

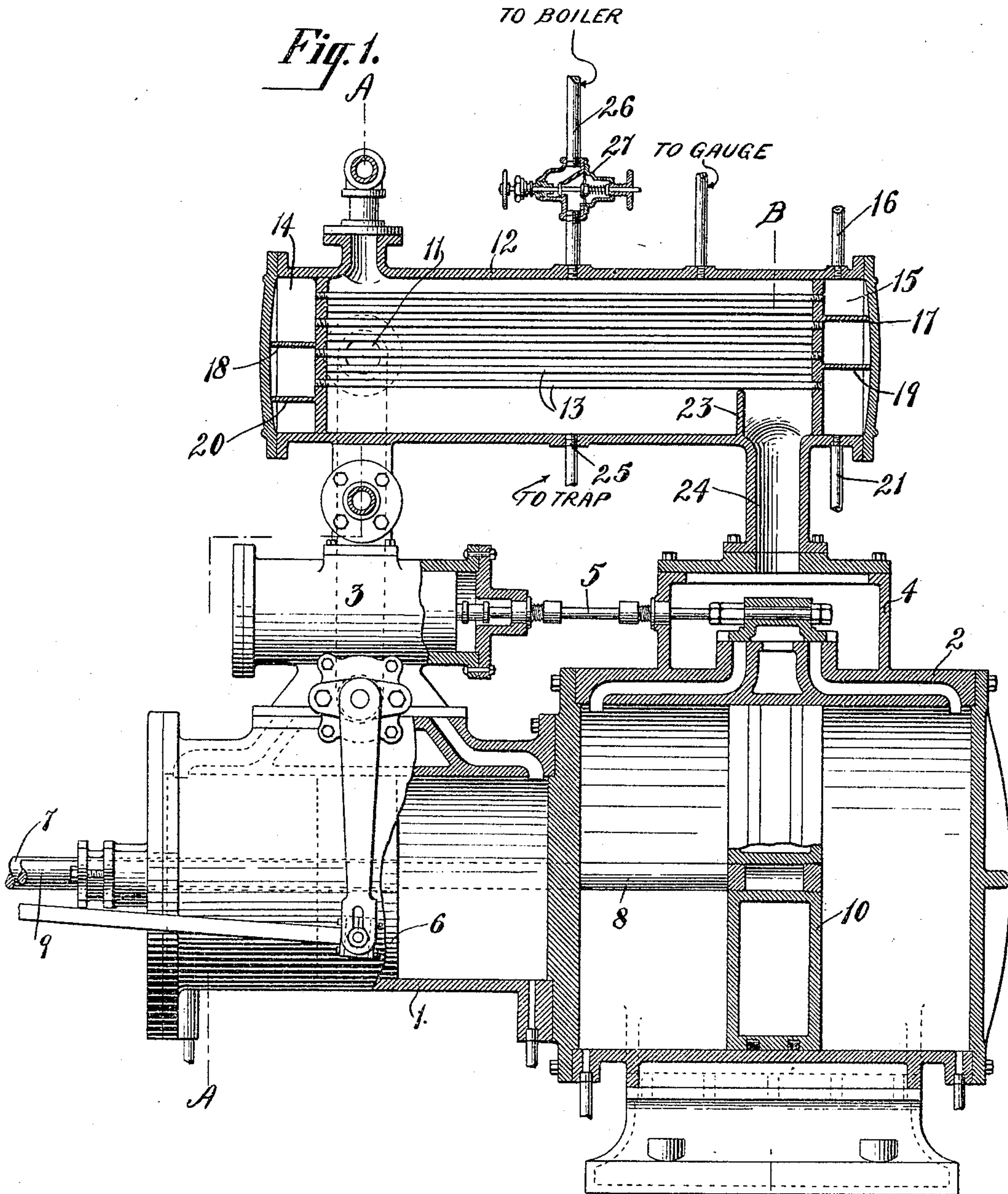
No. 784,254.

PATENTED MAR. 7, 1905.

W. A. DREWETT.
COMPOUND STEAM ENGINE.

APPLICATION FILED JAN. 25, 1904.

3 SHEETS—SHEET 1.



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Henry Thieme.

Inventor:
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3 SHEETS—SHEET 2.

Fig. 2.

