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Geo. E. Noyes.

Valve for Steam Engines.

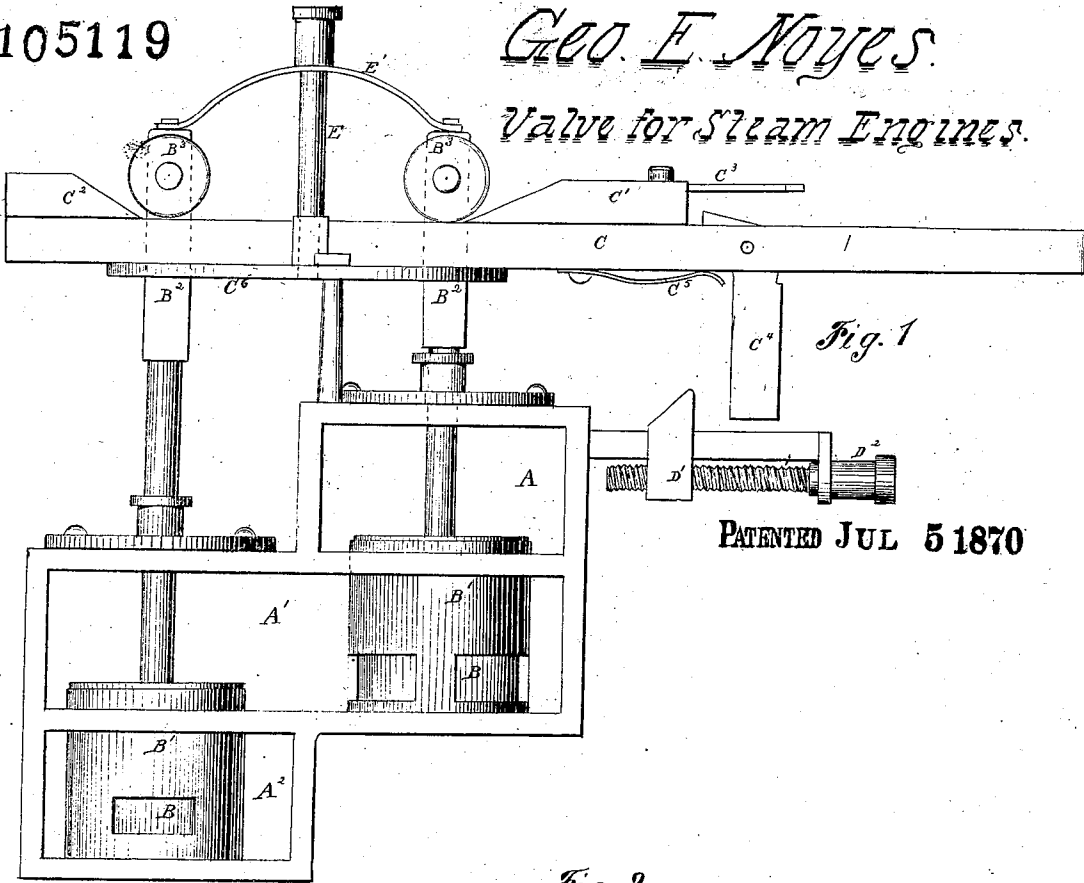
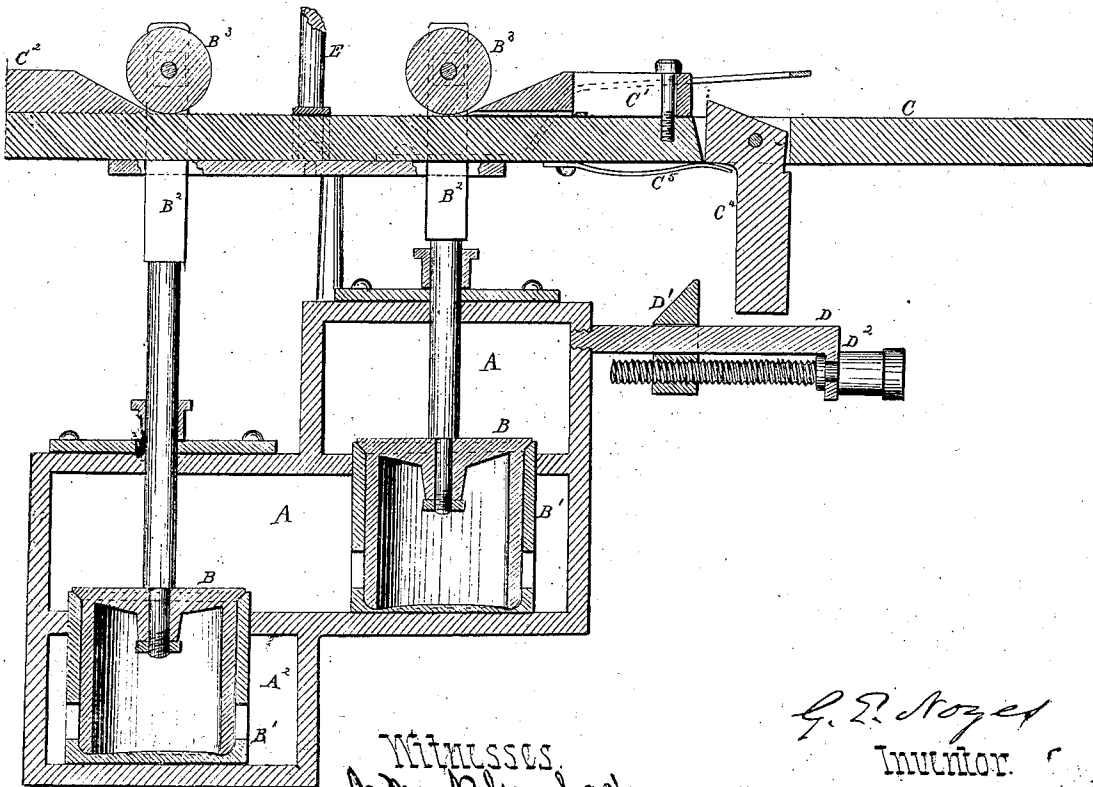


