3. That the process can be employed in sections where there is not sufficient water to run the stamp-mill.

4. That at all stages the process is completely under the control of the operator, so that the batch does not need to pass from the pans to the settlers.

As to this process, and how cheaply it will treat gold-ores, the general description which follows, and a study of the plans, will be an indication. The mill is entirely automatic, and but a single man at the rock-breaker is needed for a plant of 50 tons or more.

The ore as it comes from the mine is dumped on grizzlies. The fine material passes through and falls to the bin; the coarse lumps fall on the crusher-floors directly in front of the crusher's jaws, which should be so set that they are on a level with the floor, thus avoiding lifting. From the crusher-bin, which is inclined, the ore passes directly to a set of rolls, where it is crushed to a 30- or 40-mesh screen (900 to 1,600 spaces per square inch). After being crushed, the ore is elevated, and that which is not fine enough to pass through the screen goes back to the rolls; that which is fine enough passes through the screen into a bin which communicates with the continuous-feed and discharge pulverising cylinder. This continuous-feed and discharge pulverising cylinder is the machine to which special attention is called, and to the operation of which the success of the process is due. There are 3,000 of these cylinders (old style) now in use pulverising flint and feldspar for use in the manufacture of porcelain and pottery. These machines can be seen in operation at Brandywine Heights, Del., South Glastonbury, Conn., &c. The fineness to which it is necessary to pulverise these materials for use is 200 mesh for porcelain and 250 mesh for glazed ware (40,000 to 62,500 spaces per square inch). This machine is patented and known as the Alsing Cylinder, manufactured by the J. R. Alsing Company, 60, New Street, New York. For the amalgamation of gold it is not thought that it will be necessary to pulverise to 200 or 250 mesh. The ore, pulverised as finely as may be necessary in the cylinder, is conveyed by the discharge-pipe to a bin, the bottom of which is arranged in the form of a hopper to feed directly into the pan. The remainder of the operation is exactly that used in a silver-mill, and will not be discussed, as the operation is well known.

From the preceding description it can be seen that the operation is entirely automatic.

5. The cost of treatment, as has been shown, is of primary importance for gold-ores that will not bear the cost of smelting charges. The cost of crushing by the rock-breaker and rolls will not exceed 1s. 8d. per ton; the cost of pulverising to 200 mesh will not exceed 4s. 2d. when the ore is first put to a 30- or 40-mesh screen. Taking the total cost at 8s. 4d. for crushing, amalgamation, and retorting it is seen that by this process we can treat the ore from a large number of mines which by the ordinary process could not be made to pay until the amalgamation is completely determined by the usual method of panning samples.

6. That 90 to 95 per cent. of the gold contained in any free-milling ore can be saved. This may and will likely be questioned. Apply the following test for confirmation: Take any free-milling auriferous ore, pulverise to 125 to 200 mesh—generally 100 mesh will do; take a casserole or other proper vessel, into which put the pulverised ore, wet to the consistency of a thin paste; take a common egg-beater, and, after introducing the proper amount of mercury, agitate the mass for an hour. The result will show a saving of 90 per cent. of the gold. This is not so perfect as the combination pan however. The pan works as follows: The muller slaps the pulp out to the periphery, the spillers slap it back, thus making two lateral forces. The revolution of the muller creates a vortex of about 6in. in diameter, in and out of which the material constantly passes. We have thus three forces to effect the perfect contact of the mercury with the gold, and therefore it is said that the Murphy gold process will save 90 per cent., and even 95 per cent. of the gold contained in the ore, unless it contains elements which will foul, contaminate, or consume mercury, such as native copper and the ores containing lead. In the Broadway Mine there was a deleterious element in the gangue of the ore which operated against close saving. Professor Clayton was called on to see if he could not devise some means to save more than 40 per cent. of the value contained in that ore. He spent considerable time in the endeavour to effect that result, but without success. The Professor stated that the Broadway ore contained considerable tale in its gangue, which acted as a grease and prevented a union of the gold and mercury. In the Murphy gold process the existence of tale as a part of the gangue would in no way affect the amalgamation. The whole thing is in the pan, and the forces mentioned are sure to bring about contact of the gold and mercury, which is all that is needed. It makes no difference whether the gold is contained in iron-pyrites, copper-pyrites, peacock-ore, &c., it will be collected and saved by this process.

SPECIFICATION FOR AERIAL TRAMWAY.

Location of Site.—Before commencing survey of aërial line two points should be first determined—(1) Fix on exact site for quartz-paddock near mine, and in doing so the chief thing to be considered is a solid foundation at the lowest possible cost, as it is of little consequence whether front of paddock and course of aërial line are parallel or otherwise. As the oval can be so shaped that it will be parallel with both, then fix centre post in position for upper end of aërial line, in doing which care should be taken that sufficient space is left between paddock and centre-line for shoots, jib, oval, and half the terminal structure—say, not less than 12ft. 6in.; (2) fix position of battery-paddock, and place post in position for centre-line of aërial at lower end, so that buckets will empty from terminal into paddock, not more than from 10ft. to 15ft. distant from battery-house.

Survey of Line.—Having now fixed both ends of line, we connect them by cutting a straight line from one to the other, then measure the distance, putting a peg at each chain, or oftener if necessary, with a pilot peg having the chainage marked on it.

Levelling.—We now take levels for longitudinal section, using a dumpy level, after which the section is drawn, when the position, height, and number of trestles can be determined on.