No. 706,181. Patented Aug. 5, 1902.

C. A. & O. W. HULT.

ROTARY MOTOR.

(Application filed Dec. 5, 1899.)

(No Model.) 2 Sheets—Sheet 1.

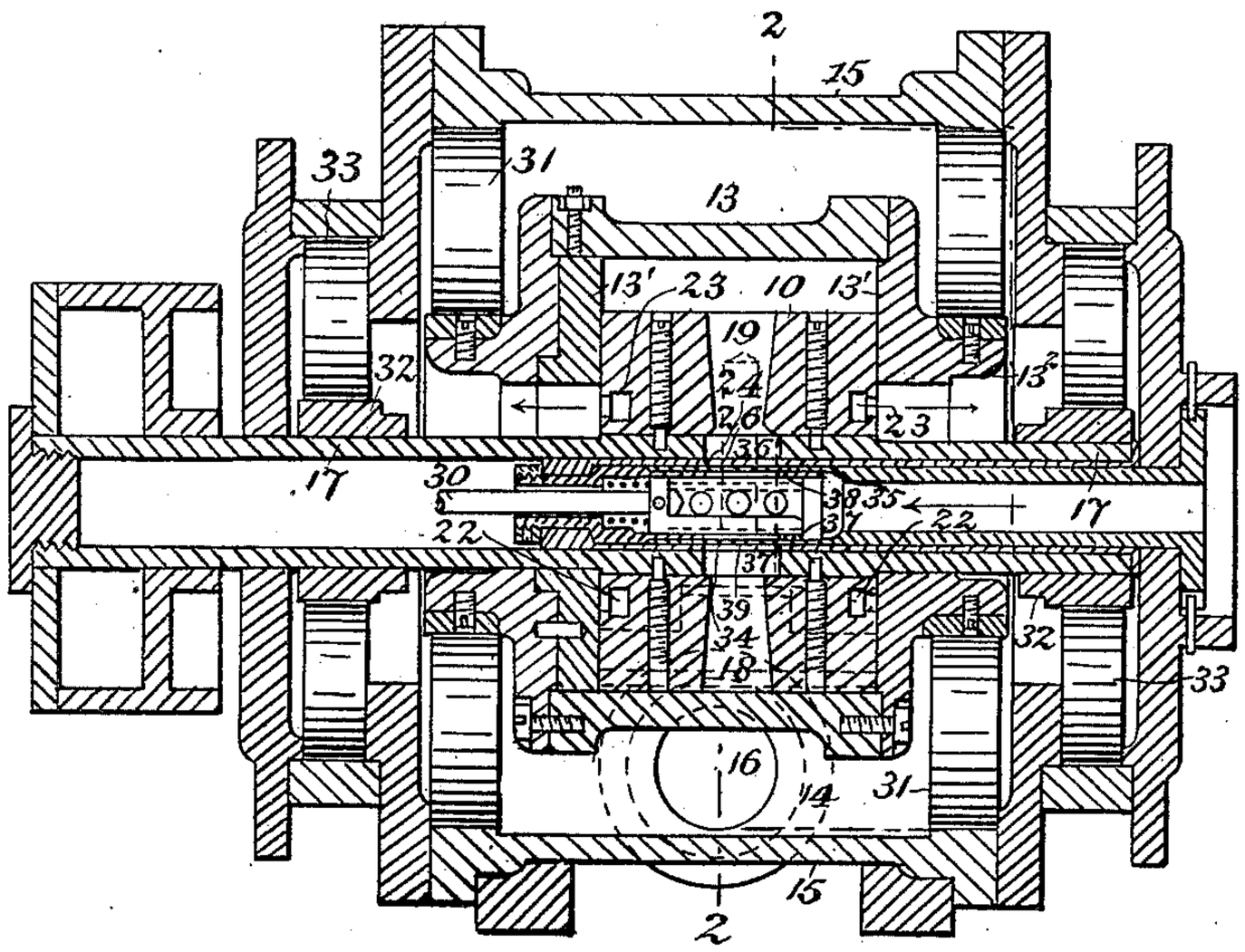

Fig. 1.

