(No Model.)

A. RIEDLER.

CONTROLLED VALVE.

No. 439,825. Patented Nov. 4, 1890.

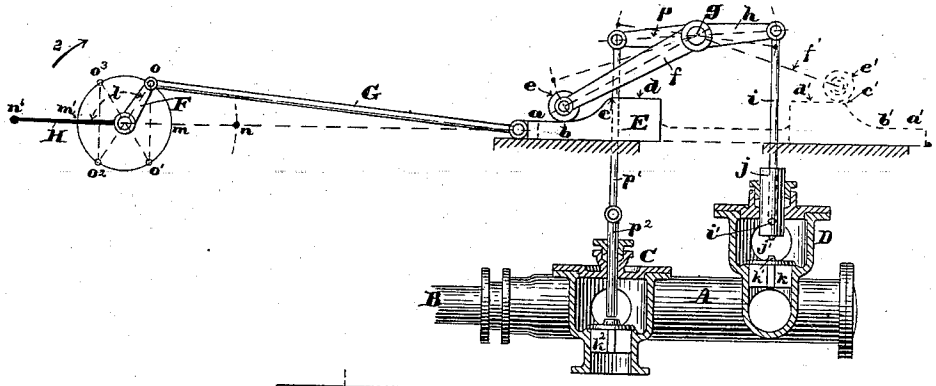


Fig. 2.

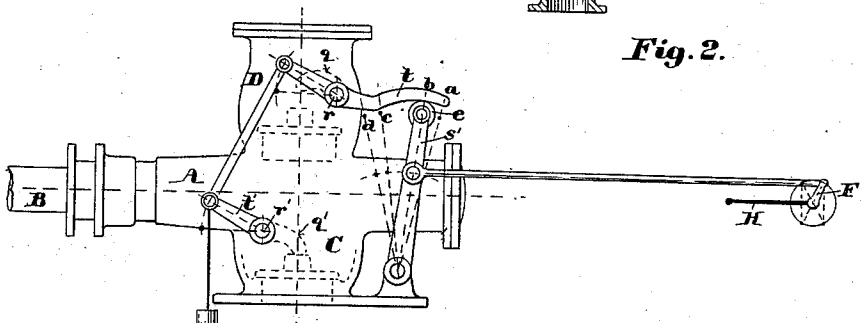


Fig. 3.

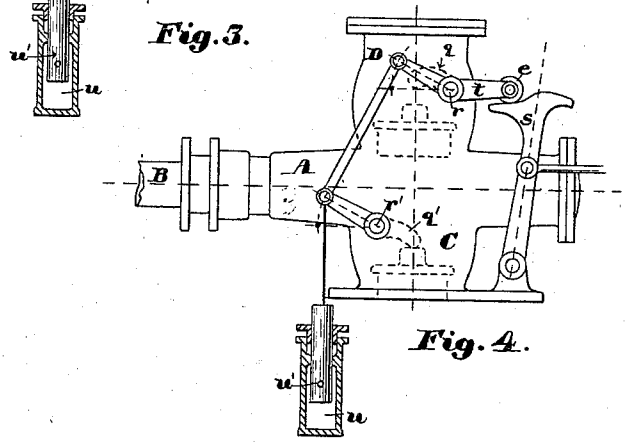


Fig. 4.

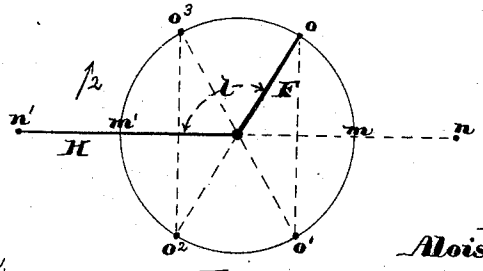


Fig. 1.

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UNITED STATES PATENT OFFICE.

ALOIS RIEDLER, OF BERLIN, GERMANY.

CONTROLLED VALVE.

SPECIFICATION forming part of Letters Patent No. 439,825, dated November 4, 1890.

Application filed January 23, 1890. Serial No. 337,845. (No model.) Patented in England January 19, 1887, No. 855; in France June 3, 1887, No. 181,005; in Germany July 10, 1887, No. 42,374, and in Belgium August 6, 1887, No. 78,497.

To all whom it may concern:

Be it known that I, ALOIS RIEDLER, professor at Berlin, a subject of the King of Prussia, and residing at Berlin, Province of Brandenburg, Empire of Germany, have invented certain new and useful Improvements in Controlled Valves, (for which Letters Patent have heretofore been granted to me in England January 19, 1887, No. 855; in Germany July 10, 1887, No. 42,374; in France June 3, 1887, No. 181,005, and in Belgium August 6, 1887, No. 78,497,) of which the following is a full, exact, and clear specification.

