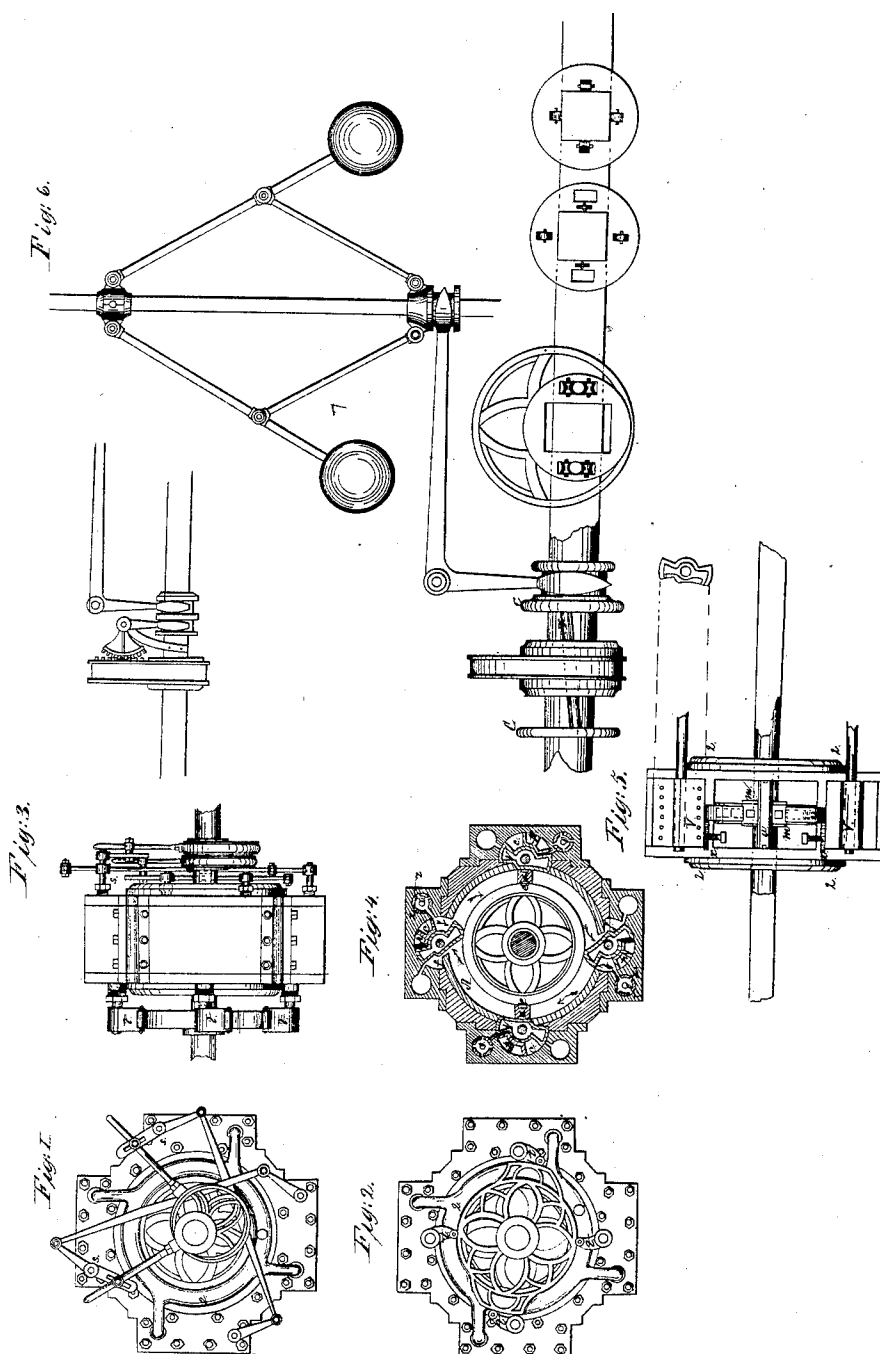


B. H. WRIGHT.
REVOLVING PISTON ENGINE.

No. 11,846.

