W. B. & E. STOTT.

Rotary Condensing Steam-Pumps.

No. 154,100. Patented Aug. 11, 1874.

Fig. 1.

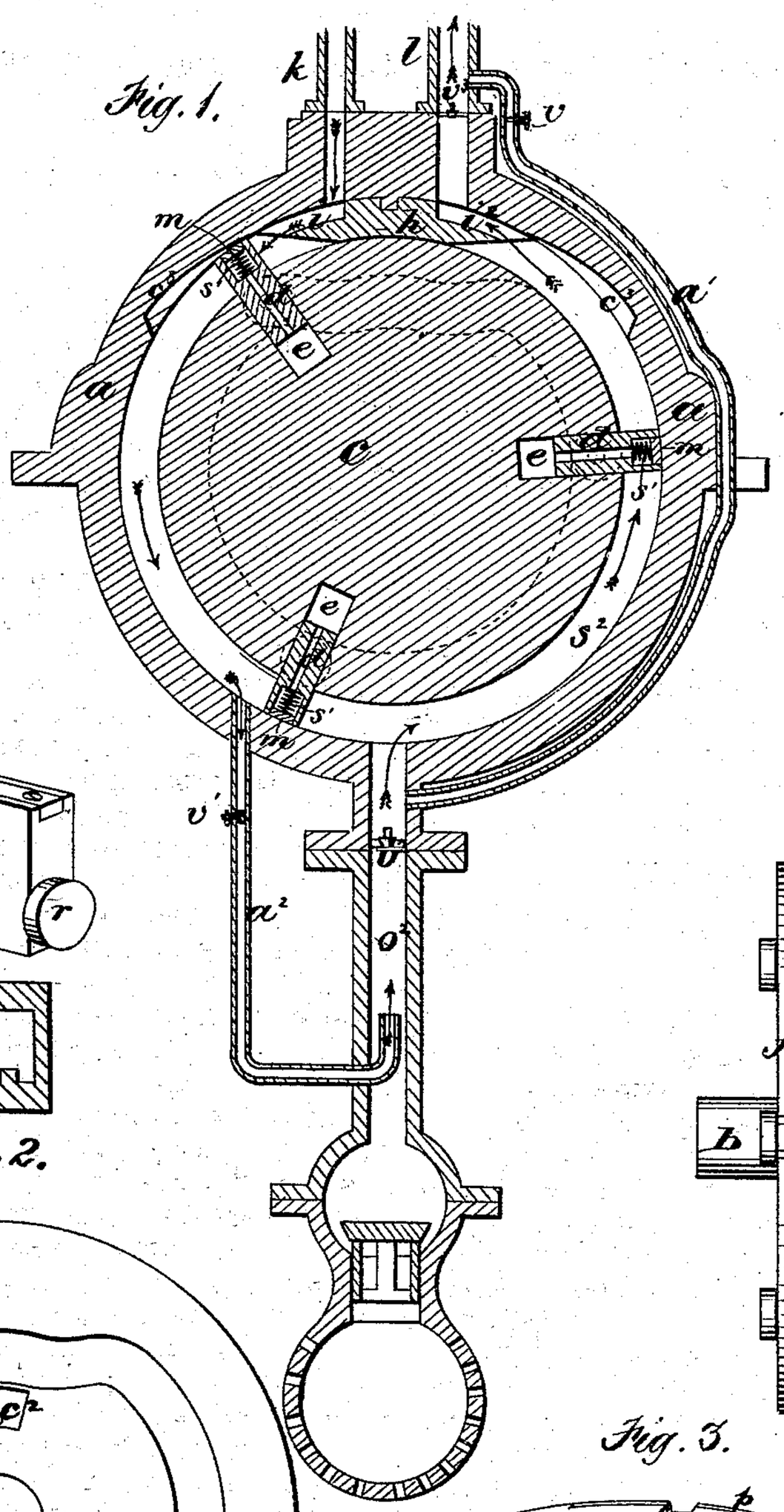


Fig. 4.

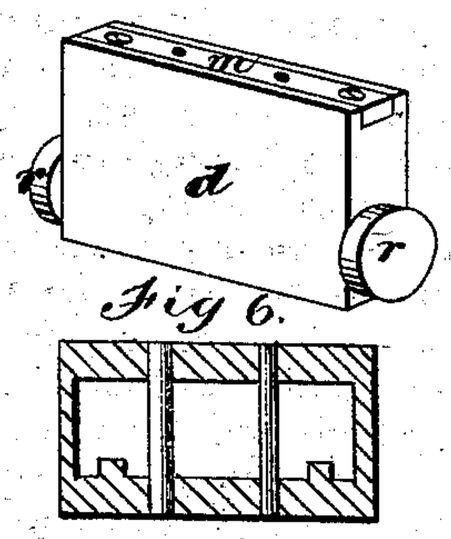


Fig 6.

