N. H. J. F. C. De Crony,

Rotary Steam Engine.

No. 3,134. Patented June 14, 1843.

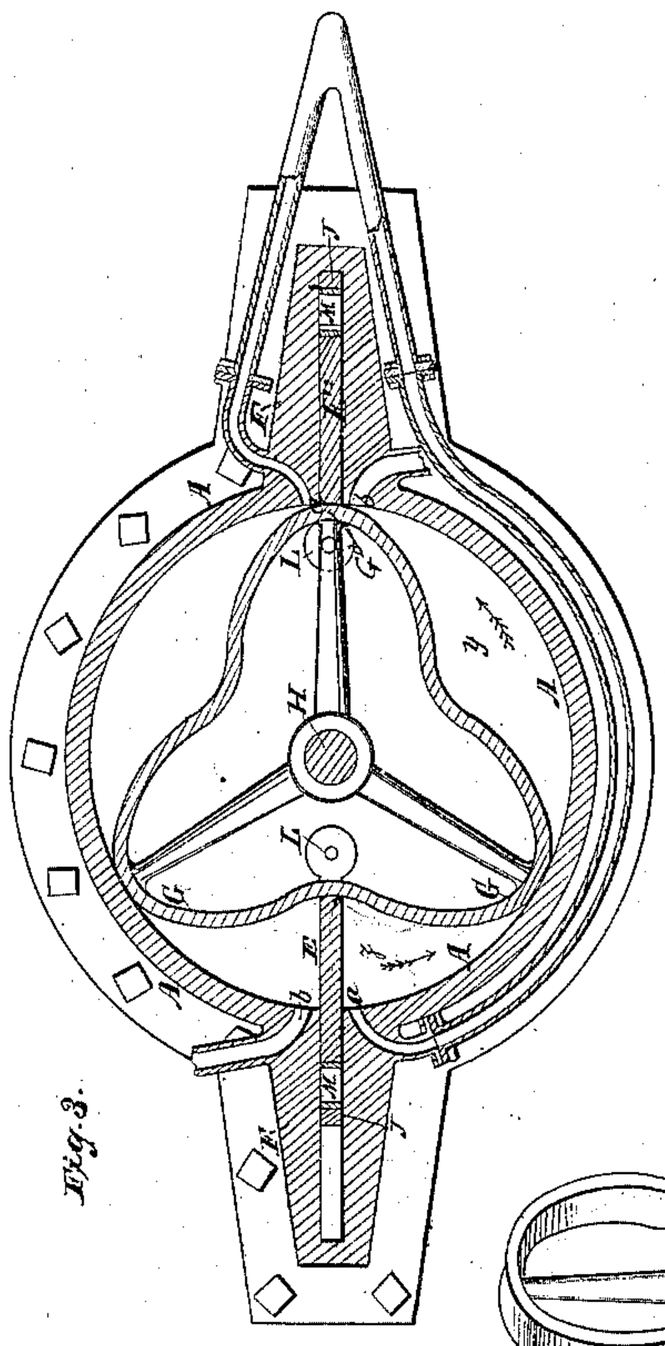

Fig. 3.

