March 13, 1951 A. TRAVIS 2,544,866

LOCOMOTIVE VALVE ARRESTER

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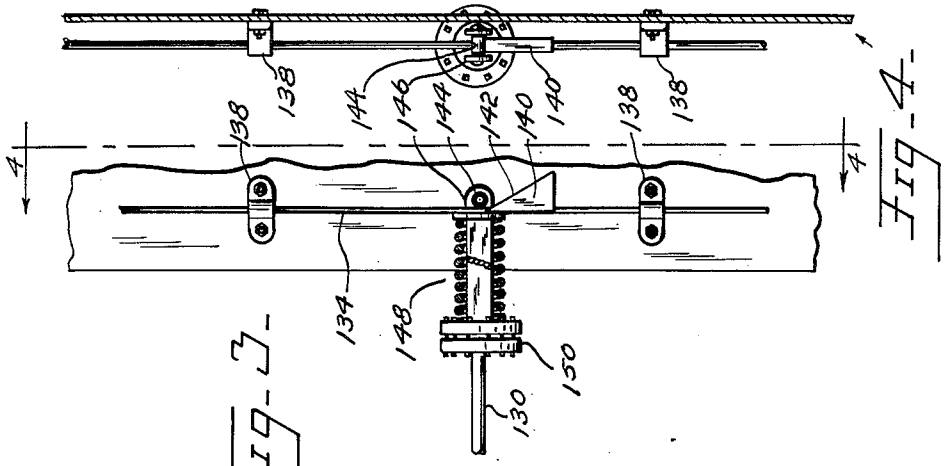


FIG. 4.

FIG. 3.

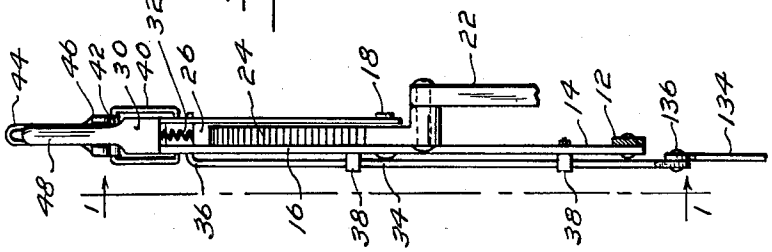


FIG. 2.

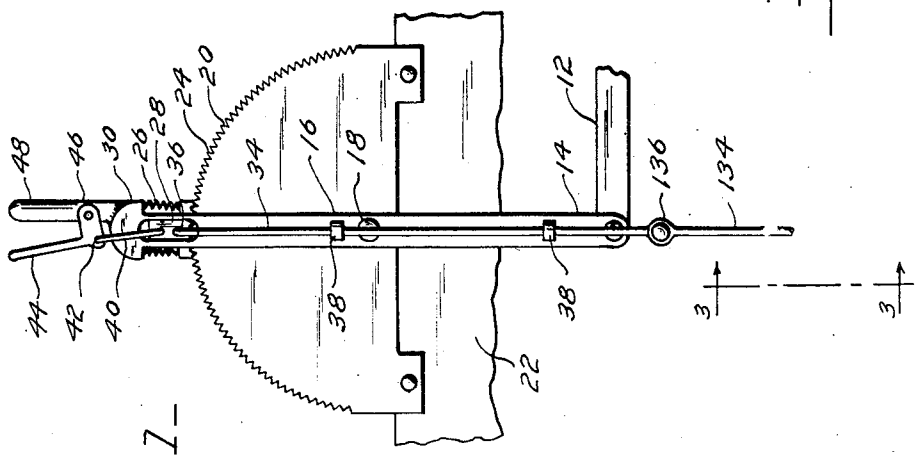


FIG. 1.

