

(No Model)

C. W. HUNT.
VALVE GEAR FOR STEAM ENGINES.

No. 410,709.

Patented Sept. 10, 1889.

Fig. 1.

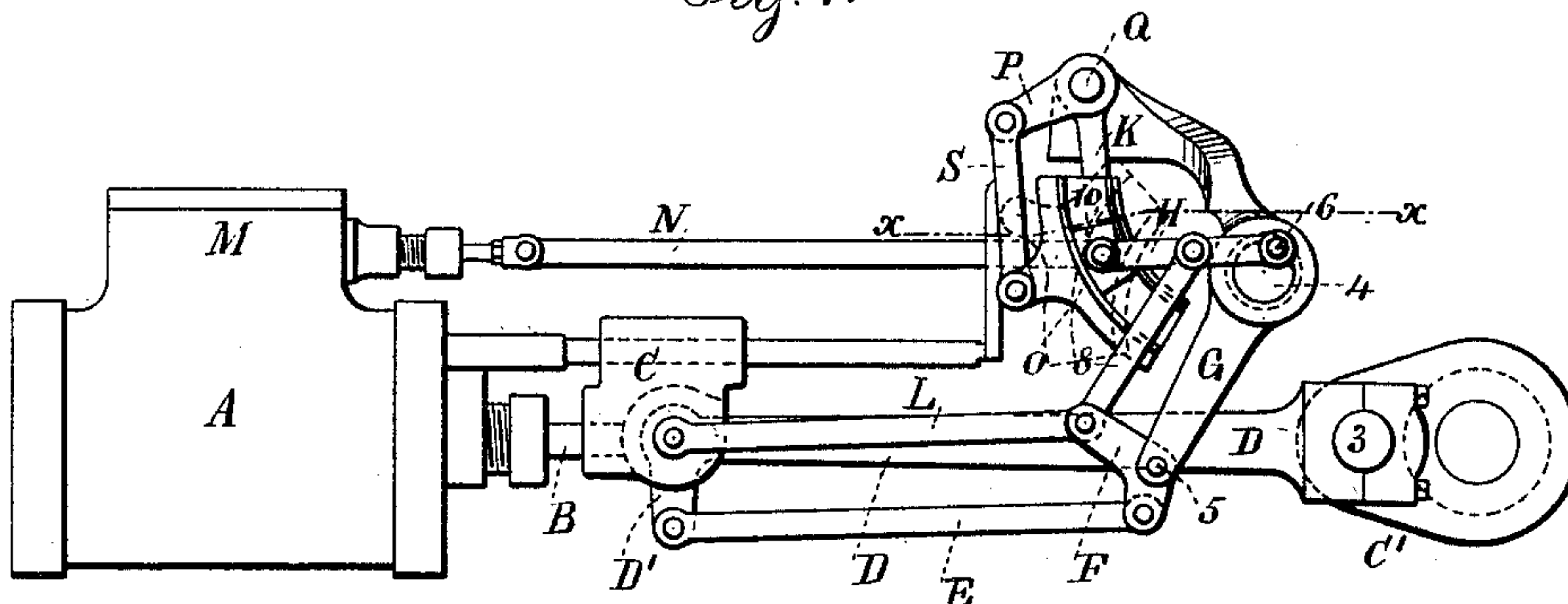


Fig. 2.

