

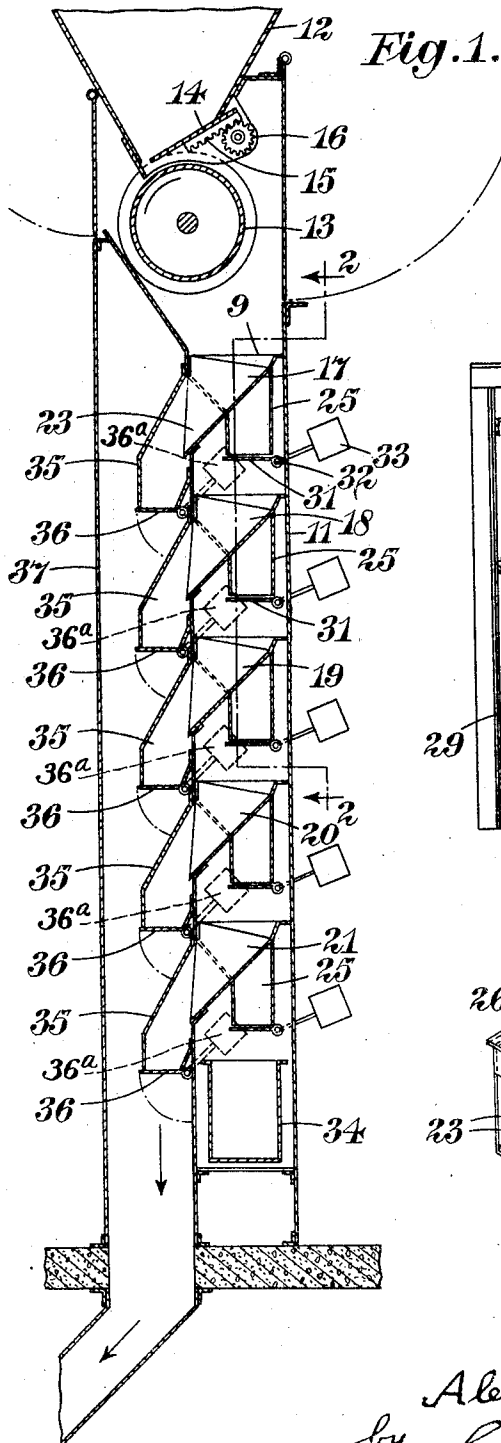
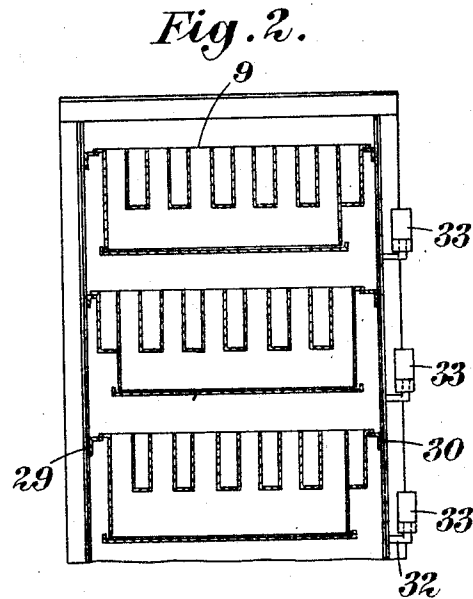
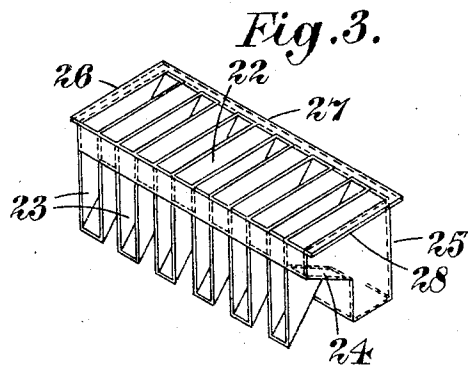
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SAMPLING APPARATUS

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UNITED STATES PATENT OFFICE

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SAMPLING APPARATUS

Application filed April 2, 1928. Serial No. 266,715.

This invention relates to improvements in sampling apparatus for dividing off from crushed ore or other pulverulent material or material capable of flowing under the influence of gravity a proportion of the total quantity which accurately represents the average constitution of the whole body.

In the usual ore sampling plant, the ore is crushed and sampled by automatic samplers, an example of which is described in my United States Patent No. 1,591,092 dated July 6th, 1926. The final sample selected by such an apparatus, although only a small portion of the original ore, is too large for laboratory tests or assays and is usually divided by hand manipulation such as "coning and quartering," taking every tenth shovel and like methods. Riffle splitters are likewise used for this purpose consisting of a number of vertical partitions uniformly spaced, the spaces between the partitions being in communication with chutes and alternate chutes facing in opposite directions so that one half of the material is delivered to one side and the other to the other side of the splitter. Such an apparatus serves to divide the material into two portions of which one can be used as a sample and by repeating the sub-division a small sample of a large bulk can be obtained.

