

Fire-damp in Collieries.

A beautiful application of that mechanical power which resides on the surface of bodies, and which is especially developed in those having a porous structure, known to us as exosmose and endosmose, has been made by Mr. G. F. Ansell, of her Majesty's Mint. It will be well known to most of our readers that Professor Graham has been engaged for many years in examining all the phenomena connected with the action of porous bodies, organic or inorganic, upon gases or liquids. As the phenomena which Mr. Graham groups under the general term of osmose force may not be familiar to all, a brief explanation may be desirable. If salt and water be placed in a bladder, and this be placed in a vessel containing pure water, the salt will pass out of the bladder into the water. Recently an application of this experiment has been made in Glasgow with much success. In salting meat a large quantity of albuminous fluid flows out of it with the deliquescent salt, and this, a valuable because nutritive portion of the animal matter, is lost. Now, this albuminous brine is placed in a bladder, and this again in a vessel of water; by virtue of osmose force all the salt passes through the animal membrane, and pure albumen, or considerable commercial value, is left behind. If in the place of a membrane of this kind we employ a porous diaphragm of baked clay, of plaster of Paris, or the like, the same action takes place. By this means we may separate bodies from each other which are mechanically mixed, and even in many cases when mechanically combined. Pursuing inquiries of this character, Mr. Ansell has been led to a discovery which promises, above all others, to give us easy methods by which we may determine the presence of carbureted hydrogen in our coal mines, and he has invented a simple apparatus which promises to indicate the accumulation of fire-damp before it becomes and either to give the miner notice of it, or to convey that notice to the surface by its connection with some simple electro-telegraphic arrangement. Mr. Ansell has given two or three forms to his apparatus. The first is that of a thin india-rubber ball, which is filled with ordinary atmospheric air, and is placed on a stand under a lever which slightly presses its upper surface. This lever is connected with a spring, which it liberates when from any cause the lever is raised, and the liberation of the spring sets a bell in vibration. This arrangement being placed in a vessel containing but five per cent of ordinary coal gas exhibits the phenomenon of endosmose with much rapidity. By the passing in of the carbureted hydrogen, the india-rubber ball swells, the lever is of course raised, and the bell is rung. Experiments made with the light carbureted hydrogen gas of the coal mines show that the action is precisely the same in character. This little apparatus, the cost of which will be very trifling, may be placed in any part of a colliery with the certainty of its indicating the presence of fire-damp when yet in small quantities, and before there is any real danger. If the spring of this little instrument be so arranged that it makes or breaks connection with an electrical battery, the signal of accumulating danger may be at once conveyed by wires into the office, or any house on the surface of the colliery, and, either by ringing a bell or moving a magnetic needle, give the necessary warning to the owner or manager. Another form of arrangement assumes the shape of a barometer. A glass tube is bent into the form of a U, and upon one of the arms is fixed either a porous earthenware cell or a slice of graphite. The lower portion of the tube U holds a few inches of mercury. The moment a current of air, mixed with either heavy or light carbureted hydrogen gas, even in small proportions, passes over the graphite diaphragm, or blows against the porous cell, the mercury is depressed in one arm of the tube, and consequently raised in the other. By an arrangement precisely similar to that which is adopted in the wheel barometer, an index may be moved over a dial, and made thus to indicate with accuracy the appearance of dangerous gas in a colliery, and register its accumulation. It is not often that a more refined application of a scientific discovery than this has been made, while the arrangements, which have been patented by the inventor (Mr. G. F. Ansell), are so simple that they may be placed with confidence in the hands of any man to whom a safety lamp would be intrusted. As an unerring indicator

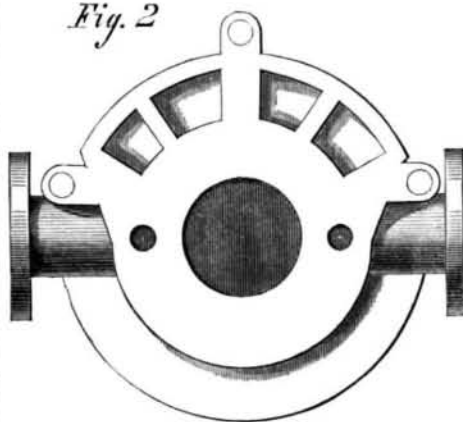
of the presence of the collier's deadly enemy—fire-damp—we cannot but regard this invention as one of the highest value.—*London Engineer.*

SMITH'S LIFT AND FORCE PUMP.

