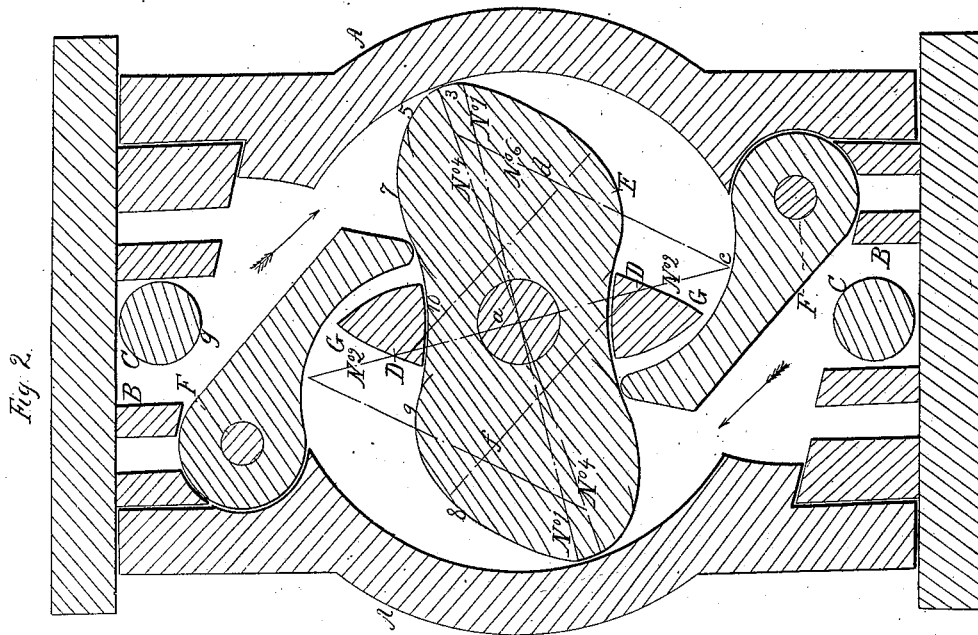
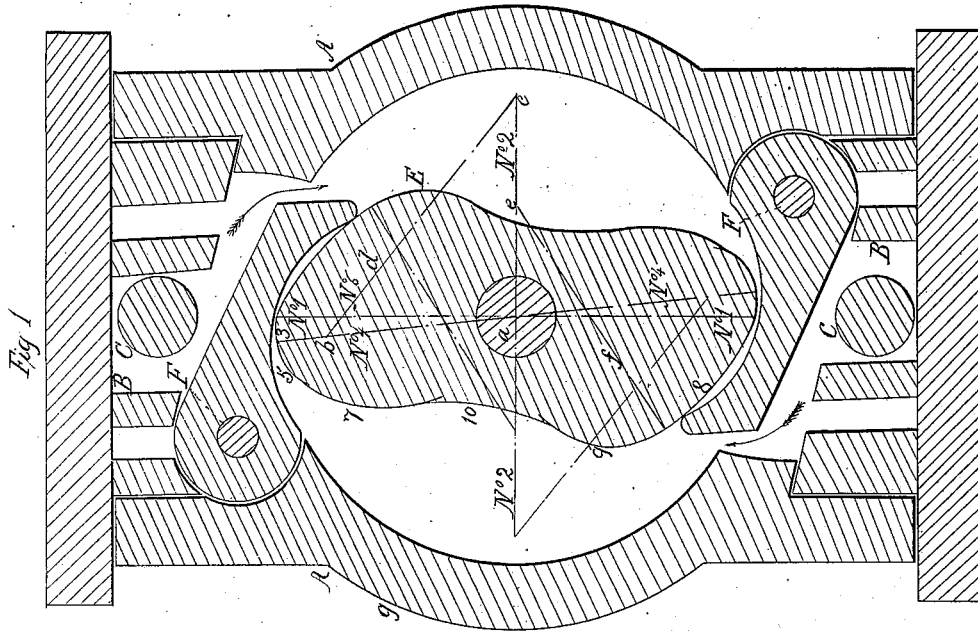


*A. & D. Buffum,*  
*Rotary Steam Engine.*  
*N<sup>o</sup> 5,343.                      Patented Oct. 30, 1847.*



# UNITED STATES PATENT OFFICE.

A. BUFFUM, OF BROOKLYN, AND D. BUFFUM, OF NEW YORK, N. Y.

## ROTARY ENGINE.

Specification of Letters Patent No. 5,343, dated October 30, 1847.

