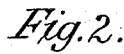


941,450.

2 SHEETS--SHEET 1.



Inventor
Horace Harsant
per J. B. Fleuret
attorney

UNITED STATES PATENT OFFICE.

HORACE HARSANT, OF PENGES, LONDON, ENGLAND, ASSIGNOR TO ERNEST GEORGE MITCHELL, OF LONDON, ENGLAND.

AIR PUMPING OR FORCING MECHANISM.

941,450.

Specification of Letters Patent.

Patented Nov. 30, 1909.

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To all whom it may concern:

Be it known that I, HORACE HARSANT, a subject of the King of Great Britain and Ireland, and residing at 2 Westbrook Villas, 5 Moreland Road, Lennard Road, Penges, S. E., in the county of London, England, have invented certain new and useful Improvements in Air Pumping or Forcing Mechanism, of which the following is a specification.

This invention relates to improvements in air pumping or forcing mechanism for use in petrol lighting and has for its object the feeding and mixing of the air and petrol spirit in a simple and more economical manner than heretofore without the use of a gas or steam engine. For this purpose water from a main pressure pipe is fed by a valve to a working cylinder the piston rod of which is connected to a bell working in an air drum. The drum is fitted with a vertical pipe open at the bottom to the atmosphere and fitted at the top with a valve so that as the bell is raised by the piston air is drawn into the same and on lowering the bell is forced in through another pipe extending up into the bell, which pipe is also fitted with a valve for permitting the passage of the air to an air storage tank which is also fitted with a bell weighted according to the amount of pressure of the air to be received and held therein. The air from the said tank is led by a pipe to the bottom of the carbureter through which the said pipe passes and in which is supported a series of horizontal plates or disks between which is placed a packing formed of plaster, whitening and sponge mixed together. The petrol filled into the carbureter at the top of same passes down through the packing through opening on opposite sides of each plate so as to take a zig-zag course, thus thoroughly saturating the packing with the spirit, any surplus of the latter being carried off by a pipe at the bottom fitted with a cock. The air fed into the carbureter passes up through the packing taking a similar zig-zag course thereby thoroughly mixing with and taking up the petrol, the said mixture of air and petrol escaping through a pipe at the top to the burners. To effect the automatic working of the apparatus a rotary disk valve supplying water to the engine is fitted with a lever connected by a rod to a piston working in a tube fixed to the in-

side of the top of the air drum, a spring being placed between the piston and the lower closed end of the tube and also between the piston and the top of the tube. A rod, fixed to the bell is provided with two beveled projections which act upon a spring catch pivoted to a frame above the bell, as the latter rises or falls, thus disengaging the catch from notches in the piston rod and permitting the latter to rise or fall by the pressure of the springs on the piston. The piston is thus stopped for a certain time and the valve is operated automatically by the pressure of the springs acting on its rod. As the pressure of the air increases the storage bell rises and acts upon a pivoted lever which is thus caused to close a valve and shut off the water supply, but upon the air pressure decreasing the valve is again opened for feeding the water supply through the operating valve to the engine. And in order to clearly understand my said invention reference is had to the accompanying sheets of drawings in which—

Figure 1 is a side elevation of the apparatus, Fig. 2 is a plan of the carbureter and air connections and Fig. 3 is a sectional elevation of the apparatus. Fig. 4 is a front elevation of the rotating valve, and Fig. 5 is a similar view of the back of the same. Fig. 6 is a section of the valve on the line *x, x*, Fig. 4. Fig. 7 is an elevation of a part of the spring piston rod and disengaging rod, and Fig. 8 is a plan showing the spring catch.

a is the air drum in which is suspended the air bell *b* by the rod *c* connecting it to the piston *d* working in the cylinder *e* carried by a plate *f* supported by the rods *g* serving as guides to the bell *b*. The drum *a* is fitted with the air supply pipe *h* open at the bottom to the atmosphere and provided at the top with a valve *h'* preferably formed of a cork or other loose disk, or a ball or other valve may be used.

