

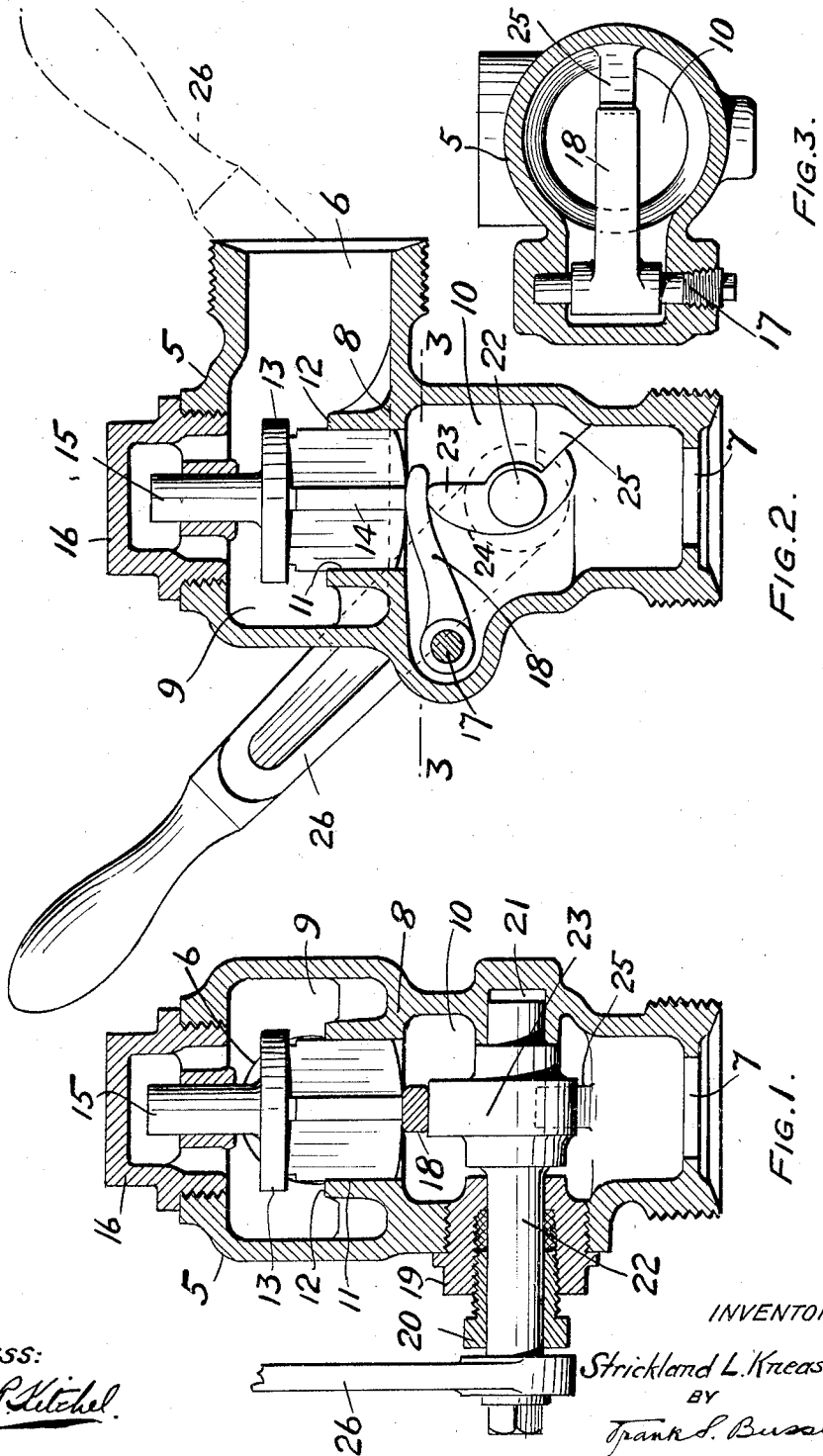
Aug. 21, 1923.

1,465,645

S. L. KNEASS

VALVE

Filed March 3, 1922



WITNESS:

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# UNITED STATES PATENT OFFICE.

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## VALVE.

Application filed March 3, 1922. Serial No. 540,741.

*To all whom it may concern:*

Be it known that I, STRICKLAND L. KNEASS, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Valves, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

This invention is directed to an improvement in valves, and more particularly relates to drifting valves for locomotives.

It has been found advantageous in operating locomotives on down grades to admit an amount of steam to the cylinders insufficient to add a propelling force to the pistons, but sufficient to prevent cutting of the sliding surfaces and the admission of air tending to the oxidation of the lubricating oil at the ends of the piston travel, all of which is well known in railroad engineering practice.

One of the objects of my invention is to provide a simple and efficient valve of this character by which the amount of steam admitted to the cylinder is confined within fixed predetermined limits beyond the judgment of the engineer or fireman. This I accomplish by providing a valve which is always shifted to either its fully open or fully closed position and cannot remain in stable position in an intermediate position.

