(No Model.) 2 Sheets—Sheet 1.

T. J. RIDER.

PISTON FOR CALORIC ENGINES.

No. 405,324. Patented June 18, 1889.

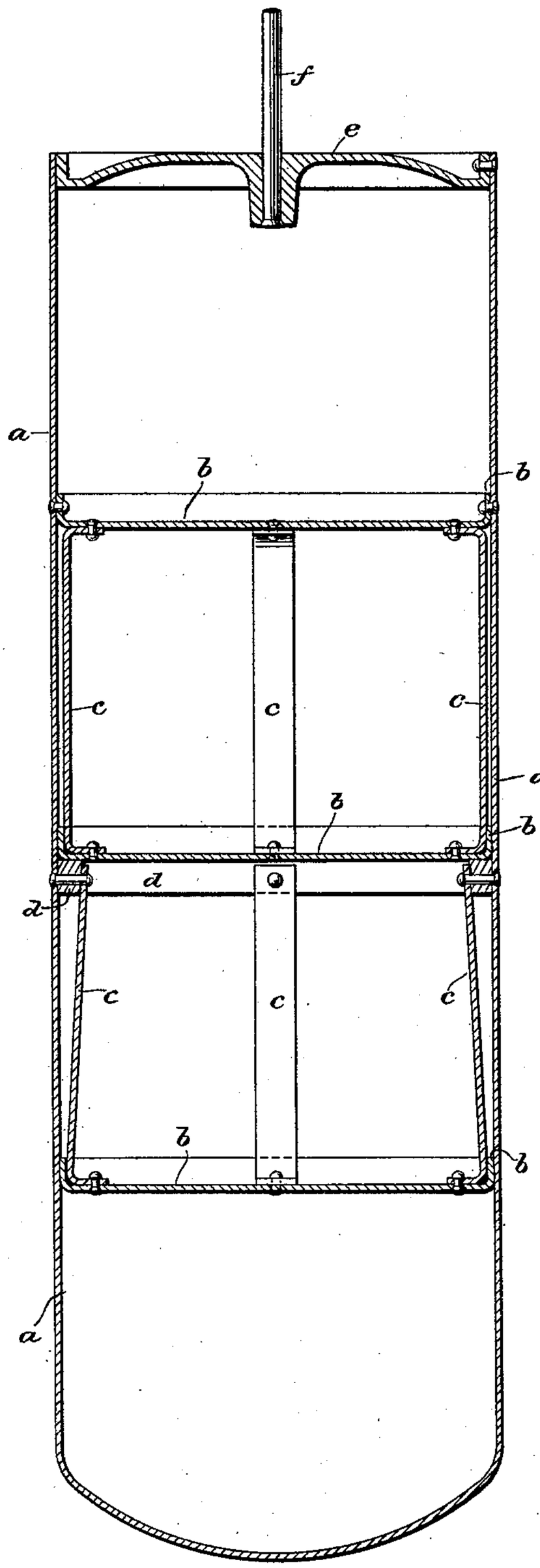

Fig. 1.

Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

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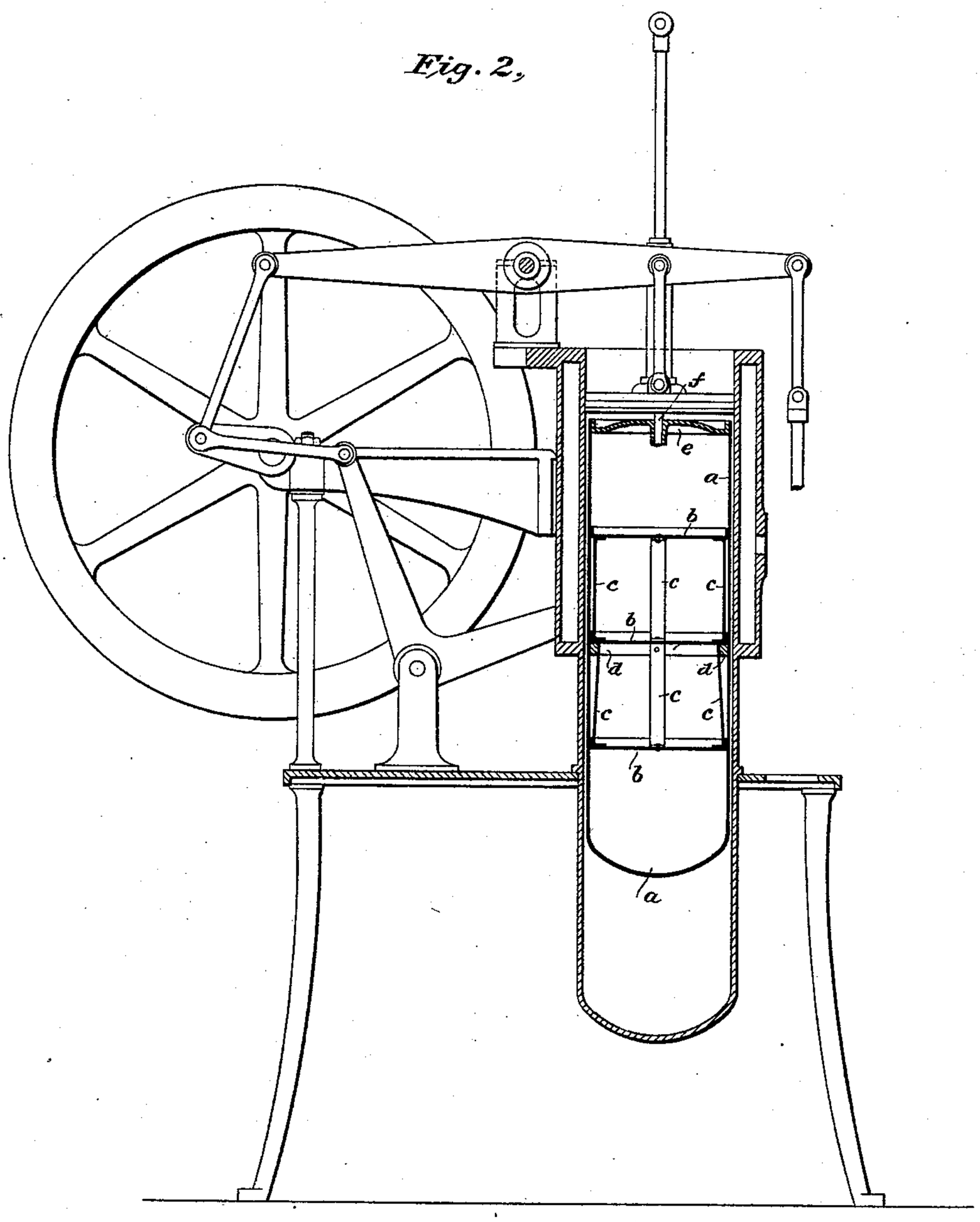
Fig. 2.



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UNITED STATES PATENT OFFICE.

THOMAS J. RIDER, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO WILLIAM DE LAMATER AND LEANDER A. BEVIN, OF SAME PLACE.

PISTON FOR CALORIC-ENGINES.

SPECIFICATION forming part of Letters Patent No. 405,324, dated June 18, 1889.

Application filed February 4, 1889. Serial No. 298,557. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. RIDER, a citizen of the United States, residing in the city of New York, county and State of New York, have invented a new and useful Improvement in Pistons for Caloric-Engines, of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings, which form a part hereof.