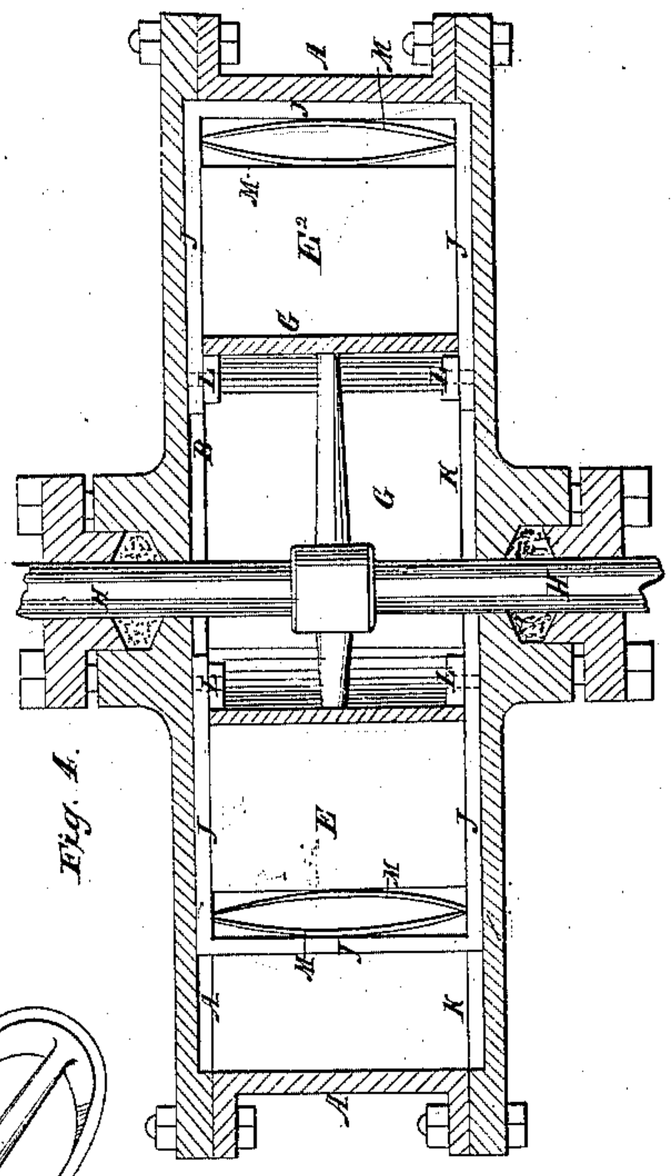

Fig. 4.

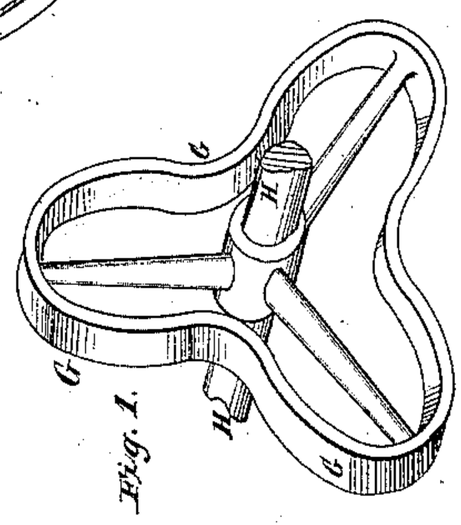

Fig. 1.

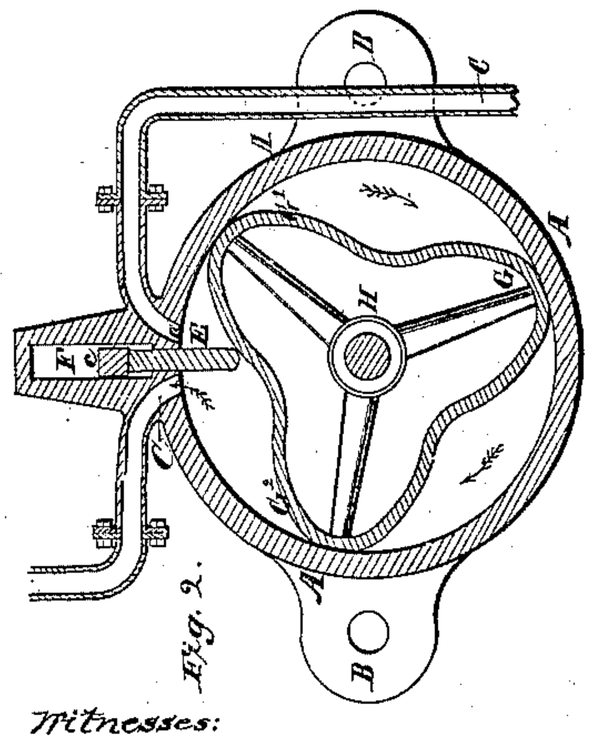

Fig. 2.

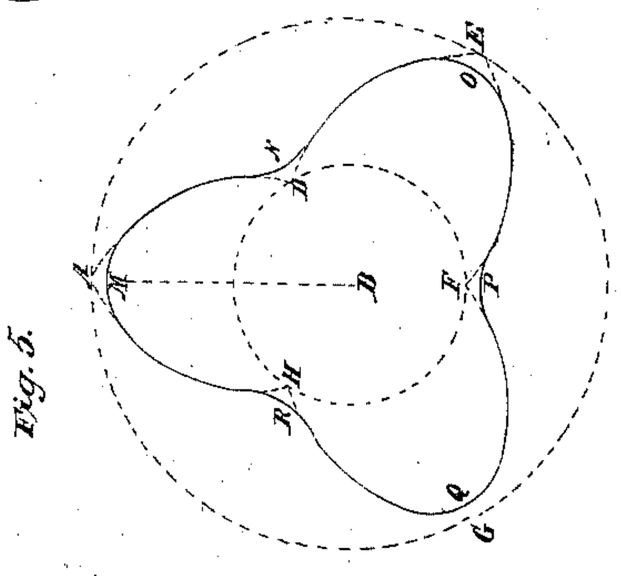

Fig. 5.

