

G. Sickels,
Rotary Steam Engine,
Nº 10,642. Patented Mar. 14, 1854.

Fig. 1.

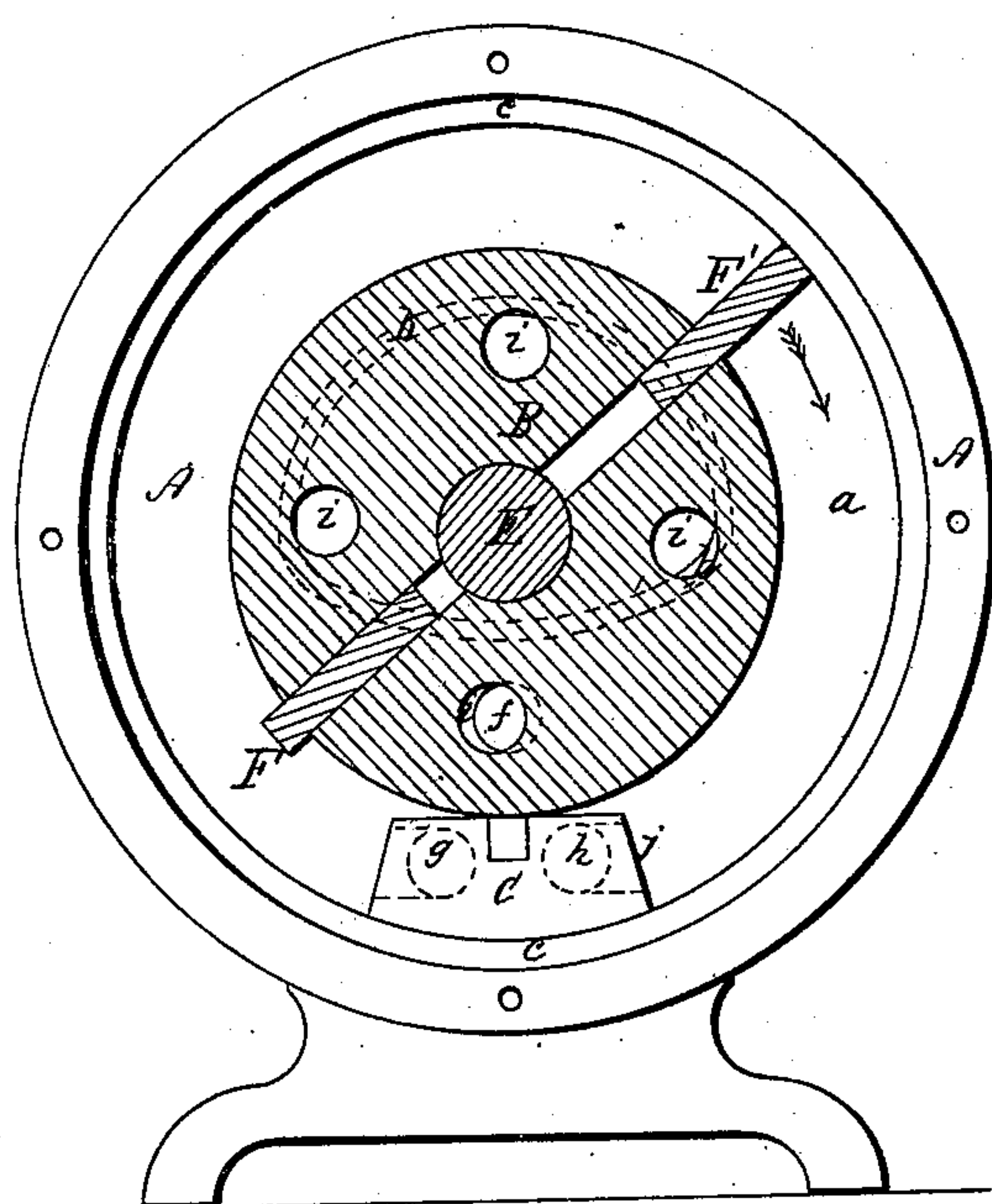


Fig. 2.

