[Fifth Edition.]

A.D. 1860, *8th February.* N° 335.

Motive Power.

LETTERS PATENT to John Henry Johnson of 47 Lincoln's Inn Fields in the County of Middlesex, and of 166 Buchanan Street in the City of Glasgow North Britain Gentleman for an Invention of "IMPROVEMENTS IN OBTAINING MOTIVE POWER AND IN THE MACHINERY OR APPARATUS EMPLOYED THEREIN" communicated to him from abroad by Jean Joseph Etienne Lenoir of Paris in the Empire of France.

PROVISIONAL SPECIFICATION left by the said John Henry Johnson at the Office of the Commissioners of Patents, with his Petition, on the 8th February 1860.

I JOHN HENRY JOHNSON of 47 Lincolns Inn Fields, in the County of Middlesex and of 166 Buchanan Street, in the City of Glasgow, North Britain Gentleman do hereby declare the nature of the said Invention for "IMPROVEMENTS IN OBTAINING MOTIVE POWER AND IN THE MACHINERY OR APPARATUS EMPLOYED THEREIN" A Communication [to him] from Abroad by Jean Joseph Etienne Lenoir, of Paris, in the Empire of France, to be as follows:—

This Invention consists in the application and use of an inflammable gas mixed with a proper proportion of atmospheric air and lighted inside a cylinder by the aid of electricity, the expansion thereby produced acting upon the piston and imparting motion thereto which motion may be transmitted in any convenient and well known manner to a driving shaft.

In carrying out this invention it is proposed to apply two slide-valves to the cylinder on opposite sides thereof, or to use a disc valve. These slides are not contained in boxes as in the ordinary steam valve but are held against the valve faces of the cylinder by springs. To one of these slides is fitted a pipe having lateral openings made therein to admit atmospheric air into the cylinder.—With this air there is also admitted by means of a gas pipe in connection with the air pipe a supply of ordinary lighting or other inflammable gas.—In the middle of the

cylinder or at a point corresponding to about half the stroke of the piston is fitted an insulated platinum wire in connection with a battery and so disposed that a spark from this wire will instantly explode the mixture of air and gas contained in the cylinder on one side of the piston and force the piston thereby to the further end of the cylinder.—On first starting the engine the piston is drawn to the middle of the cylinder which by its tendency to create a vacuum draws in a certain amount of air and gas which on the piston passing the platinum wire is exploded and the expansion produced forces the piston along the remainder of its stroke.—The momentum of the fly wheel now draws back the piston again to the middle of the cylinder and the opposite side or end is filled with gas and air and exploded by the platinum wire as before the motion of the piston being thus rendered continuous. The supply of gas is regulated by a stop cock and governor.

SPECIFICATION in pursuance of the conditions of the Letters Patent filed by the said John Henry Johnson in the Great Seal Patent Office on the 8th August 1860.

TO ALL TO WHOM THESE PRESENTS SHALL COME I JOHN HENRY JOHNSON of 47 Lincolns Inn Fields in the County of Middlesex and of 166 Buchanan Street in the City of Glasgow North Britain Gentleman Send Greeting.

WHEREAS Her Most Excellent Majesty Queen Victoria by Her Letters Patent bearing date the eighth day of February in the year of our Lord One thousand eight hundred and sixty in the twenty third year of Her Reign did for herself her heirs and successors give and grant unto me the said John Henry Johnson her special license that I the said John Henry Johnson my executors administrators and assigns or such others as I the said John Henry Johnson my executors administrators or assigns should at any time agree with and no others from time to time and all times thereafter during the term therein expressed should and lawfully might make use exercise and vend within the United Kingdom of Great Britain and Ireland the Channel Islands and Isle of Man an Invention for "IMPROVEMENTS IN OBTAINING MOTIVE POWER AND IN THE MACHINERY OR APPARATUS EMPLOYED THEREIN" A Communication from abroad by Jean Joseph Etienne Lenoir of Paris in the Empire of France upon the condition (amongst others) that I the said John Henry Johnson by an Instrument in Writing under my hand and seal should particularly describe and ascertain the nature of the said Invention and in what manner the same was to be performed and cause the same to be filed in the Great Seal Patent Office within Six Calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE that I the said John Henry Johnson do hereby declare the nature of the said Invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement reference being had to the accompanying Drawings and to the Letters and Figures marked thereon that is to say:—

The said invention consists in the application and use of an inflammable gas mixed with a proper proportion of atmospheric air and ignited inside a cylinder by the aid of electricity the expansion thereby produced acting upon the piston and imparting motion thereto which motion may be transmitted in any convenient and well known manner to a driving shaft.

