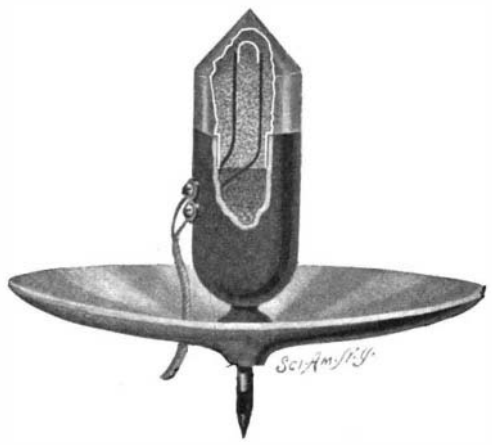
A PYROTECHNIC FIRE-ALARM.

A pyrotechnic fire-alarm torch which is electrically ignited, is an invention which we have selected this week for illustration. The inventor of the alarm is James C. Moore, of Philadelphia, Pa.

In a non-combustible shell a slow-burning material is placed. On this shell a combustible cap is supported; and in the cap pyrotechnic material is packed, which rests upon the slow-burning material of the shell. Within the torch thus constituted a fuse is arranged. The fuse consists of two metallic strips forming the terminals of an electric circuit. A fuse embedded in the pyrotechnic material joins these strips, which fuse becomes highly heated by the current.

The torch is secured to the roof of a building or in any place where it may be seen. The metallic strips are connected with push-buttons and thermostats distributed throughout the building. The circuit is completed either manually by means of the push-buttons, or automatically by means of the thermostats when the temperature becomes excessive.

When the circuit is thus completed, the fuse is heated to redness, the pyrotechnic material is exploded, thereby forcing the cap off the shell and igniting the slow-burning material.



A PYROTECHNIC FIRE-ALARM.

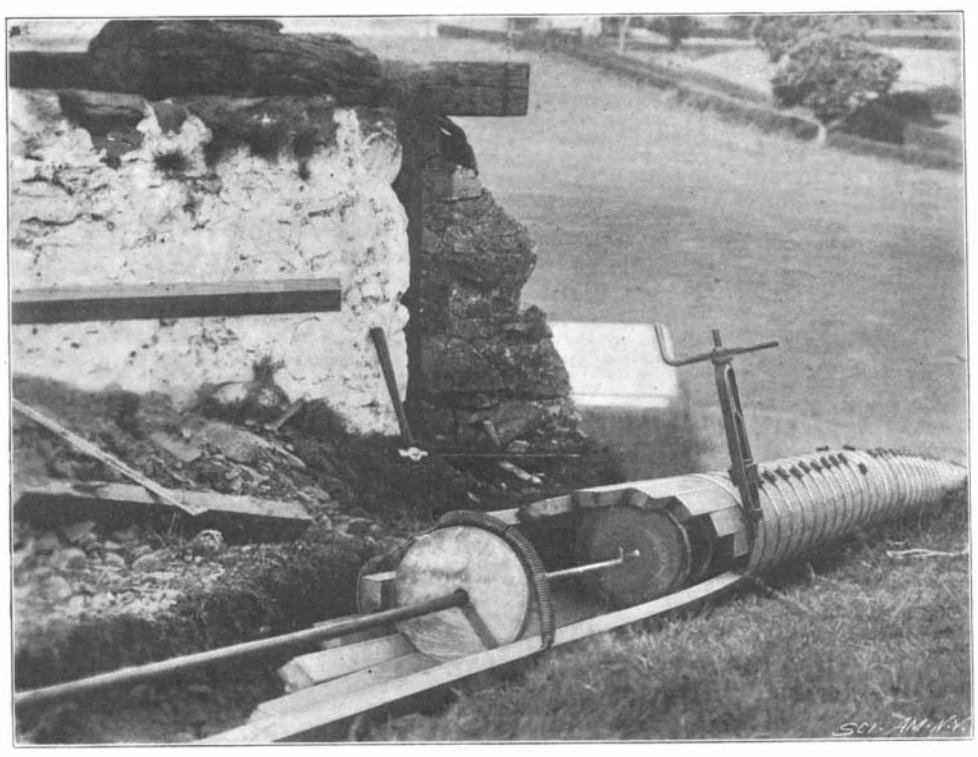
METHOD OF CONSTRUCTING WOODEN WATER-PIPE.

