June 11, 1957 R. L. PATE 2,795,141

SAMPLER CUTTER

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Fig. 1

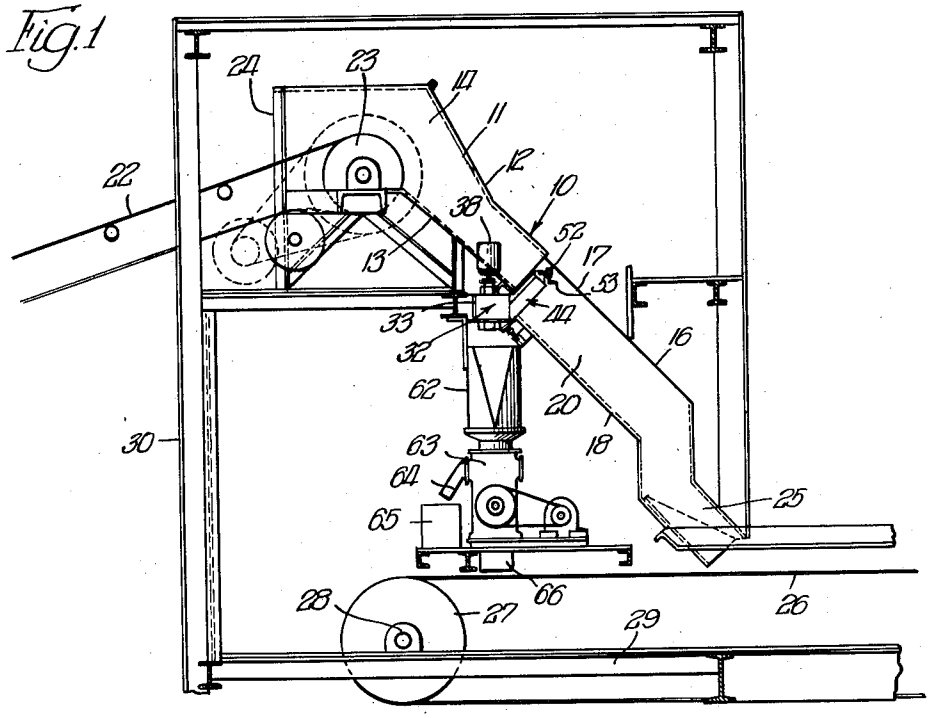
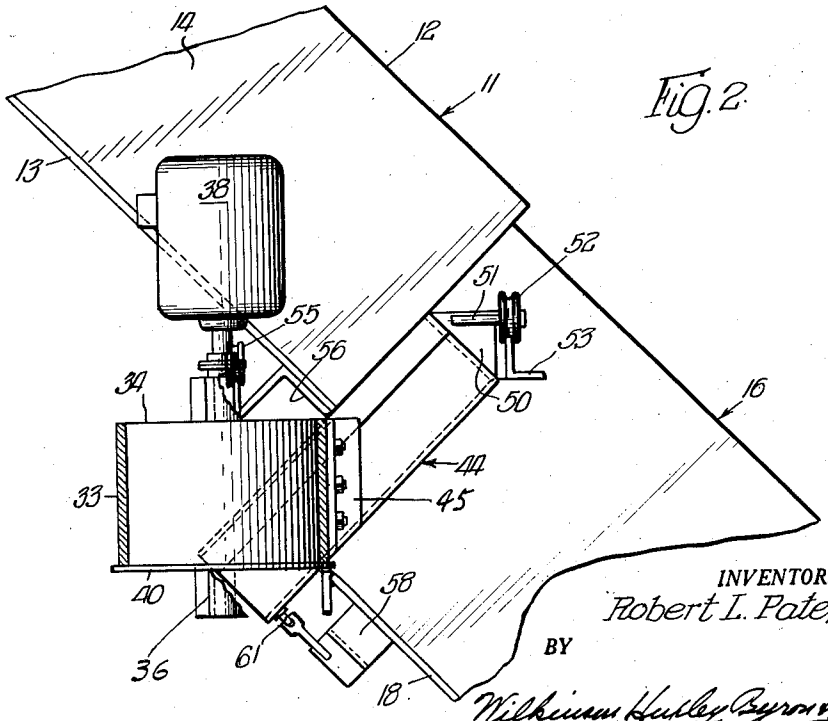


