

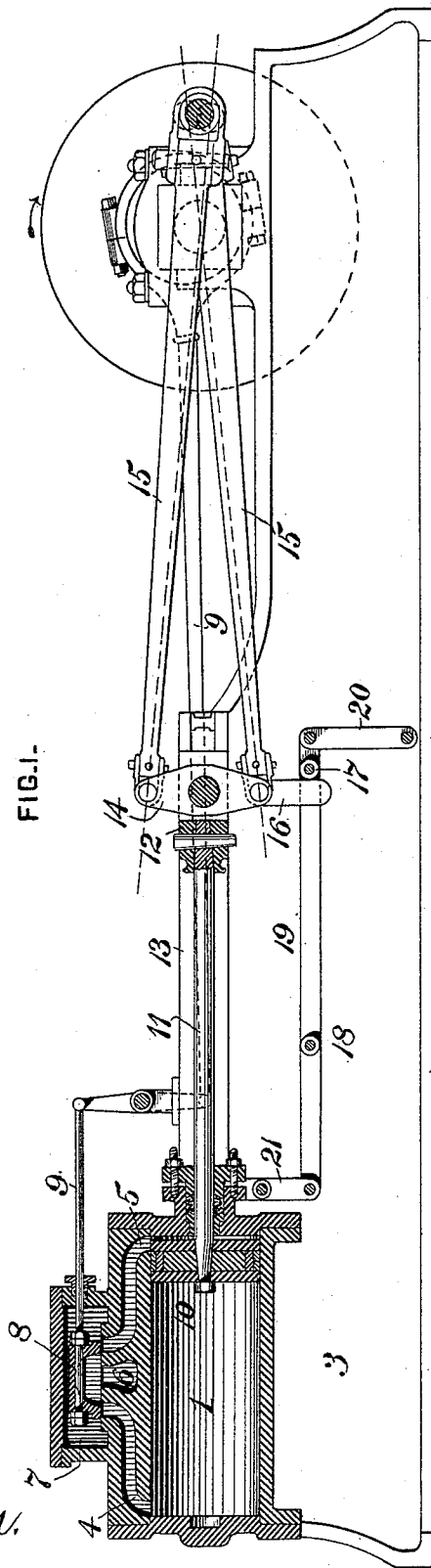
(No Model.)

2 Sheets—Sheet 1.

R. A. CARTER.
STEAM ENGINE.

No. 466,118.

Patented Dec. 29, 1891.



WITNESSES:

Danville B. Wolcott
F. E. Gaither.

INVENTOR,

Robert A. Carter,
by George H. Christy
Att'y.

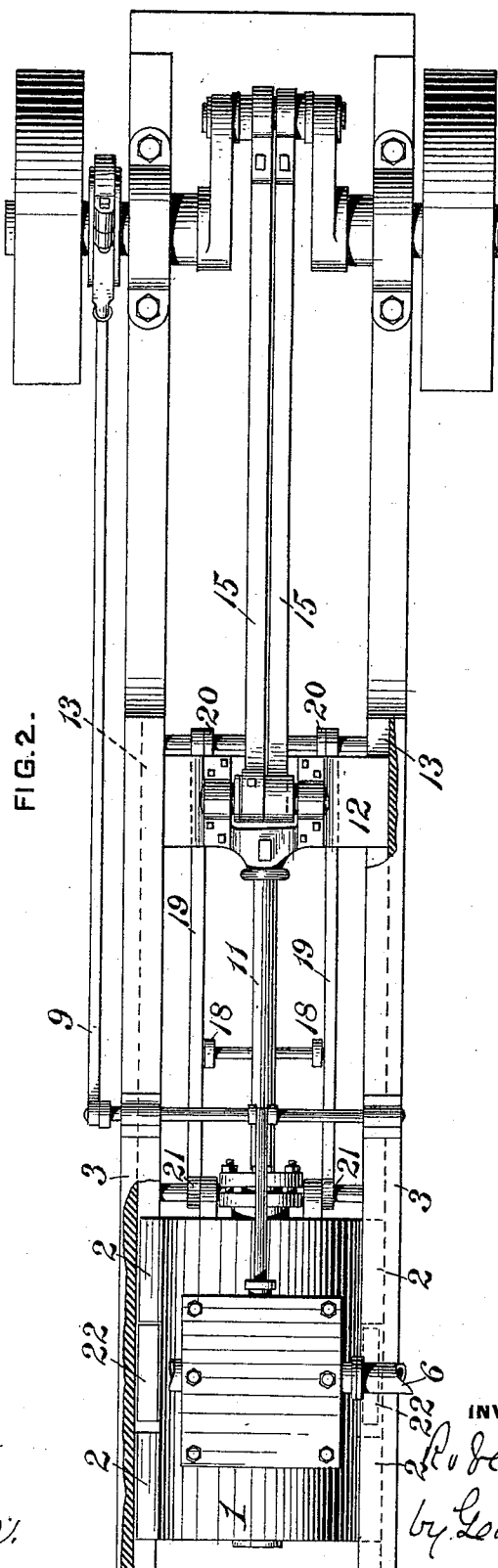
(No Model.)

