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PUMP FOR CORROSIVE LIQUIDS.

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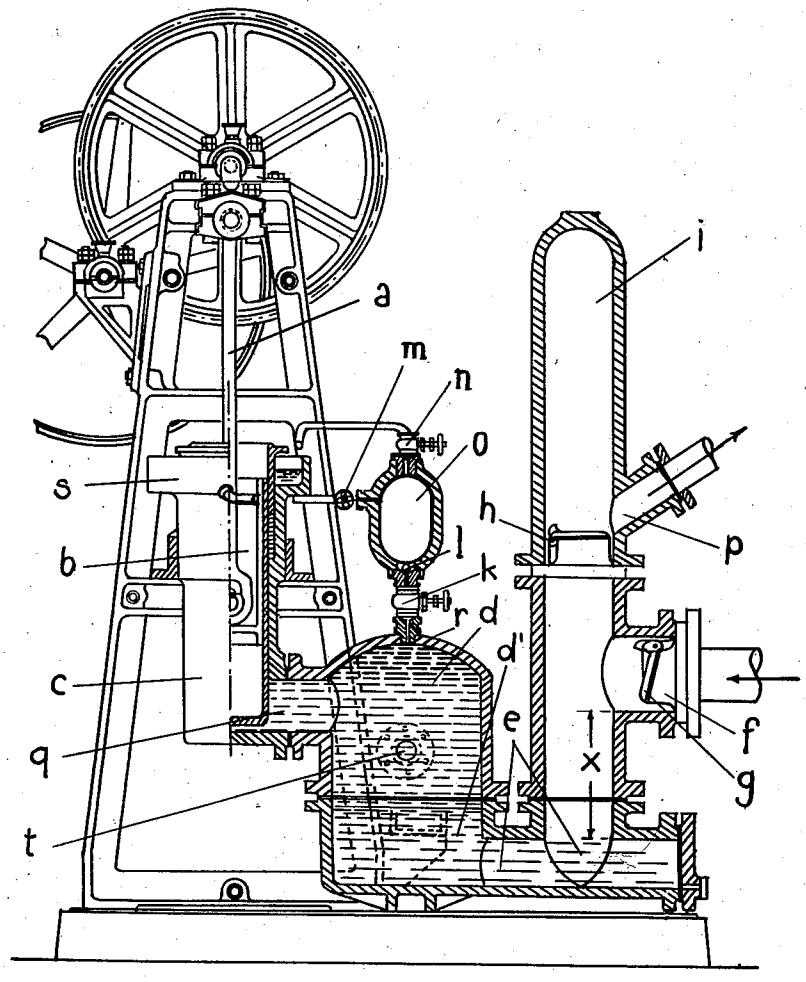
1,159,201. **Patented Nov. 2, 1915.**



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PUMP FOR CORROSIVE LIQUIDS.

1,159,201. Specification of Letters Patent. Patented Nov. 2, 1915.

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To all whom it may concern:

Be it known that I, ATTILIO FERRARIS, a subject of the King of Italy, residing at Turin, Italy, have invented certain new and useful Improvements in Pumps for Corrosive Liquids, of which the following is a full, clear, and exact specification.

Pumps for corrosive liquids are already known of the type where an inert liquid, for instance vaseline oil is interposed between the corrosive liquid and the pump piston thus preventing deterioration of the main organs of the pump. The pumps heretofore used present however many inconveniences so that they cannot practically be adopted with success; the greatest of these inconveniences is that no provision is made in order to prevent the corrosive action of the gases which at high temperatures are developed and which may produce very serious deteriorations to the pump piston. Moreover said gas accumulates between the piston and the corrosive liquid forming a pneumatic cushion with the effect of considerably reducing the efficiency of the pump and even of preventing the working of the same.

My improved pump not only eliminates the said inconvenience but means are provided for feeding the inert liquid to the pump without dismounting the same or removing any portion of it as well as for preventing the air from being sucked in the pump in the case the corrosive liquid should for any reason be missed and the pump discharged.

The annexed drawing shows a vertical section of a pump constructed according to my present invention.

