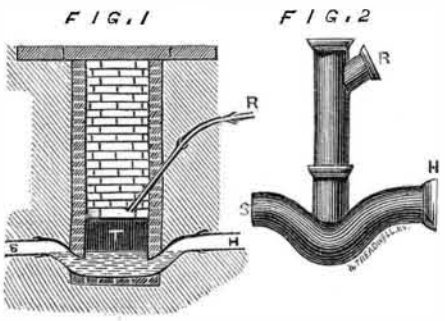
House Drains.

Mr. Osborne Reynolds, Professor of Engineering at Owen's College, Manchester, Eng., proposes to abolish all house traps altogether, and deal with the sewer gas outside the house. He places an ordinary siphon pipe between the house and the sewer, connecting the bend in the siphon—which practically forms the trap—with the open air. He has applied the principle to his own house, as shown in the annexed section. All the drains in the house are connected with the pipe, H, Fig. 1, which leads to a siphon trough, T, at the bottom of the man hole, the latter being constructed as near the house as may be convenient. The floor of this man hole is 2 feet above the bottom of the drain, which passes through it in the shape of an open trough, T, 2 feet and the width of the pipes deep, the sides being rendered in cement. This trough is so laid that the water stands half an inch above the orifice on the sewer side, S, and an inch on the house side, H, while, to prevent scum forming on the surface, the pipe, R, brings rain water from the roof and discharges it at the upper part of the trough, T. Of course, in most cases a much simpler arrangement than this will suffice for the sanitary requirements of the house, for a siphon trap, Fig. 2, with a pipe communicating with the surface and connected with the rain water pipe, will be found to prevent all influx of gas into the house. In this way, a trap is formed which effectually closes both the house and the sewer from the man hole, and doubly closes the house from the sewer; and



if care is taken to arrange the orifices of the pipes in the man hole, as recommended, it will not be possible for the water to be sucked out of the trap even should the pipe run full.

Importance of Fuel Saving Appliances.

In his recent address before the Institution of Mechanical Engineers, London, President Siemens stated that the annual coal production in Great Britain amounts at present to 120 million of tuns, which, if taken at 10s. per ton of coal delivered, represents a money value of £60,000,000. It would not be difficult to prove that, in almost all the uses of fuel, whether to the production of force, to the smelting and reheating of iron, steel, copper, and other metals, or to domestic purposes, fully one half of this enormous consumption might be saved by the general adoption of improved appliances which are within the range of our actual knowledge without entering the domain of purely theoretical speculation, which latter would lead us to the expectation of accomplishing our ends with only one eighth or one tenth part of the actual expenditure, as may readily be seen from the following figures: One pound of ordinary coal developes in its combustion 12,000 units of heat, which in their turn represent 12,000×772=9,264,000 ft. lbs., or units of force, which represents a consumption of barely ½ lb. of coal per indicated horse power per hour, whereas few engines produce the indicated horse power with less than ten times that expenditure, or say 2½ lbs. of fuel. Again, the heat required to raise a tun of iron to the welding point of say 2,800 degrees Fahrenheit requires 2,240×2,800×0·13 (specific heat of iron) = 815,360 units of heat, which are producible by 815,360 divided by 12,000=68 lbs. of coal) whereas the ordinary heating furnace consumes more than ten times that amount. In taking credit, however, for only 50 per cent of the actual average expenditure, we arrive at an annual money saving of £30,000,000 per annum—a sum equal to nearly one half the national income! Nor does this enormous amount of waste indicate all the advantages that might be realized by strict attention to appliances for saving fuel, which are, generally speaking, appliances for improving the quality of the work produced.

Soapstone Manufacture.

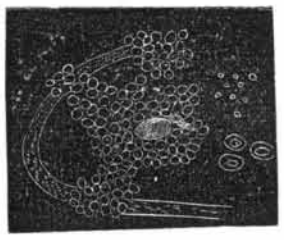
Soapstone has recently found a new application as a raw material for buttons, dominoes, and other similar objects. Chips and refuse pieces of the mineral are ground to powder, mixed with silicate of soda—water glass—and after a repose of some hours, drying on a plate, when the mixture is again pulverized. The powder is then subjected to powerful pressure in molds, and afterwards baked in airtight fireclay crucibles. The pressed objects are a second time saturated with water glass, and again heated out of contact with the air. The hardness of the products depends, in a great measure, upon the number of times the heating is repeated. The last stage of the process of manufacture consists in washing in water in a rotary tub, drying and agitating in a suitable vessel with soapstone powder, which imparts a polish to the surface.