*To all whom it may concern:*

Be it known that we, ARNOLD BUFFUM, of Brooklyn, Kings county, State of New York, and DAVID BUFFUM, of the city, county, and State of New York, have invented certain new and valuable Improvements in Rotary Steam-Engines; and we do hereby declare the following to be a full and exact description, reference being had to the accompanying drawings, making a part of this specification, the same being a vertical view of the interior having one of the end plates removed.

The following description applies to an engine six inches diameter and two inches deep, but the invention is equally applicable to engines of all sizes, and for any extent of power.

The cylinder marked A, A, is six inches diameter and two inches deep in the clear. On the sides of the cylinder opposite to each other are two projections B, B, called valve chambers, adapted to the admission of steam, and to the size and form of the valves. The space included in the valve chambers is open to the interior of the cylinder, except as partially or wholly closed by the position of the valves. The entrance of steam is to the valve chambers, directly back of the valve, at C. The valve chamber is fitted with packing so as to prevent the entrance of steam to the cylinder when the valves are closed. The ends of the cylinder are covered with even plates, secured by bolts, and made steam tight. There are two escape holes D, D, in one, or in each of the end plates, located in the open vacuum space G, between the outer surface of the central portion of the revolver, and the circle of the inner surface of the inclosing cylinder; their size and form as shown in the drawing Fig. 2, being adapted to the space allowed them by the form and movements of the revolver and valves, so as to give free escape for the expended steam. These holes are always open, except when covered by the ellipsis of the revolver passing over them; and there being four of them, (when made in each end plate) and all opened to the steam by the passing of the ellipsis of the revolver twice in every revolution, constitutes them an important improvement in the rotary steam engine, in combination with a revolver of any form admitting of their use. The revolver E is six inches in diameter in one direction, and two

and three tenths inches at the center in the other direction. Its form is represented in the drawing by the following process; viz, beginning with two straight lines crossing each other at the center at right angles, No. 1, No. 1, called the right line, No. 2, No. 2, the cross line. On the left hand side of the right line, three inches from the center, we mark the point circle 3, this circle is three tenths of an inch long, and has its radial center at the main center at *a*. Then from the left hand end of the point circle we draw a straight line No. 4, to the main center, then from a radial center on this line at *b*, with a radius six tenths of an inch, we mark the valve opening circle 5. Then we draw the straight line No. 6, from the radial center of circle 5, at *c*, on the cross line, two and seven tenths inches from the main center. Then with a radial center on this line at *d* with a radius one and eight tenths inches, we mark the valve falling circle 7. Then from a radial center at *e*, on the cross line, with a radius of three and three tenths inches, commencing at the other end of the right line, we mark the improved valve closing circle 8. Then from a radial center at *f* one and two tenths inches from the extremity of the circle 8, on a direct line toward its radial center, with a radius one and two tenths inches, we mark the valve lifting circle 9. Then with a radius of three inches, having a radial center at *g*, equal distance from the central point of circles 7, and 9, we mark the connecting curve 10, uniting the circles 7, and 9, in a concave form, which completes the form of one side of the revolver. Then by the same process, commencing at the other end of the right line, we mark the same circles and curves on the opposite side of the right line, and so complete the form of the revolver. That portion of the revolver marked by the connecting curves 10, we call the "central portion," while all the portion which extends more than one and three twentieths of an inch from the center, we call the "ellipsis."