A connecting rod *a* driven by any usual form of mechanism controls the piston *b* sliding in the cylinder *c;* the latter communicates with the cylindrical chamber *d d'* from which leads a pipe *e* bent at the upper end and communicating with the pipe *f* which contains the corrosive liquid and further with the pipe *p* leading the corrosive liquid to the upper tank where it is transferred. Two valves *g* and *h* allow the liquid to pass in one direction only; the pipe *e* leads to the air chamber *i* which besides having the object of preventing hammerings helps to obtain the uniformity of the liquid spout. The height where the pipe *f* communicates with pipe *e* as well as the diameter of the latter pipe must be such that the volume of the *x* portion of pipe *e* is greater than the pump capacity *c*. The cylindrical chamber *d d'* must have a diameter greater than that of the pump *c* in order to prevent the oil or acid forming emulsion; a sight glass *t* situated at the uppermost position which can be attained by the acid, permits of seeing if there is a sufficient quantity of oil in the chamber *d*.

The cylinder *c* communicates with the chamber *d d'* through the pipe *q* whose outlet in the said chamber is at a lower level than the vault *r* from the upper portion of which the discharge pipe provided with cock *k* and spherical valve *l*, leads to a closed tank *o* from which two additional pipes lead: a discharge pipe provided with cock *n* and another pipe leading to the bottom of the circular tank *s* which surrounds the upper portion of cylinder *c* and is provided with the cock *m*.

For the working of the pump the cylinder *c*, the pipe *q* and the cavity *d* are filled with an inert liquid as for instance vaseline oil while the cavity *d'* and the pipe *e* are filled with the corrosive liquid to be transferred.

The gas bubbles produced by the acid, specially in the case of liquids at a high temperature, are allowed to pass from the cavity *d'* under the vault *r* and are pushed at each compression phase to the tank *o* through the spherical valve *l* which prevents the return of the gas. When, after a long working of the pump the pressure which has gradually increased in the tank *o* prevents the gas bubbles from going out as described, the cock *k* is closed without stopping the pump and at the same time the cock *n* is opened thus allowing free discharge of the gas in the atmosphere while the small oil portions that are mechanically transported by the gas fall in the tank *s* where the oil which eventually escapes from the piston is also collected. By opening the cock *m* the oil passes to the tank *o* and by opening the cock *k* the oil returns to the cavity *d* until it compensates for the escaped portion. In my improved pump, therefore the gases which eventually are produced by the acid contained in the cavity *d'* cannot reach the main parts of the pump but are compelled to pass in the tank *o* from which they can discharge into the atmosphere, the same device providing means whereby any collection of gas or air under the vault *r* is prevented, which would considerably reduce the efficiency of

the pump and even stop its working. Moreover should the corrosive liquid fall in the pipe *f* and the pump continue its working, the air would be prevented from entering the chamber *d d'*, and thus produce the discharging of the pump, as the capacity of the pump is less than the capacity of the *x* portion of the pipe *e*. The cavity *d d'* and the pipe *e* being filled with the corrosive liquid the pump is always ready for working as soon as the liquid again fills the pipe *f*.

What I claim is:

1. In a siphon pump for transferring corrosive liquids, a pump cylinder, a piston reciprocating therein, a chamber communicating with the pump cylinder and containing corrosive liquid and a body of oil interposed between the corrosive liquid and the pump piston, means leading from the top of said chamber for conducting the acid gas produced to the atmosphere, means for collecting the oil carried away by the acid gas and the oil that escapes from the piston, and means for returning the oil to the said chamber.

2. In a siphon pump for corrosive liquids, the combination with the pump cylinder and piston, means for operating the piston, and the chamber communicating with the pump cylinder and containing corrosive liquid and a body of oil interposed between the corrosive liquid and the pump piston, the pump cylinder communicating with said chamber below the top of the latter, of means for automatically eliminating the acid gas produced, the said means comprising a valve controlled pipe leading from the top of the chamber, a tank to which the said pipe leads and into which the acid gas is forced at each compression phase, and a valve controlled pipe leading from said tank and discharging into the atmosphere.

3. In a siphon pump for corrosive liquids, the combination with the pump cylinder and piston, the chamber communicating with the pump cylinder and containing corrosive liquid and a body of oil interposed between the corrosive liquid, and the pump piston, of means for conveying from said chamber the acid gas produced, said means including a pipe for discharging the gas into the atmosphere, a tank surrounding the upper part of the pump cylinder to receive the oil escaping from the piston, the said discharge pipe extending over the said tank whereby oil carried by the gas is discharged into said tank, and means for conveying the oil collected in said tank back to the said chamber.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

ATTILIO FERRARIS.

Witnesses:

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