W. H. HOFFMAN.
Compound Engine.

No. 202,821. Patented April 23, 1878.

Fig. 1.

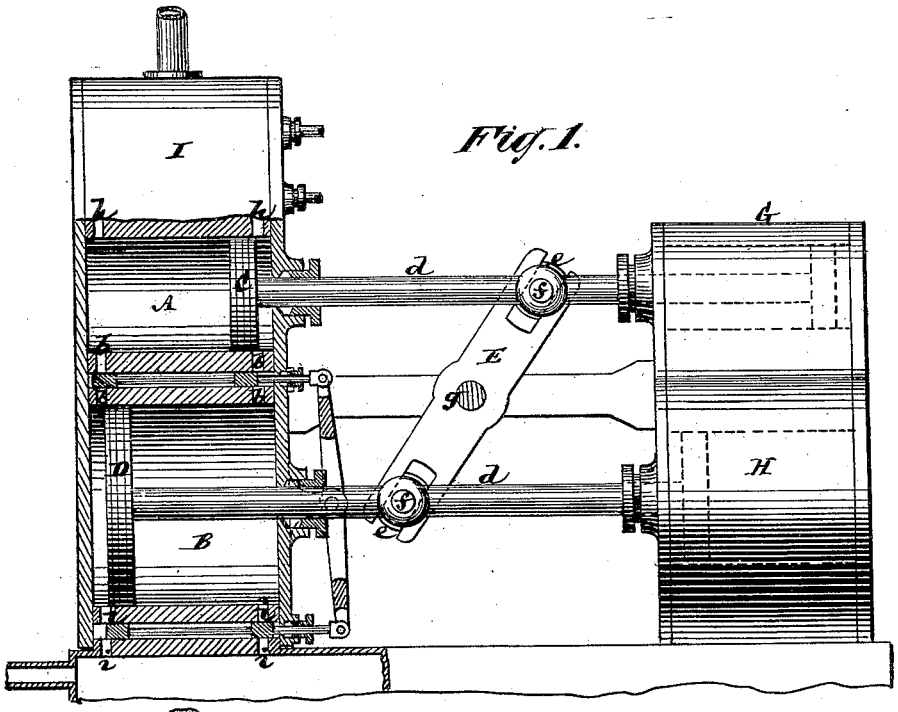
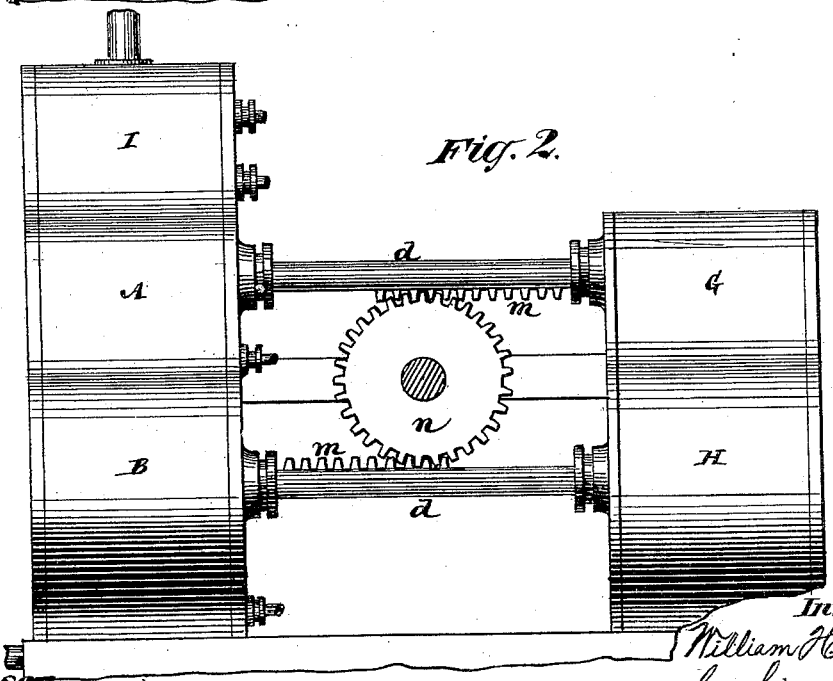


Fig. 2.



Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM H. HOFFMAN, OF PASSAIC, NEW JERSEY.

IMPROVEMENT IN COMPOUND ENGINES.

Specification forming part of Letters Patent No. **202,821**, dated April 23, 1878; application filed March 25, 1878.

To all whom it may concern:

Be it known that I, WILLIAM H. HOFFMAN, of Passaic, in the county of Passaic and State of New Jersey, have invented a new and useful Improvement in Compound Steam-Engines, of which the following is a description, reference being had to the accompanying drawing, forming part of this specification.

This invention relates to compound steam-engines of different kinds having their two cylinders arranged side by side, with ports forming communication between the corresponding or adjacent ends of said cylinders. It is, however, more particularly intended to be applied to steam-pumps and direct acting engines.

The invention consists in a connection of the piston-rods of the two cylinders of the engine by means of a reciprocating gear so arranged that the strokes of the two pistons take place synchronously in opposite directions, whereby great simplicity and compactness, combined with economy of steam, are obtained.

Figure 1 represents a partly-sectional longitudinal elevation of a compound direct-acting steam-pump or pumping-engine having my invention applied; and Fig. 2 is a longitudinal elevation of a similar engine, showing a modification of the means used to connect the two piston-rods of the engine.

Referring, in the first instance, or more particularly, to Fig. 1 of the drawing, A is the small or high-pressure cylinder of the engine, and B the larger or low-pressure cylinder thereof. Said cylinders are arranged side by side, as, for instance, one above the other, and have their communicating-ports *b b* at corresponding or adjacent ends. These ports, which are short and direct, allow of but little waste of steam in the passage of said vapor from the cylinder A to the cylinder B.

C is the piston of the cylinder A, and D the piston of the cylinder B. The rods *d d* of said pistons are, respectively, connected, by or through sliding boxes *e e* and cross-pins *f f*, with opposite ends of a rocking or reciprocating beam, E, having an intermediate fulcrum, *g*, whereby the pistons C D are compelled to move synchronously in opposite directions.

G H are pump-cylinders having pistons which are directly connected with the rods *d d*, the one cylinder, G, being that of an air-pump, and the other cylinder, H, that of a water-pump—that is, when the engine is a condensing one; but when the engine is not a condensing one, then the air-pump may be dispensed with, or it may be substituted by a water one.

I is the valve cylinder or chamber, which contains the valve that throws the main valve of the cylinder A to pass the steam alternately by ports *h h* to opposite sides of the piston C, as in other steam-pumps, or in any other suitable manner. These valves and the valve which passes the steam, after it has done its duty in the cylinder A, alternately from opposite sides of the piston C successively through the ports *b b* to opposite sides alternately of the piston D, to do duty in an expanded state and at a reduced pressure within the cylinder B, also the valve which exhausts the steam alternately by ports *i i* from opposite sides of the piston D after it has done its duty in the cylinder B, may be of the usual kind used in other compound engines, it only being necessary that the two pistons C D move synchronously in opposite directions throughout their strokes, and that the valves be arranged to insure this action.

Instead of the connection of the piston-rods *d d* of the two cylinders A B being a rocking or reciprocating beam, E, any other reciprocating gear or connection that will cause the strokes of the two pistons C and D to take place synchronously in opposite directions may be used. As, for instance, as shown in Fig. 2, the piston-rods *d d* may be provided with racks *m m*, arranged to gear with a spur-wheel, *n*, on opposite sides of the axis of the latter, said spur-wheel having a reciprocating action by means of the racks *m m*. This latter arrangement is better adapted to long-stroke engines.

I claim—

In combination with the two cylinders of a compound engine, arranged side by side, and having ports communicating between their corresponding or adjacent ends, a reciprocating connection between the piston-rods of said cylinders, whereby the strokes of the two pistons are caused to take place in opposite directions synchronously, substantially as herein described.

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