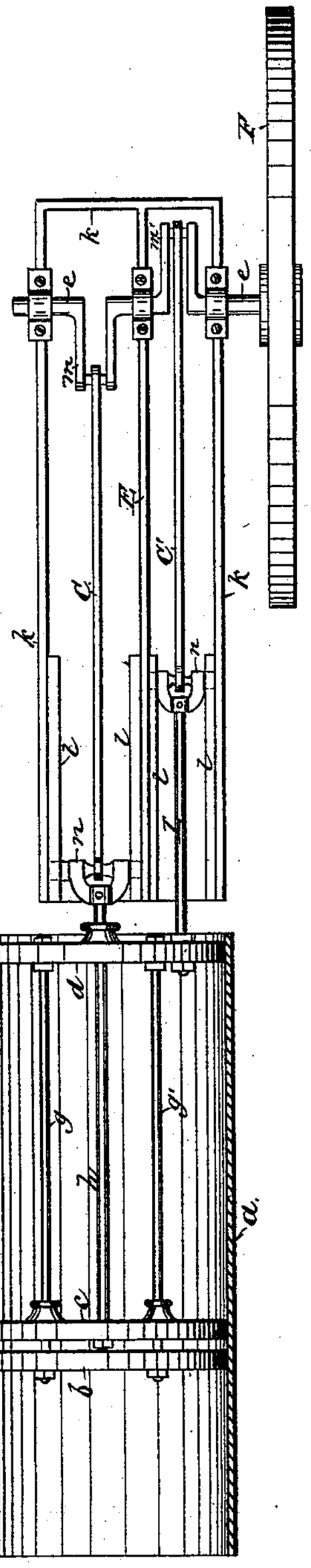
(No Model.)

J. H. HAGAN.

DIRECT ACTING ENGINE.

No. 247,048. Patented Sept. 13, 1881.



WITNESSES:

W. W. Hollingsworth

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UNITED STATES PATENT OFFICE.

JAMES H. HAGAN, OF GREENFIELD, TENNESSEE.

DIRECT-ACTING ENGINE.

SPECIFICATION forming part of Letters Patent No. 247,048, dated September 13, 1881.

Application filed April 4, 1881. (No model.)

To all whom it may concern:

Be it known that I, JAMES HAYS HAGAN, of Greenfield, Weakley county, Tennessee, have invented a new and useful Improvement in Direct-Acting Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification, in which the figure is a plan view with the cylinder in horizontal section.

My invention relates to improvements in direct-acting engines; and it consists in the peculiar construction and arrangement of the parts, as hereinafter more fully set forth.

In the accompanying drawing, *a* represents a steam-engine cylinder open at each end and provided with three reciprocating pistons, *b*, *c*, and *d*, as shown in the drawing. The outer pistons, *b* and *d*, are connected together by rods *g g'*, passing through holes in the piston *c*, and the piston *c* is centrally secured to rod *h*, which passes through a central hole in the piston *d*, and is pivotally connected with the inner end of the crank-rod C, pivotally secured at its outer end to one of the cranks, *m*, of the double-crank shaft *e*, journaled in the sides of the frame *k* and in its longitudinal partition E, and provided at one end with a wheel, F, connecting the power by means of a band to the machinery to be driven.

L is a rod, secured to piston *d* at one end, and pivotally secured at its opposite end to the crank-rod C', the opposite end of the latter being pivotally secured to the other crank, *m'*, of the double-crank shaft *e*.

l l are parallel angular guides, secured to the inner faces of the frame *k* and partition E, in which the ends of the cross-heads *n*, secured to the rods *h* L, reciprocate in the movements of the pistons.

x x are ports for the admission of steam, arranged one-third the length of the cylinder from each end.

In practice, steam being admitted between the pistons *b* and *c*, when they are near each other and at rest, the pistons *b* and *d*, being connected together, move by reason of the pressure of the steam in one direction, and the piston *c* in the opposite direction at the same time, and the pistons *b* and *c* move in opposite directions, and pistons *c* and *d* approach each other, and at the end of the stroke steam is admitted between them with the same result, as before described.

I am aware that three pistons have heretofore been arranged in a cylinder having open ends, the outer pistons being connected together by the same rod passing through an orifice in the intermediate piston, as shown in Letters Patent granted to A. W. Morrell for an improvement in double-piston engines, dated September 20, 1870, No. 107,524; and I am also aware of the patents granted to W. D. Peebles for a balanced piston engine, dated February 15, 1881, No. 237,694, and H. O. Lathrop for a direct-acting engine, dated May 19, 1868, No. 77,989; and I therefore lay no claim to such inventions, my invention being confined to the peculiar construction and arrangement of the parts, as pointed out in the claim.

What I claim as my invention is—

The combination, with the frame *k*, having the partition E and guides *l l* and shaft *c*, carrying the band-wheel F, and provided with the double cranks *m m'*, having crank-rods C C', of the cylinder *a*, open at both ends, pistons *b d*, connected together by rods *g g'*, intermediate piston, *c*, piston-rods *h* L, and cross-heads *n n*, all arranged substantially as described, and for the purpose set forth.

JAMES HAYS HAGAN.

Witnesses:
ALMUS ALLEN,
JAMES K. POLK.