

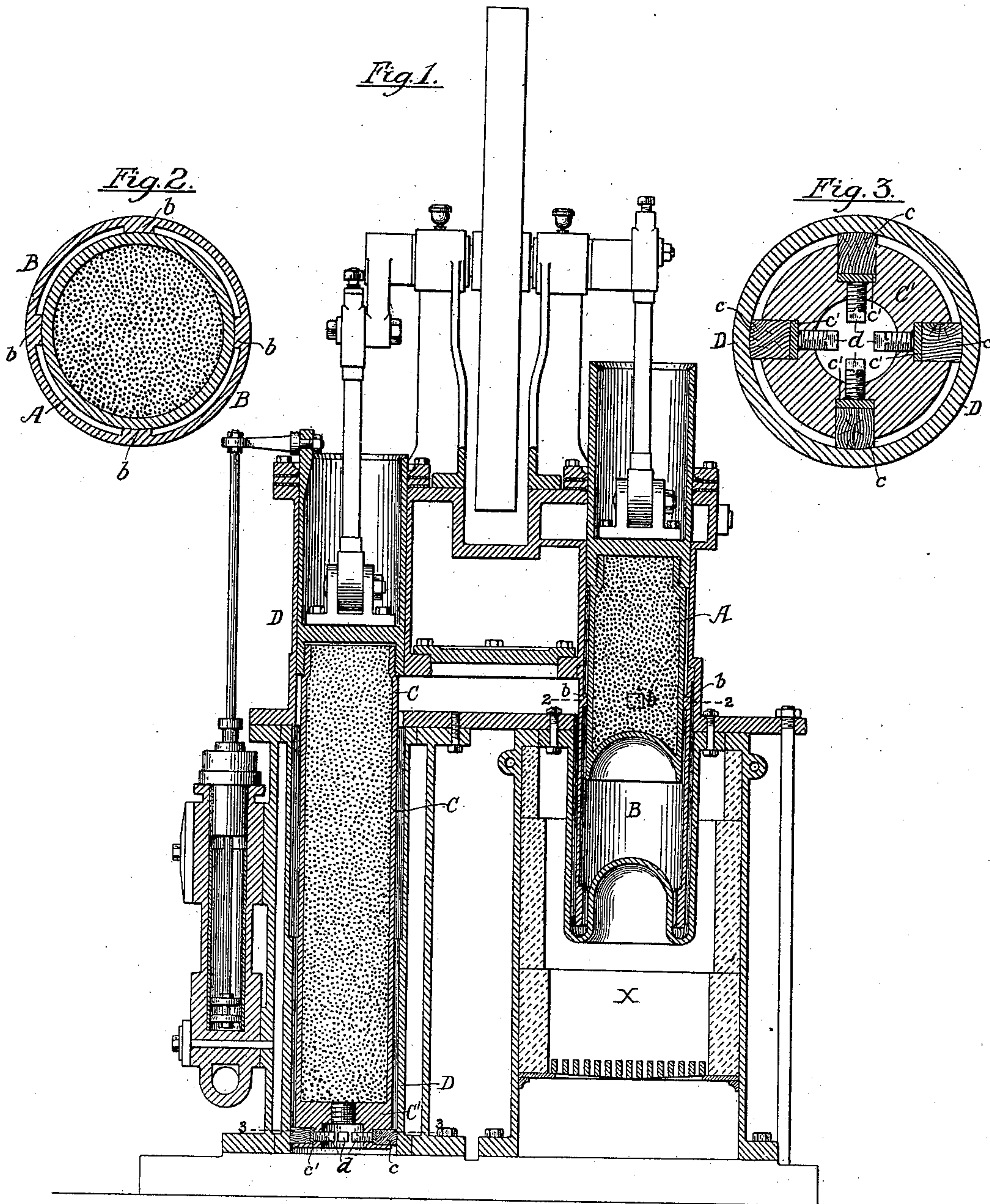
No. 639,999.

Patented Dec. 26, 1899.

W. R. KENNEDY.  
PISTON FOR HOT AIR ENGINES.

(Application filed May 17, 1899.)

(No Model.)



