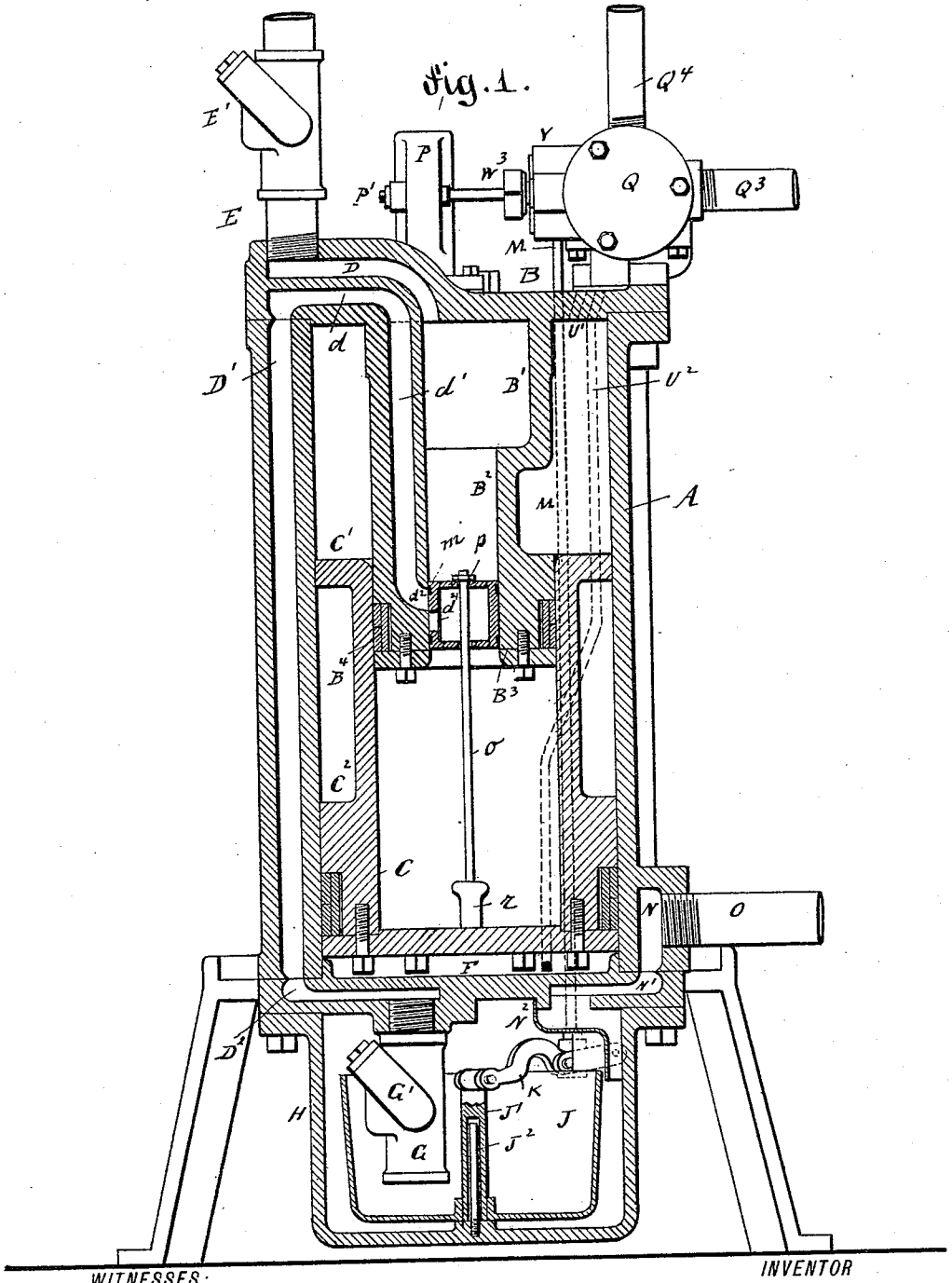
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H. CREAMER.

STEAM TRAP.

No. 457,983. Patented Aug. 18, 1891.

Fig. 1.



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Fig. 2.

