

(No Model.)

2 Sheets—Sheet 1.

H. J. JOHNSON.

STEAM ENGINE.

No. 304,269.

Patented Aug. 26, 1884.

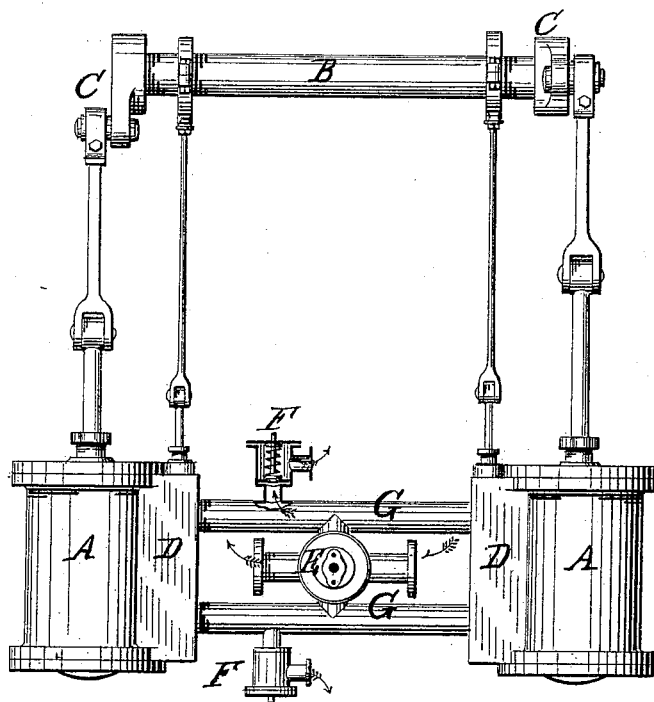


FIG. 1.

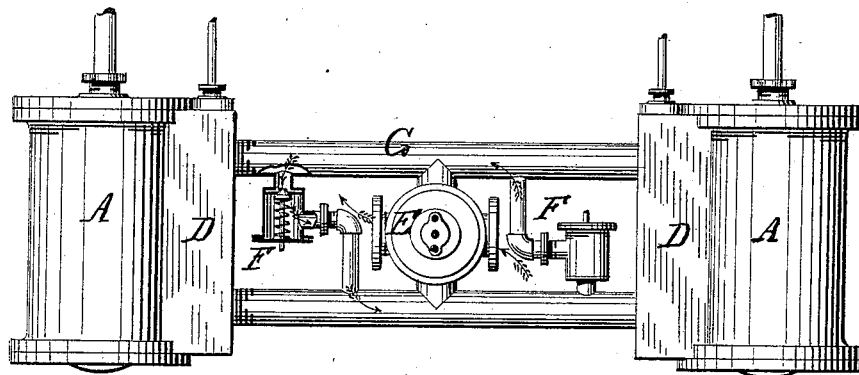


FIG. 2.

WITNESSES,

*Gardner C. Anthony*  
*Walter M. Brown*

INVENTOR,

*Henry J. Johnson*

(No Model.)

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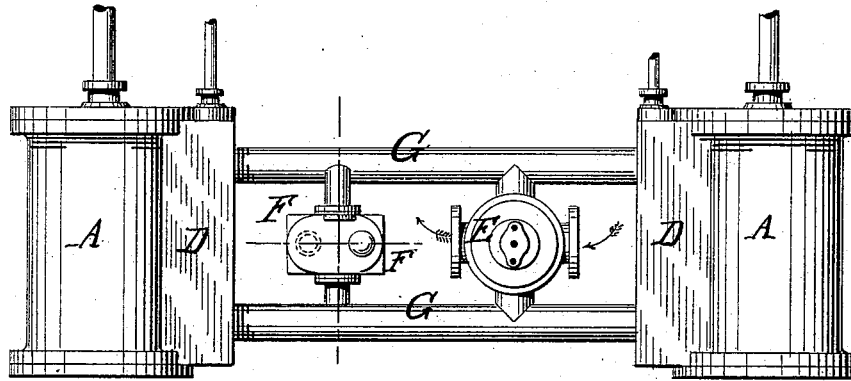


FIG. 3.

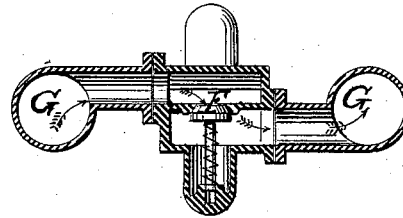


FIG. 4.

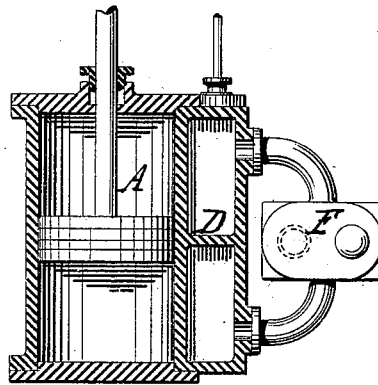


FIG. 5.

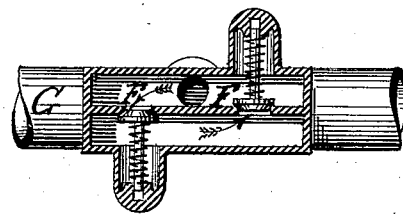


FIG. 6.

WITNESSES.

