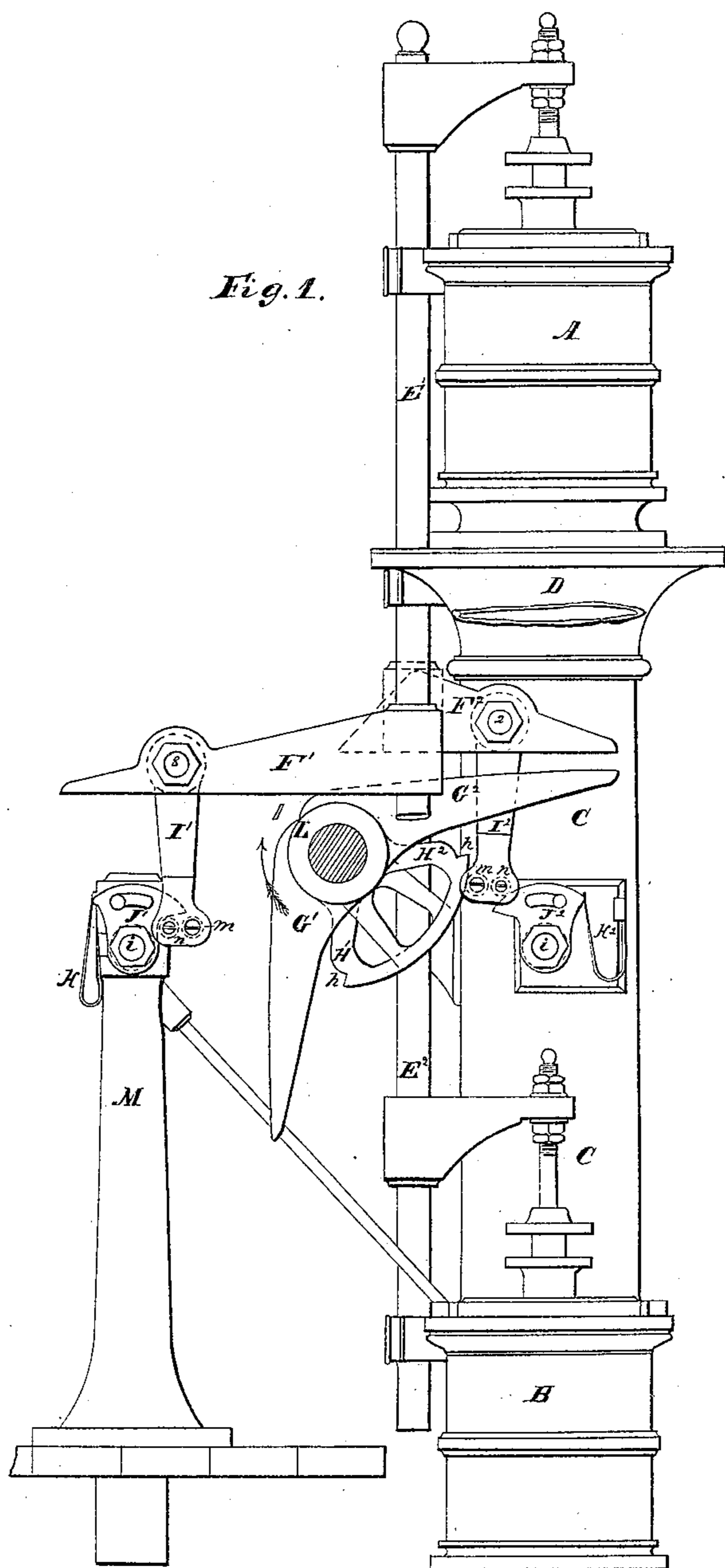


E. R. Arnold, ^{2 Sheets. Sheet 1.}

Steam Cut-Off.

N^o 23,998.

Patented May 17, 1859.



Witnesses:
L. Aug. Arnold
Howard Rogers.

Inventor:
Edward R. Arnold.

E. R. Arnold, 2 Sheets. Sheet 2.

Steam Cut-Off.

N^o 23,998.

Patented May 17, 1859.

Fig. 2.