Fig. 1

PATENTED JUL 5 1870

Fig. 2



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Sheet 2 - 2 Sheets.

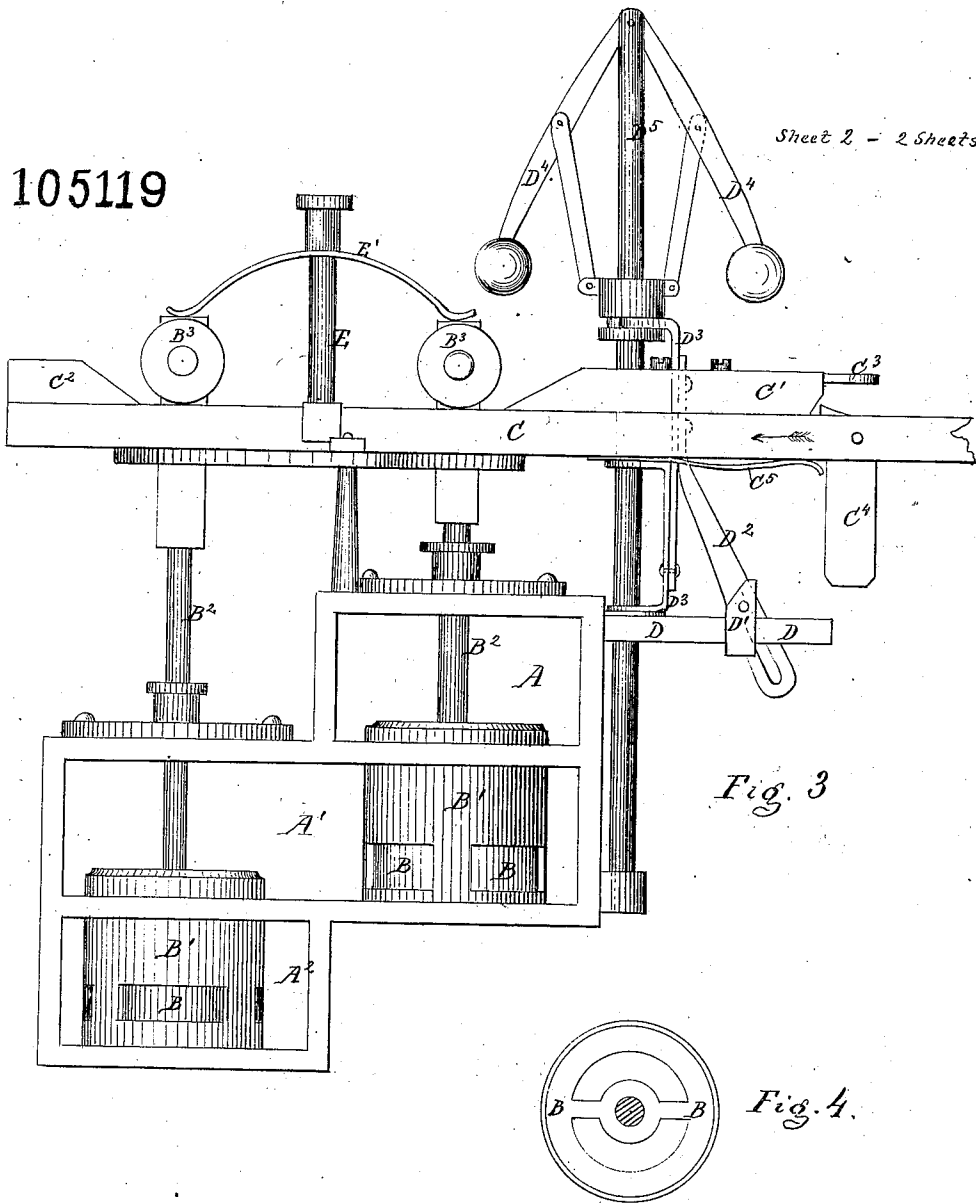


Fig. 3

Fig. 4

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Valve for Steam Engines.

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United States Patent Office.

GEORGE E. NOYES, OF WASHINGTON, DISTRICT OF COLUMBIA.

Letters Patent No. 105,119, dated July 5, 1876.

CUT-OFF VALVE-GEAR AND VALVE.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, GEORGE E. NOYES, of Washington, in the District of Columbia, have invented certain Improvements in Cut-off Valves for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawings making part of this specification, in which—

Figure 1 is a side elevation of my improved device, the steam-chest cover being removed, for the purpose of showing the construction of the valve, the other parts being arranged for regulating the point of cutting off the steam by the hand of the attendant.

Figure 2 is a vertical central section of the parts shown in fig. 1.

Figure 3 is a side elevation, showing the parts as arranged for operation by the governor.

Figure 4 is an end view of the valve.

Corresponding letters denote corresponding parts in the several figures.

This invention relates to cut-off valves for steam-engines; and

It consists in the construction, combination, and arrangement of the parts, as will be more fully described hereinafter.

In constructing steam-engines a great variety of balanced valves have been used as induction and eduction-valves, and as cut-off valves, and various forms of devices have been used for operating such valves; but mine is believed to differ from all that have preceded it, in that I use a double-seated