MUSHET ON CAST IRON.

We find the following letter in the London *Engineer:*—

SIR :—In your article last week on cast-iron ordnance are some remarks on the nature of cast iron, and the means of improving that substance for purposes where tenacity and great strength are essential, and you suggest that such an improvement may be effected by partially decarbonizing pig iron in a Bessemer converter.

In the years 1846-1847 I made a series of experiments on this subject with a Bessemer converter, operating upon various brands of pig iron. The irons I employed were of the following kinds of gray, No. 1 quality:—Cleator hematite, Workington hematite, Barrow hematite, Tow Law gray pig, Cinderford, and Parkend. Victoria, Nos. 1, 2, 3 and 4 pig irons:—Blanavon, Pontypool. Russell's Hall and Westphalian gray pig.

The melted pig iron was blown in the converter until it had thrown off the frothy silicious slag which is eliminated during the first stage of the pneumatic process.

The gray iron thus deprived of its silicium, and some of its carbon, was cast into ingots of about 4 in. square. The fracture of these showed a very uniform grain of gray cast iron, the grains being small, and the texture very compact, but in no instance was the strength of the iron found to be nearly so great as that of the original pig iron from which it was prepared. These results I was prepared to anticipate from my previous knowledge of the nature of pig iron and of the cause to which its strength is due. There is no difficulty in thus treating cast iron, for the sides of the converter are not attacked by the silicious slag, and the operation can be carried on in converters of small size, which can be charged twice in an hour, and kept going night and day if required.

The iron thus operated upon is exceedingly fluid and lively, and can be run into the finest moldings; but the castings thus made are weak and brittle. Nothing in the way of improving the strength of cast iron can be expected from thus operating upon it. The reasons are, to me, quite obvious; but so long as the public are shackled by the empirical dogmas of chemists respecting the nature of cast iron, the matter must be more or less obscure to those who rely upon these dogmas.

Cast iron is not what chemists would have us to believe it to be, namely, a carburet or carbide of iron. Gray cast iron is an alloy of carburet of iron, steel, and malleable iron, with a mechanical mixture of graphite; white cast iron is an alloy of carburet of iron, steel and malleable iron, in which the first two substances largely predominate.

In the blast furnace the ores of iron descend into the zone of fusion in various conditions. These conditions are the following:—

1st. Iron ore partially deoxydized, but not yet metallized. When this comes into the zone of fusion it is reduced to a black slag, and none of it is metallized; when an excess of ore comes down in this state the blast furnace cinder is black, the iron white, and the furnace scours.

2ndly. Iron ore fully, deoxydized, but only in the nascent state of metallic iron.

3rdly. Iron ore completely deoxydized but not carbonized. This is in the state of malleable iron.

4thly. Iron ore deoxydized, metallized and carbonized so as to be in the state of crude steel.

5thly. Iron ore deoxydized and carbonized, so as to constitute carburet of iron.

6thly. Iron ore deoxydized and carbonized, so as to contain graphite mechanically mixed with it. When the bulk of the ore coming down into the zone of fusion is of this class the pig iron produced is very rich in carbon. Such is the Scotch pig iron, in which, from the nature of the black band ironstones, the iron and carbon of which are intimately mixed, and from the hight and size of the blast furnaces, the ore is almost wholly brought into the gray carbonized condition before it reaches the melting zone.

Iron ores, therefore, when passing through the blast furnace, are deoxydized and carbonized so as to form six distinct classes of material, when they descend into the melting zone of the blast furnace. The proportionate quantities of each class will depend upon the nature of the fuel, the nature of the blast (whether hot or cold), the weight and capacity of the furnace, and the nature and composition of the ores themselves, and the fluxes with which they are smelted.

The strength of cast iron depends almost wholly upon the quantity of malleable iron it contains; and therefore, when in any blast furnace a large portion of the ore, class No. 3 comes down to the melting zone, the pig iron produced will be proportionately strong. On the other hand, when classes No. 4 and 5 predominate, the pig iron is white and brittle, for crude steel and carburet of iron are brittle, as is also any mixture of these substances. When class No. 6 predominates the iron is gray, such as Scotch pig iron; but it is brittle, containing but little malleable iron. It is not, however, so brittle as white pig iron, because its texture is granular and not crystalline.

