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GAS SAMPLING DEVICE

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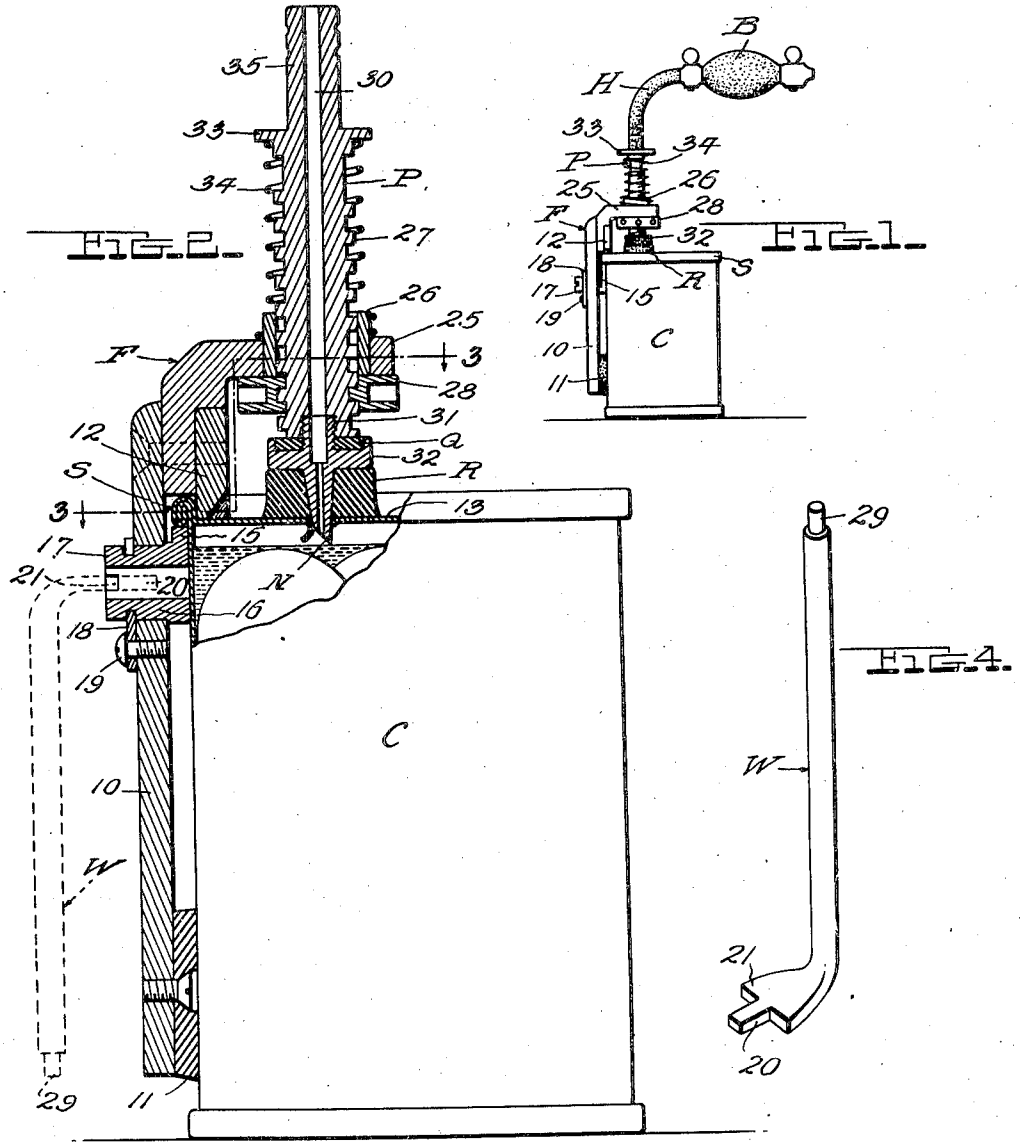


FIG. 2.

FIG. 1.

FIG. 4.