Fig. 2



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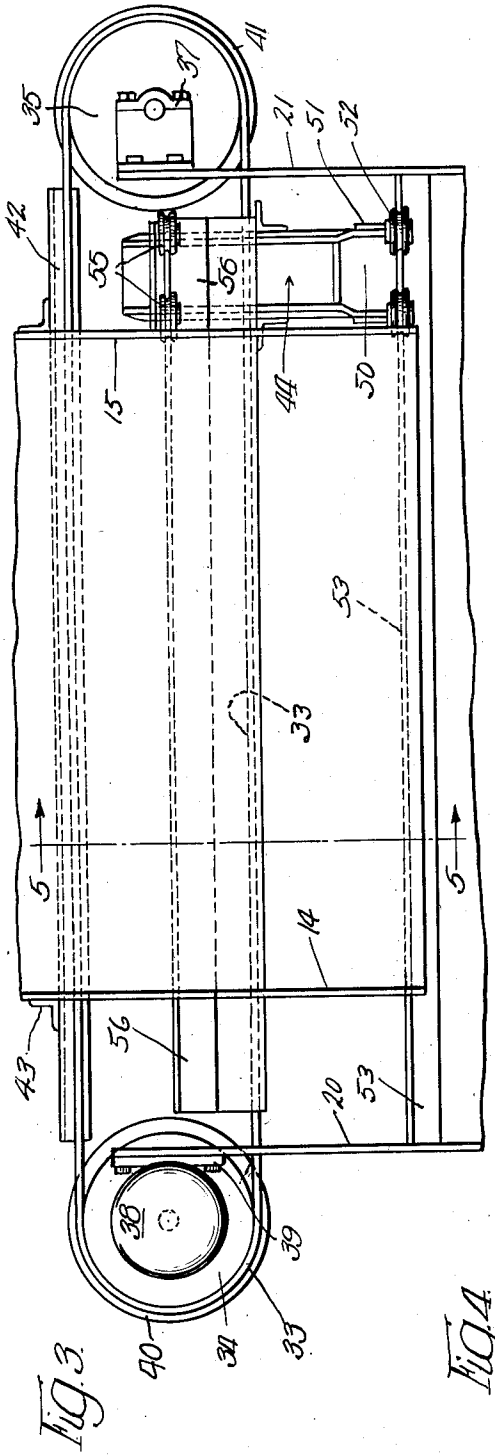


Fig. 3

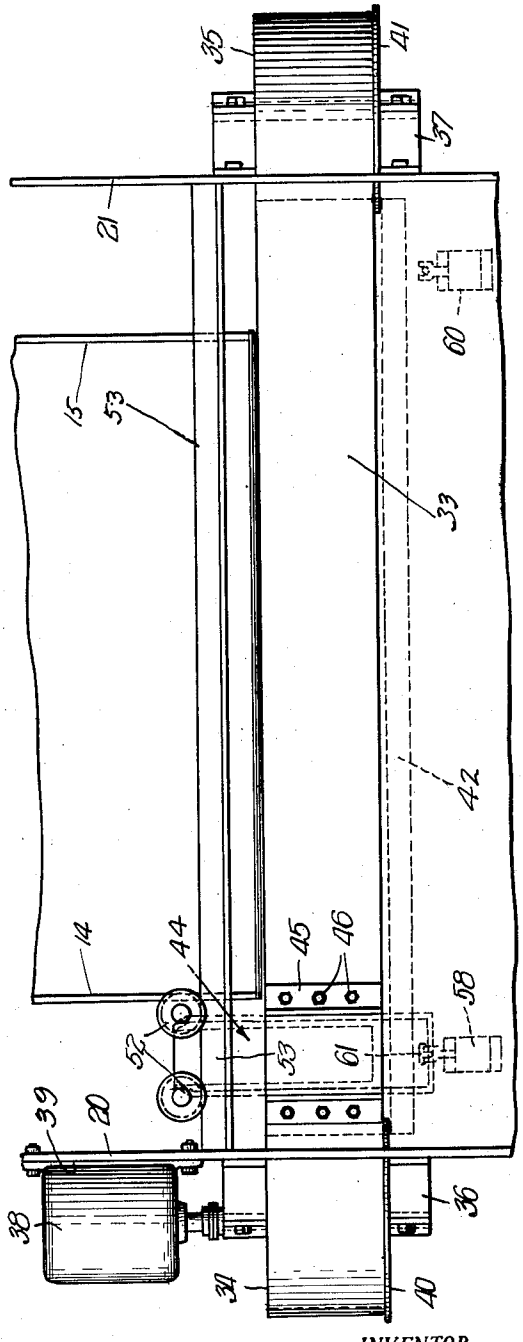


Fig. 4

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Fig. 6.

