No. 766,579. PATENTED AUG. 2, 1904.

R. BAGGALEY.

METHOD OF SAMPLING COPPER.

APPLICATION FILED JAN. 25, 1904.

NO MODEL.

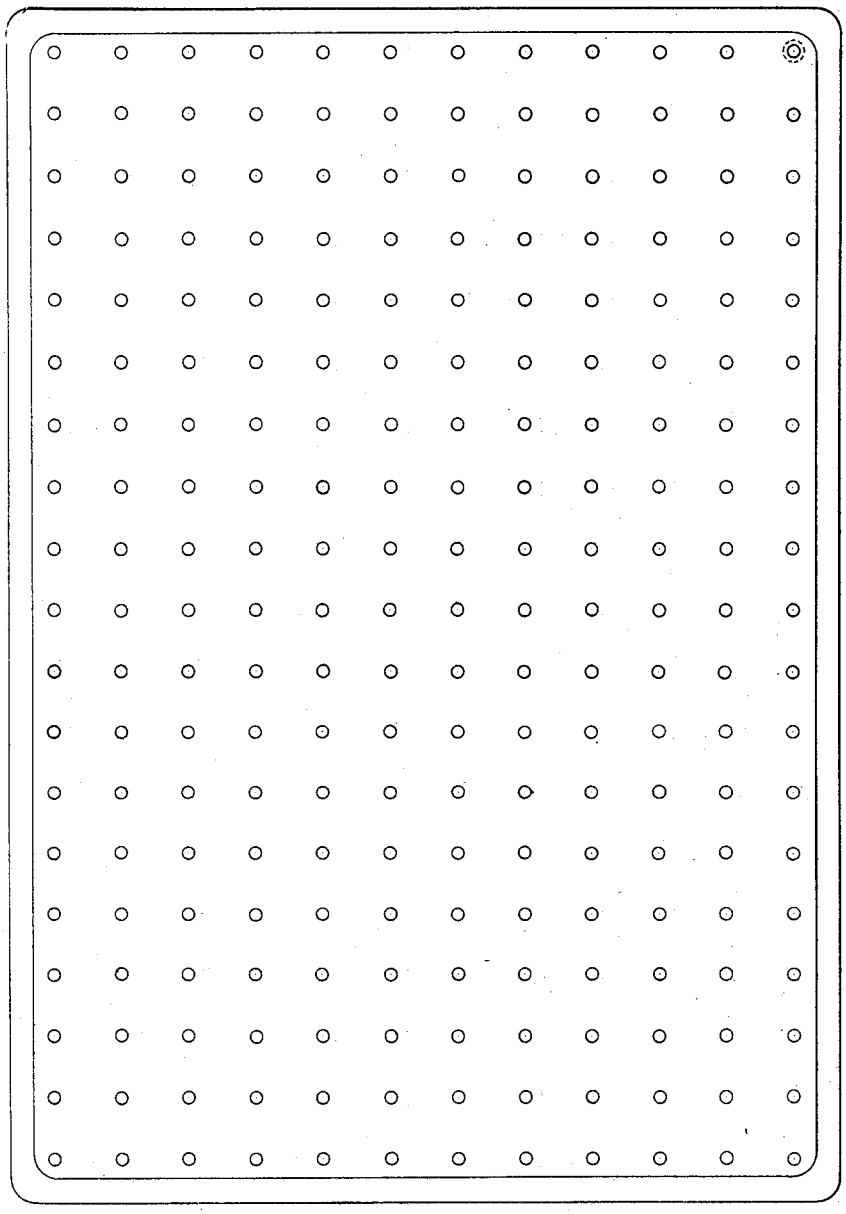


Fig. 1.

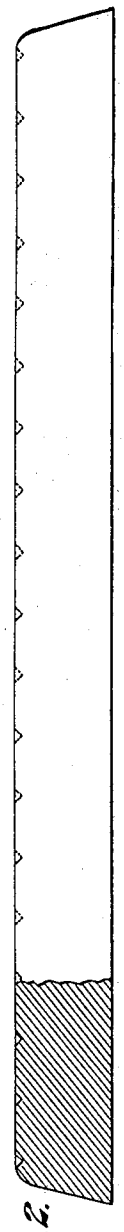


Fig. 2.

WITNESSES

INVENTOR

Ralph Baggaley

by Baldwin & Peyton

his attys

No. 766,579. Patented August 2, 1904.

UNITED STATES PATENT OFFICE.

RALPH BAGGALEY, OF PITTSBURG, PENNSYLVANIA.

METHOD OF SAMPLING COPPER.

SPECIFICATION forming part of Letters Patent No. 766,579, dated August 2, 1904.

Application filed January 25, 1904. Serial No. 190,475. (No model.)

To all whom it may concern:

Be it known that I, RALPH BAGGALEY, of Pittsburg, Allegheny county, Pennsylvania, have invented a new and useful Method of Sampling Copper, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view of a copper slab, illustrating my invention; and Fig. 2 is a side elevation, partly in section.

