

THE ST. NEOT'S RURAL SANITARY AUTHORITY AND THE DIVINING ROD.

MEMBERS of the Institute of Civil Engineers and experts generally would do well to initiate themselves into the use of the divining rod. It is an instrument which appeals to the intelligence of certain Rural Sanitary Authorities far more than the application of geological science.

At Catworth outbreaks of diphtheria directed attention to the water supply; the Local Government Board put pressure on the Authority, asking them to obtain a better supply of water for the village. The question, adjourned from time to time, appears to have exhausted the patience of the Rector, who at his own expense bored down 116 feet in search of water without success. The Medical Officer of Health, Mr. T. Poyntz Wright, who has not the same respect for mediæval superstition as those who employ him, was directed to meet a parochial committee. The wiseacres met in solemn consultation, and resolved to penetrate the secrets of the earth-crust by magical aid. A gentleman from London—a "diviner"—was called in. The diviner came, and with divining rod traversed the village. The rod wobbled at places three, and an offer was said to have been made to sink a well on the equitable conditions of "no water, no pay"!!

THE EFFECT OF TREES.

By SIR EDWIN CHADWICK, K.C.B.

In the year 1825, when I first began to pay attention to sanitation, I frequently visited Dr. Park, of Gravesend, the brother of the celebrated traveller, Mungo Park. On the way down the Thames, on the Essex side, I observed suburban residences built close under the chalk and over-grown with trees. Dr. Park informed me that there was ague in every one of those villas. He attributed it to the trees, which were afterwards cut down, when the ague disappeared. From carelessness, the trees were allowed to grow again, when the ague reappeared. I have been unable to watch their subsequent condition, but seeing the mists in closely-treed places and surrounding mansions and villas, seeing also the mossy footpaths near them, I have been led to believe that over-treing is very common. I communicated with Loudon, the eminent horticulturist, on the subject, and he agreed in the general practice of over-treing. Even now about a third of the trees near suburban mansions and in our parks may, I believe, be advantageously cut down. With Loudon, I came to the conclusion that, as a general rule, the shadow of one tree ought not to fall upon another. On the other hand, in France, in the West Indies, and the United States, great injury has been done by cutting down trees excessively for the sake of the timber, by which moisture has been reduced, and the supply of water injuriously diminished. This is so far the

case in the East Indies, and the results have proved to be so injurious, that legislative measures have necessarily been adopted for replantation, and a State department has been created for the preservation of existing timber. Fences of trees are found necessary as screens against severe winds. Altogether, the subject of treeing is a very important one for observation and study, for the avoidance of excess or deficiency. In connection with this subject a paper entitled "Insanitary Conditions in Country Homes,"* by Dr. Lucy Hall, presents an example from the United States of the excess of treeing, and deserves perusal.

THE "HOLT" SYSTEM OF QUARANTINE.

By A. CAMPBELL MUNRO, M.B., D.Sc.

A SKETCH of a system of quarantine which has been pronounced by an intelligent, if somewhat enthusiastic observer, an "ideal" system, and which it is intended to extend, with certain modifications, to all quarantine stations which may hereafter be established in the United States, may not be unacceptable to English readers, even if the conditions under which it operates do not altogether obtain in this country.

Dr. Holt is President of the Board of Health for the State of Louisiana, and his method of quarantine procedure has been elaborated in connection with the Port of New Orleans. That city is particularly liable to importations from the disease-producing and distributing centres of Colon, on the Isthmus of Panama; Vera Cruz, on the Atlantic Coast of Mexico; and the various ports of Cuba. Prior to 1884, when Dr. Holt was elected President of the State Board of Health, commerce by way of the Mississippi was practically killed in the summer or "fever" months, owing to the long detentions and heavy charges involved in the older methods of quarantine. As the result of the adoption and perfection of Dr. Holt's system, it is said that trade by the Mississippi now goes on in summer as in winter. Previously, unconsidered branches of trade have assumed handsome proportions; and for one consignment of coffee which was received under the old system it would be safe, it is said, to assert that hundreds are received to-day.

The position and relations of the port are described by Dr. Holt as follows: "There are three maritime approaches to New Orleans—the Mississippi, which is the central and main avenue; the Rigolets, thirty miles to the Eastward, a narrow strait connecting Lake Pontchartrain with Lake Borgne and the Gulf of Mexico; and the Atchafalaya River, near its debouchment into the bay of that name, and Mexican Gulf, eighty-two miles to the westward. On account of the character of

* By Dr. Lucy M. Hall, Brooklyn, N.Y., in the American "Journal of Social Science."

shipping coming through the two lateral approaches, 'light in tonnage, and mostly from domestic ports,' the Rigolets and Atchafalaya are completely closed by a proclamation of forty days' detention against all vessels from quarantine ports, compelling such to seek the Mississippi as the only available route to New Orleans. This is done in order to avoid the immense expense of keeping up three completely equipped stations, and to concentrate at a single point the fight against infection."