This invention relates to valve-controlling mechanisms for pumps, compressors, &c.; and it consists in the combination, with a pump or compressor valve, of a reciprocating cam provided with a throw or curved surface for closing the valve, a crank or eccentric connected to said cam and constructed and arranged to change its stroke at a different time to the change of stroke of the main crank of the pump or compressor engine and to reciprocate said cam through a stroke of greater length than the length of its valve-closing throw, and a transmitting-gear interposed between said cam and valve without being attached thereto and constantly pressed toward or into contact with said cam by a separate and independent power, as a spring, weight, or liquid or gaseous pressure.

It further consists in the combination, with the suction and delivery valves of a pump or compressor, of a reciprocating cam provided with a throw or curved surface for closing said valves, a crank or eccentric connected to said cam and constructed and arranged to change its stroke at a different time to the change of stroke of the main crank of the pump or compressor engine and to reciprocate said cam through a stroke of greater length than the length of its valve-closing throw, and a transmitting-gear interposed between said cam and valves without being attached to either and constantly pressed toward or into contact with said cam by a separate and independent power, whereby the delivery-valve is closed and the transmitting-gear removed from contact with the suction-valve, leaving said suction-valve free to open automatically by the positive action of said cam, and the suction-valve is closed and the transmitting-gear is removed from the delivery-valve to allow it to open automatically by the action of said separate and independent power.

Figure 1 is a diagram illustrating the movements of the valve-operating crank or eccentric relative to the movement of the pump or compressor plunger operating-crank. Fig. 2 is a sectional elevation of so much of a pump as is necessary to illustrate my invention. Fig. 3 is an elevation of a portion of a pump illustrating another form of my invention, and Fig. 4 illustrates still another form of the same invention.

In the drawings, A is the pump barrel or cylinder. B is the pump-plunger. C is the inlet or suction valve casing; D, the delivery-valve casing; E, the reciprocating cam; F, the crank for reciprocating said cam, and G the rod connecting said crank and cam. The crank F, or an eccentric in place thereof, may be mounted upon the main crank-shaft of the machine or upon a different shaft, as may be desired; but said crank or eccentric must be so mounted on its shaft as to change its stroke at a different time to the change of stroke of the main crank that reciprocates the plunger of the pump or compressor. A transmitting-gear consisting of levers and rods, which may be arranged in various ways, is interposed between said cam and the valves in said valve-casings without being attached to either the cam or valve, as will be described.

In the form of my invention shown in Fig. 2 the reciprocating cam E is arranged to move in a right line and has a movement imparted to it equal to twice the radius of the crank F, and has formed upon its upper surface two flat plane sections at different levels, as *a b* and *c d*, connected by the curved surface *b c*, having a length equal to or slightly in excess of one-half the stroke of said cam, which curved surface acts upon the roller *e*, carried by the free end of the lever *f*, mounted upon the rocker-shaft *g*, to raise said lever and oscillate said shaft. The said shaft *g* also has secured thereon the lever *h*, which is pivoted at its movable end to the link *i*, the lower end of which is pivoted at *i'* to the plunger *j*, fitted to and movable vertically in a stuffing-

box in the cover of the valve-casing D, as shown.

Within the valve-casing D is fitted to a suitable seat the delivery-valve k, the center of which is directly below the plunger j, but entirely disconnected therefrom. Said delivery-valve has formed upon its upper side the upwardly-projecting central hub k', and the plunger j has formed upon its lower end a corresponding downwardly-projecting hub j', the object of which will presently appear. For the purposes of this explanation, the plunger-operating crank H is shown as upon the same shaft with the cam-operating crank or eccentric F. (See Figs. 1 and 2.) The crank F is fixed upon its shaft at an angle of advance l relative to the crank H, and as a consequence changes its stroke or passes its dead-points at m and m' before the crank passes its dead-points at n and n', said cranks moving in the direction indicated by the arrow 2. (See Figs. 1 and 2.)

Fig. 2 shows the position of the transmitting-gear at the moment the stroke of the pump-plunger begins, or when the crank H is in dead-point n', when the delivery-valve k is to open and the section-valve k^2 is closed.