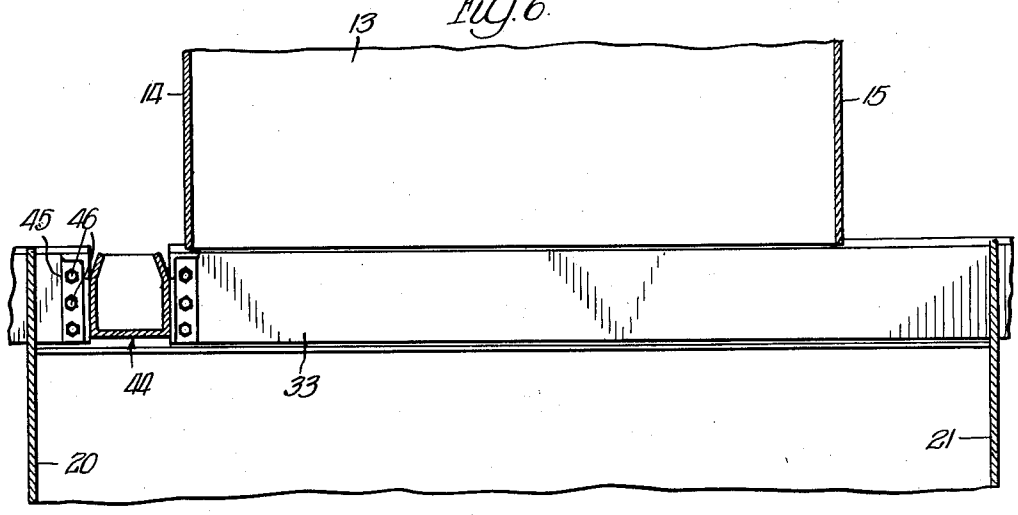
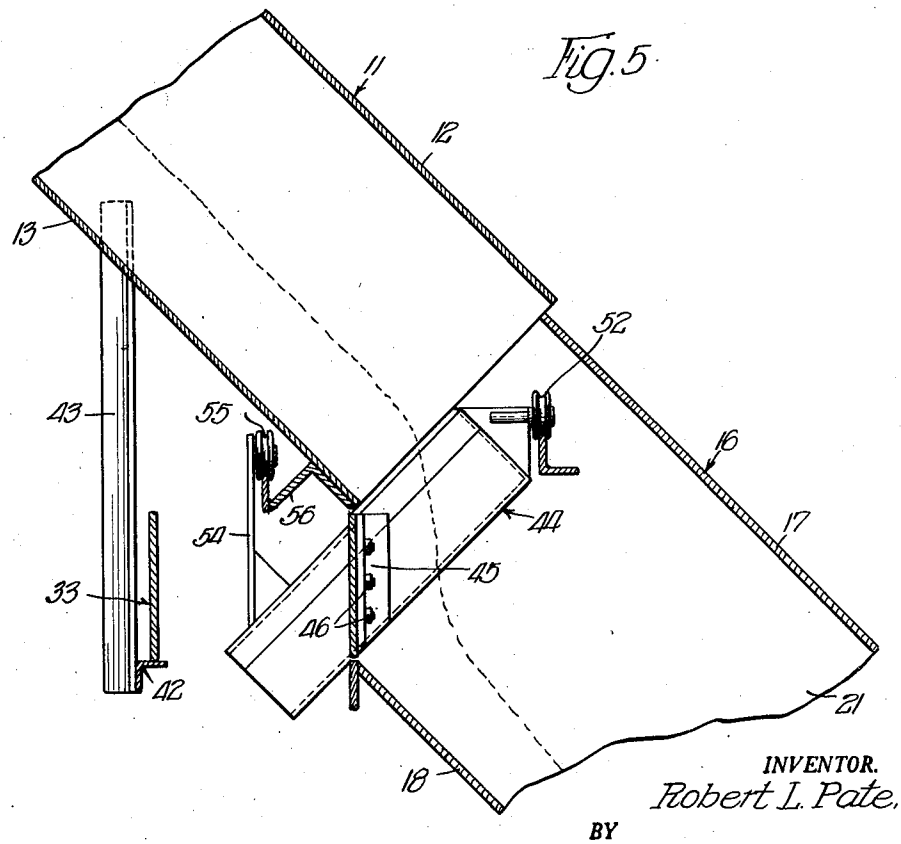


Fig. 5.