2 Sheets—Sheet 2.

R. A. CARTER.
STEAM ENGINE.

No. 466,118.

Patented Dec. 29, 1891.



WITNESSES:

Danwin B. Wolcott
F. C. Gaither

INVENTOR,

Robert A. Carter
by *George H. Christy*
Att'y.

UNITED STATES PATENT OFFICE.

ROBERT A. CARTER, OF PITTSBURG, PENNSYLVANIA.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 466,118, dated December 29, 1891.

Application filed December 6, 1890. Serial No. 373,816. (No model.)

To all whom it may concern:

Be it known that I, ROBERT A. CARTER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Steam-Engines, of which improvements the following is a specification.

The invention described herein relates to certain improvements in steam-engines, and has for its object a construction whereby a more full and rapid opening of the inlet and exhaust ports is attained at the beginning of each stroke of the piston.

It is a further object of the invention to provide for the shifting of the crank from its dead-points.

In general terms, the invention consists in the construction and combination of mechanical devices or elements, all as more fully hereinafter described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a sectional elevation of an engine embodying my invention, and Fig. 2 is a top plan view of the same.

In the practice of my invention the cylinder 1, which is of the usual or any suitable construction, is provided with lateral wings 2, adapted to rest in suitable guideways formed in the side pieces of the bed or foundation plate 3, thus permitting of a longitudinal movement of the cylinder, as hereinafter described. As usual, the cylinder is provided with inlet-ports 4 and 5, extending from the valve-chamber 7 to the ends of the cylinder and the exhaust-port 6. The valve 8 is constructed and operates in the usual manner to control the flow of steam alternately through the ports 4 and 5 to the cylinder and from the latter to the exhaust-port 6. The valve 8 is operated through the medium of the rod 9 by the eccentric on the main shaft of the engine. The piston 10 is connected by the rod 11 with the cross-head 12, which is mounted in suitable guideways 13. On the cross-head is pivotally mounted a lever 14, whose ends are connected by the rods 15 with the crank-pin of the main shaft. The lever 14 is provided with a downwardly-projecting arm 16, adapted to engage pins 17 and 18 on the horizontal bar 19, supported at one end by the

post 20, pivotally attached at its lower end to the bed-plate or other suitable foundation. The opposite or inner end of the bar 19 is attached to the lower end of the lever 21, pivoted to a suitable part of the frame of the engine, the upper end of the lever being connected to the cylinder, as shown in Fig. 2.