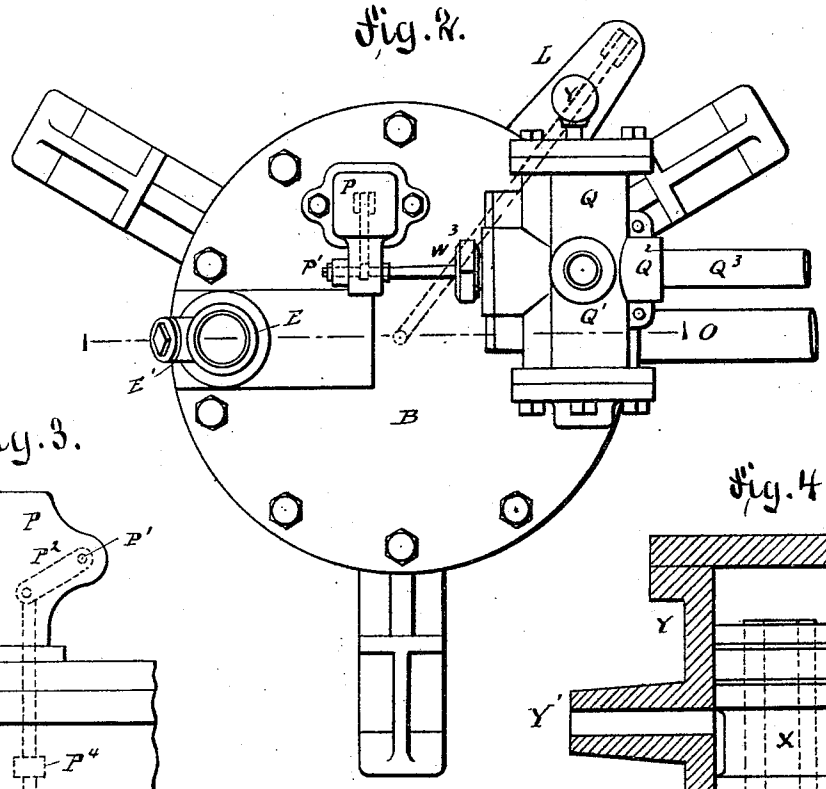


Fig. 3.

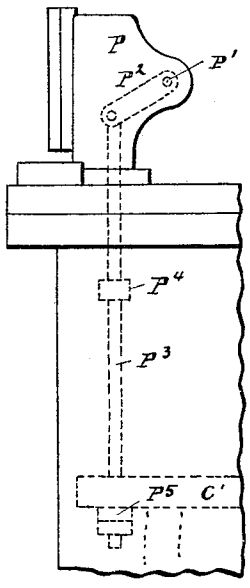
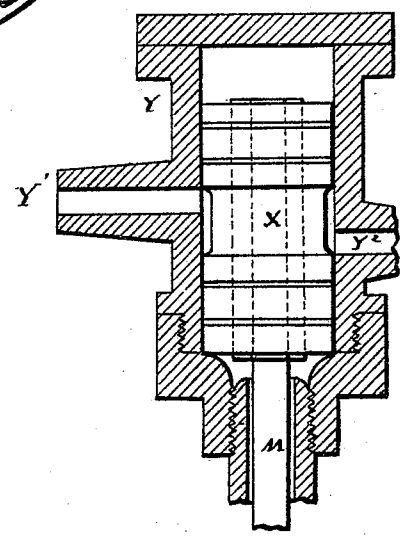


Fig. 4.



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STEAM TRAP.

No. 457,983. Patented Aug. 18, 1891.

Fig. 6.

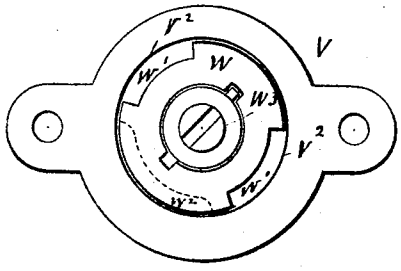


Fig. 5.