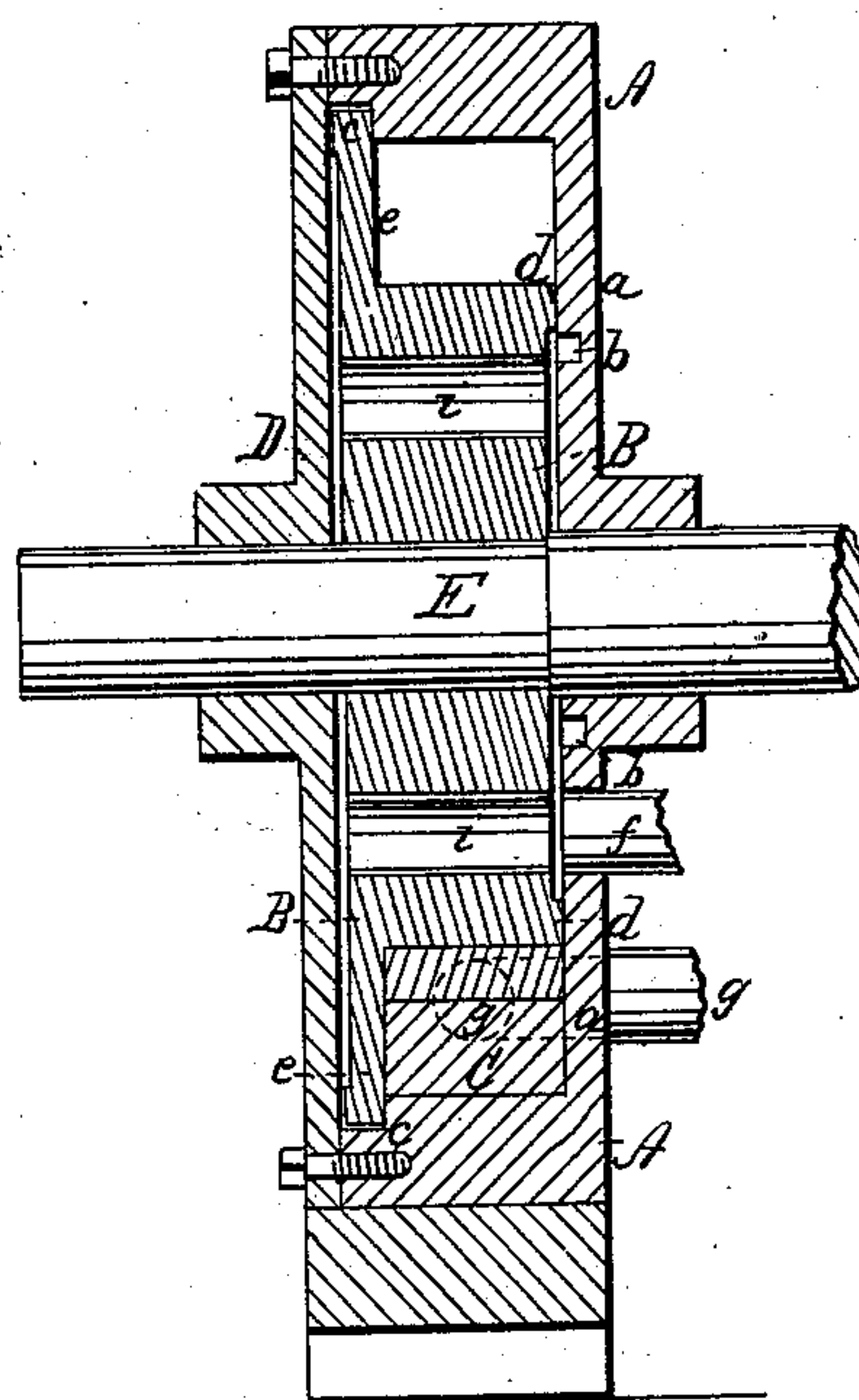
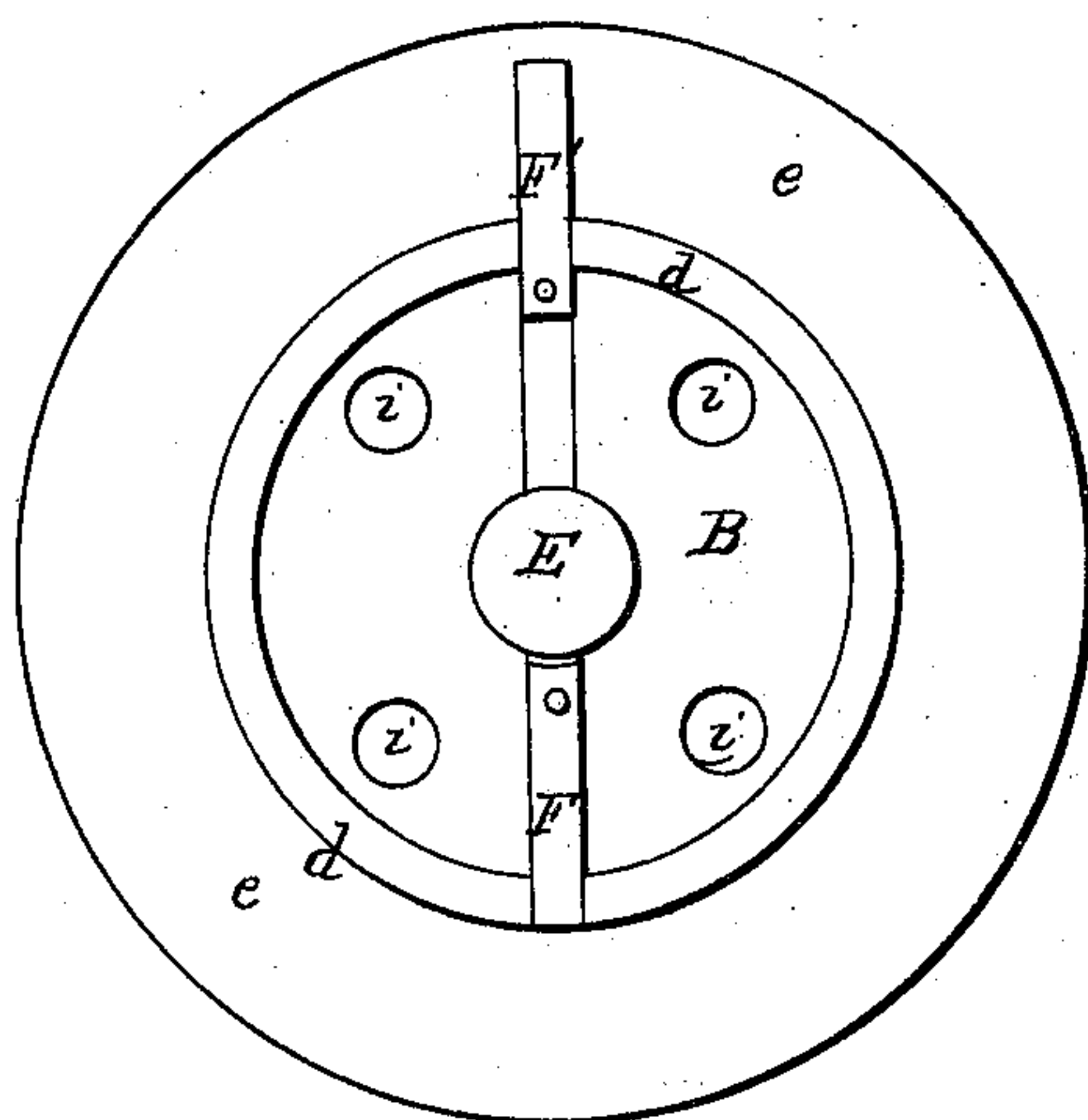