i is the air escape pipe also extending up into the bell and leading to the valve *j* outside the drum *a* from whence the air escapes to a storage tank *k*; a second air drum *l* and bell *m* may be used when an extra supply of petrol vapor or gas is required for feeding an increased number of burners. The bell *m* of this drum is also connected to the piston *n* of a cylinder *o* which latter is connected at the top by a pipe *p* fitted with a cock

p' , to the bottom of the cylinder e , and at the bottom by a pipe q , fitted with a cock q' , to the top of the cylinder e . The air drum l is thus caused to act reversely to the air drum a so as to give a continuous supply of gas on the principle of a double acting air pump. r is the carbureter consisting of a chamber fitted with horizontal plates, or disks r' supported by the distance pieces or feet r^2 projecting from the disks and having a packing r^3 placed in the space between them. This packing consists of a mixture of plaster, whitening and sponge and serves the purpose of absorbing the petrol fed into the chamber by the opening r^4 , any surplus of the spirit escaping by the pipe r^5 fitted with a cock r^6 . s is the air supply pipe leading from the drum a to the bottom of the air storage tank k , and s^2 is the gas escape pipe leading from the tank k to the carbureter r and the burners. s^5 is a pipe leading from the drum l to the pipe s and fitted with a valve s' .

The rotary disk valve supplying water to the engine, Figs. 4, 5 and 6, consists of a front disk t formed with two holes t' , t' , in a horizontal line with the axis t^2 of the valve and behind the disk t is fitted a disk t^3 of leather formed with vertical slots t^4 in line with the said holes. To the back of the leather disk t^3 is fixed a second metal disk t^5 formed with four holes t^6 one at each end of the slots t^4 , and behind the disk t^5 is fixed a leather washer t^7 also formed with four holes corresponding in position to the holes t^6 in the disk t^5 .

To the back of the washer t^7 is fixed a metal ring t^8 inside of which is fitted a metal disk t^9 formed with two holes t^{10} corresponding in position to two opposite holes in the leather washer t^7 , the disk t^9 being fixed to the axis t^2 of the valve so as to turn therewith. Behind the disk t^9 is fitted another leather washer t^{11} also formed with four holes t^{12} corresponding in position to those of the leather washer t^7 , and to the back of this washer t^{11} is fixed a third metal disk t^{13} formed with four holes corresponding to those of the washer t^{11} . A second leather washer t^{14} is fixed behind the disk t^{13} and is formed with two horizontal slots t^{15} the ends of which correspond in position with the four holes in the disk t^{13} .

To the back of the leather disk t^{14} is fixed a rear metal disk t^{16} formed with two holes t^{17} placed at right angles to the holes t' in front disk t . The said holes and slots in the disks and washers serve as passages for the water fed to the valve, all the disks and washers being fixed with the exception of the disk t^9 which is fixed to the axis t^2 . u is the water supply pipe to the said valve fitted with a cock u' and applied to one of the holes t' in the front disk t . v is the supply pipe from the valve to the top of the cylinder

e , and v' is the supply pipe to the bottom of the cylinder, the pipes v and v' being applied to the holes t^{17} in the rear disk t^{16} . w is the exhaust pipe from the valve applied to one of the holes t' in the front disk t , w' being the waste water pipe.

In operation the cock u' is turned on thus feeding the supply of water from the pressure main through the pipe u to the rotating valve, Figs. 4 to 6, by the corresponding hole t' and slot t^4 . The water from the latter passes through one of the holes t^6 and through the opposite hole in the washer t^7 to the corresponding hole t^{10} in the adjustable disk t^9 from whence it passes through the corresponding hole t^{12} in the washer t^{11} and disk t^{13} into the lower horizontal slot t^{15} in the disk t^{14} . From the slot t^{15} the water then passes through the lower hole t^{17} in the rear disk t^{16} to the pipe v' and into the lower end of the cylinder e . The piston d is thus forced upward drawing with it the bell b and causing the air to be drawn through the pipe h and valve h' for filling the bell. The air from the latter is forced on lowering the bell by the pipe i through the valve j and pipe s to the storage tank k , from whence it passes through the pipe s^2 and cock s^3 to the bottom of the carbureter r by the pipe s^4 . The air then rises through the packing r^3 and openings r^7 on opposite sides of each disk r' thus causing it to take a zig-zag course so as to be thoroughly saturated with the spirit held by the said packing. The gas so formed escapes by the opening r^8 and passes from thence through the pipe r^9 to the burners.

