No. 862,564. PATENTED AUG. 6, 1907.

R. O. KLATTE.

GAS COMPRESSOR.

APPLICATION FILED OCT. 21, 1903.

Fig. 2.

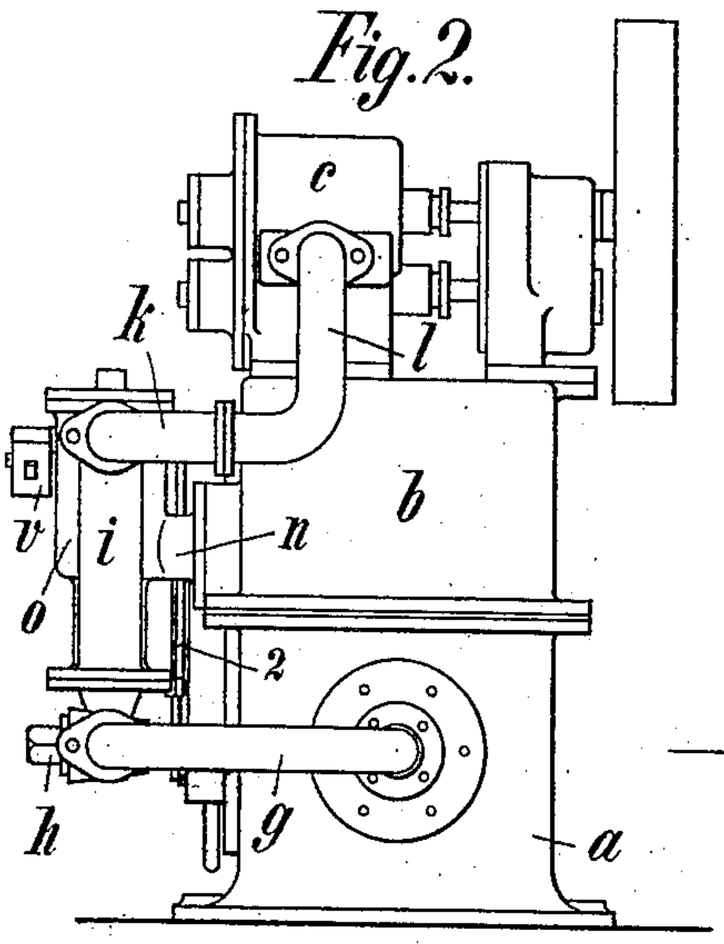


Fig. 1.