The accompanying two photographs illustrate an installation of wooden piping for carrying water to a farm for driving a mill, and for pumping, by hydraulic means, a supply for nine different farms, the most distant farm being 3,000 yards away, while the height above the pumping engines is 200 feet. The piping was erected upon the estate of Mr. Harry Buddicom, an engineer in Wales. It was constructed by three men at the rate of 15 yards per day. All the tools for building it were made by the carpenter and blacksmith employed upon the estate and cost only $10. The pipe is in two lengths. The section shown in the second illustration crosses the valley and is 80 yards in length, while the other photograph illustrates the section that runs from a tank at the top of the hill to the mill wheel at the bottom, a distance of 120 yards. The total cost of building the piping was less than half of what it would have been had cast iron pipes been employed.

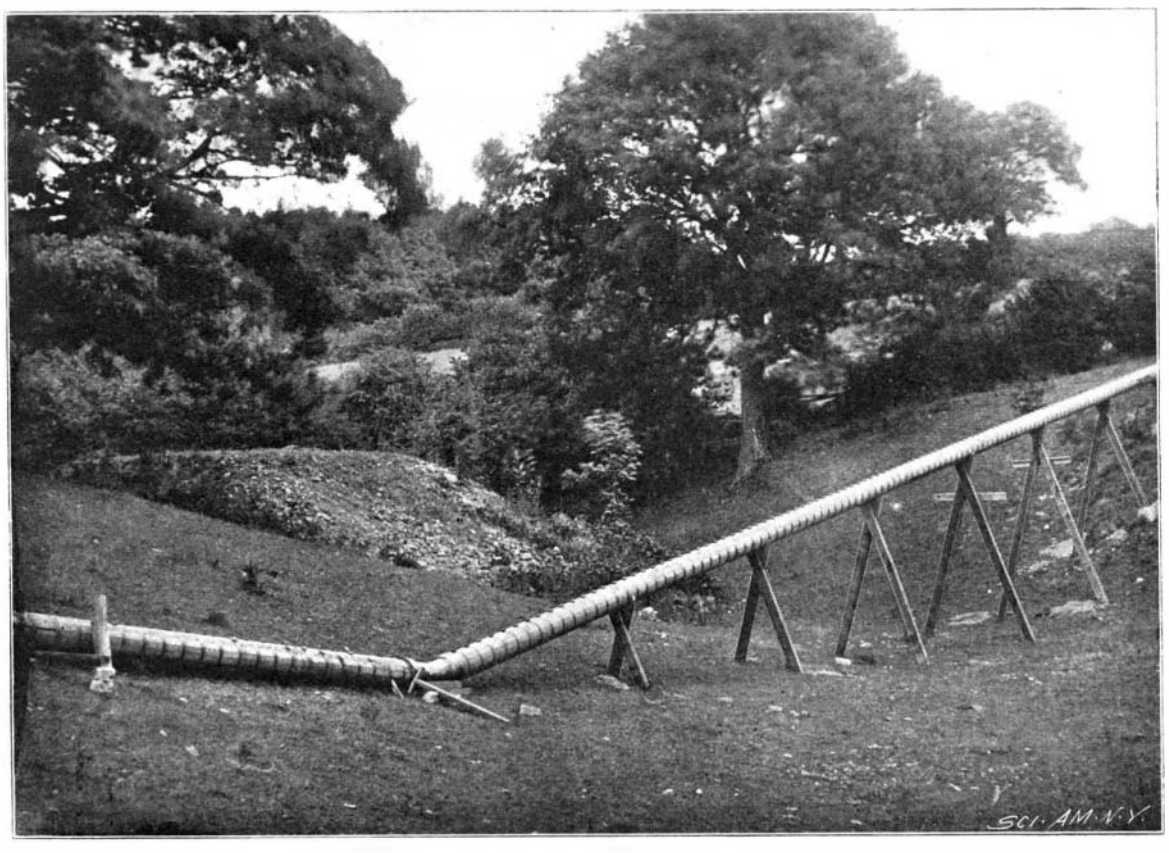
The pipe is 10 inches in diameter, internal measurement, and was constructed of pitch pine segments. These had to be perfectly clear of knots. The circumference of the pipe contains sixteen segments, each measuring 16 feet in length by 1¼ inches in thickness. The exterior surface of each segment is milled, but the inside surface is left flat. At regular distances of one foot, the pipe is banded with a length of hoop iron, to keep the segments firmly in position. The segments break joint evenly from one end to the other, and there is only one segment butt jointed under each band. The butt joints are made tight with a short length of common blind cord kept in position with two small wire nails. Each segment when driven home compresses the cord after two or three bands have been placed upon it. The pipe is quite tight under a pressure of 35 pounds per square inch, and it is always full of water.