hollow cylindrical or tubular valve, through the center of which the steam passes, said valve working in a cup-shaped vessel made to receive it, and having apertures in it, through which the steam passes from the valve, and in that the wedge which raises the induction-valve has a positive motion with reference to the valve-rod or bar, which receives its motion from the eccentric, cam, or other valve-moving devices, when the valve is being opened, but which has an independent motion, or a motion independent of the movement of such rod or bar when the valve is to be closed, and, further, in that the devices employed for producing the last-named results are novel in their combinations and arrangements.

A in the drawings refers to the steam-chest, which may be of any suitable form, its lower surface being provided with an aperture for the reception of the valve and the cap or casing in which it works, the upper or steam-receiving end of the valve being in communication with the steam-space within such chest.

A¹ refers to the steam-induction passage, which leads from the valve to the cylinder, and A² to the eduction-passage, which conducts the steam from the cylinder to the atmosphere or condenser.

B refers to the valve, which consists of a cylinder or

tube having upon its upper end a valve-seat, formed by causing a flange to project outward therefrom to rest upon the upper end of the cup or casing in which it works. At the lower end of the valve there is to be formed another seat, which, when the valve is closed, rests upon the lower end of the cup.

Across the upper end of this valve a bar extends, which is enlarged at its center, so as to receive the end of the valve-rod which works it, the form of which is shown at fig. 4.

