

B. BRAUER.
 ROTARY-ENGINE.

No. 178,589.

Patented June 13, 1876.

Fig:1.

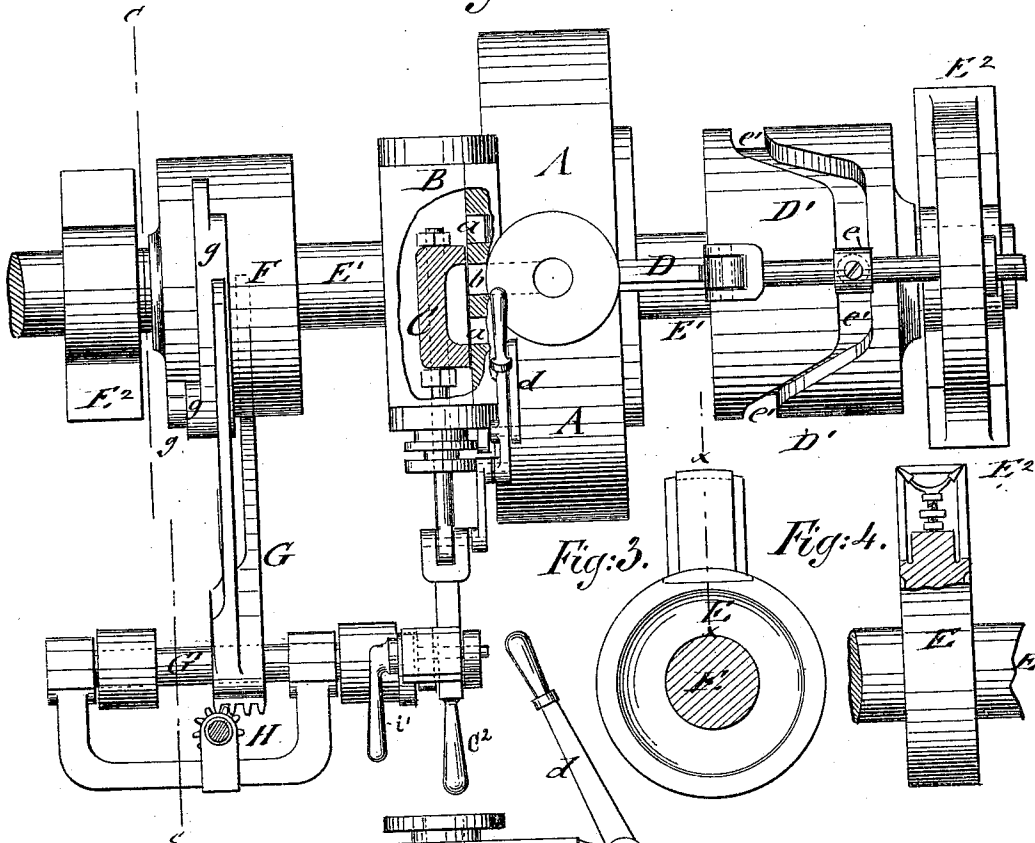


Fig:3.

Fig:4.

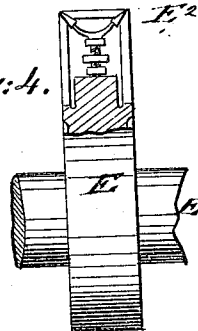
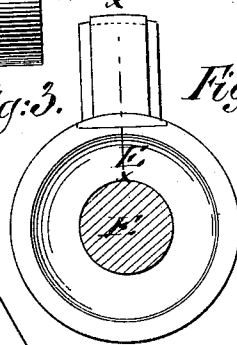
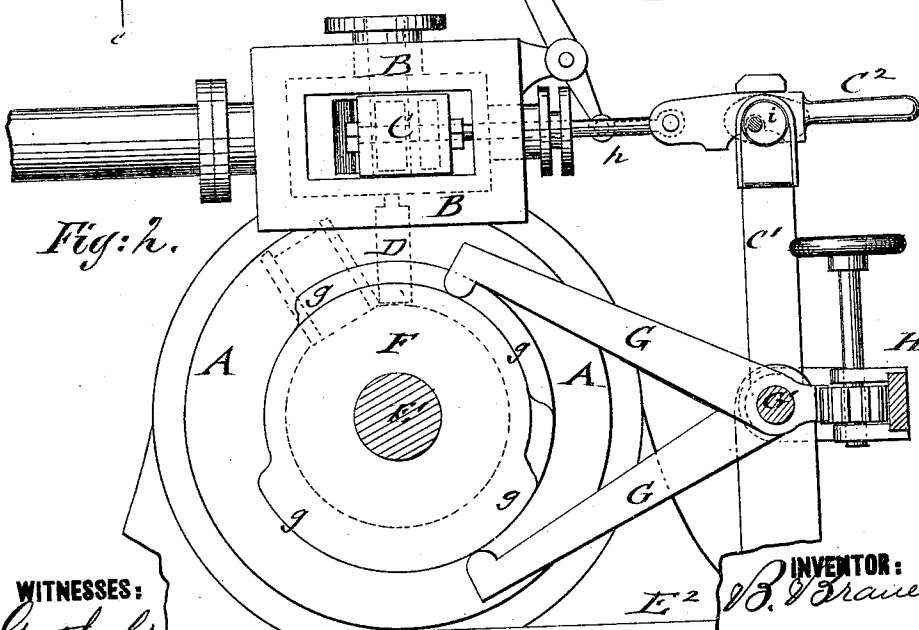