The pipe was constructed as follows: First, 16 segments, each measuring 16 feet in length, were taken and cut in two pieces of graduated lengths That is to say, the first segment was cut in two, each piece of which measured 1 foot and 15 feet respectively. Then the second segment was similarly divided, only this time one piece measured 2 feet and the other 14 feet; the third segment cut into two pieces measured 3 feet and 13 feet respectively, and so on until the whole 16 segments had been so cut. These 16 pieces of segments, varying from 1 foot to 16 feet in length, were then taken to the point where the pipe finished, since they were required to complete the pipe. The remaining 16 pieces of segments were all rabbeted at one end, so that when fitted together they were readily driven tightly into an iron ring or the end of the iron pipe connecting with the mill. When this was accomplished there was a piece of pipe, the joints following spirally round the circumference, beginning with the first 1 foot long and ending with the last segment next to it, 16 feet in length. Our first illustration will comprehensively convey the idea as to how this principle was carried out, by the varying lengths of the segments.

When the pipe had been commenced, the core or expanding mandrel, which constituted the centering upon which the pipe was built, was inserted. This core had sixteen segments expanded by means of a cone with a handle of sufficient length to clear the last segment. The core when it was contracted fitted loosely into the pipe and had a tail so that it could be kept true with the bore of the pipe. About six feet in front of the core was a disk with a coil spring adjusted around it, which was supplied so that a segment could be inserted in its place between the disk and the spring which serves to keep it in position. The mandrel was then brought opposite the shortest segment and expanded. A segment was slipped in, the band fastened round, and as it was tightened the core contracted so that the segment slipped easily into its proper place. When the tightener had sufficiently tightened the hoop-iron band, the exterior surface of the pipe was rendered as smooth and as true as if it had been turned with a lathe. The core was then moved forward a foot to the next butt joint, when the process was repeated, and so on until the end of the pipe was reached, when it was brought to a perfectly straight edge by means of the pieces which were cut from the first segments. This is one of the first instances of this system of construction in Great Britain, though it is common in the United States.



WOOD-PIPING—EXPANDING-CORE TIGHTENER AND PRINCIPLE OF CONSTRUCTION.



WOOD-PIPING—COMPLETED SECTION ACROSS A VALLEY.

New System of Refuse Furnace.

Among the different systems of refuse-consuming furnaces which are now being tried in Europe, that of Veidenbrück and Wilms, recently installed at Cologne, seems to have proved satisfactory. In this furnace, the grate bars are formed of sets of hollow cast iron tubes or conduits, arranged one above the other in pairs, the rear ends being fastened together and made tight by asbestos joints. The air penetrates by one end of the system, traverses first the upper tube, then the lower. The extremity of the latter is closed, but has a great number of side perforations directed toward the top, by which the air escapes into the combustible. To form the grate, a number of such sets of bars are placed side by side and united to an air chamber. If the grate is large, the air chamber is placed in the middle and two ranges of bars, one front and one in the rear, are used. The bars are sometimes three feet in length, so that a grate six feet deep is thus formed. The air chamber is connected with a blower, etc., which forces the air through the system. The air thus cools the bars and becomes itself heated, and coming out at a high temperature, it aids in the combustion. The bars, being kept cool by the air circulation are not as rapidly destroyed. After some preliminary trials, four of these furnaces were installed at Cologne. The blowing fan was operated by an electric motor. It was found, however, that the projection of dry air caused the burning of the dust at too great a temperature, which favored the formation of scoria, and thus the air holes became stopped up. It was remarked, however, that the bars remained cold. Some experiments were tried in which steam was introduced into the tubes, and these succeeded so well that a steam system was substituted for the fans, consisting of four tubular boilers of the Dürr system, each having a heating surface of 2,158 square feet. The system has given excellent results; the grate bars, after 4,000 hours' working, show no trace of usage, and the dust burned was of a very inferior quality, without the addition of other combustible.

AN extensive botanical garden has recently been laid out at Dahlem, a village within easy distance of Berlin, which possesses some novel features. It is situated in very rough country, and unique advantage has been taken of this fact by reproducing, as far as possible, the natural scenery from which the various specimens of flora have been collected from all parts of the world. By this means a more comprehensive idea is obtained of the native habitat of the plants and trees, and the conditions under which they thrive.