W. M. WILKIN.

STEAM ENGINE.

APPLICATION FILED JULY 7, 1916.

1,214,859. Patented Feb. 6, 1917.

Fig. 1

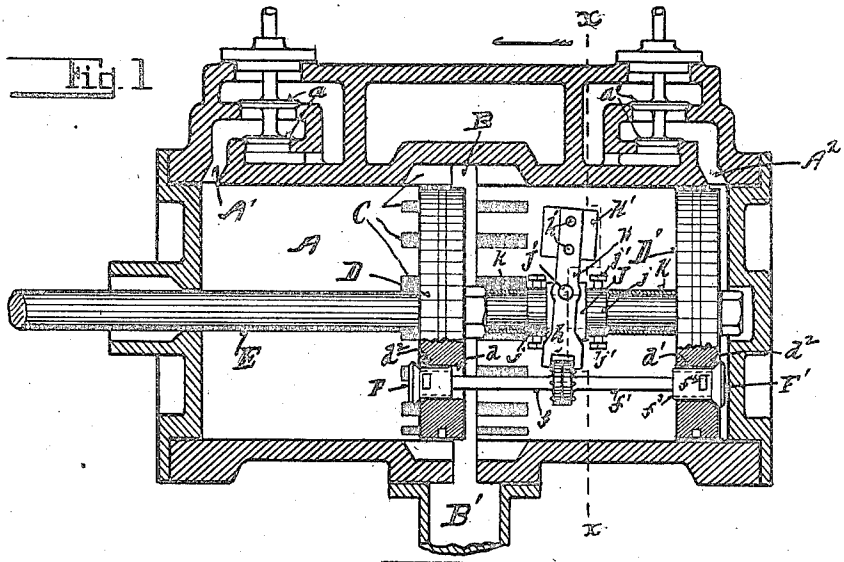


Fig. 2.

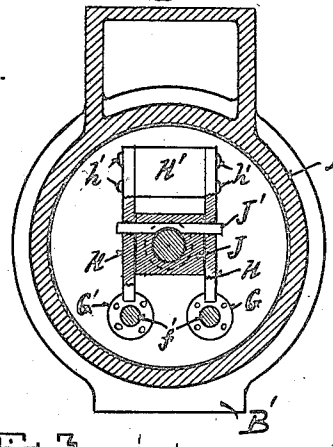
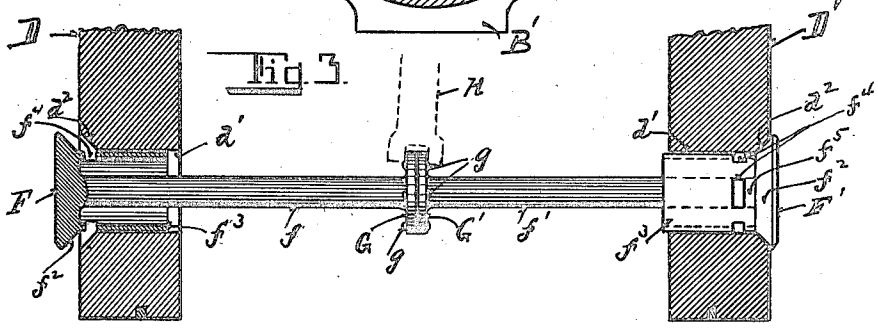


Fig. 3.



Inventor.

William M. Wilkin

By J. C. & H. M. Sturgeon

Attys.

UNITED STATES PATENT OFFICE.

WILLIAM M. WILKIN, OF ERIE, PENNSYLVANIA.

STEAM-ENGINE.

1,214,859. Specification of Letters Patent. Patented Feb. 6, 1917.

Application filed July 7, 1916. Serial No. 108,056.

To all whom it may concern:

Be it known that I, WILLIAM M. WILKIN, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, forming part of this specification.

My invention relates to steam engines of the type known as unidirectional flow, in which the steam continuously travels from the intake ports to exhaust port in the intermediate portion of the cylinder which are controlled by the operation of twin pistons.