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United States Patent Office 2,795,141 Patented June 11, 1957

2,795,141

SAMPLER CUTTER

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Application April 5, 1955, Serial No. 499,329

4 Claims. (Cl. 73—423)

The invention relates to sampling apparatus and has reference in particular to sampling apparatus for sampling material flowing as a continuous stream in a chute or the like and which may have operation to divert a representative sample from the flowing stream of material, either periodically at spaced intervals, or at any desired time.

An object of the invention is to provide apparatus which will include a cutter fixed to and reciprocated by an endless belt so as to have movement transversely across the flowing stream of material for diverting a portion of the same for sampling purposes.

A more specific object of the invention resides in the provision of sampling apparatus as above described wherein the belt is disposed in a vertical plane, and wherein said belt performs the dual function of transporting the cutter back and forth transversely of the material handling chute and also that of acting as a seal to close an opening in the chute.

Another object is to provide a sample cutter having a fixed connection to a vertically disposed endless belt, and wherein the parts are so arranged and combined with the material handling chute as to relieve the belt of any wear such as might be caused by the stream of flowing material in having contact therewith.

Another object of the invention is to provide endless belt mechanism for a sample cutter as described which will incorporate track and roller structure for supporting the respective ends of the cutter so as to relieve the belt of the weight of this element. In this connection, the end pulleys for the belt may have a flanged bottom so as to provide additional support for the belt associated therewith.

A still further object is to provide sampling mechanism that can be conveniently associated with a metal chute through which a stream of material is caused to flow, wherein limit switches are provided for automatically controlling back and forth movement of the endless belt and thus oscillating travel of the cutter fixed to the belt, and wherein the mechanism can be set for any desired speed of travel for the cutter, and for operation with any desired time interval between forward and rearward travel thereof.

With these and other objects in view, the invention may consist of certain novel features of construction and operation as will be more fully described and particularly pointed out in the specification, drawings and claims appended thereto.

In the drawings which illustrate an embodiment of the invention, and wherein like reference characters are used to designate like parts—

Figure 1 is a side elevational view showing an installation for delivering material by means of a chute, said chute being equipped with sampling mechanism embodying the improved features of the invention;

Figure 2 is an end elevational view showing certain constructional details of the endless belt mechanism for the sample cutter;

Figure 3 is a top plan view of the sampling mechanism as shown in Figure 2;

Figure 4 is a front side elevational view;

Figure 5 is a transverse sectional view taken vertically of the mechanism on line 5—5 of Figure 3; and

Figure 6 is a sectional view showing the endless belt with cutter affixed thereto, the latter being inoperatively positioned outside the stream of material flowing in the main chute.

In Figure 1 of the drawings the sampling mechanism of the invention is shown in operative association with a delivery chute identified in its entirety by numeral 10 and which receives coal or other material at its upper end and discharges the same at its lower end. The chute 10 consists of an upper portion 11 formed by a top wall 12, a bottom wall 13, and by side walls 14 and 15. The lower portion 16 of the chute 10 is formed by top and bottom walls 17 and 18 and by side walls 20 and 21. The chute is supplied with material by the belt conveyor 22, the discharge end of which is formed by pulley 23 having location within housing 24, the said housing constituting part of said chute 10. The discharge end 25 is disposed over the conveyor belt 26 which extends horizontally so that the material from the chute discharges onto the conveyor belt; and in this manner continues its movement through the plant. At this receiving end of the conveyor belt 26 said belt passes over pulley 27 supported for rotation by bearings 28 which are fixed to beams 29 of the framework 30 comprising the building or enclosure for the sampling apparatus of the invention including the various auxiliary devices associated therewith.