THERE is something more than a daily ferry now between Europe and America. In fact, the rate is something like a steamer for every 12 hours from the port of Liverpool alone. During the month of May, 53 steamships left the Mersey, of which 17 belong to the Cunard company, 11 to the Inman, 5 to the National, 5 to the White Star, 10 to the Allan, and 6 to the Guion Company, respectively. When to these are added the ships of the French and the German lines, we get some idea of the prodigious increase of late in steam communication between the continents.

DETECTION OF IMPURITIES IN MILK.

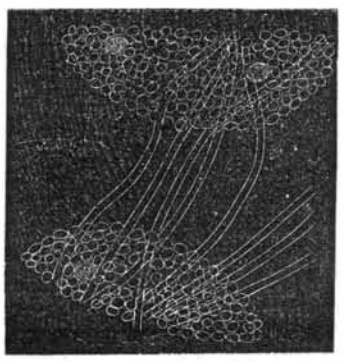
A recent number of the *Lens* contains an interesting report by Professor James Law, of Cornell University, upon certain microscopic examinations, by him made, of some samples of suspected milk. The latter was supplied by one of the best farmers near Ithaca, N. Y., and the author took the usual precautions to prevent the access of foreign matter after the receipt of the liquid for examination. This milk, when delivered, looked rich and good, presenting nothing unusual in color, consistency or flavor. But after standing for twelve hours, it had become viscid, and fell in fine threads from the point of a needle dipped therein. Placed under the microscope, it showed an abnormal adhesiveness of the oil globules, which had accumulated in dense masses instead of remaining apart as in healthy milk. Intermixed with the globules were dark colored spherical bodies of a much larger size (spores) and filaments. This cryptogam, or species of plant, steadily grew, and at the end of forty-eight hours presented the form shown in Fig. 1.

FIG. 1.



The farm buildings, pastures, and water supplies, where the cows were kept, were then examined and found to be in excellent order. The water drunk by the cows issued from a couple of springs, and, to the naked eye, looked perfectly clean and pure. But, under the microscope, it was found to contain numerous diatoms and spores of some low form of vegetable life. A little of this water was placed in a portion of milk which, by previous examination, had been found to be pure. In three days the milk so treated had become viscid, and contained numerous spores and mycelium (as shown in Fig. 2) which continued to grow.

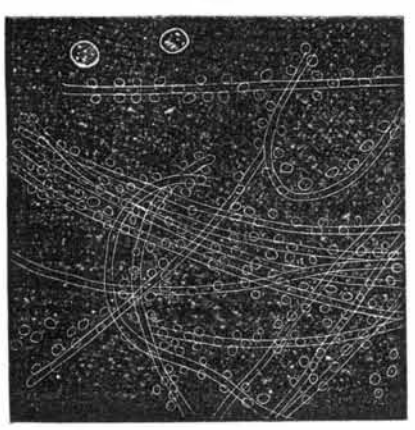
FIG. 2.



Two cows, from which the impure milk first mentioned was obtained, were then examined. The animals appeared to be in good health in every respect; but on application of the clinical thermometer, it showed a temperature of 102°, while the temperature of the other cows, giving pure milk, indicated only 100°.

A little blood was then drawn from the affected cows, and, by aid of the microscope, was found to contain ovoid bodies, double the size of the ordinary blood globules. After standing corked for a few days, this blood exhibited a luxuriant growth of mycelium, or substance from which fungus is derived. A drop of this blood was also added to a sample of pure milk, and in a few days it presented a rich fungoid growth, as shown in Fig. 3.

FIG. 3.



The farm springs were now fenced, and the cows supplied with water from another source—a well upon the premises. Dram doses of the bisulphite of soda were given, for one week, to all the stock. The impurities of the milk at once disappeared, and have not returned.

The chain of evidence now appeared complete. The water contained vegetable spores, which developed into a luxuriant growth of mycelium, when allowed to stand or when added to milk of known purity. The presence of similar germs in the blood was demonstrated by microscopical examination, by the further development of the cryptogam when the blood was allowed to stand, and by the appearance of the same product in milk to which a drop of this blood had been added. The constitutional effect of its presence was slight, being manifested by a rise of temperature not exceeding 2° Fah. The germs in question were present in the milk, and grew with great rapidity in this medium. Lastly, the disuse of the contaminated water and the administration of sulphites put an end to the affection.