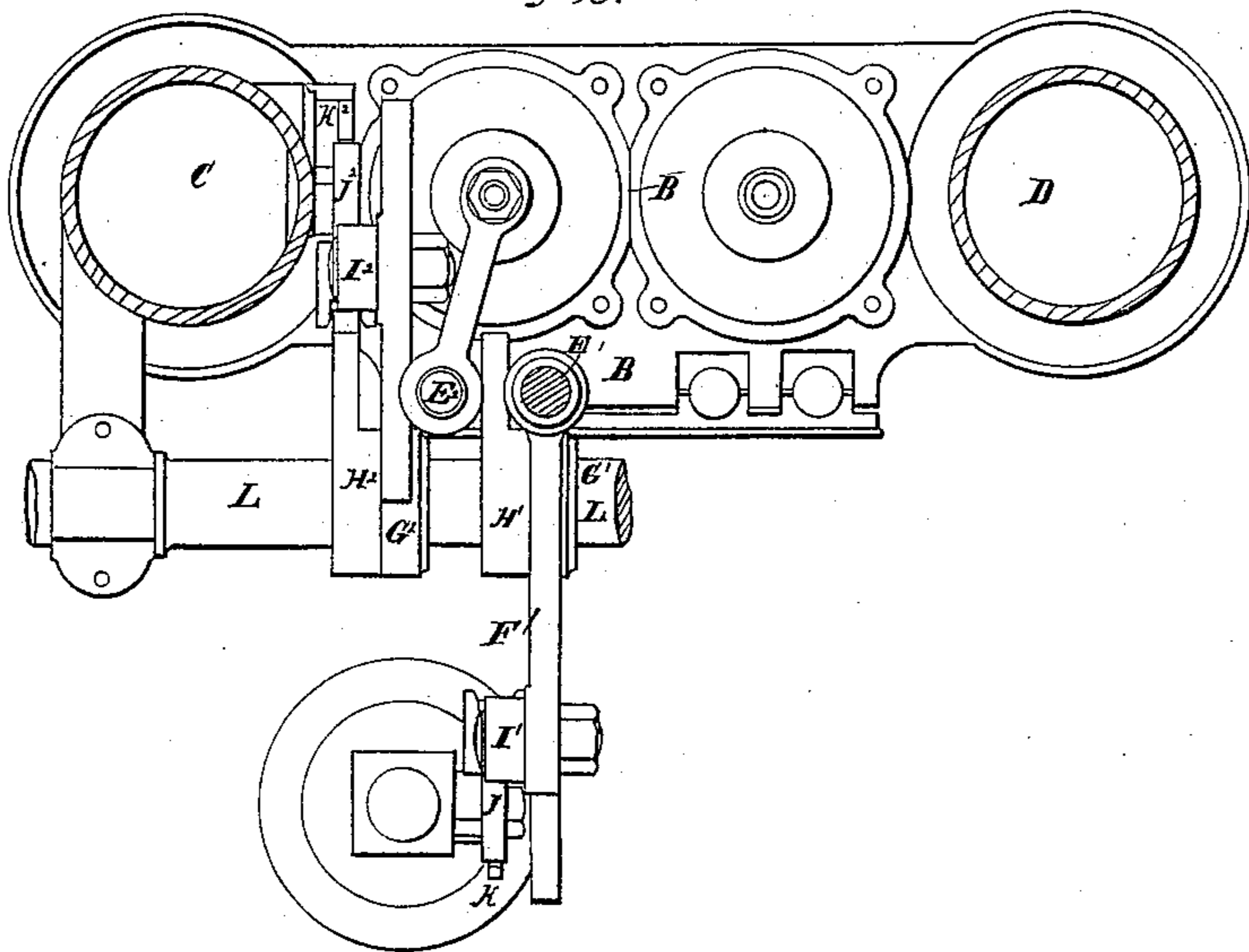


Fig. 3.

