An Explosion of Liquefied Air.

A serious accident with liquefied air occurred on October 21 at the Polytechnic Institute, Brooklyn, N. Y. Prof. Irving W. Fay, in trying an experiment with mixing liquefied air with red phosphorus, caused an explosion which injured him severely and also burned one of the students. The day previous to the accident, four gallons of liquefied air were taken to the Institute, and the next day Prof. Fay, who is head of the chemistry department, gave a lecture in which he tried all of the now classic experiments with liquefied air. After the lecture ended, half a dozen of the students remained to observe the professor try some original experiments. Kerosene, alcohol, and turpentine were among the objects experimented with, and they were frozen by the application of liquefied air. Yellow phosphorus was treated with liquefied air, which changed the phosphorus to a crystalline structure. The professor then determined to try red phosphorus, in the hope that liquid air might prove to be a solvent for it. He placed some of it in a beaker glass and poured the liquid air upon it. The mixture was then turned on a piece of paper lying on the table, and he bent over it to observe the result. The liquid air rapidly evaporated, and in a very short time there was nothing on the paper but a little pile of red phosphorus. The professor and students examined it eagerly to note the changes produced. After a moment the phosphorus became a lighter shade of red. The professor at first thought that the combination might have been changed to yellow phosphorus, but further examination led him to believe that it had become solid carbon dioxide, CO_2. While making these experiments, the professor stirred the phosphorus with a glass rod. Suddenly there was a terrific explosion, the glass in the windows was shattered, the room was filled with smoke, and the table broken. The professor gave a cry of pain and clapped his hands to his eyes. His face had been torn and burnt and his thumb nail torn completely off. Fortunately the explosion was a downward one, tearing a great jagged hole in the table, but for the nearness of Dr. Fay's face to the phosphorus he would have probably escaped without serious injury. Prof. Fay was attended by an eye and ear specialist, and it is hoped he will not lose the sight of one eye, as was at first thought.

This accident should sound a note of warning to those of our readers who are fond of chemical experiments. It is not safe to make combinations of chemicals at random. It is far better to try the older and well-established experiments. Only the carefully trained specialist should attempt to do new experiments, and even he should use the greatest possible care, and even though such care is taken, it is not always possible to avoid deplorable accidents like the one just described.

AN IMPROVEMENT IN CLEANING DEVICES.

To provide a device by means of which windows and walls may be effectively cleaned, the amount of water used being under the control of the operator, the brush illustrated in the engraving has been invented. Into the back plate of the brush screws the faucet of a hose. This faucet is provided with a plug by means of which the flow of water may be regulated. The faucet is also provided with lugs connected by means of a clamping screw with the eye of a socket secured to the operating handle. By the use of the clamping

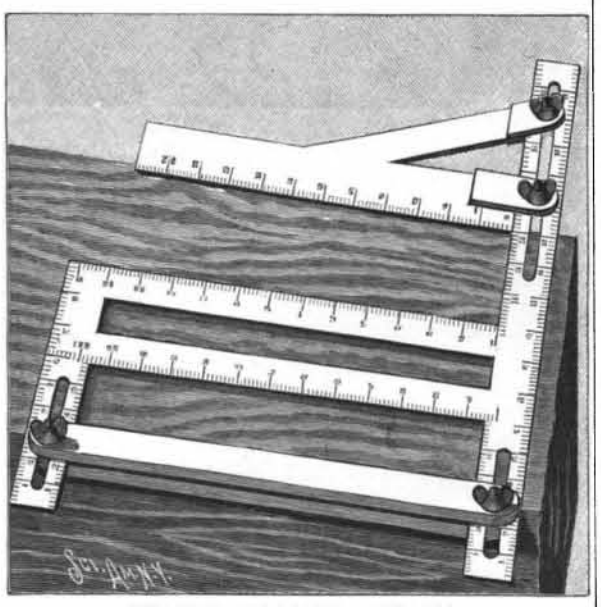
AN IMPROVEMENT IN CLEANING DEVICES.

screw the faucet-body can be moved in an angular position relatively to the handle, thus enabling the operator to apply the brush properly. Apertures are formed in the brush-back, so that the water flowing through the faucet-body may be directed through the apertures to the bristles of the brush and to the object to be cleaned, thus facilitating the removal of dirt. The brush is the invention of James R. Dever, of Olympia, Wash.

AN EFFICIENT FRAMING SQUARE.

A framing square has recently been patented by James H. White, of Ansonia, Ohio, by means of which a carpenter can lay out mortises and tenons on the top, side, or bottom of a piece of wood without the necessity of turning the timber.

As shown in the engraving, the framing square is provided with two graduated side arms of different lengths connected by a mortise and tenon bar. This mortise and tenon bar is formed with an aperture 1 inch in width, leaving the remaining two portions also 1 inch in width, so that the bar can be used in laying off 1-inch, 2-inch, or 3-inch mortises and tenons. To one slotted end of the long side arm a gage-plate, lying parallel with the mortise and tenon bar is adjustably secured and held in any position within the length of the slot by means of a clamping screw. The other end of the long side arm and the free end of the short side arm are slotted to receive the clamping screws of an adjustable head.



WHITE'S FRAMING SQUARE.

If it is desired to use the square for 7-inch timber and 2 inch mortises and tenons, the inner edge of the head is set 2 inches from that edge of the mortise and tenon bar lowermost in the engraving, and the gage-plate is set 2 inches from the edge of the mortise and tenon bar, uppermost in the engraving. The tenons as well as the mortises can then be laid out by placing the head against one side of the timber and drawing the mortise and tenon lines along the edge of the tenon bar lowermost in the engraving, and along the edge of the aperture of the mortise and tenon bar shown uppermost in the engraving. When set as described, the device can be readily used in laying off 1, 2, or 3-inch mortises 2 inches from the edges of the timber and of any desired length. The head is made adjustable, to enable the carpenter to lay off the mortise any desired distance from the edge or corner of the timber.

