reservoir by the rising main to supplement the flow from the springs and in this case the plate valve is operated by hand to maintain a pressure of 120 lbs.

The other device is the water level alarm. It is necessary to know when the reservoir is full and to prevent overflowing and unnecessary waste of energy.

There is an indicator consisting of a rubber diaphragm enclosed in an iron case 10 inches in diameter. The upper side has a 1¼-inch pipe standing vertically about 12 feet, through which is placed a wire connection to the upper and fixed contact. The lower side of the case and diaphragm is open and as the water level rises the pressure acts on the under side of the diaphragm and tends to cause it to give way, but this is retarded by a counterweighted lever. This counterweight is designed to be balanced by the pressure equal to a head of 12 feet. When this depth of water occurs the diaphragm rises and with it the lower contact, until the electric line is closed and the bell in the pump-house is rung. The electrical current is got from a low voltage transformer. These two devices were designed by Mr. E. Hubner, the chief engineer.

During 1915, 472,750,000 gallons of water were pumped. The average per day was about 1,300,000 gallons. The pumps were operated on an average of 17¼ hours daily. The population is about 10,300 and therefore the daily average consumption per capita is 126 gallons. The fuel and energy cost $3,734.30, which is equal to about $7.90 per million gallons pumped and 4.15 cents per million gallons raised one foot.

The water is good in quality. It has about 14 parts per million temporary hardness and about 4 parts per million permanent hardness. Mr. I. G. Archibald is the superintendent.

## CANADA'S IRON AND STEEL INDUSTRY.

Reflected in Canada's larger production of iron and steel, are the output of the munitions industry and the larger domestic requirements of last year, together with exports of billets and wire. Mr. J. McLeish, B.A., chief of the department of mines, division of statistics and mineral resources, has compiled the following table. The summary of iron and steel statistics, 1914-1915, are as below:—

| | 1914. Short tons. | 1915. Short tons. |
|---|---|---|
| Iron ore shipped | 244,854 | 398,112 |
| Canadian iron ore charged to blast furnaces | 182,964 | 293,305 |
| Imported iron ore charged to blast furnaces | 1,324,326 | 1,314,957 |
| Iron ore charged to steel furnaces | 37,686 | 74,872 |
| Pig-iron made | 783,164 | 913,775 |
| Pig-iron and ferro-alloys exported | 19,063 | 26,545 |
| Pig-iron imported | 78,680 | 47,842 |
| Ferro-alloys made | 7,524 | 10,794 |
| Ferro-alloys imported | 22,147 | 13,758 |
| Pig-iron and ferro-alloy consumption | 872,452 | 959,254 |
| Pig-iron used in steel furnaces | 619,030 | 747,834 |
| Steel ingots and castings made | 828,641 | 1,020,336 |
| Steel rails made | 428,225 | 232,411 |
| Canadian coke used in iron blast furnaces | 330,269 | 578,743 |
| Imported coke used in iron blast furnaces | 590,902 | 486,022 |
| Iron and steel imported | 878,179 | 771,007 |

Considerably over 100,000 tons of iron are produced annually in electric furnaces in Sweden.

The new bridge across the Tiber at Rome, having a span of 328 feet, is said to be the longest reinforced concrete arch in the world.

## TIMBER DECAY AND ITS GROWING IMPORTANCE.*

By C. J. Humphrey,
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DECAY is due almost entirely to the growth of wood-destroying fungi within the tissues of the wood. There are many hundreds of different species of these which disintegrate wood in the forest, but the greater part of the economic losses in structural timber is referable to a comparatively small number. These fungi are plants just as much as are trees and herbs. They differ merely in their form, lack of green coloring matter and methods of nutrition. While green plants absorb their food supplies from the soil through their roots, fungi derive their nutriment from the substance of the wood.

In the life-cycle of a wood-destroying fungus there are two distinct stages: 1, the vegetative stage, consisting of thread-like, usually much branched, filaments, termed "mycelium"; 2, the fruiting stage, which is nothing more than a compact mass of mycelium which takes on a definite form on the surface of the decaying timber and serves for the production of spores and, hence, the propagation of the species.

The mycelium is usually confined within the wood substance, the fine cotton-like filaments ramifying throughout the tissues and filling the pores of the wood and the cells of the pith rays, as well as boring through the walls of the wood elements. Sapwood is in most cases more susceptible to decay than heartwood because it contains a greater amount of the more easily digested compounds and, unlike the heartwood in many kinds of timber, is not infiltrated with compounds which in themselves retard the growth of the organisms.

**Conditions Essential for Growth.**—In addition to available food supplies fungi require certain essential conditions for their development. These are sufficient moisture, at least a small amount of air within the wood and a suitable temperature. A suitable amount of moisture is, without doubt, the most important factor in decay. Certain ones classified as "dry rot" organisms seem to get along on a comparatively small amount, while others thrive only in highly humid surroundings. In the case of "dry rot" fungi it appears to be more a question of the ability of the organisms to tolerate dry conditions, or to produce their own moisture from the wood, than any essential need for such conditions, for observations and laboratory tests demonstrate that an increase in the moisture under such circumstances leads to more rapid decay.

The need for at least a certain minimum of water is well shown under practical conditions. The points of failure in ordinary dry buildings are the points at which a little extra water is brought to, or held within, the timbers; for example, the ends of joists or girders set in brick or concrete walls, outer window casings, wood surrounding water pipes which may sweat or occasionally burst, porch floors and ceilings and other exposed trimmings where atmospheric moisture may collect at the joints, and last and often most important, basement timbers, either in contact with, or close to moist soil.

Most people are familiar with the way in which posts and telephone poles rot at or near the ground line. Below

*Abstracted from a paper presented before the Western Society of Engineers.