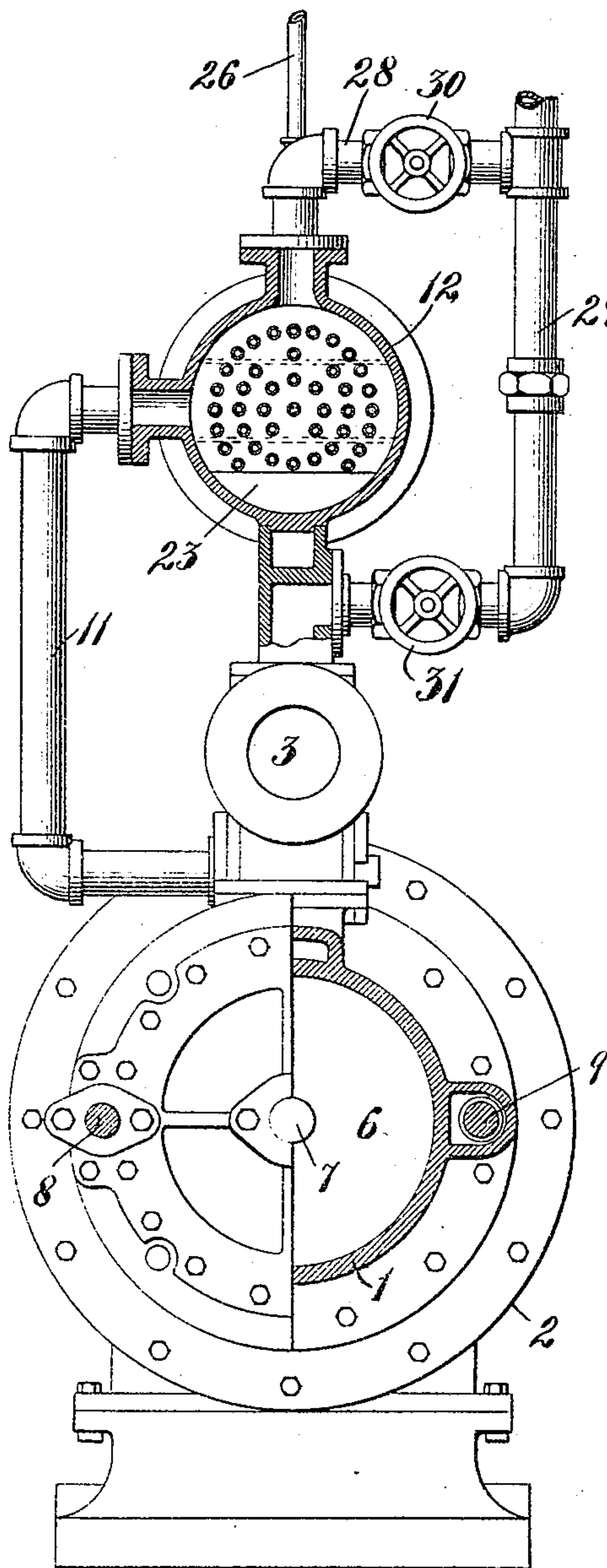
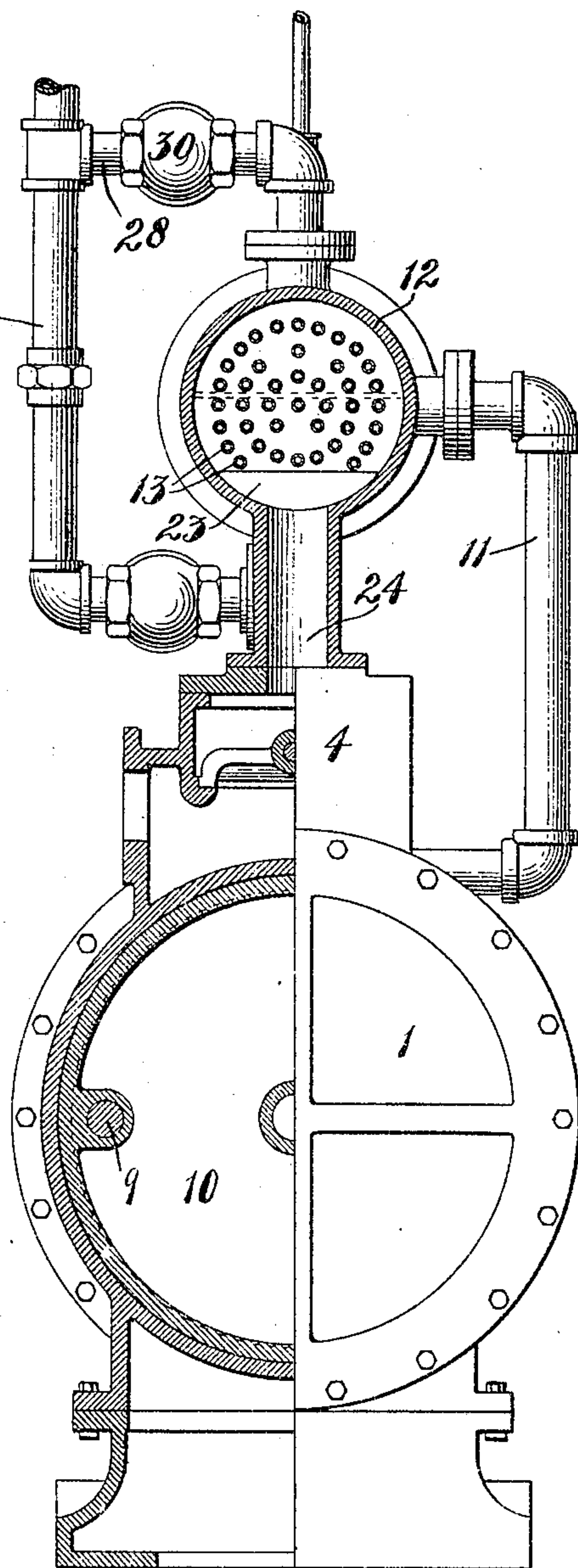