The endless belt mechanism 32 of the present sampling apparatus is interposed between the upper portion 14 and the lower portion 16 of the chute 10, and said mechanism is so combined with the respective portions of said chute that the cutter is caused to travel across the stream of material flowing in the chute and thus the cutter operates to divert a representative portion of the stream for sampling purposes.

Referring in particular to Figures 2 and 5, the endless belt mechanism 32 consists essentially of an endless belt 33 which may be fabricated of rubber or similar material, or the said belt may be of laminated formation with an outside layer of rubber and with an inside layer of another material for stiffening and strengthening the belt. Said endless belt 33 passes over end pulleys 34 and 35. As best shown in Figures 3 and 4, the said pulleys are suitably journalled to extensions of the side walls 20 and 21 of the said lower portion 16 of the chute. For example, pulley 34 is journalled by members 36 suitably fixed to and extending outwardly of the side wall extension 20, whereas, pulley 35 is journalled by members 37 fixed to and extending outwardly of side wall extension 21. The endless belt mechanism is driven through power means in the form of an electric motor 38 which is likewise secured to the extension of the side wall 20 by means of the bracket 39, the motor having its drive shaft operatively connected to the shaft for pulley 34. It will accordingly be seen that operation of the electric motor 38 will result in rotation of pulley 34 and movement of the endless belt 33. The belt is supported as it passes around the end pulleys by means of the bottom flanges 40 and 41 with which said pulleys, respectively, are equipped. Also, as best shown in Figure 5, the outside intermediate run of said endless belt is supported along its bottom edge by the angle 42 fixed to and positioned by the structural members 43 which depend from the side walls 14 and 15 of the upper portion 11 of the chute.

In accordance with the invention, the other intermediate run of the endless belt 33 has the cutter 44 affixed thereto, for which purpose it is necessary to cut an open-

ing in the belt through which the cutter extends. The cutter 44 essentially consists of a rectangular container having an open top and also being open on one end, namely, its discharge end. Whereas the endless belt 33 is disposed vertically, the cutter 44 has fixed securement to the belt at a considerable angle with respect to the vertical. This is necessary since the cutter must not only have movement transversely of the chute, but the cutter should be disposed approximately normal to the flow of material in the chute. For securing the cutter to the belt, flange members 45 are employed, which may be welded or otherwise secured to the cutter, and which are in turn fastened to the belt by the securing bolts 46. The cutter is so disposed with respect to the inside belt run as to have its rear portion located within the chute at the connection between the upper and lower portions thereof and said cutter also extends on the opposite side of the belt, that is, outwardly of the chute, for the purpose of discharging the material intercepted thereby.

From the foregoing, it will be understood that the endless belt 33 is associated at its respective ends with pulleys 34 and 35, the said belt being vertically disposed and being so associated with the chute that the inside belt run closes an opening in the bottom wall of the lower portion 16 at the joint between the same and the upper portion 11. To cause movement of the endless belt and travel of the cutter 44, rotation is imparted to pulley 34 by means of the electric motor 38. Operation of the motor will produce rotation of said pulley 34 and thus movement of the belt 33 to cause travel of the cutter 44 across the stream of flowing material. In accordance with the invention the end pulleys have a bottom flange 40 whereby to provide the desired support for the endless belt, and the outside belt run is additionally supported by the angle 42 suspended by the structural members 43. It is further proposed to relieve the belt of the weight of the cutter 44 by supporting the cutter at its respective ends through roller and track mechanism. Accordingly, the right hand end of the cutter is provided with an extension 50 which may be of triangular shape in side elevation, as shown in Figure 2, and to which is suitably secured, as by welding, the stud shafts 51, which journal the rollers 52. The angle beam 53 provides a track for the said rollers 52, the said angle beam extending between and being supported by the side walls 20 and 21 of the lower portion 16 of the chute. The opposite exterior end of the cutter 44 is likewise supported by roller and track mechanism for which purpose said end of the cutter has suitably fixed thereto the hanger 54 which carries the rollers 55 at its upper end. The rollers have rolling contact with an angle member such as 56, suitably secured to and supported by the bottom wall 13 of the upper portion 11 of the chute.