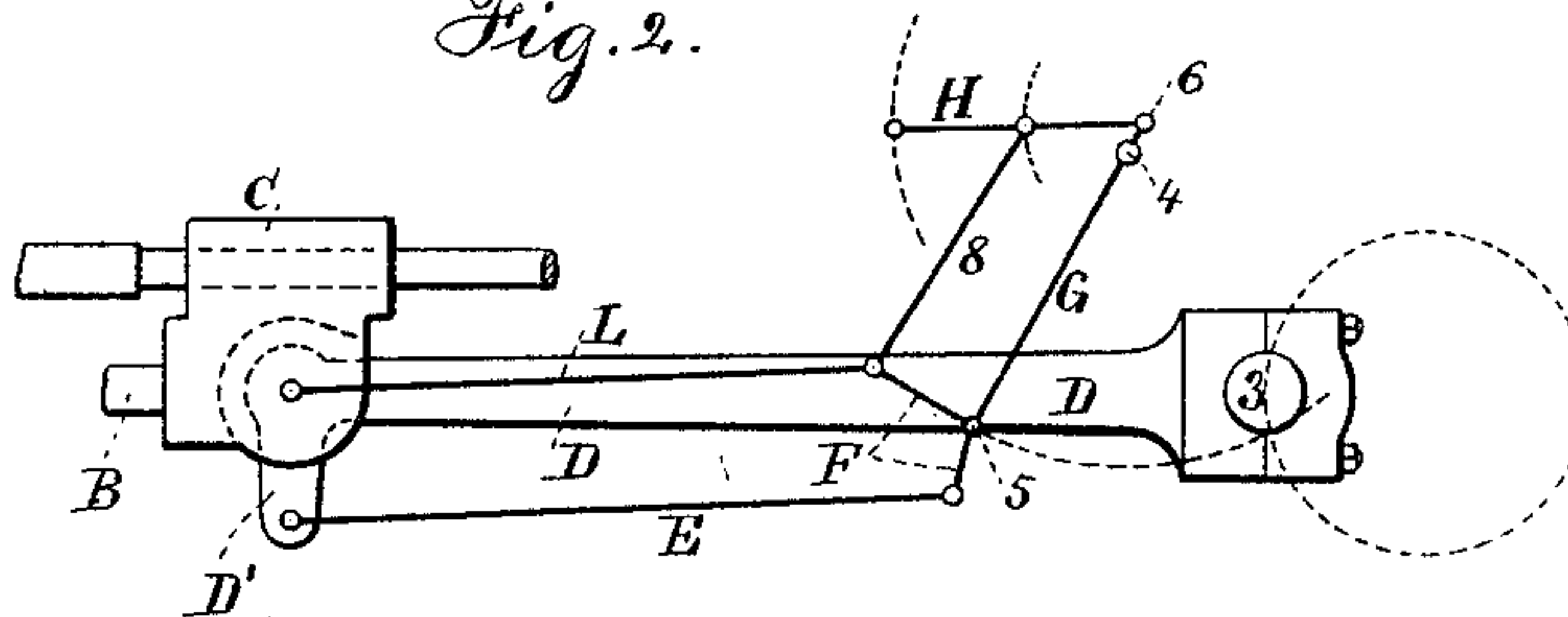


Fig. 4.