Witnesses:

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UNITED STATES PATENT OFFICE.

HENRI COMTE DE CRONY, OF HYDE PARK, GREAT BRITAIN.

ROTARY STEAM-ENGINE, WHICH IS ALSO APPLICABLE TO PUMPS.

Specification of Letters Patent No. 3,134, dated June 14, 1843.

To all whom it may concern:

Be it known that I, NICOLAS HENRI JEAN FRANCOIS COMTE DE CRONY, a subject of the Emperor of Austria, and now residing at Connaught Terrace, Hyde Park, in the county of Middlesex, in the Kingdom of Great Britain, have invented or discovered a new and useful invention of an Improved Rotary Steam-Engine, and Which May be so Modified as to Operate as a Rotary Pump; and I do hereby declare that the following is a full and exact description thereof.

In this improved apparatus I give the peculiar form to the revolving piston which is represented detached and in perspective at Figure 1; and a vertical section of a complete pump in which such a piston is used, is shown at Fig. 2.

A A A is a cylindrical chamber made air and water tight by cap plates affixed to its ends in the ordinary way.

B B are the lugs or ears by which it may be fastened to a portable frame or standards or it may be fixed against a wall. At the upper part of the cylindrical chamber there are two openings that at *a* leading to the rising main or suction pipe C that at *b* leading to the discharge pipe or jet D. A sliding plate or partition E moves up and down in a recess or box F formed in the upper part of the cylinder between the two openings *a*, *b;* which plate E is intended to operate as a stop or valve and is pressed downward by a spring in the box F behind it or by a weight *c;* the latter contrivance causing the plate or valve to act by gravity. The rotary piston G G G formed as shown in Fig. 1 is mounted upon an axle H and placed in the cylindrical chamber A A A the journals or shoulders of the axle turning in the centers of the end plates of the cylinder. The axle is to have a winch attached to its outer end for the purpose of turning it or a rigger or toothed gear might be applied for the same purpose.

The joints of the cylinder A A A and the touching points of the piston G, and slider E being all properly packed and the lower end of the pipe C immersed in the well or reservoir of water rotary motion is to be given to the piston by either of the means stated, when the piston will revolve in the direction of the arrows shown in Fig. 2. The sliding plate or valve E being pressed downward by the weight or spring as described, its lower edge will always be in contact with or bear upon some part of the curved periphery of the piston. As the larger radius of the revolving piston G acts against the lower edge of the slider E it will recede into its box and as the smaller radius of the piston comes around the slider will be allowed to move down and thereby at all times form a stop or tight partition between the ingress and egress passages. The points of the piston G being in contact with the internal periphery of the cylinder A and also the lower edge of the slider E bearing against the periphery of the piston the rotation of the piston in the direction of the arrows as described will cause an exhaustion of the air and a partial vacuum to take place in that part of the chamber at *a* which is between that side of the slider E and the receding surface of the piston G^1 and this partial vacuum will instantly become occupied with water sent up the rising main by the superincumbent pressure of the atmosphere. As the piston goes on in its rotary course the space *a* will gradually enlarge and form an elliptical chamber into which the water will continue to flow until the second point of elevation or larger radius of the rotary piston G^2 has arrived at and pushed back the slider E into its box. This second elevated part of the piston G^2 will then pass the aperture *a* of the pipe C and another partial vacuum taking place as before in the space opening from *a* the water will flow into the second elliptical chamber now forming, and so on in the same way will the third chamber be filled the volumes of water being carried around the cylinder by the rotary piston as the arrows indicate. At the time that each elevated point of the piston passes the aperture *b* leading to the eduction or outlet pipe D the water contained in the advancing elliptical chamber will begin to be discharged through the eduction pipe D and by the pressure of the revolving piston will be forced up the pipe to any required altitude according to the rotary power exerted.