This valve is open at its upper and lower ends, so that, as it is raised from its seats, the steam passes down through it and out through the apertures formed in the casing B¹, which should be of brass or some other non-corrosive metal, and always of the same material of which the valve is composed or made, in order that the expansion may always be the same in both, which is important, from the fact that the valve has two bearing parts upon the casing, and in order that both may bear equally upon their seats. At the same time it is indispensable that the relative lengths of the valve and its casing should not change.

As will be seen by referring to the drawings, this casing is open at its upper end, but it is closed at its lower end, which rests upon the metal of which the steam-chest is composed, while its upper end passes through a diaphragm or partition formed in the steam-chest, or through the side-pipe of the cylinder, in which aperture it fits snugly, but in which it may move sufficiently to admit of its longitudinal expansion. Apertures are formed through the wall of this casing, as shown, so that, as the valve is raised, the steam may pass out through them to any desired point.

B² refers to the valve-rod which moves such valves, it being secured thereto, as shown in fig. 2, and passing up through the cover of the steam-chest, where it is provided with a stuffing-box for packing it. The upper portion of this rod may be square, or of any other suitable form to which to attach the anti-friction rollers, as shown in the drawings.

O refers to the valve-rod or bar, which, in this instance, is a bar of metal, which rests and moves upon a plate or bearing O¹, as shown in figs. 1 and 2. This rod or bar is to be connected to the eccentric, cam, or other valve-moving devices from which it derives its motion.

O² refers to a slotted wedge, which rests upon the valve-rod or bar C, where it is held in position by two screws, as shown in the drawings. The slot in this wedge is to be of such a length as to permit it to move longitudinally upon the valve-rod or bar for a distance about equal to the length of the bevel upon its inner end.

C¹ refers to a wedge, which is to be attached to the

valve-rod or bar at any point where it may be necessary to enable it to operate the induction-valve, its arrangement being clearly shown in the drawings.

C³ refers to a hook or stop, which is to be attached to the plate upon which the valve-rod or bar rests, or upon some other fixed part of the engine, and is to extend outward, as shown, to the required distance, to enable it to stop the movement of the wedge C¹ as it is being carried away from the valve-rod B², such cessation of its movement being necessary in order that the dog or trigger C⁴ may come in contact with its rear end, and that it may be placed in the proper position to raise the valve B at the proper time upon its return movement.

C⁴ refers to a dog or trigger, which is pivoted to the rod or bar C, and works in a slot formed therein, as shown in fig. 2.

The lower end of this dog extends below such bar for a distance sufficient to enable it to come in contact with an adjustable stop, D¹, hereafter to be described. The form of the upper end of this dog is clearly shown in fig. 2, it being such that, when its lower end is in a vertical position, it shall project above the surface of the rod or bar C, and thus carry forward the wedge, which lifts the induction and cut-off valve until it becomes necessary to cut off the steam, when its lower end is made to come in contact with the stop D¹, and that portion of its surface which was above the rod or bar C is carried downward, and the wedge C¹ is allowed to slide outward upon the rod or bar C, when the valve B drops and the steam is cut off.

C⁵ refers to a spring, which may be used to keep the dog or trigger in position, should it be found necessary, its arrangement being clearly shown in the drawings.

D refers to a guide, which may consist of a bar of metal secured to the steam-chest, from which it extends outward for a distance sufficient to enable it to guide the adjustable stop D¹ throughout its entire range of movement, as shown in figs. 1, 2, and 3.

D¹ refers to an adjustable stop, which may be of any suitable form, and is to be provided with a slot of the size and shape of the guide D, upon which it moves, and also with a pin for working in a slot in the arm which connects it with the governor, when one is used in connection with it, as shown in fig. 3; but when arranged to be operated by hand, as shown in figs. 1 and 2, it is to be provided with a nut for the reception of the adjusting-screw.

D² refers to a slotted arm, (in fig. 3,) which is attached to the sliding collar upon the shaft of the governor, or to that portion which is moved by weighted arms, or similar devices, for the purpose of controlling the speed of the engine to which it is attached, it being extended from such point to the adjustable stop D, and provided with a slot to receive a pin attached thereto, in order that, as the position of such arm is changed vertically by the action of the governor, the adjustable stop D¹ may be moved longitudinally upon its guide D, and thus the point at which the induction-valve B shall be closed, and, consequently, the steam be cut off, shall be controlled.

