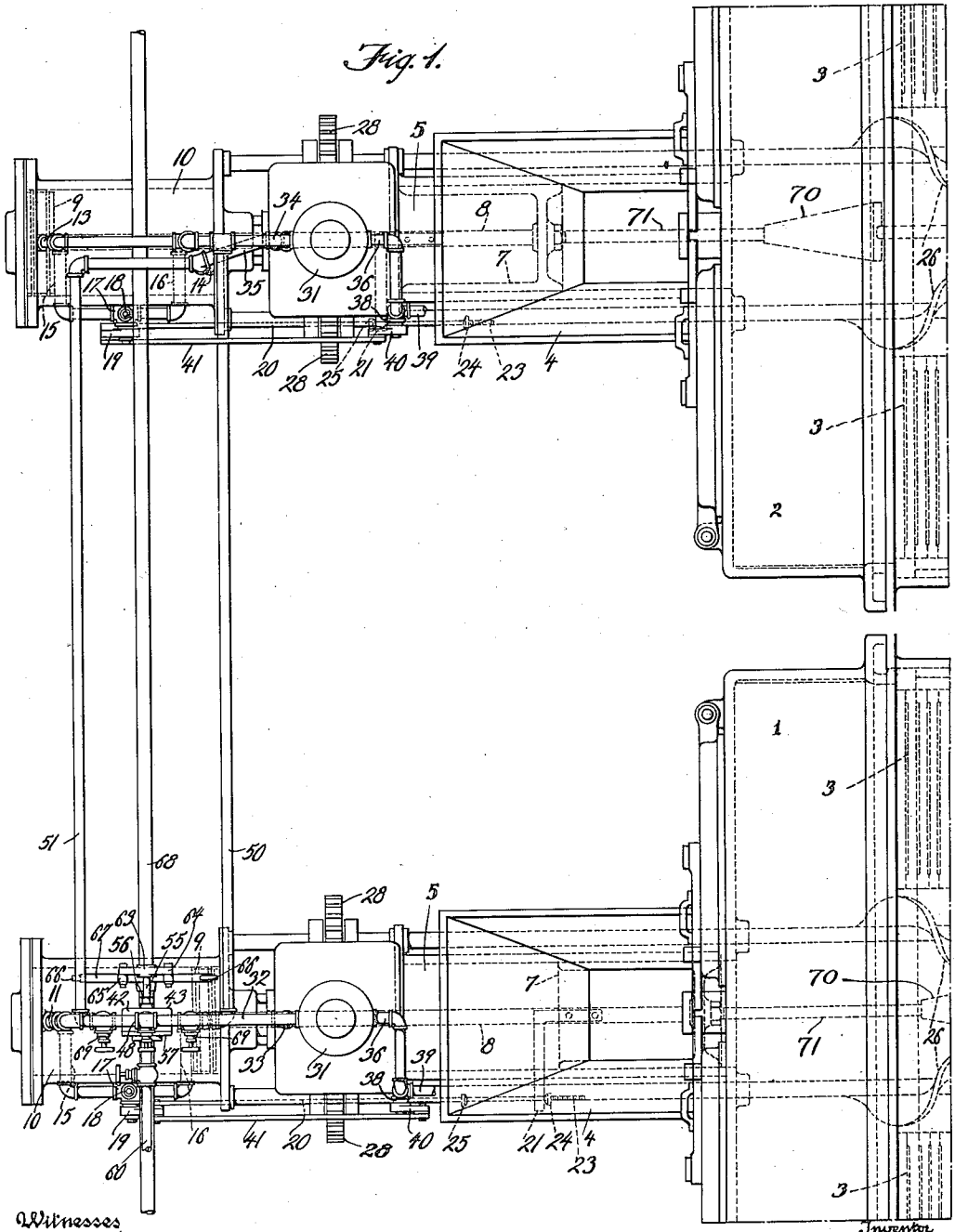
APPLICATION FILED JAN. 8, 1917.

1,243,237.