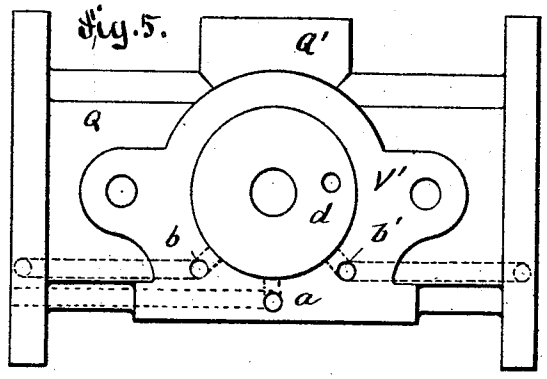


Fig. 7.

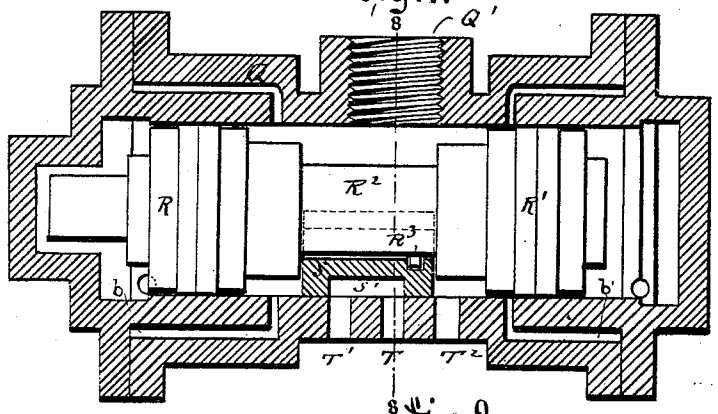
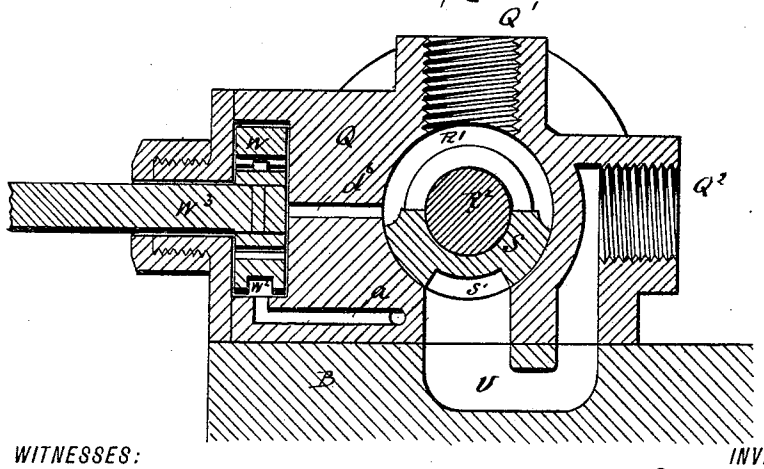


Fig. 8.



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UNITED STATES PATENT OFFICE.

HENRY CREAMER, OF NEW YORK, N. Y.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 457,983, dated August 18, 1891.

Application filed April 14, 1890. Serial No. 347,923. (No model.)

To all whom it may concern:

Be it known that I, HENRY CREAMER, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Steam-Traps, of which the following is a specification.

This invention relates to improvements in the steam-trap for which United States Letters Patent No. 394,462 were granted to me December 11, 1889.

The object of my invention is to simplify the construction of the trap and to make the same very effective.

The invention consists in the construction and combination of parts and details, as will be fully described hereinafter, and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical transverse sectional view of my improved steam-trap on the line 1 1, Fig. 2, parts being in elevation. Fig. 2 is a plan view of my improved trap. Fig. 3 is a detail side view of the upper part of the cylinder, parts being broken out. Fig. 4 is a vertical longitudinal section of the exhaust-controlling valve. Fig. 5 is a face view of the main steam-valve, the bonnet and heads being removed. Fig. 6 is an inner face view of the bonnet and the rocking valve in the same that regulates the main steam-valve. Fig. 7 is a vertical longitudinal sectional view of the main steam-valve, the heads being removed. Fig. 8 is a vertical cross-sectional view of the same on line 8 8, Fig. 7.

Similar letters of reference indicate corresponding parts.