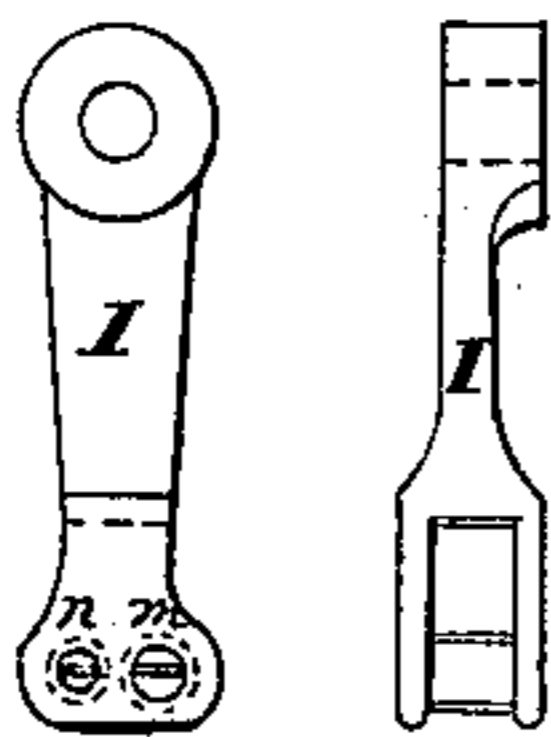


Fig. 4.

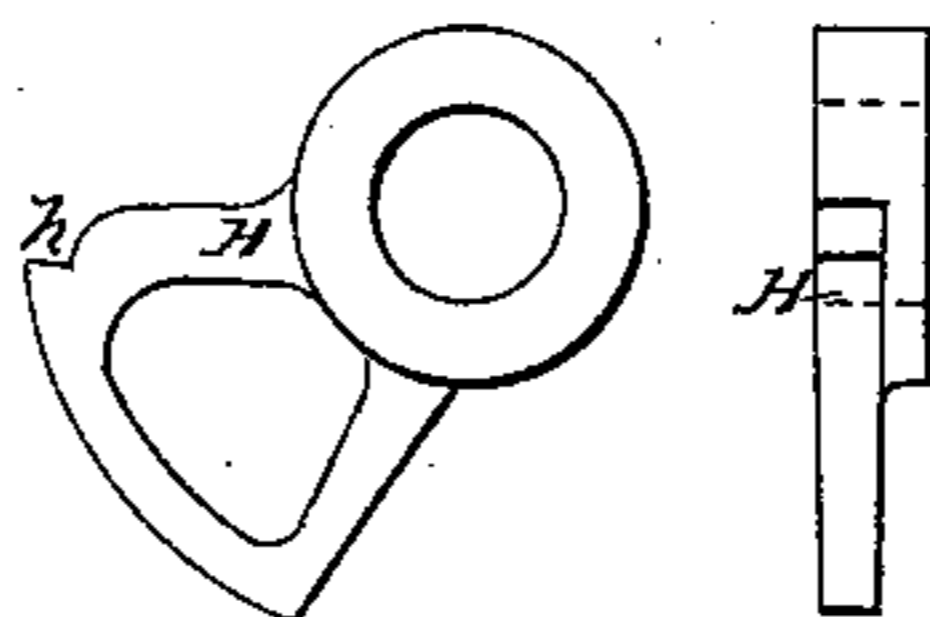
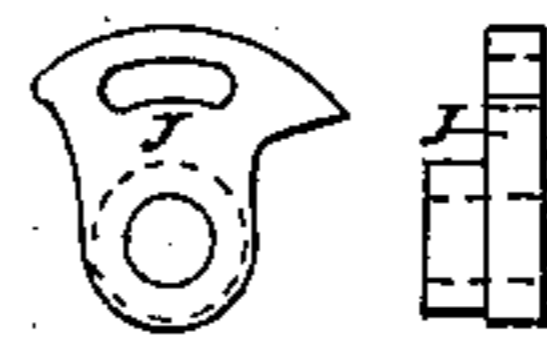


Fig. 5.



Witnesses:
S. Aug. Arnold
Howard Rogers.

Inventor:
Edward R. Arnold.

UNITED STATES PATENT OFFICE.

EDWARD R. ARNOLD, OF PROVIDENCE, RHODE ISLAND.

CUT-OFF GEAR OF STEAM-ENGINES.

Specification of Letters Patent No. 23,998, dated May 17, 1859.

