

No. 779,251.

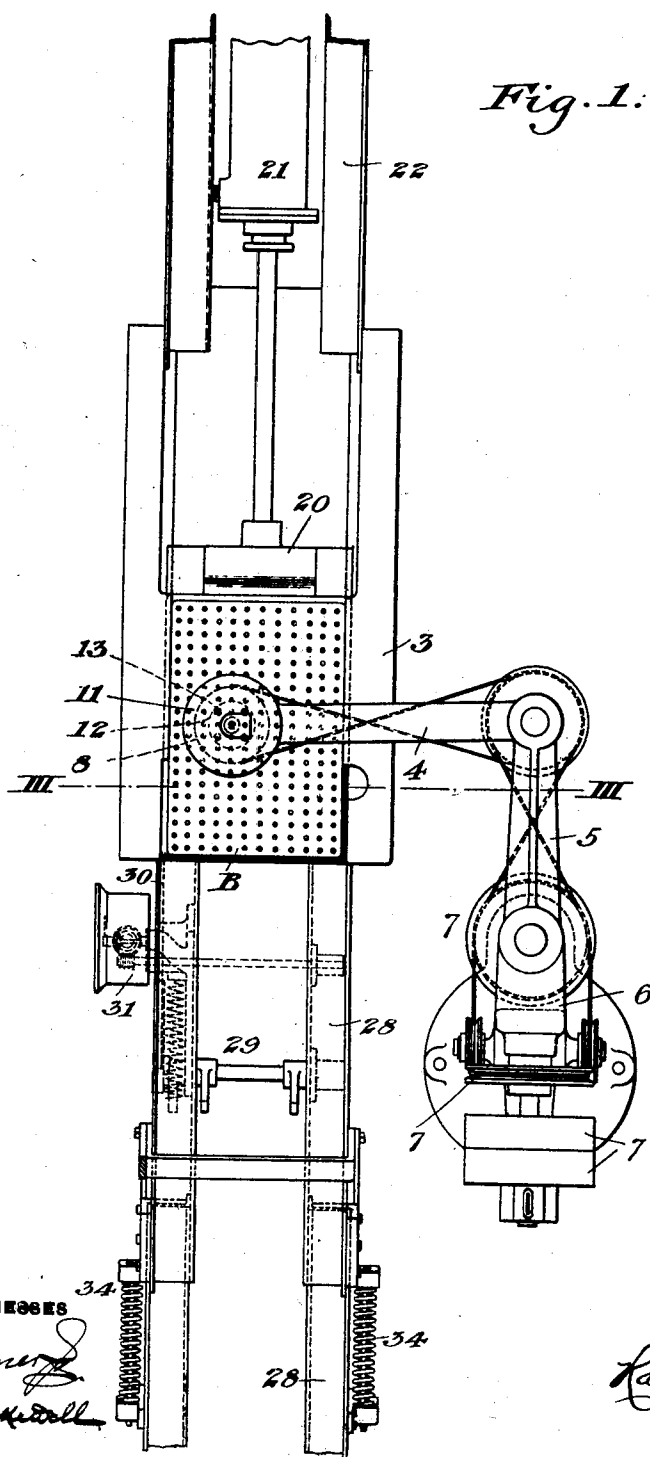
PATENTED JAN. 3, 1905.

R. BAGGALEY.
DRILLING AND SAMPLING APPARATUS.

APPLICATION FILED APR. 16, 1904.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

L. A. (unclear)
J. W. (unclear)

INVENTOR

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3 SHEETS—SHEET 2.

Fig. 4.

