

No. 730,547.

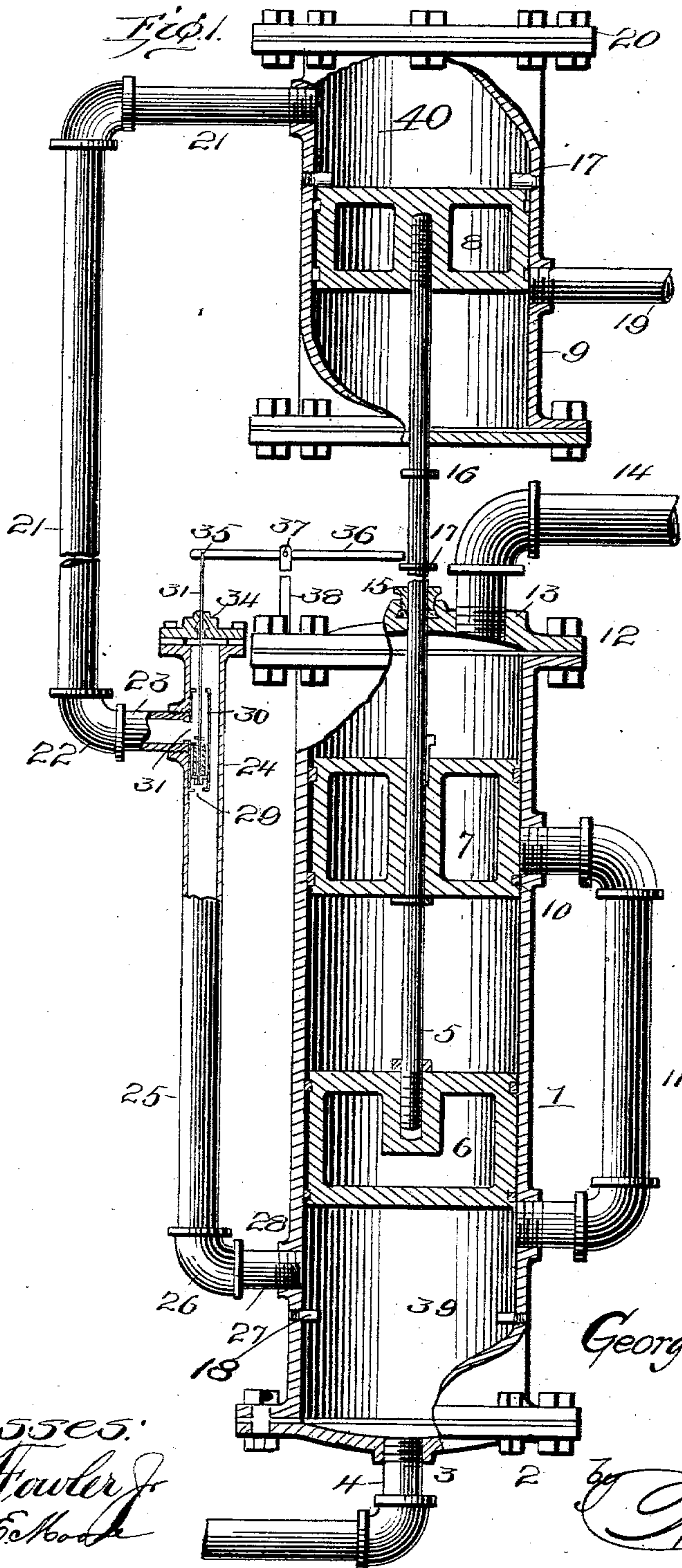
PATENTED JUNE 9, 1903.

