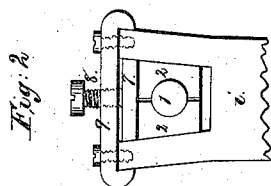
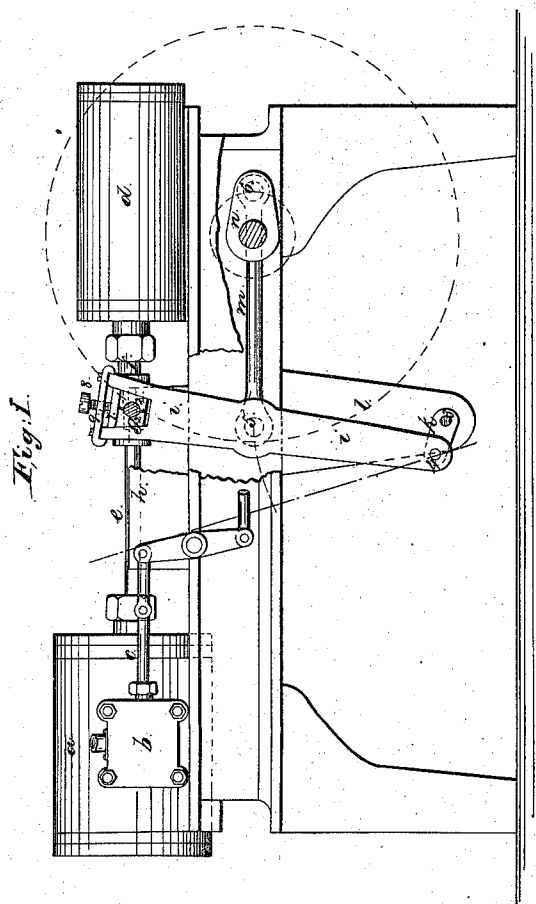


A. CAMPBELL & C. B. HARDICK.

DIRECT ACTING ENGINE.

No. 42,527.

Patented Apr. 26, 1864.



Witnesses:

Thos Geo Harold
Chas H. Smith

Inventor:

Abraham Campbell
Charles B Hardick

UNITED STATES PATENT OFFICE.

ABRAHAM CAMPBELL AND CHARLES B. HARDICK, OF BROOKLYN, NEW YORK, ASSIGNORS TO THEMSELVES AND JOHN HARDICK AND ALBERT B. CAMPBELL, OF SAME PLACE.

IMPROVEMENT IN DIRECT-ACTING ENGINES.

Specification forming part of Letters Patent No. 42,527, dated April 26, 1864.

To all whom it may concern:

Be it known that we, ABRAHAM CAMPBELL, and CHARLES B. HARDICK, of Brooklyn, in the county of Kings and State of New York, have invented and made a certain new and useful Improvement in Direct-Acting Engines; and we do hereby declare the following to be a full, clear, and exact description of the said invention; reference being had to the annexed drawings, making part of this specification, wherein—

Figure 1 represents an engine fitted with our improvement, the bed being in section to show the parts more clearly; and Fig. 2 is a side view of the journal-box employed by us. Similar parts are indicated by the same letters.

Our invention relates to an arrangement of link motion for communicating motion from the cross-head of a direct-acting engine to a crank on a fly-wheel shaft, whereby the parts are applied compactly in a small space and the sliding motions heretofore inseparable from the mechanisms used for this purpose are avoided, so that our device is much more durable and noiseless in its operation than the direct-acting engines before fitted with a fly-wheel.

In the drawings *a* represents a steam-cylinder fitted with a valve-chest, *b*, and valve and rod *c*, actuated by an eccentric or other suitable device.

d represents the water cylinder or pump of any usual construction, and fitted with induction and eduction pipes and valves in any well-known manner.

The piston-rods *e* and *f* from the respective cylinders unite with the cross-head *d*, that is fitted to slide on the slides *h*. These parts, thus far being well known, require no further description.

The cross-head *g* is made with cylindrical portions between the hub for the piston-rods and the slides as at 1, around which are the boxes 2 2 of the levers *i*, that at the bottom are united by links *k* to the fulcrum 3, or point of attachment to the engine-frame *l*, or hangers from said frame. There may be one of

these links *k* between the two levers *i*, or two of said links may be used, one outside of each lever *i*. In both cases the links swing on their attaching-bolt 3 or fulcrum, as the upper ends of the levers *i* reciprocate in a straight line with the cross-head *g* and the lower ends of said levers *i* turn at the point 4, where they are attached to the links *k*, as the engine moves.

m is a connecting-rod, attached at one end to a cross-pin, 5, between the levers *i*, and extending to the crank-pin 6 of the fly-wheel shaft *n*.

The parts are so proportioned that the crank determines correctly the movement of the cross-head and pistons in the respective cylinders.

The boxes 2 2 on the upper ends of the levers *i* are set in tapering jaws, and confined by a follower, 7, acted upon by a screw, 8, that passes through a gib, 9, confined upon the ends of the jaws. The boxes 2 2 are hence held firmly in place, and can be set up to the part 1 of the cross-head in case of wear by dressing off the faces of said boxes, that come in contact, and forcing them farther down in the tapering jaw at the end of the lever *i* by the screw 8.

The fly-wheel is shown by the red circle, and the position of the levers *i* at the opposite end of the stroke of the engine is also indicated by a red line.

What we claim, and desire to secure by Letters Patent, is—

1. The arrangement of the levers *i*, link *k*, and connecting-rod *m*, to the crank of the fly-wheel shaft for the purposes and as specified.

2. The boxes 2 2, fitted in and forced together by the tapering jaws and confined by the screw 8, for the purposes and as specified.

In witness whereof we have hereunto set our signatures this 12th day of February, A. D. 1864.

ABRAHAM CAMPBELL.
CHARLES B. HARDICK.

Witnesses:

LEMUEL W. SERRELL,
CHAS. H. SMITH.