The effect of silica in the blast furnace is to retard or prevent the carbonization of the iron ore. Therefore, pure silicious iron ores, such as hematites and magnetic ores, when they come down to the zone of fusion, are more or less largely in the condition of class No. 3, and in small cold blast furnaces almost wholly so. Therefore rich silicious hematites and magnetic iron ores, smelted in small cold blast furnaces, have a strong tendency to fill the hearth with malleable iron, unless an excessive quantity of fuel is used to guard against this; but in any case a large portion of the ore of class No. 3 always comes down to the melting zone, and hence hematite and magnetic ore pig irons, when gray, are exceedingly strong, their strength being due to the large alloy of malleable iron which they contain. Gray pig iron is often rendered stronger by re-melting, and the cause of this is that the loss of carbon which takes place in melting increases the proportion of the malleable iron present in the alloy.

By partially decarbonizing cast iron in the Bessemer converter its strength is diminished for the following reason :—The malleable iron present being highly combustible is at once attacked by the oxygen of the blast, before the less combustible carburet of iron, steel, or gray carbonized iron is at all acted upon; so that the quantity of malleable iron which imparts strength to the cast iron is reduced, and the strength of the cast iron is, therefore, proportionately reduced also.

I am not aware that Mr. Morries Stirling was acquainted with the true composition of cast iron as I have here described it; but it is certain he was aware that cast iron could be strengthened by alloying it with malleable iron, and hence his patents for effecting that improvement.

On September 3d, 1863, I took out a patent for increasing the strength of cast iron by alloying it with Bessemer metal, decarbonized so as to be in the condition of malleable iron. Like most other great improvements, no notice has as yet been taken of this process, by which in all probability the strength of cast iron may be quadrupled. Inventions relating to iron and steel appear to require a probation of a series of years before the public are able to recognize their efficiency and importance. Thus the hot blast patent was scarcely named for the first ten years of its term. My own spiegeleisen patent, on which hangs the very existence of the Bessemer process in this country, was put aside for six years. The rotary puddling furnace is only now beginning to attract proper attention, after remaining for years in abeyance.

Of my process for strengthening cast iron, which has been now nearly two years before the public, I have heard nothing, except the opinion of a leading ironmaster, to the effect that my process was not worth a trial. Opinions such as these, confidently given by men who have never devoted a moment's thought to the subject they speak of, tend more than anything else to retard the progress of improvements in iron metallurgy. When my spiegeleisen patent was taken out, eight years ago, it was pronounced to be of no value, and a mere theoretical bagatelle. Yet this bagatelle is yielding Mr. Bessemer over £100,000, and his present licenses probably one million sterling, per annum, and a few years will see these returns increased probably tenfold. R. MUSHET.

Belgrave House, Cheltenham, April 18, 1865.

MACHINES for seeding currants and stoning raisins are in common use in England.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening April 27, 1865, the President, S. D. Tillman, Esq., in the chair.

METALS—SOLID AND MELTED.

Dr. Rowell gave an account of some experiments which he had made to test the relative specific gravity of solid and molten lead. He took a hydrometer tube, which is a glass tube with two bulbs blown in it, a small one at the bottom and a larger one above, and introducing a small quantity of lead he melted the metal with an alchohol lamp. The quantity of lead was sufficient to fill the lower bulb and half the upper bulb. Dr. Rowell supposed that if the metal shrank in hardening it would draw the two bulbs together and break the glass at the neck, while if it expanded it would burst the lower bulb. The glass was not broken; he, therefore, concluded that lead in hardening neither expands nor contracts, at all events not more than glass.

