No. 658,531. Patented Sept. 25, 1900.

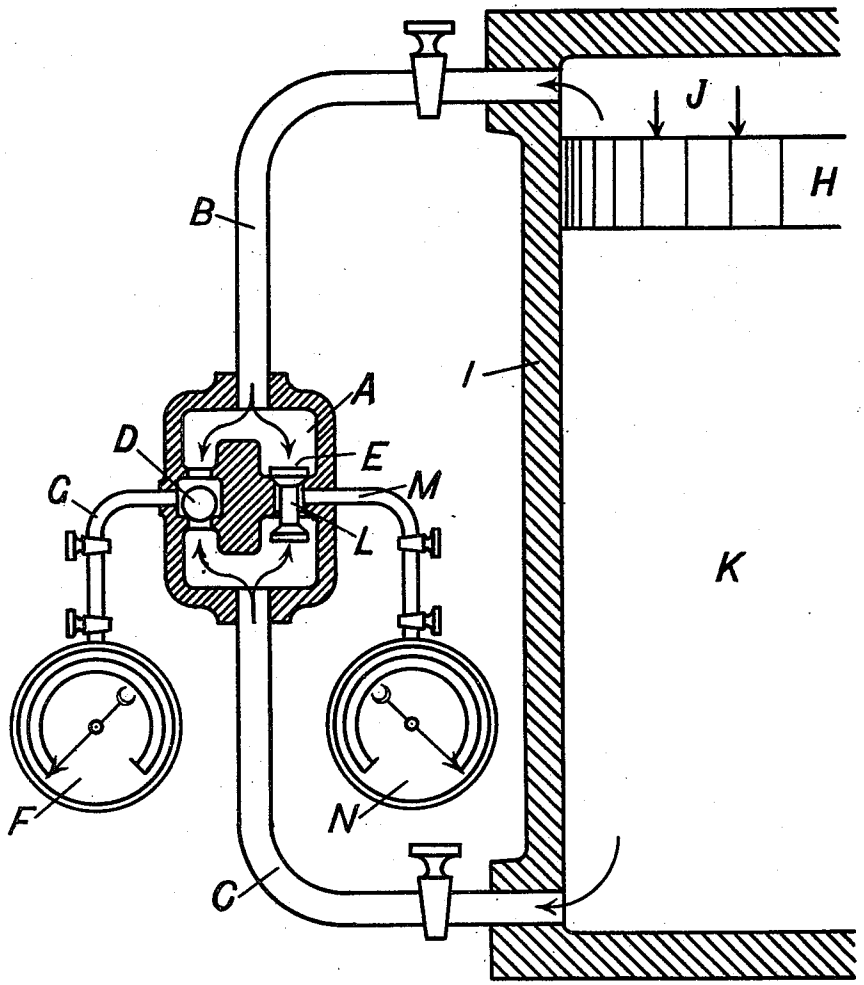
W. RIPPER.

APPARATUS FOR INDICATING EFFECTIVE PRESSURE OF STEAM IN STEAM ENGINE CYLINDERS.

(Application filed Apr. 25, 1900.)

(No Model.)

Fig. 1.



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UNITED STATES PATENT OFFICE.

WILLIAM RIPPER, OF SHEFFIELD, ENGLAND.

APPARATUS FOR INDICATING EFFECTIVE PRESSURES OF STEAM IN STEAM-ENGINE CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 658,531, dated September 25, 1900.

Application filed April 25, 1900. Serial No. 14,261. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM RIPPER, a citizen of Great Britain, and a resident of 22 Wellesley road, in the city of Sheffield, in the county of York, England, have invented certain new and useful Improvements in Apparatus and Appliances for Indicating the Pressures of Steam in Steam-Engine Cylinders and the Like, (for which I have obtained provisional protection in Great Britain, dated October 24, 1899, No. 21,209, and in Germany, No. R13,761, dated December 6, 1899,) of which the following is a specification.

This invention relates to an improved method of indicating on pressure-gages the pressures of the steam acting on the pistons of steam-engines.

It consists of an arrangement of valves which work automatically in a valve-box by the action of the steam itself and without the aid of any external system of mechanical driving of the valves. I have previously obtained a United States patent, No. 620,182, dated February 28, 1899, for an arrangement to accomplish the same result, but by a method which required that the valves should be mechanically driven by direct or indirect gearing connecting them with the main shafts of the engine. My present invention abandons the mechanical driving and substitutes automatic movement of the valves by means of the difference of pressure of the steam acting on the two sides of the valves.

The figure illustrates the construction of the instrument.

The instrument consists of a valve-box A, which is attached by pipes B and C to each end, respectively, of an engine-cylinder I. The valve-box contains two valves—a driving-steam valve D and an exhaust-steam valve E. The driving-steam valve D consists of a simple ball-valve (or other equivalent) working between two seatings, as shown, and having only a small movement. This valve is used to divert the steam of the successive driving or impulse strokes continuously into the forward pressure-gage F through the pipe G. The ball-valve works by difference of pressure, as follows: Suppose the engine-piston H to be descending. Then the driving-steam on the side J of the piston passes along the pipe B into the valve-box A above the ball-valve, and this steam having a greater pressure than the exhaust-steam on the side K of the piston which acts below the ball-valve the valve falls on its lower seating, and the steam from the side J of the piston is in direct communication with the forward pressure-gage F. The exhaust-steam valve E consists of a double mushroom-valve, (or its equivalent,) the disks of the valves being placed one at each end, respectively, of a short spindle L and working on their inner edges on two seatings placed between the valves, as shown in the drawing. The valves and their seatings are in such relative positions that when one valve-seating is closed the other is open. Communication with the exhaust-pressure gage N is made by a passage M between the exhaust-valve seatings. The movement of the exhaust-valve is due to difference of pressure. Thus when the piston H is descending, the driving-pressure at J being greater than the exhaust at K, the exhaust-valve E therefore falls and closes communication with the driving side of the piston, but opens communication with the lower or exhaust side of the piston, and the exhaust-steam pressure passes freely through the passage M to the exhaust-pressure gage N. When the engine-piston reaches the bottom, the processes are reversed, the driving-pressure steam being again directed to the driving-gage F and the exhaust-steam being again directed to the exhaust-gage N. Thus each gage indicates continuously the effect of the pressures acting upon it, the gage F giving the mean effect of the driving or forward pressures and the gage N giving the mean effect of the exhaust or back pressures. The difference between the two readings is the net mean effective pressure.

Having now described my said invention, what I claim as new, and desire to secure by Letters Patent, is—

In combination with an engine-cylinder, a valve-box having pipe connections to opposite ends thereof, pressure-gages connected with said valve-box, and check-valves located in said valve-box operating automatically to keep the pressure and exhaust ends of said piston in communication with the respective pressure-gages, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

WILLIAM RIPPER.

Witnesses:
W. H. BAIRSTO,
C. FAWCETT.