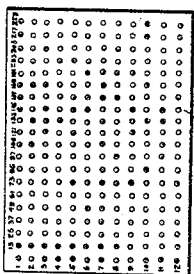
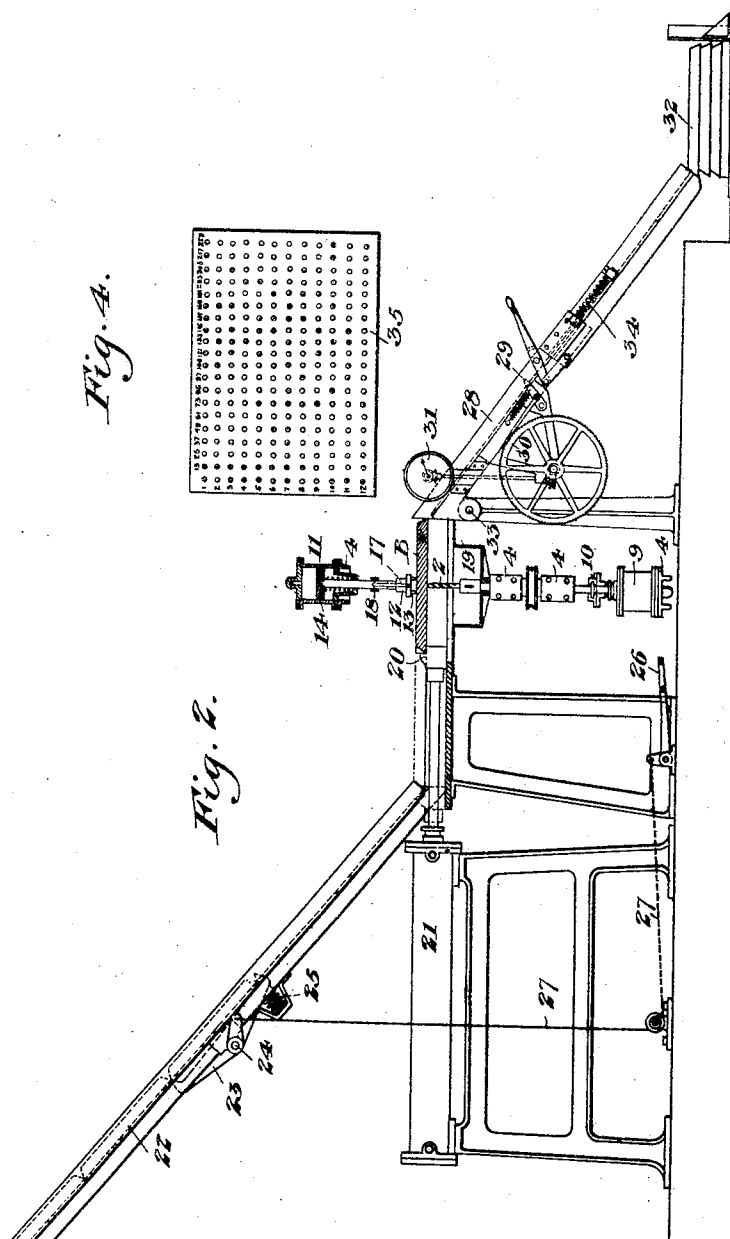


Fig. 2.



WITNESSES

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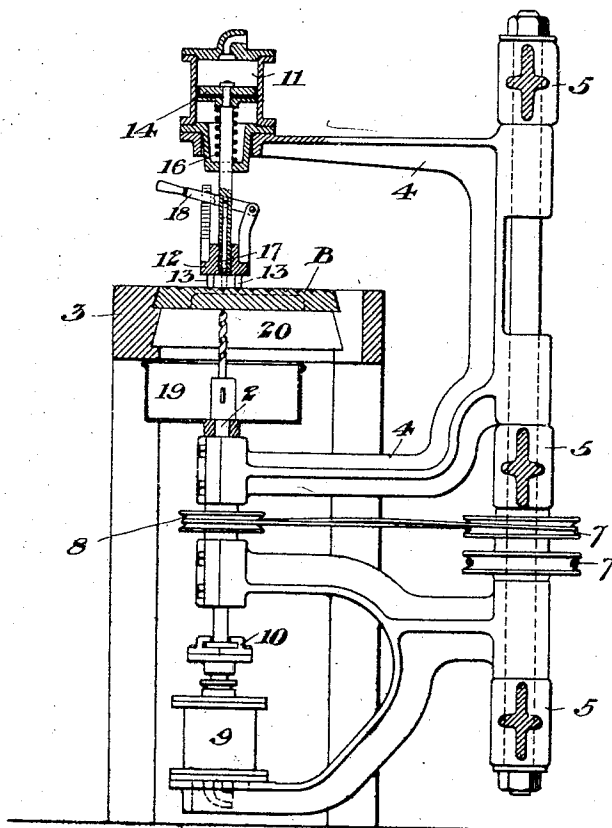
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3 SHEETS—SHEET 3.

Fig. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

RALPH BAGGALEY, OF PITTSBURG, PENNSYLVANIA.

DRILLING AND SAMPLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 779,251, dated January 3, 1905.

Application filed April 16, 1904. Serial No. 203,485.

To all whom it may concern:

Be it known that I, RALPH BAGGALEY, of Pittsburgh, Allegheny county, Pennsylvania, have invented a new and useful Drilling and Sampling Apparatus, of which the following is a description, reference being had to the accompanying drawings, wherein the preferred construction of the apparatus is illustrated.

Figure 1 is a plan view; Fig. 2, a side elevation, partly in vertical section; and Fig. 3, a vertical cross-section on the line III III of Fig. 1. Fig. 4 is a diagram of the model 35.

The object of my invention is to provide means 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 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 contents 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 variations 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 of an 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 of gold in different parts of the same plate amounting generally to less than one per cent. The reason of 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 borings 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.

5 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 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 the sample will be taken from each portion of the area of the plate.

My present invention provides means for expeditiously and cheaply drilling the several plates so as to obtain the required samples, and it 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.

The drilling and sampling apparatus is designed especially for drilling plates which have been cast with a series of marks or indentations indicating the location of the holes to be drilled. The indentations are preferably two hundred and forty in number, each approximately one-fourth of an inch wide by one-eighth of an inch deep, located symmetrically over the entire under surface of the cast-plate, as described and claimed in an application filed by me on January 25, 1904, Serial No. 190,475. 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.