My invention has special reference to single-cylinder closed-cycle hot-air engines of the Ericsson type, and relates to what is generally known as the "transfer" or "exchange" piston of such an engine. Its object is to simplify and improve the construction of this piston and to adapt it more perfectly for the performance of its functions therein, and to make it more durable and more economical than such pistons have been heretofore. The office of the transfer-piston in these engines is to transfer or displace the air from the bottom of the cylinder, where it has been heated, to the top of the cylinder to be cooled, and vice versa. The lower end of this piston will necessarily become heated; but should the piston become heated throughout its entire length the engine would lose a large percentage of its power, the amount of this loss depending upon the amount of heat transmitted to the upper end of the piston. To prevent the heating of the upper end of this piston, it has hitherto been provided with a light metallic box containing powdered charcoal placed at about the center of the piston, the part of the piston above this metallic box being packed tightly with cotton or other non-conducting material and the part below being left empty; but this old form of piston has many defects, such as the liability of the cotton or other packing to be burned and destroyed, which would at the same time tend to produce a pressure within the piston, and thus cause the piston to leak, the tendency of the metallic box to become loose or get out of place, thus destroying the entire utility of the non-conducting material, and the liability of the piston to collapse under the pressure in the cylinder.

The improvement herein described accomplishes the desired results, avoiding at the same time the disadvantages just referred to and making the piston light and strong.

My invention is shown in the accompanying drawings, in which—

Figure 1 is a vertical section of my improved transfer-piston, and Fig. 2 shows the piston combined in an Ericsson engine.

My transfer-piston is connected with the other parts of the engine in any usual manner, an example of which is shown in Fig. 2. As my invention relates solely to the piston, I will not herein describe the other parts of the engine.

Referring to the drawings, *a* is the shell of the piston. This shell is preferably made of steel or iron. When my entire invention is employed, this shell is made in a single piece, instead of riveting a seam on the side or riveting on the bumped head or brazing the parts together. *b b b* are diaphragms or partitions dividing the interior of the shell into four substantially equal compartments. These diaphragms are made of some suitable metal, preferably steel or iron. The upper one is bolted or riveted to the wall of the piston, while the one below that is connected with the upper one by the bars or bracing-strips *c*, and is supported also by the ring *d*, which is riveted or bolted to the wall of the piston. The lower diaphragm is supported by other bars or bracing-strips *c*, which are riveted or fastened to the ring *d* at their upper ends. The object of thus connecting and supporting the diaphragms is to avoid the necessity of having many rivets or bolts pass through the piston, such rivets tending to weaken the piston and cause leakages.

e is the top of the piston, which is made, preferably, of brass and in any usual form, and to which the piston-rod *f* is attached.

In my improved piston the diaphragms *b* prevent the circulation of the air which is heated at the bottom, and consequently the piston is not heated at the top by the rising of this heated air, as would be the case if the diaphragms were not present.

The air in the lower compartment will of course become heated and will transmit some of its heat to the next compartment above it; but the air in the top compartment will re-

ceive but very little, if any, of the heat imparted to the air in the lower compartment, and can be very easily kept cool by the water which is made to flow through the water-jacket. Again, these diaphragms strengthen the shell materially by forming braces in it at short intervals, and thus assist the shell in withstanding the pressure of the air around the piston.

This improved piston, being entirely of metal, is practically indestructible by any heat which could be brought to bear upon it in its position in the engine, and is therefore more durable. There is no inflammable material in it, the disadvantages of which in such an engine have already been set forth. As the transfer-piston has a peculiarly rapid and comparatively irregular motion, it is important that it should be as light in weight as possible. It is also of the utmost importance that the transfer-piston should be air-tight. The construction of my improved piston secures these two advantages.

It is apparent that the number of diaphragms might be varied.

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

1. In a caloric-engine, a transfer-piston consisting of a shell, diaphragms within the shell and fastened to it, and bars connecting the diaphragms, substantially as shown and described.

2. In a caloric-engine, a transfer-piston consisting of the shell *a*, in a single piece, the diaphragms *b*, the bars *c*, and the ring *d*, all arranged and combined substantially as shown and described.

THOMAS J. RIDER.

Witnesses:
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