Another experiment resulted in the same conclusion. Having a kettle with a hemispherical bottom he filled it with molten lead and allowed it to cool. He then melted it all except a little lump at the center of the surface, and observed that the upper part of this lump was precisely at the level of the surface of the molten mass. But if the temperature of the molten lead be raised a few degrees above the melting point, the solid lump sinks; lead, whether molten or solid, being subject to the law of expansion like other bodies.

The case is different with iron. Visiting an iron foundery a few days before, he took the opportunity to drop a small ball of nearly red hot cast-iron into a ladle of the molten metal, and the ball floated with about one-tenth of its mass above the surface. One of the workmen dropped a leaden bullet into the ladle, when it went to the bottom instantly.

Mr. Blanchard said that he had tried the experiment of throwing solid cast-iron into molten cast-iron a thousand times, and it will always float.

Mr. Norman Wiard observed that there was some deception practiced in relation to the lead bullet; as every foundery man knows that if lead be mixed with molten cast-iron an explosion follows. The iron may all be thrown out of a ladle at any time by placing a little lead in the bottom of the ladle before the iron is drawn in.

Mr. Bird said that in melting lead he had tried the experiment many times of pushing with a stick a solid lump of lead to the bottom of a molten mass, and it would invariably rise again to the surface.

The Chairman explained that he was present at the experiments made by Professor Everett, an account of which was given at the time, and it was found that a pig of solid lead would sink in a kettle of molten lead, but whether the temperature of the molten lead was not considerably above the melting point, was not carefully observed. Had the solid and the molten lead been of about the same temperature perhaps the result would have been different.

Mr. Garvey remarked that the fact of the solid floating upon the molten metal was not conclusive proof of a lower specific gravity, as there were mysteries connected with the behavior of the substances under these conditions that had not yet been unraveled.

Dr. Parmelee observed that water, sulphur and some other substances when they change from the solid to the liquid state crystalize, and the crystals arrange themselves in such way as to have interstices between them, in this way diminishing the specific gravity of the substances. But substances which have not this property, increase their specific gravity in passing from the solid to the liquid state. If the experiment be properly and fairly tried it will be found that solid lead or iron will always sink in the same metal melted.

THE VANDERBILT MEDAL.

Mr. Norman Wiard presented the designs and plaster casts of the gold medal voted by Congress to Commodore Vanderbilt in recognition of his munificent gift of his superb steamship, the *Vanderbilt,* to the nation in her hour of need. The design was by Leutze and the medal is being executed by Mr. Salathiel Ellis. On one side is a likeness of the Commodore in bas relief, and on the other an allegorical design; a female figure representing commerce is kneeling to another meant for America, standing upright, with a huge two-handed sword on her shoulder, and with her left hand resting upon a shield, while the back ground is filled with the spars and hull of the great ship. The medal will be three inches in diameter, and will cost $3,000. The ship is of 5,000 tuns burden; she was built in the most thorough and careful manner, and cost $800,000.

DECOMPOSITION OF OXYGEN.

The President read an extract from a foreign paper stating that Schonbein had succeeded in decomposing oxygen, but expressed doubt in regard to the truth of the statement.

INJURY TO CLOTH FROM SILICATE OF SODA.

The President also read a statement that Mr. Calvert, of England, had been examining some damaged cotton cloth, and had come to the conclusion that it was injured by the silicate of soda employed in finishing it. The conclusion seemed to be that the crystals formed from the silicate used in connection with lead had broken the fiber of the cotton.

PRODUCTION OF HEAT IN STRETCHING INDIA-RUBBER.

The effect of stretching on the temperature of wire being spoken of,

Dr. Parmelee called attention to the fact that india-rubber is heated by being stretched, and if held a moment to allow the heat to radiate, and then suffered to contract, it is very perceptibly cooled. By frequent repetition of the process the temperature may be lowered a great many degrees. Dr. Parmelee supposed that he was the first to observe this curious phenomenon. His theory to account for it is, that in stretching the india-rubber is in fact condensed, the fibers being drawn together somewhat as the strands of a net are when it is stretched.

