March 30, 1965 HIROSHI HIGAMI ETAL 3,175,402

SAMPLING DEVICE

Filed July 10, 1961

FIG. 1

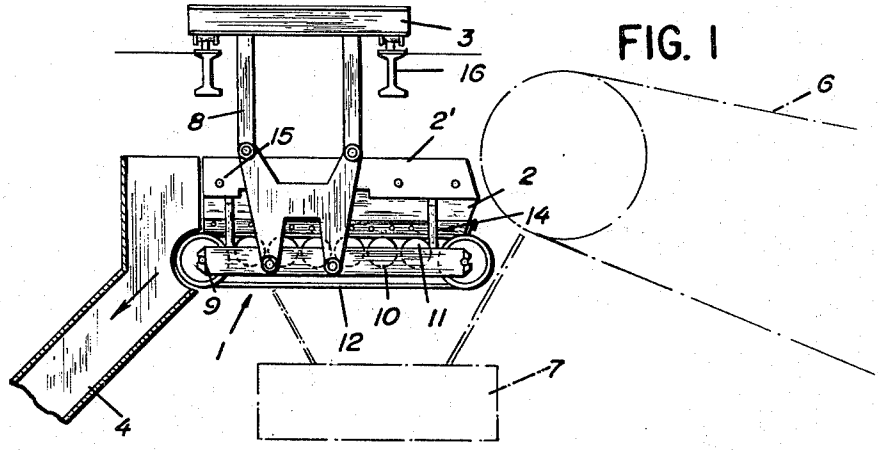
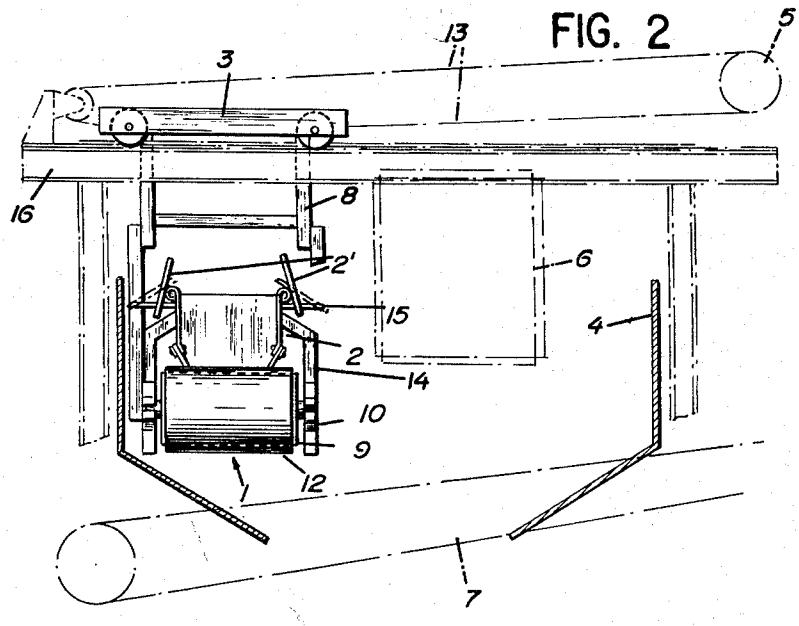


FIG. 2



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SAMPLING DEVICE

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1 Claim. (Cl. 73—421)

This invention relates to a simpling device for substances being conveyed in a conveying system for powdery, granular or lumpy substances. It is important to the stabilization and maintenance of the quality of a product to correctly detect the quality characteristics of its raw material during all the steps of production. In order to correctly detect the quality characteristics of such raw material, it is necessary first to take samples from the raw material correctly. For this purpose, there have been devised various sampling methods and there have been used various sampling devices. However, such sampling devices are required to have the following various characteristics:

(1) They should cause no partiality in sampling.

(2) They should be able to sample the raw material uniformly over the whole width of the flow of the material.

(3) They should cause neither leakage nor retain any part of the sample in them.

(4) They should be easily set.

(5) They should be durable.

(6) They should be easy and cheap to make.

Conventional main sampling systems have mostly used a galley type or a bucket type device.

However, in the galley type, the conveyed material falling from one belt to another at a transfer point between conveying belts is cut across substantially vertically to the dropping direction of the sample by using a cutter so as to take the sample. In the bucket type, a bucket is moved in the sample dropping zone. A large space is required in the direction of the fall of the sample in setting either of them. It is impossible to set such device directly in the transfer point between a first and second conveying belts in the conveying system.

Even if such a conventional sampling device is installed by taking up a large space at the transfer point between the conveying belts, in the galley type, due to the large drop between the conveying belts, the wear on the second conveying belt will be so large that the period of normal use will be greatly shortened and, in the bucket type, because the buckets of the sampling device are limited, when the total width of the conveying belt for the raw material to be sampled is large, it will be difficult to take samples from the whole flow. When the amount of material conveyed is large, the sample taken will overflow the buckets. Further, in the galley type, because the sample taken is collected at the lower part of the first conveying belt, impurities will be likely to be present in the sample and therefore account of such impurities must be taken. In such a sampling device, when the raw material contains much water or is highly adhesive, the cutter which is the principal part of the sampler will be clogged with the sample and the sampling wil lbecome impossible. Therefore, although it is an automatic sampling device, it must be always watched. There is another known method wherein the sample is scraped or scooped up from the main conveyer. However, it is not effective in taking samples from ores containing lumps and no precise sampling can be obtained by using it.

The present invention has been made to eliminate the defects of the above described various sampling devices.