Fig. 3.



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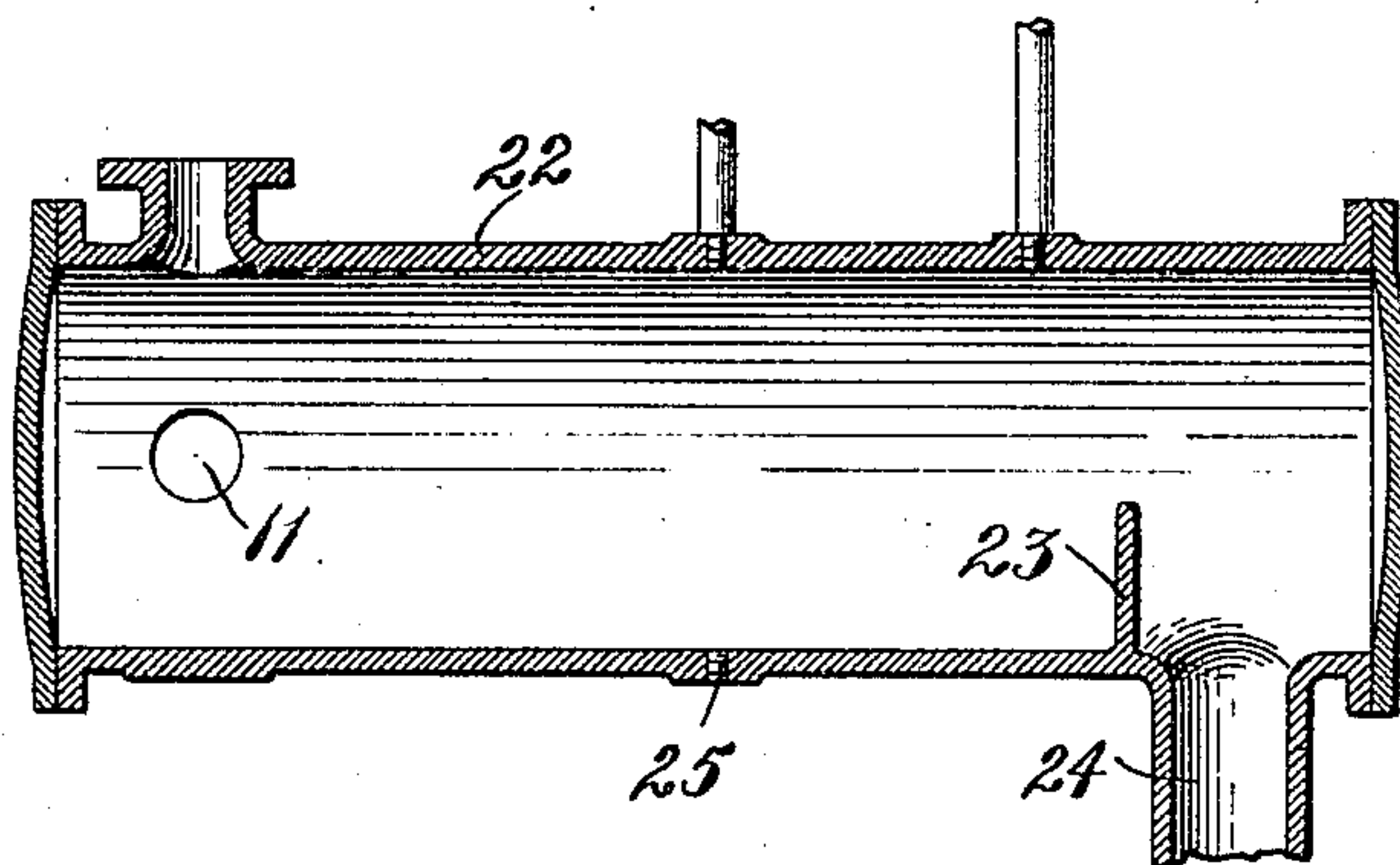
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3 SHEETS—SHEET 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM A. DREWETT, OF NEW YORK, N. Y., ASSIGNOR TO MARSHALL T. DAVIDSON, OF BROOKLYN, NEW YORK.

