(No Model.)

# W. W. ANDREWS.

## ROTARY ENGINE.

No. 500,988. Patented July 4, 1893.

Fig. 1

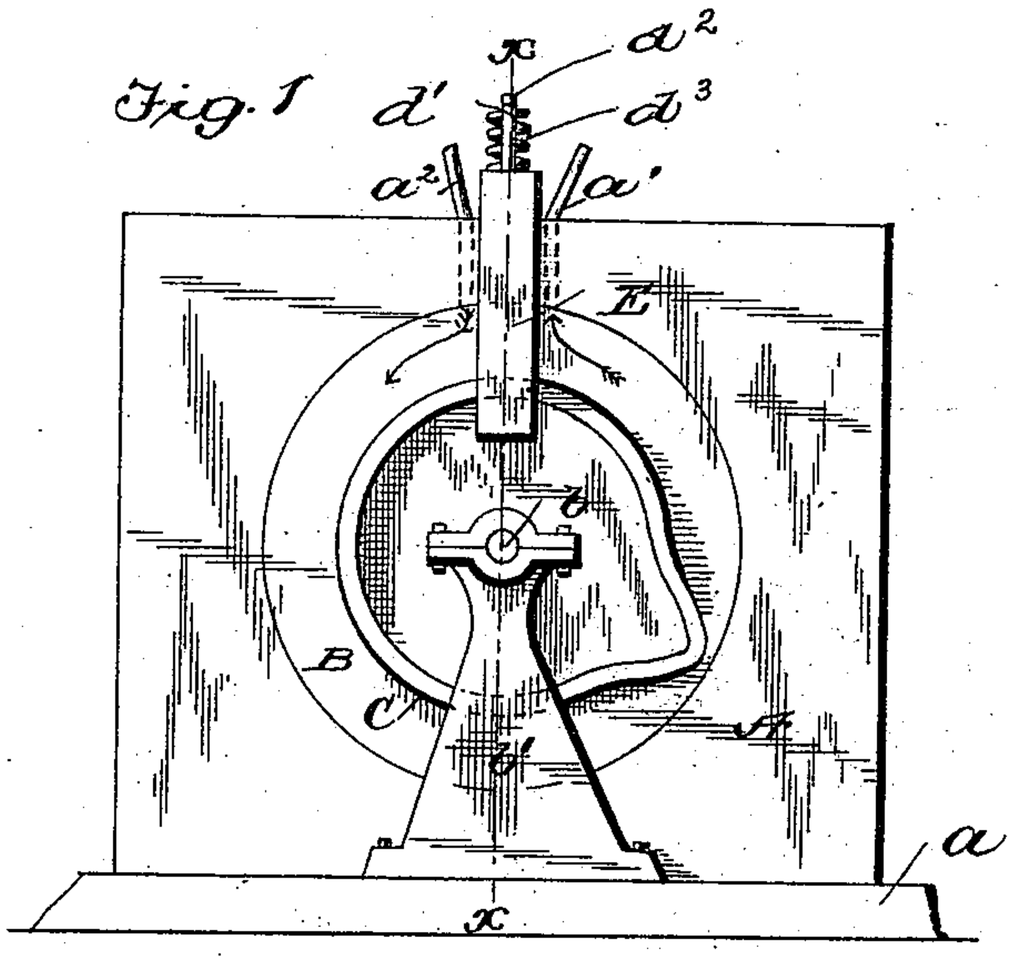



Fig. 2

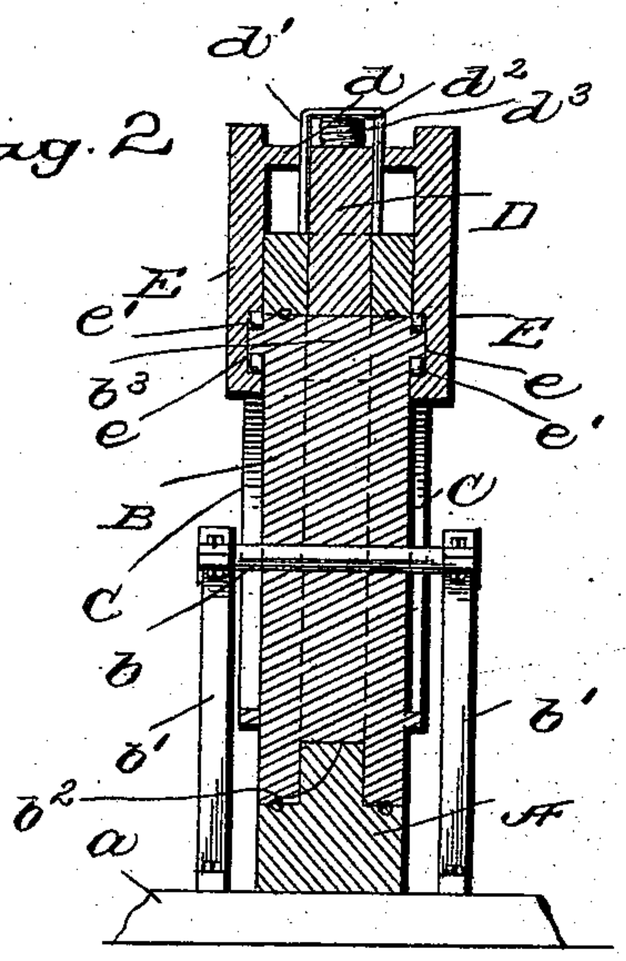



Fig. 3.