It is well known to mechanics, or other persons using pumps, that they are frequently inoperative from derangement of the valves. It is a simple matter to inspect these when accessible, but very many

Fig. 1

manufacturers seem to take special pains to put them in the most inconvenient and difficult positions; as also to fasten the bonnets, covering them with innumerable bolts, so that it is an hour's work to break the joints.

Fig. 2

These engravings represent a simple lift and force pump, which is conveniently arranged with regard to its valves. The bonnets, A and B, cover, respectively, the top and bottom suction and discharge valves, and communicate with the channels, C, and the pump barrel, D, in the usual manner. By merely unscrewing three nuts, the valves can be examined at any time, or renewed with facility when worn out. Fig. 2 represents a plan of the valve seats, which are both alike at the top and bottom. A patent is now pending on this invention through the Scientific American Patent Agency, by T. C. Smith; for further information address him at Chicago, Ill.

THE Bergen tunnel, on the Erie Railroad, which has been the scene of so many accidents, is now lighted with a calcium light.

Purification of Petroleum.

In treating for disinfecting and removing the impurities from petroleum and products thereof, it has been usual to employ chloride of lime in a dry state and in combination with other matters, but which, however, is very imperfect in its action and far from obtaining the desired results. According to an invention which has been patented by Mr. B. Azular, of Rotherhithe, the oils are treated with a saturated solution of chloride of lime, and, as it were, washed in the solution. For this purpose the oil is placed in a suitable vat or vessel and the solution poured over it, the solution sinks through the oil, and is drawn up from the bottom, and by a pump or other means is elevated again to the top, and so a circulation of the solution in the oil is kept up, and the impurities thus abstracted from the oil, which is rendered clean and quite free from offensive smell, besides enhancing its lighting properties. If the oil is not very bad the same solution may be used again. If the oil is very bad it may be found necessary to repeat the process with a fresh solution, in that case a second vat is provided, the top of which would reach the oil tap of the first vat; the treated oil is then drawn from the first into the second vat and washed in water. After the oil has been separated from the water, the latter is drawn off and a second solution is then thrown on the oil, and the process proceeds as before. Instead of the solution of chloride of lime being applied at the top and drawn up from the bottom of a vessel, the oil may be forced in at the bottom of a vessel containing the solution of chloride of lime, when it will rise through the solution and may be drawn off at the top, repeating the operation as often as may be necessary according to the quality of the oil operated upon.—*Mechanics' Magazine.*

Death of a Distinguished Naval Officer.

Edwin J. De Haven, a lieutenant in the United States Navy, died at Philadelphia on the 2d inst., in the forty-sixth year of his age. He has been repeatedly noticed for his gallantry and skill, and was also celebrated for his fine scientific attainments. He was attached to the Washington Observatory, and constructed the famous ocean charts for which the rebel Maury received so much credit. He was selected to command the Grinnell Expedition to the North Sea in 1850, and, on his return, was employed in the Survey Department on the Southern coast. In 1857 his eye-sight became so much impaired that he was compelled to retire from active service.

NOTES AND QUERIES.

We are continually in receipt of letters from parties inclosing three cents, accompanied with a request to write them by return mail on the size of boiler flues, where to obtain bolts, and all sorts of miscellaneous information. We are pleased to answer these letters, but not by return mail, and all replies to such correspondence will be found in the "Notes and Queries" column at the back part of each paper.

SPECIAL NOTICE.

GEO. W. OTIS, Lynn, Mass., has petitioned for the extension of a patent granted to him on the 20th day of August, 1851, for an improvement in insulators for lightning rods.

Parties wishing to oppose the above extension must appear and show cause on the 7th day of August next, at 12 o'clock, M., when the petition will be heard.

At the last sitting of the Academy of Sciences, M. M. Engard and Philippon sent in a new hygrometer, formed out of a flat piece of ivory cut out of the tusk perpendicularly of its axis, and then formed into a spiral. The instrument is extremely sensitive, the spiral either being dilated or contracted circularly, but it has not yet been compared with other hygrometers.

In consequence of the increasing difficulties in the tunneling operations at Mont Cenis, it is now computed that the works cannot be completed within the former estimate of ten years, instead of four or five years. Geologists predict that a stratum of granite will sadly interfere with the progress of the work.