Patented Oct. 24, 1854.



UNITED STATES PATENT OFFICE.

BENJ. H. WRIGHT, OF ROME, NEW YORK.

ROTARY STEAM-ENGINE.

Specification of Letters Patent No. 11,846, dated October 24, 1854.

To all whom it may concern:

Be it known that I, BENJAMIN H. WRIGHT, of Rome, in the county of Oneida and State of New York, have invented new and useful
5 Improvements in Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the aforesaid improvement and operation of the same, reference being had to the accompanying drawing, making part of this specification, wherein—

Figure 1 is an end elevation; Fig. 2 also an end elevation but of the opposite or reverse end; Fig. 3 a side elevation; Fig. 4 a
15 middle section transverse to the shaft; Fig. 5 the fixtures, designed to regulate the velocity of the engine exhibited on an enlarged scale.

The general features of this class of engine are so well known and understood as to render unnecessary a description, except so far as the former are connected with, or have relation to the improvements claimed. The drawing exhibits the usual annular
25 space or chamber A which the floats or pistons (using an analogous term) follow in the revolutions. The pistons *a a* are either attached to a barrel or drum which extends the entire width of the annular space, or, otherwise, they may be attached to a center
30 wheel of limited thickness, and the remaining surface that constitutes the inner boundary of the annular space, is formed by a single cylinder on each side of the wheel cast
35 attached to the head, and projecting from the latter till it comes in contact with the before mentioned piston wheel. In this method of construction it has hitherto been found necessary, in order to prevent the
40 egress of steam adjacent to the wheel, to introduce there a ring of metallic or other packing; for although immediately after construction the machine may be sufficiently
45 tight without it, the slightest wear at this point will, it is obvious, cause a loss of steam, and hence detract from the efficiency of the engine. To overcome the imperfections I
50 discover even when packing is used, I have devised a more perfect method, in the case where a center wheel is employed. In lieu of a single cylinder, as before mentioned, I use a double cylinder on one or both sides of the wheel—the smaller attached to the
55 head as before described, and the latter *x x* Fig. 5 concentric with the first, enters a groove in the head. By means of set-screws

placed in the head opposite to the detached cylinder or any analogous method, as in Fig. 5, the latter is made to slide on the lesser toward the center wheel—enough so to prevent the egress of steam, and at the same time to allow ease of movement.

The pistons may be packed in any judicious manner, but my method of packing the inner surface is to use a single piece of metallic packing *e, e* extending the length of the piston through a cut over the piston wheel removing so much of the latter as will at all times secure the contact of the packing, with the stationary portions of the cylinder. To guard against any liability to leak at this point, I protect it by the lateral overlap of the base of the piston, in other words the flanges which serve in attaching the latter to the wheel. See Fig. 5, *m m*.

The valve or steam abutment *v, v, v, v*, I employ, I distinguish from all others as the double oscillating. It has two opposite wings, nevertheless combines the advantage of a single wing by reason of its peculiar
80 configuration, to obtain which I place the axis of the valve without the cylinder. I am thus enabled to form a cylindric surface between the wings adjacent to the annular chamber, thus reducing the cut in the cylinder, which the piston must necessarily pass, to the least practical dimension—in other words to that of the single wing.

By means of a like cylindric surface between the wings on the opposite side of the valve, I introduce a partition *p, p, p, p* and form a separate chamber *c c* adjacent to the outer wing—the first cutting off all communication, except at will, with the induction passage, *s*, that the chamber referred to, may
95 be used as a vacuum, steam, or air chamber, according as may be preferred, or experience dictate. When used as an air chamber my plan is to make an orifice and insert a small cock, thus putting it in communication
100 with the atmosphere. With the cock nearly shut, the restrained issue of the air, which enters at each reverse movement of the valve, will operate as an air cushion, and the powerful striking of the valve on the stationary
105 cylinders will thus be effectually prevented.

