

May 24, 1932.

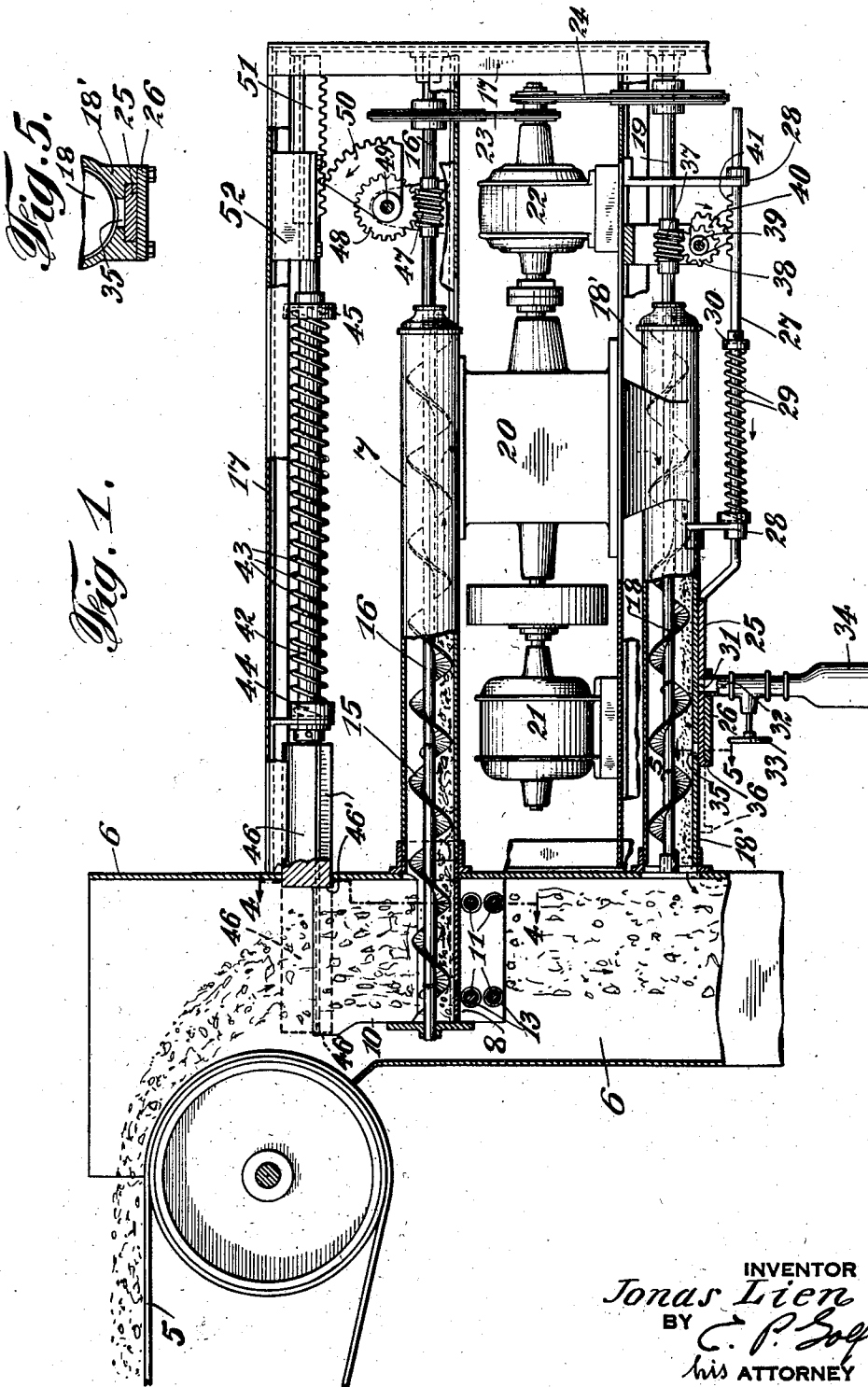
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1,860,107