The Outer Quarantine Station is situated at the mouth of the Mississippi, 110 miles below New Orleans. Here ships, inward bound, are boarded by a quarantine medical officer, and a careful inspection is made of her sanitary record and present conditions. If from a non-quarantined port, and if all on board are well, she is allowed to proceed, undetained, to the city. If from a quarantined port, but with a clean health-record of the voyage, and if there is no evidence of sickness of an infectious or suspicious character on board, she is sent on to the Upper Quarantine Station, about seventy miles below the city. Arrived at this station, the vessel is brought alongside the wharf by the aid of a tug reserved for the purpose; all on board—officers, crew, and passengers—are at once sent ashore, where they find ample accommodation provided for their reception, during the time occupied in the disinfection of the ship and baggage. All bedding, ship's linen, cushions, mattresses, carpets, rugs, all personal luggage and wearing apparel of whatever descriptions, are now removed from the ship to a commodious building in close proximity, in which they are exposed to a moist heat of not less than 230° F., with the exception of such articles—as those made of leather, rubber, etc.—which would be injured by the heat, and which are disinfected by means of a solution of mercuric chloride. The general plan of the steam disinfecting-chamber is that of one of the drying closets we are accustomed to see attached to large laundries, containing a series of horses or racks, which, however, are suspended *overhead*, on travelling rollers, from iron rods which extend from the rear wall of the chamber to a support ten feet in front of it. By this overhead arrangement obstructing rails or rods on the floor are avoided. The chamber is sixty feet long, ten feet wide, seven feet high, and contains forty horses. The walls, which are eight inches in thickness, are composed of the following layers: First, externally, a layer of three-quarter-inch planking, feathered and grooved; second, three inches of air-space; third, a second layer of planking; fourth, an inch thickness of "Russian haircloth"; fifth, one and a-half inches of air space; sixth, a layer of three-quarter inch planking; seventh, a double layer, or internal lining, of heavy asbestos felting—this to render the chamber as far as practicable fireproof. When drawn out the full length of ten feet the rear panels of the horses securely close the chamber in front, thus admitting of the

heating of the chamber while the articles of clothing, etc., are being hung upon the rack-bars preparatory to disinfection. The front panels of the horses are lined internally with a layer of Russian haircloth, over which is nailed a double layer of asbestos felting. To obviate risks of an accidental fire spreading, bulkheads of one-inch feathered-and-grooved planking, lined on each side with a double layer of asbestos felting, are placed at intervals of seven and one-half feet, thus subdividing the chamber into eight fireproof compartments. In addition, there is a double lead of one inch fire-hose, in connection with a steam pump, ready to turn on two streams of water on any point at fifteen seconds' notice. A horizontal screen of stout galvanized iron meshwork forms a false floor to the chamber, and is intended to catch any article falling from the racks. Underneath this false floor is placed a system of forty-five three-quarter inch steampipes, aggregating 5,509 lineal feet, running the full length of the chamber, and furnished with a "bleeder" for conveying away the water of condensation. This system furnishes the dry heat. The moist heat is supplied by a one-inch steam main, running centrally the entire length of the chamber in the midst of the dry-heat system; this pipe is perforated by eighty one-twelfth inch holes, so placed as to furnish steam to each horse. While the articles of clothing are being hung on the bars of the racks, the dry heat is turned on, and the temperature of the chamber is raised to about 190° F. As each rack is filled it is pushed back into its place. By the time the last rack has been pushed in, the temperature within the chamber has risen to between 190° and 200°, the moist steam is then turned on, and the temperature soon mounts to between 230° and 240°, at which point it is maintained for twenty minutes. The steam is then entirely shut off from the chamber, and the horses are drawn out. The heat in the texture of the fabrics at this point is said to be so great as to immediately expel all moisture, and shirts and collars are said at once to resume the crispness which characterised them before treatment. The time occupied in the process is: Charging the chamber with articles for disinfection, thirty minutes; exposure to the moist heat, twenty minutes; removal of articles, fifteen minutes; total, sixty-five minutes. The disinfection of the *material* of a large passenger vessel may necessitate two or three charges of the chamber. The racks in the chamber are numbered, and a check corresponding to the rack on which his property is hung is given to each person. The clothing actually worn by the crew and passengers is exchanged temporarily for suits which have undergone disinfection with the first charge, and are included in the second charge.