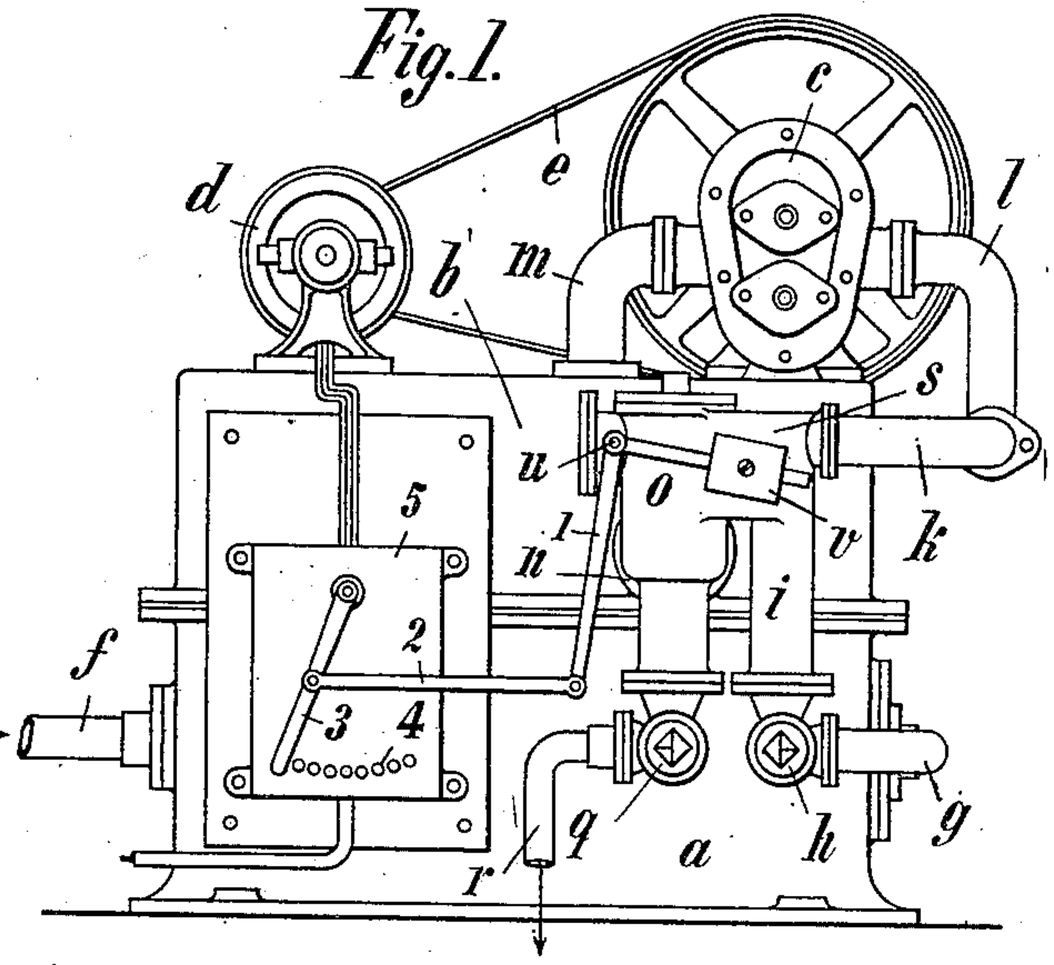
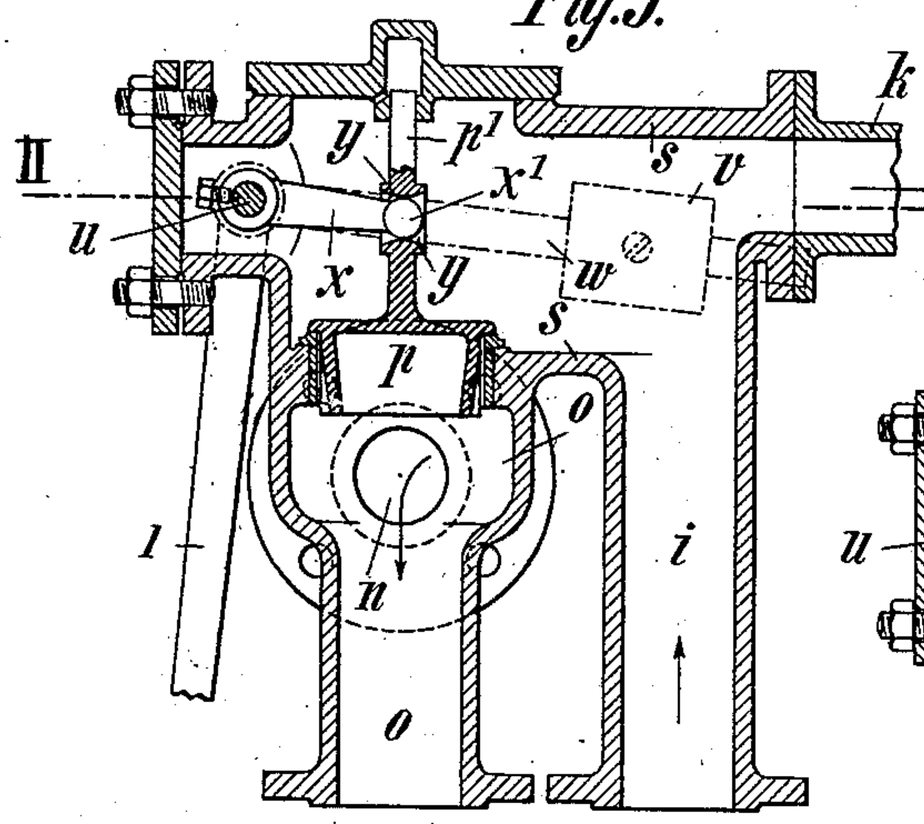
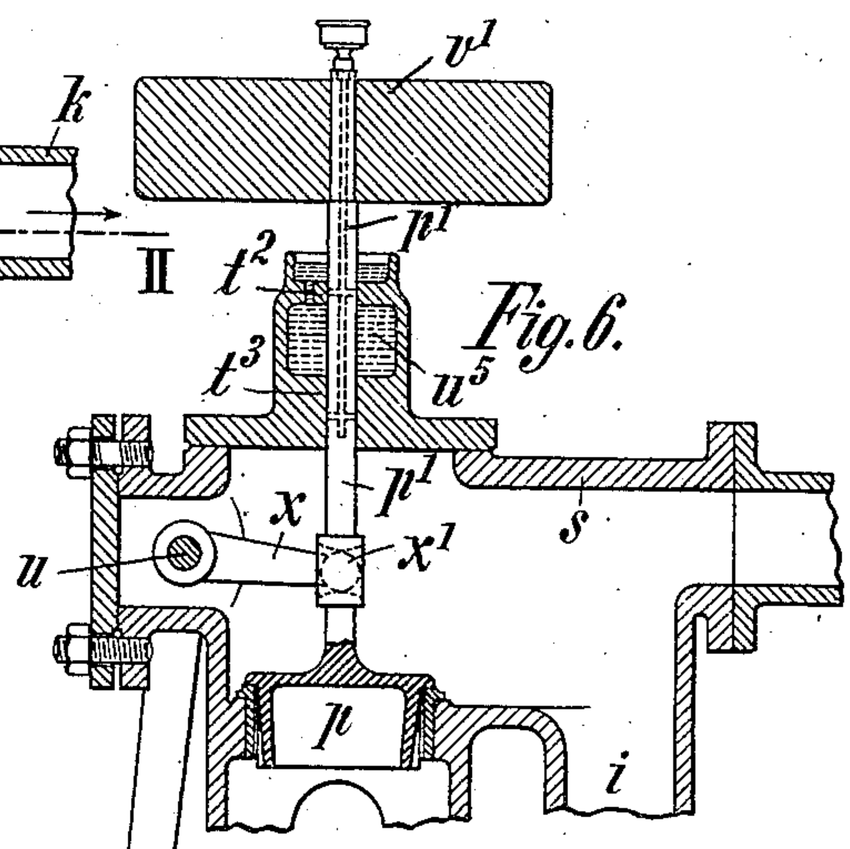