AUTOMATIC SAMPLER

Filed Dec. 23, 1929

3 Sheets-Sheet 1



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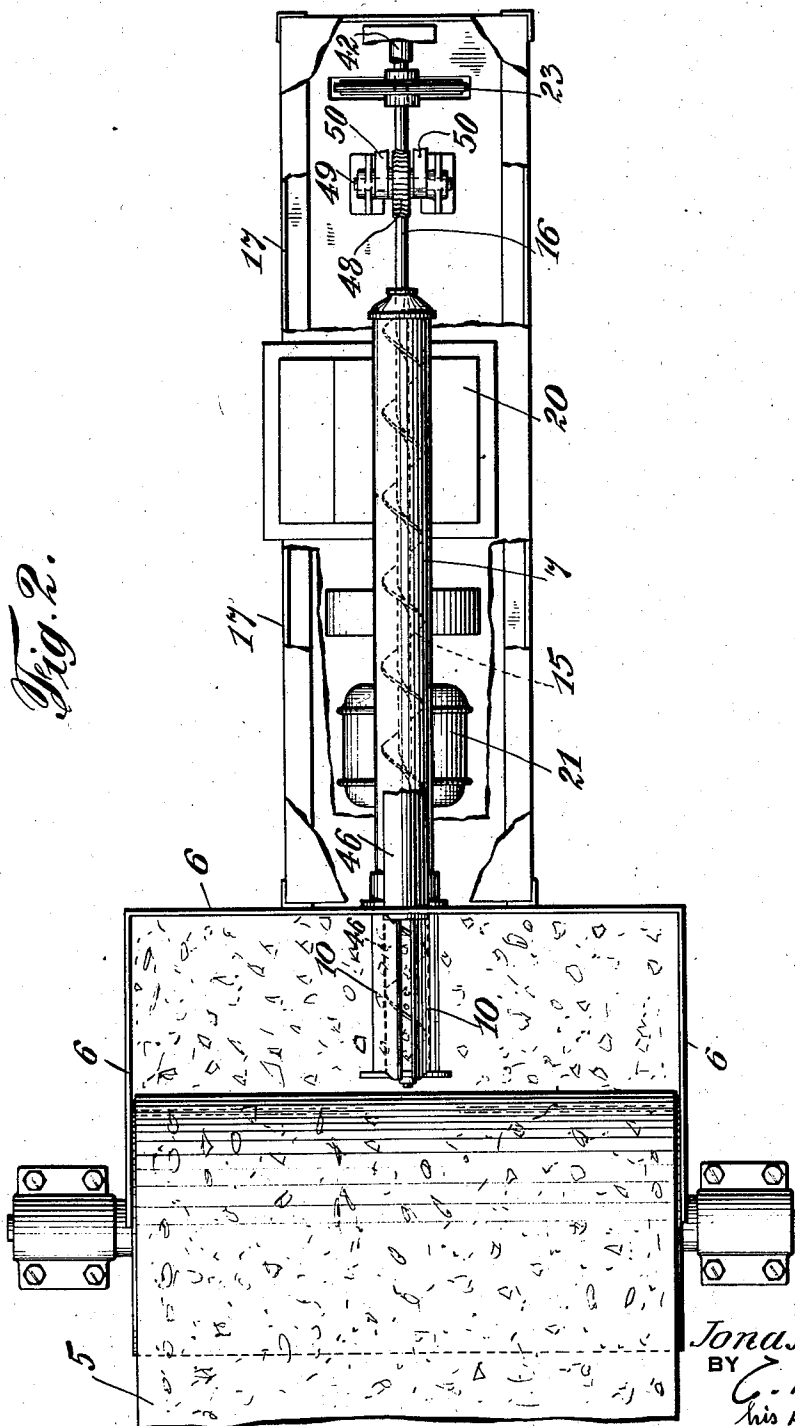
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Fig. 2.