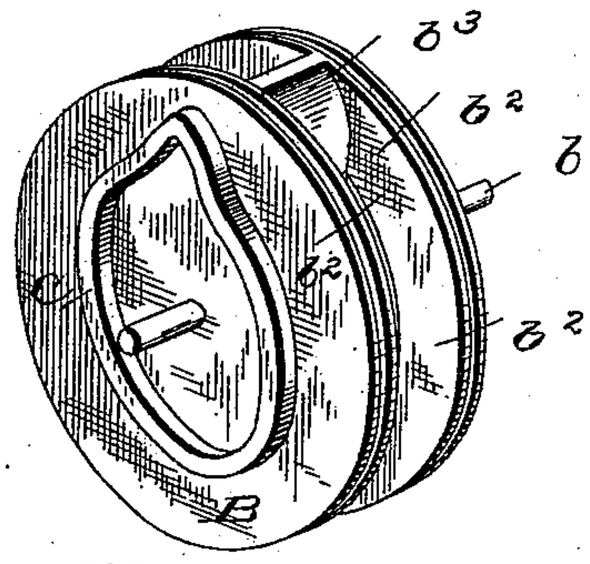
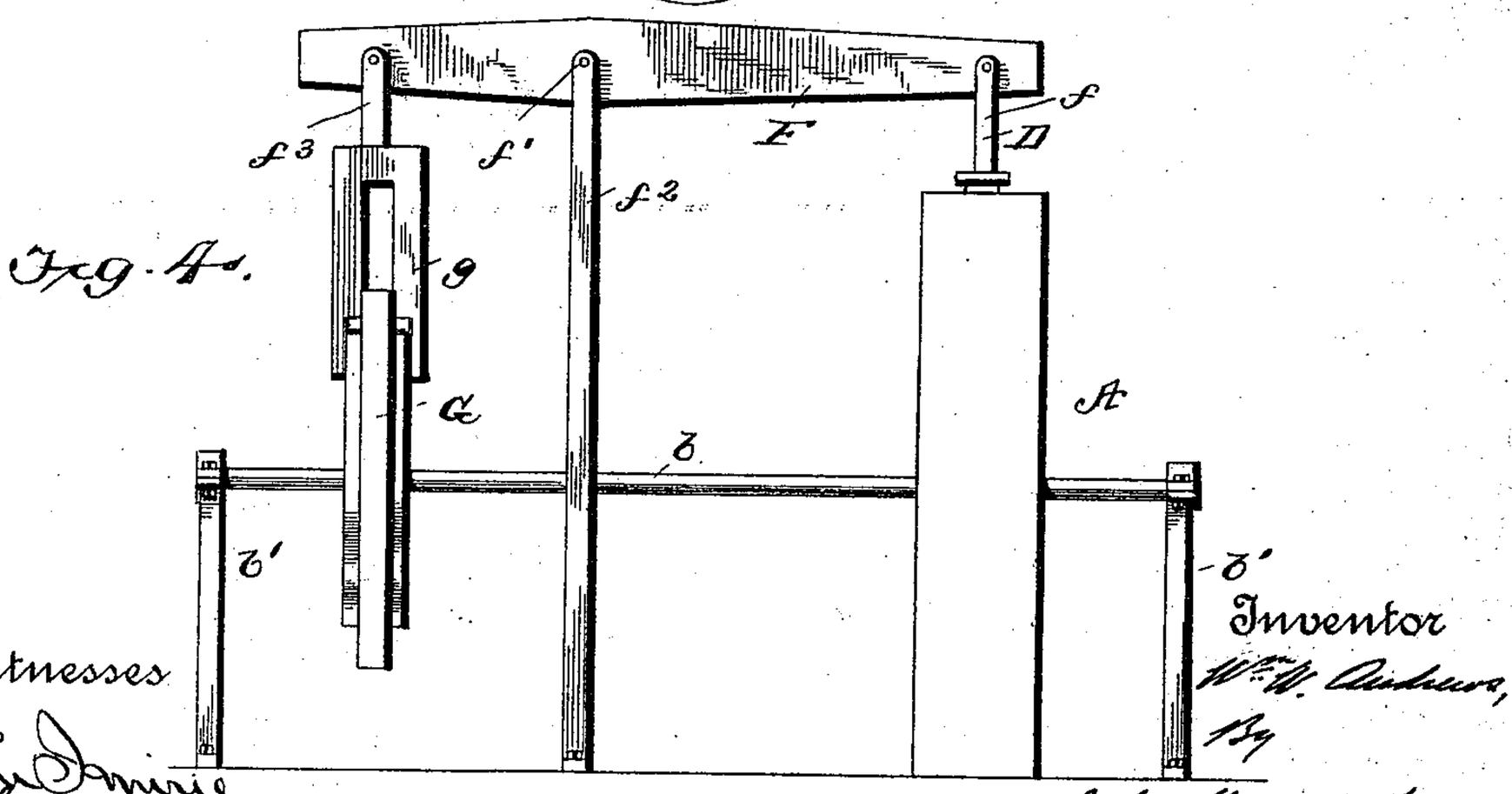



Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 500,988, dated July 4, 1893.

Application filed December 15, 1892. Serial No. 455,253. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM W. ANDREWS, of Fallbrook, in the county of San Diego and State of California, have invented certain new and useful Improvements in Rotary Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention contemplates certain new and highly useful improvements in rotary engines, and it has for its object the production of a cheap, simple and highly efficient engine of this class in which a concentric piston is employed.

The invention comprises the details of construction, combination and arrangement of parts substantially as hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings:—Figure 1 is a view in side elevation of my improved rotary engine. Fig. 2 is a vertical sectional view on the line *x*—*x*, Fig. 1. Fig. 3 is a view of the piston detached. Fig. 4 is a view of a modified form of my invention.

Referring to the drawings, A designates a vertically disposed casing secured to a base-board *a*. In this casing is formed a circular opening, and into its top open two steam-ports $a'$, $a^2$, one for live steam and the other for exhaust.

B is the piston wheel located in the circular opening of casing A, and it is keyed on main-shaft *b* resting in supports $b'$. In the periphery of this wheel is a continuous groove or channel $b^2$. A stop or projection $b^3$ is located in this groove or channel, the same fitting snug therein. On the sides of the piston-wheel are cam-flanges C. For the greater portion of their lengths these flanges are circularly arranged, but at a point corresponding to the stop or projection $b^3$, each flange is formed into V-shape.

D is a sliding abutment extended through an opening in the top of the casing and secured to a cross-head *d* movable between two posts or uprights $d'$. To the upper ends of the latter is secured a cross-bar $d^2$ to which is attached one end of a spring $d^3$, the other end thereof being in contact with and bearing upon the cross-head *d*, thus holding said sliding abutment firmly in place. To the ends of the cross-head are secured two arms E, which hug the sides of casing A. Each arm has a groove or cut away portion *e* corresponding to the adjacent cam-flange which fits snug therein. I preferably provide these arms with upper and lower frictional rollers $e'$ which engage the cam-flanges. The V-shape portions of the cam-flanges will effect the raising of the arms E and the elevation of the sliding abutment D. This occurs as the stop or projection of the piston wheel is passing beneath said sliding abutment and immediately thereafter the latter is returned to its lowered position by the spring pressure thereon.

The operation of my invention is apparent. Steam is admitted through one of the steam pipes and forms a compact between the lowered sliding abutment and the stop in the groove or channel of the piston-wheel, effecting the revolution of the latter. As the stop approaches the sliding abutment the latter is raised through the agency of the cam-flanges and grooved arms and immediately reseated. As the stop passes the exhaust port, just as the sliding abutment begins to rise, the exhaust steam passes out of said exhaust port.

In Fig. 4 I have shown a slightly modified form of my invention, the change consisting in the means employed for operating the steam valve. In this form an extension *f* of the sliding abutment is connected to one end of a rocking bar F, fulcrumed at $f'$ on supports $f^2$. To the outer end of the bar F is connected a link $f^3$ to which parallel arms *g* are secured. These arms extend on either side of a cam-wheel G mounted on shaft *b*. This cam-wheel corresponds to the cam-flanges before described and takes the place thereof.

A rotary engine thus constructed is extremely simple and inexpensive; and being composed of but few parts is not liable to readily get out of order or be deranged.

I claim as my invention—

1. The combination with the casing having a circular opening and a hole or opening in its top, and the steam inlet and outlet ports, of the circular piston-wheel mounted in said circular opening and having a peripheral groove or channel and a stop therein, the cams

on the sides of said wheel, the sliding abutment located in said hole or opening, the spring bearing thereon, and the parallel arms connected to said sliding abutment and having inner grooves or recesses corresponding to said cams which fit therein, substantially as set forth.

2. The combination with the casing having a circular opening, and a hole or opening in its top, and the steam inlet and outlet ports, of the circular piston wheel mounted in said circular opening and having a peripheral groove or channel and a stop therein, the cams on the outside of said wheel having V-shape portions corresponding with said stop, the cross-head, the vertically movable sliding abutment, the spring bearing thereon, the parallel arms having inner grooves, and the rollers located in said grooves and between which said cams fit, substantially as set forth.

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

WILLIAM W. ANDREWS.

Witnesses:
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