Another object of my invention is to provide a valve which is self-seating and gravity-actuated so that if excess pressure occurs in the pipe connecting the valve to the cylinders, the valve will be raised to relieve said pressure and be automatically returned to its seat without attention on the part of the operator.

Still another object of my invention is to provide a quickly opening valve whereby the required amount of steam can be instantly delivered to the cylinders to prevent damage immediately after the main steam supply is cut off; also a valve having ample area to supply the necessary amount of steam while drifting, as well as operating mechanism for opening and closing the valve so arranged as to require the minimum amount of effort on the part of the operator to quickly open the valve against the high

steam pressures now carried by locomotive boilers.

A still further object of my invention is to arrange the valve and its operating mechanism so that the valve is moved substantially rectilinearly and friction and wear on the bottom of the valve and the guiding parts thereof are avoided, and the valve is thereby permitted to lift and seat easily, as well as seat squarely on its seating surface.

The above objects are accomplished by providing a simple form of casing in which is mounted a gravity-actuated valve provided with guiding means at the top and bottom, and which is opened against the steam pressure so that the valve is held to its seat under normal conditions. As the valve is held to its seat under normal conditions, all danger of the valve permitting a continuous flow of steam to the cylinder is eliminated, when it is opened by accidental means, such as excessive compression within the cylinders, which might tend to cause an accumulation of steam pressure in the cylinders and produce a gradual increase of pressure sufficient to move the locomotive forward or backward from a standing position and cause an accident.

The valve actuating mechanism comprises a lifting lever pivotally mounted in the casing below the valve, which is actuated by a rotatable cam actuated by a lever, the lifting speed of the cam relative to the extent of movement of the operating lever gradually increasing, from the beginning of movement of the cam to a point near the end thereof, whereby the greatest amount of leverage is obtained when the full boiler pressure is upon the top of the valve, i. e., when there is the greatest difference in pressure between the receiving and delivering chambers in the valve body. As the lift of the cam gradually increases from the beginning toward the end of the movement thereof, a comparatively large arc of travel of the operating lever is required for the initial valve lifting movement of the cam, the arc of travel of the operating lever decreasing as the valve is continued to be lifted, thereby providing the maximum lifting power and slowest speed of valve movement when the valve is under the greatest pressure and an increasing speed of valve movement and reduced power as the pressure on the valve decreases. This in-

crease of valve movement and decrease of power are enhanced by the circumstance that at the beginning of the valve-lifting movement, the cam 24 contacts with the free  
 5 extremity of the lever 18 and that, as the valve lifts, the point of contact between the cam and the lever shifts toward the pivot of the lever.

A still further object of my invention is  
 10 to provide a valve in which the velocity of the steam passing through the valve controlled opening is reduced below that at another portion of the valve body, so as not to cause undue wear on the valve seat and  
 15 valve guiding surfaces. This is accomplished by interposing a restricted area in the valve body, preferably in the outlet, which throttles the flow of steam.

The precise nature of my invention will  
 20 best be understood by reference to the accompanying drawings, which will now be described, it being premised, however, that various changes may be made in the details of construction without departing from the  
 25 spirit and scope of my invention as defined in the appended claims.

Fig. 1 of the drawings is a vertical section through the valve body.

Fig. 2 is a similar view at right angles  
 30 to Fig. 1.

Fig. 3 is a sectional plan view on the line 3-3 of Fig. 2.

In these drawings, the reference character  
 5 designates the valve body, 6 the inlet opening, and 7 the outlet opening which is restricted as clearly shown in Figs. 1 and 2. Both the inlet and outlet openings are provided with threaded portions for coupling  
 35 the valve body to the steam line. 8 designates the septum in the valve body which separates the receiving chamber 9 from the delivery chamber 10, and is provided with a passage 11 having a cylindrical wall and an annular valve seat 12. 13 is the valve  
 40 controlling the passage 11 and having downwardly extending guiding members 14 which engage the walls of passage 11. The valve is also provided with an upwardly extending guiding member or stem 15, which is  
 45 guided in a guide in a cap 16. The cap 16 has a threaded engagement with the wall of an opening in the body in line with the passage 11, through which the seat and passage are machined, and through which the  
 50 valve member is inserted into the body.

Pivotaly mounted in the delivery chamber 10 on a pin 17 seated in orifices in the walls of the body is a lever 18, the free  
 55 end of which is arranged to engage the lower faces of the valve guiding members 14 to raise the valve member as hereinafter described. Journalled in a stuffing box member 19 threaded in one wall of the body, and in its gland 20 threaded therein, and  
 60 in a bearing 21 in the opposite wall of the

body, is a spindle 22. 23 is a cam connected to the spindle 22 having a curved surface 24 in engagement with the lower face of lever 18.