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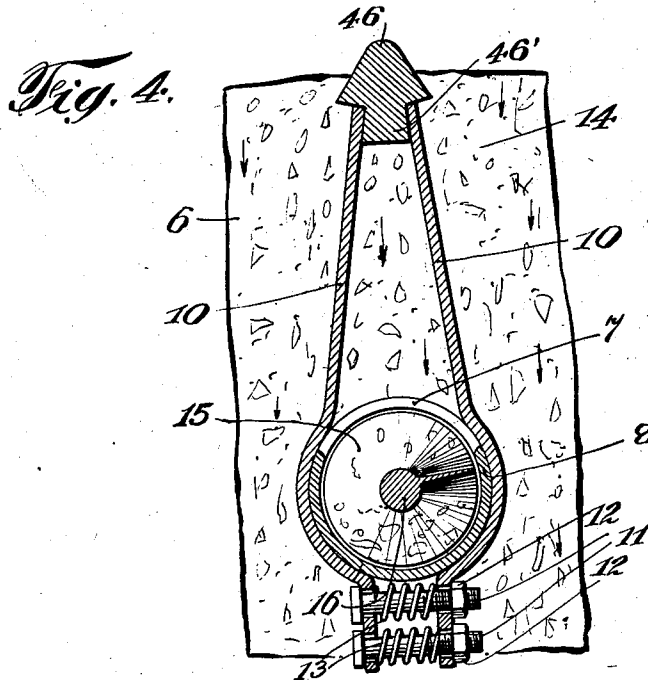
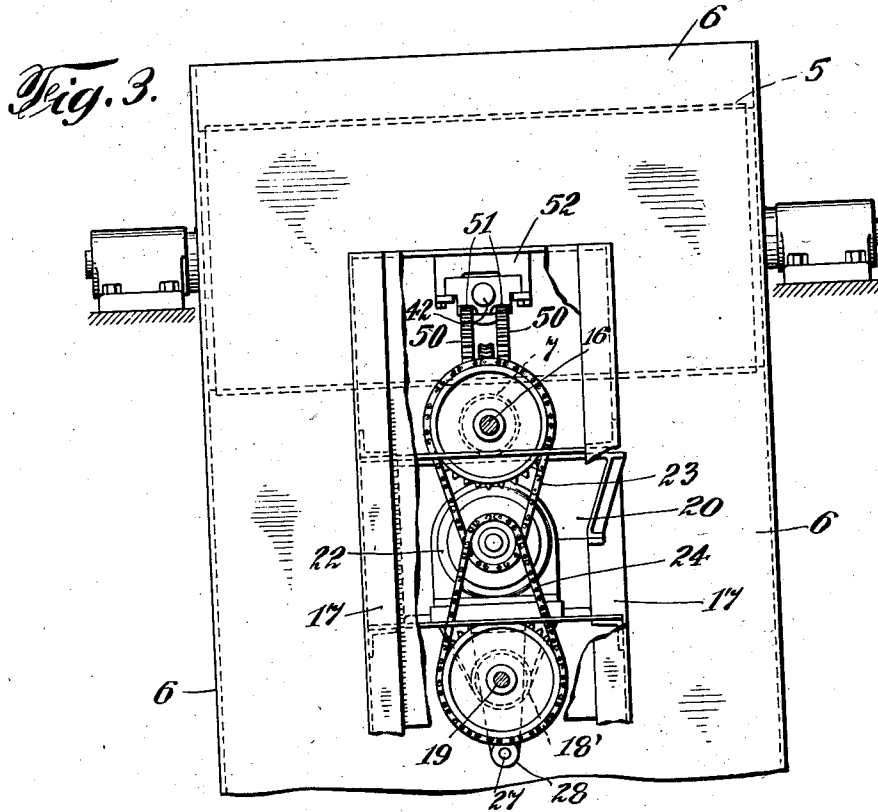
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AUTOMATIC SAMPLER

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3 Sheets-Sheet 3



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AUTOMATIC SAMPLER

Application filed December 23, 1929. Serial No. 415,984.

This invention relates to an automatic sampler for use in connection with apparatus for transporting or feeding coal, ore, cement, lime, sand, grain or other materials from the mass of which it is desired to either continuously or periodically segregate or withdraw a characteristic sample quantity for purposes of analysis.

It is the principal object and purpose of my present invention to provide such an automatic sampler which may be assembled from parts or elements of standard construction so combined and arranged as to produce a practical unit capable of easy application in operative relation to various types of material transporting and feeding apparatus, or which if desired, may also be utilized in connection with a bin or other storage container for the material.

A more particular object of the invention is to provide a collecting means for the material to be sampled embodying a conveyer trough, and adjustable collector plates extending above the open side of the trough together with automatically operating means for preventing clogging of the material between the collector plates and dislodging and removing undesirable matter to prevent the same from entering the collector trough.

A further object of the invention resides in the provision of a crusher for the segregated material to be sampled, and automatically actuated means for intermittently collecting portions of the ground or crushed material and delivering the same to a receptacle.

It is a further general object of the invention to provide an automatic sampler unit of the above character, in which the initial construction cost as well as the maintenance and operation expense will be comparatively low, and which will be highly efficient and reliable in its practical operation.

With the above and other objects in view, the invention consists in the improved automatic sampling device, and in the form, construction and relative arrangement of its several parts, as will be hereinafter more fully described, illustrated in the accompanying

drawings, and subsequently incorporated in the subjoined claims.