MANUFACTURE OF INDIA-RUBBER COMBS.

Mr. Parmelee, being called upon to open the regular subject of the evening, the manufacture of combs, remarked that he had designed to speak only of combs made from hard rubber. Exhibiting a black mass, he said that it was a specimen of the rubber after being masticated—that is, passed between hot rollers one of which revolves a little more rapidly than the other, and thus grinds and kneads the substance into a homogeneous mass. He then exhibited a specimen of the rubber after being mixed with the sulphur. It was a light colored, limber, elastic sheet. The speaker remarked that hard rubber differs from soft vulcanized rubber only in containing a larger proportion of sulphur, and being subjected to a higher temperature and for a longer period. It was invented by a younger brother of Mr. Charles Goodyear, the author of the great discovery of vulcanized rubber. The materials are mixed in various proportions, ranging from 4 to 16 ounces of sulphur to the pound of rubber. The best proportion is that of equal parts of sulphur and rubber. After the two ingredients are thoroughly incorporated the sheets are rolled down to about one-sixteenth of an inch in thickness, and are then subject to a temperature of 280° for 8 hours. In order to keep the surfaces of the sheets smooth they are oiled on both sides with a solution of lard in petroleum, and covered with a very thin sheet of block tin. They are then placed either in a pan of water or in a tight soapstone box, and enclosed in a strong air-tight cylinder, where they are heated to the required temperature.

The speaker stated that hard rubber may be softened by immersing it in boiling water, or otherwise raising its temperature to 212°. It can then be stamped, pressed, or molded into any desired form. Combs are made by pressing the substance into the proper form, while it is thus softened, and then cutting the teeth. There are three processes for cutting the teeth. By one process each tooth is cut separately by a circular saw. A small machine has been invented by which the comb is fed to the saw, drawn back automatically and carried forward to the next tooth, till the comb is completed, when the feed motion stops, and the machine gives notice by sounding an alarm.

The machines are ranged in a row, and one girl can attend some 20 of them. By another process, a piece of hard rubber is pressed into the proper form for two combs with the backs at the two edges, and then the teeth are all formed at a single stroke of a press, each tooth of one comb coming from out the space between two teeth of the other comb. The third process is employed in cutting the finest teeth. A very thin blade of steel has a rapid reciprocating vertical motion, over an anvil of block tin, and the comb to be cut is fed along horizontally under the cutter, one tooth being formed at each stroke. In this operation the rubber is kept warm, and no material is cut out, the tooth being formed by pushing aside a portion of the substance.

After the teeth are cut the combs are polished by hand, the work being done mostly by girls. The combs are first ground upon a stone, and the polishing is finished upon a buffer of cotton and oil. They are then packed and sent to market. The business is large, and great fortunes have been made from the manufacture.

An Inventor Buried under Twenty Tuns of Iron.

John Wilkinson, an eccentric English inventor, was the inventor also of the art of boring cannon and cylinders, and contracted for, and supplied, all the iron pipes for the celebrated Paris Water Works. He was a most eccentric man. In his will he ordered at his death that his body should be buried in his own garden grounds at Castlehead; where for many years he had kept a large iron coffin to be ready. It stood amongst the laurel trees near the house, along with many other smaller ones, which he took a delight in showing to and offering to his friends gratis, to their utter horror and dismay. When he died (about 1807) his body was brought to Castlehead, according to his own request, but owing to the length and bulk of the lead and wood coffins in which he was encased, the iron coffin which he had so long kept for the purpose was found to be too small, and in consequence, his body was temporarily deposited in the garden walk till such time as a much larger iron coffin could be made at the Works in Wales and sent to Castlehead. When the new coffin at length arrived, the body was disinterred and placed therein, and again buried in the grave originally intended for it. Here it remained a short time, but as the size of the coffin was very great it stood up above the ground and looked unsightly, so that it was thought desirable to take it up again and sink the grave about three feet into the solid rock, which accordingly was done, when it was again buried, and over the grave was erected a pyramidal tomb of iron, in one piece, twenty tuns in weight, with a medallion containing an excellent likeness of the deceased, and the following inscription, written by himself:—

"Delivered from Persecution, Malice and Envy, here rests John Wilkinson, Iron Master,

In certain hopes of a better state and heavenly mansion, as promulgated by Jesus Christ, in whose gospel he was a firm believer. His life was spent in action for the benefit of man, and he trusts in some degree to the glory of God."