The valve closing circle 8, being drawn from a radial center on the cross line No. 2, on the opposite side of the right line No. 1, has a peculiar eccentric movement, which imparts to a regularly curved gate valve, as it presses it toward its chamber, such a movement and consequent position, that while the point formed by the junction of

the valve closing and point circles, at the end of the right line, No. 1, is passing by the face of the valve, it constantly finds the adapted curve of the valve, presenting itself on the line of the circle of the inner surface of the cylinders, and consequently supplying an unbroken bearing surface, constituting a leading barrier to the passage of steam; while at the same time, the opening edge of the valve, continues in contact with the surface of the revolver, constituting a backward barrier to the passage of steam, as shown by Fig. 1.

The design of the novel form given to the revolver, by the other circles and the connecting burners, is, to effect the combination of a well graduated movement of the valves, with a large space between the surface of the revolver and the inner surface of the inclosing cylinder, for the action of steam on the leverage of the revolver; and also, to give larger space for the escape holes through which the expended steam passes off. All the circles and curves however, admit of various modifications; the radial center of the valve closing circle, may be at a greater or less distance from the main center, and its radius proportionally increased or diminished; which increase or diminution, will determine the requisite curve of the face of the valve, in order to produce the specified movement and position. The other two surfaces are fitted with packing to run steam tight, between the even plates which cover the ends of the cylinder.

The valves, F, F, are two curved gates, three and two-tenths inches broad from the center of motion; two inches long, and of varied thickness. The force of the valve is curved by a sweep of a radius one and six-tenths inches. A bolt five tenths of an inch diameter, passes through the length of the valve, at the back edge, and through the plates which cover the valve chamber, constituting an axis on which the valve turns in opening and shutting, as a door turns on its hinges. The valves are placed in the valve chamber with the face of the valve at its axis on a line with the circle of the inner surface of the cylinder, in such position, that they can open into the interior of the cylinder, by the action of the steam pressing on them, when the position of the revolver will admit of their doing so. As the point of the revolver when in action, approaches the valve which is before it, the valve closing circle coming in contact with the opening edge of the valve, communicates to the valve the requisite movement and consequent position, as it shuts the valve into its chamber, when no steam can enter the cylinder; and at the same moment, the escape holes being uncovered, by the passing of the ellipsis of the revolver, the expended steam passes freely off. Pack-

ing is used in all parts where it is necessary to make the engine steam tight.

To keep up a uniform power in the engine without a fly wheel, two revolvers, either with one or two ellipses to each, may be placed on the same shaft, with two or four valves, so arranged, that when one revolver is at its dead point, the other will be at its greatest power, having a partition between the two revolvers and also between their relative valves.

By the use of a cut off valve, the entrance of steam to the cylinder may be stopped at any part of the revolution, and the expansive power of the steam be effectually applied.

The engine may be placed directly on any shaft to which we desire to communicate a rotary movement.

By the term "gate valve" we mean a valve constructed and arranged to turn on an axis, whereby it is secured in its proper position. By the term "point of the revolver," we refer to the point of junction of the valve closing and the point circles, No. 2, and No. 3, with the end of the right line No. 1.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The peculiar relative position of the revolver and the gate valve, during the passage of the point of the revolver by the face of the valve; to wit, the point of the revolver, running in continuous contact with the face of the valve, and the opening edge of the valve, during the same time (as at all times,) continuing in contact with the surface of the revolver. See Fig. 1.

2. The concave, instead of the cylindric form of the central portion of the revolver, adapted to the application of a larger quantity of steam to act on the leverage of the revolver, and at the same time, admitting such breadth to the ellipsis of the revolver, as to secure a very gradual and easy movement to the valves, and also allowing a more free escape for the expended steam. See Fig. 2.

3. The location of the escape holes, in the open vacuum space G, between the outer surface of the central portion of the revolver, and the circle of the inner surface of the inclosing cylinder, in the plates which cover the ends of the cylinder, in combination with the revolver herein described.

New York, Sept. 27, 1847.

ARNOLD BUFFUM.  
DAVID BUFFUM.

Signed, by Arnold Buffum in presence of—

CHARLES H. HEDGES,  
A. E. FREELAND.

By David Buffum in presence of—

THOS. BUFFUM,  
GEORGE ALDRICH.