The arrangement of this apparatus suited to a steam engine, and which constitutes the

principal features of novelty in my invention, is shown in the vertical and horizontal sections at Figs. 3 and 4, which differs from the preceding in being furnished with two sliding valves or steam stops E, E, placed diametrically opposite to each other. These sliders are held against the periphery of the piston G by springs placed within the box F behind each of them, which springs may be of any convenient form; in the arrangement shown in the drawings the sliders E E are mounted in frames J J their ends taking into slots formed therein and consequently are capable of moving independently thereof; the frames J, J, slide in slots K, K, K, K, formed in the two side plates of the engine and carry at their extremities antifriction rollers L, L, L, L, which rollers are in contact with the inward surface of the piston G; behind each slider E is affixed a double feather spring M which springs abut against the outward ends of the frames J, J, hence it will be perceived that as the rotatory piston revolves and its smaller diameter approaches the sliders E E it will act as a cam upon the rollers L L L L, and cause the frames J, J, to advance bringing with them the sliders E, E, through the intervention of the springs M M and that on the approach of the larger diameter thereof the sliders E E will be forced inward carrying back with them the frames J, J. By this arrangement the sliders E E are always kept in contact with the rotatory piston G by means of the springs M M the rollers serving as a check against any accidental impulse given to the sliders whereby they would be caused to move from their contact with the piston G. *a a* are the induction orifices, *b b* the eduction orifices. When the steam is admitted into the space *z* it presses equally against the side of the slider E′ and the surfaces of the piston and cylinder and the piston being the only movable part that is necessarily forced around in the direction of the arrows. The sliders E E being pressed by the springs their edges are always in contact with the periphery of the piston whatever part of its curved surface is presented to them the one receding as the other advances. Hence as the chamber or space *z* becomes enlarged by the expansive force of the steam pressing the piston onward the chamber *y* (which may be supposed to have been previously filled with steam) becomes open to the eduction and the steam immediately escapes through the aperture *b* leaving the chamber *y* in a state of vacuum. By this rotatory movement of the piston the point of contact G^3 will be made to press the slider E and open the induction aperture *a* so as to form a chamber for the expansive action of the steam between the piston the slider and the cylinder as that before described at *z*, by which means a continued rotary movement of the piston will be effected and the power derived therefrom may be communicated from the axle H of the piston to drive other machinery as is commonly done in other constructions of rotary steam engines.

It is evident that in all the positions of the rotary piston the power transmitted to the rotary axle is proportional to the sum of the force exerted against the surfaces of the two sliding plates or steam stops acted upon by the steam. Thus in the position represented in Fig. 3 the slider E being a stop or resistance to the steam as the piston moves around the surface of the slider E′ will diminish and that of the slider E^2 will be increased in the same ratio so that in all the positions of the two sliding steam stops the sum of their surfaces acted upon by the steam will be equal to the surface of the slider E′ when caused to move out to its greatest extent as shown in the figure. The advantage gained by this arrangement and mode of working the piston is that the engine is caused to work regularly which would not otherwise be the case.

The rotary piston must be made so as to possess the three following advantages: 1st. To be in contact with its circular box at the least possible number of points so as to reduce the friction as much as possible. 2nd. The combined areas of the surfaces of the two sliding plates or stops acted upon by the steam must be always the same this sum being as great as possible. 3rd. That the rotary piston in order to give the greatest facility to the movements of the sliders or steam stops must be formed to the figure shown having the curve described as follows which will fulfil the two first conditions.

Let A B Fig. 5 be a right line which turning on the point B will describe a circle whereof B is the center. Let us suppose something moving uniformly with a reciprocating action along the line A B from A to C and from C to A. Let us suppose also that it descends from A to C during the time that the revolving line A B describes the sixth part of the circle and that it ascends from C to A while the said line is describing a second sixth and so on. The curve which will be described around the circle by this double movement will be that shown by dots at A D E F G H A which is easily formed by means well known. If we take this curve for the generative curve of the piston it is evident that the two first conditions will be fulfilled. But this curve has six abrupt turns or points inimical to the smooth and regular movement of the sliding plates which must always press against the periphery of the piston. These points must then be removed and curves or segments of circles substituted in their place so that three of them may be convex and fit the inside or inner periphery of the cylinder and the

other three concave as shown. By this slight modification which instead of the true curve A D E F G H A gives the curve M N O P Q R M the three conditions are fulfilled in the most satisfactory manner.

What I claim as new in the within described rotary steam engine is—

The peculiar form of the piston as described, in combination with the arrangement of sliding steam stops as shown in Fig. 3, by which form and arrangement the same surface of piston is always presented to the action of the steam, by which a regular motion is obtained.

In witness whereof I the said NICOLAS HENRI JEAN FRANCOIS COMTE DE CRONY have hereunto set my hand and seal this second day of March in the year of our Lord one thousand eight hundred and forty three.

HENRI COMTE DE CRONY. [L. S.]

Witnesses:
J. W. MOFFATT,
FRED WALKDEN.