

(No Model.)

A. RIEDLER.
VALVE GEAR.

No. 459,515.

Patented Sept. 15, 1891.

Fig. 1.

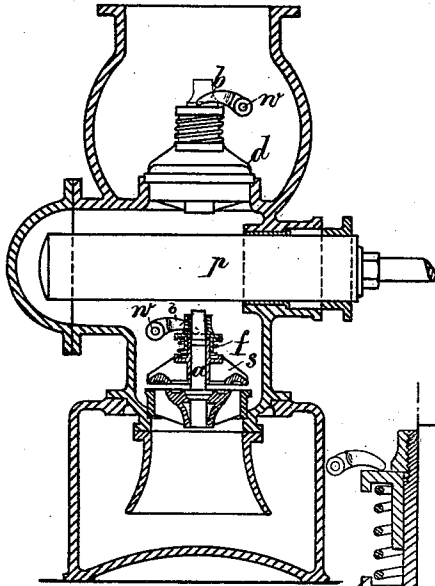


Fig. 2.

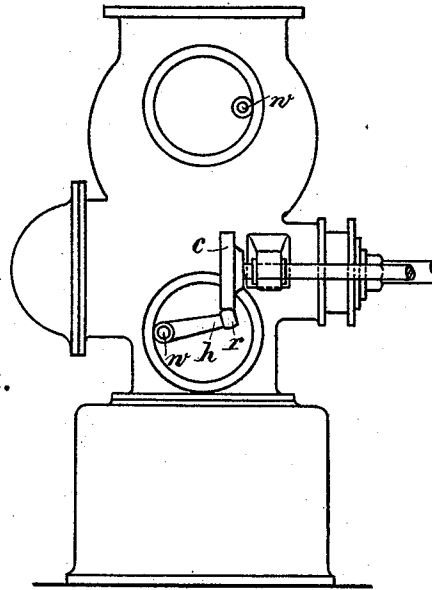


Fig. 4.

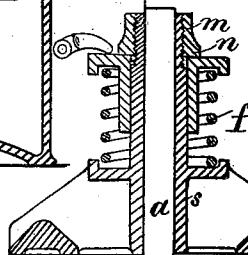


Fig. 6.

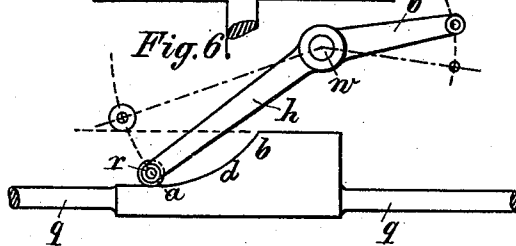


Fig. 7.

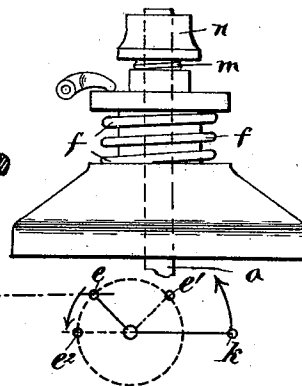


Fig. 5.

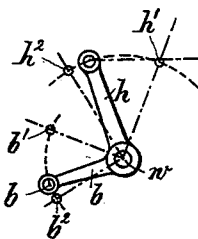
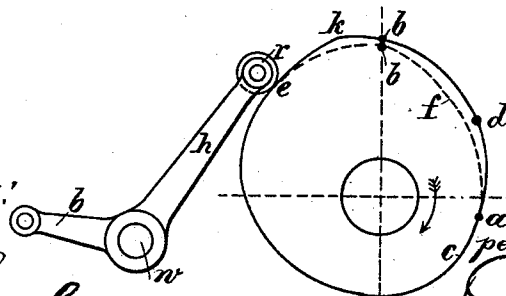


Fig. 3.



Witnesses:

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ALOIS RIEDLER, OF BERLIN, GERMANY.

VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 459,515, dated September 15, 1891.

Application filed April 16, 1891. Serial No. 389,202. (No model.)

To all whom it may concern:

Be it known that I, ALOIS RIEDLER, a subject of the King of Prussia, and a resident of the city of Berlin, Prussia, German Empire, have invented certain new and useful Improvements in Valve-Gears, of which the following is a specification.

This invention relates to a valve-gear for pumps in which there is applied a spring between the valve-actuating mechanism and the valve in such a manner that at the beginning of the plunger's stroke (opening of the valve) and while the valve mechanism is retracted the spring does not exert pressure upon the valve, whereas at the end of this stroke (closing of the valve) this spring is compressed in proportion to the resistance of the valve by means of the closing movements of the valve mechanism, and the pressure of the spring therefore assists in closing the valve and allows the valve mechanism to complete its closing movement, during which period the spring is still further compressed.

In the accompanying drawings, Figure 1 is a vertical section of a force-pump. Fig. 2 is an elevation thereof. Fig. 3 is a detail view showing a form of driving-cam. Fig. 4 is a sectional view to illustrate the spring and manner of mounting the same. Figs. 5 and 6 show different forms of actuating mechanisms. Fig. 7 is a detail elevation showing the valve pressed down to its seat and in its final position.

