This invention relates to a sample collector especially adapted for taking samples of flowable materials such as liquids, solids, and mixed materials. More particularly, a sample collector is provided as a closed or sealed envelope, container or package from which a sample pouch or bag is detached for collecting a sample. There are many instances where samples are frequently taken and it is necessary or desirable to take and preserve the samples as free from contamination as possible. The cost of the sample collectors often necessitates reuse, and cleaning and sterilizing are necessary between uses and at times prior to the initial use. In addition to the direct cost involved, additional equipment, working facilities, and storage space are required. The possibility also exists that the sample collectors may not be processed properly.

It is an object of the invention to provide a new and improved sample collector which overcomes the disadvantages of prior devices and furnishes advantages thereover.

A particular object is to provide an inexpensive and disposable sanitary sample collector which is sealed until the time of use.

Another object is to provide a sample collector which is readily opened when a sample is to be taken, and then rapidly closed and sealed.

An additional object is to provide a sample collector which requires no appreciable storage space and need not be processed in any way.

Another object is to provide a sample collector whose requirements are simple and economical and is adaptable to field use.

Another object is to provide a sample container which requires merely detaching a sample pouch or bag which is then ready for taking a sample.

Another object is to provide a sample collector useful for taking diverse samples and especially liquids which should remain free from contamination. The collector is very advantageously used for example in sampling milk in dairy and like operations, in collecting water samples, in taking samples for medical purposes and in sampling industrial liquors. Solid materials may be collected equally well, and the absence of foreign materials is insured.

Another object is to provide a collector which includes construction for taking the sample pouch containing a sample, and which may serve for suspending the sample in a convenient location.

Further objects include the provision of a sample collector and a method for taking a sample which preserve the sample in a sanitary condition in the sample pouch and under internal pressure. These and other objects, advantages and functions of the invention will be apparent from the specification and upon reference to the accompanying drawings, in which like reference characters designate like parts in each of the views, and in which

FIGURE 1 is a side elevation of one embodiment of the sample collector of the invention;

FIGURE 2 is a perspective view of the embodiment of FIGURE 1, illustrating the sample pouch detached from the remainder of the collector and held in position for taking a sample;

FIGURE 3 is a side elevation of another embodiment of the sample collector;

FIGURE 4 is a perspective view of the sample pouch portion detached from the sample collector illustrated in FIGURE 3;

FIGURE 5 is a side elevation of the embodiment of FIGURES 1 and 2 after a sample has been taken and the sample pouch has been sealed; FIGURE 6 is a side elevation illustrating the operation of tying the pouch containing a sample, following the sealing operation illustrated in FIGURE 5; and FIGURE 7 is a side elevation of another embodiment of the sample collector, on a reduced scale, which provides two sample pouches from each sealed collector.

The new sample collector is constructed as a flat packed envelope or the like of flexible sheet material, and a score line is provided on the envelope and defines a sample pouch at one end of the envelope. The score line also defines finger tabs integral with the pouch, and the pouch and the tabs are detachable as a unit along the score line.

The flexible sheet material may be a resilient material, preferably thermoplastic synthetic resinous material such as polyethylene, or other sheet materials such as treated or untreated paper may be employed depending upon the intended use. When it is necessary or desirable to hermetically seal the sample collector and the sample pouch after taking a sample, it is preferred to employ resilient sheet material. The sample collector of resilient material is also preferably a continuous extruded tube which is sealed at each end.

Referring to the drawings, several embodiments of the sample collector are identified by the numerals 1, 2 and 3 in FIGURES 1, 3 and 7, respectively. The sample collector in each embodiment is a continuous extruded tube of polyethylene which is transversely heat sealed at the opposite ends of the tubes, as indicated by the bands 4 and 5, 6 and 7, and 8 and 9 in the respective FIGURES 1, 3 and 7. In producing the collector, the tube may be formed in such a manner that air may be expelled, and a hot bar or the like is applied to the tube to close and seal the flat sides together. The operation may involve producing a series of spaced transverse seals along the length of an elongated tube, followed by severing individual sample collectors therefrom. The collectors may be severed with a knife blade so that the sealed area shown are spaced slightly inwardly from the ends of the tube. Alternatively, the bands 8 and 9 may have sufficient width so that the tube may be cut in the center of the band to form the ends of two different collectors at each seal.

While it is preferred to employ a continuous tube for producing the most reliable seal and the strongest container, the sample collectors 1, 2 and 3 may be produced from a folded sheet appropriately sealed along a longitudinal edge. Other materials may be employed, such as cellophane, saran, paper, and various known sheet materials which are sufficiently strong and flexible to perform in the described manner. Instead of heat seals, other sealing means known to the art may be employed, such as adhesives and solvent welding. A representative thickness of sheet material is about three mils in the case of polyethylene, and the sample collectors 1 and 2 may be about three inches wide by seven inches long.

The sample collector 1 or 2 is provided with a corresponding score line 10 or 11 impressed on the collector between the sealing means 4 and 5 or 6 and 7 for the respective tube ends. The score lines are preferably arranged on opposite sides of the flattened tubes so that those on each side are opposite to each other. It is further preferred to provide on each collector a single endless score line which completely circumscribes the collector. The collector 1 or 2 may then be severed along the score line 10 or 11, tearing with the fingers, to produce a sample container 12 or 13 detached from a discarded portion 14 or 15.

