Correspondence.

The Changing Color of Glass.

To the Editor of the SCIENTIFIC AMERICAN:

The writer has recently observed in your columns a communication, bearing date February 1, from Mr. W. L. Brown, of San Bernardino, Cal., regarding the change in color of common white glass when exposed to the intense light of western deserts, in which he controverts the theory of an earlier contributor, that this change is due to the action on the glass of alkali in the soil of these deserts, and himself ascribes it to the oxidation of the iron present in the glass.

Mr. Brown is correct in his first statement—alkali has nothing to do with the change in question—but wrong in his own explanation. In the materials which compose common white glass, there is always present as an impurity a small quantity of oxide of iron, which in the process of manufacture is reduced to protoxide, imparting to the glass a more or less pronounced greenish tint. To guard against this, an oxidizing agent is added, and this is frequently a minute amount of peroxide of manganese, which gives up a portion of its oxygen to the protoxide of iron, converting it into the practically colorless sequioxide, while it is itself reduced to a lower and colorless oxide. Under the continued action of strong light, this colorless lower oxide of manganese is slowly oxidized to the original peroxide, and this latter imparts to the glass the amethyst or rose-purple color observed, which indeed it should do, as the amethyst itself is simply silica, colored by a minute amount of peroxide of manganese, and glass is a mixture of silicates. A. L. B.

Portland, Ore., February 22, 1905.

The Changing Color of Glass.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of February 18 Mr. W. L. Brown reported on his observations of the discoloration of glass under the influence of sunlight. To my knowledge the phenomenon in question was originally described and interpreted by Faraday. Later it was found by Gaffield, who systematically subjected various glasses to the action of sunlight, that for many specimens a few hours' exposure was sufficient to distinctly produce a faint coloration. Of a great number of samples examined, there were only two (a certain Belgian and German glass) which withstood the action of light during a long-continued exposure.

At the present time it is known that the presence of manganese in the glass accounts for this singular deportment. The manganese may get into the glass as a contaminating ingredient of the raw material, or more especially by the process of discoloration in the glass works. Black oxide of manganese (MnO_2) is added to the fusion, for the purpose of converting the ferrous compounds into the ferric state, changing therewith the color from blue green to a faint yellow green. After the reaction is complete, the manganese occurs as proto-oxide (MnO) which forms a colorless silicate. This compound appears to be sensitive to light, either alone or more likely in presence of oxidizing agents, such as ferric compounds. The result of the chemical reaction inactuated by the energy of light will ultimately be a compound of the type Mn_2O_3, called sesquioxide of manganese. This compound is the most stable oxide of manganese, and forms a silicate of dark amethyst, violet color. R. V. HEUSER.

Erie, Pa., February 25, 1905.

Steam Navigation Prior to 1836.

To the Editor of the SCIENTIFIC AMERICAN:

In 1806 Robert McQueen, of Scotland, and a Mr. Sturtevant commenced at the corner of Barley (Reade) and Cross (Center) Streets the repairing of steam engines and boilers. In 1813 James P. Allaire, a brass founder, also commenced, under the patronage of Robert Fulton and the elder Gibbons, the repair and construction of steam engines and boilers.

The universal type of marine engine then was that of the vertical crosshead. The boiler was that known as a D and kidney flue of copper; so termed as a cross section of the furnace was that of the letter D, and the return flue at its side was shaped alike to a kidney, to conform to that of the curved vertical side of the D. Iron was not used until 1819. Prior to this the boats even hence to Albany had copper boilers.

The necessary heavy construction of the hulls of marine vessels was so fixed in the minds of shipbuilders, that they failed to recognize that river and even coast navigation did not require it, and as a result the hulls of primitive steamboats were unnecessarily heavy. The scantling of the hull of the "James Kent," in service hence to Albany, was that of a seagoing ship.

In illustration of this, the "Chancellor Livingston," which was built for service hence to Albany about 1812, was in 1826 refitted with engine and boilers and plied hence to Providence, Rhode Island.