Fig. 3.





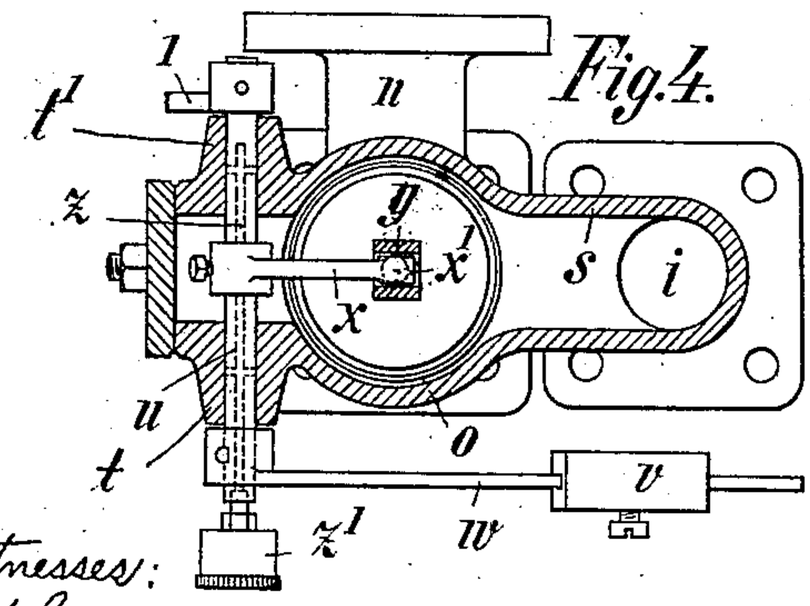


Fig. 4.

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ROBERT OSCAR KLATTE, OF HAMBURG, GERMANY.

GAS-COMPRESSOR.

No. 862,564. Specification of Letters Patent. Patented Aug. 6, 1907.

Application filed October 21, 1903. Serial No. 177,972.

To all whom it may concern:

Be it known that I, ROBERT OSCAR KLATTE, a subject of the German Emperor, residing at Hamburg, in the German Empire, (whose post-office address is 93 Fruchtallee,) have invented certain new and useful Improvements in Gas-Compressors, of which the following is a specification.

My invention relates to gas compressors, and has for its object to produce an apparatus of this character in which the back-pressure in the delivery main will automatically vent the pressure gas through a valve from the pressure side of the apparatus to the suction side, and thereby relieve the excess of pressure in the delivery main and at the same time utilize this back pressure to perform useful work through the medium of said valve by causing a controlling device for the compressing motor to be operated, together with details of construction to be hereinafter described and claimed.

