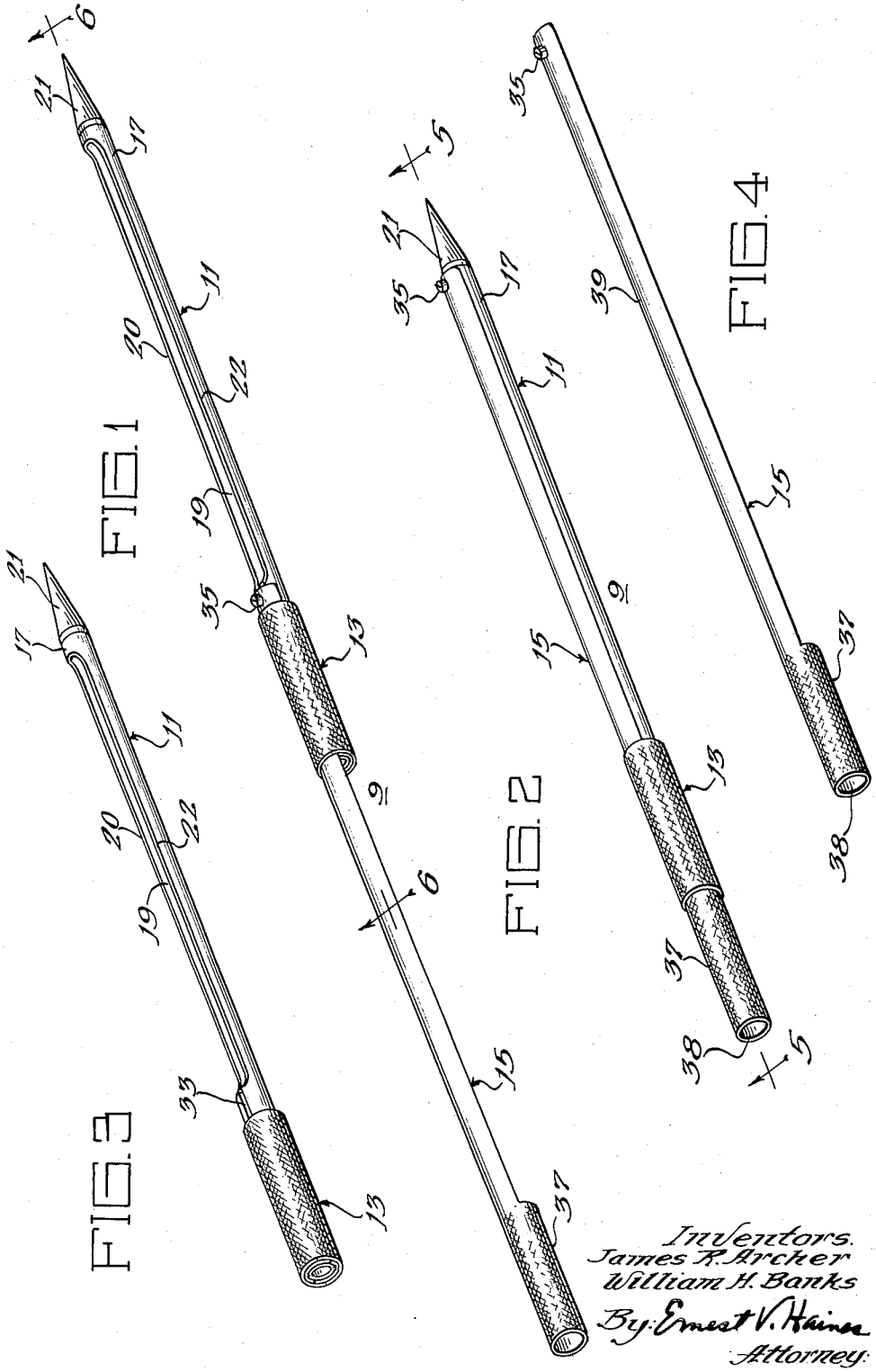
Jan. 17, 1961 J. R. ARCHER ET AL 2,968,184