WITNESSES:

*Henry C. Boye*

*Hamilton D. Turner*

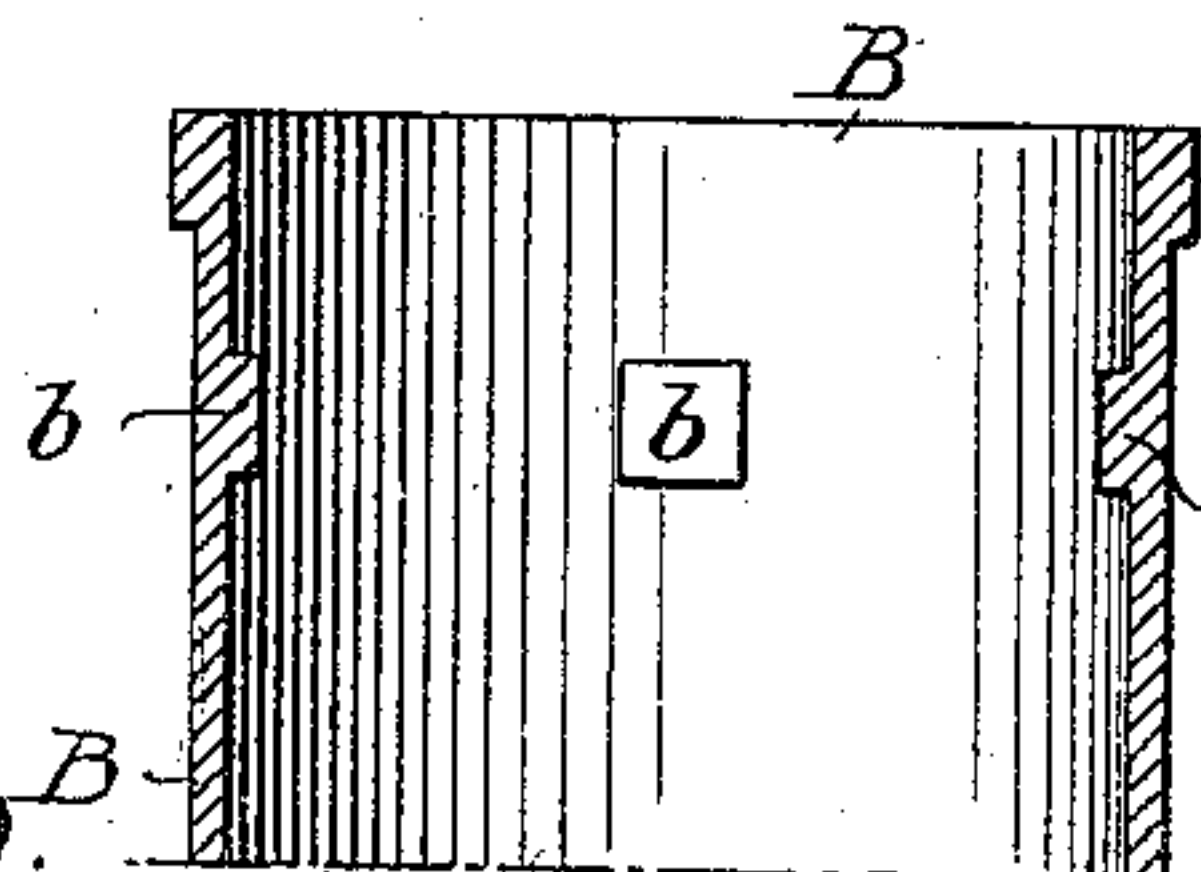


Fig. 4.

INVENTOR:

*William R. Kennedy*

BY

*Howard M. Brown*

ATTORNEYS.



# UNITED STATES PATENT OFFICE.

WILLIAM R. KENNEDY, OF NEWARK, DELAWARE, ASSIGNOR TO THE  
AMERICAN MACHINE COMPANY, OF SAME PLACE.

## PISTON FOR HOT-AIR ENGINES.

SPECIFICATION forming part of Letters Patent No. 639,999, dated December 26, 1899.

Application filed May 17, 1899. Serial No. 717,183. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM R. KENNEDY, a citizen of the United States, and a resident of Newark, New Castle county, Delaware, have  
5 invented certain Improvements in Hot-Air Engines, of which the following is a specification.

My invention relates to improvements in hot-air engines of the Rider type; and it consists of means for steadying the compressor-  
10 piston and the piston on the hot side of the engine in their respective cylinders.

