made much larger without difficulty, and be more protected from the effect of frost.

The above very imperfect sketch is not intended to prescribe details of any value, but to suggest what it is conceived would be the *principles* desirable to be acted upon.

1. That an ample and well organised fire police be established, and constantly ready to act with rapidity; as the necessity for them is only occasional, and may at any time, without previous warning, require more or less means. It is assumed that this can only be done with economy, by making it a branch of the active metropolitan police.

2. That the body charged with this service be thoroughly acquainted with the business—that they be invested with a certain degree of authority, and have full power to bring all the necessary means at once into activity, without the presence or intervention of any other persons.

3. That the most perfect machinery be established in the several parts of the city most suitable, in connexion with this body, and under their charge.

4. That the most complete arrangements be made for obtaining water, at the early periods of the occurrence.

It is suggested, that considering the importance of the object, the expense would not be great, of obtaining all the improvements that have been here proposed. It might not be unreasonable to calculate, that in the course of the next three years, the value of property that would be saved by such precautions would more than pay for the first outlay.

It is supposed that there could be no difficulty in effecting so perfect a co-operation between the police and the pipe water, and the paving boards, as regards this particular service, as would give the full benefit of all the means that could be furnished by the two latter, and of putting those means on such temporary occasions at the disposition of the police, without the necessity at the moment for applying to those distant offices.

On this subject it is not possible to omit the very natural suggestion of the propriety and economy of consolidating pipe water, paving, and wide street departments, into one body, all being municipal establishments, and with duties necessarily very much connected.

J. F. B.

ABSTRACTS OF SPECIFICATIONS OF ENGLISH PATENTS RECENTLY ENROLLED.

JAMES STIRLING, OF DUNDEE, ENGINEER, AND ROBERT STIRLING, OF GALSTON, AYRSHIRE, D.D., *for certain improvements in air engines.*—Enrolment Office, April 1, 1841.

The engines referred to in this patent are those in which motion is obtained by the alternate expansion and contraction of air, by the application or abstraction of caloric.

An "air vessel" is formed of cast iron, and connected by a port and pipe with the top of a cylindrical cast iron vessel called the "plate box;" the air vessel also communicates at its lower part with the plate box by three or more parallel pipes, which terminate within the air vessel in fan shaped orifices for the purpose of rapidly spreading the air over the whole extent of spheroidal face of the air vessel. An air-tight cast iron vessel called "the driver," occupies $\frac{5}{6}$ths of the air vessel, and in order to prevent heat from ascending, this driver has a cast iron plate fixed outside its bottom, and in its lower part is placed a quantity of brickdust or other non-conducting material; the remainder of the interior is divided into 12 or 16 compartments by thin iron plates. The driver is made to fit the bored part of the air vessel, so as to move easily up and down, but not to allow air to pass by its side; its upper and lower end are so formed as to fit the top and bottom of the air vessel. The driver is moved by a piston rod passing through a cupped leather collar, fixed on the top of the air vessel, in which also there is a pipe descending into a vessel of oil, so as to prevent access of air to the collar, and thus make the joint air-tight. Another kind of driver consists of an outer shell of cast iron, accurately turned and fitted to the air vessel, and having a number of holes pierced in its bottom for the passage of air; upon the bottom of this shell rests a piece of cast iron, similarly pierced, having small ridges on its upper surface to support a number of plates and facilitate the distribution of air among them; these plates consist of alternate sheets of plain and fluted glass, in narrow strips not exceeding an inch in width, which accurately fill up the interior space of the driver. At a small distance above these plates is the cover, which is perforated with small holes for the transmission of air, and is attached to the outer shell by a ring of sheet iron.

The "plate box," about $\frac{5}{8}$ from the bottom, is filled with perpendicular plates of iron, kept at $\frac{1}{10}$ of an inch from each other by ridges; the remainder of the plate box is occupied partly by blocks of iron, glass, or other solid bodies, and partly by a refrigerating apparatus, composed of a great number of copper pipes, through which a stream of cold water circulates, arranged in 27 horizontal rows, at a distance of $\frac{1}{20}$ of an inch apart. These pipes are soldered into two brass plates, and to these two other plates of brass are soldered, having horizontal passages at their four margins for connecting the ends of the pipes, and returning the water from one end to the other, furnish-

ed with larger passages for introducing and carrying off the water. The main pipes pass through holes in the cover of the plate box, made tight with lead packing.