SAMPLING TUBE

Filed May 29, 1958 2 Sheets-Sheet 1



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SAMPLING TUBE

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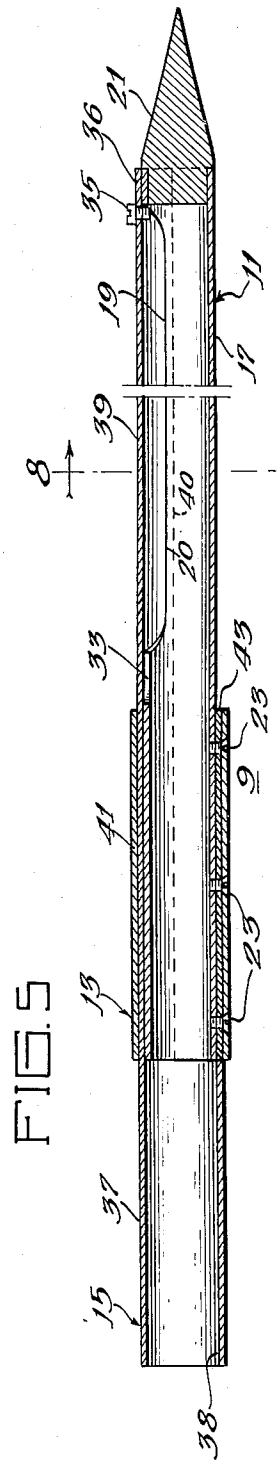


