(No Model.) 2 Sheets—Sheet 1.

N. E. NASH & G. A. EDDY.

MECHANICAL BOILER FEEDER.

No. 532,006. Patented Jan. 1, 1895.

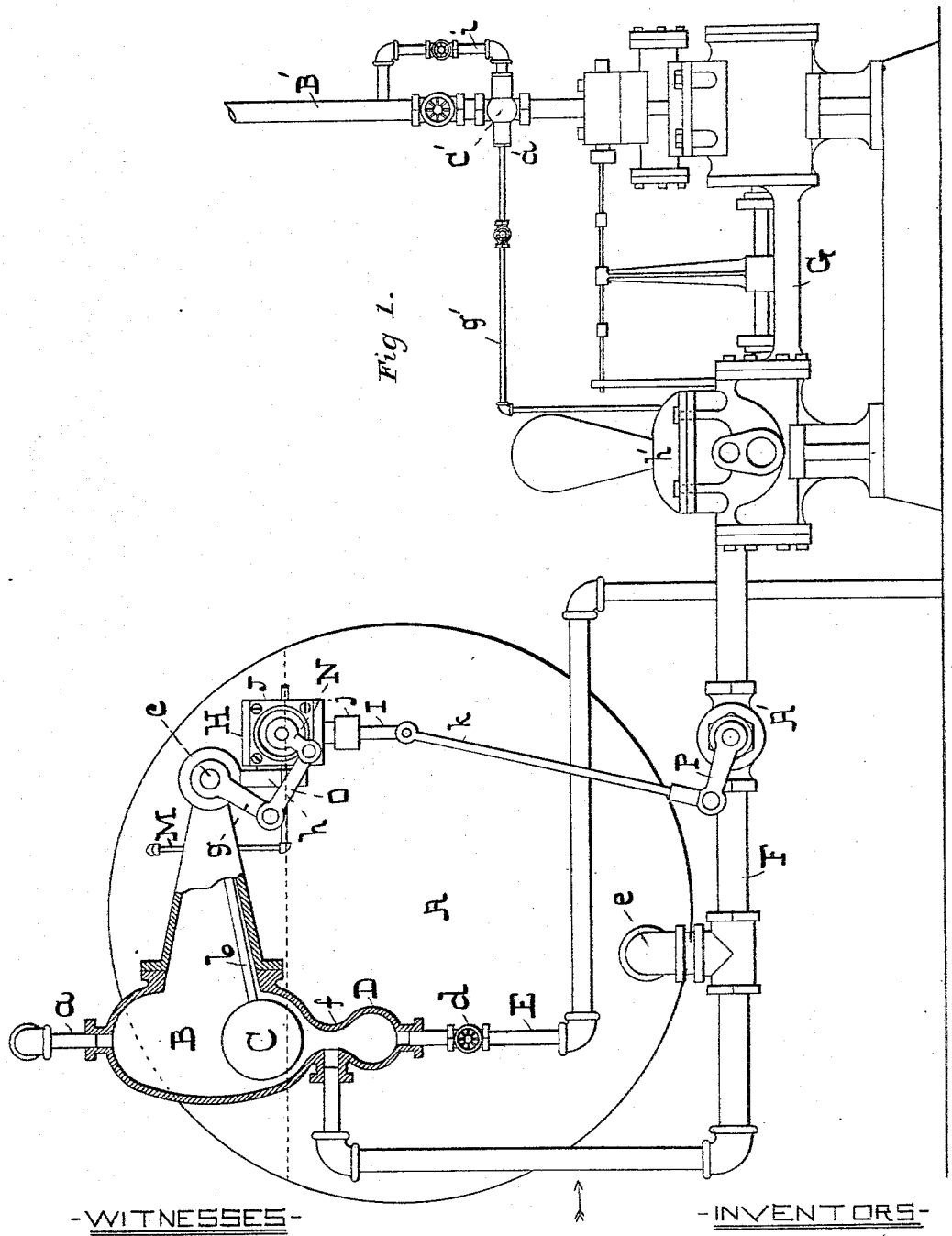

Fig 1.

-WITNESSES-

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(No Model.) 2 Sheets—Sheet 2.

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Fig 6.