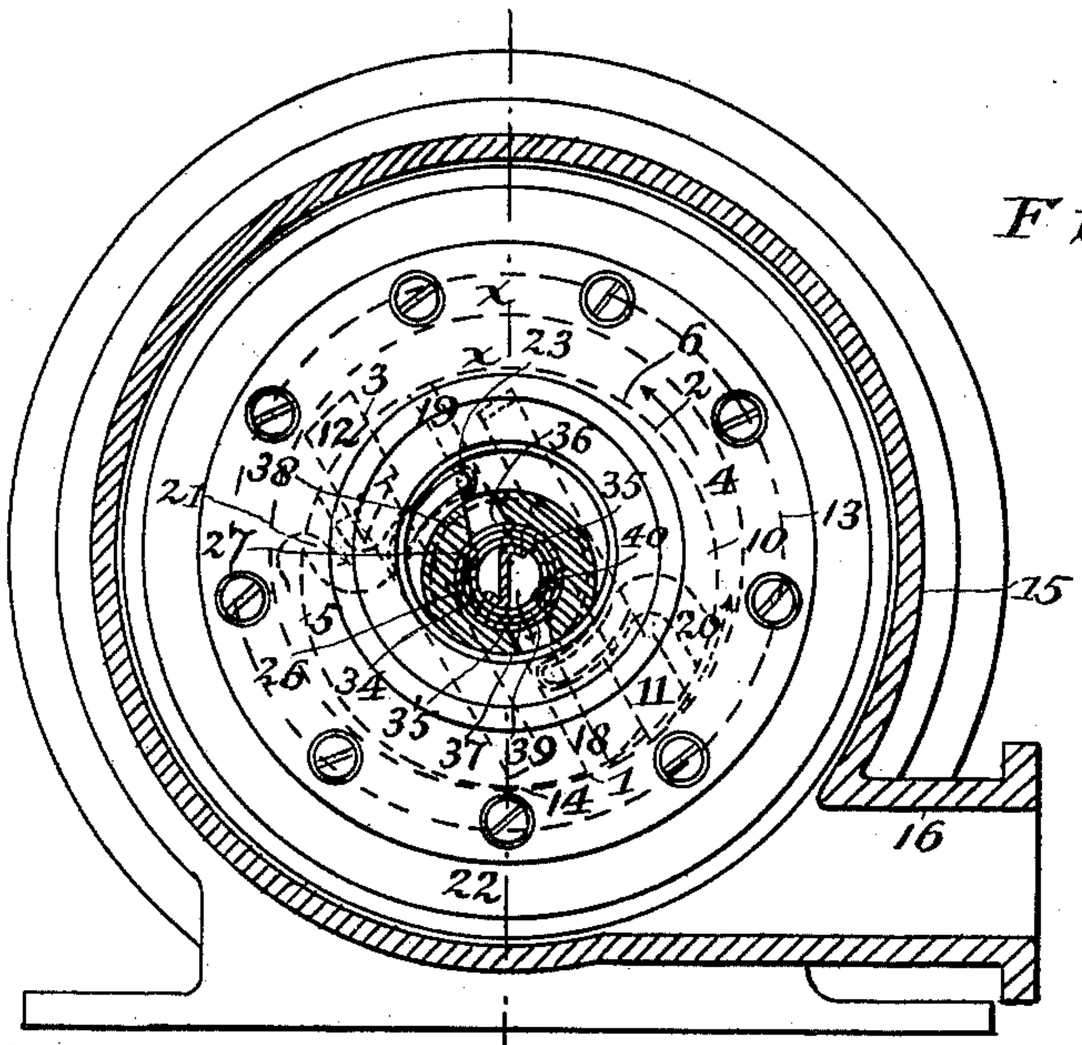

Fig. 2.