On an attentive examination of the plans of rotary engines having partially rotating valves, nearly all, if not quite all, will be found so arranged that the valve performs
110 its revolution in an exhausted or partially exhausted chamber, or else with the piston

subject to a back action. In many cases the valve appears to move with velocity, but not sufficiently so to adapt itself to scarcely any inclination or slope of the piston wheel, because the two are moving in opposite directions, and therefore leaving each other under the combined velocity. I aim by my arrangement and double wing valve, at a different result, through a combination of forces. First I leave the valve face adjacent to the induction channel, to the free action of steam, that is to say at the proper time. Next by means of a channel through the valve Fig. 5 (or some other equivalent passage) entering near the periphery, the steam in the annular chamber which has been following the piston, finds its way through the valve to the place of issue, which I make fronting the plane face f, f, f, f of the cylinder, otherwise the valve seat. A reaction or pressure upon the valve ensues, which acting in conjunction with the force applied to the opposite wing, together with the resistance removed from the reverse side of the same wing, combines to produce a more rapid movement of the valve across the piston channel, and, consequently, an earlier action of the steam upon the piston.

Directing attention to the figure of the valve and position of the axis,—it will be seen that the two combined, furnish an induction passage from the piston channel at the proper moment; whilst the dimension of the circumferential surface which I give to the valve, is such as to retain the action of the steam upon the face of the latter during its revolution athwart the channel, notwithstanding the arrangement just mentioned (to which however I do not intend to limit myself) does not permit the entering steam to reach the piston at the first instant, I am to compensate for this by a new feature, to wit; the combined forces acting upon the valve cause it to turn on its axis. To the latter produced through the head and a suitable distance beyond, a tappet t, t, t, t is attached, having a friction roller at its extremity. The latter, in the revolution of the valve, is forced down the inclined surface of a cam wheel attached to the shaft of the piston wheel, and, in this manner, the force applied within to move the valve is made effective on the outside to propel the piston wheel.

To admit and cut off the steam at suitable intervals I employ two concentric cylinders the one rotating, or partially rotating, within the other. The inner one o, o, o, o is hollow, and in free communication with the steam in the boiler so that it is at all times filled with steam. The aperture or slot in the outer cylinder is the measure of a full volume of steam; the width of the corresponding slot in the inner one, in conjunction with the extent of the re-

ciprocating movement, or the latter alone if working steam expansively, regulates the time during which it flows. With a wide aperture, a variable eccentric such as I provide, will regulate the time of flow to any desired velocity of the engine; the degree of expansion likewise included.

With the object of balancing the pressure cause by a removal of a certain extent of surface of the inner cylinder when creating a passage for the steam to the valve, I remove from the point of pressure which is that diametrically opposite to the passages z, z and equal, or little greater extent of the cylinder, as illustrated in the accompanying drawing. Where however, as in the present case two passages are proximately situated, it serves like purpose to remove a double extent opposite to a point midway between the two. These cuts or openings not being designed for steam passages it is evident that their size or extent will be governed by totally distinct considerations, in other words involve different principles.

The rotating or partially rotating cylinders are actuated (that is to say one of each pair) by means of a stem or spindle s, s which passes through one of the heads of the main cylinder, and has an arm or lever attached thereto moved by an eccentric rod, see Fig. 1. The motion is transmitted to the opposite cylinder belonging to the same pair, by means of a connecting rod and two arms or levers, as illustrated in the drawing, Figs. 1 and 3.