Fig. 2.

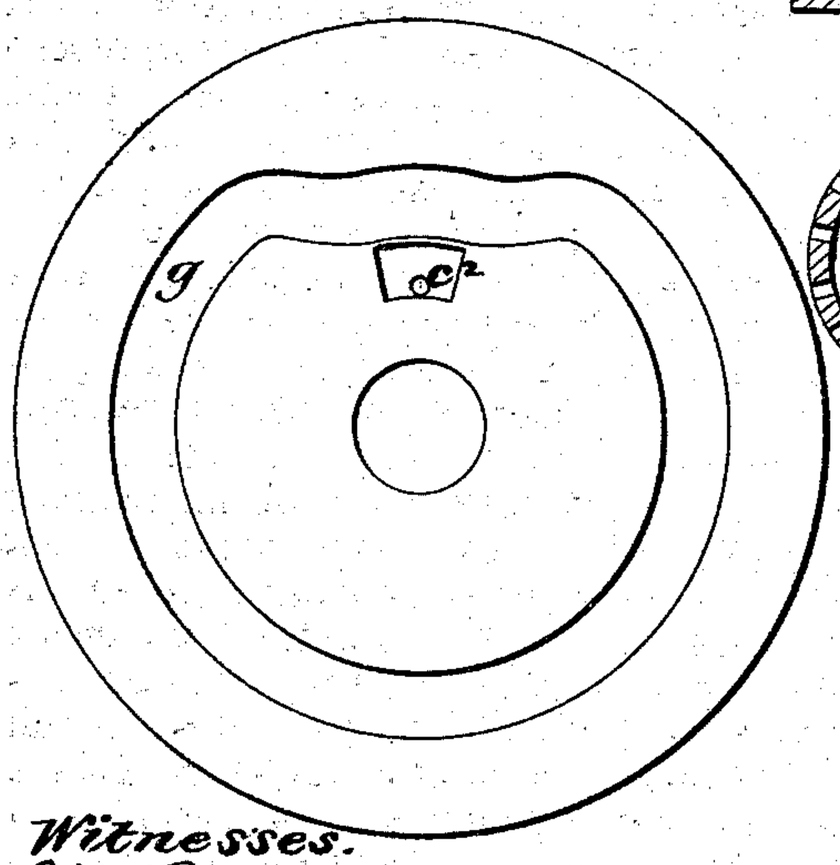


Fig. 5.

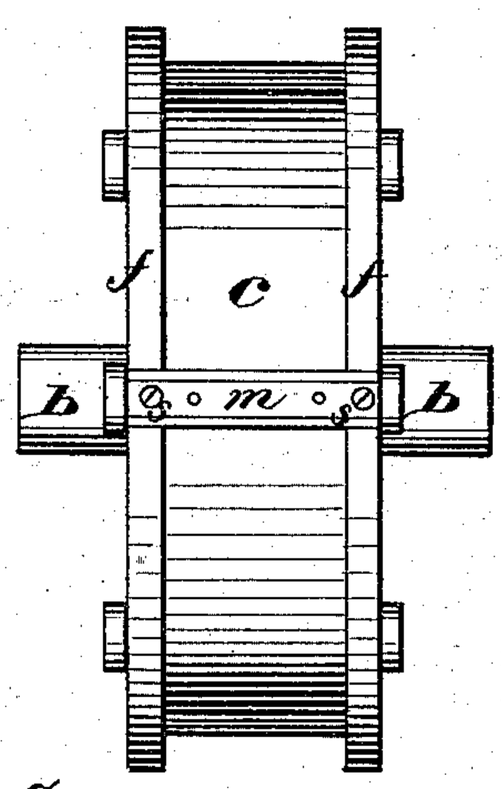
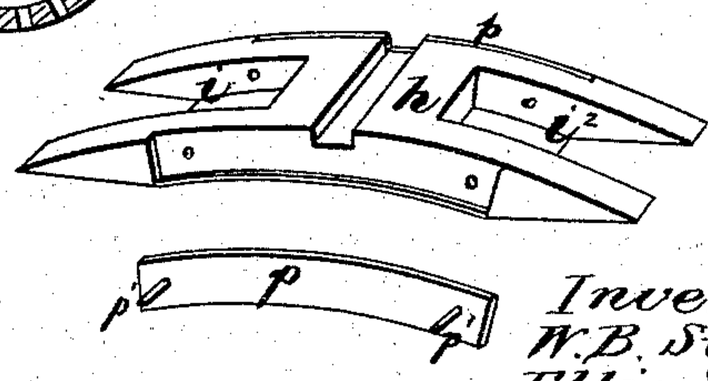


Fig. 3.