This cam 23 is provided with a tail piece  
 70 which is arranged to engage one side of a stop lug 25 when the valve is open as shown in Fig. 2. 26 is an operating lever connected to the spindle 22 and which is shifted  
 75 from the full line position to the dotted line position, as shown in Fig. 2, when the valve is closed; and when the valve is in its closed position the straight portion of cam 23 will engage the upper face of stop lug 25.

The arc of movement of the lever 26 from  
 80 one position to the other is approximately ninety degrees and the parts are so positioned with relation to each other that the lever is at approximately forty-five degrees  
 85 from the vertical when the valve is in either of its positions, so that the parts are always maintained in their shifted positions by the weight of the lever 26 and by fluid pressure, holding the valve against its seat, or  
 90 against the lever 18 when the cam 24 is in stable position relative to such pressure.

The curved surface of the cam 24 is so  
 arranged about the axis of the spindle 22, that the radius of its point of contact with  
 95 the lever 18 varies from a minimum when the long axis of the cam is in a horizontal or inoperative position to a maximum when the long axis is about vertical and the valve is fully opened as shown in Fig. 2. When  
 100 the valve is in this position, the operating mechanism is in stable position, preventing accidental closing of the valve.

When it is desired to close the valve, the  
 lever 26 is shifted from the full line position to the dotted line position, in which  
 105 position the cam 23 will contact with stop 25 and arrest the further movement of the lever 26 in a clockwise direction.

When lever 26 is in the dotted line position, the valve 13 will be seated on its seat  
 110 12, and the lever 18 will rest on cam 23, while the upper face of lever 18 will be clear of the lower faces of the valve guiding members 14.

When it is desired to open the valve, the  
 115 lever 26 is shifted from the dotted line position to the full line position. During the first movement of cam 23, lever 18, which raises the valve, is moved but slightly for a long arc movement of lever 26 so that the  
 120 leverage for raising the valve from its seat while under full boiler pressure is very great, but as the lift of the cam due to the eccentric curvature thereof rapidly increases and the area of the passage 11 is relatively  
 125 large, the valve will be quickly opened to a sufficient degree after it has been raised from its seat to provide a free passage for the steam and relieve the pressure on the  
 130 top of the valve.

By the interposition of lever 18 between the cam 23 and the valve, the lifting pressure upon the valve is always in the line of its axis, while the guides for the valve are so arranged that pressure of entering steam is ineffective to produce lateral movement of the valve.

The advantages of my invention result from the provision of a quick opening valve, which is arranged to be shifted to and maintained only in its fully opened or closed position, and in which the mechanism is so arranged that leverage of the valve opening means is relatively great when the valve is initially moved from its seat, but rapidly decreases as the valve moves farther away from the seat. A further advantage results from the provision of a valve in which the velocity of the steam passing through the valve controlled passage is less than the velocity of the steam passing through other portions of the valve body, so that the cutting action of the steam on the valve guides and seat is reduced to a minimum. Another advantage of my invention results from the provision of means to prevent any tilting of the valve to cause its axis to deviate from parallelism with its direction of movement.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:

1. A hand operated locomotive drifting valve comprising a body, a septum dividing the body into a receiving chamber and a discharge chamber and provided with a passage, a gravity check valve controlling said passage, guides preventing lateral displacement of the valve by fluid pressure, and valve opening mechanism situated in the discharge chamber and comprising a cam and a pivoted lever adapted to be operated by said cam and transmit rectilinear motion to the valve.

2. A hand operated locomotive drifting valve comprising a body, a septum dividing the body into a receiving chamber and a

discharge chamber and provided with a passage, a gravity check valve controlling said passage, guides preventing lateral displacement of the valve by fluid pressure, and valve opening mechanism situated in the discharge chamber and comprising a cam and a pivoted lever adapted to be operated by said cam and transmit rectilinear motion to the valve, a hand lever for operating said cam, the cam surface being so shaped that a comparatively large arc of travel of the hand lever is required for the initial lifting movement of the valve and the arc of travel of the operating lever decreasing as the valve is continued to be lifted.

3. A hand operated locomotive drifting valve for controlling the flow of steam, comprising a body having a receiving chamber with an inlet thereto and a delivery chamber with an outlet therefrom, a septum between said chambers with a passage extending therethrough, a valve controlling said passage, guides for the valve preventing its lateral displacement by fluid pressure, and hand actuating mechanism for the valve, the outlet from the delivery chamber being of smaller effective area than the passage between the chambers.

4. A hand operated locomotive drifting valve comprising a body having a receiving chamber with an inlet thereto and a delivery chamber with an outlet therefrom, a septum between said chambers with a passage extending therethrough, a valve for controlling the passage in the septum, a hand actuated cam for raising the valve to open said passage, a lever interposed between the cam and the valve member to cause the lifting pressure to be solely in the direction of the valve's axis, and guides to prevent lateral movement of the valve under pressure of the entering steam.

In testimony of which invention, I have hereunto set my hand at Philadelphia, Pa., on this first day of March, 1922.

STRICKLAND L. KNEASS.