Referring to the drawings, in which like parts are similarly designated—Figure 1 is a side elevation, and Fig. 2 a front elevation of my apparatus. Fig. 3 is a vertical section on an enlarged scale, the valve, valve chest and suction and delivery unions thereon. Fig. 4 is a horizontal section on line II—II Fig. 3. Fig. 5 shows in detail a somewhat modified form of the rock-shaft shown in Fig. 4, and Fig. 6 illustrates a modification of valve with means to load it.

The apparatus in order to be of small size has all its parts mounted on a single support, and to this end I use a hollow metallic frame, *a*, containing the suction chamber, surmounted by a second hollow frame or casing *b* that contains the compression chamber.

Mounted on the top of the casing *b* and at one side thereof, is the gas compressor or rotary pump *c* belted by the belt *e* to an electric motor *d* that is also mounted on the top casing *b*. The section *a* of the casing contains a suction chamber, to which the gas is led, first through a gas meter, the gas coming directly from the producer or a storage gasometer as the case may be. The valve is contained, preferably, but not necessarily, in a separate casting or chest secured to the outside of the casing *b* that contains the compression chamber, and this casting consists of a chamber *s* having two preferably parallel depending branches *i* and *o*, the one *o* being somewhat enlarged at and slightly below the valve seat, at which portion but below the valve seat in the upper end of *o* is a connecting member or union *n*, the passage through which communicates with the compression chamber in the casing *b*. The suction chamber in *a* is connected by a pipe *g* through a cock *h* to the suction branch *i* of the valve chest, and this branch *i* communicates on the one hand with a pipe *k* that is connected by a pipe *l* to the suction side of the compressor pump *c*, and on the other hand with the chamber *s* connecting the upper ends of the two branches *i* and *o*, as clearly seen in Figs. 1 and 3. The parts *i o s* and *n* are formed of a single casting, readily removable from the device. The delivery side of the pump is connected by a pipe *m* with the compression chamber in the casing *b*, whence it passes through the connecting member or union *n* into the branch *o* below valve *p*, thence through cock *q* to the delivery or service main *r*.

Within the valve chest there is the valve *p* in the upper end of the branch *o* of said chest, closing communication between the upper end of this branch and the chamber *s*. The chamber *s* connects the upper ends of the branches *o* and *i*, and in common with the latter communicates with pipe *k* leading to the suction side of the pump. The valve *p*, as shown in Fig. 3, is entirely within the valve chest, closing the upper end of the vertical branch *o* just above the pressure gas inlet union *n*, the stem of which valve is guided at its upper end, as shown.

Within the valve chest and above the valve *p* passing transversely through a portion of chamber *s* is journaled a rock-shaft *u* gas-tight in bearings *t*, *t'*. On one end of this rock-shaft outside of the valve chest is secured a lever arm *w* carrying a weight *v* capable of adjustment along the arm to change the load on the valve, and inside the valve chest this rock-shaft carries an arm *x*, the free end of this arm having a ball head *x'*, anti-friction roller, or the like device, engaging in a suitably shaped notch *y* in the valve stem *p'*, so that the up and down movements of the valve *p*, due to the back pressure in and the venting of the pressure gas from the main, will rock said shaft. The rock-shaft has an axial lubricating channel *z* from which are lateral branches supplying the bearings *t*, *t'* with lubricant from the lubricator *z'*. Where high pressure gases are to be used I prefer to provide the shaft *u* with conical trunnions *u'* and *u²*, Fig. 5, which are ground in their bearings, said bearings being recessed to form annular chambers *u³*, *u⁴*, around the trunnions for the storage of lubricant. Instead of employing a weighted lever on rock-shaft *u* for loading the valve, I directly load it by extending the valve stem *p'* through the top of the valve chest, providing the same with a changeable weight *v'*, Fig. 6.

In order to prevent the jerking of the valve-stem in the top of the valve chest, as well as to prevent the escape of gas through the same, the cover is designed to form two guide-ways *t²*, *t³* for the passage of the valve stem, between which guide-ways is an annular chamber *u⁵* for the oil. The bearings *t²* and *t³* prevent the rocking of the valve and insure the vertical movement of the same.