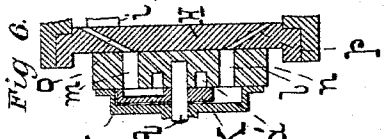


Fig 5.

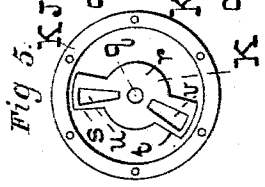


Fig 7.

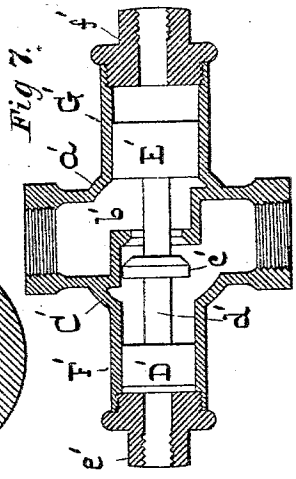


Fig 3.

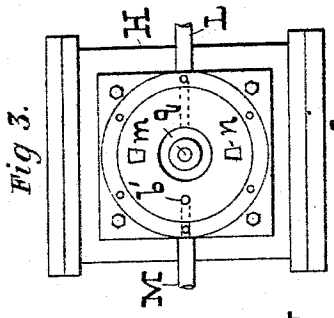
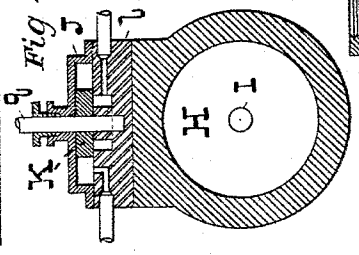


Fig 4.



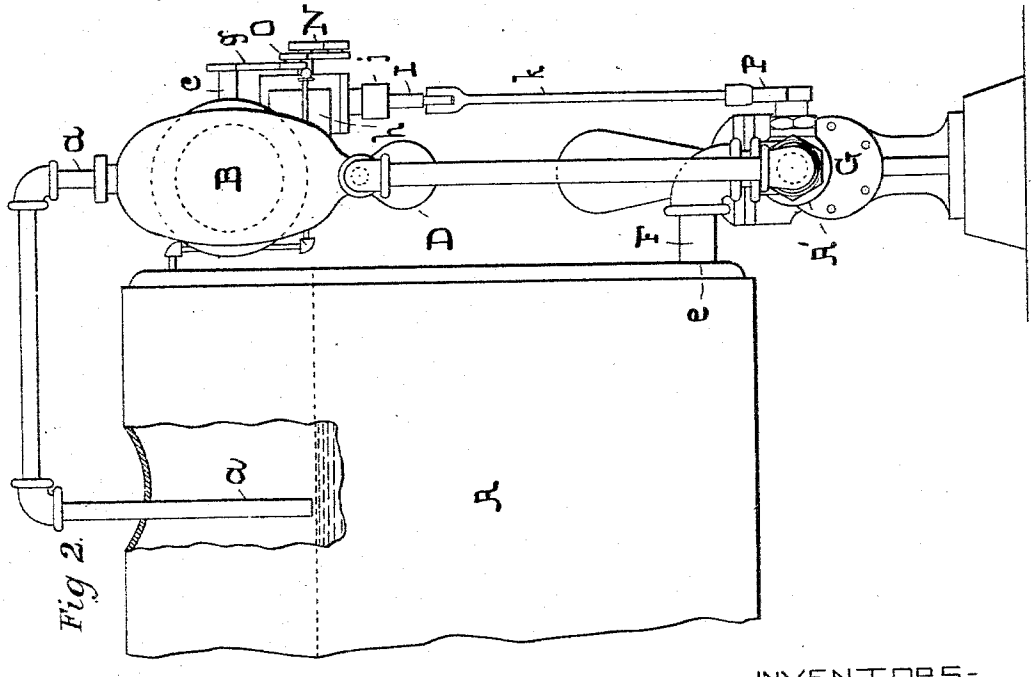


Fig 2.

-WITNESSES-

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UNITED STATES PATENT OFFICE.

NATHAN E. NASH, OF WESTERLY, RHODE ISLAND, AND GEORGE A. EDDY, OF CLEVELAND, OHIO, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO THE AUTOMATIC TANK AND BOILER FEED COMPANY, OF OHIO.