Turf Briquettes in Germany.

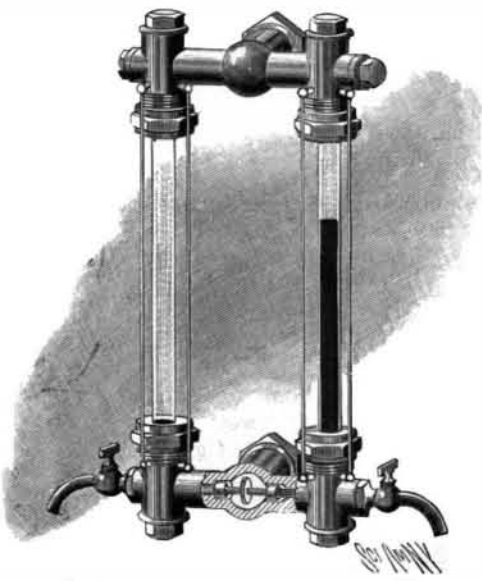
Consul Powell, of Stettin, in his last report, calls attention to a briquette factory at Langenburg, Pomerania, which is somewhat of a new venture, as it has only been in existence for two years, but has proved so far a complete success. It is the consul's opinion that proprietors of turf moors in Scotland and Ireland might start factories of a similar nature with profit. The owner and manager of the factory has taken a patent in England for his machinery; it could, therefore, be employed either by purchase or by royalty. The turf at Langenburg is cut from the adjacent moor and is brought by water in an undried condition, and can be used immediately. The turf on coming from the moor is thrown into the first breaker machine, somewhat in effect like a large turnip cutter, and in this it is broken into small lumps. From the first it passes to the second breaker, and is ground into mull or a fine powder. From here it goes into the drier, a steam cylinder which is filled with the exhaust steam from the engine, and is perforated by tubes much in the manner of boiler tubes, but larger. This cylinder revolves, and being on a gentle slope, the mull passes slowly through the tubes and by this means becomes thoroughly dry. From the drier it passes to a hopper which feeds the plunger. This plunger receives the power of a 75 horse power engine, and by pressing the mull in a form against the preceding briquettes pushes them forward each stroke the width of a briquette.

The factory turns out 80 briquettes a minute, or 35 tons per day, with an average output of about 255,500 centners (12,775 English tons) a year, and the demand is far greater than the supply. the reason for this being that the briquettes are so marvelously cheap—an average price being 13 cents per 130 briquettes, or at the rate of something like two briquettes for ½ cent retail—that this is certainly the poor man's fuel, as they burn slowly and give a fairly good heat. In a closed oven one briquette will remain in a glowing state for twenty-four hours; in an open grate it burns more quickly, but remains for a longer time alight than any coal, giving a good red heat. The cost of working is comparatively light, as but few men are required to attend to the machinery. The cost at Langenburg of material and working one centner (112 pounds) is 35 pf. (9 cents), and per ton about $1.75. With a more extended plant the owner of this factory is of opinion that this could be reduced to $1.25 per ton.—Journal of the Society of Arts.

A SAFETY GAGE-GLASS.

It is the purpose of an invention patented by John McCormick, of Wilmerding, Pa., to provide a gage arranged to cut off water and steam automatically should the gage-glass be broken, and to make a connection with a second glass.

The gage is provided with two glasses joined above and below by tubular connections communicating with the steam and water compartments of the boiler. Both tubular connections have valve-casings and outlets leading from the glasses. In the valve casings, double valves slide which may be seated on valve-seats in the outlets. By referring to the illustration, it will be seen that when the valves are seated in one outlet, the seats in the other outlet are uncovered. On the outlets of the lower tubular connection faucets are arranged, by means of which faucets communication may be automatically established between one of the glasses and the water compartments of the boiler. Should it be desired, for example, to use the right hand glass, then the left hand faucet is for an instant opened, causing the escaping water to shift the valve upon the seats in the left hand outlets and shut off the water from the left glass. Communication will then be established between the upper and lower tubular connections and the outlets of the right hand gage-glass. Should this right hand gage-glass be broken, then the outrushing



McCORMICK'S SAFETY GAGE-GLASS.

steam and water will be automatically cut off by the shifting of the valves on the seats in the right-hand outlets. The seats in the other outlets being uncovered, communication will be established between the tubular connections and the left hand glass. The broken glass may then be removed and replaced by a new one.

A Magnetic Survey of the Globe.

A meeting of scientific men has just concluded its labors at Bristol, England, in connection with the British Association for the Advancement of Science. The body was composed of leading authorities on the study of terrestrial magnetism and included some of world-wide reputation. Magnetic surveys of the United States are by law intrusted to the Coast and Goedetic Survey, so that the United States was represented by Charles A. Schott of the Survey. The questions for deliberation before this body concerned the preparation of a plan for a systematic magnetic survey of the entire globe, and the deliberation of the conference resulted in a general recommendation for that purpose. The principal work of the conference centered in the wider questions involving magnetic observations; their, at present, unsatisfactory distribution over the globe, and their inadequacy as regards numbers. The United States is in a position to take a most important step in the advancement of our knowledge of terrestrial magnetism by establishing and maintaining a well-equipped magnetic observatory on one of the Hawaiian Islands. Their position is unique, being central to a vast unexplored or rather magnetically unknown region and well adapted for the special study of the modifications which the diurnal and secular variations of the magnetic needle are supposed to undergo in consequence of a surrounding ocean as contrasting with a continental surface. The president of the conference, Prof. Rucker, complimented the Coast and Geodetic Survey upon their valuable services.