In describing the operation of my improvements it will be supposed that the cylinder is at the left-hand limit of its movement, the piston 10 and the valve 8 being in the position shown in Fig. 1, the valve having been shifted sufficiently to the left to partially uncover the ports 4 and 5, the former being connected to the exhaust-port 6. The admission of steam between the piston and the head of the cylinder will not only impart an impulse to the piston, but will also shift the cylinder, which, as heretofore stated, is free to move to the right until the wings 2 abut against the ends of its guideways or against an abutment 22, formed midway of the guideways, the wings being divided so as to operate in the ways on both sides of the abutment. The movement of the cylinder is limited by the ends of the guideways or the abutment, or both, to an amount sufficient to effect a more or less complete opening of the ports 4 and 5, the cylinder moving under the valve at the same time that the valve is moving along the cylinder to the left. It will be readily understood that these combined movements of the cylinder and valve will effect a more rapid and complete opening of the ports, thereby permitting an earlier and fuller admission of steam to and exhaustion from the cylinder than could be effected by the shifting of the valve alone. When the piston is at the opposite end of its stroke, the above-described movements of the valve and cylinder are reversed.

If desired, the valve and its eccentrics may be so constructed and adjusted that the exhaust-port will be so closed, retaining sufficient steam in the cylinder that the cushioning of the piston will shift the cylinder, thereby opening the ports for the return stroke prior to the movement of the valve for that purpose. As the piston approaches the right-hand limit of its movement, the arm 16 comes in contact with the pin 17 on the bar 19, which is immediately shifted to the left by the move-

ment of the cylinder, as hereinbefore described. This movement of the bar 19, operating through the pin 17, shifts the upper end of the lever 14 to the right and the lower end thereof to the left. This shifting of the lever 14 imparts through the medium of the rods 15 a downward push and pull to the crank-pin, thereby shifting said pin from the dead-center a little before or just as the piston commences its return movement. At the opposite end of the stroke an upward push and pull is imparted to the crank-pin by the movement of the cylinder operating through lever 21, bar 19, and pin 18. The bar 19 may be made stationary and the pins 17 and 18 so adjusted thereon with reference to the stroke of the piston that the arm 16 will engage said pins and shift the lever just as the piston is completing its stroke.

By reference to Fig. 1 it will be observed that the rods 15 have dead-centers, that of the lower rod occurring just before the crank reaches its dead-center and that of the upper rod occurring after the crank-pin leaves its dead-center, as indicated by dotted circles, during the forward stroke or movement of the piston to the right. On the backward stroke, or the movement of the piston to the left, the dead-centers of the rods 15 occur in reverse order. The pins 17 and 18 are so located with reference to the stroke of the piston or movement of the cross-head that the arm 16 will come in contact therewith as the lower rod reaches its dead-center during the forward stroke and the upper rod during the back-stroke. Hence during the forward stroke the upper rod moving forward along

will be effective to push the lower rod from its center and also to assist in moving the crank from its center, while the lower rod pulled back by the cylinder will assist in pulling the crank from its center and the upper rod from its center.

I claim herein as my invention—

1. In a steam-engine, the combination of a reciprocating piston, a reciprocating valve, a cylinder movable for the purpose of opening the inlet and exhaust ports independent of the movement of the valve, and stops on the bed-plate for limiting the movement of the cylinder, substantially as set forth.

2. In a steam-engine, the combination of a reciprocating cross-head, a lever pivoted to said cross-head, a crank-pin, rods connecting the ends of the lever with the crank-pin, and pins or stops for shifting the lever as the crank-pin approaches its dead-centers, substantially as set forth.

3. In a steam-engine, the combination of a movable cylinder, a reciprocating cross-head, a lever pivoted thereto, a crank-pin, rods connecting the ends of the lever with the crank-pin, a bar provided with pins or stops arranged to engage the lever in the cross-head, and a lever connected to said bar and cylinder, whereby the movement of the cylinder will shift the crank-pin from its dead-centers, substantially as set forth.

In testimony whereof I have hereunto set hand.

ROBERT A. CARTER.

Witnesses:

DARWIN S. WOLCOTT,
W. B. CORWIN.