The steam ferryboats hence to Brooklyn and Jersey City had vertical beam engines with the old parallel motion of Watt to guide the piston rod. Robert L. Stevens in 1826 introduced a single front link and slides in the ferryboat "Newark," hence to Hoboken, and the West Point Foundry in 1836 introduced links and slides in the steam ferryboat "Jamaica."

In 1821 David Dunham and Robert Fulton built a steamship, the "Robert Fulton," to ply hence to New Orleans, but the enterprise failing, she was sold to the Brazilian government and converted to a frigate. In this year the "North America," built by the Messrs. Robert L. and E. A. Stevens, made the passage from Albany here in the time, then unprecedented, of ten hours and twenty minutes.

A monopoly of the steam service on the Hudson River, which had been enjoyed solely by Robert Fulton and Robert R. Livingston, was set aside by the decision of the Chancellor of the State; and the steamboat "Olive Branch," in order to avoid the State law, would leave Jersey City early in the morning, run over to New York, leave there at the regular hour of the Albany boats, and in returning, after leaving passengers at New York, would pass over to Jersey City for the night.

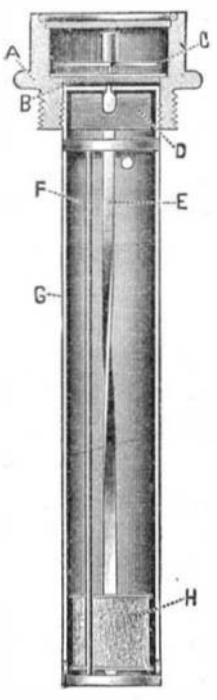
In 1821 a steamboat was advertised to make Sunday excursions. So generally was such a purpose condemned, that not only did the clergy denounce it, but a number of our citizens met and expressed displeasure, but it did not avail, and excursions were had and have continued ever since. The wail of the clergy was caricatured by the representation of a steamboat leaving her pier so crowded with clergymen and their families that some were shown hanging on to the outside of her rails. It was not until 1826 that inclosed pilot-houses were adopted and connection with the engine room effected by bells.

CHARLES H. HASWELL, C. and M.E.

New York, March 4, 1905.

A MAGNETIC INDICATOR FOR TANKS.

A very ingenious little appliance for indicating the level of a fluid in a tank was exhibited at the recent Motor Boat and Sportsmen's Show by the R. & C. Indicator Company, of Bridgeport, Conn. The construction of the indicator is well shown in the accompanying cross-sectional cut. In a closed tube, *G*, set vertically in the tank, is a float, *H*, adapted to slide on a rod, *F*, at one side of the center, and on a flat, twisted strip, *E*, placed in the float, *H*, adapter. This strip is pivoted and carries on its upper end a small bar magnet, *D*. As the float rises in the tube, it travels upward along the twisted ribbon, and, since it cannot turn about its axis the rod, *F*, it makes one-half turn on account of which a revolution bon, which travels the cap, *A*, of tire travel of a magnetized needle, *C*, which the cap, *A*, and tube, over a dial, *B*. This needle is moved over the dial by the bar-magnet, *D*, below it, and hence it always indicates the level of the fluid in the tank. The cap, *G*, can be removed for filling the tank, or the apparatus can be placed in another part of the tank, instead of in the regular filling hole, in which event it will not need to be disturbed. It will be found a great convenience to automobilists, launch users, and others using gasoline in quantities, as there are no holes through which the vapor can leak, and the tank is hermetically sealed as before.



A MAGNETIC INDICATOR FOR TANKS.

The Current Supplement.

The current SUPPLEMENT, No. 1523, opens with a continuation of Tsybikoff's article on Lhasa and central Tibet. Splendid illustrations accompany the text. Prof. William J. Baldwin recently delivered at the Brooklyn Polytechnic Institute's College of Arts and Engineering an excellent paper on steam-heating principles. This paper is published. The new Belgian process of electrically-welding chain, which was briefly discussed in these columns some time ago, is fully described and illustrated. Just at the present time the developments in heavy electric traction are attracting more attention than any other subject in the electrical field. For this reason readers will follow with particular interest the abstract which is published of a paper by Mr. W. B. Potter, of the General Electric Company, which paper states the opinion held by that corporation on the future of electric railway operation. "Meteorology in the British Empire," Sir John Eliot's paper, is concluded. Prof. N. Monroe Hopkins presents his eighth paper on "Experimental Electrochemistry." He discusses important conditions to be noted in electrochemical operations; caustic soda and chlorine from salt; electrolytic production of white lead; electrolytic production of cadmium yellow; electrolytic production of mercury vermilion; electrolytic production of Scheele's green; and electrolytic production of Berlin blue.