As shown in Figs. 2 and 3 of the drawings, the drill and drill-shaft 2 are on the under side of a table 3, on which the copper plate or slab B to be drilled is delivered. The drill-shaft together with a clamping device above it and a cylinder or other lifting device below it are carried by connected arms 4, jointed to the end of arms 5, which swing radially on an upright standard 6, from which by belts and belt-pulleys 7 power is transmitted to the driving-pulley 8 on the drill-shaft. The drill and its connected parts, therefore, by motion of the arms 4 and 5 can be moved to bring the drill and the clamp opposite to any part of the area of the plate or slab B.

The drill-shaft has appropriate mechanism for raising it into contact with the plate or slab. This consists, preferably, of a power-cylinder 9, the piston of which is swiveled to

the drill-shaft at 10 and which can be controlled by the same valve or controlling device which controls the operation of a second cylinder 11, set on the upper side of the machine and adapted to operate the clamp. This clamp preferably consists of a head 12, having on its under side pins 13, adapted to engage the indentations on the face of the plate, which immediately surround the indentation at which the hole is to be drilled. The head is fixed to the piston 14 of the cylinder 11, which is moved downward by power and is preferably retracted by a spring 16, and as a rapid means for adjusting the position of the clamp I provide the head 12 at its center with a sliding pointer 17, set in exact vertical line with the drill and adapted to be moved into contact with the plate by a lever 18.

To adjust the clamp, the arms 4 are swung so as to bring the pointer 17 directly above the indentation opposite to which the hole is to be drilled. This point can be determined by moving the pointer down into the indentation, and the clamp-cylinder is then actuated to press the clamp-head against the surface of the plate, and the drill is at the same time raised into contact with the under side of the plate. The drill is then rotated and drills a hole through the plate, and as the drilling is done from beneath the chips fall automatically into a pan 19. When the hole has been drilled, the clamp and drill are retracted into their original positions, and the plate being released is pushed from the table of the machine by a pusher 20, which may be actuated by a cylinder 21, and another plate is then delivered to the table from an inclined chute 22 and is moved into drilling position by the pusher. The plates are preferably delivered from the chute 22 as required by means of a rocking detent 23, centrally pivoted at 24 and normally held by a spring 25 so that its lower end shall be in engaging position. The detent is rocked by a lever or pedal 26, connected by a cord 27 with an arm on the detent. When the second plate has been delivered to the drill-table, the drill and clamp instead of being adjusted opposite to indentation No. 1, as in the case of the first plate to be drilled, are adjusted opposite to indentation No. 2, and each successive plate in like manner is adjusted so that it will be drilled at a succeeding indentation, the last plate of the group being drilled at indentation No. 240. The combined drillings from all of these plates are collected in the pan 19 and may then be removed and assayed, and as their delivery into the pan is automatic all the drillings will be collected there without loss.

In order to provide for the automatic delivery and counting of the drilled plates, I provide the following mechanism, (shown in Figs. 1 and 2:) At the delivery end of the table is a chute 28, down which the plates slide as they are discharged. As they pass down in suc-

cession they engage and move a detent 29, which by ratchet mechanism operates a wheel 30 one step for each actuation of the detent, and the number of such actuations, and consequently the number of plates which have passed, is indicated on a dial 31, whose index is connected with the wheel. The work of the driller can be facilitated by affixing to the machine or in convenient proximity thereto a model 35 identical with the copper plates, having two hundred and forty holes marked thereon and numbered in succession. The workman by glancing at the model can at once determine the location of the hole which is indicated by the dial as the one next to be drilled.

The plate passes from the chute to a pile 32 on the scale for weighing, and when four plates have accumulated the pile is removed and loaded on a car or taken to a place of storage. The removal can be effected readily by the truck described in an application of E. W. Lindquist, Serial No. 194,354, filed February 19, 1904. The chute is pivoted at 33, so as to be capable of vertical movement, and has a short telescopic movement against springs 34, so that as each plate is delivered the chute can be shifted to deliver the next plate at the top of the pile.

The apparatus is of great advantage in facilitating and hastening the drilling and sampling of the plates and in making it possible to obtain accurately representative samples.

Within the scope of the invention as defined in the claims the mechanism may be altered, since

What I claim is—

1. Apparatus for sampling metal comprising a table or holder for the metal piece and a laterally-movable drill on the under side thereof; substantially as described.

2. Apparatus for sampling metal comprising a holder for the metal piece, a drill on the under side thereof, and a collecting-receptacle adjacent to the drill; substantially as described.

3. Apparatus for sampling metal comprising a table or holder for the metal piece, a laterally-movable clamp on the upper side and a drill on the under side thereof, and means for preserving the alinement of said clamp and drill; substantially as described.

4. Apparatus for sampling metal comprising a table or holder for the metal piece, a clamp on the upper side and a drill on the under side thereof, said clamp having a pointer in line with the drill; substantially as described.

In testimony whereof I have hereunto set my hand.

RALPH BAGGALEY.

Witnesses:

J. H. REED,

THOMAS W. BAKEWELL.