These methods require hand manipulation. The sample usually consists of a mixture of ore particles ranging in size from one quarter of an inch down to less than that which will pass a screen having 100 meshes to the linear inch. Since the coarser sizes of particles frequently contain a different proportion of valuable mineral from those contained in the finer sizes and in hand manipulation some segregation from one another of coarse and fine particles may occur it is quite possible for the finer sample not to be a true average of the original material. Indeed, where shovelling is resorted to in separating the sample the shoveller sometimes gains such skill in effecting segregation of the particles that he can make a high or low sample at will. It is an object of the present invention to provide an automatic apparatus for subdividing the material which will yield a fair

sample and avoid hand manipulation. The present invention comprises an apparatus for sampling crushed ore and similar material the combination of a plurality of riffle-splitters in series and means for directing a sample divided off by the first splitter to the second splitter and thus again dividing it, and so on through any remaining splitters in the series. It is to be understood that the term "riffle-splitters" as used herein is intended to include any apparatus comprising fixed upright partitions on to which the material to be sampled descends and which serve to sub-divide it into a sample-portion and a reject-portion.

Preferably chutes are provided for collecting the sample-portion of the ore and redirecting it to the next riffle-splitter and these chutes may be formed as storage receptacles with means to permit periodic discharge of their contents. The automatic discharge means may consist of a counter-weighted hinged bottom to the storage receptacle.

The material rejected by the riffle-splitters preferably all passes into a reject-collecting chamber common to all of them, chutes for delivering reject from each splitter being connected thereto. As the reject-collecting chamber will necessarily, in handling dry material, tend to become filled with fine floating dust, the chutes are preferably provided with a counter-weighted dust-seal thereby preventing return of the dust up any of the chutes and obviating any liability of the sample being altered by the admixture of such dust.

The accompanying drawing illustrates diagrammatically one form of apparatus in accordance with the invention.

In the drawing:—

Figure 1 is a vertical longitudinal section through the apparatus.

Figure 2 is a cross section on the line 2, 2 of Figure 1 showing a portion only of the apparatus, and

Figure 3 is a detail of a riffle-splitter.

The apparatus comprises a sampling chamber in the form of a vertically extending column 11 at the top of which is a hopper 12

which receives the bulk-sample from the bottom of the usual "sample-safe" of a sample mill. This material is ready crushed to a pulverulent form. At the bottom of the hopper 5 12 is a feed-roller 13 and the delivery of ore to the feed-roller is controlled by a sliding gate 14 actuated by a rack 15 and a pinion 16, the pinion being actuated by a hand-wheel outside the column 11, said hand wheel 10 being shown in the drawing. The feed-roller 13 is rotated by suitable gearing from a driving motor which is also not shown and it serves to deliver a uniform feed of material to the apparatus below.

15 This apparatus comprises a series of riffle-splitters 17, 18, 19, 20, 21, mounted one below another in the column 11. One of the riffle-splitters is illustrated in Figure 3 and comprises a number of vertical partitions 22 20 uniformly spaced from one another. The spaces between the partitions are connected to chutes 23, 24 and alternate chutes face in opposite directions. The chutes 23 all deliver toward the front of the riffle-splitter 25 and are open at the bottom. The chutes 24 form part of a storage receptacle 25 which extends along the rear portion of the splitter and is open at the bottom. The riffle-splitter is flanged round three sides, as shown at 26, 30 27, 28 and the flanges rest on brackets 29, 30, (Figure 2) inside the column 11. To the underside of each storage receptacle 25 there is fitted a hinged door 31. The door is hinged by mounting it on an operating shaft 32 35 which passes through the walls of the column 11 and is connected to a counterweight 33. The counterweight 33 is so disposed that when the storage receptacle 25 is filled the weight of the material contained therein will 40 cause the door 31 to open rapidly and fully. To this end the counterweight is mounted above the axis of the shaft 32 so that the leverage exerted by it falls off as the door 31 opens. When the storage receptacle 25 45 is completely emptied the counterweight rapidly closes the door 31. It will be noted that the riffle-splitters are so mounted in relation to one another that when the doors 31 open they serve to direct the material flowing by 50 them on to the riffles of the splitters next below and to prevent loss of material by passing around the flange 27 at the back of the splitter.

The storage receptacle 25 of the lowermost 55 riffle-splitter 21 discharges into a removable sample-safe 34. The sample-safe 34 is provided with flanges similar to those of the riffle-splitters and the column 11 has doors (not illustrated) which enable any one or 60 more of the splitters to be removed and the sample-safe 34 to be substituted at any point in the series.

