July 12, 1966 D. W. STILWELL 3,260,120

SAMPLING DEVICE

Filed Feb. 17, 1964

Fig. 1

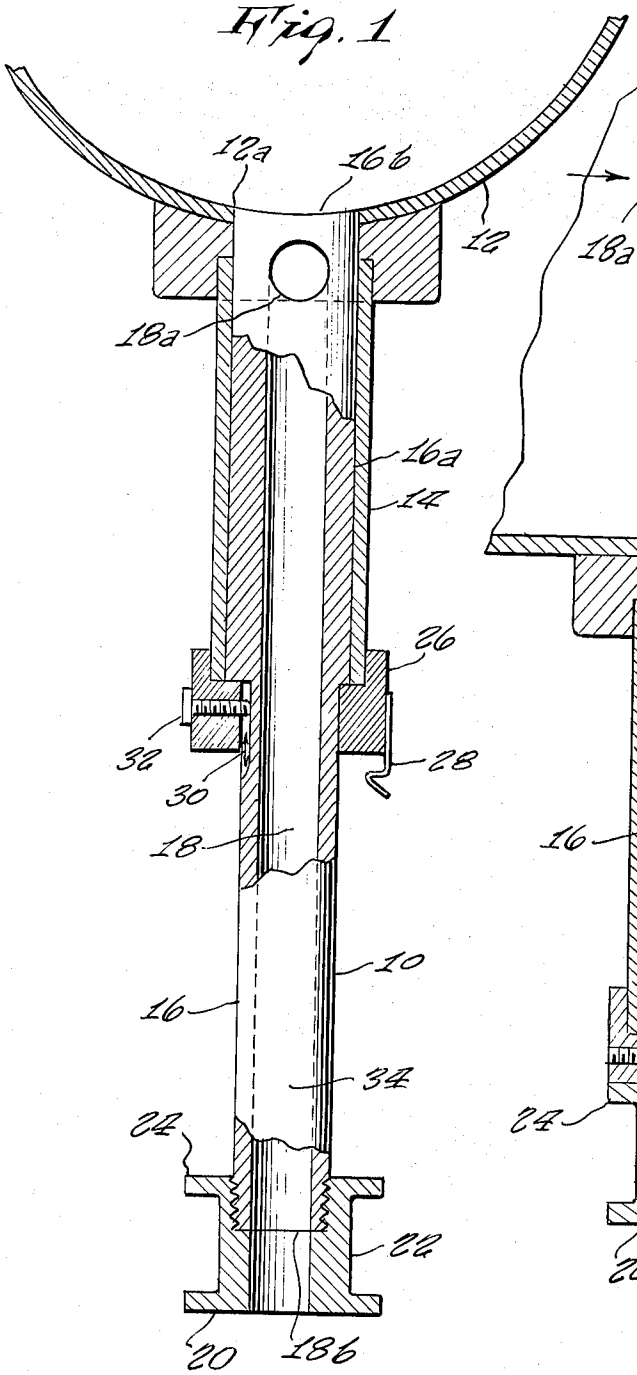
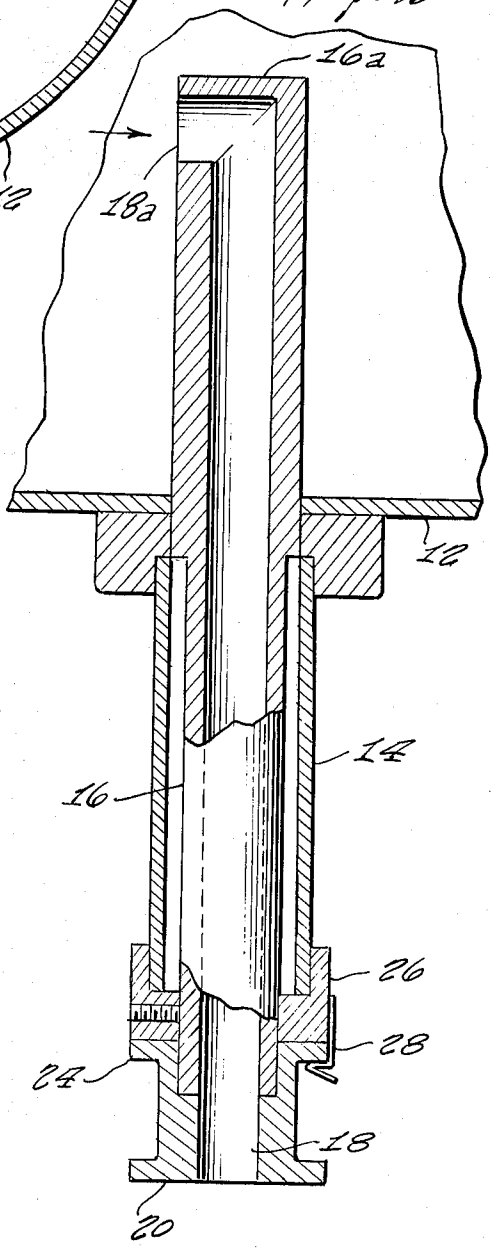