In engines of this type, only a small portion of the steam, in weight, passes out of the central exhaust ports, when the engine is not connected with a condenser, and provision must be made for the escape of the residue of steam remaining in the cylinder after the central exhaust ports have been closed by the return movement of the piston. The object of this invention is, therefore, to provide valve mechanism in the piston to permit of the escape therethrough of steam during a portion of the backward movement of the piston, and counterbalancing mechanism to control the inertia of such valves, which will be actuated by the stopping of the pistons at the ends of their forward and backward strokes; also to provide a valve with sufficient steam cushion to render its operation noiseless.

The features of my invention are hereinafter set forth and pointed out, and are illustrated in the accompanying drawings, in which:

Figure 1, is a longitudinal central section of an engine cylinder showing my invention embodied therein.

Fig. 2, is a transverse section thereof on the line x—x, in Fig. 1, looking in the direction of the arrow.

Fig. 3, is an enlarged view partially in elevation and partially in section of a portion of my invention.

In these drawings A, indicates an engine cylinder having the usual steam inlet ports A′, and A², at the ends thereof, controlled by valves a and a', in the usual manner. B, indicates an annular groove where the interior wall of the cylinder is cut away, the lower portion of said groove B, communicating with the exhaust B′, of the engine. C, indicates longitudinal grooves in the interior wall of the cylinder A, at each side of the annular groove B. D and D′, indicate twin pistons within the cylinder A, so spaced and secured upon the piston-rod E, that when the pistons are in the position shown in Fig. 1, the piston D, will have uncovered one end of the groove C, through which the working steam, or a portion thereof, which forced the pistons into that position, may escape into the annular groove B, the space between the pistons, and thence into the exhaust B′.

Pistons D and D′, are each provided with one or more valve-openings d and d', which are provided with valve-seats d^2, and within these valve-openings I place valves F and F′, which are connected by means of a rod f—f', of such length that when the valve F′, is closed, the valve F, will be open, as shown in Figs, 1 and 3. The valves F, and F′, consist of a valve portion f^2, and a hollow cylindrical guide portion f^3, having port openings f^4, through the wall thereof spaced from the base of the valve portion f^2, so that there will be a short cylindrical space between the ports f^4, and the base of the valve portion f^2, which will cut off the escape of steam through the ports f^4, prior to the seating of the valve portion f^2, upon the valve seats d^2, thereby leaving a steam-filled space between the valve and its seat, to act as a cushion to prevent pounding of the valves upon their seats. The steam cushion between the valve f^2, and the valve seat d^2, is prevented from freely escaping therefrom around the periphery of the valve, as the valve moves toward its seat, by means of the constantly increasing compression between the moving piston and the cylinder head, which packs the space vacated by the closing valve, so that there is no space left to receive the steam which flows from between the valve and its seat. The slight difference between the area of the valve opening and the area of the annular opening between peripheries of the valve f^2, and its seat d^2, being sufficient to force the valve down upon its seat, which operation also aids in increasing the com-

pression behind the piston. Each of the valves F and F′, is provided with a stem or rod *f* and *f′* which is provided with a flange collar G, and G′, by means whereof they can be secured together by rivets *g;* or said rods and valves may be connected in any other suitable manner; but I prefer the construction shown and described. To counterbalance the valves F and F′, and their connecting rod *f—f′*, I support upon the piston-rod E, between the pistons D and D′, a pivotal lever H, the lower end of which is provided with a notch or recess *h*, which is adapted to receive the flanges G—G′, thereinto; and to the upper end of the lever H, is secured a counter weight H′, of sufficient gravity to counterbalance the momentum of the valves F and F′, and their connecting rod.