The cylinder A is provided with a head B, from which the neck B′ projects downward, said neck being contracted at B^2 and provided at its lower end with the annular projection or head B^3, in the outer edge of which a suitable packing-ring B^4 is held. The cylindrical piston C, within the cylinder A, is closed at its bottom end and open at its upper end, the inner diameter of said cylindrical piston being of such size that the head B^3 on the neck B′ fits snugly within the same. Said cylindrical piston C is provided at its upper end with the outwardly-projecting piston-collar C′, and at its lower end with a similar piston-collar C^2, which piston-collars fit closely within the cylinder A. The head B of the cylinder A is provided with the channel D, with which a pipe E is connected, having a check-valve E′, said pipe E serving for conducting water to the boiler. Directly below the channel D the channel d is formed in the head B, one end of which is in communication with the channel d', formed in the side of the neck B′ and terminating at its lower end in the port d^2, near the lower end of the neck. The opposite end of the channel d is in communication with the upper end of a vertical channel D′, formed in the side of the cylinder and extending from the top of the same to the bottom, the lower end of said channel D′ being in communication with the channel D^2, formed in the bottom plate F of the cylinder.

From the channel D^2 a suction-tube G, having a check-valve G′, projects downward into a pot H, open at the top and bolted to the under side of the bottom plate F. Within said pot a cup-shaped float J is arranged, which is provided with a central tubular stem J′, mounted to slide on a guide-rod J^2, projecting upward from the bottom of the pot. The upper end of the tubular stem J′ is pivoted to the inner end of a lever K, the outer end of which is pivoted in the end of a hollow bracket or pocket L, projecting laterally from the pot H, near the top of the same. A rod M (shown in dotted lines in Fig. 1) projects through an opening in the top of the hollow bracket L to the head B of the cylinder A, and is connected with a valve that will be described hereinafter.

A channel N is formed in the side of the cylinder at the bottom part and is connected with the pipe O, that conducts the water of condensation to the trap, said channel N being also in communication with the channel N′, formed in the bottom plate F of the trap and serving to conduct the water into the pot H. A guard-plate N^2, secured to the under side of the bottom plate F, serves to conduct the water entering the pot to the side of the same, so that said water cannot pour into the top of the cup-shaped float J. A cylindrical valve m, having a port d^4, is placed into the lower end of the neck B′, said valve being provided with suitable spring packing-rings. A rod o projects upward from the bottom of the piston C, through apertures in the top and

bottom cross-pieces of said valve m, and is provided on its upper end with a head p and at its lower end with a projection r, that can act on the bottom cross-piece of the valve.

In a box P on the upper surface of the head B of the cylinder A a rock-shaft P′ is arranged, which is provided within the box with an arm P^2, connected with a rod P^3, projecting through an aperture in the head and through an aperture in the piston-collar C′ on the top of the cylindrical piston C, which rod P^3 has fixed lugs P^4 and P^5, the lug P^5 being below the piston-collar C′ and the lug P^4 a short distance below the top of the cylinder.

The main steam-valve consists of a cylindrical casing Q, having a neck Q′, with which the supply-pipe Q^4 for the live steam is connected, and is also provided with a side neck Q^2, with which the pipe Q^3 for carrying off the exhaust-steam is connected, said pipe Q^3 to be connected in some suitable manner with the pipe O, that conducts the water of condensation to the trap. In the valve-casing Q the two pistons R R′ are mounted on a stem R^2, which is provided with a pin R^3, projecting into the slide-valve S, which is segmental in cross-section and fits in the bore of the valve-cylinder Q, said slide-valve S having a bottom recess or cove S′.

In the bottom of the valve-casing Q the slots T, T′, and T^2 are arranged, the slot T being connected with the channel U, that conducts the steam to the neck Q^2, with which the exhaust-steam pipe is connected, the slot T′ being connected with a channel U′, that conducts the steam to the upper part of the cylinder, and the slot T^2 being connected with the channel U^2, which conducts the steam to the bottom part of the cylinder, said channels U′ and U^2 being shown in dotted lines in Fig. 1. The flat face V′ of the valve-casing Q is provided with a circular recess V^2 containing the rock-valve W, which has two notches W′ and the segmental cove or recess W^2, said valve W having a stem W^3, which is connected with a rock-shaft P′, previously described.