G. W. MACDOUGALL.
STEAM BOILER FEED.

APPLICATION FILED JUNE 2, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



George W. MacDougall

Inventor

witnesses:
J. M. Fowler
May E. Moore

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Attorney

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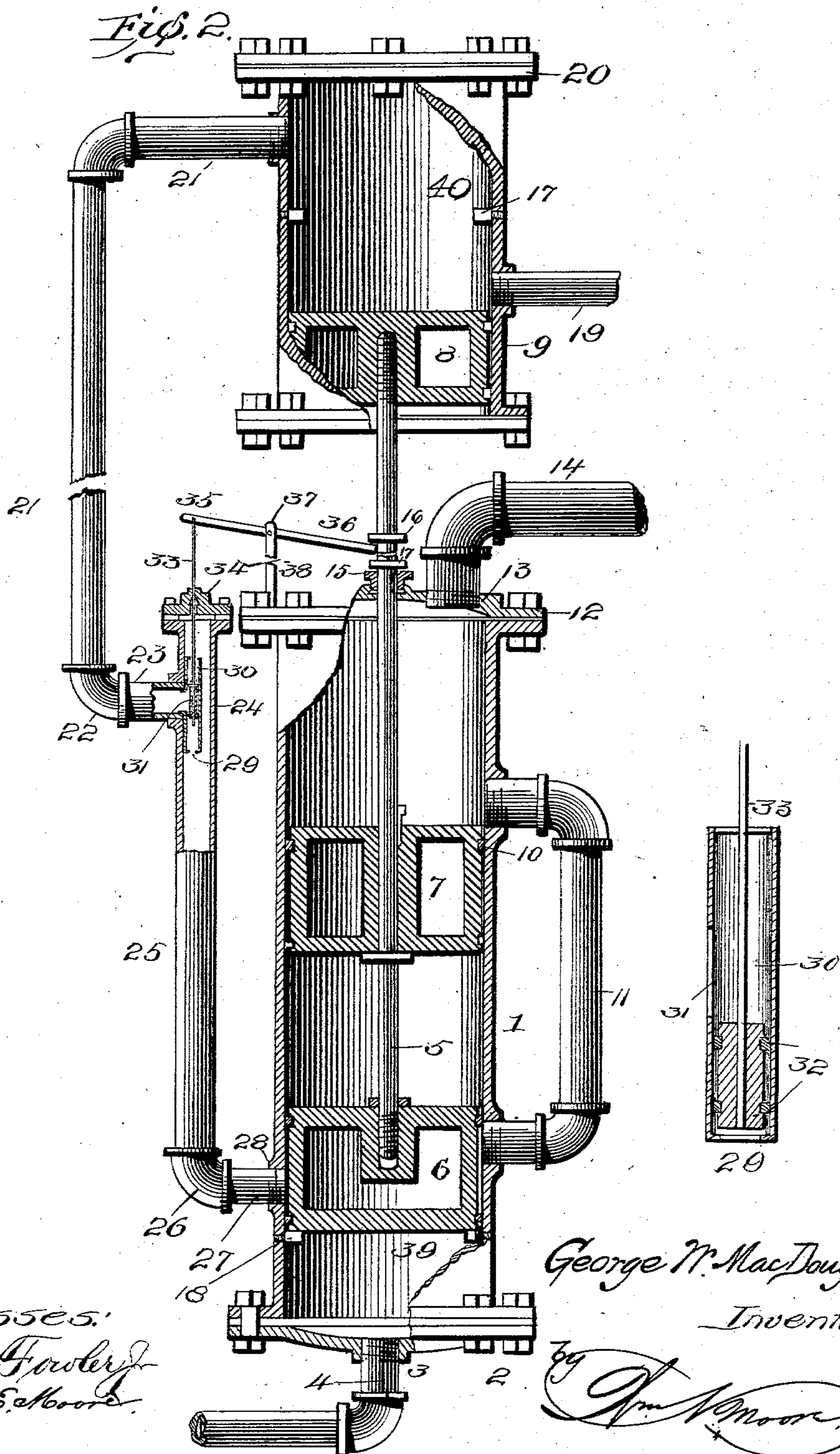
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Inventor

By J. Moore.

UNITED STATES PATENT OFFICE.

GEORGE W. MACDOUGALL, OF BOONTON, NEW JERSEY.

STEAM-BOILER FEED.

SPECIFICATION forming part of Letters Patent No. 730,547, dated June 9, 1903.

Application filed June 2, 1902. Serial No. 109,944. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. MACDOUGALL, a citizen of the United States, residing at Boonton, in the county of Morris and State of New Jersey, have invented certain new and useful Improvements in Steam-Boiler Feeds, of which the following is a specification.

This invention relates to new and useful improvements in boiler-feed devices; and it has for its objects, among others, to provide a simple, cheap, and efficient boiler-feed having provision for the return of condensed steam to the boiler.