Within the last two months the mausoleum has been broken up and sold for old iron.

New English Nursing Chair.

This invention, is a chair or other seat combined with receptacles in such manner that a person seated thereon may open and close the receptacles and place articles therein, or withdraw them therefrom without rising or removing from his seat. The receptacles are fixed in a chamber or frame attached to the framework of the chair below the seat in the space usually left vacant between the legs. They are divided into compartments, and preferably closed by spring fastenings. The chair may be adapted with great advantage as a nursery chair, being in that case fitted with arrangements for receiving the clothes and various articles required in tending infants, so as to avoid the necessity of the nurse or mother rising and leaving the children in order to get the desired wardrobes from somewhere else. This article is patent in England.

How to Raise Mushrooms.

The *Irish Agricultural Review* gives the following instructions for raising mushrooms:—

The usual width for a bed of this description is five feet at bottom, four feet high, sloping from either side, and ending in the form of a ridge or roof of a house. As soon as the foundation is laid to your satisfaction, the remainder ought to be stacked up, as it were, and firmly beaten down, so as to make it somewhat solid, by the aid of a three-pronged fork, as the final result mainly depends upon its solidity. Small sticks should then be placed in it at intervals, and examined daily, for the purpose of ascertaining the heat, which when mild is ready for work, and then the spawn may be freely inserted or planted. The heat is merely requisite to incite or start the spawn, and, therefore, it is not necessary that it should be very great. Some beds, after making up, will need a fortnight for the heat to diminish or subside; but, as a rule, when it averages 45 deg. or 50 deg., the spawn may with safty be inserted. As soon as the spawn is planted, the bed or beds must be earthed up with a three-inch thickness of good soil, which, after being pressed down smooth with a spade, should be covered with at least eight inches of dry straw.

Area of Roofing to Supply Tanks of Given Dimensions with Rain Water.

Our rain fall averages 25 inches per annum, being rather more than two cubical feet for every square foot of horizontal surfaces employed in catching it; or, say, 200 cubical feet of water to the square. Each foot contains 6¼ gallons of water. A tank, 15 ft.× 9 ft.×7½ ft., will hold 6,581 gallons, and about 5¼ squares of horizontal surface would catch enough rain water to fill it in the year at the above rate of rainfall. In estimating the area of roof, the level area only must be calculated and not the surface area, which is often half as much again. Hence the simple method is to take the area of ground plan and double the number of feet contained in it, which will give the amount in cubical feet of water that, on the average, may be collected in each year.

Detection of Fires in Ships.

An exhibition of a very interesting character was made on the 6th of April, at Blackwall, England, the object being to indicate and announce the presence of fire. An indicator, with an alarm bell, was placed in a part of the building supposed to represent the Captain's cabin, connected with a battery, with wires leading to the calormetres fixed in the hole and other parts of the vessel. Some of these wires also led to the water apparatus placed in the well of the ship. The first experiment was made by increasing the water in the hold, and immediately upon its rising a few inches the alarm bell was rung, and the indicator showed that the cause of the alarm was from "water;" the continual increase of water caused the indicator again to show "water two feet." The second experiment was made upon some jute which was supposed to be in the hold and in the act of heating, which, when the temperature rose to only 100 deg., caused the apparatus to ring the alarm in the captain's cabin, while the indicator denoted "Fire-Hold." The heat was generated upon this occasion by pouring a quantity of warm water upon the jute. The other experiments were made from calormeters supposed to be placed in various other parts of the ship, the indicator showing in what part of the vessel the fire was generating; the heat in these cases also being from a tumbler of water heated only to 100 deg., applied to the several calormetres.