With the sample cutter 44 fixed to belt 33 so as to form a unit therewith, it will be clear that belt movement has to be confined to forward and rearward oscillations. This can be conveniently accomplished by a pair of limit switches 58 and 60, which are suitably supported from bottom wall 18 of portion 16 of the chute. The limit switches are located at respective sides of the chute, as best shown in Figure 4, and said switches are of standard construction, such as may be actuated by a lug or similar projection 61 fixed to the underside of cutter 44 and disposed in alignment with said switches. It will also be understood that the switches are electrically connected in circuit with the motor 38 so that upon closing of the circuit to the motor, the motor will be caused to operate in a direction to move the sample cutter from its position of rest, as shown in Figure 4, to a similar position at the opposite side of the chute, as shown in Figure 3. When the cutter reaches said opposite side position the projection 61 on the cutter will contact limit switch 60, whereupon the electric motor 38 is caused to reverse its direction of rotation. If desired, a time delay device can be incorporated in the electrical connections so that the endless belt does not immediately reverse its direction of movement but does so only after a lapse of a predetermined interval of time. However, eventually the cutter will travel rearwardly and upon reaching its position of rest projection 61 will contact limit switch 58 to open the circuit and terminate one complete cycle of operation.

When the cutter 44 is located in a position of rest, as shown in Figure 3, the said cutter is located beyond side wall 14 of the chute so that the cutter is therefore inoperatively positioned when idle. Likewise the cutter is inoperatively positioned due to its location beyond side wall 15 when it assumes its opposite side position, that is, at the end of its forward travel and before the cutter is caused to travel rearwardly. Due to the provision of limit switches the operation of the sample cutter is automatic and the same can be set for any desired speed and for operation at any desired time intervals.

Referring again to Figure 1, the cutter 44 delivers the sample of material into the hopper 62 which has a length equal to the extent of travel of the cutter. From the hopper 62 the sample is delivered to crusher 63 which is preferably a conventional piece of equipment, and following the operation of crushing the sample a portion of the same is delivered through spout 64 into the sample container 65 provided for the purpose. The remaining portion of the sample is discharged through spout 66 onto the conveyor 20.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawings, as various other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. In sampling apparatus, in combination with a sloping material delivery chute, of endless belt mechanism in association with said chute, said mechanism including a pair of pulleys located exteriorly of the chute at respective sides of the same, an endless belt operatively supported by the pulleys and driven thereby, said pulleys having their shafts disposed vertically and which therefore form an angle with the sloping chute, whereby the spaced belt runs are vertically disposed, one of said belt runs coacting with the chute so as to form a vertical wall for closing an opening in the chute, a sample cutter fixed to the belt at said belt run and extending through the belt, whereby the cutter has a portion located within the passageway of the chute and a portion disposed exteriorly of the chute, power means for driving one of the pulleys whereby to cause movement of the belt and travel of the cutter across the stream of material flowing in the passageway to divert a portion of the material for sampling purposes, and supporting means in the form of roller and track mechanism for supporting and guiding the cutter during its travel.

2. Sampling apparatus as defined in claim 1, additionally including limit switches in electrical connection with said power means for effecting oscillating movement of the belt and back and forth travel of the sample cutter within the passageway.

3. In apparatus for obtaining a representative sample from a stream of flowing material, the combination with a chute providing a passageway through which said material is caused to flow, of a pair of pulleys located exteriorly of the chute at respective sides of the same, an endless belt in association with said pulleys, said belt being supported by the pulleys at respective ends and providing spaced, parallel belt runs between the pulleys, said pulleys having their shafts disposed vertically and which therefore locates said belt and the belt runs in a vertical plane, one of said belt runs coacting with the chute so as to form a vertical wall for closing an opening extending transversely of the bottom wall of the chute, a sample cutter fixed to the belt at said belt run and extending through the belt, whereby the cutter has a portion located

within the passageway of the chute and a portion disposed exteriorly of the chute, power means for driving one of the pulleys whereby to cause movement of the belt and travel of the cutter across the stream of material flowing in the passageway to divert a portion of the material for sampling purposes, and supporting means in the form of roller and track mechanism at respective ends of the cutter for supporting and guiding the cutter during its travel.

4. Sampling apparatus as defined in claim 3, additionally including limit switches in electrical connection with said power means and actuating means carried by the sample cutter for actuating the said limit switches whereby to effect oscillating movement of the belt and back and forth travel of the sample cutter within the passageway.

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