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by their Attys.
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UNITED STATES PATENT OFFICE.

WILLIAM B. STOTT AND ELLIS STOTT, OF SCRANTON, PENNSYLVANIA.

IMPROVEMENT IN ROTARY CONDENSING STEAM-PUMPS.

Specification forming part of Letters Patent No. **154,100**, dated August 11, 1874; application filed June 3, 1874.

To all whom it may concern:

Be it known that we, WILLIAM B. STOTT and ELLIS STOTT, of Scranton, in the county of Luzerne and State of Pennsylvania, have invented a new and Improved Rotary Condensing Steam-Pump; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings forming part of this specification, in which—

Figure 1 is a vertical longitudinal section of our improved rotary condensing steam-pump. Fig. 2 is a side elevation of one of the heads of our rotary pump, showing the cam-groove, in which one set of the rollers of the pistons are guided. Fig. 3 is detached view of the abutment and its packing and cavity, and Fig. 4 is a similar view of one of the valves. Fig. 5 is a longitudinal central section through one of the valves or pistons, showing the transverse tubes and air-spaces located in the valves.

Similar letters of reference in the accompanying drawings denote the same parts.

Our invention relates to improvements in rotary condensing steam-pumps having a single cylinder; and consists, first, in the employment in this class of rotary pumps of steam as the motive power to drive the revolving drum carrying the valves or pistons, the same steam also being in our construction condensed to form a vacuum, and thereby raise water in the pump-cylinder. Our invention also consists in providing the sliding valves or pistons with transverse tubes extending through them for the passage of steam to the rear faces of the valves to equalize the pressure on their front and rear faces, and also with an interior air-cavity, as hereinafter more fully set forth. Our invention also consists in an improved packing for the abutment, as hereinafter more fully set forth. Our invention further consists in the employment of a tube provided with a valve, and extending from the lower end of the eduction-pipe to the upper end of the induction-pipe, by means of which the pump may be primed from the eduction-pipe, if necessary. Our invention also consists in the employment of a steam-pipe provided with a valve, and connecting the induction-pipe with the steam-space in the outer cylinder, by means of which the water in the induction-pipe is forced upward by the steam, as hereinafter more fully set forth.

In the accompanying drawings, *a* is the outer cylinder or shell of our rotary condensing steam-pump supported by the horizontal shaft *b*, to which is secured the drum *c*, provided with flanges *f f* fitting steam-tight in the cylinder, and radial recesses *e e* for the reception of the valves or pistons *d d*, which are made to slide therein in the revolution of the drum, the rollers *r r* on the ends of the sliding valves *d d* operating in the cam-grooves *g g* made in the pump-heads. *h* is an abutment attached to the upper part of the inner face of the shell, and provided with passages *i* i^2 for the introduction of steam through the pipe K, and the eduction of water through the pipe *l*. The outer faces of the sliding valves *d d* are provided with recesses for the reception of bearing-blocks *m m*, which are adjustably attached to the valves in said recesses by screws *s s*, the shanks of which are surrounded by coiled springs *s′ s′*, the tension of which is constantly exerted to force the bearing-blocks *m m* outwardly and radially against the inner face of the outer cylinder to preserve a water and steam tight joint in the revolution of the drum. The upper faces of the bearing-blocks *m m* are perforated, the perforations extending transversely and entirely through the valves, and tubes are inserted in the perforations in the valves for the passage of steam or water to their rear faces to equalize the pressure on the outer and inner faces of the valves, and thereby prevent binding and reducing the friction of the rollers *r r* on the valves with the cam-grooves *g g* in the pump-heads. The sliding valves are made hollow in the interior, the object of such construction being to leave a stratum of air between the faces of the valves, which, being a poorer conductor than metal, will prevent the rapid cooling or heating of the valves from the water and steam in contact with them. A similar cavity or space is made in the abutment *h* for the reception of air to prevent the rapid heating and cooling of the metal of which the abutment is constructed by reason of the steam and water brought in contact with it in the operation of the pump. The abutment *h h* is designed to

fit steam-tight between the flanges *f f* of the drum C, and is provided with recesses in its longitudinal faces for the reception of the curved metallic packing-pieces *p p*, provided with pins *p' p'* attached thereto, which are inserted in suitable holes in the abutment, the former opening into the steam and water passages *i i*^{2} in the abutments.