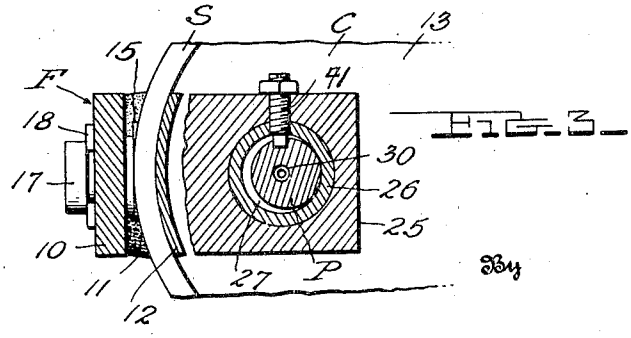


FIG. 3.

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GAS SAMPLING DEVICE

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6 Claims. (Cl. 222—5)

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It is frequently desirable, for example with containers having fillings of food products, to obtain samples of the gas content of the container, preliminary to analysis or other test.

The present invention is concerned with a device by which such samples may be quickly and conveniently obtained.

One of the features of the device is the provision of a structure including parts for presenting a piercing and sampling tool to a wall of a container, together with means for moving the tool and thereby piercing the container wall.

Another feature of the invention is the provision of a tool which may be employed upon containers of different sizes, without requiring extensive adjustment of parts preliminary to the sampling operation.

A further feature of the invention is the provision of such a device in which means are included for assuring the sample from loss or adulteration during its removal from the structure undergoing test.

With these and other features as objects in view, as will appear in the course of the following description and claims, an illustrative form of practicing the invention is shown on the accompanying drawings, in which:

Figure 1 is a general assembly view, showing the employment of the device.

Figure 2 is an upright section through the device as employed upon a tin can, with parts broken away for clearness of disclosure.

Figure 3 is a section of parts of the device shown in Fig. 2, on line 3—3 thereof.

Figure 4 illustrates an adjusting wrench or tool.

In these drawings, the device is illustrated as employed with a tin can C which has a double seam S at its upper end, this seam projecting radially beyond the body wall.

The device has a frame F which can be held immovable with respect to the container C, and a plunger P which can be guidedly moved toward a wall of the container C so that a hollow piercing needle N is forced through this container wall for extracting the sample. A seal R of rubber or similar resilient material surrounds the needle N and is engaged with the container wall as a preliminary to the piercing operation, so that it provides a packing against escape of gas from the container, or penetration of the atmosphere to the container, except as permitted through the passageway of the needle N. The plunger P is connected by a flexible conduit such as a

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rubber hose H with a vessel B which forms part of the analytic apparatus itself by being one of the usual reagent vessels or a sampling flask.

More specifically, the illustrative form of Fig. 2 has a frame F provided with a leg 10 having a rubber cushion pad 11 secured near its lower end. An abutment piece 12 can be engaged with the upper or end wall 13 of the container C, inside of the peripheral double seam S. An eccentric 15 has a journal portion 16 mounted in the leg 10 for rotation, and also has an outer end 17 provided with a diametrical kerf. A groove between the portions 16, 17 receives a key piece 18 which is retained by a screw 19 threaded into the leg 10; this key piece being effective; to prevent axial movement of the eccentric 15. It is preferred to provide a central axial bore in the eccentric asembly 15—17 for the pilot 20 of a wrench W, Fig. 4, which has a diametrical bit 21 for engagement in the kerf in the end 17, so that this removable wrench may be employed for rotating the eccentric 15. Obviously, an ordinary screw driver may also be used, but the special tool is preferred to avoid accidental slippage from the kerf and possible damage to the side of the can.

The upper portion 25 of the frame F extends over the container C, in the illustrated form, and has a bushing 26 secured therein to form a guide for axial sliding movement of the plunger P. This plunger P is formed externally with a thread 27 of coarse pitch, as for example a square thread, and preferably having a relatively wide land at the outer periphery, for guided movement in the bushing 26 and to avoid locking with turns of the surrounding spring 34. A nut 28 is threadedly engaged with the thread 27, and can be rotated even when the device is tightly seated on the can end, by engaging the spanner pin 29 of the wrench (Fig. 4) in the peripheral holes provided. A screw 40 is pased through the frame, the bushing 26, and into a longitudinal groove of the plunger P, to prevent rotation of the plunger while turning the nut 28.