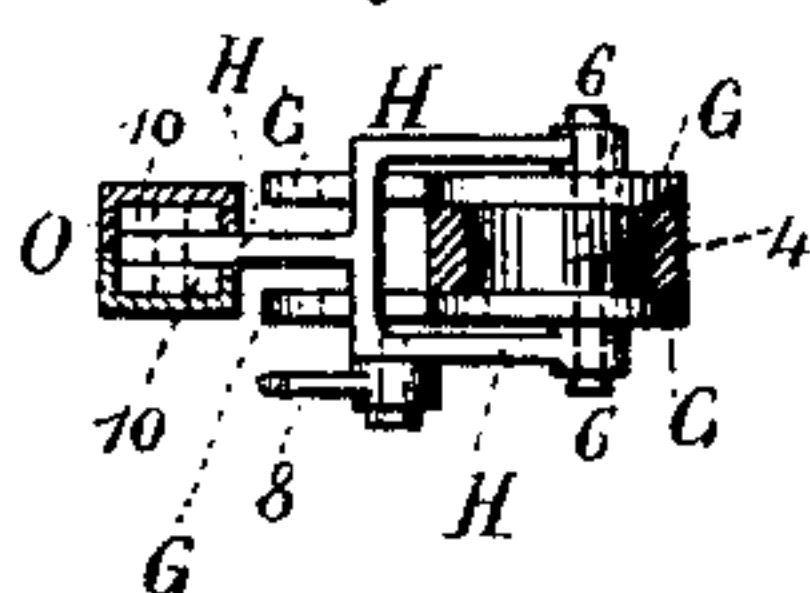
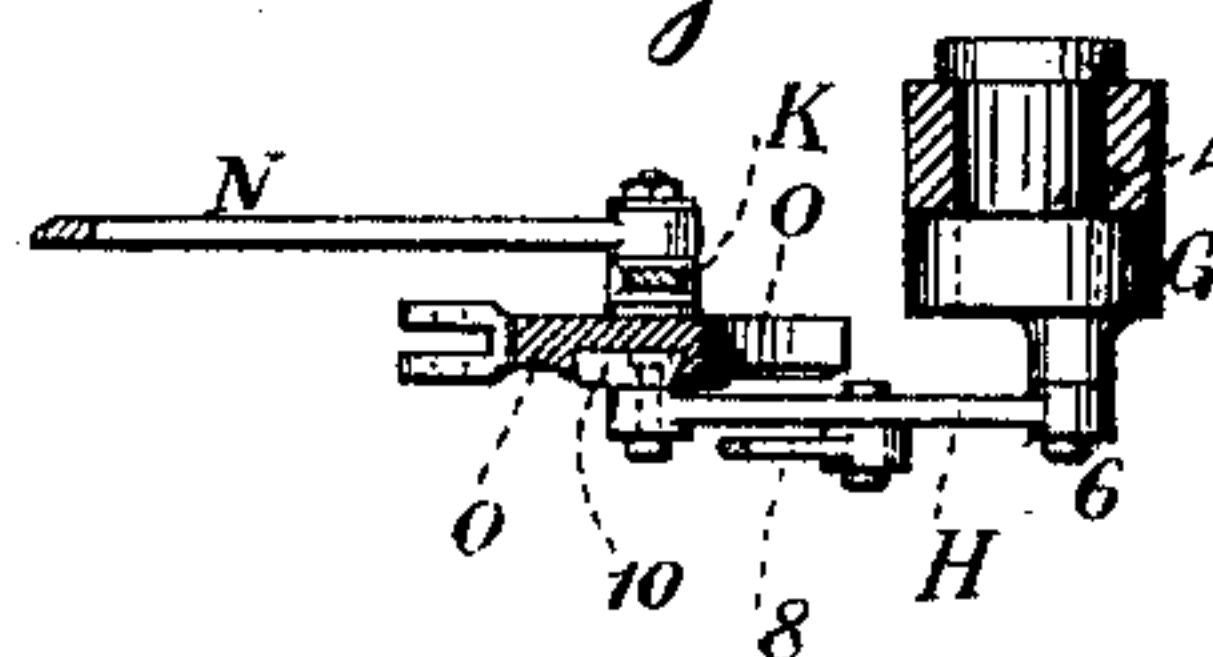


Fig. 3.



Witnesses:

J Staib.
Chas H. Smith

Inventor:

Charles W. Hunt

per Lemuel W. Serrell atty

UNITED STATES PATENT OFFICE.

CHARLES W. HUNT, OF WEST NEW BRIGHTON, ASSIGNOR TO THE C. W. HUNT COMPANY, OF NEW YORK, N. Y.

VALVE-GEAR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 410,709, dated September 10, 1889.

Application filed July 17, 1889. Serial No. 317,797. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. HUNT, of West New Brighton, in the county of Richmond and State of New York, have invented
5 an Improvement in Valve-Gears for Steam-Engines, of which the following is a specification.

This valve-gear is intended especially for railway-locomotives, but may be employed
10 wherever available.

I make use of a connecting-rod in the form of a bent lever, the short arm of which gives a rocking motion through a link to a rocker pivoted upon a swinging radius-arm, and the
15 valve receives its motion from a swinging link and block moving within a slotted sector.

The special feature of my improvement relates to the combination, with the parts before mentioned, of an eccentric pivot between
20 the swinging link and the radius-arm, whereby the radius-arm in its movement varies the position of the pivot of the swinging link sufficiently to produce the lap and lead required of the valve in the engine.

In the drawings, Figure 1 is an elevation of the devices made use of by me, and Fig. 2 is a diagram illustrative of the motions given to the respective parts. Fig. 3 is a sectional
25 plan view below the line $x x$, Fig. 1; and Fig. 4 shows the sector made in two parts and the radius-arm as double.