An object of the present invention is to provide a sampling device which can be placed in any existing conveying system without needing a large space at a transfer point between conveying belts in order to take samples.

Another object of the invention is to provide a sampling device which needs no vertical space than is necessary for transferring material from one conveyor to the next.

A further object of the present invention is to provide a sampling device wherein samples can be easily taken from the whole flow irrespective of the amount of the raw material conveyed and even the samples of even the raw materials containing large lumps or much water or which are high in an adhesiveness will not clog the device.

With these objects in view, the present invention relates to a sampling device characterized by comprising a moving means which reciprocates laterally over the whole width of a conveying belt for raw materials to be sampled at the terminal part of the belt and a sampling and conveying means hung on said moving means.

The sampling device of the present invention is set on the moving means which reciprocates laterally over the whole width of the first conveying belt at the terminal part of the belt. Therefore, even if the width of the first conveying belt is large, it will be possible to easily take samples over the whole width of the belt.

Because the present device is always driven to convey samples out of the stream of conveyed materials in the sample receiving direction by a driving means having a belt conveyor on belt bearing rollers, it can be set adjacent to the first conveying belt. Further, because the samples taken while the conveyed material is dropping from the first conveying belt are collected in turn in a sample receiver from a sample discharging end, even raw materials containing large lumps or much water or which are high in adhesiveness will not stay in the sampling device to clog it.

As described above, according to the present invention, the sampling device is mounted on a moving means and the conveying means in which a belt conveyor is used is provided to collect the samples in the sample receiver. Therefore, the device of the present invention can be easily incorporated in most existing conveying equipment.

The accompanying drawings shall be briefly explained.

FIGURE 1 is a side elevation view of a sampling device according to the present invention positioned in a conveying system, and

FIGURE 2 is a front elevation view of the device of FIG. 1.

An embodiment of the sampling device according to the present invention shall be described in detail with reference to the drawings.

In the drawings, **6** is a first conveying belt and **7** is a second conveying belt. In this embodiment, the raw material is fed with an ordinary drop from the first conveying belt **6** to the second conveying belt.

A sampling device **1** to take and convey out of the falling material samples is hung on a moving carriage **3** by a supporting frame **8** so as to extend through the path of the falling raw material as it falls from the terminal part of the first conveying belt. The sampling device has on the sides fixed side plates **2** supported on a supporting frame **10** and having adjusting threaded rods **15** thereon. Adjustable side plates **2'** for adjusting the sampling opening in the sampling device are positioned on the threaded rods **15** and extend above the upper ends of said side plates **2**. Such adjustable plates **2'** are pivotable about axes parallel to the collecting conveyor **12** so that the sampling opening may be adjusted by rotating the adjusting threaded rods **15**. Therefore, when the upper edges of the plates **2'** are inclined inwardly, the lower edges of said adjustable plates **2'** will open outwardly so as to protect the side of the sampling device **1** from the

falling powdery and granular substances. The sampling device 1 has a small belt conveyor 12, a motor pulley 9 provided at one end of the supporting frame 10 and belt supporting rollers 11 rotatably mounted in the supporting frame 10.

The moving carriage 3 is movably mounted on a frame 16 to move at right angles to the direction of the first conveying belt and is connected by a cable 13 to a driving device 5. The driving device 5 is made to reciprocate the carriage 3 by means of a limit switch or a timer device or may be interlocked with an automatic weighing machine. In the embodiment shown, there is used a cable drawing device but the present invention is not limited to this type of drive for the carriage 3. A sample receiver 4 is provided at the discharging end of conveyer 12 for the samples which are taken.

In operation, a part of the raw material falling onto the second conveying belt 7 from the first conveying belt 6 will fall into the sampling device 1 as the sampling device is moved reciprocally by the driving device 5. The sampling body 1 hung on the moving carriage 3 will continuously take samples impartially over the whole width of the first conveying belt 6. The samples taken are sent to the sample receiver 4 by the conveyor 12 on the sampling body 1.

What we claim is:

The claim in a conveyor system having a material conveyor moving in only one direction for conveying powdery, granular and lumpy substances, said one direction being fixed, said material conveyor having a width, that improvement comprising a sampling device, said sampling device comprising a carriage positioned immediately adjacent the end of the material conveyor and movable back and forth across the entire width of the material conveyor transversely of the direction of movement of the material

conveyor, and a collecting conveyor mounted on said carriage and having a width less than the width of the material conveyor and movable in a direction transversely to the direction of back and forth movement of said carriage, said collecting conveyor having one end immediately beneath the end of the material conveyor and conveying material away from beneath the end of said material conveyor, said sampling device further having side plates adjacent said collecting conveyor and extending about the level of said collecting conveyor and pivoted about axes parallel to the direction of movement of said collecting conveyor, and means for pivoting said side plates and retaining them in a pivoted position, whereby back and forth movement of said carriage moves said collecting conveyor through the stream of conveyed material falling from the material conveyor and the material collected on said collecting conveyor is conveyed out of the stream of falling material and said side plates can be freely pivoted over the edges of the collecting conveyor to adjust the size of the opening presented to the falling material and the bottoms of said side plates will protect the sides of the sampling device from the falling material which is not collected.

References Cited by the Examiner

UNITED STATES PATENTS

1,431,216	10/22	Cameron	198—97
2,277,416	3/42	Rutten	198—101
2,316,537	4/43	Hendrickson	73—421

FOREIGN PATENTS

1,078,547	8/57	Germany.

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