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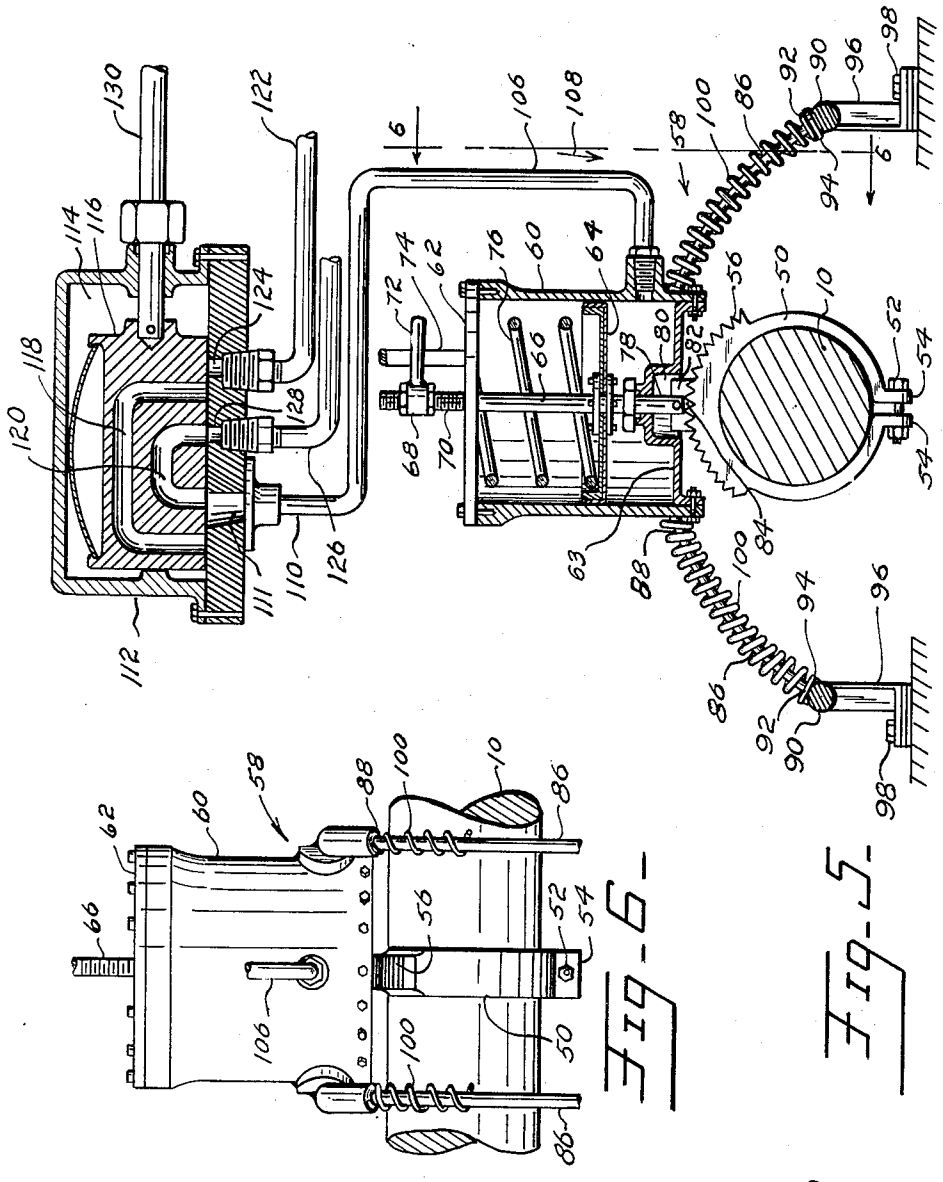


FIG. 5.

FIG. 6.

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LOCOMOTIVE VALVE ARRESTER

Aubrie Travis, Grenada, Miss.

Application October 11, 1946, Serial No. 702,825

2 Claims. (Cl. 121—170)

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This invention relates to devices for restraining any undesired motion of locomotive valves.

An object of the invention is to provide a device whereby the valves of a steam locomotive may be substantially prevented from any undesired motion.

Another object of the invention is to provide a device which is so arranged and constructed as to be attachable to the valve control gear and mechanism of a steam locomotive to prevent creeping of the valves, thereby avoiding the well known dangers thereof, and making for smoother operation.

A further object of the invention is to provide a valve arresting device which is simple in design, relatively inexpensive to manufacture, and which is adaptable to use in a large number of types of locomotives for effective control of the valves thereof against undesired creeping.

Other objects and advantages of the invention will become apparent from the following description of a preferred embodiment thereof as illustrated in the accompanying drawings, and in which,

Figure 1 is a side elevational view of a portion of the valve control mechanism of a locomotive, showing the hand lever for actuating and reversing the valves, and its quarant,

Figure 2 is a right-hand edge elevation of Figure 1,

Figure 3 is a face elevation of a portion of the mechanism showing the lower portion of the valve connection rod shown in Figures 1 and 2, with its cam and a portion of the valve stem it actuates,

Figure 4 is a sectional elevation taken on line 4—4 of Figure 3,

Figure 5 is a sectional elevation of a locomotive tumbling shaft with valve arrester and control valve for the valve arrester, and

Figure 6 is an elevational view taken on line 6—6 of Figure 5.

In the operation of a locomotive, the strokes of the valves which admit steam into the cylinders is of necessity the most important event or feature of the valve operation, since all the other actions of the valve are controlled by the valve stroke, and the slightest change in the position thereof changes the stroke of the same. Reference may now be had to the drawings, in which like reference characters denote similar parts throughout the several views.