Patented Oct. 16, 1917.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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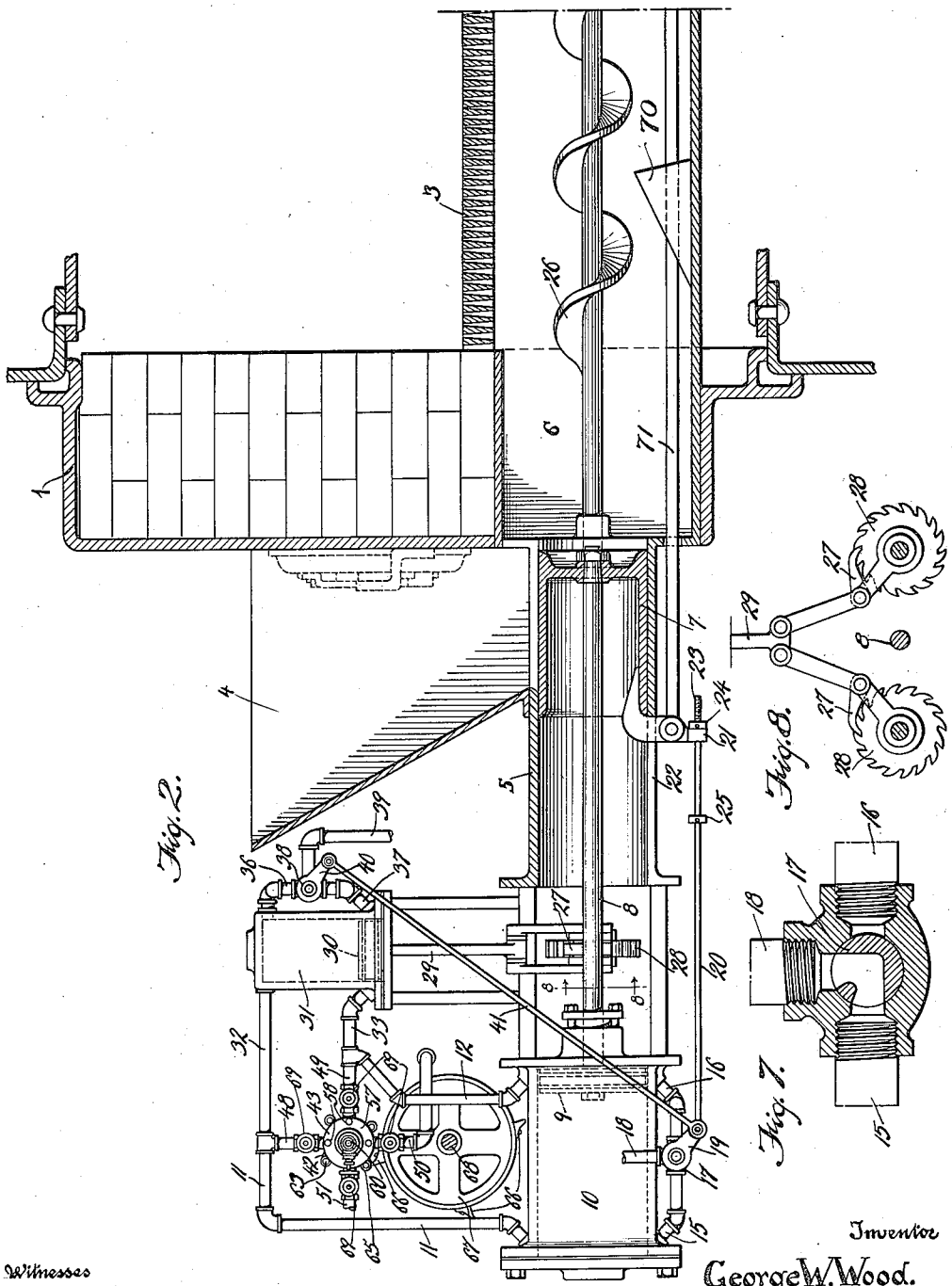

Fig. 2.

Fig. 8.

Fig. 7.

Witnesses

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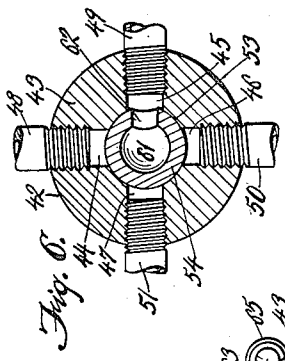

Fig. 6.