The engine-cylinder A, piston-rod B, cross-head C, crank C', crank-pin 3, and connecting-rod D are of ordinary construction, and the
35 connecting-rod D has a short arm D' at right angles to the connecting-rod itself, so that such connecting-rod and short arm form a bent lever, and there is a radius-arm G, having a pivot or gudgeon 4, supported by an arm
40 upon the frame of the engine, having an eye at the end, and at the moving end of this radius-arm G is a rocker F in the form of a bent lever, one end of which is united by a link L directly to the cross-head C, and the
45 other end is united by a link E to the short arm D' of the connecting-rod; hence in the movement of the parts the rocker F swings the radius-arm G upon its pivot 4, and the rocker F is swung upon its pivot 5 at the end
50 of the arm G, in consequence of the short arm

D' of the connecting-rod having a swinging movement as the crank-pin 3 describes a circle, and the end of the connecting-rod D rises and falls as it moves with such crank-pin; hence the link H, pivoted at 6 upon the radius-arm
55 G, receives a swinging motion up and down by the link 8 between the rocker F and said link H, and in addition to the up-and-down swinging motion given to the link H the pivot 6 thereof describes an arc of a circle, and as
60 the radius-arm G is moved it carries the pivot 6 toward and from the valve-chest M, for giving to the valve the lap and lead required according to the direction in which the piston is moving. The valve-rod N is connected to
65 the valve within the chest M, and such valve may be of any desired character, and at the other end of such valve-rod N is a sector O, pivoted at or near its center to such valve-rod N, and this valve-rod and sector can move
70 back and forth in line with the valve-rod, the parts being supported by a pin in a horizontal slot, or, preferably, hung by a loose link K from the shaft Q, to which shaft a reversing-lever of any desired character is to be applied,
75 and upon the end of the shaft Q is a crank-arm P and a link S to an arm upon the sector O. In this sector O is a slot or curved channel the radius of which is the same length as the swinging link H, and in the slot of this
80 sector is a block 10, to which the moving end of the swinging link H is pivoted. If now the parts stand in the position represented by the full lines in Fig. 1, the valve receives its motion from the endwise movement given to the
85 valve-rod N by the block 10 being moved up and down in the curved slot of the diagonally-placed sector O by the swinging link H, which link receives its motion as before described, and the proportion of the parts is such that
90 the center of the block 10 is in line with the connection between the sector O and the valve-rod N when the crank passes the dead-center, and as the crank rises the block 10 is moved downwardly, and by the curvature of
95 the sector O the valve receives its end motion, and when the crank C' passes the other dead-center the block 10 is moved upwardly to give the required motion to the valve in the other direction. In both instances the radius-arm 100

G, as it swings, moves the pivot 6 of the link H toward and from the valve-chest, and thereby the proper movement is given to the valve in addition to the motion resulting from the block 10 moving in the sector O, so that the proper lap and lead to the valve is the result. When the shaft Q and crank-arm P are moved by the reversing-lever, the sector O is swung upon its connection to the valve-rod N, and it assumes the reverse diagonal position indicated by the dotted lines, so that the engine will run in the other direction; but if the reversing-shaft Q and crank-arm P are moved to an intermediate position the sector O is not moved by the swinging of the link H, because the arc of the sector O corresponds to the arc described by the link H as a radius; but the slight movement resulting from the pivot 6 being carried toward and from the valve-chest by the movement of the radius-arm G will by construction equal its lap and lead of the valve, but not be sufficient to admit steam even when the momentum of the locomotive or the fly-wheel of the engine may produce a continuance of the revolution of the crank C' and the shaft with which it is connected after the reversing-gear has been moved to stop the engine. By these improvements I am enabled to move the valve with

great accuracy, regardless of the direction in which the engine is running, and also to move the parts to intermediate positions at will to use steam expansively or to shut off the steam from the cylinder entirely.

Upon reference to Fig. 4 it will be seen that when the sector O for the sliding block 10 is made box-shaped and in two parts the connections are not liable to become bent by any lateral strain.

The link L may extend from the cross-head C to the pivot 5 at the end of the arm G, instead of being connected with the rocker F, the motions and operations being unchanged.

I claim as my invention—

The combination, with the engine valve-rod, cross-head, and connecting-rod having a short arm, of the radius-arm G, the rocker F, and links E L, for moving the same, the swinging link H, the pivot 6 for the same upon the radius-arm G, the link 8, connecting the swinging link H with the rocker F and the sector, and connections to the valve-rod, substantially as set forth.

Signed by me this 12th day of July, 1889.

CHAS. W. HUNT.

Witnesses:

GEO. T. PINCKNEY,
WILLIAM G. MOTT.