

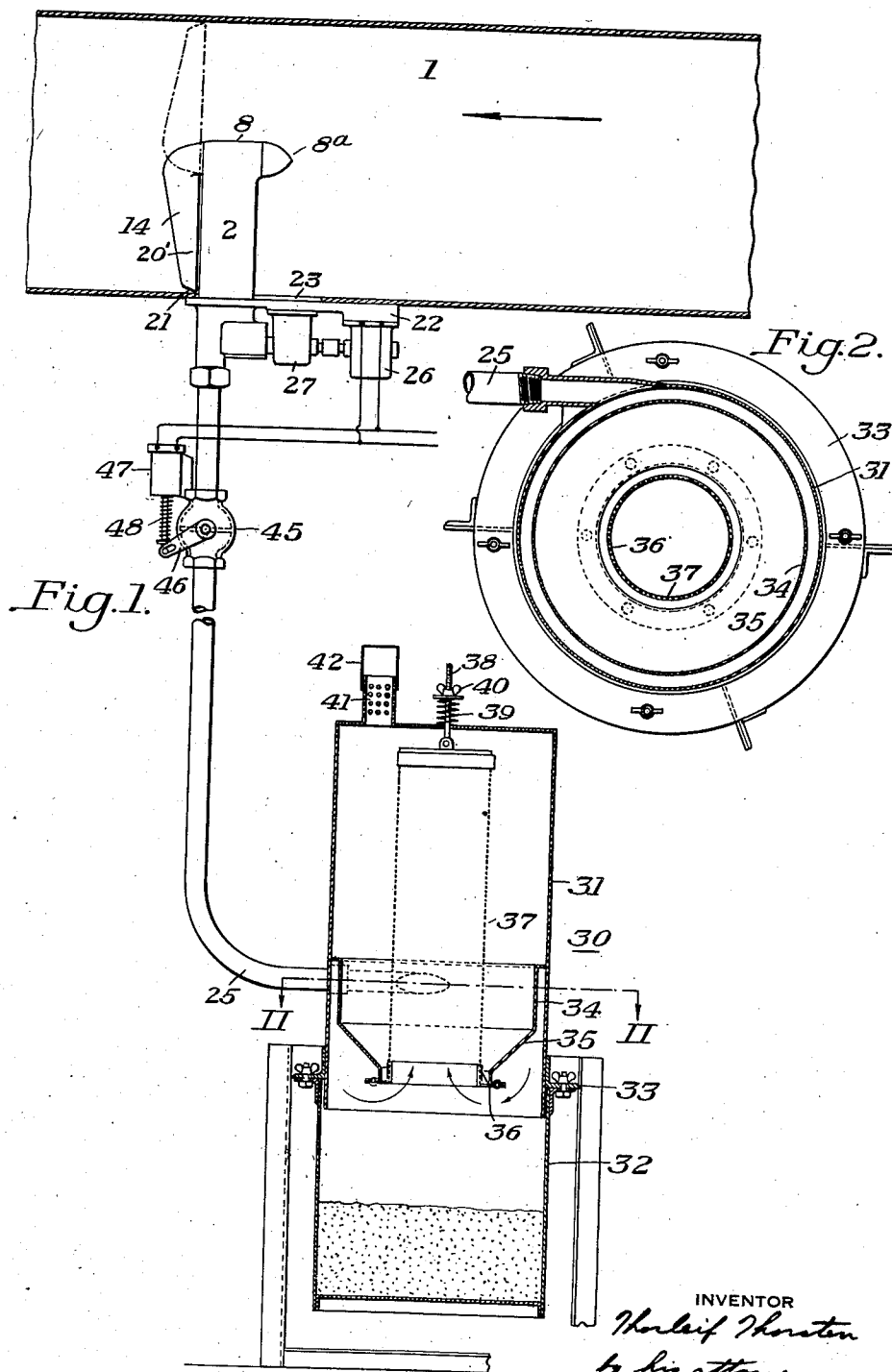
Nov. 12, 1935.