The International Commission and the Auto Races.

The recent action of the French Automobile Club regarding the Gordon Bennett Cup race awakened quite a stir in automobile circles, and finally led to the appointment of an International Commission, which recently met in Paris and succeeded in bringing this much-disputed question to a successful issue. It will be remembered that the Automobile Club of France decided to run the Gordon Bennett Cup together with the new event, the Grand Prize of $25,000 which has been recently established. The club considered that the Cup race as it was held heretofore is quite unjust to the national industry, seeing that the French cars run a chance of being beaten by another nation who may figure for but little in automobile affairs, as at present the number of cars is equal for each nation. The other clubs naturally take the opposite view of the affair, as any change in the rules tending to give a number of entries proportional to the extent of the industry would place them at a disadvantage. After the decision of the French club was announced, namely, to hold the two events at the same time and over the same course this year and afterward to modify the rules for the Cup race so as to give a proportional number of entries, all the other clubs protested energetically against such an action, and decided not to enter the races at all unless some understanding could be made. On the other hand, the French constructors who expected to enter the Cup and the Grand Prize held a meeting and decided to follow the plan of their club, or else refuse to take part in the races. This state of affairs led to the formation of the International Commission, which met at Paris on February 20. It had delegates from all the leading clubs. The delegates from France were Baron de Zuylen, M. de Dion, Réné de Kniff, Count de Vogüé; from England, Mr. J. Orde; Germany, Count Sierstorpff, Levy-Stoelping, Fasbender; Holland, M. Hombach; Austria, Prince of Solm-Braunfels; Belgium, Baron de Crawhez, Count de Liedekerke, Ph. de Burlet; Switzerland, Baron de Sulzer; Italy, Sig. Mario Monta. After considerable discussion it was finally decided that the Cup and the Grand Prize would be separated, and the Gordon Bennett Cup will be run this year according to the existing rules. The Grand Prize will be held fifteen days later. Another decision of considerable interest is that all the clubs who participate in the Cup race are to share in the expenses of the event instead of allowing a single club to bear them, as heretofore. The rules for the Cup race will be revised for the following years, so as to give a more equitable representation to the nations whose industry is the largest; and the entries, instead of being equal, will be in proportion to the importance of each nation. The proportion of entries which the Automobile Club of France decided for the Grand Prize this year will no doubt be made the base of the new rules for the Gordon Bennett Cup, and these figures will be subject to revision every year. For the Grand Prize this figure is fifteen cars for France and twenty-seven for the other countries combined. It was also decided that the eliminating trials would be run in the first part of June, the Cup race fifteen days after, and the Grand Prize in the first week of July.

Seventh Satellite of Jupiter.

Dr. Perrine, of the Lick Observatory, has discovered a seventh satellite of Jupiter. The discovery of the seventh moon was made on January 6, the day following the announcement of the discovery of the sixth satellite, when Mr. Perrine resumed his comparative examination of the negatives secured and was rewarded by discovering the image of a very faint body which changed its position from night to night.

Whether these new satellites are revolving around Jupiter in the same direction as the five inner satellites, or in an opposite direction, is not known. It is certain that the planes of their orbits make a considerable angle with each other and that they make large angles with the plane of Jupiter's equator. The distances of the two satellites from Jupiter are not very unequal, in both cases probably lying between 6,000,000 and 8,000,000 of miles.

Gas-engine power and single-phase traction are combined in an electric railway system being built to operate between Warren, Pa., and Jamestown, N. Y. The power station is being equipped with two 500-horse-power gas engines, of horizontal single-crank double-acting type, directly connected to two single-phase alternators supplying high voltage current for direct transmission—without raising transformers. A 55-horse-power gas engine is also provided for the exciter and the air compressor.