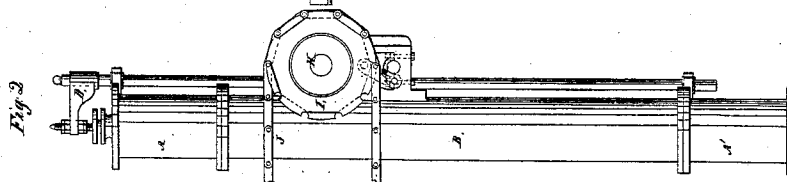
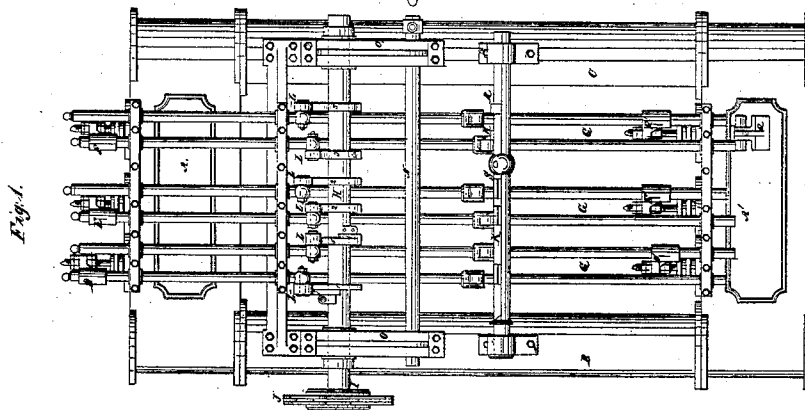
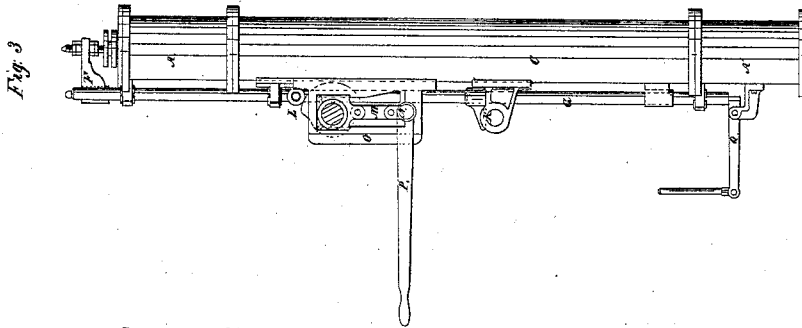
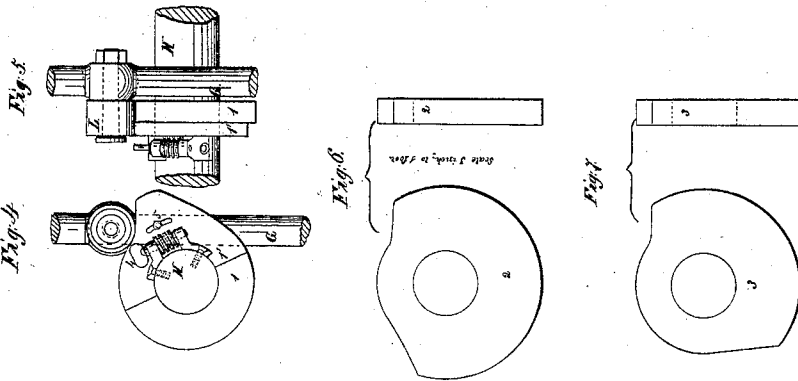


D. Barnum,
Steam-Engine Valve-Gear.

N^o 25,798.

Patented Oct. 18, 1859.



Witnesses:

D. Barnum
E. A. Barnum,

Inventor:

Daniel Barnum

UNITED STATES PATENT OFFICE.

DANIEL BARNUM, OF NEW YORK, N. Y.

STEAM-ENGINE.

Specification of Letters Patent No. 25,798, dated October 18, 1859.

To all whom it may concern:

Be it known that I, DANIEL BARNUM, of the city, county, and State of New York, have invented new and useful improvements in valve-gear, and in the manner of arranging and working the same, so as to constitute an adjustable rotary cut-off, for steam-engines; and I do hereby declare the following to be a full and clear description of the same, reference being had to the accompanying drawings, wherein—

Figure 1 represents a front view of a double cylinder engine as applied on the steam boat "Economy," with these improvements. Figs. 2 and 3 are side elevations showing the chain wheel and the manner of raising and lowering the cam shaft, which answers to the technical phrases, of hooking, and unhooking, the engine. Figs. 4 and 5, are side, and front, views of the cut off cams in detached figures, and enlarged scale, showing the adjusting screw, in connection with the adjustable portion of the cam, so as to effect the adjustment while the engine is in motion. It should be understood that the adjustable portion of the cam may be used with a simple screw bolt working in a slot, the point of cut off being set while the engine is at rest. Figs. 6 and 7 are side and edge views of the expansion and exhaust cams as proportioned for this particular form of engine, but it will of course be understood that the exhaust cam for a single cylinder engine will require to be so proportioned as to give the proper lead in opening the valves and so also as to close them at the proper time for the reception of the steam on each center, as with the ordinary rack shaft and toes, when worked by an eccentric.