T. THORSTEN
APPARATUS FOR SAMPLING

2,020,529

Filed June 23, 1931

4 Sheets-Sheet 1



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Nov. 12, 1935.

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4 Sheets-Sheet 2

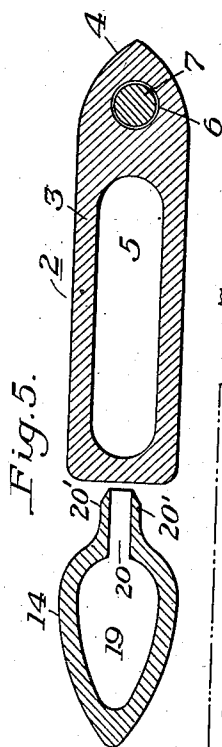
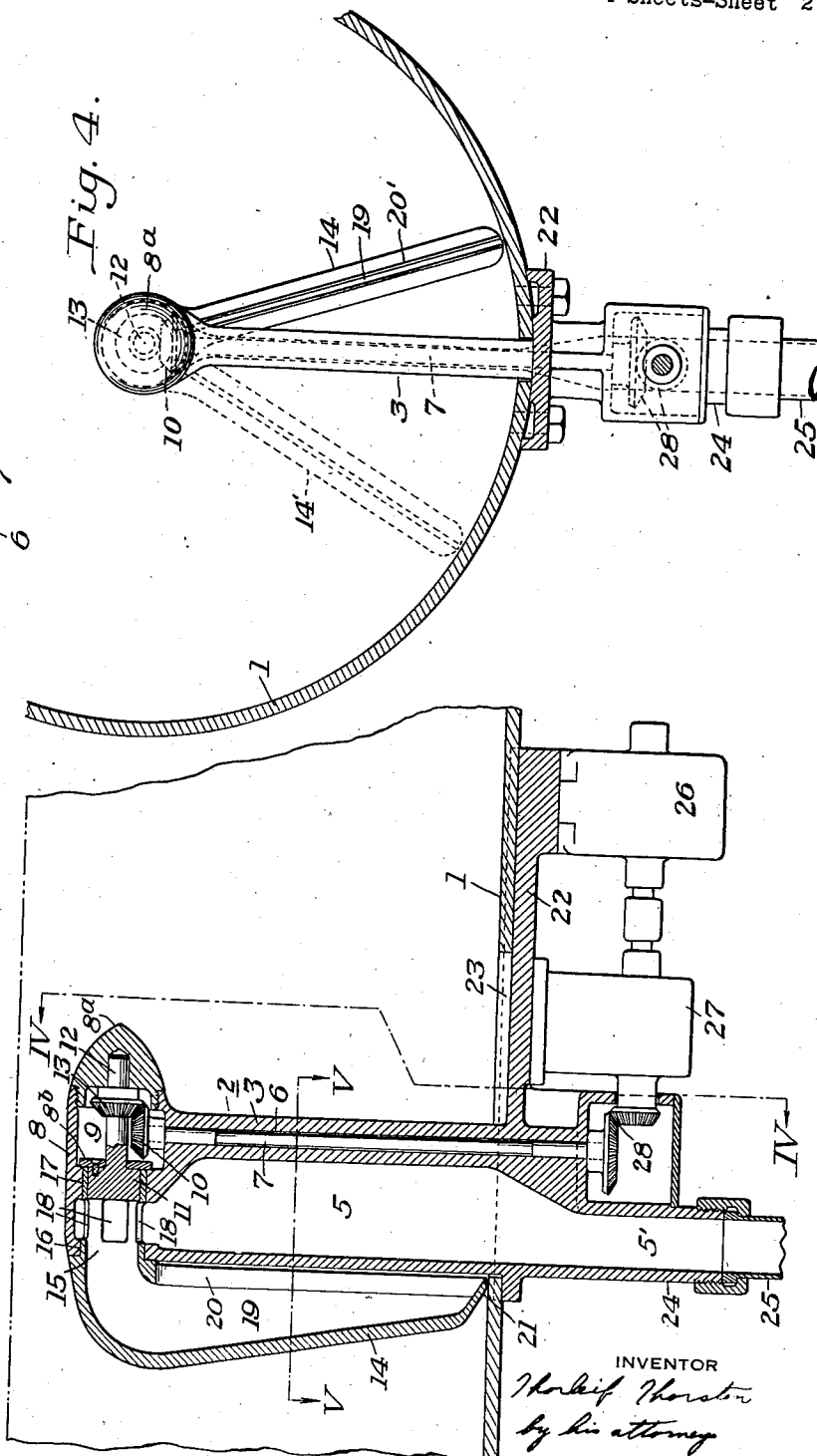


Fig. 3.



