C. A. AMERMAN.

Valve-Gear for Steam-Engines.

No. 164,123. Patented June 8, 1875.

fig. 1

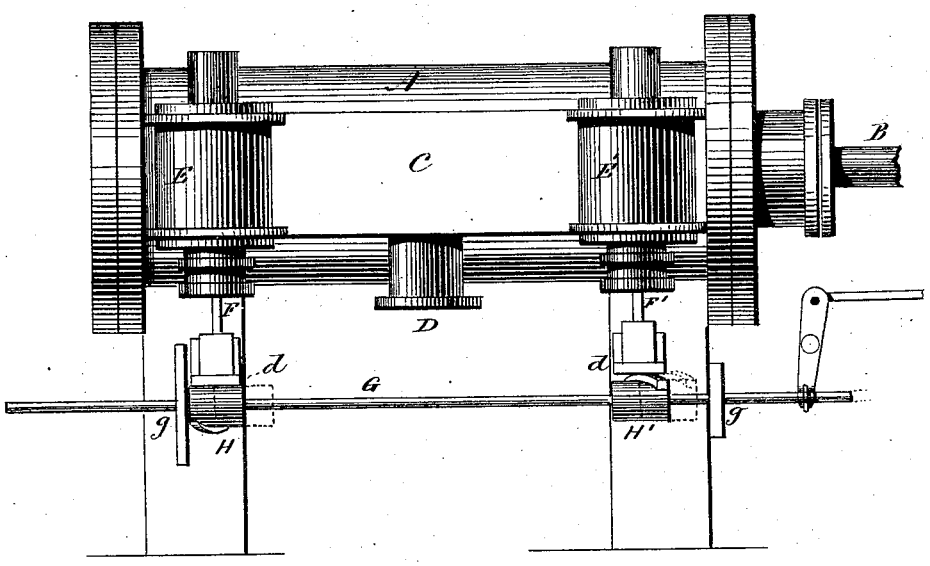
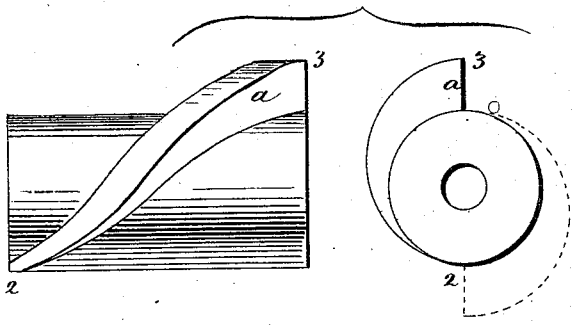


fig. 1a



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UNITED STATES PATENT OFFICE.

CHARLES A. AMERMAN, OF HARTFORD, CONNECTICUT.

IMPROVEMENT IN VALVE-GEARS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **164,123**, dated June 8, 1875; application filed February 18, 1875.

To all whom it may concern:

Be it known that I, CHAS. A. AMERMAN, of Hartford, in the county of Hartford and State of Connecticut, have invented a new Improvement in Steam-Engines; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Sheet 1, Figure 1, side view; Fig. 1ª, cut-off cam enlarged.

This invention relates to an adjustable or variable cut-off, applicable to both simple and compound engines; and consists in combining, with the two induction-valves, a revolving shaft, carrying a pair of cams, one for each valve, the said shaft and cams having also a longitudinal or axial movement, the fall-off of the cams spiral and encircling one-half the hub, the same relative points on the one opposite those of the other, and the height of the fall-off increasing from one end to the other, as more fully hereinafter described.

A is the cylinder; B, the piston-rod; C, the steam-chest; D, the steam-inlet; E E′, the valve-chambers, and F F′ the valve-stems, all substantially of well-known construction for variable or adjustable cut-off. G is a horizontal shaft, arranged in bearings *g g*, and connected with the driving-shaft of the engine by suitable gearing, so as to receive a positive and continuous revolution when the engine is moving, and also connected to the governor by suitable levers, so that as the governor rises and falls by the variation of the speed of the engine a corresponding longitudinal or axial movement will be imparted to the said shaft. On this shaft G two cams are rigidly fixed, so as to positively move with the shaft in both its axial and revolving movement. These cams are arranged one beneath each valve-stem. They are both alike—one shown enlarged in Fig. 1ª. They each consist of a cylinder or hub, H, and on this a rib, *a*, constitutes the rise and fall-off. This rib extends spirally one-half around the hub, starting from nothing at the point 2, and gradually increasing to the highest point 3 on the opposite side. The two cams are set upon the shaft, each in the same relative axial position to its respective valve-stem, and so that the fall-off of one is at all points opposite corresponding points of the other, as denoted in broken lines—that is to say, the starting or lowest point of one begins at the highest point of the other. Hence, if the action of the cams upon the valves be through their full extent, one will begin to act the instant the fall-off occurs on the other.

Such full action will admit steam through the entire stroke. This is the normal relative position of the cams to their respective valve-stems; but so soon as the speed of the engine causes the governor to act the shaft G and the cams will be drawn axially away from the valve-stems, as denoted in broken lines, Fig. 1. The fall-off and the closing of the valve will then occur before the completion of the stroke, to the extent of the axial movement of the cams—that is to say, an axial movement of one-half the length of the cams will cut off at half-stroke the area of opening of the valve diminished in same proportion; but in all cases the commencement of the opening of the valves occurs at the same time or point in the stroke—that is, at the 2.

The cam is a spiral rib, as shown, and that it may act upon the valve-stem throughout its length the valve-stem is provided with a shoe, *d*, (seen enlarged in Fig. 1ᵇ,) of the length of the cam, so that the commencement or lowest point of the rib will strike the shoe at the same time at any point within the axial or longitudinal movement of the cam.

Some of the advantages of this spiral rib and shoe on the valve-stem over the usual cam used for this purpose are, first, the wear between the rib and the shoe extends over the whole surface of both, whereas in the old construction the bearing-point of the valve-stem on the cam must be small, and hence will wear away with much greater rapidity than the shoe, and is also liable to wear grooves in the cam; and, second, the cost of producing the usual cam is much greater than in this invention, because in this invention the rib is made from a bar of steel bent into the required form, and secured in a spiral groove, which is easily made in the surface of the cam.

I do not wish to be understood as broadly claiming any of the elements herein described, except in the combination as hereinafter specified.

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

In combination with the valve-spindles F F′ of a steam-engine, each provided with a shoe, *d*, the shaft G, with the spiral ribs *a* arranged thereon, and of increasing elevation from one end to the other, in the relative position described, and having a continuous revolution imparted through said shaft, combined with an adjustable axial movement, substantially as described.

CHAS. A. AMERMAN.

Witnesses:
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