FIG. 5

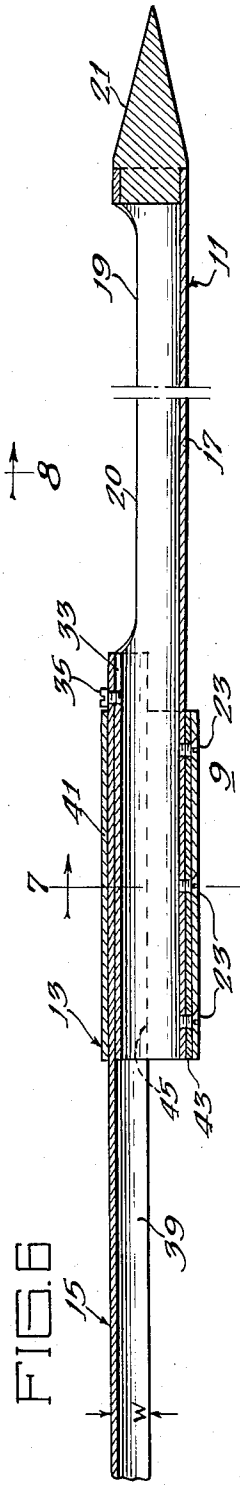


FIG. 6

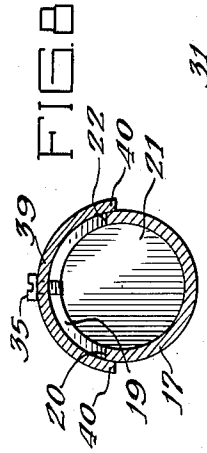


FIG. 8

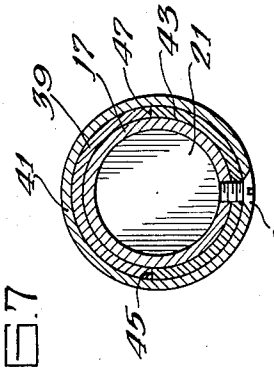


FIG. 7

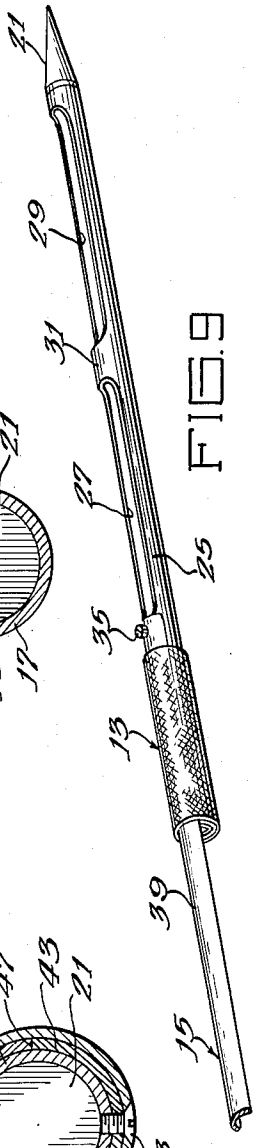


FIG. 9

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SAMPLING TUBE

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The present invention generally relates to a sampling tube for sampling solid materials and more particularly relates to a sampling tube for sampling granular materials such as grain, mash, meal, animal feeds, fertilizer, etc.

Sampling tubes are, in general, well known and the use and design of sampling tubes have been of considerable interest to agricultural chemical analysts, agronomists, plant pathologists, and control officials as well as other persons concerned with the sampling of divided materials such as grain, animal feeds, fertilizers, etc.

Considerable difficulty has been experienced with previously used sampling tubes. One difficulty is that the materials being sampled would frequently clog the sampling tube and render the tube inoperative or difficultly operative. Also, the design of some of the previous sampling tubes was such that a representative sample would not be taken.

An object of the present invention is to provide a new and improved sampling tube.

Another object of the present invention is to provide a sampling tube which is relatively simple to operate.

A further object of the invention is to provide a sampling tube which is simple in design and relatively inexpensive to manufacture.

A still further object of the present invention is to provide a new and improved sampling tube having nonclogging and self cleaning features.

These and further objects and advantages of the present invention will be apparent from the following description and accompanying drawings which illustrate embodiments of the invention.

In the drawings:

Figure 1 is a perspective view of a sampling tube embodying various features of this invention, the tube being illustrated in its open position for receiving material;

Figure 2 is a perspective view of the sampling tube shown in Figure 1 with the tube illustrated in its closed position;

Figure 3 is a perspective view of the receiving and handle members of the sampling tube illustrated in Figures 1 and 2;

Figure 4 is a perspective view of the cover member of the sampling tube illustrated in Figures 1 and 2;

Figure 5 is a cross-sectional view of the sampling tube taken along line 5—5 of Figure 2;

Figure 6 is a fragmentary sectional view taken along line 6—6 of Figure 1;

Figure 7 is a cross-sectional view taken along line 7—7 of Figure 6;

Figure 8 is a cross-sectional view taken along line 8—8 of Figure 5; and

Figure 9 is a perspective view of a modification of the sampling tube illustrated in Figures 1 and 2.

The present invention provides an apparatus for sampling materials such as grain, mash, meal, animal feeds, fertilizers, etc. The apparatus includes a hand grip member adapted to be grasped and firmly held by the hand

of the user, a receiving member extending from the hand grip member, the receiving member including a receptacle for receiving material to be sampled, and a cover member slidably engaged with the hand grip member. The cover member is slidable to a closed position wherein the cover member is in overlying position relative to the receptacle so as to prevent material to be sampled from entering the receptacle. The cover member is also slidable to an open position wherein the cover member is removed from the overlying position so as to permit material to be sampled to enter the receptacle.

The use of the apparatus makes possible the sampling of materials with a minimum of difficulty. The sampling tube may be constructed of any suitable material such as wood, paper, metal, plastic, etc. which has sufficient structural rigidity. The various parts of the sampling tube may be of the same material or of different materials.