Fig:2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

BRUNO BRAUER, OF BREMERHAVEN, GERMANY, ASSIGNOR TO HIMSELF,
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SAME PLACE.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. **178,589**, dated June 13, 1876; application filed
April 18, 1876.

To all whom it may concern:

Be it known that I, BRUNO BRAUER, of Bremerhaven, Germany, have invented a new and Improved Rotary Engine, of which the following is a specification:

In the accompanying drawing, Figure 1 represents a top view, partly in section, of my improved rotary engine; Fig. 2, a vertical transverse section of the same on the line *c c*, Fig. 1; and Figs. 3 and 4 are a detail side view and section on the line *x x*, Fig. 3, of the piston detached.

Similar letters of reference indicate corresponding parts.

My invention has reference to an improved rotary engine, in which the steam acts directly on the piston-shaft, allowing the use of the same with variable expansion, and the ready reversion of the engine.

The invention consists in the construction and combination of parts, which will be hereinafter more fully set forth, and then pointed out in the claims.

In the drawing, A represents the cylinder of my improved rotary engine, which is provided with a steam-entrance chamber, B, and slide-valve C. The steam-chamber B communicates with the cylinder by entrance-ports *a* at both sides of the central exhaust *b*, that remains continually open to convey the steam to the open air or a condenser. When the slide-valve C is set to one side or the other of the exhaust-port by means of a lever, *d*, the engine runs in one direction or the other, as required. A tightly-packed piston, E, with radially-extending part, is carried by the entering steam in either direction, according as the steam enters through the part at one side or the other of a laterally-sliding and packed gate, D, which forms a steam-chamber with the piston E. The sliding gate D is withdrawn from the cylinder for the passage of the piston at the completion of each revolution, and instantly carried back again by a guide-lug, *e*, of its pivot-rod running in a curved groove, *e'*, of a cylinder, D', of the piston-shaft E¹. The shaft E¹ turns in suitable

bearings of end standards E², of which one also serves as support for the pivot-rod of the sliding gate. The slide-valve C is operated expansively by a separate cam-cylinder, F, that is placed on shaft E², at the opposite side of cylinder A. Different cams *g* of varying length are arranged sidewise of each other on cylinder F, to form contact with and govern the lever-arms G that are keyed axially at an angle to the shaft G¹, turning in suitable side standards G². The ends of the lever-arms S form contact with the cam-cylinder F at the upper and lower part of the same, and may be brought into connection with either one of the cams *g*, by being carried laterally on shaft G¹, by means of a pinion and rack, H, as shown in Figs. 1 and 3.

The greater or less expansion of the steam, and thereby the greater or less speed of the engine, is produced by setting the lever-arms G to the required cam of the expansion-cylinder.

To the shaft G¹ of the lever-arms G is keyed the slide-valve connecting-lever C¹, that is attached by a recessed locking-handle, C², of the slide-valve rod, and an eccentric, *i*, with bearing-pin of the connecting-lever C¹ to the slide-valve, serving to set the slide-valve into position to stop or reverse the engine.

By carrying the handle *i'* of the eccentric *i* in vertical position, the slide-valve closes the entrance-ports, and stops the engine. By carrying the handle down to either side, it admits the running of the engine in either direction, producing, by the swinging over of the eccentric-handles from one horizontal position to the other, the instant and convenient reversing of the engine.

As all the parts of the engine are fully within sight and control, and not placed within the steam-cylinder, they may be readily kept in order and repairs, and the machine easily set up and operated to be run at any suitable speed desired.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of the sliding lever-arms G G, rocking shaft G¹, and cylinder F, having cams g g of different length, with the adjustable slide-valve C, and a connecting and reversing lever mechanism, substantially as shown, for the purpose set forth.

2. The combination of the locking-lever C²

and eccentric bearing-pin i with the slide-valve C and operating mechanism, as and for the purpose set forth.

BRUNO BRAUER.

Witnesses:

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