In these drawings I have shown a block J, through which a pivot pin J′, passes, and having an opening bored therethrough for the piston rod E, to pass, which opening cuts into said pivot pin J′, as shown in Fig. 2. This block J, with the pivot pin J′, is then placed upon the piston rod E, the piston-rod thus retaining the pin J′, in the block J. Upon each end of the pin J, I place a lever H, the lower ends of which are provided with recesses *h*, as above stated, which engage the collars G, and between the upper ends of the lever H, I secure a weight H′, by means of rivets or bolts *h′*, which hold the levers H H, from spreading, and thus retaining them in place upon the pivot pin *j*. The block J, is preferably provided with collars *j′* which are provided with set screws *j′*, to prevent the block J, from moving upon the piston rod E; I also place upon the piston rod E, between each piston and the collars *j*, of the block J, sleeves K, which insure the block J, from longitudinal movement on the piston rod E.

In operation, when the pistons D and D′, travel toward the end of the cylinder adjacent to the piston D, and begin to slacken their movement prior to coming to the end of their travel in that direction, the counter weight H′, will continue in that direction and through the lever H, cause the valve F, to close, and the valve F′, to open; the ports f^4, in the valve F, being closed prior to the valve portion f^2 engaging the valve seat d^2, in the piston D, thus leaving a film of steam between the valve and its seat to be forced out against the pressure of the steam by the action of the counter weight H′.

During this forward movement of the pistons D and D′, the residue of steam, remaining in the cylinder after the uncovering of the exhaust grooves C, by the piston D, escapes through the open valve F, and owing to the progressive decrease of the longitudinal motion of the pistons, as they approach the terminii of their reciprocations, the counter weight H′, being free from the control of the engine crank is actuated by its own momentum, and operates to close the valve F, before the piston D, has reached the end of its forward travel, thus insuring sufficient compression. This operation is repeated at each forward and backward movement of the pistons.

Having thus fully shown and described the construction and operation of my invention so that others may utilize the same, what I claim as new and desire to secure by Letters-Patent is:

1. In a steam engine, a cylinder having inlet ports at the ends and exhaust ports at the intermediate portion thereof, a piston-rod, twin pistons having valve openings therethrough secured on said rod in spaced relation to each other adapted to control said exhaust ports, connected valves in said openings adapted to alternately seat against outer sides of said pistons and counterweight controlled mechanism supported between said pistons, to counterbalance the inertia of said connected valves, substantially as set forth.

2. In a steam engine, the combination of an engine cylinder having a steam inlet port at one end of its piston stroke and exhaust ports at the other end of its piston stroke, a piston therein adapted to control said exhaust ports, a non-return valve in said piston seated against the steam side thereof, and counterweight controlled mechanism traveling in unison with said piston adapted to counterbalance the inertia of said valve, substantially as set forth.

3. In a steam engine, the combination of an engine cylinder having a steam inlet port at one end of its piston stroke and exhaust ports at the opposite end of its piston stroke, a piston therein adapted to control said exhaust ports, a non-return valve in said piston seated against the steam side thereof, a valve-stem thereon, a piston-rod connected to said piston, a lever supported on said piston-rod, one end thereof connected to said valve-stem, and a counterweight secured to the opposite end thereof, substantially as set forth.

4. In a steam engine, the combination of an engine cylinder having a steam inlet port at one end of its piston stroke and exhaust ports at the opposite end of its piston stroke, a piston therein adapted to control said exhaust ports, a non-return valve in said piston seated against the steam side thereof, a valve-stem, a piston-rod secured to said piston, a block secured upon said piston-rod, a lever pivoted upon said block having one end thereof engaging said valve-stem, and a counterweight secured to the opposite end of said lever, substantially as set forth.

5. In a steam engine, the combination of an engine cylinder having inlet ports at one

end of its piston stroke and exhaust ports at the opposite end thereof, a piston in said cylinder adapted to control said steam exhaust ports, a valve opening in said piston having a valve-seat on the steam side thereof, a valve adapted to seat on said valve-seat, a cylindrical projection on said valve adapted to close said valve opening prior to the seating of said valve, and mechanism traveling with said piston adapted to counterbalance the inertia of said valve, substantially as set forth.

In testimony whereof I affix my signature.

WILLIAM M. WILKIN.