METHOD AND APPARATUS FOR PROVIDING A SAMPLE FOR TESTING FOR VOLATILE EMISSIONS

The present disclosure is directed to a sample taking technique and also an apparatus which enables taking of a sample. It is particularly useful as a portable device which can be moved to and from remote sites where samples are required even where samples are required without any available electricity. Indeed, electrical power is avoided. It is a device which can be used to sample a fixed tank or container which must be tested or assayed to vouch for the purity of the material in the sample container. It can be used with both liquid and gas samples. Likewise, it can be used with a fixed tank or a moveable tank such as a rail tank car, or perhaps a tank in a barge.

The present apparatus is particularly useful in obtaining a sample for testing purposes without opening the lid or hatch on a container. There is a risk that dangerous fumes can be released upon cracking the lid or cover of a liquid or gas storage vessel. For instance, a liquid may create volatile fumes which are either poisonous or explosive.

They may create problems for nearby personnel, vegetation, cattle, livestock or wild life, or any other of a number of problems. In addition, some volatile discharges do not create a problem for anyone near the products but rather disperse in the atmosphere and create problems in the atmosphere, for instance, in airborne pollution, ozone depletion and the like. Suffice it to say, these problems are epidemic and create such difficulties that safety and personnel protection are paramount. Accordingly, the present disclosure sets forth an improved system for taking samples to avoid accidental release of vapors.

The present disclosure shows a structure cooperative with and coordinated with a storage tank or vessel having an internally located system which, more specifically, is permanently installed, is provided with quick disconnect fittings, and incorporates multiple lines extending to different depths of a storage or transportation vessel. More specifically, this set of equipment is utilized so that, as often as needed, the present apparatus can be connected to draw a sample or specimen from the interior. The sample or specimen is placed in a small container for easy testing at a remote location such as a laboratory. To get to the laboratory, a sample vessel must be taken to the site of the tank, filled with the sample and then removed to the testing laboratory. This provides small, easily handled samples.

The present system contemplates the use of a sample container having a protective lid which, when removed, exposes a septum over the mouth of a shatter proof container so that the material making up the sample is captured on the interior. This material is delivered by means of syringe needles which are inserted through the septum. Moreover, the syringe needles provide two paths through the septum, one to introduce the sample and the second to remove the gas originally in the sample container. The two needles cooperate with a valve mechanism supported on an upstanding frame. One needle is connected directly with the valve and serves as an inlet. The valve is a two position, three way valve providing an alternate port for recirculation. Moreover, the valve is constructed and positioned by means of a mounting mechanism so that the valve provides flow directly out of the valve into an industry approved fitting connecting directly to a straight needle for injection of the sample. By contrast, a bent needle is provided which enables gas circulation from the sample container flowing in the bent needle connected through another industry standard fitting and out through a flow line assembled of industry standard fittings. The valve and the associated fittings are constructed on a mounting mechanism which aligns the needles so that the needles are in close proximity to form the necessary perforations in the septum for injection into the container. Moreover, this type arrangement is able to deliver the vented or voided gas flow for circulation back towards the storage vessel. For instance, the storage vessel which is being sampled may hold a very large volume. When the present apparatus is connected with it, the volume of sample flow delivered is relatively small. Accordingly, a highly reliable delivery system for transfer of gas sample to and from the large storage vessel is readily provided in this apparatus. Moreover, this apparatus provides a mechanism which can readily pump the required sample. Pumping is accomplished by means of a portable structure which is suitably hand carried to a field location so that the sample can be readily extracted in all kinds of field locations, in all kinds of inclement weather, and with all kinds of risks relatively safe handled. For instance, if the sample is a gas which is explosive when exposed to atmosphere, the present apparatus accommodates that problem by the incorporation of a sample collection mechanism which features the twin needle system just mentioned as well as a pump which is hand operated substantially without risk of electrical spark. It is preferably constructed without steel so that the whole of the structure is not able to form a spark. In addition to that, there is safety in the definition of the flow path. Escape of the sample gas to atmosphere is prevented. There is a closed flow path which extends through the equipment of this system serially connecting with a pump, then a valve, then the twin needle construction adjacent to the valve for delivery into the sample container and back to the storage tank. This route (provided substantially without chance of escape to the atmosphere) yields a system which is able to operate safely without creating fugitive gases which might otherwise escape to the atmosphere.

The present apparatus is summarized as a portable sample collection system which has an integrated pump, valve and twin needle delivery system. In a large housing which is sized to be hand carried, a hand crank provides power for a pump. The pump forces the sample gas through the equipment by delivery of the flowing sample from the pump into a two position, three port valve. In one position, the sample is delivered through a twin needle construction into a closed sample bottle. Moreover, the sample bottle is filled while the previously existent gas in the bottle is forced out through the twin needle construction. That defines a return flow path back to the storage tank. In the preferred embodiment, the twin needle construction is achieved by mounting twin needles on a bracket or frame work which supports the two position valve along with a valve actuator. The valve and frame work align the needles so that they may be jointly forced into the sample container. Moreover, the twin needle construction utilizes approved standard fittings which are leak proof and which are also known to provide quality sealing for the sample collection system. The apparatus is portable, being provided with a pair of hoses which