The *modus operandi* is as follows:—The bottom of the air vessel, the parallel pipes, and the plate box, are heated by a fire underneath, until the soot is burned off and ceases to adhere; if the driver is then moved upwards, it will diminish the space at the top of the air vessel, and enlarge that at the bottom equally, which causes a portion of air to pass downwards through the plate box into the heated part of the vessel, being there heated and expanded, it is more than sufficient to occupy that space, and is forced out at the port. On the contrary, when the driver is moved downwards, a quantity of air is made to ascend through the cooling apparatus in the plate box, and being cooled and contracted, it is insufficient to occupy the increased space at the top, and a quantity of air must enter by the port to restore the equilibrium. One of these air vessels being placed at each end of the working cylinder of an air engine, is set in motion by the foregoing expanding and contracting of the air.

The claim is to—1. The employment of strips or rods of glass for receiving and imparting heat, during the passage of air from the hot to the cold chamber, and *vice versa*.

2. The formation of the glass, iron, or other materials employed for this purpose, into continuous plates, strips, or rods of considerable length, having their contiguous surfaces so placed as to make all the passages for the air narrow, and in a line parallel, or nearly so, with the axis of the plate box or driver.

3. The mode of constructing air engines, whereby the air, in passing from the heated end of the air vessel to the cool end thereof, is caused to pass first amongst an extensive system of surfaces to give off heat thereto, and then to pass amongst an extensive cooling apparatus, cooled by the passage of fluids, whereby the air, in returning from the cool end of the air vessel to the heated end thereof, is caused to pass through the same extensive system of surfaces, and having taken up heat from those surfaces, to pass into the heated end of the air vessel.

4. The use or application in air engines of cupped leather collars around the piston rods, or other rods, which communicate with the interior of the engine, by which means the air is enabled to be confined at a high pressure.

WILLIAM HENRY FOX TALBOT, OF LACOCK ABBEY, WILTS, ESQ., *for improvements in producing or obtaining motive power.*—Enrolment Office, April 1, 1841.

A strong metallic vessel is provided, of the ever memorable "black bottle" shape, the part corresponding to the neck of the bottle, being a cylinder fitted with a piston, and the ordinary appendages for communicating motion to a crank shaft in the usual manner. This vessel is filled about half way up with water, or with water slightly acidulated to facilitate its decomposition. A pair of wires enter that part of the vessel which is occupied by the fluid, on opposite sides, and terminate in two metal plates a short distance apart. These wires are to be properly insulated at their insertion into the containing vessel. Above the part occupied by the fluid, there are another pair of wires, connected together by a very fine wire of platinum. The upper and lower pair of wires are alternately connected with, and disconnected from the positive and negative poles of a galvanic battery; the ends of the wires terminate in springs which press upon the circumference of a revolving metal shaft upon which a fly-wheel is mounted; part of the metal is removed from the circumference in places, and filled up with wood, bone, or other non-conducting medium, so that the springs continually pressing upon the revolving surface are alternately in, and out of connection with the battery.

By means of this arrangement an electric current is first passed through the lowest pair of wires, which being spread over the extended surfaces of the two plates, decomposes the water, oxygen being evolved from the one plate and hydrogen from the other; this connection is then, by the revolution of the shaft, broken, and the current passed through the upper pair of wires, when the platinum wire becomes red hot and inflames the gases. The evolution of the gases caused an upward, and the explosion produces a downward motion of the piston.

A second arrangement for producing power, is described as follows:—A large soft iron horseshoe, surrounded with helical wires, is placed perpendicularly in a square case or frame, to the top of which a long lever is jointed; at a short distance from this fulcrum an armature is attached. At the other end of the lever there is a small hole through which passes a connecting rod from the crank shaft of a fly wheel; this rod terminates in a knob or stop, so that as the crank approaches the upper part of its circuit the lever and armature is raised; but as the armature has but a very limited range of motion, as the crank descends the armature rests upon the horseshoe, and the connecting rod continues its progress passing freely downwards through the hole in the lever.

Two wires proceed from the helix to the opposite poles of a battery, the connection with which is made and broken by a revolving shaft as before. On the connection being made, and the crank being in its highest po-