The device which corresponds to the one last described, and which is shown in figs. 1 and 2, consists of a screw, which may be operated by the hand of the attendant, and thus the stop be placed in any desired position to effect the result above named.

D³ D⁴ D⁵ refer to different parts of the governor, and its connection with the slotted arm above referred to, which may be of any approved form of construction, but which, considered separately, forms no part of my invention, and need not be more particularly described here.

The operation of my improved mechanism, and some of the advantages due thereto, may be stated as follows:

The parts having been constructed and arranged substantially as shown in fig. 3, the rod or bar C is supposed to be moving in the direction indicated by the arrow, the dog or trigger C⁴ being in the proper position to cause the wedge C¹ to move with the bar C, which is carried forward by the eccentric or other valve-moving device until the point of the wedge C¹ comes in contact with the roller B², when, through its action thereon, the valve B is raised from its seats, and the steam passes under its lower end to the cylinder of the engine. The governor having previously been arranged to cause the adjustable stop D¹ to stand in the proper position with reference to the dog or trigger C⁴, it comes in contact with such stop, and its upper surface is depressed, which permits the wedge C¹ to slide back upon the rod or bar C, and, consequently, the valve B to drop again to its seat, in doing which the flow of steam into the cylinder is arrested.

The downward movement of the valve-B is caused by the weight of the parts connected therewith, and by the spring E.

After the wedge C¹ has receded and the induction-valve has closed, the rod or bar C continues its movement in the same direction until it has traveled through the space due to the throw of the eccentric, when its movement is changed to an opposite direction, carrying with it the wedge C¹, until its rear end comes in contact with the hook or stop C³, when its motion is arrested; but as the rod or bar C continues to move in the same direction, it follows that the position of the wedge will be the same as in the commencement, and that the parts are ready to repeat the operation above described.

It will be seen that, during the backward movement of the rod or bar C, the wedge C¹ comes in contact with the roller B² upon the upper end of the induction-valve rod, and that it will thereby be opened for the escape of the steam.

As a consequence of the construction of the valve B, I am enabled to relieve it of nearly, if not quite, all of the friction usual upon steam-induction and induction-valves, and thus effect a great economy of power, the opening movement requiring but a small amount of force to effect it, and the closing less than the opening.

Another advantage due, in part, to the construction of the valve, and in part to its combination with its operating mechanism, consists in the rapidity with which the valve closes when the point at which it is desirable to cut off the steam has been reached, it being a fact that the more rapid the movement of the valve at such time, the greater the economy in steam.

I am aware that double-seated valves, having bearing surfaces of different diameters, have been used for safety-valves, and, consequently, that they are not novel, when broadly considered. I am, however, not aware that a valve constructed as mine is, in the form of a tube, with a projecting bearing-surface upon its upper end of greater diameter than the body of the tube, and a bearing-surface upon its lower end of the same diameter as the body of the valve, has ever been made or used.

I do not desire to be understood as claiming, broadly, a cylindrical valve; but having thus described my invention,

What I claim, and desire to secure by Letters Patent, is—

1. The double-seated tubular valve, of equal diameter from the lower portion of the upper valve-seat to the upper portion of the lower seat, it being so arranged as to receive the steam upon its inner surface and discharge it through its lower end, substantially as and for the purpose set forth.

2. The combination of the tubular valve and its cup-shaped casing, having apertures for the discharge of

the steam, substantially as and for the purpose set forth.

3. The combination of a wedge for operating the cut-off valve of a steam-engine, and a rod or bar which receives its movement from the eccentric or cam, when the parts are so arranged that the wedge has a positive motion with reference to such rod or bar during a portion of its movement, but a motion or movement independent of such rod or bar during the remainder of its movement, substantially as and for the purpose specified.

4. The combination and arrangement of the rod or bar C, the movable wedge C', trigger or dog C', hook or stop C', and adjustable stop D', substantially as and for the purpose set forth.

5. In combination with the parts enumerated in the

fourth clause, the slotted arm D', or its equivalent, and the governor, substantially as and for the purpose set forth.

6. The arrangement of the valves B B, their rods B² B², rollers B³ B³, spring E, wedge C', and rod or bar C, as a consequence of which the movement of the rod or bar C is made to operate both the induction and eduction-valves, substantially as shown and described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

G. E. NOYES.

Witnesses:

F. H. SPRAGUE,
B. EDW. J. EILS.