V is a head bolted on the flat face V′.

The channel a in the valve-casing Q serves to conduct the exhaust-steam of the rock-valve W to the end of the valve-casing Q, which channel is then connected with the neck Y′ of a vertical cylindrical valve-casing Y, provided with an opposite neck Y^2, some distance below the plane of the neck Y′. Said valve-casing Y contains the piston-valve X, which is connected with the upper end of the rod M, (shown in dotted lines in Fig. 1,) and connected with the lever K of the cup-shaped float J. The channels b and b' in the valve-casing Q serve to conduct the steam to both ends of the valve-casing Q, and the channel d^6 serves to conduct live steam from the central bore of the valve-casing Q to the rock-valve W.

The operation is as follows: As the water flows through the pipe O into the trap it accumulates in the pot H, between the side walls of the pot and the float J, keeping said float in raised position, which is the normal position of the float and the position which it has when the trap is not operating or pumping. As the flow of water continues the water flows over the top edge of the float J into the same and gradually fills it, the weight of the water in the float causing the same to descend. As the float descends it pulls down the rod M, which in turn pulls down the piston-valve X in the casing Y, thereby establishing communication between the channels Y′ and Y^2, thus permitting the exhaust-steam from the main steam-actuated valve, which passes from the ends of the casing Q through the channels b b' to the rock-valve W, to pass through the channel a, the neck Y′, the space between the casing Y, and the recess in the piston-valve X and neck Y^2 into the open air. The piston C is now at the bottom of the cylinder, and the port d^2 of the channel d' is closed by the valve m, and the slide-valve S in the casing Q is in the position shown in Fig. 7—that is, the top channel U′ of the cylinder is connected with the exhaust-channel T, and the channel U^2, leading to the bottom of the cylinder, is in communication with the live-steam pipe Q^4. The live steam passes through the channel to the bottom of the cylinder, and acting on the bottom of the piston C forces the same upward. The water that is within the hollow piston is forced up through the neck B′ B^2 and the channel D out through the pipe E to the boiler. This water cannot be forced into the tubular float J, for the reason that the channel d' is closed. When the piston C has just completed its upstroke, its piston-collar C′ strikes the stop-lug P^4 on the rod P^3, whereby the rock-shaft P′ is turned axially and turns the rock-valve W in such a manner as to admit steam through the channel b to the left-hand end of the valve-casing Q and to connect the channel b' with the exhaust-channel a. At the same time the projection r on the bottom of the cylinder strikes the bottom cross-piece of the valve m, moving the same upward, so that the port d^4 in said valve registers with the port d^2 at the lower end of the channel D′. The live steam now forces the pistons R R′ and the slide-valve S from left to right, thereby shutting off the steam from the channel U^2, connecting the channel U′ with live steam, and also connecting the channel U^2 with the exhaust-channel T. The steam now acts on the piston-collar C′ of the piston C and forces the same downward, the expanded steam below the piston passing up through the channel U^2, through the valve-casing, and through the channel U and through the pipe Q^3 into the pipe O, that conducts the water of condensation to the trap. As the cylindrical piston descends it creates a vacuum in the neck B′ and B^2 and in the channel d d' D′ D^2, whereby the water is drawn out of the float G, said water rising through the said channels