It has for a further object to provide an efficient device of this character which shall be automatic in its operation, requiring no attention upon the part of the attendant, not liable to get out of order, and readily applied.

Other objects and advantages of the invention will hereinafter appear, and the novel features thereof will be particularly pointed out in the appended claims.

The invention is clearly illustrated in the accompanying drawings, which, with the numerals of reference marked thereon, form a part of this specification, and in which—

Figure 1 is a substantially central vertical section showing my improvement with the pistons at their uppermost limit. Fig. 2 is a similar view showing the position of the parts when the pistons are at their lowermost stroke. Fig. 3 is an enlarged detail in section, showing the piston-valve and its chamber.

Like numerals of reference indicate like parts throughout the different views.

Referring to the drawings, 1 designates a cylinder, having a detachable bottom 2, the inner wall of which is preferably tapered toward the center, and there it is provided with a screw-threaded boss 3, into which is screwed a pipe 4, which is connected with the steam-space of the boiler, (not shown,) and through this pipe steam is supplied to the lowermost chamber of the cylinder, and through the said pipe the condensed steam is returned to the boiler.

5 is a piston-rod to which are secured the three pistons 6, 7, and 8. The pistons 6 and 7 are adapted to move within the cylinder 1, while the piston 8 is disposed to move within the separate cylinder 9. These pistons are

designed to move water-tight within their cylinders, being provided with suitable peripheral packing-rings 10 for this purpose.

11 is a connection between the lower portion of the cylinder 1 and the upper portion.

The cylinder 1 has a detachable head 12 with a screw-threaded boss 13, into which is screwed the return condensation-pipe 14.

The piston-rod 5 works through a suitable stuffing-box 15, and outside the cylinder 1 it is provided with the tappets or collars or the like, 16 and 17.

Within the cylinder 9 are the stops 17, against which the piston 8 is adapted to contact to limit its upward movement, while within the cylinder 1, near its lower end, are the stops 18, which are designed to limit the downward movement of the pistons by the contact of the piston 6 therewith, all as will be readily understood from the drawings.

19 is an exhaust-pipe leading from the cylinder 9 at a point somewhat below its mid-height.

The cylinder 9 is provided with a detachable head 20, suitably packed, and connected with this cylinder 9 near its upper end is a pipe 21, the lower end of which is connected by elbow 22 with the pipe 23, which communicates with the piston-valve cylinder 24, which is arranged within the pipe 25, the lower end of which is connected by elbow 26 with the pipe 27, which is threaded into a threaded boss 28 on the cylinder 1 just above the stops 18 thereof, all as clearly illustrated in the drawings.

The piston-valve cylinder 24 is disposed within the pipe 25 near its upper end and has an opening 29 in its lower end and an opening 30 in its upper end. 31 is a piston-valve mounted to reciprocate in said piston-valve chamber or cylinder and is provided near each end with a spring-ring 32 to form a tight joint with the walls of the cylinder, as shown. This cylinder may be supported within the pipe in any suitable manner.

33 is the valve-stem, connected with the valve in any suitable manner, and working through a suitable stuffing-box 34 on the top of the pipe 25 and pivotally connected with this stem at its outer end, as at 35, is a lever 36, which is pivotally mounted between its ends, as at 37, on an upright or bracket 38,

mounted on the head 12 of the cylinder 1. The free end of this lever projects into the path of and is disposed between the lugs or tappets 16 and 17 on the piston-rod 5, so that said lever is operated to move the piston-valve 31 in one direction or other, according as it is engaged by the one tappet or the other.