The nature of my invention consists in constructing adjustable cut off cams in two parts of the same shape forming one cam, and in the manner of arranging them on a revolving shaft, in combination with adjusting screws, and with other cams thereon, and in combining these, substantially as arranged, with lifting rods, and by this means, with puppet valves, in steam engines, substantially as shown in Fig. 1, thus forming a revolving cam, puppet valve gear, with an adjustable cam cut off, which possesses the capacity of adjustment, so as to vary the point at which the valve is permitted to return to its seat, during the stroke of the piston, while the engine is in motion. The

effect of this capacity for adjustment is to enable me to increase, or diminish, at pleasure, the arc, or segment of a circle formed by that portion of the periphery of both parts of the adjustable cams, upon which the valves rest, when they are fully open, and thus to keep valves open for the admission of steam into the cylinder, for a longer, or shorter, period as desired, by which means I secure the greatest efficiency, as well as economy in working steam.

It should be understood that I do not intend to limit myself to the particular form of engine shown in the drawings, as this valve gear, and cut off, is equally applicable to the ordinary puppet valve, single engine, and to the one shown. I do not claim either adjustable cut off cams, or adjusting screws as devices.

To enable others skilled in the arts to make and use my invention I refer to the drawings, where it will be seen in Fig. 1, that A represents the steam chests; B and C, the side pipes; D, the steam valves and lifters on the lifting rods G; E, the expansion valves, and lifters; F, the exhaust valves and lifters, all of which are operated by cams on the rotating shaft H by means of the chain wheel I and chain J, this chain extending to and around a corresponding wheel on the main shaft of the engine; upon the lifting rods G are seen friction rollers L, which rest upon, and are operated by, the cams —1—1— 2—2— 3—3— at the proper times for admitting, or exhausting the steam into, or from the engine. This revolving cam shaft H is fitted and arranged so as to be raised or lowered, whenever it may be desired to stop, or start the engine, by means of the toggle joints M, the shaft N, and the hand lever P or by any analogous device. These arrangements will be understood by an examination of Figs. 1, 2 and 3, the revolving cam shaft being made to slide up and down in the boxes O, attached to the side pipes B and C. B is the steam side pipe, and C the exhaust side-pipe. The two cylinders being attached to the steam chests A. Now it should be understood that for a single cylinder engine, the valves F, with their connections of lifting rods, cams, &c., are to be dispensed with, and the cams 2, 2, as seen in Fig. 6, so altered in their proportions as to seat the exhaust valve at the proper time for the admission of the steam, as in the ordinary

way with the rock shaft and toes. The cut off cams, are constructed as seen in Figs. 1, 4, and 5, in two parts, part 1, being fixed to the shaft H, and part 1', is made adjustable so as to vary the point of cut off by either increasing or diminishing the arc of the circle, formed by the cam. The means of adjustment are seen in Figs. 4, and 5. They consist of an adjusting screw as shown at 4, Fig. 4. This arrangement enables me to adjust the cut off while the engine is in motion, or, a bolt and nut as seen at 5, working in a slot may be used, but with this the cut off is required to be adjusted, when the engine is at rest. Otherwise, the result is the same in both. The friction rollers L, for the cut off cams, are to be made longer than the others, so as to extend over the adjustable part 1' as seen in Figs. 1 and 5.

K, represents the trip shaft, for working the engine by hand, the toes upon this shaft are so arranged and constructed, as to work the whole of the six lifters and valves, so as to secure the benefit of the cranks at right angles.

S, shows a place for the starting bar.

R, R, are toes upon the trip shaft which are elevated, these are to be slipped from under the toes on the lifting rods, when the engine is hooked on, as shown in Fig. 1, and they are to be slipped under when the engine is to be worked by hand. For this purpose the lever Q is placed under the lifting rods so as to raise them up, when the trip shaft is to be slipped under the toes thus keeping the valves F, F, off their seats, so that the engine may be worked by hand as a single engine, or by an additional motion of the

starting bar, these two valves may be seated, alternately, and both cylinders used. It will be seen that the toes upon the trip shaft which are to work the valves D and E, are extended so as not to leave the toes on the lifting rods, when the trip shaft is slipped so as to remove the toes R, from the rods F.

Having thus fully described my improvements with a method for applying them, I do hereby declare that I do not claim a revolving cam shaft, as such, to be operated for working valves, or for cutting off steam, in steam engines, these having been before used for such purposes, but not in the same manner, or in the same combinations, as described and claimed by me.

What I do claim as new and of my own invention, and which I desire to secure by Letters Patent of the United States, is—

1. The method of constructing and combining adjustable cut off cams, and adjusting screws, and a revolving and sliding rock shaft, substantially as specified, and of combining these with the means described for working puppet valves in steam engines, substantially as and for the purposes specified.

2. The method of constructing, or using, or adjusting, the cut off cams, 1, 1', for the purpose of enabling me to fix, or to adjust the point, at which the steam is to be cut off during any portion of the stroke, whether it be done while the engine is in motion or at rest, substantially as described and shown Figs. 1, 4 and 5.

DANIEL BARNUM.

Witnesses:

JOANNA BARNUM,
EMILY A. BARNUM.