

Patented Nov. 8. 1870.

Fig. 2. shows an alternative arrangement where the rectangular component b^* is positioned between the vertical components a^* and c . The label A is placed below the central area.

Fig. 3. shows another alternative arrangement where the rectangular component b^{**} is positioned between the vertical components c' and a^{**} .

Inventor:
Thomas May
By Van Hookwood Haupt
his atty.

United States Patent Office.

THOMAS MAY, OF BROOKLYN, NEW YORK.

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IMPROVEMENT IN VARIABLE CUT-OFF APPARATUS.

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, THOMAS MAY, of Brooklyn, in the county of Kings and State of New York, have invented a new and improved Cut-Off; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification, in which drawing—

Figure 1 represents a longitudinal section of this invention.

Figure 2 is an inverted plan of the valve.

Figure 3 is a plan or top view of the valve-seat.

Similar letters indicate corresponding parts.

This invention consists in the arrangement of an auxiliary cylinder and piston in the back of or connected to the slide-valve, in combination with suitable steam and exhaust-ports in the valve-seat, in such a manner that, when the main piston has completed the required part of its stroke, steam is admitted to one part of the auxiliary cylinder and exhausted from the other part, and the auxiliary piston is caused to move and to close the steam-port in the slide-valve, thus cutting off the steam at the required point of the stroke.

The exhaust-ports in the valve-seat, which communicate with the exhaust-ports of the auxiliary cylinder, are provided with slides, so that they can be adjusted, and that the time when the steam exhausts from said auxiliary cylinder, and consequently the point of cut-off, can be regulated at pleasure.

In the drawing—

The letter A designates the slide-valve, which is seated on the bottom B of the steam-chest, in the ordinary manner.

This bottom or valve-seat is provided with two steam-ports, *a a'*, which communicate with the opposite ends of the main cylinder, and with two exhaust-ports, *b b'*, which communicate with the exhaust-pipe.

The slide-valve is provided with two ports, *a* a**, which control the induction of steam through the ports *a a'*, and with two cavities, *b* b**, which control the eduction of the steam from the main cylinder, as will be presently explained.

The ports *a* a** in the slide-valve communicate with auxiliary cylinders, C C', formed in the back of said slide-valve, and fitted with auxiliary pistons, D D', which are connected by a rod, E.

The auxiliary cylinders are open on their outer and closed at their inner ends, and they are provided with ports, *c c'*, through which steam is alternately admitted and exhausted, the mouths of said ports being so situated that, when the slide-valve moves on its seat,

they are alternately brought over the auxiliary ports *d d'*, and then over the cavities *e e'* in the valve-seat.

The auxiliary exhaust-ports *d d'* are provided with slides, *f f'*, whereby their area can be increased or diminished, and the time when the steam from the auxiliary cylinders is allowed to exhaust can be regulated.

When the slide-valve is moving in the direction of the arrow shown thereon, in fig. 1 of the drawing, steam passes in through the open end of the auxiliary cylinder C, and through the ports *a** and *a* into the main cylinder, and the main piston moves in the same direction as the slide-valve. But, by the time the main piston has completed half its stroke, the slide-valve has reached the position shown in fig. 1, and at this point the steam from the auxiliary cylinder C exhausts through the ports *c* and *d'*, while the auxiliary cylinder C receives steam through the cavity *e* and port *e*, and the auxiliary pistons D D' are suddenly moved to the opposite end of their stroke from that which they occupy in fig. 1. The port *a** is thereby closed, and steam is cut off from the corresponding end of the main cylinder, while the port *a'* in the valve is opened. This port, however, is not in position to admit steam to the main cylinder; but while the main piston completes its stroke, the slide-valve is moved in the direction opposite the arrow marked thereon, in fig. 1, and by the time the main piston has reached the end of its stroke, the port *a'* in the valve-seat begins to open so as to admit steam to the main cylinder, while the steam from the opposite end of said cylinder exhausts through the port *a*, cavity *b**, and port *b*. The main piston begins its return stroke and when it has completed one-half of its stroke the steam is again cut off by the motion of the auxiliary pistons, as above stated.

In the foregoing description the time for cutting off the steam has been assumed to be at half-stroke, but this time can be changed by changing the time for exhausting the steam from the auxiliary cylinders. This change is effected by the action of the slides *f f'*. If these slides are pushed in, the slide-valve has to travel a greater distance before the steam from the auxiliary cylinders is allowed to exhaust, and steam is cut off from the main piston at a later period of the stroke of its piston, and, by drawing the slides *f f'* out, the reverse takes place, and steam is cut off at an earlier part of the stroke.

The slides *f f'* can be adjusted by hand, or they may be connected to the governor so that they are adjusted automatically, as may be required.

It must be remarked that the pistons D D' might be connected to the slide-valve and the auxiliary cylinders made movable without changing the result.

The auxiliary cylinders are provided with cavities,

h h', to receive projections *i i'*, on the auxiliary pistons, so as to cushion said pistons and prevent slamming.

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

1. The auxiliary piston or pistons *D D'*, moving in a cylinder or cylinders connected to the slide-valve *A*, in combination with ports *a a'*, *a* a**, *c c'*, and *d d'*, substantially in the manner described, so that the auxiliary piston or pistons are caused to move automatically at the proper intervals, and that, by their mo-

tion, steam is cut off from the main cylinder at the required part of the stroke of the main piston.

2. The combination of slides *f f'* with the auxiliary exhaust-ports *d d'*, substantially as described, so that the time when the motion of the auxiliary pistons takes place can be regulated and the cut-off varied to any desired part of the stroke.

THOMAS MAY.

Witnesses.

W. HAUFF,
C. WAHLERS.