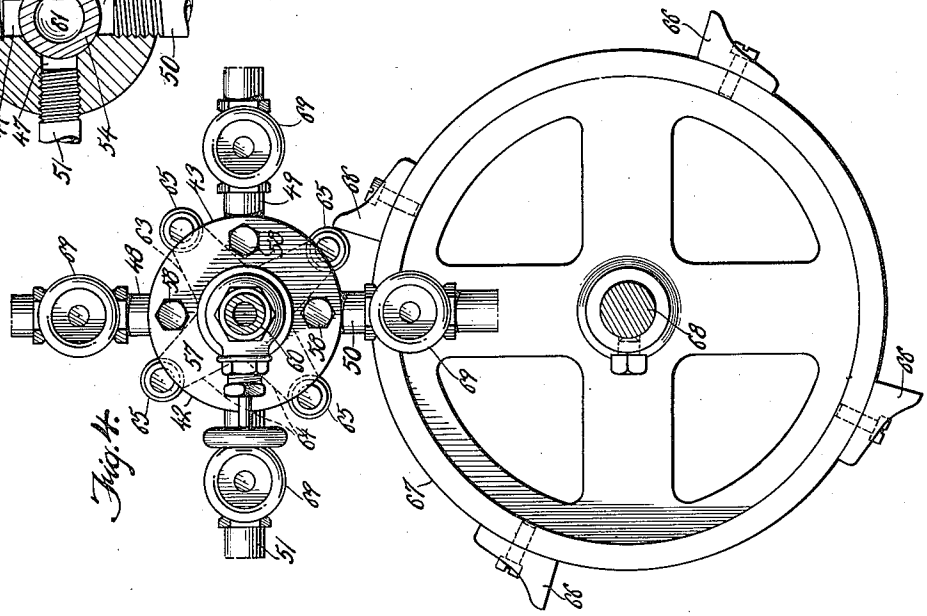

Fig. 4.

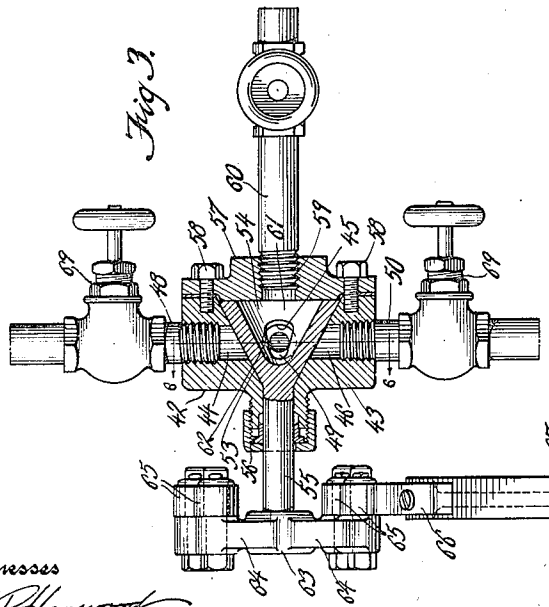

Fig. 3.

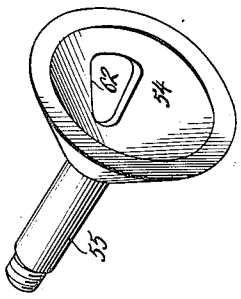

Fig. 5.

Witnesses

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UNITED STATES PATENT OFFICE.

GEORGE W. WOOD, OF CAMDEN, NEW JERSEY.

CONTROLLING-VALVE MECHANISM FOR FURNACE-STOKERS.

1,243,237. Specification of Letters Patent. Patented Oct. 16, 1917.

Application filed January 8, 1917. Serial No. 141,228.

To all whom it may concern:

Be it known that I, GEORGE W. WOOD, a citizen of the United States, residing at Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Controlling-Valve Mechanism for Furnace-Stokers, of which the following is a specification.

My invention consists of improved controlling valve mechanism for furnace stokers, one object of my invention being to provide mechanism which will operate automatically to effect the intermittent feeding of fuel to furnaces.

Another object is to so make my invention that it will be of simple construction, durable and will require but little power to operate.

These objects, and other advantageous ends which will be described hereinafter, I attain in the following manner, reference being had to the accompanying drawings in which

Figure 1 is a top plan view of a series of two furnaces equipped with my invention.

Fig. 2 is an enlarged elevation partly in section showing a side view of one of the furnaces illustrated in Fig. 1.