COMPOUND STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 784,254, dated March 7, 1905.

Application filed January 25, 1904. Serial No. 190,555.

To all whom it may concern:

Be it known that I, WILLIAM A. DREWETT, a citizen of the United States, and a resident of the borough of Brooklyn, in the city and State of New York, have invented a new and useful Compound Engine, of which the following is a specification.

My invention relates to a compound engine, with the object in view of providing means for maintaining the pressure in the secondary cylinder at working efficiency during the intervals when the engine is stopped and to further provide for utilizing the secondary cylinder as a primary cylinder under conditions of emergency when the engine may be called upon temporarily to do unusual work.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 is a view of the engine in side elevation, partly in section. Fig. 2 is an end elevation, partly in section, looking toward the right, the part section being taken in the plane of the line A A of Fig. 1. Fig. 3 is an end elevation, partly in section, looking toward the left, the part section being taken in the plane of the line B B of Fig. 1; and Fig. 4 is a longitudinal section showing a modified form of receiver.

The engine to which my invention may be applied may either be single-cylinder or duplex and may be applied to different uses in the art, the particular type of engine which I have taken to illustrate my invention in the accompanying drawings being a form which is well adapted to pumping in connection with elevator service.

The primary cylinder is denoted by 1 and the secondary cylinder by 2. These cylinders are provided with the usual valve-chambers, the valve-chamber upon the cylinder 1 being denoted as a whole by 3 and the valve-chamber upon the cylinder 2 being denoted by 4. The valves for the two cylinders are connected, as is usual, by a rod 5 to work simultaneously, and the piston 6 in the cylinder 1 is provided with a central piston-rod 7, to which the two piston-rods 8 and 9 of the piston 10 of the cylinder 2 are connected at a point ex-

terior to the cylinder 1, so that the pressure applied upon the two pistons will be transmitted to the work, as is usual.

The exhaust from the primary cylinder 1 is transmitted, through a pipe 11, to a receiver 12, the connection with said receiver 12 being in the present instance at the side of the receiver near one end. The particular form of receiver which I have illustrated in Figs. 1 to 3, inclusive, is provided with a nest of tubes 13 for reheating the exhaust-steam within the receiver 12, and to this end the receiver is provided with hollow head portions 14 15, into one of which—in the present instance 15—the steam-pipe 16 from the boiler delivers the steam, which is deflected from the upper portion of the head 15 by means of a diaphragm 17 into the upper tubes of the nest 13 and transmitted by them to the head 14, from which it is directed, by means of a diaphragm 18, through other tubes of the nest into the head 15 below the diaphragm 17 and is in turn deflected into other tubes by means of the diaphragm 19 and caused to pass back again into the head 14 below the diaphragm 18, from where it is again deflected by the diaphragm 20 into other tubes of the nest 13 back to the head 15 at a point below the diaphragm 19, from which it escapes through a pipe 21. This arrangement for reheating may or may not be used in connection with the other features of my invention, but is found in practice to be important under certain conditions. In the event this reheating of the exhaust-steam within the receiver is not provided for the receiver may take the form shown in Fig. 4, where it is denoted by 22 and where the exhaust-pipe 11 from the cylinder 1 connects with it in substantially the same position as that already described. Where this form of the receiver shown in Fig. 4 is employed, the hollow heads, with their diaphragms, are not needed, and the interior of the receiver may be left free from obstruction other than the water-guard 23.