In carrying out this invention it is proposed to apply two slide valves to the cylinder on opposite sides thereof, or to use a disc valve.—These slides are not contained in boxes as in the ordinary steam valve but are held against the valve faces of the cylinder by springs or screws. Suitable means are employed for admitting atmospheric air in to the cylinder. Along with this air there is also admitted by means of a pipe employed for that purpose a supply of ordinary lighting or other inflammable gas or vapour.—Inside the cylinder are fitted either at the middle or at both ends thereof one or more pairs of insulated platinum or other wires in connection with a battery and so disposed that an electric spark will be produced which will instantly ignite the mixture of air and gas contained in the cylinder on one side of the piston and by the expansion of the air so produced force the piston to the opposite end of the cylinder.—The supply of gas is regulated by a suitable stop cock and governor.

And in order that the said Invention may be fully understood I shall now proceed more particularly to describe the same and for that purpose I shall refer to the several figures on the sheet of drawings hereunto annexed the same letters of reference indicating corresponding parts throughout all the figures.

Johnson's Improvements in Obtaining Motive Power.

Figure 1 of the accompanying sheet of drawings represent a side elevation of the improved motive power engine complete Figure 2 is a corresponding plan and partial horizontal section of the same and Figure 3 is a transverse vertical section of the working cylinder.—It will be seen on referring to the drawings that this motor is similar in its general construction and arrangement to the ordinary steam engine and is therefore equally susceptible of the same transformations and arrangements.—The working cylinder A cast with a jacket is provided with two valve faces upon or against which work the two slide valves T and T^1 which open alternately and at the proper times the ports a, a^1 and a^2 for conducting the mixture of air and gas to each side of the piston as well as the ports b b^1 and b^2 for the emission of the products of combustion.—The valve T, which regulates the inlet of the air and gas into the cylinder is provided with an orifice t which communicates with one or other of the two openings o, o^1, made in the plate P.—This plate carries the two cocks r; r^1 which admit the gas.—The introduction of atmospheric air takes place through the port a, which is in communication with the open nozzle b^{11}, surmounted by a cap b^{111} as shewn clearly in figure 3. The slides are held against the valve faces and work outside, by guide rods which slide in the bearings C, C, the usual valve chest being dispensed with.—These bearings are so arranged as to enable the slides to be set up more or less tightly against the valve faces by means of pressing or adjusting screws as shewn in the drawing figure 2. The cap b^{111} acts as a species of gasometer that is to say it retains the gas which would tend to escape, and which can then enter or be drawn into the cylinder at the next stroke of the piston.—The movement of the piston p, is transmitted to the main crank shaft B by the aid of the connecting rod C^1 which is secured to the crank of the main shaft. The two eccentrics D and D^1 actuate the slide valves T and T^1 and a small pulley E, imparts motion by means of a strap to the governor or regulator of the machine.—The cylinder is provided at each end or has fitted upon its two covers the igniters G and G^1 in communication with an electric distributor H, carried by the main driving shaft and is itself in connection with a Rhumkorff coil which is in communication with any convenient battery or generator of electricity.—In starting the engine the piston p is first caused to travel a certain distance along the cylinder as shewn by the red lines thereby producing a vacuum behind it and allows the air and gas to enter such void space through the ports a and a^1 respectively, but as the slide T opens the port a before the passage t, comes into communication with one or other of the gas inlet orifices, o, o^1, it follows that a supply of air will have already entered the cylinder.—The slide T then opening one of the orifices, o, o^1 in the plate P, the gas and air both enter the cylinder but without becoming entirely mixed together and will exist in the space behind the piston in distinct strata.—The slide T, now closes the port leading to that end of the cylinder and the igniter G suddenly producing an electric spark the gas explodes and heats the air and its combinations, which expand considerably and the pressure produced operates upon the piston so as to force it to the opposite end of the cylinder, the residuum of the combustion or the products thereof escaping by the exhaust slide valve T^1 and passage b.—The fly wheel assists the piston in its course towards the end of the cylinder and the slides T and T^1 changing their positions the air and gas are introduced to the other side of the piston just at the moment that the second igniter G^1 produces a spark which ignites the gas and causes the piston to return to the opposite end of the cylinder thus completing a double stroke.—The object of introducing a supply of air into the cylinder before the gas is allowed to enter is to neutralize the effect of the carbonic acid gas formed by the combustion of the first portion of the inflammable gas as the carbonic acid gas without being thus neutralized might prevent the ignition of the remainder of the inflammable gas. As the machine in working attains a considerable temperature it is proposed to introduce into the jacket a suitable supply of cold water regulated by the cock l, and which water becomes heated or converted into steam and flows off through the pipe l^1, to any place where it can be stored or used. The apparatus which I term