As the bell b rises the rod y , Fig. 7, carried by the same, also rises until a beveled projection y' thereon acts upon a spring catch y^2 , Figs. 7 and 8, pivoted to the frame f so as to disengage the said catch from a notch A' formed on the rod A whose lower end is provided with a piston A^2 working in a tube B . Within the latter is placed a spiral spring B' below the piston and a spring B^2 above the latter, thus the lifting of the bell causes the compression of the spring B' which as the catch y^2 is disengaged from the notch A' forces the rod A upward and turns the lever C , connected to the axis of the rotating valve, into the position shown in Fig. 1 where it is held by the notch A^3 engaging with the catch. This actuates the disk t^9 of the valve so as to feed the water to the upper end of the cylinder e by bringing one of the holes t^{10} opposite the upper slot t^{15} . As the bell b and the rod y descend by the pressure of the water on the piston d the upper projection y^3 on the rod y pushes the catch y^2 out of gear with the notch A^3 thus permitting the rod A to descend by the action of the spring B^2 on the piston A^2 and drawing down the lever C so as to actuate the disk t^9 for feed-

ing the water to the lower end of the cylinder *e*, the catch holding the rod down by its engagement with the upper notch *A'* until the rod *y* again rises so as to unlock the catch and cause it to engage with the lower notch *A³* of the rod *A* thereby holding the latter in its raised position. By this means the rotating valve is automatically operated for causing the water supply to flow through one or the other of the set of holes and slots formed therein to the top or bottom of the cylinder *e* thus effecting the reversing of the said valve. It will thus be seen that the movement of the lever *C* oscillates the disk *t⁹* of the valve so as to place the supply pipe *u* and exhaust pipe *w* alternately in communication with the pipes *v* and *v'*. As the pressure of air in the storage tank *k* raises the bell *k'* the projection *k²* on the latter bears against and lifts a weighted lever *k³* for causing the same to close the valve *k⁴* thus shutting off the supply of water until the bell again descends when the lever will fall and open the valve.

Should the burners show any tendency to smoke fresh air may be fed to them from the tank *k* by opening a cock *D*, Fig. 2, in the pipe *r⁹* leading to the burners.

Having now fully described the nature of my said invention, what I claim and desire to secure by Letters Patent is:—

In air pumping mechanism, the combination of an air bell, an air drum in which the air bell works, an air storage tank con-

nected to said drum, a cylinder, a piston working in the same, a rod connecting said piston to and actuating the air bell, fixed metal disks formed with holes and slots, fixed leather washers formed with similar holes and slots for the passage of the water through pipes to and from each end of the cylinder, a rotating metal disk having two holes formed in the same communicating with the holes and slots in the said disks and washers, a central spindle upon which the rotating disk is mounted, the said disks, washers and spindle forming a valve for feeding water to and permitting of its escape from the cylinder, a lever mounted on said spindle, a rod connected to said lever, a piston connected to said rod, a tube carried by the air bell and in which the piston works, springs acting upon each side of the piston, a rod carried by the air bell and a spring catch pivoted to a frame above the air bell and upon which the said rod acts for permitting of the upward and downward movement of the rod connected to the lever mounted on the spindle of the valve disk for causing the rotation of the latter, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

HORACE HARSANT.

Witnesses:

FREDERICK MICAH MELLOR,
H. D. JAMESON.