As shown in Figures 5 and 6, there is a tumbling shaft 10, which is normally connected with the valves of a locomotive engine in such a manner as to permit a reversal of the direction of motion from the tumbling shaft arm, as is well known to those skilled in the art. The tumbling shaft 10 is turned about its axis by means of a crank actuated by a reach rod 12, part of which is shown in Figures 1 and 2. The reach rod 12 is actuated by movement of the lower end 14 of the hand lever 16 which is pivoted on shaft 18 extending through the center of a quadrant 20 carried on a fixed frame 22 in the engine cab. The quadrant 20 has peripheral teeth 24 for engagement with a correspondingly toothed dog 26 which is movable in a slot 28 formed in the upper end portion 30 of the operating hand lever 16, a spring 32 acting between the upper end portion 30 and the inside recess of the dog 26 to normally bias the dog downwardly with its teeth in locking engagement with the teeth on the quadrant.

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A valve connection rod 34 has its upper end 36 secured to the movable dog 26 as shown, and has its body portion extending slidably through guides 38 carried on the actuating lever. The link 40 is secured at its lower end to the dog 26, with its upper end extending through an aperture 42 in a hand lever latch handle 44 whose ears 46 are pivotally attached to the hand grip 48 of the hand lever 16, whereby the hand lever is normally locked against pivotal movement about the shaft 18 by the engagement of its teeth with the teeth on the quadrant 20. Hence, the hand lever may be moved to any desired position on the quadrant by merely squeezing together the hand grip 48 and the latch handle 44, so as to elevate the dog out of engagement with the quadrant teeth, thereby freeing the actuating hand lever. Release of the squeezing force allows the handle 44 and hand grip 48 to be separated by expansion of the spring 32 whereby the dog and the quadrant become again locked together.

Movement of the actuating hand lever 16 about its pivot shaft 18 results in the turning of the tumbling shaft 10 about its axis, thereby shifting the engine valves, and also reversing the direction of the locomotive if desired, depending upon the direction of movement of the hand lever 16. Due to the magnitude of the forces involved, it is customary to employ a power drive which is interposed between the reach rod 12 and the tumbling shaft, whereby the power of the actuating lever is multiplied many fold, to change the rotary position of the tumbling shaft 10, and influence the valve operation.

To avoid any undesired rotary motion of the tumbling shaft, with resultant valve creeping, I

provide a toothed quadrant 50 which is so constructed as to embrace the tumbling shaft, with a bolt 52 extending through aligned apertures in the ends 54 of the quadrant to enable them to be drawn tightly together to lock the quadrant on the tumbling shaft. The quadrant has teeth 56 projecting from an arcuate portion thereof as shown in Figures 5 and 6. A valve arrester generally indicated at 58, is so mounted relative to the quadrant 50 as to be engageable therewith to arrest undesired motion of the tumbling shaft 10. The valve arrester includes a cylinder 60 having upper and lower cylinder heads 62 and 63 bolted thereto. A piston 64 secured to a piston rod 66, is slidable within the cylinder, as shown in Figure 5, the rod 66 extending upwardly through an aperture in the upper cylinder head 62, and having a lock nut 68 threaded onto its upper end 70. A handle 72 secured to the lock nut, engages in a lock frame 74 carried on the cylinder head 62.

A spring 76 disposed inside the cylinder, with its upper end bearing against the lower surface of the cylinder head 62 and with its lower end bearing against upper surface of the piston 64, biases the piston downwardly. The lower end portion 78 of the piston rod 66 projects downwardly through an aperture in the lower cylinder head 63 which is upwardly deformed to provide a downwardly opening recess or quadrant lock guide 80 into which the portion 78 of the rod 66 projects. The recess 80 serves as a guide for the movable dog or quadrant lock 82 which is pinned to the lower bifurcated end of the rod 66. The quadrant lock 82 has downwardly projecting teeth 84 for engaging with the teeth 56 on the quadrant 50. The spring 76 normally depresses the piston 64 and hence maintains the quadrant lock 82 in engagement with the quadrant 50, thereby positively precluding vagrant rotation of the tumbling shaft 10.

The cylinder 60 is supported upon four curved rods 86 which are secured at their upper ends 88 to the cylinder, the lower ends 90 of these rods 86 extending through apertures 92 in the flanges 94 carried on the upper ends of brackets 96 bolted to a frame at 98. The support rods 86 extend through coil springs 100 the upper ends of which bear against the cylinder 60 and the lower ends of which bear against the upper surfaces of the flanges 94, thereby furnishing a resilient mounting for the cylinder 60. It is apparent that in the event any creeping movement of the tumbling shaft 10 occurs, the cylinder 60 which is connected to the shaft 10 through the teeth 84 and 56 will be momentarily rocked in a corresponding direction and compress the related pair of coil springs 100.