In the drawings, wherein I have illustrated one simple and practical embodiment of the invention, and in which similar reference characters designate corresponding parts throughout the several views,—

Figure 1 is a side elevation illustrating one practical form of my present invention and also showing the same in its operative relation with a material transporting and feeding apparatus;

Fig. 2 is a top plan view thereof;

Fig. 3 is an end elevation;

Fig. 4 is an enlarged sectional view taken on the line 4—4 of Fig. 1, and

Fig. 5 is a detail sectional view taken on the line 5—5 of Fig. 1.

While the automatic sampler to be hereinafter described in detail may be employed for collecting and withdrawing sample quantities of material from a stationary mass contained in a bin or other storage receptacle, in the accompanying drawings, for purposes of illustration, I have shown the device as mounted and applied for use in connection with a material transporting or feeding conveyer 5 which discharges or delivers the material from one end of the conveyer into a directing chute indicated at 6 by which the material may be finally delivered to the charging hopper of a furnace stoker, or to a second conveyer, screen, or a storage bin.

In one practical embodiment of the automatic sampling device, I provide within the chute 6 at a convenient point, a collector which segregates or removes from the mass of material falling from the conveyer 5 a properly predetermined quantity thereof which shall be characteristic of the entire mass of the material. While this collector might be of various mechanical forms, as herein shown, the same consists of the trough-shaped end portion 8 of a conveyer housing or casing 7 which extends horizontally and laterally from one side of the chute 6, said trough-shaped end portion 8 of the conveyer casing extending across the chute and terminating in spaced relation to the opposite side thereof. This end portion of the casing

is substantially semi-circular in cross section as shown in Fig. 4 and open at the top thereof. Upon the opposite sides of the material receiving trough 8, upwardly extending plates 10 are mounted. The lower ends of these plates project below the trough in spaced relation to each other and are connected by the bolts 11 having the adjusting nuts 12 threaded upon one of their ends and engaging one of the plates. Upon each of these bolts, coiled expansion springs 13 are arranged between the plates 10 to urge the lower ends of said plates apart, thus tending to rock the same upon the collector trough 8 and urge the upper edges of said plates towards each other. Thus by properly adjusting the nuts 12, it will be readily understood that the space between the upper edges of the plates 10 may be varied to thus regulate the quantity of the material falling from the conveyer 5 which may enter between said plates and be received in the trough 8. For convenience, I have shown the intake of the material collector extending in parallel relation with the horizontally positioned conveyer housing 7, but it will be understood that if desired, this collector may be arranged with its inlet opening disposed at right angles to the conveyer in said housing or at any other desired angle.

While any desired type of conveyer might be utilized, I have shown a conventional screw conveyer 15 within the housing or casing 7, the shaft or axis 16 of which is extended beyond the end of the conveyer casing and journaled in a suitable bearing provided upon a supporting frame structure generally indicated at 17.

At a point suitably spaced below this conveyer 15, a second similar conveyer 18 is mounted, the shaft 19 thereof being likewise extended beyond the conveyer casing and journaled in a bearing on the frame 17. The opposite end of the conveyer casing opens into the main guide chute 6 for the falling material delivered from the conveyer 5.

Between the spaced conveyers 15 and 18, a suitable type of crusher indicated at 20 is mounted in the frame 17. This crusher receives the sample quantity of material delivered from the conveyer 5 by the lateral conveyer 15 and after crushing the sample is delivered in crushed or comminuted form to the lower conveyer 18. This crusher is operated by a suitable motor 21 which may be connected either directly or indirectly to one end of the crusher shaft, the other end of said crusher shaft being coupled with a suitable speed transmission indicated at 22, the shaft of which is operatively connected with the shafts 16 and 19 of the spaced conveyers, as by means of suitable drive chains 23 and 24 respectively.

While in the present instance, I have shown the spaced conveyers 15 and 18 as ar-

ranged in parallel relation to each other, it will of course, be apparent that if desired, various other arrangements of these conveyers might be adopted as found advisable in a particular application and use of the device.

Upon the under side of the casing 18' of the lower conveyer 18 a slidable plate 25 is arranged and supported in operative relation to the casing wall by the guide plate 26 fixed to said wall. The slide plate 25 is connected with one end of a rod 27 supported for movement longitudinally of the conveyer casing in suitable bearings indicated at 28. A coil spring 29 is arranged on said rod between one of the bearings 28 and a collar 30 fixed on the rod, and yieldingly urges said rod in one direction to a normal position to cause the opening 31 in the plate 25 to register with the open end of a downwardly extending tube 32 fixed in one end of the guide plate 26. This tube is preferably provided with a valve 33 to control the discharge of material therethrough into a collecting receptacle indicated at 34.