The exhaust-steam from the cylinder 1 after entering the receiver 12 passes along the receiver to the pipe 24, through which it is delivered into the valve-chamber 4 of the sec-

ondary cylinder 2. Any of the exhaust-steam which becomes condensed during the passage of the steam through or while it remains in the receiver 12 is prevented from entering the pipe 24 by means of a water-guard 23, extending transversely across the bottom of the receiver, and is led from the receiver 12 through an opening 25 in the bottom of the receiver to a trapped water-discharge pipe.

One of the important features of my present invention is the maintaining of a steam-pressure within the receiver 12 or 22 corresponding to the working pressure of the exhaust-steam from the cylinder 1 in order that the engine may be started at any moment after an interval of rest under full working pressure upon the pistons in both the primary and secondary cylinders. To provide for this, a pipe 26, leading from the boiler or from some pipe in connection with the boiler, as may be found most convenient, is connected with the receiver 12 or 22 and is provided with a reducing pressure-valve 27 of any well-known or approved form for automatically maintaining the pressure within the receiver 12 at any degree which may be determined upon within the range of the original boiler-pressure. This reducing pressure-valve 27 is set to work automatically to shut off the admission of steam from the boiler whenever the pressure within the receiver 12 reaches a point above the minimum working pressure desired for the secondary cylinder and to open and admit steam from the boiler into the receiver 12 whenever the pressure within the receiver 12 reaches a degree below the minimum working pressure required of the secondary cylinder 2. In this manner the engine is at all times ready to start under full working pressure even though the load be greater than that which the piston and pressure in the primary cylinder is calculated to perform, since the maintenance of the pressure in the receiver will provide for utilizing the piston in the secondary cylinder to complete the power required. For instance, if the load required to be moved by the engine be a hundred pounds and the pressure and piston surface of the primary cylinder be calculated to perform seventy-five pounds and the secondary cylinder twenty-five pounds so long as the pressure in the receiver is maintained at twenty-five pounds the engine will be in position to start the load.

Should the pressure in the receiver fall below twenty-five pounds, as might happen during an interval of rest by the entire or partial condensation of the steam therein, then the engine would be stalled and would have to be operated by some mechanical means for

one or more strokes until the working efficiency of the exhaust-steam in the receiver had been reached, and it is to overcome any such annoying and objectionable feature that my present invention is directed, and this it accomplishes by the means hereinabove described for automatically maintaining the pressure within the receiver up to its required working efficiency.

In the event the engine is to be employed temporarily for moving an unusually-heavy load at an unusual expenditure of steam I provide for using the secondary cylinder 2 as a primary cylinder by admitting steam under full pressure into the receiver 12—as, for example, by a branch pipe 28 connecting with the main steam-pipe 29 and with the receiver 12, the said branch pipe 28 being provided with a valve 30 and the pipe 29 with a valve 31. When the secondary cylinder is so used as the primary cylinder, the piston in the primary cylinder 1 would work idly under a balanced pressure equal to the pressure of the steam in the secondary cylinder 2.

What I claim is—

1. The combination with a primary and a secondary cylinder, their pistons, a piston-rod to which the two pistons are connected and suitable valve-gear, of a receiver through which the exhaust-steam passes from the primary to the secondary cylinder and automatic means for maintaining the pressure of the steam in the receiver at a predetermined degree while the engine is at rest.

2. The combination with the primary and secondary cylinders, their pistons, a piston-rod to which the two pistons are connected and the receiver, of a pipe leading from a steam-supply to the receiver and a reducing pressure-valve in said pipe for automatically maintaining the pressure of steam in the receiver at a predetermined degree while the engine is at rest.

3. In a compound engine, the combination with a high-pressure cylinder and a low-pressure cylinder, of a receiver into which said high-pressure cylinder normally exhausts to thereby maintain sufficient pressure to actuate the piston of the low-pressure cylinder and means for automatically maintaining said pressure in said receiver when the engine is at rest.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 5th day of January, 1904.

WM. A. DREWETT.

Witnesses:

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HENRY THIEME.