Embodiments of the apparatus of the present invention are shown in the drawings and are described in the following paragraphs. While the sampling tube shown in the drawings is specifically adapted for the sampling of granular fertilizers, it will be understood that the sampling tube may be used in the sampling of other products with equal facility.

The sampling tube **9** shown in the drawings includes, generally, an elongated receiving member **11** having a hand grip member **13** at one end. A cover member **15** is slidable relative to the receiving member **11** and the hand grip member **13**. The open position of the sampling tube **9** is shown in Figure 1. In the open position the material to be sampled is able to enter the receiving member **11** as will hereinafter become apparent. The closed position of the sampling tube **9** is shown in Figure 2. In the closed position the cover member **15** is in overlying position relative to the receiving member **11** and the material to be sampled cannot enter the receiving member **11**.

Referring now more particularly to the drawings, the specific sampling tube **9** illustrated embodies various of the features of the invention and, as has been pointed out, is particularly adapted to the sampling of granular fertilizers. The illustrated sampling tube **9** includes the receiving member **11**. The receiving member **11** includes a tubular receptacle portion or tube **17**. The tube **17** has an elongated opening **19** in the walls and a tapering or sharp end plug **21** at one end of the tube. The end of the tube **17** opposite the end plug **21**, is attached to the hand grip member **13** by set screws **23** (Figures 5, 6 and 7).

The tube **17** illustrated is a hollow cylinder of any suitable material which has structural rigidity. Instead of a hollow cylinder other similar hollow conduits of oval, square, polygonal or other cross section may be used. The tube **17** has the opening **19** in the walls of the tube and the opening may be formed by cutting away a portion of the tube wall. The receiving member **11** may, of course, be constructed in other manners such as rolling, stamping, molding, etc. As is particularly illustrated in Figure 8, the opening **19** is somewhat less than a semicircular portion, which accordingly leaves somewhat more than half of the tube as a holder or receptacle for the material. The opening **19** is elongated and extends from adjacent the plugged end of the tube to adjacent the hand grip member **13**. The sides **20** and **22** of the opening **19** are substantially parallel and are parallel to the longitudinal axis of the tube **17**. In the tube **17** illustrated in Figures 1–8 a single opening **19** in the walls of the tube is indicated. The tube may however be modified as is illustrated in Figure 9. The tube **25** shown in Figure 9, has two openings **27** and

29 in the walls thereof, with the remaining tube portion 31 between these openings forming a bridge-like structure. The bridge 31 imparts greater rigidity to the tube.

The opening 19, near the hand grip member 13, necks down to form a narrow slot 33 which extends to adjacent the hand grip member 13. The sides of the slot 33 are substantially parallel and are parallel to the longitudinal axis of the tube 17. The slot 33 is provided to accommodate a set screw stopper means 35 on the cover member 15 as is hereinafter set forth in greater detail.

The cover member 13 is also fabricated from a tube having a circular cross section; however, it will be apparent that the cover member may have other cross sections and may be constructed of materials other than tubes. The cover member 13 has a tubular handle portion 37 and a cover portion 39. With a tubular handle portion 37 there is an opening or passageway 38 through the handle portion. The cover portion 39 is of a size and shape so that in the closed position of the sampling tube, as is illustrated in Figures 2 and 6, the cover portion 39 overlies the entire opening 19 in the tube 17. To insure against leakage of material between the cover portion 39, the cover portion 39 preferably overlaps the entire opening 19 as is illustrated in Figure 8 at 40. In the illustrated embodiment the cover portion 39 is almost a 180° segment of a circular tube, that is, it is approximately semicircular in cross section.

The cover member 15 has the centrally positioned set screw 35 therein adjacent the end of the cover portion 39 opposite the handle portion 37. The screw 35 extends through the cover portion 39 and is centrally positioned so as to slide into the slot 33 in the tube 17 when the cover member 15 is in its open position as illustrated in Figures 1 and 6. By providing the slot 33 and the set screw 35 adjacent the end of the cover portion 39, the entire opening 19 is exposed for the entry of material to be sampled into the tube 17. The set screw 35 is not at the extreme end of the cover portion 39 but is set back slightly so there remains an end portion 36 (Figure 5) of the cover portion 39 which overlaps the tube 19 when the sampling tube is in its closed position.