the director of the electric current (a sectional detail of which is shewn on an enlarged scale at figure 4) consists of a species of collar or ring of hard india rubber, gutta percha or other good non-conductor L in the periphery of which are inlaid the metal segments M. M^1. The segment M^1, rotates in constant communication with the conducting wire N, leading from the coil and the segments M, M^1, with each one of the directing wires g, and g^1; these wires being respectively connected with the igniters G, and G^1. The short metal rods m, m^1 unite the metallic contact segments of the director with that of the conducting wire N.—As the cylinder conducts one of the poles the operation of the director will be readily understood.—This director may also be constructed in various ways so as to produce the same effects.—If found desirable liquid or solid Hydro-Carbons may be employed in this engine for heating and expanding the air and its combinations in which case the substances from which the inflammable gases or vapours are to be obtained are placed in a small boiler and are heated by means of a serpentine or coil placed in the bottom of the boiler and in direct communication with the escape pipe of the engine. The boiler is first heated and as soon so the hydro-carbon is converted into vapour gas, it is placed in communication with the working cylinder. The vapour so produced is ignited in exactly the same manner as the inflammable gas before mentioned and similar effects will follow.—I may here observe that the air may be introduced alone into that part of the cylinder where the pressure is to be produced and the gas introduced alone near the igniter.—It is obvious that this Invention may be applied to coupled engines of two or more cylinders suitable for steam boats and locomotive or traction engines.

Having now described and particularly ascertained the nature of the said Invention and the manner in which the same is or may be used or carried into effect I would observe in conclusion that what I consider to be novel and original and therefore claim as the Invention secured to me by the hereinbefore in part recited Letters Patent is:—

First.—The general construction and arrangement of machinery or apparatus for obtaining motive power by the aid of inflammable gas or vapour in conjunction with atmospheric air as hereinbefore described.

Second.—The employment of electricity for the purpose of igniting gas or inflammable vapour when used for the obtainment of motive power as hereinbefore described.

Third.—The application and use to and in the heating of air in the cylinders of motive power engines of solid or liquid hydro carbons converted into vapour as hereinbefore described.

Fourth.—The application and use of electric igniters placed in the cylinder of a motive power engine for the purpose hereinbefore described.

Fifth.—The application and use of a director of the electrical current for the purpose of bringing a spark to bear at the proper time and place upon the gas or vapour to be ignited in a motive power engine as hereinbefore described.

In witness whereof I the said John Henry Johnson have hereunto set my hand and seal this Second day of August one thousand eight hundred and sixty.

J. HENRY JOHNSON. (L.S.)

Redhill: Printed for Her Majesty's Stationery Office, by Malcomson & Co., Ltd.
[G. 5667—50—1/1904

A.D. 1860. Feb. 8. N°. 335.
JOHNSONS' Specification.
(5th Edition)

(1 SHEET)

FIG. 1.