For a machine of direct rotary action such as the present one, where the velocity of the piston augments with great rapidity upon an increase of steam it will be found necessary to attach fixtures for regulating the power according to the work to be performed. To avoid confusion in the drawings I have represented this portion of my machine detached Fig. 6 on an enlarged scale. This will enable any one to comprehend, almost at first sight, its mode of operation. The eccentric disk it will be seen, has an elongated opening so that it can move back and forth, on a line corresponding to its principal diameter. It is detached from the hub, and the two parts of the latter are secured in the ordinary way to the shaft, allowing the eccentric disk free motion between them. The drawing shows in detail the manner the two portions of the hub and the eccentric disk are prepared with friction rollers to facilitate the movement of the disk. The two portions of the hub are perforated and two rods one of which only r , is in view inserted, the plane of the two rods is inclined to the shaft. The ends of these rods are fixed firmly to two collars c, c which slide freely on the shaft. Friction rollers are placed in the eccentric disk

to assist the movement of the rods. One of the forked ends of a bent lever is fitted to a groove in one of the collars and the other extremity reaches the revolving spindle of a governor, a part which needs no elucidation. The movement of the rods, as the collars are drawn back and forth, are, in effect, as an inclined plane, raising and depressing the eccentric disk, hence varying the eccentricity, and, in consequence, the throw, technically speaking, of the valve. A modification of the part of the engine just described, will be seen adjacent in the drawing. In this a toothed segment or ratchet wheel is employed, in lieu of the inclined rods, to give movement to the eccentric disk.

To convey the steam to the different valves I form an annular chamber 2, 2 in one of the heads of the machine opposite to the piston channel, with branches to the cut off cylinder, respectively. And to carry the steam away, a like common receiver in the other head 2, 2, and, also, in like position.

Having sufficiently described my improvements, and the operation thereof, what I claim as new and desire to secure by Letters Patent is—

1. Whenever a central piston wheel is used, the double cylinder, the one sliding on the other, in the manner, and for the purpose, or substantially the same, as set forth in the preceding specification.

2. I claim the two parts separately, and in combination, viz; the method of inserting a single piece of packing in the inner surface of the piston through an aperture or recess in the latter, with a corresponding but limited cut in the piston wheel; together with the mode of protecting this aperture by the lateral overlap of the base or flange of the piston.

3. I claim the double oscillating valve; having opposite wings, nevertheless preserving the advantage of a single wing through the peculiar outline or use of a lesser cylindrical surface between the wings on the side of the piston channel, reducing the cut in the cylinder for the passage of the piston to the least practicable dimensions.

4. I claim the introduction in connection with a like cylindric surface between the two wings on the opposite side of the valve

of a partition and separate chamber adjacent to the outer wing, for the purpose explained in the foregoing specification.

5. I claim the arrangement, in connection with the oscillating valve, of the induction and eduction passages, such that the first opens just at the termination of the revolution of the valve athward the piston channel; and the second by an aperture in the valve cap, uncovered by the opposite wing when the valve is in the position before stated, the purpose of the arrangement being to promote regularity of movement, and the working of steam expansively.

6. I claim also the method of compensating for the less ready action of steam directly on the piston, by the use of tappets which are forced by the revolution of the valve, down the abrupt inclination of an exterior cam wheel.

7. I claim separately, the passage through the valve, commencing near its periphery and terminating at the plane surface or valve seat as described.

8. I claim the method specified of balancing the pressure on the cylindrical cut off valve, that is to say by the removal of a suitable extent of surface diametrically opposite to the passages, or, where there are two passages proximately situated, it is obvious a middle point may be used. These cuts or openings not being designed for steam passages it is evident that their size or dimensions will be governed by totally distinct considerations.

9. I claim governing the velocity of the engine by changing the position of the eccentric disk, which governs the motion of the cut off valves, by the lever from the governor, said disks when thus changing having a transverse motion on the shaft.

10. I claim the annular steam chamber 2 formed in one of the heads opposite to the piston channel, with branches to the cut off cylinders respectively; and a like chamber 2 in the other head, as a common receiving chamber from the eduction ports.

Rome, N. Y., August 20, 1852.

BENJAMIN H. WRIGHT.

Witnesses:

WM. T. JONES,

W. E. WRIGHT.