I utilize the back-pressure not only to automatically vent the gas under pressure in the service main, back to the suction side of the motor by lifting the valve, but also to control the speed of the motor and there-

through the pump by means of a suitable controller actuated from the valve, and this I do by securing to the rock-shaft *u* outside of the valve chest, a lever arm 1 that is connected by a link 2 to the switch-lever 3 of an adjustable electrical resistance 4 on the switch board 5. The switch board 5 is secured on the outside of the frame *a*, *b* of the machine. The greater the lift of the valve *p* the greater will be the extent of movement of the rock-shaft *u* and lever 1 and consequently the greater will be the amount of resistance thrown into the motor circuit. In consequence of this, the quantity of current supplied to the motor will be decreased and the speed of the motor will decrease accordingly. The capacity of the motor and of the compressor is consequently controlled in accordance with the gas consumption along the service main and the gas-pressure cannot rise beyond a determined amount. If no gas is consumed the motor will be entirely stopped and will be automatically started again as soon as the gas pressure in the service main is reduced by use by the consumers.

From what has been said it will be seen that by the construction shown I have a small compressing apparatus, by means of which the pressure in the service main is maintained constant, notwithstanding the greatly varying quantities of gas withdrawn from the service main by the consumers. This pressure is maintained by pumping the gas into the service main and utilizing the excess of pressure, above a pre-determined regulable amount, to automatically relieve the pressure in the service main by venting it through the valve to the suction side of the pump, and at the same time utilizing the movement of this valve to cut off the supply of electricity to the motor to reduce the speed of the motor and consequently of the pump, thereby reducing the speed of both so as to compress the gas in accordance with the existing conditions to maintain the pressure in the service main constant.

It will be noted that the load on the valve can be changed in accordance with the service conditions, day and night service, without opening the valve chest.

I claim—

1. The combination with a suitable casing containing a compression chamber, a compressor and an electric motor to drive the latter, of a valve chest having a suction and a delivery branch; and a variable resistance for the motor circuit mounted outside of the casing, said valve chest having a chamber connecting the suction and delivery branches, a pressure actuated by-pass valve in the upper end of the delivery branch and a switch arm connected to the valve and moved over the variable resistance by the movement of the valve, said suction and delivery branches having communication between them above the valve, whereby excess of pressure in the compression chamber and delivery branch operates said valve to automatically vent gas into the suction pipe and simultaneously insert resistance into the motor circuit to reduce its speed, substantially as described.

2. The combination with a suitable casing containing a compression chamber, a compressor and an electric motor to drive the latter; of a valve chest having a delivery branch, a union connecting said branch with the compression chamber, a service pipe connected to said branch and having direct communication through the branch and union with the compression chamber, a suction branch on the valve chest communicating with the compressor, a pressure actuated lift valve in the upper end of the delivery branch, an arm within the chest operated by the valve, a chamber connecting the two branches above the valve, a rod outside of the chest connected with the arm, and means to variably load said rod against oscillation whereby excess of pressure in the compression chamber and delivery branch will operate said valve to vent gas into the suction pipe, substantially as described.

3. The combination with a casing containing a compression chamber, a compressor and a motor to drive the latter, of a valve chest on the casing having parallel suction and delivery branches connected together, a pressure actuated lift valve in the chest in the end of the delivery branch, said delivery branch having a pressure gas inlet below the valve, controlling mechanism for the motor mounted on the casing and connected to the valve, whereby excess of pressure in the compression chamber and delivery branch will lift said valve to vent compressed gas into the suction branch and simultaneously operate the controlling mechanism.

4. The combination with a suction chamber, a compression chamber, a compressor and a motor to drive the latter, of a valve-chest outside of the chambers having a suction branch and a delivery branch communicating respectively with the suction chamber and compression chamber, said branches connected by a chamber which communicates with the suction side of the compressor, means connecting the pressure side of the compressor with the compression chamber, a pressure actuated valve in the delivery branch above the point of communication with the compression chamber, and controlling mechanism for the motor operated by the valve.

5. The combination with a suction chamber, a compression chamber, a compressor and a motor to drive the latter, of a valve-chest outside of the chambers having a suction branch and a delivery branch communicating respectively with the suction chamber and compression chamber, said branches connected by a chamber which communicates with the suction side of the compressor, means connecting the pressure side of the compressor with the compression chamber, a pressure actuated valve in the delivery branch above the point of communication with the compression chamber, a lever pivotally mounted on the chest, means controlled by the valve to oscillate the lever, a variable resistance for the motor circuit and a switch arm connected to the lever adapted to be moved thereby over the resistance.

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