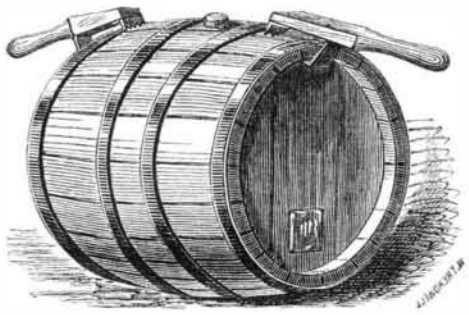
There is one more feature of the case which ought not to be passed without notice. Out of a herd of about twenty cows, only one or two were attacked at first, and after giving tainted milk for a week or more they recovered, while one, two, or three more had in the meanwhile been taken ill. At first the whole of the milk was injured by the admixture of the impure, and it was only by setting aside a little milk from each cow in a separate vessel that the owner was enabled to fix on the affected ones.

This unsusceptibility of the majority of the cows to the agent which all alike were swallowing, and the acquirement of this susceptibility by one after another at irregular intervals, demand investigation.

It may be added that Dr. Percy's report to the New York Academy of Medicine, in 1858, "On Swill Milk," shows the presence of spores in such milk when drawn and the growth of mycelium within twenty-four hours thereafter, though the liquid had stood in a well corked bottle in the interval. This report shows, further, the tendency of such milk to induce severe and even fatal disorders of the digestive organs of infants fed upon it exclusively in its fresh condition.

HANDLES FOR BARRELS AND BOXES.

This is the invention of M. S. Scofield, of Stamford



Conn. The construction and manner of using these handles can be readily understood from the engraving. To adapt them for use on boxes or other packages without chimes, the jaws are serrated or toothed, so that, by a sudden thrust of the handle, the teeth of the hook-shaped jaw will be forced into the side of the box sufficiently to give the handle a firm hold upon it. This seems a simple, useful, and practical invention.

Progress of the Telegraph.

The progress of the electric telegraph within the past six years has been very great in every quarter of the globe. Upon this continent, the electric wire extends from the Gulf of St. Lawrence to the Gulf of Mexico, and from the Atlantic to the Pacific Ocean. Three cables span the Atlantic Ocean, connecting America with Europe, and another submerged in the Gulf Stream unites us with the Queen of the Antilles. Unbroken telegraphic communication exists between all places in America and all parts of Europe; with Tripoli and Algiers in Africa, Cairo in Egypt, Teheran in Persia, Jerusalem in Syria, Bagdad and Nineveh in Asiatic Turkey, Bombay, Calcutta, and other important cities in India, with Hong Kong and Shanghai in China, Irkoutsk, the capital of Eastern Siberia, Kiakhta on the borders of China, Nagasaki in Japan.

A direct line of telegraph, under one control and management, has recently been established between London and India, with extensions to Singapore, Hong Kong, Java and Australia.

Europe possesses 450,000 miles of telegraphic wire and 13,000 stations; America, 180,000 miles of wire and 6,000 stations; India, 14,000 miles of wire and 200 stations; and Australia, 10,000 miles of wire and 270 stations; and the extension throughout the world is now at the rate of 100,000 miles of wire per annum. There are, in addition, 30,000 miles of submarine telegraph wire now in successful operation, extending beneath the Atlantic and German oceans; the Baltic, North, Mediterranean, Red, Arabian, Japan and China seas; the Persian Gulf; the Bay of Biscay, the Strait of Gibraltar, and the Gulfs of Mexico and St. Lawrence.

More than twenty thousand cities and villages are now linked in one continuous chain of telegraphic stations. The mysterious wire, with its subtle and invisible influence, traverses all civilized lands, and passes beneath oceans, seas and rivers, bearing messages of business, friendship and love, and constantly, silently but powerfully, contributing to the peace, happiness and prosperity of all mankind.

RE-SENSITIZED PHOTOGRAPHIC PLATES.—After the collodionized plate has been sensitized in the nitrate bath in the usual manner, it is exposed to a weak diffused light; the picture is then taken in the ordinary way. Singular as it may appear, this exposure to diffused light increases the sensitiveness of the plate for pictorial purposes. Anthony's *Photographic Bulletin* states that Mr. H. J. Newton, of this city, has fully tried the plan, and finds that it reduces the time of exposure nearly two thirds without any photographic loss. Mr. Gutzlaff, of Bahia, Brazil, is the patentee of this new method.

M. GAUDUIN has been making experiments to supersede borax, which is generally employed in soldering, and the result is that he finds that an excellent flux for soldering iron, and brazing copper and aluminium bronze, is obtained by a mixture of equal parts of cryolite and chloride of barium. Cryolite is a product and export of Greenland, and consists of a double fluoride of aluminium and sodium.