In the meantime the disinfection of the ship is being attended to. Immediately adjoining the

quarantine wharf, and standing at a height of 45 feet above the mean level of the river, is a wrought iron tank of eight thousand gallons capacity, in which is stored a solution of perchloride of mercury of a strength of one in a thousand—chloride of ammonium being added to aid in the solution. To prevent the contact of the solution with the iron, the interior of the tank is painted over with three coats of red lead and two of paraffin paint; to prevent the access of light the tank is covered over, the cover and the exterior of the tank being painted black. From the tank issue three leads of three-quarter inch indiarubber hose, to the further ends of which are attached either wide nozzles or block-tin "roses" similar to those of ordinary watering-cans. With the aid of this apparatus all the available surfaces of the vessel, excepting the cargo, but including the bilge, ballast, hold, saloons, fore-castle, decks, etc., are wetted with the perchloride solution. During the process all three sets of hose are in operation—fore, aft, and amidships; the process lasts for from thirty minutes to two hours, according to circumstances; and on an average fifteen hundred gallons of the solution are expended upon each ship—sometimes as much as three thousand gallons are used. The advantages claimed for this disinfectant are its potent bactericidal action, and its being colourless and inodorous. It is stated, after four years' experience of its use in this wholesale fashion, that it is absolutely harmless to persons, however expensive or constant the contact, unless swallowed.*

As soon as the "bi-chloriding" of the vessel has been completed, the process of fumigating with sulphurous acid is put into operation. The fumigating apparatus, placed upon the deck of a tug-boat alongside, consists of a "battery" of eighteen small furnaces, each of which is supplied with a pan to contain the sulphur during combustion. These furnaces open into a common reservoir, to the further end of which is connected a powerful exhaust fan, from which emerges a twelve-inch galvanized iron pipe, which in turn terminates in a length of flexible asbestos piping. This piping is conducted down a convenient hatchway to the bottom of the hold of the ship to be operated on, or as near the keelson as possible. In the case of a sailing ship one hatchway usually affords access for the sulphurous acid gas to the entire hold, but in large steamers the hold is subdivided by bulkheads into two or more distinct compartments which must be treated separately. Every opening into the hold is closed, and the fan is set in motion. The time required to complete the fumigation varies from

half-an-hour to three hours, and from one to seven hundred pounds of sulphur are used per ship, according to the size of the vessel, number of compartments, etc. In the course of this treatment the cargo is not disturbed, except that a certain space has to be cleared to permit of the passage of the fumigating pipe down into the "dunnage" at the bottom of the cargo; but by arrangement with the owners of ships frequenting the port, an open framework shaft is usually placed in the centre of the hatchways, while the cargo is being stowed, down which the fumigating pipe can be passed without disturbing the cargo. The hatches are kept battened down for eight hours after the process of fumigation has been completed.

On the completion of these various processes the crew and passengers, if any, are allowed to return to the ship, and the ship may then be allowed to proceed to the city, or may be detained under observation for a period not exceeding five days, at the discretion of the Board of Health or Quarantine Officer.

If, upon inspection, a vessel entering the river is found to be foul—that is, showing positive or suspicious evidence of infection—she is remanded to the Lower Quarantine Station, a hundred and three miles below the city. The sick, if any, are removed to hospital; the ship, below deck, is charged with sulphurous acid gas by the quarantine tug-boat, from which, also, all accessible surfaces and every article of baggage and ship's wardrobe are saturated with perchloride solution. In the case of a cholera-infected vessel the water-tanks are emptied and disinfected; the food supply is destroyed and the ship is re-victualled. The ship with all on board is detained for observation for a period of ten days or more, according to the circumstances of the case, when she is released and proceeds to the Upper Quarantine Station, where she is subjected to the treatment above described as applicable to non-foul ships from quarantined ports.

However alien all this may be to our methods of thought and of procedure, it must be commended as a logical and thorough-going practical development of the views of the authorities in the United States upon the subject of quarantine, and it is in some points suggestive of possible improvements in our own methods of operation.

THE QUANTITY OF NITROGENOUS FOOD NECESSARY TO MAINTAIN HEALTH.—F. Hirschfeld has published a research in *Pflügers Archiv*. [xli. 533-565], which casts some doubt upon received opinions on the quantity of nitrogen necessary to take in the form of food to maintain health. He has proved the possibility of a healthy man, in the one case for fifteen days, in the other for ten days, to maintain nitrogenous balance and equal body weight on from 5.8 grams of nitrogen daily. This corresponds to 30.35 grams of proteid.

* This experience the writer of this sketch is able to confirm as the result of three years' experience of the use of the perchloride solution in the practice of a fever hospital: articles of underclothing which have been steeped in perchloride solution may be worn with perfect impunity, even by children and even when simply dried after being steeped, without previous rinsing.