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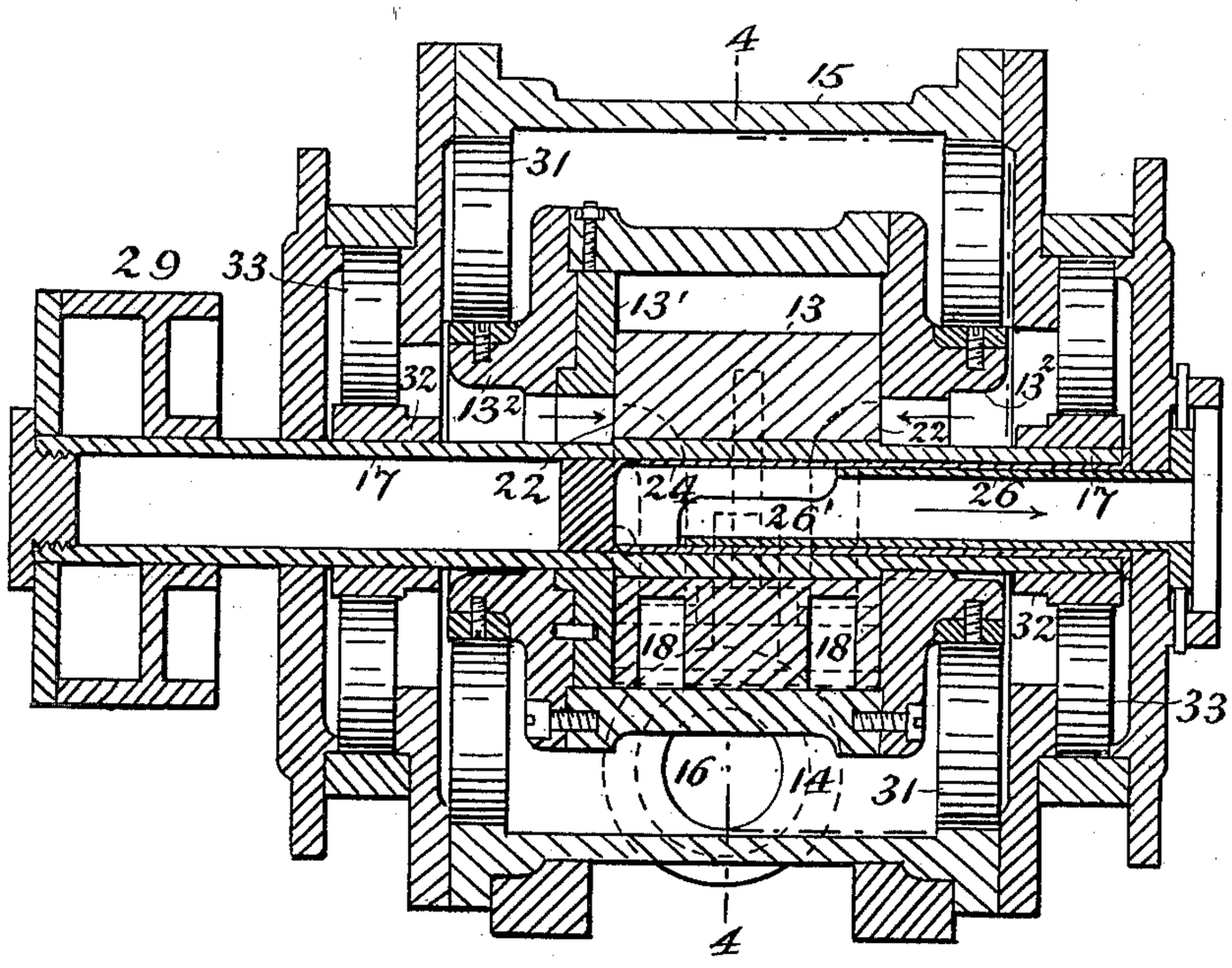
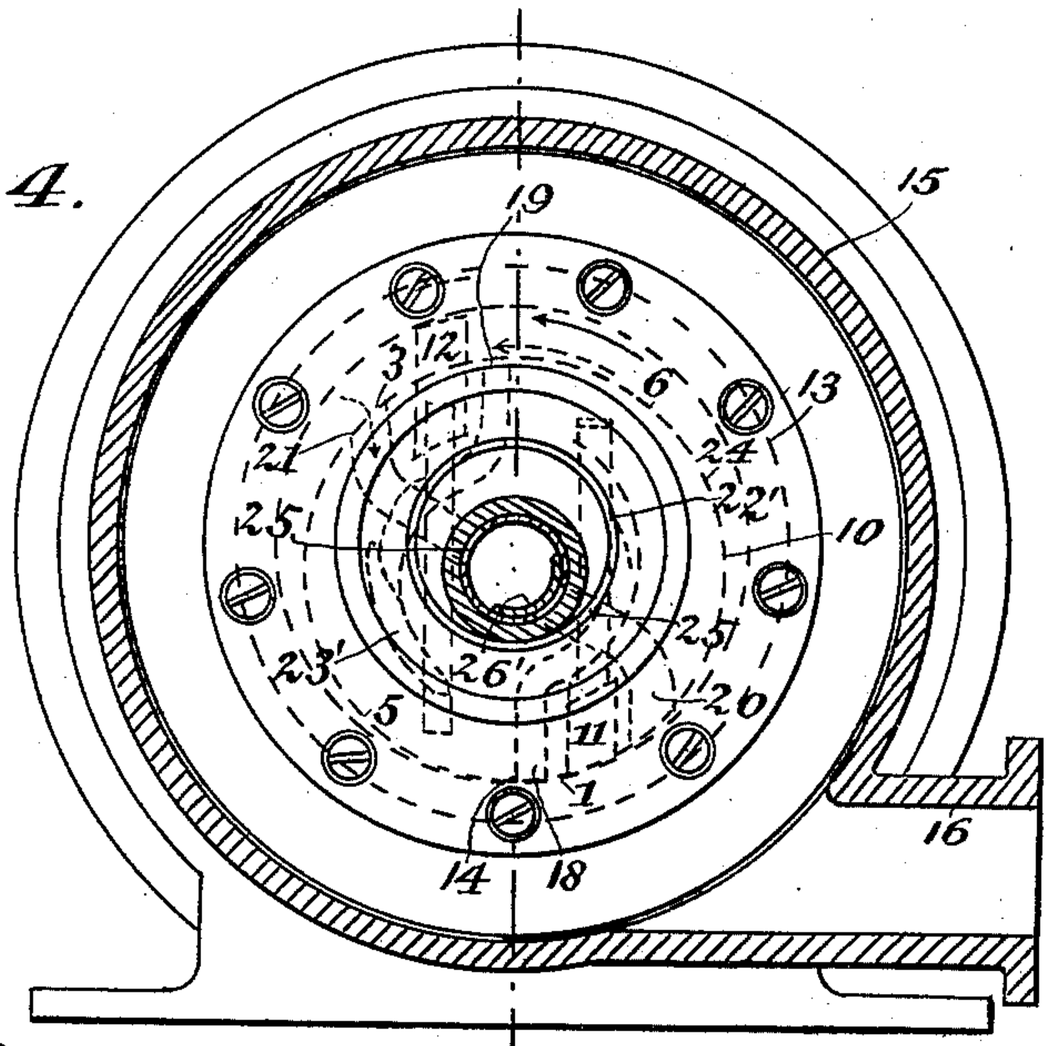