As hereinbefore set forth, the end of the tube 17, opposite the end plug 21, is attached to the hand grip member 13 by set screws 23. As illustrated in Figures 5 and 6 the tube 17 extends to the left or outer ends of the hand grip member 13. The hand grip member 13 is a relatively short section of a tube 41 and the cover portion 39 of the cover member 15 is slidable within the hand grip 13. As illustrated in Figures 5, 6 and 7, the interior diameter of the hand grip member tube 41 is substantially equal to the exterior diameter of the tube from which the cover portion 39 is fabricated. Likewise, it should be noted, that the interior diameter of the tube from which the cover portion 39 is fabricated is substantially equal to the exterior diameter of the tube 17. The cover portion 39, therefore, slides within the hand grip 13 between the hand grip tube 41 and the tube 17. The cover portion 39 is readily slidable through the hand grip 13 in a direction parallel to the longitudinal axis of the tube 17; however, to prevent rotational motion of the cover member 15 about this axis a runner member 43 is provided within the hand grip tube 41. This runner member 43 also serves to space the lower section of tube 17 from the hand grip tube 41. The runner member 43 is a segment of a short section of a tube of approximately the same diameter as the cover portion 39. The segment of the tube is approximately equal to the segment of the circle that is absent from the cover portion so that the runner member 43 and the cover portion 39 form a complete circle as is shown in Figure 7. The upper edges 45 and 47 of the runner member 43 are parallel to each other and are parallel to the longitudinal axis of the tube 17. The runner member 43 is secured within the hand grip member 13 by the set screws 23. When the members 11, 13 and 15 are of a cross section other than circular, the same general close fitting relationship of these members, as is illustrated in Figure 7, is preferably maintained.

In one commercial embodiment of the sampling tube illustrated in Figures 1–8, the overall length of tube 17 was 26" and had an I.D. of ⅞" and an O.D. of 1". The opening 19 in the tube 17 measured 13/16" wide and was 18⅞" long. The cover member 15 was fabricated from a 31⅜" length of tube of 1⅛" O.D. and 1" I.D. The handle portion 37 was 4⅞" long. The dimension W (Figure 6) was ½", the handle member 13 was a 6" length of tube of 1¼" O.D. and 1⅛" I.D. The slot 33 was ⅜" wide and ⅞" long.

The commercial embodiment of the tube has proven very easy to use, is non-clogging, self cleaning, and is relatively inexpensive to fabricate.

When used to sample a material such as, for example, granular fertilizer from a bin, the sampling tube 9 in its closed position, as is illustrated in Figure 2, is inserted into the bin, point first. The user then keeps a firm grip on the hand grip member 13 with one hand and pulls on the handle portion 37 of the cover member with the other hand thereby sliding the cover member 15 along the exterior surface of tube 17 and out through the hand grip member 13 until the set screw stopper 35 hits the end of the slot 33 nearest the hand grip member. The sampling tube is now in open position as illustrated in Figure 1. In order to aid in maintaining a firm hold on the hand grip member 13 and the handle portion 37, the exterior surface may be scored, ribbed, checkered, or otherwise roughened as is indicated in the drawings, or may be taped, have handles attached, etc.

When the sampling tube is in open position the fertilizer enters the receptacle portion of the receiving member 11 through the opening 19. The cover member 15 is then pushed back over the receiving member until it again assumes the closed position as illustrated in Figure 2. The entire sampling tube 9 may then be withdrawn from the bin by pulling on the hand grip member 13, and the sample of fertilizer may be removed from the tube by sliding back the cover member 15 and emptying the contents through the opening 19. The filled sampling tube may also be emptied by adjusting the position of the sampling tube so that the contents empty through the hand grip member 13 and pass out the opening 38 in the tubular handle portion 37 of the cover member 15. Emptying the contents through the opening 38 may be performed with the cover member 15 in the closed position.