*Gardner C. Anthony*  
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INVENTOR

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# UNITED STATES PATENT OFFICE.

HENRY JAMES JOHNSON, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO  
HENRY W. GARDNER, OF SAME PLACE.

## STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 304,269, dated August 26, 1884.

Application filed February 29, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY JAMES JOHNSON, of the city and county of Providence, and State of Rhode Island, have made an invention of certain new and useful Improvements in Steam-Engines; and I do hereby declare that the following, in connection with the accompanying drawings, is a full, clear, and exact description and specification of the same.

10 This invention has reference to reversible winding-engines, engines for capstans, and other purposes which are frequently supplied with steam from boilers working at a higher pressure of steam than is required to run the engines at their proper capacity; and the object of the invention is to prevent such engines from being subjected to a greater pressure of steam than they are designed to withstand, and from being thereby unduly strained.

20 To this end my invention consists of a certain combination and arrangement of the steam-cylinder with valves, whereby any excessive pressure of steam in the steam-cylinders is prevented.

25 In order that my invention may be fully understood, I have represented in the accompanying drawings and will proceed to describe the best modes in which I have embodied the invention for practical use.

30 Figure 1 of said drawings represents a side view of certain parts of a winding-engine with a relief-valve in section. Figs. 2, 3, and 4, represent similar views, showing variations in the application of the invention.

35 The winding-engine represented in Fig. 1 has two steam-cylinders, A A, connected with one engine-shaft, B, with the cranks C C at right angles with each other. The steam-valves of this engine are of the usual construction, and are contained in the steam-chests D D. These steam-chests are supplied with steam through a reversing-valve, E, by which the steam and exhaust are reversed, as is well understood by engineers, for the purpose of reversing the revolution of the engine-shaft B whenever this operation becomes expedient. The reversing-valve also operates as a throttle or stop valve to shut-off or admit steam to the engine.

In order that the steam-cylinder may not be subjected to the action of steam of too great pressure, which may be supplied from the boiler through the reversing or stop valve E, a relief-valve, F, held to its seat by a spring, is arranged between the reversing-valve and the steam-cylinder A, the reversing-valve in this case being applied to the pipe G, which supplies steam from the reversing-valve E to the valve-chest on the steam-cylinder. The spring which holds this valve closed is made of the proper strength to yield whenever the pressure in the pipe or passage G between the reversing-valve and either steam-cylinder A exceeds a predetermined amount—say, for example, twenty-five pounds to the square inch. Consequently, if the boiler pressure should exceed that amount and the reversing-valve E should be opened so far as to admit to the cylinders more steam than the engines should receive, the relief-valve F opens, and, by permitting the escape of steam, reduces the pressure of the steam entering the steam-cylinder to that which it is desired should not be exceeded.

In an engine having a reversing-valve such as I have described the connecting-pipes G G become alternately steam-pipes and exhaust-pipes as the engine is run in one direction or the other; hence each connecting-pipe G is fitted with a relief-valve, F, between the reversing-valve E and the steam-valve in the steam-chest D of the steam-cylinder, and the risk of straining the engine by an excessive pressure of steam is prevented, whatever be the direction in which the engine is caused to run by the position of the reversing-valve E.

In the engine represented at Fig. 2 the escape-nozzle of each relief-valve F upon one connecting-pipe G is connected with the opposite connecting-pipe, so that whatever surplus of steam escapes through either relief-valve passes into the connecting-pipe through which the exhaust is taking place.

In the modification represented in Figs. 3 and 4 both relief-valves are arranged in one chest, which is arranged between the connecting-pipes G G, that connect the reversing-valve E with the steam-chests D D of the

steam-cylinders; and in the modification represented at Figs. 5 and 6 separate connections *a* are made between the steam-chest D of the steam-valves and the chest of the relief-valves; but as the same steam-chest is, in practical use, connected with a reversing or stop valve (which is not shown in the drawings) these relief-valves operate upon the steam between the reversing or stop valve and the steam-cylinder, and relieve the engine from an excessive pressure of steam.

With the various modifications above described the quantity of steam which is admitted to the connecting-pipes between the reversing or stop valve and the steam-cylinders and the pressure of that steam is generally controlled by opening the reversing or stop valve to a greater or less extent, which is done according to the judgment of the engineer; and, consequently, when the engine is running at its regular work, and the engineer exercises good judgment, the relief-valves do not open; but, if the engine be overloaded so that its motion is prevented, even a slight opening of the reversing or stop valve will admit steam from the boiler at practically full pressure, and in such case the relief-valve operates at once to per-

mit the escape of steam between the reversing or stop valve and the steam-cylinder, thus reducing the pressure of the steam passing to the steam-cylinder, and relieving the engine of the risk of being overstrained.

I claim as my invention—

1. The combination, substantially as before set forth, of the steam-cylinder, its steam-valve, and its reversing-valve with a relief-valve arranged to permit the escape of steam between the steam-valve of said cylinder and the reversing-valve.

2. The combination, substantially as before set forth, of the steam-cylinder and its reversing-valve with a relief-valve arranged between the supply-pipes extended from the reversing-valve to the steam-cylinder, whereby the steam which escapes through the relief-valve from one supply-pipe is permitted to exhaust through the other.

In witness whereof I have hereto set my hand this 23d day of February, A. D. 1884.

HENRY JAMES JOHNSON.

Witnesses:

GARDNER C. ANTHONY,  
WALTER F. BROWN.