Fig. 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

CARL ALRIK HULT AND OSCAR WALFRID HULT, OF STOCKHOLM, SWEDEN.

ROTARY MOTOR.

SPECIFICATION forming part of Letters Patent No. 706,181, dated August 5, 1902.

Application filed December 5, 1899. Serial No. 739,283. (No model.)

To all whom it may concern:

Be it known that we, CARL ALRIK HULT and OSCAR WALFRID HULT, engineers, subjects of the King of Sweden and Norway, and residents of Stockholm, in the Kingdom of Sweden, have invented certain new and useful Improvements in Rotary Motors, (for which we have filed applications in Sweden the 6th day of May, 1899, under No. 809/99, and the 25th day of September, 1899, under No. 1,639/99; in France the 29th day of July, 1899, under No. 279,316; in England the 9th day of August, 1899, under No. 16,252, and in Germany the 17th day of August, 1899, under H. 22,606 1/14,) of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a device for controlling the driving fluid in rotary engines, more particularly engines in which the envelop or case inclosing the piston is caused by the latter to rotate.

The invention consists chiefly in so arranging the usual ports at the ends of the piston, which ports communicate with the admission and discharge passages made in said piston for the driving fluid, that they will be alternately covered by the side pieces of the case and uncovered by circular apertures arranged in the latter concentrically to the said case, but eccentrically to the piston. Owing to this construction it is made possible, by placing the ports of the piston nearer or farther from the center of the piston, to determine in a simple manner the portion of a revolution that the vanes are to be actuated by full-pressure fluid and full-pressure or expanding fluid, respectively.

In the accompanying drawings engines are shown as constructed according to this invention.

Figure 1 shows a vertical longitudinal section of an engine which in Fig. 2 is shown in a section on the broken line 2 2 of Fig. 1. Fig. 3 shows a vertical longitudinal section of a modified form of the engine shown in Figs. 1 and 2, and Fig. 4 a section of this modified engine on the broken line 4 4 of Fig. 3.

The engines have a cylindrical piston 10, provided with two sliding vanes 11 and 12 therein. The number of vanes, however, may be greater when desired. The piston is eccentrically located in a case 13, which is suitably made revoluble, so as to rotate with the piston, which is in contact with the case on line 14. The case 13 is journaled, conveniently by means of yielding rings 31, in a frame 15, forming a steam-tight chamber around the case 13. In the following steam is assumed to constitute the driving fluid. The space between the case and the frame, which latter is provided with an inlet or outlet 16 for the steam, is traversed either by the high-pressure steam from the boiler or by the expanded steam.

The numerals 1 to 6 denote different positions of the lines of intersection between the circumference of the piston and the surfaces exposed to the pressure of the steam on the vanes—the working faces of the vanes.