Fig. 3.



UNITED STATES PATENT OFFICE.

GERARD SICKELS, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. 10,642, dated March 14, 1854.

To all whom it may concern:

Be it known that I, GERARD SICKELS, of the city of Brooklyn, in the county of Kings, and State of New York, have invented a new and useful Improvement in Rotary Engines to be Impelled by Steam or other Fluid; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of an engine constructed according to my invention, the cylinder-head being removed, and the revolving head containing the sliding pistons being shown in section. Fig. 2 is a vertical section of the same through the axis of the cylinder. Fig. 3 is a view of the revolving head turned in the opposite direction to Fig. 1.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to a method of making and maintaining a perfectly tight fit between the cylinder and the revolving head which carries the pistons or sliders, without the aid of packing, and is applicable to rotary engines with variously constructed and arranged pistons.

It consists in making the revolving head with a flange on one side only, which flange has its inner face fitting to a suitable surface within the cylinder, while that face of the main portion or hub of the head opposite the flange fits close to the bottom end of the cylinder and admitting steam to act on the sides of the revolving head, thereby packing up the head to the cylinder. The pistons work between the flange above named and the bottom end of the cylinder, and a certain portion of the cylinder is always open to the exhaust, thereby causing the steam to produce an excess of pressure on the flanged end of the revolving head and force the head in close contact with the bottom end of the cylinder, and this contact will be always maintained while the pressure of steam is on the outside of the revolving head.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the cylinder of the engine, which is represented to have one end *a* cast solid with it.