Fig. 2



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United States Patent Office 3,260,120 Patented July 12, 1966

3,260,120

SAMPLING DEVICE

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Filed Feb. 17, 1964, Ser. No. 345,231
1 Claim. (Cl. 73—422)

This invention relates to a device for sampling fluids and particularly to a device for removing small quantities of fluids conveyed through pneumatic conduits or pipe lines.

In various manufacturing processes it is necessary to intermittently withdraw samples of material from a flowing stream of a fluid product passing through a conduit which will be representative of the product. A specific application is that of sampling a fluid stream containing fines or pellets of industrial chemical products such as polyethylene or other polyolefin compositions. Generally, in such installations it is usual to provide a fluid sampling device having a sampling tube positioned so as to permanently protrude into the stream of fluid.

A number of problems are frequently encountered in sampling devices of this nature. For example, prior art sampling devices having tubes constantly present in the main fluid stream may cause the entrapment of fines or pellets of polyethylene or other polyolefins thereby creating an aggregation of these materials about the sampling tube. Upon a sufficiently large aggregation of these materials, a flaking-off of lumps or large particles thereof will occur, and the flaked-off materials will consequently be carried into the main product fluid stream thereby contaminating the product. Thus, in polyethylene (or other polyolefins) manufacture, various products of different melt indices, densities and/or molecular weights are usually conveyed through the same pneumatic conduits and pellets or powders of one type entrapped or held on permanent sampling devices can readily contaminate another type of product conveyed subsequently through the same conduit. This cross-contamination is often serious enough to cause the downgrading of an otherwise prime lot of product due to tight product specifications, thereby entailing an economic loss. Further, the permanent presence of the protruding sampling tube in the fluid stream is an obstruction to the smooth flow of product and may cause turbulence in the fluid stream resulting in an uneven distribution of material and consequent undesirable effects on the quality and nature of the product.

One object of the present invention is to provide an improved sampling device for fluids which avoids the problems encountered with the use of prior art sampling devices, as set forth hereinabove.

Another object of the present invention is to provide a sampling device which may be removed from the conduit and fluid stream when not engaged in a sampling operation.

Still another object of the present invention is to provide a sampling device in which the sampling tube when not engaged in a sampling operation may be retracted to form a continuous surface with the inner wall of the conduit, thereby preventing the aggregation of fines or pellets of polyethylene or other polyolefin materials.

In its broad aspects, the present invention contemplates a sampling device for fluids which comprises a conduit for carrying the fluid to be sampled, a tubular member attached to and projecting from the conduit and adapted to mate with an opening in the latter; a piston slidingly positioned within the tubular member and adapted to be advanced into said conduit at predetermined intervals; the piston having a passageway extending therethrough and permitting flow of fluid from the conduit when the piston is in its advanced position and preventing flow of fluid therethrough when the piston is in a retracted position. As used herein, the term "fluid" or "fluids" indicates solids such as powders, pellets and the like which are conveyed or flowed by gravity or pneumatic means through conduits such as pipes, etc. from one area to another.

Other objects and advantages of the present invention will become apparent by referring to the detailed description in the specification and preferred embodiment in the accompanying drawings which form a part of this invention, wherein:

FIGURE 1 is a front elevational view partially in section showing the sampling device of the invention in retracted non-operative position; and

FIGURE 2 is a side elevational view of the sampling device with portions broken away to provide a partial sectional view and with the device shown in extended operative position.