Fig. 3 is an end elevation partly in section of my main distributing valve mechanism.

Fig. 4 is a front elevation of Fig. 3.

Fig. 5 is a perspective view of one of the elements shown in Figs. 3 and 4.

Fig. 6 is a section on the line 6—6 of Fig. 3.

Fig. 7 is an enlarged longitudinal section of one of the exhaust valves shown in Figs. 1 and 2.

Fig. 8 is a fragmentary section taken on the line 8—8 of Fig. 2.

Referring to the drawings, furnaces 1 and 2 are similarly constructed and each include grate bars 3 and a hopper 4 into which the fuel is fed. This hopper at its bottom communicates with a cylindrical casing 5 which is in line with the fuel inserting space 6 within the furnace.

A cylindrical pusher 7 slidably fits within the casing 5 and is reciprocated within said casing through the medium of a piston rod 8, the latter having a piston 9 on its forward end which is operative within a steam chest or cylinder 10, the latter, as illustrated in connection with the furnace 1, having steam inlet pipes 11 and 12 which enter its opposite ends. The steam cylinder 10 of the furnace 2 has steam pipes 13 and 14 respectively which enter its steam cylinder 10.

It will thus be noted that if steam alternately enters the pipes 11 and 12 or 13 and 14, that the respective pistons 9 will be alternately moved within the cylinder 10 to effect a reciprocating movement to the pushers 7 and thereby cause charges of fuel to be intermittently fed into the space 6 within the furnaces.

Each of the cylinders 10 has exhaust pipes 15 and 16 leading therefrom. These exhaust pipes communicate with two-way valves 17 to which the exhaust pipes 18 are connected and as hereinafter more fully described, the valves 17 are automatically moved to alternately throw the pipes 15 and 16 open to the exhaust to permit the proper movement of the piston 9.

One of the important features of my invention consists of the means whereby the steam or other fluid under pressure is admitted to the cylinders 10 through pipes 11, 12, and 13, 14 respectively, and will be described in detail hereinafter.

To each of the two-way exhaust valves 17, an arm 19 is connected, and to this arm is pivotally connected one end of an actuating rod 20, the other end portion being freely slidable within and supported by a bracket 21 which depends from the pusher 7 and through a slot 22 within the lower portion of the casing 5. The rod 20 is screw-threaded at 23 adjacent one end and on this threaded portion is fitted a nut or adjusting collar 24. Another adjustable collar 25 is also mounted on the actuating rod as clearly shown in Fig. 2.

With this construction, the bracket 21 is free to move between the collars 24 and 25 for a portion of the movement of said pusher 7 within the casing 5, the other portion of the movement of said pusher being operative to reciprocate said actuating rod by alternately engaging the collars 24 and 25.

The positioning of said collars is such as to effect the partial rotation of the two-way exhaust valves 17 in opposite directions, so that the exhaust will be open to one end of a cylinder 10 while the steam is being admitted to the other as is obviously necessary to provide the proper operation of the elements.

Each furnace also includes two agitating and feed worms 26 which are operated by

means of pawls 27 and ratchets 28, and these feed worms and the pawl and ratchet mechanism form a part of and are claimed in my prior United States Patent No. 1,206,071 dated November 28th, 1916.

The pawls 27 are actuated through the medium of a connecting rod 29 to the upper end of which is attached a piston 30 which operates within a cylinder 31. It will be noted that each of the furnaces as illustrated, has an independent cylinder 31, the cylinder 31 of the furnace 1 having steam inlet pipes 32 and 33 which enter opposite ends thereof, while the furnace 2 has steam inlet pipes 34 and 35 respectively entering opposite ends of its cylinder 31.

These steam inlet pipes 32, 33, and 34, 35, respectively are supplied with steam as hereinafter more fully set forth, to actuate the pistons 30 and in turn reciprocate the connecting rod 29 of each of the furnaces to rotate the worms 26 so that while the pusher 7 of each furnace is operating to intermittently charge the furnace with fuel, the worms 26 are also rotating to feed the intermittent charges longitudinally throughout the furnace and to keep the fuel agitated in order to secure a desirable combustion.

Each of the cylinders 31 has exhaust pipes 36 and 37 which communicate with a two-way exhaust valve 38, which is of similar structure to the valves 17 previously mentioned, and has an exhaust pipe 39 communicating therewith.

