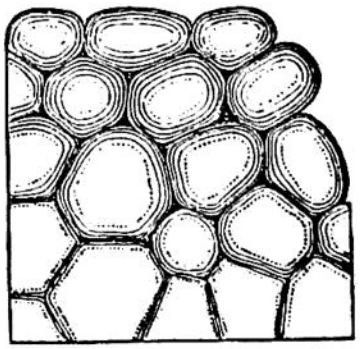
This oxidation process, and other methods of decay, go on with greatest rapidity in the fissures of rocks, below a surface of soil, because the descending surface waters keep them almost continuously wet; and it is under such circumstances that a rock which is much fissured or jointed becomes reduced to a pile of great bowlders with rusty earth between, as illustrated in the figure annexed. The balls of rock here represented are very common in decomposing rocks from granites and trap to sandstones. They are simply a result of surface decay along the many planes of fracture (Fig. 134). The decay or oxidation at first produces a thin discoloring of adjoining surfaces, as in the lower part of the figure; and this continues, eating off the angles, which are attacked from three directions, until a bluff of solid rock becomes apparently a pile of great bowlders. With the progress of the alteration, the discolored portion becomes banded with yellow and brown; and as it deepens, the outer part of the spheroid sometimes separates in concentric shells, precisely corresponding with the concentric structure of a concretion. But these concentric shells are due to the decay that is in progress; and apparently to alternations in the work of decay dependent on climate and the capillary action above explained. Rounded stones or bowlders are very often so made. After separation from the pile, and therefore from exposure to almost permanent moisture, the masses may decompose outside with extreme slowness.

134.



5. *Constructive effects.* — As the process is a means of reducing the hardest rocks to earth and sand, it aids in preparing material for new rock-making, and also in supplying earth and sand for soil and fertility. Without it, and one other associated process mentioned beyond, the earth would have had very scanty geological records and only low-grade life.

This agency has produced, or aided in producing, a large part of the great and valuable iron ore beds of the world's history, from Archæan time onward. The limonite ore beds (often called by miners "hematite" beds) are among the products. They occur of great size and value in West Stockbridge, Mass., Salisbury, Conn., Amenia and elsewhere in New York, in eastern Pennsylvania, western Virginia, and farther south to Alabama, as a result of the oxidation chiefly of a ferriferous limestone, and of any iron carbonate the limestone may contain. In the formation of the iron oxide, carbonic acid is set free, and the weakened calcareous rock is hence readily removed by percolating waters; hence great cavities are made by the process, ready to receive the ore as it is produced. Any slates or schists adjoining are also destroyed by the action.

Iron sulphides have been the source of similar beds, but such ore is likely to contain some sulphur. The Amenia ore bed is a good place for studying the formation of the ore from both a ferriferous limestone and a massive iron carbonate. These ore-beds, although superficial, cannot be