In spaced relation to the tube 32, the wall of the conveyer casing 18' has an outlet opening 35 therein for the ground or crushed material. The end of the slide plate 25 is provided with a downwardly extending lip or flange indicated at 36, which by contact with the end of the guide plate 26 limits the movement of the slide plate to its normal position in which the outlet opening 35 is closed by said plate while the opening 31 is in communication with the tube 32.

Any desired operating means may be provided for reciprocating the plate 25 and rod 27, but for this purpose, I have herein shown the conveyer shaft 19 provided with a worm 37 meshing with the worm gear 38 on the transverse shaft 39. This shaft carries a gear segment 40 meshing with rack teeth 41 provided upon the upper side of rod 27.

From the above description it will be seen that in the operation of the mechanism, as the gear segment 40 engages the rack teeth 41, the rod 27 and slide plate 25 are moved to the left from the position shown in Fig. 1 of the drawings until opening 31 registers with the opening 35 in the conveyer casing. Thus, the ground material will pass through the latter opening and fill the opening 31 in plate 25. In the continued rotation of gear segment 40, it moves out of mesh with the rack teeth 41 so that the spring 29 will then expand and return the plate 25 to its normal position, thus registering the opening 31 thereof with tube 32 so that the material will drop by gravity from said opening through the tube and into the collecting receptacle 34. When the slide plate is thus returned to normal position by the spring 29, the flange 36 of said plate forcibly contacts with the end of the guide plate 26. The slide plate will

thus be jarred or vibrated so that in the event the material in opening 31 is moist and tends to stick or clog therein, such material will be dislodged or loosened.

5 I also find it advantageous to provide a means which will automatically operate to minimize the quantity of straw, excelsior, wire or other extraneous material entering the collector trough 8. Such materials are
10 usually placed in the bottom of the dump cars and are discharged therefrom with the coal into the hopper delivering the material to the conveyer 5. For this purpose, I provide a reciprocating plunger rod 42 mounted
15 in the frame 17 above the upper conveyer 15, said rod being yieldingly urged to its normal position by a coil spring 43 arranged thereon bearing at one of its ends against a guide support 44 for the rod and at its other end
20 against the collar 45 fixed on said rod. One end of this rod is slidable through an opening in the wall of the chute 6 and is provided with a scraper part 46 preferably of the general form shown in Fig. 4 of the drawings
25 and having a portion 46' extending below the rod and between the upper ends of the collector plates 10 in engagement with the opposed faces thereof. At opposite sides of the rod 42, this part 46 slides upon the upper
30 edges of the collector plates. Thus when said part is projected longitudinally across the upper ends of the plates to the position shown in dotted lines in Fig. 1 of the drawings, no material can enter between the collector plates.

35 The means for operating the plunger rod 42 may be similar to the operating means for the rod 27 above referred to, including the worm 47 on the upper conveyer shaft 16 meshing with worm gear 48 on a transverse shaft 49. This shaft carries the two sector gears 50 arranged at opposite sides of gear 48 and meshing with spaced racks 51 connected with the end of rod 42, said racks being
45 movably supported in suitable guide means indicated at 52 which is fixed to the frame 17.

In the operation of the above described feature of my invention, it will be understood
50 that as the sector gears 50 are brought into co-acting engagement with racks 51, the rod 42 is moved in one direction against the action of spring 43, thereby sliding the part 46 between and upon the upper ends of the collector plates 10. Accordingly, any material becoming clogged between the upper ends of said plates will be scraped by the part 46
55 beyond the end of the collector trough 8 and will fall downwardly between said end of the trough and the wall of the chute 6. As the gears 50 move out of contact with the racks 51, the spring 43 acts to return part 46 to its normal position. This reciprocating travel of the part 46 across the upper open
65 end of the collector will therefore, effectively

dislodge and remove straw, wire or other extraneous materials, or fine moist coal or other material being sampled which may collect in a conglomerate mass upon and between the upper edges of the plates 10. Therefore, only a very minor quantity of such material
70 will enter the collector trough and be removed by the conveyer 15.