The score line 10 or 11 defines a sample pouch or bag 16 or 17 at one end of the envelope or tube 1 or 2. The score line also defines opposed finger tabs 18 and 19 or
and 21 which are integral with the respective pouches. Rounded corners 22 or 23 are provided at the junctions of the tabs and the pouches, to prevent tearing in sampling and particularly, in sealing and tying the pouches containing samples.

The tabs 18-21 extend upwardly or longitudinally from the pouches 16 and 17 for a sufficient distance to enable the pouch to be sealed and tied as subsequently described. For example, the tabs may be about three inches long.

The score lines 10 and 11 are preferably impressed so that the pouch and tabs are detachable as a unit therealong, with no or but insubstantial perforation of the same. FIGURE 2, indicated 2. However, perforation of the collector may be tolerable in some instances, and in other instances may present no problem, particularly where the articles are supplied and stored prior to use in clouded containers or packages.

In the embodiment illustrated in FIGURE 7, which may be somewhat longer than the collector of FIGURES 1 and 3, one sample collector 3 provides two sample containers 24 and 25, defined by a single circumscribing score line 26 impressed in the manner described for FIGURES 1 and 3. By tearing the collector along the score line, the container 24 having a pair of integral central tabs 27 is produced. At the same time, the container 25 having a pair of integral tabs 28 along the edges is produced.

Each of the embodiments of FIGURES 1 and 3, and the two types of containers resulting from the embodiment of FIGURE 7, has advantages, so that either or both may be employed as desired. The embodiment of FIGURE 1 has the advantage that with the tabs 18 and 19 along the edges of the collector, the packaged sample is more secure. The embodiment of FIGURE 3 has the advantage that with the tabs 20 and 21 centrally located, the pouch 17 may be opened more readily for taking a sample.

FIGURE 2 illustrates the manner of taking a sample with the embodiment of FIGURE 1. After tearing the container 12 from the remaining portion 14, the tabs 18 and 19 are grasped between the fingers without inserting the fingers within the pouch 16, and the container may be pressed inwardly to spread the mouth 29 of the pouch. After taking a sample, the bag is whirlurubed about the axis passing through the extended tabs, which are preferably disposed around the tube about 180° apart. This causes the container 12 to wind around this axis as illustrated in FIGURE 5, closing and sealing the mouth 29 of the pouch 16. Air is also trapped in the pouch 16, and as the roll seal is produced, a small internal pressure is produced, which further guards against contamination. The tabs 18 and 19 are then knotted together as illustrated in FIGURE 6 to maintain the closure. The loop formed by the knotted tabs also serves as a means for hanging the container 13 in a convenient location, such as on hooks or rods in the laboratory.

In using the construction of FIGURE 3, the tabs 20 and 21 are pulled apart for taking a sample. The bag is whirlurubed about the axis of the opposed tabs while continuing to pull them apart, to produce a roll seal like that shown in FIGURE 5, except that the axis extends at an angle of 90° to the bottom or end seal 7. In this embodiment, it may also be advantageous to longitudinally crease the collector 2 in the center of each of the opposite sides, at the location of the tabs 20 and 21.

The invention thus provides a very effective and reliable yet inexpensive sample collector. Maximum cleanliness and freedom from contamination are assured, particularly inasmuch as a new article can be used for each sample at a cost substantially less than the cost of washing and sterilizing sample bottles or the like. At the same time, there need be no provision for storage and for processing the sample containers. The construction is eminently simple and very easy to use. The pouch containing a sample is easily and rapidly sealed, and the sealing means also serves as suspending or hanging means. The invention is especially useful in dairy operations and in other instances where samples are taken frequently and should be maintained as clean and sterile as possible.

The invention is hereby claimed as follows:

1. A sample collector comprising an elongated tube of thermostaltic synthetic resinous material, a heat seal closing each end of said tube, an endless undulating score line extending about said tube and between the heat seals for defining a sample pouch having an open end at one end of said tube, said score line also defining a pair of substantially diametrically opposed finger tab portions at the open end of said pouch, said tab portions being of lesser width than said open end, said pouch and tab portions being detachable as a unit from said tube, and said tab portions extending from the pouch a sufficient distance to afford tie members enabling the pouch to be sealed by winding same about a transverse axis extending through said tab portions and then joining said tabs together to maintain the seal.

2. A sample collector as defined in claim 1 and in which said score line is disposed in position to define such a sample pouch with such tabs on the open end thereof at each end of said tube.

3. A sample collector as defined in claim 1 and which includes rounded corners at the junctions of said tabs and said pouch.

4. A sample collector comprising a tube of flexible sheet material, means sealing each end of said tube, an undulating score line affording a separation line between one end portion of said tube and the remainder of said tube, said score line being disposed in such position on said tube as to define the open end of an open-ended samples pouch disposed between said sealing means, said score line also defining edge portions of elongated, substantially diametrically opposed finger tab portions projecting longitudinally from said open end of said pouch, said pouch and tab portions being separable as a unit from said open end portion along said score line, and said tab portions extending from said pouch a sufficient distance to enable the pouch to be sealed by winding it about an axis extending through said tab portions and then to enable said tabs to be joined together to maintain said seal.

References Cited in the file of this Patent

UNITED STATES PATENTS

1,453,015 Lavigne ------------ Apr. 24, 1923
2,192,722 Vogt -------------- Mar. 5, 1940
2,279,989 Hirschberg -------- Apr. 15, 1942
2,552,870 Scherer ------------- May 15, 1951
2,554,050 Neubeck ------------ May 22, 1951
2,750,033 Pickens ---------- June 12, 1956