However, such creeping of the shaft 10 is cancelled out by the action of the springs 100 which return the shaft 10 to its starting position or the position in which it was set. For resetting the tumbling shaft to a selected position, it is necessary to elevate the quadrant lock 82 out of engagement with the teeth 56 of the quadrant 50. For this purpose, I provide a pipe 106 through which air or steam may flow in the direction of the arrow 108 into the lower part of the cylinder 60, and force the piston 64 upwardly against the resistance of the spring 76, thereby simultaneously elevating the quadrant lock 82 out of engagement with the quadrant 50, and freeing the tumbling shaft 10 to be reset by means of the hand lever 16, shown in Figures 1 and 2.

The pipe 106 is connected at its other end 110 into a port 111 in a control valve housing 112 having a chamber 114 within which is slidable from left to right and return, a slide valve 116 having passages 118 and 120 therein. An inlet pipe 122 is connected to a port 124, and an air exhaust pipe 126 is connected to a port 128. It is apparent that when the slide valve 116 is moved to the right by the valve stem 130 to which it is connected, air may be conducted from air inlet pipe 122 through passage 118 and into pipe 106, to elevate the piston 64 and free the tumbling shaft 10 for resetting. Similarly, movement of the stem 130 to the left, that is, to the position shown in Figure 5, connects the pipe 106 to the passage 120 and to the air exhaust pipe 126, allowing the air to leave the cylinder 60, and permitting the spring 76 to depress the piston 64 and its rod 66, and thereby engage the teeth 84 of the lock 82 with the teeth 56 on the quadrant 50, and again locking the tumbling shaft against undesired rotation.

Movement of the valve stem 130 is brought about by squeezing of the handle 44 and hand grip 48 together, the said squeezing together having the effect of raising the dog 26 and the valve connection rod 34. The valve connection rod has a lower extension 134 pivoted thereto at 136, the extension 134 also moving vertically in guides 138 as the rod 34 moves in its guides 38. The extension rod 134 has a cam 140 whose face 142 is inclined, as shown in Figure 3, to bear against roller pin 144 carried in the bifurcated end 146 of a valve extension rod 148 connected by a flange coupling 150 to the end of the rod 130. It is thus apparent that the squeezing of the actuating handle parts 44 and 48 results in raising the extension rod 134 and movement of the cam 140, pushes the shaft 130 toward the right in Figures 3 and 5, thereby moving the slide valve 116 toward the right, whereby air or steam under pressure from a suitable source passes through pipe 106 into the lower part of cylinder 60 to raise the piston 64 and disengage the dog 82 from the teeth 56 of the quadrant 50, thereby freeing the tumbling shaft 10 to be moved to a new position of rotation by means of the pivoting of the handle 16 about its pivot shaft 18, release of the handle 44 on the hand lever 16 resulting in locking the tumbling shaft 10 against creeping.

Although I have described a preferred embodiment of my invention in specific terms, it is to be understood that various changes may be made in size, shape, materials and arrangement without departing from the spirit and scope of the invention as claimed.

I claim:

1. In combination, a valve having operating linkage including a rotatable shaft having circumferential teeth, reversing means operatively connected to rotate said shaft in opposite directions into different set positions, a cylinder supported adjacent to said shaft having a piston working therein including a piston rod projecting therefrom toward said shaft, spring means normally urging said piston rod toward said shaft, a dog on said piston rod positioned for and normally urged by said spring means into engagement with said shaft teeth whereby rotation of said shaft from a selected set position is resisted, and means for supplying fluid pressure to said cylinder to move said piston in a direction to retract said dog out of engagement with said shaft teeth so as to free said shaft for resetting by said reversing means, said cylinder being positioned with its axis substantially normal to said shaft, and resilient

means supporting said cylinder comprising balancing spring means at opposite sides of said shaft and engaging opposite sides of said cylinder whereby said cylinder can yield to a limited extent toward either side of said shaft against the resistance of the corresponding spring means whenever vagrant rotation of said shaft away from its set position occurs and whereby said shaft will be returned toward its set position as the force producing such vagrant rotation diminishes.

2. In combination, a rotatable shaft having circumferential teeth, means for rotating said shaft in opposite directions to set positions, a member comprising a dog supported for movement toward and away from said shaft, means normally urging said dog toward said shaft to engage said dog with said teeth whereby rotation of said shaft in either direction from a set position is positively prevented, a stationary support, means mounting said member on said support for sidewise movement toward either side of said shaft, and balancing spring means operating between said support and said member and arranged to yield whenever vagrant rotation of said shaft in either direction takes place and acting whenever the force producing such vagrant rotation diminishes to return said shaft to a set position.

AUBRIE TRAVIS.

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