Feb. 5, 1929. 1,701,359

J. W. CASE

VACUUM PUMP SYSTEM

Filed Jan. 28, 1927

Fig. 1.

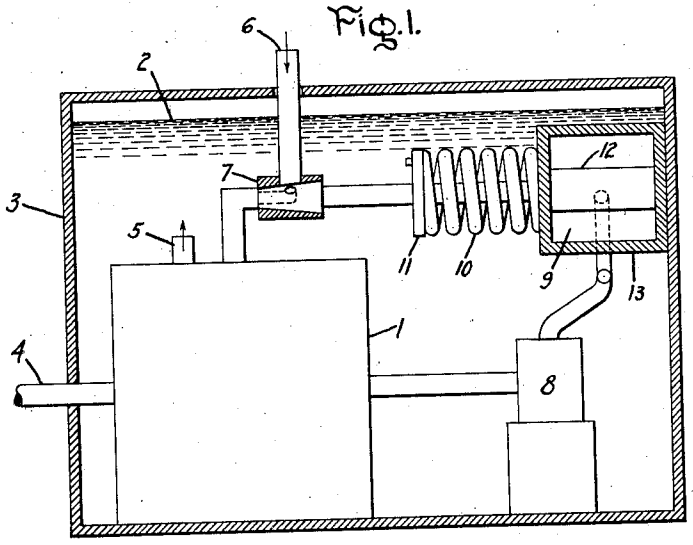
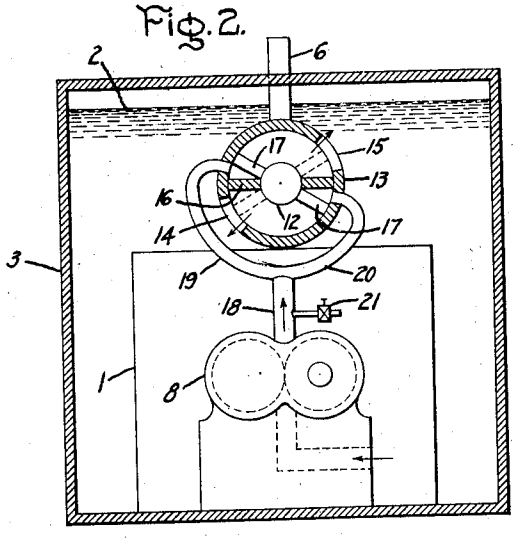


Fig. 2.



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UNITED STATES PATENT OFFICE.

JAMES W. CASE, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

VACUUM-PUMP SYSTEM.

Application filed January 28, 1927. Serial No. 164,343.

My invention relates to vacuum pump systems, such as those used to maintain a vacuum within the tank of a mercury arc rectifier, and has for its principal object the provision of an improved apparatus for controlling the connection between the vacuum pump and the evacuated tank.

In the operation of vacuum pump systems comprising a valve connected between a vacuum pump and a vessel wherein a vacuum is to be produced or maintained, it is desirable that the valve be controlled to open the connection between the vessel and pump only when the pump is operating at or above a predetermined speed. In accordance with my invention, this result is produced by a control apparatus comprising a torsion spring arranged to close the valve, and a fluid pressure device which operates to open the valve against the torsion of the spring when the pump is operating.

My invention will be better understood from the following description when considered in connection with the accompanying drawings, and its scope will be pointed out in the appended claims.

Referring to the drawings, Figs. 1 and 2 show different views of a vacuum pump apparatus wherein my invention has been embodied.

This apparatus comprises a vacuum pump 1 which is submerged in a liquid 2, such as oil or the like, contained in a vessel 3, and which is provided with a shaft 4, an outlet conduit 5 and an inlet conduit 6 comprising a valve 7. The operation of the valve 7 is controlled by an apparatus comprising an auxiliary pump 8, a fluid pressure device 9 and a torsion spring 10 which surrounds the stem of the valve 7 and is adjusted to maintain this valve in its closed position when the pumps 1 and 8 are not operating, or are operating below a predetermined speed. Any suitable means, such as a disk 11 fixed to the stem of the valve 7 and provided with a plurality of openings arranged to receive one end of the spring 10, may be provided for permitting adjustment of the valve stem to any desired position.

The fluid pressure device 9 is provided with a shaft 12 which is fixed to the stem of the valve 7, with a casing 13 having diametrically opposed openings 14 and 15 and a bipartite partition 16 which engages, but is not fixed to, the shaft 12, and with rotatable fins 17 which are fixed to the shaft 12 and engage the inner surface of the casing 13 at their outer ends. It will be observed that the casing 13 is connected to the pump 8 through a conduit 18 provided with prongs 19 and 20, and that a by-pass valve 21 is provided for adjusting the position which the fins 17 assume at any given speed of the pumps 1 and 8.

The operation of the apparatus will be readily understood without detailed explanation. Assuming the pumps 1 and 8 to be at rest, the valve 7 is closed and the various parts of the apparatus are in their illustrated positions. When the pump is accelerated to a predetermined speed, however, the fins 17 are forced into the position indicated by dotted lines in Fig. 2, thus opening the valve 7 and maintaining it open so long as the pump 8 operates with sufficient pressure to force the liquid through the orifices 14 and 15 against the tension of the spring 10. As the speed of the pumps 1 and 8 decreases, the valve 7 is operated to its closed position, and the leakage of gas or liquid into the evacuated vessel through the conduit 6 is prevented.

The embodiment of the invention illustrated and described herein has been selected for the purpose of clearly setting forth the principles involved. It will be apparent, however, that the invention is susceptible of being modified to meet the different conditions encountered in its use, and I, therefore, aim to cover by the appended claims all modifications within the true spirit and scope of my invention.

What I claim as new, and desire to secure by Letters Patent of the United States, is:

1. The combination of a vacuum pump provided with an inlet valve, a torsion spring arranged to maintain said valve in its closed position, and fluid pressure means arranged to open said valve against the torque of said spring when the speed of said pump attains a predetermined value.

2. The combination of a vacuum pump provided with an inlet valve, a torsion spring arranged to maintain said valve in its closed position, a fluid pressure device comprising a shaft coupled to the stem of said valve and arranged to rotate said valve against the torque of said spring, and means arranged to supply fluid to said device at a pressure which is dependent on the speed of said pump.

3. The combination of a vacuum pump pro-

vided with an inlet valve, a torsion spring arranged to maintain said valve in its closed position, a fluid pressure device comprising a rotatable member fixed to the stem of said valve and arranged to be rotated against the torque of said spring, and means operable in accordance with the speed of said pump for maintaining within said device a fluid pressure whereby said valve is rotated to its open position when the speed of said pump exceeds a predetermined value.

4. The combination of a vacuum pump provided with an inlet valve, a torsion spring arranged to maintain said valve in its closed position, and a fluid pressure device comprising a casing having openings, a bipartite partition within said casing between said openings, a rotatable member fixed to the stem of said valve and arranged to be held between said openings by the torque of said spring, and means operable in accordance with the speed of said pump whereby said rotatable member may be moved against the torque of said spring into alinement with said openings.

In witness whereof, I have hereunto set my hand this 26th day of January, 1927.

JAMES W. CASE.