The exhaust pipes 18 and 39 may be connected together if desired, or they may independently lead to the atmosphere or to a reservoir for any purposes whatever. Each of the valves 38 has an arm 40, and these arms 40 are connected to the arms 19 respectively by links 41 (see Figs. 1 and 2) so that as the arms 19 are operated by the rods 20, the arms 40 will be simultaneously operated to alternately open the pipes 36 and 37 to the exhaust.

The steam inlet pipes 11 and 12 are connected respectively to the steam inlet pipes 32 and 33 so that steam will simultaneously enter the pipes 11 and 32 and will also simultaneously enter the pipes 12 and 33, thus the pistons 9 and 30 will operate in conjunction with each other by the same charge of steam when it is admitted in the manner hereinafter set forth.

In like manner, the pipes 13 and 34, which lead respectively to the cylinders 10 and 31 of the furnace 2, communicate with each other as do also the pipes 14 and 35.

A main distributing valve 42 is located in any convenient position adjacent the furnaces and consists of a valve casing 43 having a number of radial outlet or distributing passages 44, 45, 46, and 47.

The passage 44 is connected by a pipe 48 to the pipes 11 and 32 above mentioned so that said passage 44 will be in communication with both of said pipes 11 and 32. The passage 45 is connected by a pipe 49 and communicates with both of the pipes 12 and 33. The passage 46 is connected by a pipe 50 which in turn communicates with the pipes 13 and 34. The passage 47 has a pipe 51 leading therefrom, and this pipe 51 communicates with the pipes 14 and 35.

The valve casing 43 has a frusto-conical central opening 53 with which the passages 44, 45, 46, and 47 communicate. A hollow frusto-conical valve 54 fits the opening 43 and has a stem 55 which projects rearwardly through the casing 43 as clearly shown in Fig. 3. The casing 43 has a stuffing box or gland 56 in order to prevent leakage of steam which enters the valve casing as will hereinafter be more fully described.

A cap 57 is secured to the valve casing 43 in the present instance by bolts 58, and this cap has a threaded opening 59 into which fits a main steam supply pipe 60. The opening 59 communicates with the chamber 61 formed by the frusto-conical valve 54, said valve having a single port 62 which registers, when the valve is rotated, with all of the passages 44, 45, 46, and 47.

A wheel 63 is fixed to the outer end of the valve stem 55 and has a plurality of arms 64 which extend radially therefrom. An anti-friction roller 65 is journaled adjacent the outer ends of each of the arms 64 and these rollers 65 are in line with and designed to be engaged by cams 66 on a cam wheel 67, the latter being fixed to a shaft 68 which may be rotated through the medium of any source of power, the arrangement between said cam wheel and the rollers 65 being such that the movement of each of the cams 66 is sufficient to move the wheel 63 and consequently the valve 54 to such extent that the port 62 will be moved into successive register with each of the passages 44, 45, 46, and 47 to permit the incoming steam to successively enter each of the pipes 48, 49, 50, and 51, and thereby operate the pistons 9 and 30 within the cylinders 10 and 31 respectively of each of the furnaces.

As illustrated in the drawings, the arrangement of the valve 54 is such that the steam is about to enter the pipes 12 and 33 through the medium of the pipe 49 to move the respective pistons 9 and 30, of the furnace 1, rearwardly and upwardly.

The next movement of the valve 54 will admit steam through the pipe 50 and consequently through the pipes 13 and 34 and thus cause the pistons 9 and 30, of the furnace 2, to move forwardly and downwardly. Another movement of the valve 54 will bring the port 62 into register with the passage 47 and thereby cause the said latter mentioned pistons 9 and 30 to be moved rearwardly and upwardly.

The next movement of said valve 54 will be to have the port 62 communicate with the passage 44 and the pipes 11 and 32 to move the pistons 9 and 30 of furnace 1 forwardly and downwardly. This completes a cycle of the valve 54, it being noted that when the pistons 9 of each of the furnaces move forwardly they actuate the respective pushers 7 to insert a charge of fuel into the furnace and as the pistons 30 move upwardly, they rotate the feed worms 26 to agitate, convey and distribute the charge within the furnace.

