buildings forms an important phase of the engineering skill applied to the system.

Throughout the entire area to which the heating will apply there will eventually be spread several miles of iron piping varying in size from 12 inches to 2 inches in diameter and laid underground at an average depth of from 8 to 10 feet.

The preparation of the base upon which this piping is laid, as well as the insulation and protection of the piping itself from the destructive agents that are ever at work below the surface of the ground, has been taken care of by the method employed by the Ric-Wil Underground pipe-covering Company, of Cleveland.

At the bottom of trench excavation concrete is poured to a depth of 4 inches and laid to grade with its top surface smooth and level forming a solid foundation. On this base and throughout the entire length of trench is laid an interlocking base-drain to provide for under-drainage, upon which feature the life and value of any system of underground heating principally depends, the drainage being accomplished by leaving the end-to-end joints open when the base-drain is being laid. The lower surface of the base-drain is flat and is made to conform with and become a part of the foundation by the use of a thin layer of grout or cement between it and the concrete. The top

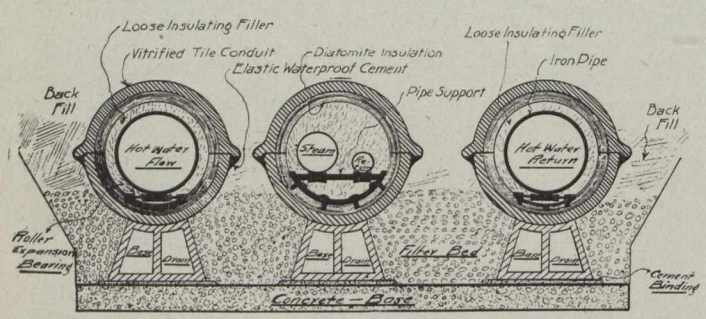

Fig. 2.—Cross-section of Pipe Line System.

surface conforms to the curvature of the tile conduit covering the pipe, for which the base-drain forms a substantial support, besides aiding in the perfect alignment of pipes in the conduit.

For the support of 16-inch conduit the base-drain is provided with a longitudinal centre rib giving additional strength. At the centre of the top surface of the base-drain an opening is left to receive the bell of the conduit, the base-drain and conduit being of the same length and laid staggered. The different lengths of both drain and conduit are thus linked together and rigidity is given to the entire line.

Connections are made from manhole to manhole and the drainage conducted to sewers, the base-drain being accessible to flushing and cleansing when necessary. The conduit, or pipe covering, consists of the Ric-Wil vitrified, salt-glazed tile lined with a mineral insulation. The tile is manufactured from Akron shale, thoroughly ground and mixed, free from foreign substances and withstands perfectly the heat necessary for vitrification. It is supplied for the present construction by the company covering the patents. All the sections are salt-glazed inside and out and are waterproof. The inside surface is serrated or grooved to assist in keeping the insulation in place, insulation and tile making a rigid combination.

The insulating material used inside the tile is a mixture consisting mostly of Diatomite, or infusorial earth, and has for a long time been the standard insulation in European countries where it is known as "Kieselguhr."

Diatomite has proved to be a better insulator, stronger and lighter than magnesia or asbestos. It is insoluble in water, indestructible by acids and high in insulating efficiency. It is unaffected by atmospheric conditions and steam leaks in the pipe it covers have no injurious effects.

The vitrified tile conduit is cut longitudinally during manufacture into two sections, sufficient material being left to keep the two halves intact for handling and shipping. When ready for use the sections are easily separated by means of a chisel or slight taps from a hammer.

On either side of the upper half of the conduit a lip extends longitudinally where the casing is split which provides a protection for the joint throughout its entire length.

After the pipe and conduit have been laid and thoroughly tested previous to the back-filling of the trench a layer of filtering material is thrown down surrounding the base-drain and conduit to a depth of 8 or 10 inches. The material used for this purpose is crushed stone and rejects from the sand screens, readily obtainable and forming an admirable filter bed serving to prevent the clogging of the joints in the base drain.

Expansion and contraction of the pipes in the conduit is provided for by roller expansion bearings made of malleable iron guides, pocketed to support a steel spindle on which brass rollers are free to turn.

Lugs penetrate the insulation in the conduit insuring against any lateral movement of the bearings which are spaced about 10-foot centres throughout the entire length of the conduit.

At the various manholes expansion joints are provided to take up expansion and contraction of the pipe line between manholes.

Fig. 2 represents in cross-section the installation of base-drain, conduit and pipe-lines from power house to first and second cottage centres.

UNCONSCIOUSLY BENEVOLENT.

An electrical engineer recently returned from Europe tells a story of the way in which the Germans furnished electric current to light French headquarters and camps and also probably to charge barbed wire entanglements in front of the French positions.

Soon after the capture of Lille, the Allies continuing to occupy Armentieres close by, the Germans discovered the abandoned Lille electric generating station. The mechanics with the German army soon put the station in operating condition and the town was once again lighted by electricity. But what the Germans didn't know was that the current for Armentieres was furnished from the Lille station.

It was several months before the Germans learned that while they were enjoying the benefits of the operation of the power house the Allies also were utilizing the current for the lighting of their camps, a good share of the energy generated by the Germans going into the lines of the Allies. As soon as this was discovered the transmission lines to Armentieres were promptly cut.

Copper mining in Canada in 1914 was marked by an increased production in Ontario and Quebec, with a falling off in British Columbia and the Yukon, leaving the net result as a very slight decrease. The copper contained in matte, blister copper, etc., produced in Canadian smelters, together with the estimated recoveries or amounts paid for in ores exported, amounted in 1914 to 75,738,386 pounds, valued at $10,310,935.