MECHANICAL BOILER-FEEDER.

SPECIFICATION forming part of Letters Patent No. 532,006, dated January 1, 1895.

Application filed April 4, 1894. Serial No. 506,250. (No model.)

To all whom it may concern:

Be it known that we, NATHAN E. NASH, of Westerly, Washington county, Rhode Island, and GEORGE A. EDDY, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain Improvements in Mechanical Boiler-Feeders, of which the following is a specification.

In the description of the said invention which follows, reference is made to the accompanying drawings, forming a part hereof, and in which—

Figure 1 is an end view of a cylindrical boiler to which the invention is applied, and a water feeding steam pump with the necessary pipes and connections. Fig. 2 is a side view of Fig. 1 looking in the direction indicated by the arrow in Fig. 1. Figs. 3, 4, 5, 6 and 7 are details of the apparatus on an enlarged scale, and hereinafter fully described.

Referring to the drawings, A represents a boiler of the ordinary cylindrical type. From the end of the boiler, or from any other stationary object, is supported, a vessel, B, the upper end of which is connected by a pipe *a* to the steam space of the boiler A. This vessel is preferably of spheroidal shape at one end, and conical at the other, in order that a spherical float C on a stem *b* hinged or pivoted to a spindle *c* may be vibrated therein. A globular extension D at the lower end of the spheroidal portion of the vessel, is for a purpose hereinafter described, and it is provided with a waste pipe E having a valve *d* therein, leading to a sewer or any other suitable place.

F is the main feed pipe which supplies the boiler with water, and it may lead to any source of water supply under pressure greater than that in the boiler. In the present case, it leads to an ordinary steam pump G. By reference to the drawings it will be seen that this feed pipe connects directly with the boiler at *e*, and also with the neck *f* between the vessel B and the globular extension D. By this means water is maintained naturally in the vessel B at a height corresponding to that of the water in the boiler, and the float before referred to rests on the surface of the water in the vessel.

H is a steam cylinder supported by a bracket *h* forming a part of the vessel B. Figs. 4, 5 and 6 are details of this steam cylinder and its connections. Within the steam cylinder is an ordinary piston, a portion of which is shown in Fig. 6 and denoted by *i*.

I is a piston rod leading through a suitable stuffing box *j* in the lower head of the cylinder, to which a connecting rod *k* for opening a cock A′ in the feed pipe F, and hereinafter described, is united.

On the front side of the cylinder H, is secured a valve face *l* having ports *m* and *n* therein connecting with passages *o* and *p* leading, respectively, to the upper and lower end of the cylinder H.

J is a valve chest fastened to the valve face *l*, in which a vibratory valve K is situated. A central valve stem *q* leads through a proper stuffing box in the outer wall of the chest, and is stepped in a cavity in the valve face; and to this stem is fastened the vibratory valve before referred to. The valve K has a central disk *r*, and radial projections *s* and *t* in which are recesses or rabbets *u* and *v* one of which is always in communication with an annular groove *a′* from which the exhaust pipe L leads.

M is the steam pipe leading from the boiler to the steam chest, the connection being a port *b′*. In the vibration of the valve K the ports *m* and *n* are alternately disclosed and take steam which moves the piston in the cylinder.

Fig. 5 is an under side view of the valve K and its chest J, and Fig. 6 a vertical central section of Fig. 3.

Fig. 4 is a transverse section of Fig. 3.

To the outer end of the valve stem *q* is attached an arm N connected by a link O to the arm *g* of the spindle *c* before described.

From the foregoing description it will be seen that in the vibration of the stem *b* and its float C, the piston in the cylinder H is reciprocated.

The cock A′ may be of any ordinary construction but is preferably of a peculiar construction which forms a part of another application. It has an arm P to which the connecting rod *k* before referred to, is attached.