With the parts constructed and arranged substantially as hereinbefore described the operation will be apparent and, briefly stated, is as follows: As shown, the pistons are all at their uppermost stroke, being thus limited by the stops 17 in the upper portion of the cylinder 9. In this position the space 39 in the cylinder 1 below the piston 6 and the space 40 in the cylinder 9 above the piston 8 are both full of live steam from the boiler, balancing them. Hot water is now running through the pipe 14 on top of the piston 7, that will overbalance the pistons, causing them to move downward until the piston 6 contacts the stop 18 near the lower end of the cylinder 1, when the pistons will be arrested in their downward movement. As the pistons move downward the collar or tappet 16 on the piston-rod will strike the lever 36 and moving its free end downward will move the piston-valve 31 upward to close the opening through the pipe 23 into the valve-cylinder 24. The piston 7 will uncover the upper end of the pipe 11, and the piston 6 will cover the opening in the lower end of said pipe or receiver 11, when the water lying on top of the piston will run into said receiver. Now the opening from the pipe 23 into the valve-cylinder 24 being closed by the valve-piston 31 there is no steam passing through the pipe 21 into the cylinder 9, and what steam was in said cylinder 9 above the piston has been exhausted through the exhaust-pipe 19. The space 39 beneath the piston 6 is always full of steam at boiler-pressure and will force the pistons 6, 7, and 8 upward until the upper piston is engaged by the stops 17 in the cylinder 9. The collar 17, engaging the free end of the lever 36, forces the same upward, and this moves the piston-valve 31 downward, opening the communication between the pipe 23 and the cylinder 24, and steam passes through the pipe 21 onto the top of the piston 8 and balances the piston again. The opening into the lower end of the pipe or receiver 11 is again opened and the upper end closed, thus letting the water out of said receiver or pipe 11 down through the opening in the lower end of the cylinder 1 and through the pipe 4 into the boiler. Thus the operation is automatically repeated.

Modifications in detail may be resorted to without departing from the spirit of invention or sacrificing any of its advantages.

What is claimed as new is--

1. The combination of two independent cylinders, a piston-rod common to both, pistons in one cylinder, a piston in the other, a connection for one cylinder to the other and a valve automatically controlling the flow from

one cylinder to the other by the movement of said pistons.

2. The combination of two independent cylinders, a piston-rod common to both, pistons in one cylinder, a piston in the other, a connection for one cylinder to the other and a valve automatically controlling the flow from one cylinder to the other by the movement of said pistons and a connection from the boiler to the lowermost cylinder.

3. The combination of two independent cylinders, a piston-rod common to both, pistons in one cylinder, a piston in the other, a connection for one cylinder to the other and a valve automatically controlling the flow from one cylinder to the other by the movement of said pistons, and a connection from the boiler to the lowermost cylinder, and a connection between the opposite ends of said cylinder.

4. The combination with a cylinder and two pistons therein and an independent cylinder with a piston therein, of a piston-rod common to all of said pistons, a connection between said cylinders, a piston-valve controlling said connection and means actuated by the movement of the piston-rod to actuate, as set forth.

5. The combination with a cylinder and two pistons therein and an independent cylinder with a piston therein, of a piston-rod common to all of said pistons, a connection between said cylinders, a piston-valve controlling said connection and means actuated by the movement of the piston-rod to actuate, an exhaust from one cylinder and a connection between opposite ends of the cylinder.

6. The combination with two separate cylinders, pistons in one of said cylinders and a single piston in the other and a piston-rod common to all, of a communication between said cylinders automatically controlled by the movement of said rod.

7. The combination with two separate cylinders, pistons in one of said cylinders and a single piston in the other and a piston-rod common to all, of a communication between said cylinders automatically controlled by the movement of said rod and stops within said cylinders for limiting the movements of the pistons.

8. The combination with two separate cylinders, pistons in one of said cylinders and a single piston in the other and a piston-rod common to all, of a communication between said cylinders automatically controlled by the movement of said rod and stops within said cylinders for limiting the movements of the pistons, and a connection between the opposite ends of the lowermost cylinder alternately opened and closed by the piston therein.

9. The combination with the cylinders, arranged in line one small and the other larger, a single piston-rod for both cylinders, a single piston in one cylinder, a pair of pistons in the other cylinder all mounted on said piston-rod, of tappets on said rod, a connection between said cylinders, a valve controlling said con-

nection, and a lever pivotally connected with the stem of said valve with its free end disposed in the path of said tappets.

10. The combination with the cylinders, arranged in line one small and the other larger, a single piston-rod for both cylinders, a single piston in one cylinder, a pair of pistons in the other cylinder all mounted on said piston-rod, of tappets on said rod, a connection between
10 said cylinders, a valve controlling said connection, and a lever pivotally connected with

the stem of said valve with its free end disposed in the path of said tappets, and a valve-cylinder within the connection between the two cylinders.

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

GEORGE W. MACDOUGALL.

Witnesses:

SAMUEL TUCKER,
FRANK J. YOUNGS.

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