In Figs. 1 and 2 are shown a vertical section and an elevation of a force-pump.

s is the suction-valve, *d* the delivery-valve, and *p* is the plunger. The valves are provided with a valve-gear, which is shown as applied to the suction-valve in Figs. 1 and 2. The same valve-gear as applied to the suction-valve may be applied to the delivery-valve and will be described as follows: As an example, a double-seated annular valve, which is guided by a central spindle *a*, is taken. Above the valve is a pressure-lever *b* of the valve mechanism, which is secured to the shaft *w*, passing through the valve-chest, and which shaft *w* is actuated by a lever *h* outside of the chest on the same shaft *w*, and upon which lever *h* the external valve-actuating mechanism operates. When the pressure-lever *b* rises, the valve *s* can open automatically without

being influenced by the valve mechanism or by the pressure-spring *f*. On the other hand, when the pressure-lever *b* moves downward the valve can be closed thereby. Now to prevent shocks during the closing of the valve at the change of stroke a spring *f* is inserted between the valve and the pressure-lever, which springs may freely expand during the time when the valve-gear does not touch the valve, so that it is either under no tension or it strikes a stop *n*, Fig. 4, which prevents its further expansion. In both cases the spring does not weight the valve and exerts no influence upon the valve movement. This is the condition in which the valve is at the time it is to open automatically. However, as soon as the closing movement of the valve mechanism—for example, by means of the pressure-lever *b*—is transmitted to the valve (lever *b* moving downwardly) the valve *s* will not be immediately closed by pressure-lever *b*, but the spring *f* will first be compressed an amount corresponding to the valve resistance, and then the valve will be closed partly by the continued closing movement of the valve mechanism and partly by the force of the spring *f*. The external valve mechanism, therefore, has also to perform the duty of producing the force of the spring which assists in closing the valve. The spring *f* may not alone be placed directly over the valve; but it may also be arranged outside the valve-chest between the valve-actuating mechanism and the transmitting-lever *h*, Fig. 2. Further, the spring *f* may be placed under an initial minimum compression—for example, by an adjusting-nut *m*, Fig. 4—so that the valve-gear only begins to further compress the spring after the valve-resistance has exceeded this minimum compression of the spring, and then when this limit is reached the further operation is the one already described.

It follows that with the arrangement already described any desired valve-actuating gear may be employed, as the latter need only to lift the transmitting-lever *b* from the valve *s* before or at the moment the valve is to open automatically, and before or at the moment of the next change of stroke the valve is to close by the combined action of the gear and the compressed spring, as described above. In

Fig. 2, for example, the driving-gear is shown as an eccentric cam *c*, which drives the transmitting-lever *h* by means of a transmitting-roller *r*, which operates the valve in the manner already described. In Fig. 3 is shown the form of the driving-cam. In positively-operated valve-gearing it would be absolutely necessary that the closing curves *a f b* should end at the point *b* abruptly and that the roller *r* be stationary at the point *b*, while the roller *r* drops to the concentric curve *d e* and follows the same. In the pump-valve gear herein described, on the contrary, the curve *a b* may be of any form desired from *a d b*, and during the rolling off portion from *d* to *b* the compression of the spring takes place. The valve-gearing need not pause at *b* on the closing of the valve at the change of stroke. It might continue its movement after the roller *r* has passed the curve from *b* to *k* after closing the valve, (change of plunger-stroke.) This continued movement would not exert any influence upon the already-closed valve. It would only further compress the spring. The form of the cam-curve may therefore be so chosen that the transition is a most gradual one and that the compression of the spring from the time of mid-stroke is a most gradual one, free from shocks.

30 In Fig 5 another form of actuating mechanism, by means of an eccentric, (crank,) for example, is shown. The eccentric *e* drives the lever *h* and the lever *b* by means of a rod *s*. From the time of mid-stroke (eccentric at *e'* and pressure-lever at *b'*) the spring is compressed, and at the change of stroke (eccentric at *e*, pressure-lever at *b*, pump-crank at *k*) the valve is closed, as has been described. After the change of stroke and after the valve is closed the eccentric continues its motion from *e* to *e''* until its own stroke changes. During this time the pressure-lever *b* passes to *b''* and continues to compress the spring.

Thus, also, in this gearing no positive movement is required, and any movement will serve so long as it allows the valve to remain free before the beginning of the suction-stroke and compresses the valve-spring before the beginning of the valve-closure, as they may serve to compress the spring of the valve at the time of closure, as shown in Fig. 6, in the manner already described. The reciprocating rod *q q* carries, for example, as shown in Fig. 6, a curved portion *a d b*, which transmits the movement of the roller *r* to the levers *h* and *b* in the manner described in Fig. 3. During the movement of the roller *r* up the curve from *a* to *b* the lever *h* is lifted, the lever *b* is depressed, and the valve-spring is compressed. The form of the valve used is immaterial, whether the pump is for water, air, or for gases.

For compression-springs, spiral springs or rubber springs may be used, and also to get the effect of compression-springs compressed air or the like may be employed.

What I claim is—

In a valve-gear for pumps, the combination of a valve-gear, a valve not connected to said gear, and a spring inserted between the gear and the valve, the parts being arranged so that at the opening of the valve, while the gear is withdrawn, the spring does not exercise any pressure on the valve, and at the shutting of the valve the shutting motion of the gear produces, according to the resistance of the valve, a tension of the spring, which tension supports the shutting of the valve.

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

ALOIS RIEDLER.

Witnesses:

A. VOGT,
W. HAUPT.