It is bored truly and has the inside of the end *a* faced. The end *a* has a groove *b*, to direct the movements of the sliding pistons; but they may be operated in any other way. The opposite end of the cylinder has a rabbet-formed recess *c c* turned truly in the inside of the rim to receive the flange of the revolving head, and is closed by a cover D, (see Fig. 2,) which is secured to said rim by bolts, thereby forming a case within which the revolving head moves.

B is the revolving head, which carries the sliding pistons. It consists of a hub, which may be either solid or hollow, and has a raised annular surface *d* at one end, (see Figs. 2 and 3,) which is faced to form a steam-tight fit to the inside of the bottom end *a* of the cylinder. The opposite end has the flange *e*, whose inner side is faced to fit the back of the recess *c c*. At the same time the surface *d* fits to the bottom end of the cylinder, thereby forming a steam-tight passage, in which the pistons or slides operate. This flange is shown in Figs. 2 and 3, but is removed in Fig. 1 to show the piston for the purpose of explaining the effect of the exhaust. The periphery of the flange is not required to fit to the recess. The sliding pistons *F F'* are of well-known construction fitted to radial slots in the head B and filling up the space between the flange *e* and the end *a* of the cylinder, and being furnished with studs to work in the groove *b*. The revolving head is secured to a shaft E, which works through stuffing-boxes in the cylinder ends. The steam-space between the cylinder and the revolving head is divided by an abutment C, which is secured firmly to the cylinder, and packed to fit the periphery of the hub in the same way as the abutments in other rotary engines. The face of the abutment next the flange *e* is flush with the back of the recess *c c* and fits close to the flange. The steam and exhaust pipes *g h* communicate with the cylinder through the abutment, but enter on opposite sides of the abutment, either of said pipes being the steam-pipe and the other the exhaust-pipe, as may be required, according to the direction it is desired to run the engine.

In addition to the steam and exhaust pipes another steam-pipe *f*, which needs to be of small size only, enters the cylinder for the

purpose of admitting steam to the sides of the piston. As I desire to admit steam on both sides of the revolving head, I introduce the pipe *f* through the fixed end *a* of the cylinder, and allow it to communicate with the opposite side of the revolving head through openings *i i*, made in the hub or main part of the said head.

When the engine is set in operation, the pipe *f* requires to be opened to admit steam to the cylinder on the sides of the revolving head. The steam thus admitted would act equally on both sides of the revolving head, but that the pressure is always removed from that portion of the inner side of the flange *e* between the front of the acting piston and the abutment, and therefore the pressure on the outer side of that part of the flange causes the revolving head to be driven toward the end *a* of the cylinder and causes the flange *e* to be forced close up to the back of the recess *c c* and to the abutment *C*, and the face *d* of the hub of the revolving head to be forced close up to the inner face of the cylinder end *a* and a perfect joint to be formed. This action of the revolving head may be understood by referring to Fig. 1, where the head is supposed to be moving in the direction of the arrow and the steam to be exhausting from the front of the piston *F'*, on the back of which it is acting. All that part of the steam-space between the piston *F'* and the face *j* of the abutment being open to the ex-

haust, the inner face of that part of the flange which covers it receives no pressure. The pressure of the steam keeps the revolving head always tight in the cylinder, and as the surfaces which are in contact wear away the head moves up and preserves the necessary close contact, so that the head can never become loose to allow any leakage of steam.

If the engine is placed above the boiler, any water that may be condensed in the cylinder at the sides of the revolving head may run back through the pipe *f*, but otherwise the condensed water would be driven out through the exhaust-pipe by the entrance of steam after a stoppage of the engine.

I do not confine myself to the particular construction, arrangement, or manner of operating the pistons as described, nor to the form of the working-faces of the revolving head and cylinder; but

What I claim as my invention, and desire to secure by Letters Patent, is—

The method herein described of making and maintaining a perfectly-tight fit between the ends of the cylinder and the revolving head, which carries the sliders or pistons by admitting a pressure of steam outside the flange of the revolving head, substantially as herein set forth.

GERARD SICKELS.

Witnesses:

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JNO. W. HAMILTON.