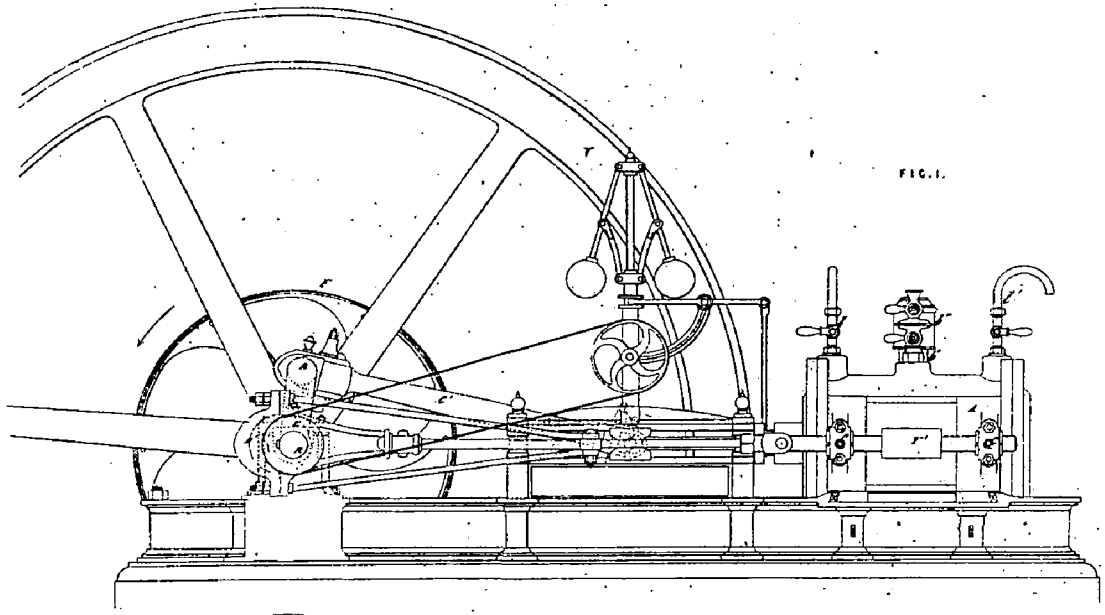


FIG. 2.

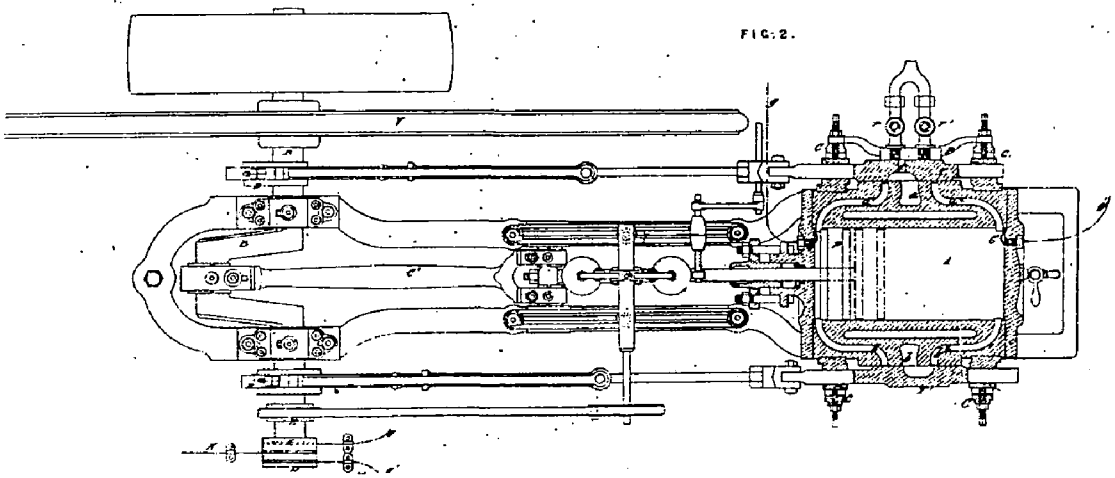


FIG. 3.

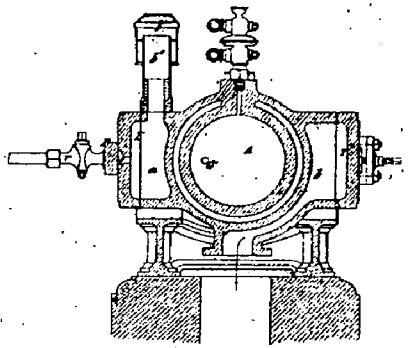
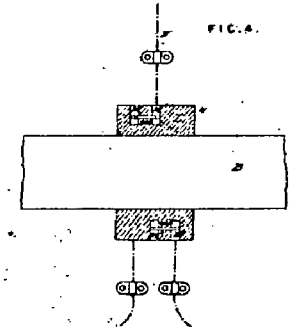


FIG. 4.



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