The plunger P has a central passage 30 from end to end. At the lower end of the plunger, it has a threaded cavity 31 into which the hollow needle N may be introduced. This hollow needle N is illustrated as formed integrally with a knurled collar 32 which is recessed to receive the resilient sealing ring Q; and preferably has a slightly tapered form leading to an oblique piercing end. The sealing member R is illustrated as a cylinder having a central bore smaller than the needle and of a resilient rubbery com-

position which is resistant to deterioration by the action of the contents of the container C, and in unstressed condition projects beyond the needle.

Near the upper end of the plunger P is provided a flange 33 against which bears a spiral coil spring 34 whose enlarged lower end engages the frame F, illustratively surrounding the bushing 26. It will be noted that the pitch angle of this spring is preferably opposite to the pitch angle of the thread 27, to avoid interlocking. The upper end of the plunger P is provided with a corrugated nipple 35 for the hose connection H.

In use, when it is desired to take a sample of gas from the container C, the eccentric 15 is rotated into a free position, and the nut 28 is moved to a position near the needle end of the plunger P, this plunger being retracted by the spring 34.

The frame F is then presented over the container C so that the abutment 12 engages the end wall of the container, and the cushion pad 11 rests against the side of the container. The eccentric 15 is then rotated by the wrench W until it engages beneath the double seam S of the container, and thus firmly clamps the frame F in position by the opposed engagements of the abutment 12 and the eccentric 15. It will be noted that the abutment 12 is essentially engaged with the inner surface of the axially projecting part of the double seam, so that relative movement of the frame F away from the axis of the container C is avoided.

The nut 28 is then rotated by hand and by the wrench W. The plunger P is thus moved downward, into the position of parts as shown in Fig. 2, until the sealing member R engages the outer surface of the end wall 13 of the container. Continued rotation of the nut 28 causes the plunger P to compress the sealing member R and also to cause the piercing needle or point N to penetrate through this wall 13. When this penetration has occurred, the gas within the container C is free to move through the hollow needle N and the passage 30 to the testing apparatus. At this time, the sealing member R prevents contamination or escape of this gas.

Thus, the sampling bottle B, the hose H and the bore 30 down to the tip of the needle N may be previously filled with an inert displacement liquid, which is expelled by the gas sample and therewith no contamination by air in these parts results. Similarly, the hose H may be connected directly to an Orsat apparatus for analyzing gases.

The apparatus can be quickly removed from the container by turning the eccentric 15 and thus freeing it from the double seam S.

When a number of containers are to be tested, it is merely necessary to turn the nut 28 backwardly a sufficient distance so that the needle is withdrawn and the sealing member R is ready for engagement with the end wall 13 of a further container, and then the seating, piercing and sampling operations are accomplished on the second container, and so on.

It will be noted that the illustrated construction permits employment on containers of different sizes and shapes without major adjustment, that the piercing needle N may be removed and replaced when worn or broken, and that the passage 30 and the passage in the needle or point pin are in alignment so that the structure may be easily cleaned in the event of soiling. It will further be understood that the illustrative form is not restrictive, and that the

invention may be employed in many ways within the scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A gas sampling device for containers comprising a frame having means for securing the same against movement in one direction relative to a container, a hollow plunger movable in said frame and having means whereby the same may be connected to a gas-receiving device and also having a hollow piercing point at its end, a gas-receiving device connected to said connection means, means engaged with the frame and plunger and effective when the frame has been secured to a container to cause the plunger to move its point in the opposite direction and through a wall of the container, and a resilient sealing member surrounding and closely embracing the point and in unstressed condition extending beyond the point and operative upon said movement of the plunger to establish a seal around the point and against the can wall prior to penetration of the can wall whereby communication from the interior of the pierced container is limited to the passage through said hollow point.