Fuel actuating blocks 70 are positioned within the space 6 of the furnaces and these blocks are connected to the brackets 21 by bars 71 so that as the pushers 7 reciprocate, the blocks 70 will also be reciprocated through the mass of fuel and thereby tend to further agitate and cover the fuel within the furnaces.

It will be noted that as each of the pushers 7 moves forwardly, the arms 19 and 40 will be actuated during the latter part of said forward movement of the pusher, to operate the exhaust valves 17 and 38 in one direction and as the pushers 7 move rearwardly, the arms 19 and 40 are moved in a similar direction through the medium of the links 41 and actuating rods 20 to again actuate the exhaust valve. Thus, the opposite ends of the cylinders 10 and 31 are alternately open to the exhaust.

While I have illustrated the casing 43 as having four outlet passages for controlling two furnaces, it will be understood that this number may be varied if a greater number of furnaces are arranged in series. However, with my invention I provide an efficient mechanism of simple construction for automatically controlling the stoking of furnaces and the cam wheel 67 may be so timed as to permit the proper amount of dwell of the respective pistons 9 and 30.

Furthermore, it will be noted that the arrangement of the valve casing 43, valve 54, and cap 57 is such that the pressure of the incoming steam, together with the particular design of said parts, that a tight fitting valve is assured.

Each of the pipes 48, 49, 50, and 51 is provided with a valve 69 so that if desired to render the parts of one of the furnaces inoperative, it can be done so by closing these valves.

While I have described my invention as taking a particular form, it will be understood that the various parts of my invention may be changed without departing from the spirit thereof, and hence I do not limit myself to the precise construction set forth, but consider that I am at liberty to make such changes and alterations as fairly come within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with a plurality of stokers, each having independently operative fuel actuating means, of a valve casing having a plurality of distributing passages therein respectively connected to said actuating means, a valve having a port successively movable into register with said passages, means for supplying pressure fluid to said valve and to successively enter said passages through the port when the valve is actuated, and means for actuating said valve, substantially as described.

2. The combination with a series of stokers each having independently operative fuel actuating means, of a valve casing having a plurality of distributing passages therein respectively connected to said actuating means, a valve having a port successively movable into register with said passages, means for supplying pressure fluid to said valve and to successively enter said passages through the port when the valve is actuated, a stem on said valve, a wheel on said stem, and means for intermittently operating said wheel to actuate said valve, substantially as described.

3. The combination with a series of stokers each having independently operative fuel actuating means, of a valve casing having a plurality of distributing passages therein respectively connected to said actuating means, a valve having a port successively movable into register with said passages, means for supplying pressure fluid to said valve and to successively enter said passages through the port when the valve is actuated, a stem on said valve, a wheel on said stem, said wheel having arms thereon, anti-friction rollers on said arms, a cam wheel, cams on said cam wheel operative to engage said anti-friction rollers and thereby intermittently rotate said first wheel to actuate the valve, substantially as described.

4. The combination with a series of stokers, of a valve casing having a frusto-conical opening and a series of distributing passages communicating with said opening, a hollow frusto-conical valve fitting said opening and having a single port designed to successively register with said passages when the valve is rotated, means for supplying pressure fluid to said valve, and means for rotating said valve to cause said port to successively register with the distributing passages, substantially as described.

5. The combination in a stoker, of a pusher, a cylinder, a piston connected to the pusher and operative within the cylinder, fuel agitating means within the furnace, a second cylinder, a piston within the second cylinder and operatively connected to the fuel agitating means, means for alternately effecting the operation of said pistons in op-

posite directions to move said pusher and fuel agitating means, exhaust valves for said cylinders, means operatively connecting said exhaust valves, and means operatively connected to one of the valves whereby movement is imparted to both of said valves, substantially as described.

6. The combination in a stoker, of a pusher, a cylinder, a piston connected to the pusher and operative within the cylinder, fuel agitating means within the furnace, a second cylinder, a piston within the second cylinder and operatively connected to the fuel agitating means, means for alternately effecting the operation of said pistons in opposite directions to move said pusher and fuel agitating means, exhaust valves for said cylinders, arms on said valves, a link connecting said arms, and means for operating one of said arms whereby the movement is imparted through the medium of said link to the other of said arms, substantially as described.

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

GEORGE W. WOOD.

Witnesses:

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CHAS. E. POTTS.