D^2 D′ d' d and accumulating in the interior of the cylindrical piston C. A short time before said piston has completed its downstroke the head p on the upper end of the rod o strikes the top cross-piece of the valve m and pushes said valve downward, whereby the valve m closes the port d^2 at the lower end of the channel d', thereby destroying the communication between the water-pot H and interior of the hollow cylinder C, and at the same time the piston-collar C′ strikes against the stop-lug P^5 on the rod P^3 and pulls the same downward, whereby the shaft P′ is rocked and the valve W reversed. Steam is admitted to the right-hand end of the valve-casing Q, thereby the valve S is reversed, live steam is again admitted to the bottom of the cylinder, and the expanded steam from the top is forced out through the pipe Q^3, and so on alternately until the flow of water into the pot H ceases. As soon as the flow of water ceases and steam from the radiators passes into the pot C the rod M, which is made of brass, immediately expands under the action of heat, thereby moving the piston-valve X upward, which valve is moved upward still farther by the float J, which rises as the water is pumped out of the same and no more flows in. When the piston-valve X rises, it interrupts the communication between the channels Y′ and Y^2, thus preventing the escape of steam that operated the main steam-actuated valve in the casing G, thereby stopping said valve, and the piston C remains at a standstill until the water again rises in the pot H sufficiently to cause the float J to descend. As the pot becomes filled with water, this water causes a contraction of the rod M, whereby the piston-valve X is slightly lowered and is lowered still farther by the descending float J, thus establishing communication between the necks Y′ and Y^2, and thus permitting of the escape of the steam that actuated the steam-operated main valve, and the pump begins to operate in the manner described.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A steam-trap constructed with a cylinder having a neck projecting downward from the top head of the cylinder, a cylindrical piston into which said neck can pass, a water-pot on the bottom of the cylinder, a cup-shaped float in said pot, a rod actuated from said float and controlling the exhaust-steam valve of the trap, and a suction-tube extending into the cup-shaped float and connected with a channel leading to the above-mentioned neck on the top head of the cylinder, substantially as set forth.

2. A steam-trap constructed with a neck projecting downward from the top head of the cylinder, and a channel extending from the upper part of said neck to the under side of the bottom of the cylinder, a cylindrical piston in said cylinder, and a water-pot held at the bottom of the cylinder, and a float in said water-pot, substantially as set forth.

3. A steam-trap constructed with a cylinder having a neck projecting downward from the top head of said cylinder, a channel extending to the bottom of the cylinder, a water-pot on the bottom of the cylinder, a float in said pot, and a pipe for conducting the water into said pot, substantially as set forth.

4. In a steam-trap, the combination, with a cylinder and piston, of a main steam-valve for controlling the passage of steam into the cylinder, an additional valve governing said main steam-valve and operated by the ascending and descending piston, and a valve controlling the exhaust of the above-mentioned additional valve, substantially as set forth.

5. In a steam-trap, the combination, with a cylinder and piston, of a main steam-valve for controlling the passage of steam into the cylinder, an additional valve governing said steam-valve and operated by the ascending and descending piston, a valve controlling the exhaust of the above-mentioned additional valve, and a rod for operating the said exhaust-valve, which rod extends into the compartment of the trap for receiving the water of condensation, substantially as set forth.

6. In a steam-trap, the combination, with a cylinder and piston, of a main steam-valve for governing the passage of steam into the cylinder, an additional valve controlling the main steam-valve, which additional valve is operated by the ascending and descending piston, an exhaust-valve controlling said additional valve, and a float operating said exhaust-valve, substantially as set forth.

7. In a steam-trap, the combination, with a cylinder and piston, of a main steam-valve, a rock-valve controlling said main steam-valve, a rock-shaft connected with said rock-valve, a box on the top of the cylinder, through which box the rock-shaft passes, and a rod projecting downward from the box and connected with the rock-shaft, which rod has stop-lugs on which the piston can act, substantially as set forth.

8. In a steam-trap, the combination, with a cylinder having a neck projecting downward from its top head, of a water-pot at the bottom of the cylinder, a channel extending from the lower end of said neck to the water-pot, a suction-pipe connected with the lower end of said channel, an outlet-channel extending from the top of the neck, an outlet-pipe connected with said outlet-channel, a valve in the lower end of the neck, means for operating said valve from the cylindrical piston, a main steam-valve, and a float in the water-pot, which float controls the main steam-valve, substantially as set forth.

9. In a steam-trap, the combination, with the valve-casing Q, of the two pistons R R′ in the ends of the same, a stem R^2, connecting said pistons, a segmental slide-valve S, mounted

loosely on said stem R^2 and fitting against the sides of the bore of the valve-casing, said valve-casing being provided with the top steam inlet-neck Q′ between the pistons, the side outlet-neck Q^2, the slots T T′ T^2, of which the slot T is connected with the channel U, leading to the outlet-neck Q^2, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

HENRY CREAMER.

Witnesses:
OSCAR F. GUNZ,
JOHN A. STRALEY.