The crank or eccentric F in moving from o to o' moves the cam E toward the right of Fig. 2 from a to b and return, and in moving from o' to o^2 said crank or eccentric moves said cam toward the left of Fig. 2 from c to b, and raises the free end of the lever f and depresses the movable end of the lever h and the plunger j, which, coming in contact with the delivery-valve k, forces it to its seat. While the crank or eccentric F is moving from o^2 to o^3 the straight portion $c\ d$ of the cam E is moved under the roll e from c to d and from d to c, and while the crank F is moving from o^3 to o the curved portion of said cam moves under said roll from c to b, when the pressure of the liquid air or gas in the delivery-valve casing acting upon the lower end of the plunger j raises it, and through it the attached end of the lever h, and depresses the free end of the lever f, causing the roller e to keep in contact with the upper surface of the cam E, and thus leaves the valve k perfectly free to be opened automatically or by the pressure of the liquid air or gas beneath it, when the pump-plunger commences to move toward the right of Fig. 2 or when the plunger-operating crank H passes its dead-center n'. When the straight portions $a\ b$ and $c\ d$ of the cam E are passing under the roller e, the transmitting-gear remains in a state of rest.

Instead of raising the transmitting-gear by the pressure within the delivery-valve casing, as above described, the lever f may be weighted sufficiently to more than counterbalance the lever h, link i, and spindle or plunger j, or a spring may be applied to said lever to force it into contact with the cam F, or said transmitting-gear may be kept in contact with its operating-cam by means of liquid or gaseous pressure applied through a cylinder and piston independent of the delivery-valve casing, as shown in Figs. 3 and 4.

The suction-valve k^2 may be closed by the liquid or gaseous pressure in the delivery-valve chamber by making the plunger j of sufficient area and securing on the shaft g the lever p, the movable end of which is connected by the link p' to the spindle p^2, as shown in full lines in Fig. 2, or the suction-valve k^2 may be closed positively by the action of the crank or eccentric F in the same manner that the delivery-valve is closed by extending the cam-bar to the right of the rocker-shaft g, and forming thereon another cam-surface $a'\ b'\ c'\ d'$, substantially like $a\ b\ c\ d$, but reversed, and extending the lever p to form the arm f', which carries at its free end a roller e' to rest upon and be acted upon by the cam $a'\ b'\ c'\ d'$, all as shown in dotted lines in Fig. 2.

The suction-valve will be positively closed when the main crank H of the pump is at its dead-center n' and fully relieved and free to open automatically when the crank H is at dead-point n.

This invention is susceptible of several modifications of construction without departing from the essential features of the invention—as, for instance, instead of using the spindles j and p^2, oscillating levers or arms q and q' may be mounted upon horizontal rocker-shafts r and r', extending through the delivery-valve casing D and the suction-valve casing C, respectively, as shown in Figs. 3 and 4.

Instead of moving the cam E in a straight line, as hereinbefore described, it may be formed on the end of a lever, as s in Fig. 4, and be moved in a path concentric to the axis of said lever, or the cam may be formed upon one arm of the lever t, mounted upon the rocker-shaft r, and the roller e be mounted upon the upper end of the lever s', which is vibrated to and fro so that said roll, moving along the cam-surface $a\ b\ c\ d$ of said arm of lever t in one direction, will cause said arm to be raised, the other arm of said lever and the levers t' and q to be depressed, and the lever q' raised, thus forcing the delivery-valve to its seat and relieving the suction-valve from the pressure of the transmitting-gear, so that it may open automatically, or when said roll e is moved in the opposite direction the pressure of the separate and independent power, as a liquid or gaseous pressure in the cylinder u, acting upon the plunger u', will force the suction-valve to its seat and raise the transmitting-gear from the delivery-valve and leave it free to open automatically, all as shown in Fig. 3.

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

1. The combination, with the valve of a pump or compressor, of a reciprocating cam provided with a throw or curved surface for closing the valve, a crank or eccentric connected to said cam and constructed and ar-

ranged to change its stroke at a different time to the change of stroke of the pump-plunger operating-crank and to reciprocate said cam through a stroke of greater length than the length of its valve-closing throw, and a transmitting-gear interposed between said cam and valve without being attached thereto and constantly pressed toward or into contact with said cam by a separate or independent power, as a spring, weight, or liquid or gaseous pressure.

2. The combination, with the suction and delivery valves of a pump or compressor, of a reciprocating cam provided with a throw or curved surface for closing said valves, a crank or eccentric connected to said cam and constructed and arranged to change its stroke at a different time to the change of stroke of the pump-plunger operating-crank and to reciprocate said cam through a stroke of greater length than the length of its valve-closing throw, and a transmitting-gear interposed between said cam and valves without being attached to either and constantly pressed toward or into contact with said cam by a separate and independent power, whereby the delivery-valve is closed and the transmitting-gear removed from contact with the suction-valve, leaving said suction-valve free to open automatically by the positive action of said cam, and the suction-valve is closed and the transmitting-gear is removed from the delivery-valve, leaving it free to open automatically by the action of said separate and independent power.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALOIS RIEDLER.

Witnesses:
NIC. JOS. LASCHET,
CARL LEIST.