The chutes 23 which carry the reject away from the splitters discharge through open- 65 ings cut in the wall of the column 11 into

hoods 35 said hoods forming the outer walls of said chutes, the bottom ends of which are closed by hinged doors 36 which serve as dust-seals and which are normally held closed by counterweights 36^a. The hoods and 70 hinged doors are surrounded by a reject-collecting column 37 which extends from the top to the bottom of the apparatus and receives all the reject material.

In operation the material uniformly de- 75 livered to the uppermost-splitter 17 is divided by it into two equal portions, one of which passes out by the chutes 23 into the uppermost hood 35 and through the door 36 to the reject column 37. The other portion 80 collects in the storage receptacle 25 which forms part of the chutes 24 until its weight is sufficient to overcome the counterbalance weight 33, where-upon it is discharged to the second riffle splitter 18. As it is discharged 85 in bulk there is no doubt that it will be accurately sub-divided. Were the door 31 to be omitted so that the first riffle-splitter delivered continuously to the second there 90 might be some chance that the material in falling rapidly would rebound from some of the surfaces with which it came into contact and if the dividing walls 22 of the splitter were in any way irregular some selective ac- 95 tion might take place which would interfere with the fairness of the sample.

As soon as the storage receptacle 25 of the riffle-splitter 18 is filled, which will not take place until the storage receptacle 25 of the 100 first riffle-splitter 17 has been emptied more than once, the discharge door 31 of the splitter 18 will open and deliver the material to the third splitter 19. Here it is again sub-divided and the action is repeated by the 105 splitters 20 and 21 so that the material finally delivered to the safe 34 consists of only one-thirtysecond part of that initially delivered to the splitter 17. If it is desired to take a larger sample any one of the splitters may be removed and the sample-safe 34 110 inserted at any point in the series which may be desired. It is for this reason that the riffle-splitters are made removable and interchangeable with the sample-safe.

I claim:— 115

1. Apparatus for sampling crushed ore and similar material, consisting of a series of riffle splitters mounted in a series one below 120 another, chutes between each adjacent pair of splitters in the series for directing samples divided off by the splitters above the chutes to the splitters below by gravity, said chutes being provided with means to store sample material and automatic means to dis- 125 charge material from such storage when a predetermined amount thereof has accumulated.

2. Apparatus for sampling crushed ore and similar material, consisting of a series of riffle splitters mounted in a series one below 130

another, means between each adjacent pair of splitters in the series for directing samples divided off by the splitter above said means to the splitter below, a reject-collecting chamber common to all of said splitters, chutes for delivering reject from each splitter thereto and a counterweighted dust seal below each said chute.

3. Apparatus, for sampling ore and similar material, comprising a series of riffle-splitters mounted in a series one below another, means between each adjacent pair of splitters in the series for directing samples divided off by the splitter above said means to the splitter below, a reject-collecting chamber common to all of said splitters, chutes for delivering reject from each splitter to said chamber, said chutes including hoods forming the outer walls thereof, and hinged counterweighted dust seals for automatically closing the lower ends of said chutes.

4. Apparatus for sampling crushed ore and similar material comprising, in combination, a sampling chamber in the form of a vertical column, means, at the top of said column, for distributing material continuously and uniformly across the width thereof, a riffle-splitter below the said means, other riffle-splitters, in a series, below said first-named splitter, each of said splitters being provided with a sample chute and a reject chute, sample receptacles communicating with said sample chutes, counterweighted hinged doors for emptying said receptacles, when sufficiently filled, to the next riffle-splitter below, a sample safe below the lowermost sample receptacle of the series, a reject-collecting column into which said reject chutes discharge, said chutes including hoods forming the outer walls thereof, and hinged counter-weighted dust seals for automatically closing the lower ends of said reject chutes.

5. Apparatus for sampling crushed ore and similar material comprising in combination a sampling chamber in the form of a vertically-extending column, means at the top of the column for distributing material continuously and uniformly across the width thereof, a riffle splitter below the said means and other riffle splitters below the first said splitter in a series, each provided with a sample chute and a reject-chute, sample receptacles communicating with the sample chutes, counterweighted doors for discharging said receptacles automatically to the next riffle splitter when sufficiently filled and a sample-safe below the last sample-receptacle of the series.

6. Apparatus for sampling crushed ore and similar material comprising a plurality of riffle splitters mounted in a series one below another and chutes between each adjacent pair of splitters in the series, for directing samples divided off by the splitters above the

chutes to the splitters next below them in the series, and storage receptacles into which said chutes may deliver material, said receptacles having hinged counterweighted bottom doors to permit discharge of material when a predetermined amount thereof has accumulated in said receptacles.

7. Apparatus for sampling crushed ore and like material consisting of a series of riffle splitters mounted in a series one below another, chutes between each adjacent pair of splitters in the series for directing samples divided off by the splitters above the chutes to the splitters below, by gravity, said chutes being provided with means to store sample material, and automatic means to discharge sample material, said means consisting of a counterweighted hinged bottom to the storage receptacle.

In testimony whereof I affix my signature.
ALEXANDER GRANT MCGREGOR.

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