To all whom it may concern:

Be it known that I, EDWARD R. ARNOLD, of the city and county of Providence, in the State of Rhode Island, have invented a new and useful Improvement in Cut-Off Valve-Gear for Steam-Engines; and I do hereby declare that the following specification, taken in connection with the drawings making a part of the same, is a full, clear, and exact description thereof.

Figure 1, is a side view of the side pipes and valve chests of an ordinary steam engine, having what is known as the Stevens cut-off—to which is attached the improvement which I claim as my invention. The exhaust pipe in the drawing is represented as broken off. Fig. 2 is a plan of an engine so arranged. Figs. 3, 4, and 5 are the detailed parts composing my improvement.

The Stevens cut-off valve gear is by far the most common arrangement in marine engines for working steam expansively. Its general use since its first introduction has made it familiar to engineers while its simplicity and freedom from liability to derangement has given it an universal popularity with constructors. Its principal defect is, however, that it cannot be used as a variable cut-off and consequently is subject to considerable disadvantages in cases where as in a rough sea or on a lee shore it is desirable to have the steam follow the piston farther than the point to which the valve gear is set to cut-off.

To so improve this description of valve gear that the cut off may by the hand of the engineer be adjusted instantly to any part of the stroke is the object of my invention.

In the accompanying drawings the upper steam and exhaust valves are represented as operated by the toes G' , G^2 working on the rock shaft L. By the use of the improvement hereinafter next described both the toes for the steam and exhaust valves can be worked by one eccentric while if the improvement is applied only to the mode of operating the steam valves a separate eccentric working through a separate rock shaft should as in the Stevens arrangement be applied to the exhaust valves.

To the foot of each of the lifters as F' , F^2 I attach upon a pivot (α) so as to vibrate freely an arm I' , I^2 . As the toe G' moves in the direction of the arrow the valve is lifted. When the lifter has reached its

highest point of ascent the arm I' , I^2 is correspondingly raised. At this moment the stop block J' , J^2 capable of vibrating freely on the pivot (i) in the supporting pillar M is thrown forward by the action of the spring K' , K^2 so that the arm I' , I^2 as it descends will come in contact with it.

H' H^2 (also Fig. 4) are cams or sectors set on the rock shaft L and capable of being moved to such positions on the rock shaft in reference to the position of the toe G' G^2 as the engineer may desire; so long as the true face of this sector is in contact with the friction roller — m — in the arm I' I^2 it will prevent the arm from sliding or rolling off the inclined face of the stop block J' J^2 . When however in the course of its motion the notch or recess — h — in the sector passes the roller in the arm I' I^2 rolls off the stop block and permits the valve to close. As the rock shaft again moves the toe in the direction of the arrow to commence the next stroke the arm I' I^2 rises and by the friction roller (n) pressing against the under inclined side of the stop block pushes it away from its path, when as it reaches its highest point of ascent the stop block J' J^2 darts forward again, by the action of the spring K' — K^2 as before described.

It will be seen that by this arrangement the steam or exhaust valves can be kept open during any period of the stroke desired—the length of time being dependent upon the position of the sector upon the rock shaft.

I propose to connect the two sectors which govern the steam valves together so that by a hand lever or screw gear their positions can be instantly adjusted so as to effect a cut off of the steam in its passage into the engine at any desired point in the stroke.

I do not limit myself to the construction of the several parts which compose my improvement precisely as described as it is evident that the form, position and arrangement of the several parts may be greatly varied without changing the principle of my invention.

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

1. The combination of an adjustable cam or sector H' H^2 —Fig. 4 or its equivalent located on the rock shaft; a stop block J' — J^2 —Fig. 5—or its equivalent and an arm I' I^2 Fig. 3—or its equivalent attached to the devices which lift the valve the three so com-

bined operating to regulate the cut off of the steam in its passage into the engine at any desired point of the stroke in the manner and on the principle substantially as described.
5

2. I claim the same combination above specified for the purpose of working the ex-

haust valves of a steam engine by means of the same rock shaft and eccentric motion with which the steam valves are operated.

EDWARD R. ARNOLD.

Witnesses:

AUG. ARNOLD,
HOWARD ROGERS.