The present invention has been described with reference to a specific illustrated embodiment of the present invention; however, other physical embodiments and various modifications within the scope of the present invention will be apparent to those skilled in the art.

Having now fully described and illustrated the invention, what is desired to be secured and claimed by Letters Patent is set forth in the appended claims.

1. A sampling tube comprising a tubular hand grip member adapted to be grasped and firmly held by the hand of the user, an elongated tubular receiving member having one end secured within said hand grip member and extending therefrom, said tubular receiving member having an elongated opening in the wall of the tube so that material to be sampled may pass into the interior of said tubular receiving member, an elongated cover member slidably engaged with the interior surface of said hand grip member and slidable in a direction parallel to the longitudinal axis of said tubular receiving member to a closed position wherein said cover member overlies said opening in the wall of said tubular receiving member so as to prevent material to be sampled from entering said tubular receiving member and slidable to an open position wherein said cover member is removed from

the overlying position so as to permit material to be sampled to enter said tubular receiving member through said opening, said cover member being in contact with the exterior of said tubular receiving member in both said open position and said closed position, said cover member being of dimensions so as to overlap said opening in the wall of the tubular member when said cover member is in the closed position, and a runner member secured within said hand grip member, said runner member slidably engageable with said cover member to permit the cover member to slide in a direction parallel to the longitudinal axis of said tubular receiving member and to prevent rotational motion of said cover member about said longitudinal axis.

2. A sampling tube comprising a generally tubular hand grip member adapted to be grasped and firmly held by the hand of the user, an elongated tubular receiving member secured at one end to said hand grip member and extending therefrom, said tubular receiving member having an elongated opening in the wall of the tube so that material to be sampled may pass into the interior of said tubular receiving member, said elongated opening extending from adjacent said hand grip member to adjacent the other end of said tubular receiving member, an elongated cover member slidably engaged with the interior of said hand grip member and slidable along the surface of said tubular receiving member in a direction parallel to the longitudinal axis of said tubular receiving member to a closed position wherein said cover member overlies the entire opening in the wall of said tubular receiving member so as to prevent material to be sampled from entering said tubular receiving member and slidable to an open position wherein said cover member is removed from the overlying position so as to permit material to be sampled to enter said tubular receiving member through said opening, a slot in said tubular receiving member extending from said opening in the wall of said tubular receiving member to adjacent said hand grip member, said cover member being in

contact with the exterior of said tubular receiving member in both said open position and said closed position, said cover member being of dimension so as to overlap said opening in the wall of the tubular receiving member when said cover member is in the closed position and having a stop means adjacent an end thereof and positioned on said cover member so as to slide within said slot when said cover member is in open position.

3. A sampling tube comprising a tubular hand grip member adapted to be grasped and firmly held by the hand of the user, an elongated tubular receiving member having one end secured to said hand grip member and extending therefrom, said tubular receiving member having at least one opening in the wall of the tube so that material to be sampled may pass into the interior of said tubular receiving member, an elongated cover member slidable within said tubular hand grip member and slidable along the surface of said tubular receiving member in a direction parallel to the longitudinal axis of said tubular receiving member to a closed position wherein said cover member overlies said at least one opening in the wall of said tubular receiving member so as to prevent material to be sampled from entering said tubular receiving member and slidable to an open position wherein said cover member is removed from the overlying position so as to permit material to be sampled to enter said tubular receiving member through said at least one opening, and a runner member secured within said hand grip member, said cover member slidably engageable with said runner member to permit the cover member to slide in a direction parallel to the longitudinal axis of said tubular receiving member and to prevent rotational motion of said cover member about said longitudinal axis.

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