The object of my invention is to expedite and cheapen the sampling of plates or slabs of blister-copper. Until recently it has been the practice to cast blister-copper from the converter into pigs weighing from two hundred to four hundred and fifty pounds, then to send the copper in this form to refiners, generally at distant points, where it is treated in furnaces for the removal of impurities, and then to cast it into anodes preliminary to the removal of the gold and silver by electrolytic separation. The sampling of the copper after it has been cast for the purpose of determining its content of precious metals is an important step in its commercial manufacture, and the methods heretofore employed for this purpose have been difficult and often inaccurate. It has been found that when blister-copper is cast in the form of pigs or in any other form except in the form of slabs the variations in the content of precious metals, especially the variation in the content of gold in different pigs and in different portions of the same pig, have been very great. For example, a sample taken from one portion of a pig would assay seven ounces in gold and a sample taken from another portion of the same pig would assay twenty-seven ounces in gold. These fluctuations do not take place to the same aggravated extent in the case of slabs as in the case of pigs. The separation of the precious metals in this manner is caused by the tendency of the gold during the chilling of the molten metal in the mold to forsake the setting copper and to concentrate itself in the liquid portions of the molten mass, so that a large and unequal portion of the gold and silver would be found concentrated in the portion of the pig which was last to solidify—namely, the center of the pig. From four to seven times as much gold would be concentrated in that portion of the pig last to solidify as in the portions of the pig which are first to solidify.

An experiment has been made of casting blister-copper in the form of plates about two inches thick and then drilling in the plate holes of about five-eighths inch diameter and taking separate samples from the borings from each hole. Separate assays of each of such samples developed the fact that when copper was cast in this form the assays obtained from the entire area of the plate were practically uniform, the variation in gold in different parts of the same plate amounting generally to less than one per cent. The reason for this is that when blister-copper is cast in the form of a thin plate—for example, twenty-four inches long by seventeen inches wide and two inches thick—the cooling-surface of the mold is greatly increased over that of the ordinary pig-mold, and the copper will begin to set almost instantly over the entire bottom surface, so that the travel of the precious metals in the act of separation will be upward. The copper at the top of the plate will be the last to solidify, and when it solidifies the precious metals will be concentrated at the top and will be distributed with practical uniformity over the entire surface, leaving the plate with very little of the precious metals at the bottom. If such plate were laid flat and a hole drilled through it, the boring or cuttings thus obtained would afford a practically accurate sample of the proportions of copper, gold, and silver contained in the entire plate. In casting the contents of a copper-converter into plates of this description, each weighing about two hundred and fifty pounds, variations will occur in the precious metals contained in the various plates, because the metal last poured from the bottom of the converter will be richer in gold and silver than the metal first poured therefrom. It is therefore essential in sampling the copper to procure a sample from each of the plates which make up one casting or one car-load,

for if this is not done the exact value of the car-load cannot be determined in advance of its shipment.

In the practice of my invention I cast the copper from the converter in plates of uniform size, preferably seventeen inches wide by twenty-four inches long by two inches thick, the only variation being in the thickness of the plates, which variation will not exceed one-fourth of an inch. A car-load of such plates will consist of two hundred and forty plates, and in order to obtain accurate samples and assays each plate must be drilled, and the holes should be drilled in the respective plates at different points so located that a sample will be taken from each portion of the area. This mode of sampling as practiced heretofore is tedious and expensive, because the plates have had to be handled separately and the locations of the holes to be bored determined by the use of templets and stencils.

My present invention simplifies and cheapens the operation and constitutes a step in a system invented by me which enables one man in ten hours to drill a sample correctly, to weigh and record the weight, and to load the plates in box-cars for shipment of two hundred and forty plates or thirty tons of copper, thus reducing greatly the cost of this part of the operation. For this purpose I determine the location of the holes to be drilled by forming on the mold in which the plates are cast projections which produce indentations on the bottom of the plate. These indentations are preferably two hundred and forty in number and each approximately one-fourth of an inch wide by one-eighth inch deep, and they are located symmetrically over the entire under surface of the plate so cast, as shown in the drawings. Instead of forming the marks on the bottom of the plate by indentations they may be formed by casting lines on the under surface of the plate, which intersect at right angles and by their intersection determine the points at which the drilling is to be done.

The plates are delivered from the molds to a slide or chute leading to a suitable drilling-press, and as they come to the press the first plate is seized by the operator, who drops his drill into indentation No. 1 and at this indentation drills a hole through the plate, the cuttings being delivered from the tool and into a suitable sampling-receptacle. The first plate is then removed and delivered to weighing-scales, and a second plate is then brought to the drill and drilled in like manner through indentation No. 2, and in this way each of the two hundred and forty plates is drilled through a hole of successive number and different location. When the samplings thus obtained from all the plates are collected, they will represent in aggregate the drillings from every part of the entire area of the copper as cast in all the molds and when assayed can be depended upon to give an accurate and reliable indication of the proportions of copper and precious metals contained in the casting.

The number of the marks produced on the plate in the casting operation may be varied according to the details of the system as applied to any particular plant, and the shape and arrangement of the marks so made may also be varied, since

What I claim is—

The method herein described of sampling copper plates or slabs, which consists in casting on the surface of such plate or slab marks indicating the location of the sampling-holes, and obtaining samples from the various slabs at differently-located portions of the plates; substantially as described.

In testimony whereof I have hereunto set my hand.

RALPH BAGGALEY.

Witnesses:

WILLIAM M. KIRKPATRICK,

W. D. KYLE.