In the engine shown in Figs. 1 and 2 steam from the boiler entering through the hollow engine-shaft 17, concentric to the piston 10, passes alternately through the passages 18 and 19 of the piston into the working chamber formed by the space between the piston and its case 13. The admission of steam into the working chamber is controlled by some suitable device—for instance, that described in Swedish Patent No. 10,304. Each admission-passage 18 and 19 terminates in the working chamber near the corresponding vane 11 and 12, (the number of passages evidently being the same as the number of vanes.) At the other side of each vane is the mouth of a discharge-passage 20 and 21. The latter passages being likewise arranged in the piston 10 lead to recesses or ports 22 and 23, arranged at one or both sides of the piston 10. The latter arrangement is to be preferred, since a sufficiently large outlet for the steam is in the reverse case hard to procure. The ports 22 and 23 have such a position on the sides of the piston that when the latter rotates they will be alternately covered and uncovered by the centrally-open side pieces 13′ of the case 13. The direction of rotation of the piston 10 and case 13 is indicated by arrows in Fig. 2. In the said figure the ports 22 are shown to occupy the positions in which they are just being uncovered to allow the steam to escape from the space behind the vane 12. The expansion of the steam in said space having be-

gun when the vane 12 was at 2 ceases when said vane is at 3. According as the ports 22 are uncovered the ports 23 of the side pieces 13′ are covered, thus gradually closing the space in front of the piston 12. This closing becomes complete when the vane 12 has arrived at 5, (the vane 11 then being at 4.) The exhaust-steam flows from the ports 22 and 23 through the projections or necks 13^2, arranged on the side pieces 13′ and serving as tracks for the rings 31, supporting the case, and thence through and past the rings 31, through the chamber between the case 13 and frame 15, and through the boss 16 to the atmosphere or to a condenser.

In the modified form of the engine shown in Figs. 3 and 4 there are likewise recesses or ports 22′ and 23′ at the sides of the piston. They are not, however, as before, in communication with the exhaust-passages 20 and 21, but with the admission-passages 18 and 19. The admission of steam is controlled by the side pieces 13′ of the case 13, the ports also in this form of the invention being so located as to be alternately covered and uncovered by the said side pieces. The flow of steam through the engine in this case is the reverse to that in the engine previously described, steam from the boiler entering through the boss 16 and flowing through the space between the case 13 and frame 15, then past the rings 31 and through the necks 13^2 into the case, and exhausting from the engine through the hollow shaft 17. In the latter is a special device for governing the discharge of the expanding steam. In the position of the engine parts shown in Fig. 4 the ports 22′ are just about to be uncovered by the side pieces 13′, so that the boiler-steam can begin to enter the working chamber behind the vane 11. Exhaust is going on from the space in front of the piston 12 through the passage 21.

In both of the engines described the admission of steam commences when the vanes are at 1 and continues until the vanes have reached 2, expansion then beginning. Expansion takes place while the vanes move to 3 and is succeeded by the exhaust, which continues until the vanes are at 5, the vane exposed at the time to the pressure of the steam from the boiler being then at 4.

The device described offers great advantages. If when using two or more vanes the system of passages for distributing the driving fluid were arranged in usual manner—*i. e*, with exhaust-passages always in communication with the outer air or with the condenser—the exhaust would begin immediately after or even before the close of the admission period, or, in other words, either a very slight degree of expansion or an immediate discharge of the driving fluid would result, and consequently considerable loss of energy. As is very evident from Fig. 2, this is due to the fact that each exhaust-passage—for instance, 21—would commence discharging the driving fluid already when beginning to move past the place of contact between the piston and the case. In the case assumed the driving fluid would commence discharging already in the position 6 of the vane. According to the present invention, on the other hand, the exhaust is delayed until the vanes have reached the place denoted by 3. The apertures in the sides of the piston when the exhaust is controlled (see Fig. 2) are suitably located in or behind the radial planes in which the vanes are situated. By this arrangement the advantage is easily seen to be gained that the driving fluid can act on each vane fully or more than the portion of a revolution which corresponds to the number of vanes.

We claim—

In a rotary engine a piston provided with at least two vanes and an eccentric case set in rotation by the said piston characterized by circular apertures arranged in the side pieces of the case, concentrically to said case, and surrounding the piston-shaft, said apertures being alternately passed by the ports, in the ends of the piston, of the admission and exhaust passages provided in the piston for the driving fluid.

In witness whereof we have hereunto signed our names in the presence of two subscribing witnesses.

CARL ALRIK HULT.
OSCAR WALFRID HULT.

Witnesses:
ERNST SVANQVIST,
HANS B. OHESSON.