To Remove Flies from Rooms.

Now that hot weather approaches, the following method of trapping flies, as practiced and indorsed by a correspondent of the *Irish Agricultural Gazette*, will be found useful:—A hand glass, commonly used by gardeners (a square one is the best), is the instrument to be used. This has to be tightly covered at the bottom with thick white paper. A circular hole, 6½ inches in diameter, is then cut in the center of the paper, and the glass is placed on three bricks over a plate filled with beer, sugar, and a little rum, a moderate distance from the infested spot. The effect is magical; in a few hours the glass is crammed with flies, which, having tasted the sweets, fly upward to the light. A common sulphur match, made by dipping brown paper into melted brimstone, will destroy thousands. The constant hum of insect life will attract all to the glass, and the scent of the rum is sure to induce the most fastidious wasp to enter, as no insect can resist its powerful attraction. This is stated to be effectual in alluring hornets and wasps from fruit trees, though we imagine it would take a large glass to hold all we have seen in some neighborhoods.

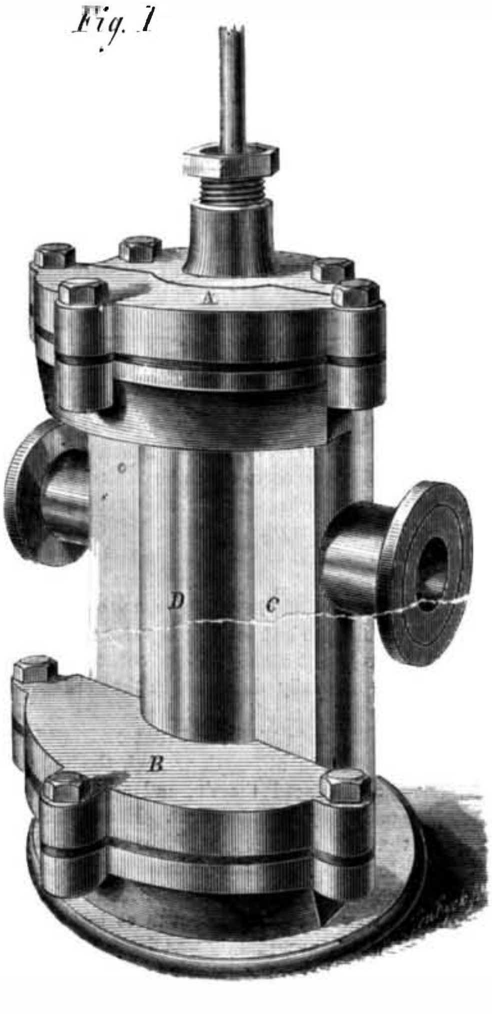
Fire-damp in Collieries.

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 diliquescing 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, of 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 breakes 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 unfailing 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.

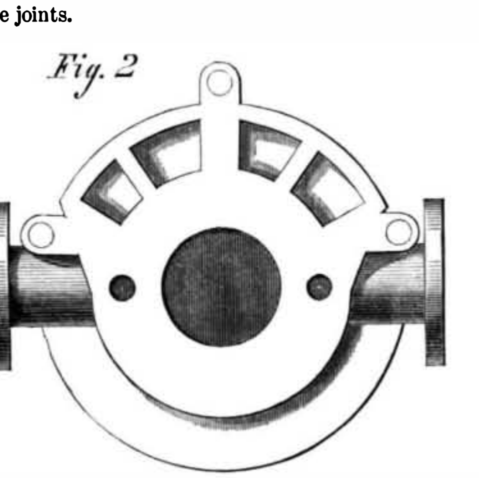
It is well known to mechanics, or other persons using pumps, that they are frequently inoperative from derangement of the valves. It is a simple matter to inspect these when accessible, but very many

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 propelties. If the oil is not very bad the same solution may be used again. If the oil is bad the solution will be found to have acquired the taint of the oil and must not 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 Sonthern 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, MM. 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 it 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.