AN UNUSUAL CAUSE OF SPALLING OF SEWER PIPE.

By Cullen W. Parmelee.

Not long ago the writer was requested to investigate the cause of spalling of sewer pipe which occurred during the burning of the ware. The pipe as it came from the kiln was marred by the flaking of the outside surfaces. Usually these flakes were detached. Sometimes they were almost but not quite separated from the pipe. An examination of the ware showed that in practically every instance a small fragment of what had been a more or less spherical hollow body was imbedded in the detached spall and the other portion of the spheroid was attached to the surface of the fracture of the pipe. These spheroids were about 2 to 3 mm. in diameter. Under a magnifying glass they showed the characteristic appearance of small geodes, that is, small hollow bodies with the interior face of the cavity lined with small crystals. Our opinion regarding the nature of these spheroids was confirmed by members of the faculty of the Department of Geology.

The occurrence of geodes in clay is probably rather unusual but they are known to occur in certain clay deposits in Illinois, notably in the vicinity of Hamilton. These geodes, we are informed by one familiar with that locality, vary in size from a marble to those which are six inches or more in diameter. The larger are more commonly found and do not give rise to trouble except for the expense of repairs to the machinery—due to breakage if these hard nodules are not first removed from the clay.

The spalling, which we observed, accompanied the use of a clay which is of a different character and geological occurrence from that at Hamilton. At the latter place, the geodes are of common occurrence while at the other locality their presence was not known previous to our investigation.

After having determined the probable cause of the trouble, we undertook to locate the stratum containing these nodules. A search of the floor of the clay pit was rewarded by the discovery of a geode imbedded in a large block of a sandstone conglomerate,

which originally had formed part of the rock mass underlying the clay deposit. A painstakingly thorough examination of the rock ledge resulted in the discovery of a number of small geodes varying in size from a hickory nut to a large bean. Together with these geodes was found a remarkable accumulation of more or less perfect quartz crystals, double ended, each not much larger than a kernel of rice. These geodes apparently were located in a very small area on top of the sandstone underlying the clay deposit.

The spalling occurs, apparently, during an early stage of the burning. This is indicated by the small cracks on the reverse side of each spall and radiating from a point almost exactly above the geode fragment—showing that a strain was developed while the clay was at a temperature too low to have given it a permanent set.

The small geodes which we found were all lined with quartz crystals. We are uncertain as to whether the spalling was due to the popping of the geodes—due to the expansion of the air-filled cavities—or whether it was due to the expansion of the quartz particles. Probably the former was the cause.

DEPARTMENT OF CERAMIC ENGINEERING,
UNIVERSITY OF ILLINOIS.