My invention is fully illustrated in the accompanying drawings, in which—

Figure 1 is a sectional elevation of a hot-air  
15 engine of the Rider type, showing my improvements applied thereto. Fig. 2 is an enlarged sectional view of the piston and cylinder on the hot side of the engine, taken on the line 2 2, Fig. 1. Fig. 3 is an enlarged  
20 sectional view of the compressor piston and cylinder, taken on the line 3 3, Fig. 1; and Fig. 4 is an enlarged detached sectional view of a portion of the cylinder on the hot side of the engine.

25 In Fig. 1, A represents the piston adapted to the cylinder B of the hot side of the engine, located directly above the fire-box X, and C is the compressor-piston adapted to the compressor-cylinder D. These pistons  
30 are filled with sand or any other suitable material to give them sufficient weight to perform their work of compression. As will be noticed, the pistons A and C fit their respective cylinders B and D only at the top, the  
35 greater portion of the pistons being unconfined in said cylinders. Such construction is necessary in this class of engines; but it allows of great play of the lower part of the pistons, and the constant reciprocation of the  
40 same gives them a pendulum or rotary movement at the lower end, which in time throws the pistons out of line and damages the walls of the cylinders, besides maintaining an incessant noise while the engine is in operation.

45 The object of my invention is to steady the pistons in the cylinders during their reciprocating movements in such manner as to reduce to a minimum, if not entirely eliminate, the friction and noise common to this class  
50 of engines. In engines of this character heretofore the compressor-piston has been pro-

vided with an annular ring or shoulder adapted to fit the compressor-cylinder. This construction was objectionable, because the piston being metallic and surrounded by hot air 55 it invariably expanded and would bind in the cylinder, or if made loose enough to compensate for the expansion it was liable at all times to rattle in the cylinder. I overcome this objection and also provide a packing 60 which acts as a steadying means for the piston and one that reduces the friction and is practically noiseless. This latter feature is of particular value in view of the fact that these engines are mainly used in apartment 65 houses and residences where noise is most objectionable.

My invention as applied to hot-air engines of the Rider type is as follows:

To the inner walls of the cylinder B, I at- 70 tach lugs *b*, of copper or other suitable material, or the cylinder may be cast with the lugs integral therewith. These lugs are arranged at a point where they will be just covered by the end of the piston A in its extreme raised 75 position, so that said piston will be in engagement with the same during its entire range of movement. This arrangement is sufficient to steady the piston at all times and insures a smooth and steady working of the same. 80 The lugs *b* are arranged at four points equidistant from each other, as shown in the sectional view Fig. 2.

The compressor-piston C is of greater length than the piston A, and the means for steady- 85 ing the piston C are preferably carried thereby. I arrange at the lower end of this piston a series of wearing-blocks of wood, fiber, or other suitable material, which will serve to maintain the piston in the center of 90 the cylinder, but will not cut the same.

The compressor-piston C is cast with a heavy flanged end C', and this flange has a series of openings to which wearing-blocks *c*, four in number, are adapted. Back of these 95 blocks bearing-plates *c'* are arranged, and tapped into the flange C', back of the plates *c'*, are set-screws *d* to set up the blocks when they wear and keep them in contact with the inner surface of the cylinder D. It is not ab- 100 solutely essential that four wearing-blocks be employed. Blocks arranged at three points

would be sufficient to steady the piston in the cylinder.

I claim as my invention—

- 5 1. The combination in a hot-air engine of the compressor-cylinder, an elongated piston fitting said cylinder at one end adapted to reciprocate therein, and means at the opposite end of said piston for steadying the same in its cylinder, said means comprising wear-  
10 ing-blocks carried by the end of the piston, with means for adjusting said blocks as they wear so as to keep them in contact with the walls of the cylinder, substantially as and for the purpose set forth.
- 15 2. The combination in a hot-air engine of the compressor, an elongated piston adapted

thereto, fitting said cylinder only at the top, said piston having a flange at its lower end, wearing-blocks carried by said flange and adapted to engage the walls of the cylinder, 20 set-screws for adjusting said blocks as they are worn, and bearing-plates interposed between said set-screws and the wearing-blocks, substantially as and for the purpose set forth.

In testimony whereof I have signed my 25 name to this specification in the presence of two subscribing witnesses.

WILLIAM R. KENNEDY.

Witnesses:

GEORGE B. LUTTON,  
FRANK M. LUTTON.