2. A gas sampling device for containers comprising a frame having means for clamping to a container and including a guide, a hollow plunger movable along said guide toward and from a wall of the container and having means at one end for connection to a gas-receiving device, a gas-receiving device connected to said connection means, a hollow piercing point at the other end of the plunger, means engaged with the frame and plunger to move the plunger along the guide and force the point through a wall of the container, and a resilent sealing member surrounding and closely embracing the point and in unstressed condition extending beyond the point and effective to establish a seal around the point and against the can wall prior to penetration of the can wall whereby communication from the interior of the pierced container is limited to the passage through said hollow point.

3. A gas sampling device for containers comprising a frame having a stop engageable with an end wall and with the inner surface of a double seam of a container, a rotatable eccentric on the frame effective upon rotation to engage the double seam of the container and clamp the same against said stop, said frame including a guide, a hollow plunger movable along said guide toward and from said end wall of the container and having means at one end whereby the same may be connected to a gas-receiving device, a gas-receiving device connected to said connection means, a hollow piercing point on the other end of the plunger, means engaged with and movable relative to the frame and plunger to move the same and force the point through a wall of the container, said frame including an abutment part for engagement with the container at a point spaced from said stop and from said point whereby to assist the frame to resist movement responsive to the forces operative during said forcing, and a resilient sealing member surrounding and closely embracing said point and effective to establish a seal prior to penetration of the can wall whereby communication from the interior of the pierced container is limited to the passage through said hollow point.

4. A gas sampling device for containers comprising a frame having means for clamping to a

container and including a hollow guide portion, a hollow threaded plunger slidable in said guide and having means at one end whereby the same may be connected to a gas-receiving device, a gas-receiving device connected to said connection means, a hollow piercing point on the other end of the plunger, a threaded nut engaged with said plunger and engageable with said frame upon rotation whereby to cause the plunger to move toward the container and force said hollow point through a wall of the container, and a sealing member carried by the plunger and surrounding and closely embracing the point and in unstressed condition extending beyond the point and effective to establish a seal around the point and against the can wall prior to penetration of the can wall between the plunger and the container wall whereby communication from the interior of the pierced container is limited to the passage through said hollow point.

5. A gas sampling device for a container having a double seam at the junction of its body and one end, comprising a frame having arms extending from the double seam along body and end walls of the container, an abutment piece at the end of one of said arms for engaging a said wall at a point remote from the double seam, clamping means at an intermediate part of the length of the frame for securing the device to the double seam, hollow piercing means guided by the other arm and having means whereby the same may be connected to a gas-receiving device, a gas-receiving device connected to said connection means, means engageable with the other arm and with the piercing means for actuating the latter to pierce a wall of the container when said frame has been clamped to the container, and a resilient sealing member surrounding and closely embracing said point and effective to establish a seal prior to penetration of the can wall whereby communication from the interior of the pierced container is limited to the passage through said hollow point.

6. A gas-sampling device for perforating the end of a sealed can and sampling a gas in the headspace thereof without contamination from the atmosphere, comprising a bracket having a part to be positioned along a side of the can,

means connected with the bracket for gripping an end seam of the can and including a movable part for detachably connecting the bracket to the can, said bracket having an extension which in the connected position of the bracket is located over the can end adjacent the said seam, a threaded plunger carried by the bracket extension, an elastic sealing member connected at the end of the plunger and positioned between the bracket extension and the said can end, a piercing element connected to the plunger and located within the sealing member in the unstressed condition of the sealing member, a threaded member cooperative with the threaded plunger and reacting against said bracket extension for moving the sealing member into sealing engagement with the can end and thereafter forcing the piercing element through the can end while stressing the sealing member, and a gas receiving device attached to the other end of the plunger, said piercing element and plunger being provided with a passageway therethrough for providing a sealed communication between the interior of the pierced can and said gas receiving device.

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