would be about equally considered national airs. The music of the former is substantially the same, as that of "God Save the Queen," or "God Save the King," as it was first known. There is every reason to believe that the tune was composed in the time of James I., by Dr. John Bull, but it was not by him used for a national hymn. One Anthony Young, organist of All Hallows, Barking, adapted it to a "God Save the King," for James II., at the time when the Prince of Orange was hovering over the coast, but it was not so used until the time of George II. A letter from Victor to Garrick, October, 1745, mentions that it was sung at both theaters nightly amid great applause. It is a singular coincidence that Young's daughter was married to Arne, who composed "Rule Britannia." Mrs. Arne received a pension of £30 a year. In 1789 Mrs. Henslowe, who was grand-daughter of Mrs. Arne, received £100 from the government as "the accumulated amount of a yearly pension of £30 a year, awarded to Mrs. Arne as the eldest descendant of A. Young, the composer of 'God Save the King.'" The tune is almost a literal translation of a *cantique* sung by the Demoiselles de St. Cyr, when Louis XIV. attended morning prayer at that chapel. The words were by M. De Brion, and the music by the famous Sully. The "Star Spangled Banner" was first applied to the flag of the United States in a poem written by Francis S. Key, on the morning after the British attack on Fort McHenry at Baltimore in 1812. The bombardment, which took place during the night, was witnessed by Mr. Key, who with some friends watched with intense anxiety for the return of day. At length the light came, and they saw the American flag still flying from the fort, the attack having failed. In the excitement of the moment he wrote the now famous song, the first verse of which so graphically describes the scenes of the night and morning. 2. Will a No. 3 pump, on a two inch pipe, throw water faster, than a No. 2 pump on same piping (well 20 feet deep)? If so, why? A. There are similar proportions in the steam and water pistons of most pumps. The water pressure would be nearly the same in No. 2 and No. 3 pump of the same make. The only gain a No. 3 pump would have is to throw more water with less speed. The piping should be of the assigned sizes due to the size of the pump for a proper proportion of work. 3. When a tree is felled, what force draws it in falling away from the stump? A. The manner in which a tree falls is largely due to the skill of the woodman, who takes advantage of the wind, the way the tree stands, etc.

(774) H. A. M.—Brick tiling on flat roofs cannot be made tight with cement. The tiles will absorb water. The cement will also open a little by the sudden shrinkage from the heat of the sun to the temperature of falling rain. We can only recommend a coat of coal tar, which allow to dry and then put on a thick coat of coal tar and asphalt, put on hot, and spread over with clean coarse sand, thick enough to keep the tar and asphalt from running by sun heat. See answer to Query 601, in our issue of April 13.

(775) B. V. G. asks (1) how a cable car rounds a curve. A. The cable is kept in place by flat-faced pulleys on vertical shafts, arranged around the curve, so as to just clear the grip in its passage around the curve. The grooved pulleys carry the cable just below the bottom of the grips, so that the cable in the grip is raised out of the pulley groove when passing. 2. Why the steamboats using electric headlights have the headlight glass cut in strips about ¾ inch or 1 inch wide. A. The glass in the headlights is cut into strips to prevent breakage from the high heat of the arc.

☞ Books or other publications referred to above can, in most cases, be promptly obtained through the SCIENTIFIC AMERICAN office, Munn & Co., 361 Broadway, New York.

NEW BOOKS AND PUBLICATIONS.

MAY TIME. A compilation, by Marcus Benjamin, of sundry poems. 84 pp. 25 cents. New York: De Witt Publishing House.

EXAMINATION OF WATER FOR SANITARY AND TECHNICAL PURPOSES. By Henry Leffmann, Ph.D., and William Beam, M.A. Philadelphia: P. Blakiston, Son & Co. 1889. Pp. 106. Price $1.25.

This convenient little manual contains within small compass an excellent *resume* of methods of water analysis. The determinations of solid matter, of nitrogen in its various forms, of phosphates and oxygen required to oxidize organic matter are all treated. The all-important subject of interpretation of results has devoted to it a special chapter. A chapter giving analytical data and an index close a very useful work.

INDEX OF PUBLICATIONS ON METHODS OF COMMUNICATION IN THE FIELD AND ON TORPEDO WARFARE. By R. Von Fischer-Treuenfeld. London: Alabaster Gatehouse & Co.; New York: D. Van Nostrand. Pp. v, 71.

The title of this book tells its story. From military telegraphy, through signaling, both audible and visible, ballooning, carrier pigeons, dogs and velocipedes, torpedo service, electric light apparatus, and many other subjects, down to cryptography, the literature is indexed in twenty-nine divisions. This gives the titles of the papers and publications. An index of authors' names, referring back to the main work, completes it, giving an excellent presentation of the subject.

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