By this construction the pressure of the steam or water on the ends of the pins *p p* will be constantly exerted to press the packing laterally, and thus always preserve a tight joint between the abutment and the flanges *f f*, of the drum *d*.

a^1 is a tube or water pipe leading from the lower end of the eduction-pipe *l* to the induction-pipe *o*^{2}, and *a*^{2} is a steam-pipe situated on the opposite side of the outer cylinder, and connecting the steam-space of the latter with the water-induction pipe *o*^{2}. The pipes *a*^{1} *a*^{2} are provided with cocks or valves *v v*^{1}, and the steam-pipe *a*^{2} is bent upwardly at its lower end after it enters the induction-pipe *o*^{2}, to act with more effect on the water in the latter. *v*^{2} *v*^{3} are valves in the induction and eduction pipes, both opening upward. *c*^{2} *c*^{2} are cavities in the inner faces of the pump-heads, having passages connecting them provided with cocks to discharge the water contained therein. *c*^{3} is a cavity in the upper part of the inner face of the outer cylinder, which forms a communicating passage between the spaces on each side of the sliding valves. They pass over the cavity in the revolutions of the drum *c*, and at the same time permit a portion of the water in rear of the valve to pass from behind it through the transverse tubes to their front faces, thus equalizing the pressure on the front and rear faces of the valves.

The operation of our pump is as follows: Steam is admitted through the steam-pipe K into the interior of the outer cylinder, the pump having been previously primed in the ordinary manner, or by turning the valve *v* and allowing water to pass through the pipe *a*^{1}. The steam operates on the sliding valve nearest its point of admission, as shown by the arrow, and gives a rotary motion to the drum *c*. After the valve first acted upon passes the steam-pipe *a*^{2}, a portion of the steam is forced into said pipe, and thence into the induction-pipe *o*^{2}, forcing the water up the latter, and into the steam-space *s*^{2} in the outer cylinder. That portion of the steam not forced into the pipe *a*^{2} is condensed when it comes in contact with the water with which the pump is primed, forming a vacuum, and the further elevation of water in the induction-pipe, which is carried by the valves upward and out of the pump through the eduction-pipe *l*. When the valves are passing the abutment, the pressure of the steam on the outer faces of the valves is considerable, but it is equalized in our construction by reason of the passage of the steam through the transverse tubes in the valves to the rear faces of the latter. After the valve has reached the induction-port and is carrying water, the latter is introduced in a similar manner to the steam, before described, through the tubes to the rear face of the valve. When the valve reaches the cavity *c*^{3} in the cylinder, a communicating passage at the outer end of the valve is made between the water-spaces on each side of it, thus relieving the valve from the pressure of water on its face, which is borne by the valve succeeding it. Any water remaining behind the sliding valves falls by gravitv into the cavity *c*^{2}, when the valves arrive opposite the center of the abutment, the water passing from the cavity out of the pump through the passage above described.

It will be seen from our construction that steam is employed as the motive power to drive the pump, and also by the condensation of the same steam a vacuum is produced to elevate water in the induction-pipe, and by the continued rotation of the valves the water is carried out through the eduction-pipe.

We claim as our invention—

1. The combination of the single cylinder *a*, cylinder *c*, having valves *d*, the steam-induction pipe K, and water-pipes *o*^{2} and *l*, substantially as described, and for the purpose set forth.

2. The valve *d*, provided with an interior air-cavity and transverse tubes, as and for the purposes set forth.

3. The valve *d* sliding in recesses in the drum *c*, and provided with transverse tubes, in combination with the cavities *c*^{2}, as and for the purposes set forth.

4. In a rotary engine the water-pipe *a*^{1}, provided with a valve, in combination with the water-eduction pipe *l* and induction-pipe *o*^{2}, substantially as described, and for the purpose set forth.

5. The steam-pipe *a*^{2}, provided with a valve and bent upward at its lower end, in combination with the cylinder *a* and water-pipe *o*^{2}, substantially as described, and for the purpose set forth.

6. The abutment *h*, provided with steam and water passages *i i*^{2}, and longitudinal recesses, in combination with the packing *p p*, having pins *p' p'* attached thereto, and drum *c* provided with flanges *f f*, substantially as described.

7. The outer cylinder *a*, provided with the steam and water pipes K *l o*^{2}, in combination with the drum *c* having valves *d d*, as set forth, and steam and water pipes *a*^{1} *a*^{2}, the whole constructed, arranged, and operated in the manner and for the purpose set forth.

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