As shown in FIGURE 1, sampling device **10** is attached to a conduit **12** which can be a portion of a pipe line system. The sampling device **10** includes a tubular portion or member **14** attached to the conduit **12** in alignment with an opening **12***a* in the conduit wall. A piston **16** having a portion of enlarged diameter **16***a* is reciprocally supported within said tubular member **14** and is adapted to slidingly move in close contact with the inner wall of tubular member **14**. The end of the piston **16** protruding into the conduit **12** through opening **12***a* is preferably shaped to provide a surface **16***b* conforming substantially to the inner wall contour of the conduit **12**. A passageway **18** is provided in piston **16**, generally coaxial with the longitudinal centerline of the piston and preferably has a port **18***a* extending substantially perpendicular to the passageway **18** through surface **16***a* of the piston near the end of the piston adjacent the conduit **12**. The passageway **18** then leads to a second opening or port **18***b* at the distal end of the piston **16**, the latter of which is adapted to engage an attachment **20** for a sampling bag (not shown).

The sampling bag attachment **20** may be provided with an annular recess portion **22** adapted to provide an attaching surface for the sampling bag, and with an annular flange portion **24** which is designed to contact a bushing or closure member **26** threadingly attached to the tubular portion **14**. The closure member **26** provides for the retention of the piston within the tubular portion **14** and prevents the piston **16** from overtraveling during retraction.

The closure member **26** can also be provided with one or more resilient spring clips **28** which are adapted to engage flange portion **24** on the sample bag attachment **20** and retain the latter in the fully advanced position of piston **16** during a sampling operation (FIGURE 2). The closure member **26** may also be provided with a set screw **32** adapted to engage a slot **30** provided in the outer wall of the piston **16** in order to prevent rotation of the latter and thus assure positioning of port **18***a* in the direction of the flow of the fluid stream within conduit **12**. In order to indicate to a viewer that port **18***a* is positioned correctly with respect to the direction of flow of the fluid stream, a scribe line **34** may be provided on the outer surface of the piston **16**.

FIGURE 2 depicts the sampling device **10** in its operative sampling position with the piston **16** being fully advanced into the conduit **12**. At this point, flange portion **24** of attachment **20** abuts against closure member **26** and is firmly held in this position under the urging of spring clips **28** which are now located below the flange portion **24**. Port **18***a* in the piston **16** preferably faces in the direction of the fluid stream (shown through arrows) and samples of the fluid are thus permitted to

flow through port **18***a* and passage **18** into a sampling bag fastened to attachment **20**. When the desired quantity of sample material has been collected, the spring clips **28** may be manually deflected radially outwardly thereby disengaging flange portion **24** and permitting the manual movement of the piston **16** to the retracted position shown in FIGURE 1. When piston **16** reaches its retracted position upon the portion **16***a* of piston **16** abutting against closure member **26**, port **18***a* will be sealed off from the conduit **12**, thereby preventing flow of fluid through passage **18** and placing the sampling device **10** into its inoperative position. At that time the surface **16***a* of piston **16** will substantially blend with the inner wall contour of the conduit **12**, thus providing an unrestricted, substantially smooth flow passage for the fluid stream passing through the conduit.

While particular embodiments of this invention are shown above, it will be understood that the apparatus of this invention is obviously subject to variations and modifications without departure from its broader aspects.

What is claimed is:

A polyolefin pellet sampling device which comprises:

(a) a conduit for carrying pellets to be sampled,

(b) an open-ended tubular member attached at one end to the wall of said conduit and projecting outwardly from said conduit, said tubular member being in alignment with an opening in said conduit,

(c) a piston reciprocally supported within said tubular member whereby one end thereof can be alternately advanced into said conduit and retracted therefrom, said piston including a passageway adapted to convey pellets from said conduit through the entire length of said piston when said piston is in an advanced

position, the end portion of said piston adjacent to said conduit containing a port in fluid communication with said passageway and extending substantially perpendicular thereto, the portion of said piston which forms said port forming a substantially continuous surface with the inner wall of said conduit when said piston is in a retracted position to prevent flow of pellets and the distal end of said piston containing an opening in coaxial alignment with said passageway,

(d) means connected to said distal end of said piston for attaching a receptacle adapted to collect pellets passing through said port, pasageway and opening,

(e) a closure member attached to the end of said tubular member opposite said conduit for retaining said piston within said tubular member and for preventing said piston from overtraveling during retraction and

(f) at least one manually operable spring clip member attached to said closure member for retaining said piston in an advanced position within said conduit.

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