From the foregoing description considered in connection with the accompanying drawings, it will be seen that I have provided an automatic sampling device in which parts or elements of standard form are arranged in a simple and compact combination which
75 can be readily installed and applied for use in connection with many different types of material transporting or conveying apparatus, or if desired, in connection with a storage bin or other receptacle. By means of such a device, characteristic samples of the
80 coal, ore, grain or other materials may be automatically segregated from the mass for purposes of analysis without interruption in the continuous operation of the material transporting, conveying or receiving and directing apparatus with which the device may
85 be associated.

I have herein illustrated and described a practical embodiment of my present invention particularly designed for use in the
90 sampling of coal, ore and other relatively heavy materials which require crushing or grinding for the purpose of making a proper analysis. It will be understood however, that in the adaptation of my present improvements to various other analogous uses, certain variations or modifications in the construction and relative arrangement of the
95 several elements might be found desirable. Accordingly, I reserve the privilege of resorting to all such legitimate changes therein as may be fairly embodied within the spirit and scope of the invention as claimed.

I claim:

1. In combination with a chute to receive and direct a stream of material delivered to one end thereof, an automatic sampling means including a crusher mounted in spaced relation to said chute, a conveyer discharging at one end into said crusher and having a
105 trough at its other end extending into said chute, collector plates mounted upon the opposite sides of said trough and extending upwardly therefrom in the chute, means for adjusting said plates transversely with respect to the trough to vary the distance between the upper ends of said plates and regulate the sample quantity of material segregated from the falling stream, a second conveyer receiving the ground and crushed material from
110 said crusher and delivering the same into the chute below the collector plates, means for removing a small sample quantity of the ground material from the latter conveyer and directing the same into a collection receptacle,
115

and operating means for said conveyers and the crusher.

2. An automatic sampling device of the character described including collecting and conveying means for removing a quantity of material from a mass thereof, and said collector means having spaced plates between which the material is received, a scraper part mounted between said collector plates at the entrance for the material, and means for intermittently moving said scraper part across the collector entrance to force material lodging therein to be discharged externally of the collector.

3. In an automatic sampling device, in combination with a material receiving chute, collecting and conveying means mounted in said chute for removing a quantity of the falling mass of material, said collecting means including spaced plates disposed in the path of falling material, a plunger rod, a scraper part fixed to said end of the plunger rod and movable between the spaced ends of the collector plates at the material entrance, a spring urging said plunger rod in one direct on to a normal position to dispose said rod and the scraper part out of the path of the falling material, and means for intermittently moving said plunger rod in the opposite direction to project said scraper part across the entrance between the collector plates and thereby dislodge and force material collecting in said entrance into said chute externally of the collecting and conveying means.

4. In sampling apparatus, a material receiving chute, and means for removing a segregated quantity of the material falling through said chute including a conveyer having one of its ends positioned in said chute, said material segregating means consisting of collector plates mounted at opposite sides of the conveyer within said chute and extending upwardly from the conveyer in the path of the falling material, and means for relatively adjusting said plates to space the same at their upper ends and thereby regulate the volume of material received by the conveyer.

5. In sampling apparatus, a material receiving chute, and means for removing a segregated quantity of the material falling through said chute including a conveyer having one of its ends positioned in said chute, and material segregating means consisting of collector plates mounted at opposite sides of the conveyer within said chute and extending upwardly from the conveyer in the path of the falling material, and means movable upon and between the upper ends of the collector plates to force material clogging the entrance therebetween to be discharged into said chute beyond the end of the conveyer.

6. In combination with a gravity conducting chute for material to be sampled, sampling means including upper and lower conveyers extending laterally from said chute,

means for collecting a part of the material falling through the chute and delivering the same to the upper conveyer, a crusher arranged between said conveyers and receiving the material from the upper conveyer and delivering the crushed material to the lower conveyer for return to said chute, means actuated during operation of said conveyers for intermittently extracting definitely proportioned samples of the crushed material during transit by the latter conveyer, means operatively connecting said sample extracting means with the lower conveyer, a motor, and driving connections between said motor and the upper and lower conveyers.

7. In combination with a gravity conducting chute for material to be sampled, upper and lower conveyers extending laterally from said chute, means arranged within the chute for collecting a definitely predetermined proportion of the falling stream of material and delivering the same to said upper conveyer, a crusher arranged between said conveyers receiving the material from the upper conveyer and delivering crushed material to the lower conveyer for return to said chute, means for intermittently extracting definitely proportioned samples of the crushed material during transit by the latter conveyer comprising a reciprocating plate and actuating means therefor, and means for operating said conveyers and the sample extracting means.

In testimony that I claim the foregoing as my invention, I have signed my name hereto.

JONAS LIEN.

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