D. Bickford,

Rotary Steam Engine.

No. 49,070. Patented Aug. 1, 1865.

Fig: 1.

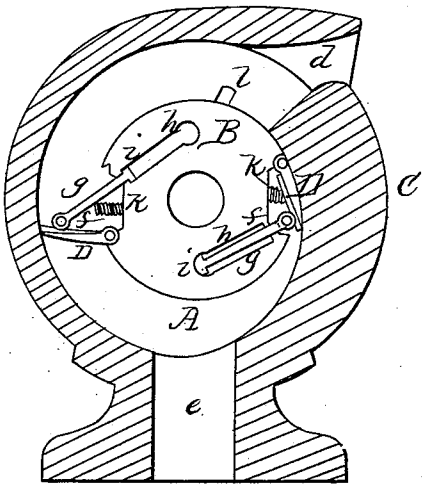


Fig: 3.

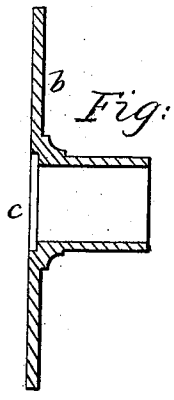


Fig: 2.

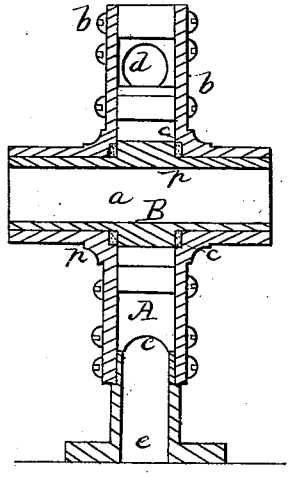
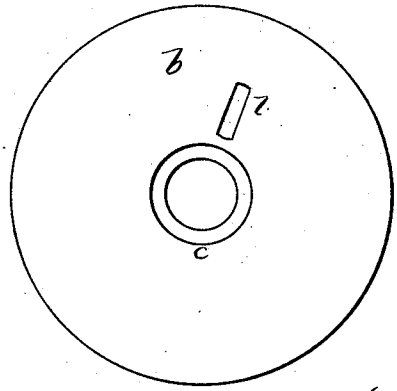


Fig: 4.



Witnesses.

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by his attorney.

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UNITED STATES PATENT OFFICE.

DANA BICKFORD, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. **49,070**, dated August 1, 1865.

To all whom it may concern:

Be it known that I, DANA BICKFORD, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improved Rotary Engine; and I do hereby declare the same to be fully described in the following specification and represented in the accompanying drawings, in which—

Figure 1 is a longitudinal and vertical section, and Fig. 2 a transverse and vertical section, of it. Fig. 3 is a vertical section, and Fig. 4 is an inner side view, of one of its side plates.

This engine can be operated either by the force or pressure of steam, air, gas, or water, or it may be employed as a measurer of the flowage of a liquid or a gas.

Within a cylindrical case, A, and concentrically thereto, there is arranged a rotary cylinder or head, B, which is supported by a shaft, *a*, extending through both heads *b b* of the said case. There is an annular groove, *c*, formed in each head, and so as to encircle the shaft, and be for the purpose of receiving a packing, *p*, to go around it. The case A has within it a cam, C, which is arranged therein and between an inlet, *d*, and an outlet, *e*, in manner as shown in Fig. 1. Furthermore, the cylinder or head B is recessed in its periphery, as shown at *f f*, to receive two pistons or valves, D D, which are hinged, respectively, to the cylinder, and so as to close into the recesses. These pistons, when thrown open or out of the recesses, are to rest against the inner circumference of the case A. A brace, *g*, is hinged to each piston and extends into a chamber, *h*, formed in the cylinder B. The said brace has a head, *i*, on its end, which enters the chamber *h*, and such chamber, at or near its junction with the recess *f*, is to be so formed as to serve as a stop to the head just as the end of the valve or piston may come into contact with the inner circumference of the case A. The object of the brace *g* is to prevent wear of the end of the piston by the inner circumference of the case A while such piston may be moving around within such case.

A small spring, *k*, arranged as shown in Fig. 1, serves to aid in raising the valve or piston at the proper times. There is also a cavity or recess, *l*, made in each side plate of the case, and arranged therein and with respect to the recess *f*, the cam C, and the inlet-passage *d* in manner as shown in Fig. 1. The object of the said passage *d* is to convey the liquid or steam directly underneath the piston preparatory to its being thrown up out of its recess, in order that by such steam or liquid such piston may be elevated against the inner circumference of the case.

In the operation of this engine the steam, gas, air, or water under pressure, on entering the case by the induction-passage *d*, will throw the piston D out of the recess *f* and up against the inner curved surface of the case, and by its pressure on the piston the said steam, air, gas, or liquid will produce a rotative motion of the cylinder B. On the piston reaching the induction-opening *e* the impelling-motor will be free to escape through the said opening *e*, and as the piston may continue on it will be closed down upon its seat by the cam C and by the impelling-power acting on the other piston.

In the above-described rotative engine I claim the following, viz:

1. The combination of the brace *g* and its receiving and stopping passage *h* with each piston G, arranged in and so as to operate with a cylinder, B, cam C, and a case, A, substantially as specified.

2. The combination and arrangement of the passage *l* in the head or side plate of the case A, with the cylinder B and its pistons D D, arranged within the said case, as and for the purpose specified.

3. The arrangement of the annular packing-recess *c* in the head or plate *b*, and with respect to the cylinder B, as specified.

DANA BICKFORD.

Witnesses:

R. H. EDDY,

F. P. HALE, Jr.