Supposing the steam pump to be in operation and feeding the boiler, the water line of which is slightly below the end of the pipe *a* so that steam will enter the said pipe and fill the vessel B, the water line in which corresponds in height with that in the boiler, as shown in the drawings. At this time the float C is at its lowest point or position, and the piston *i* at its highest place in the cylinder H. As the boiler is fed, the water line rises until the end of the pipe *a* is sealed, when the steam above the water in the vessel and in the pipe *a* becomes isolated from that in the boiler, and immediately condensation begins. This effects a reduction in pressure in the vessel B and an inflow of water from the boiler takes place, and the water line in the vessel rises. The float being carried up with the rising water effects the reversal in position of the piston in the cylinder,—that is to say, the piston descends, and through the medium of the connecting rod *k* and its attachments, the cock A′ in the feed pipe is closed and all feed to the boiler stopped. These new conditions are maintained until the water in the boiler falls below the end of the pipe *a* when steam again enters the said pipe and the vessel B, and the full pressure of steam in the vessel being re-established, the water therein falls by gravity so that its height corresponds with that in the boiler, and the movable parts of the apparatus assume their original positions, and the feeding begins as before described. Any sediment collecting in the vessel B is finally deposited in the globular extension D thereof, and is ejected by opening the valve *d* in the pipe E, and blown off.

It will be understood that when the boiler is fed by a steam pump, the closing of the cock A′ would place on the pipe F an undue strain or pressure, and consequently it becomes necessary that when said cock is closed, steam should be shut off from the steam pump, so that its movement may be stopped. To effect this result, we place in the steam pipe of the pump a governor valve C′ which is closed by a rise in pressure in the feed pipe. This valve is shown on an enlarged scale in Fig. 7.

Now referring to Fig. 7, *a′* represents an ordinary globe valve casing having the usual bridge *b′*. An ordinary puppet valve *c′* is provided having on its stem *d′* two pistons, D′ and E′, of unequal diameters, the one E′ being the largest. These pistons are in suitable cylinders F′ and G′ formed integral with the valve casing *a′*, and they have heads *e′* and *f′*. Into the head *e′* is screwed a pipe *g′*, which connects directly with the discharge chamber *h′* of the pump, and into the head *f′* is screwed a pipe *i′* which leads to the steam pipe B′ as shown, or in fact, to any pipe open to the steam space of the boiler, or to the boiler itself. When the boiler is being fed, the pressure on the two pistons is equal, but as the one E′ is larger in diameter than the one D′, the puppet valve *c′* is held open and steam passes to the pump; but when the cock A′ is closed the pressure in the feed pipe F increases, and the pressure on the piston D′ becomes sufficient to move that device against the steam pressure on the one E′, and in consequence, the valve *c′* is closed, and the pump stops. Upon the cock A′ being opened again, the pressure of water on the piston D′ is reduced to the boiler pressure, and its area being less than that of the piston E′ the valve *c′* is again opened, and held open as before described.

We claim as our invention—

1. In combination with a steam boiler, a practically closed vessel connected by a pipe which leads to the steam space of the boiler to the desired water line therein, and by another pipe to a part of the boiler which is always below the desired water line, whereby the said vessel is filled with water from the boiler when the first pipe is water-sealed, and emptied when the said pipe is unsealed, a feed water pipe leading from some source of water supply under pressure having a controlling cock or valve therein, provided with an actuating arm, a pivoted float in the said vessel, a steam motor, arms and a link to communicate motion from the pivoted float to the valve mechanism of the motor, and a rigid connecting rod to unite the piston rod of the said motor to the actuating arm of the water valve or cock, substantially as specified.

2. In a mechanical boiler feeder, the combination of a steam boiler, a steam feed pump, a feed water pipe leading from the pump to the boiler, a practically closed vessel connected by a pipe which leads to the steam space of the boiler and to the desired water line therein, and by another pipe to a part of the boiler which is always below the desired water line whereby the said vessel is filled with water from the boiler when the first pipe is water-sealed and emptied when the said pipe is unsealed, a feed water pipe leading from some source of water supply under pressure having a controlling cock or valve therein, a steam motor connected to the said cock to open and close it, a float in the said vessel, and devices to connect the said float with the valve mechanism of the motor, a valve in the pipe which supplies the said pump with steam and means operated by the pump pressure to close said valve when the water cock is closed, substantially as, and for the purpose specified.

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GEORGE A. EDDY.

Witnesses to the signature of N. E. Nash:
WM. T. HOWARD,
DANL. FISHER.

Witnesses to the signature of George A. Eddy:
LOUIS H. WINCH,
W. E. CRAIG.