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2,020,529

Filed June 23, 1931

4 Sheets-Sheet 3

Fig. 6.

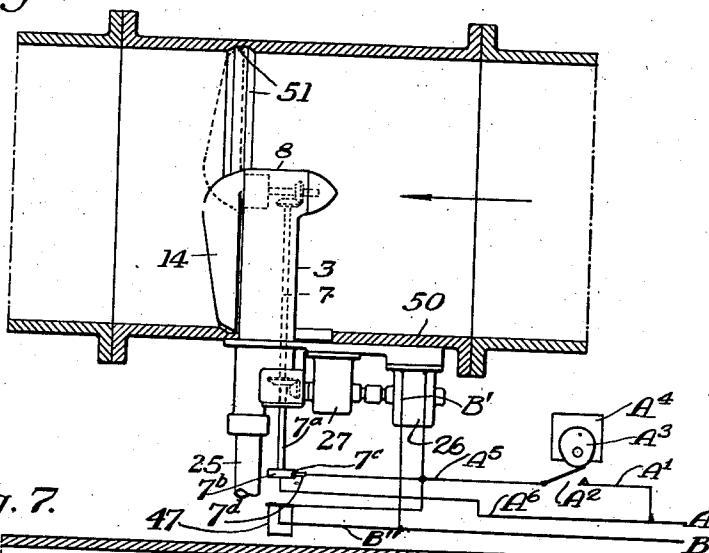
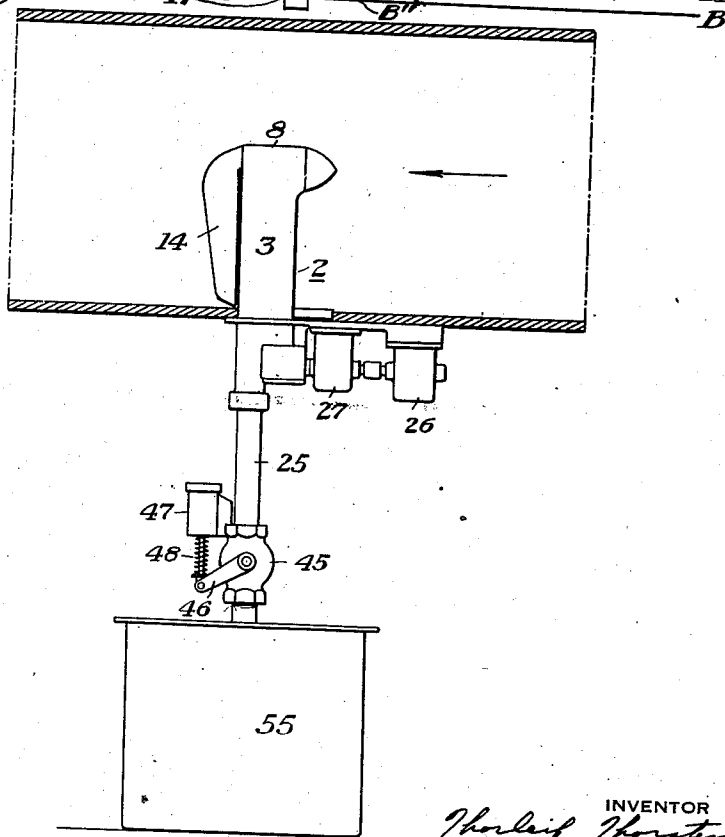


Fig. 7.



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Filed June 23, 1931

2,020,529

4 Sheets-Sheet 4

Fig. 8.

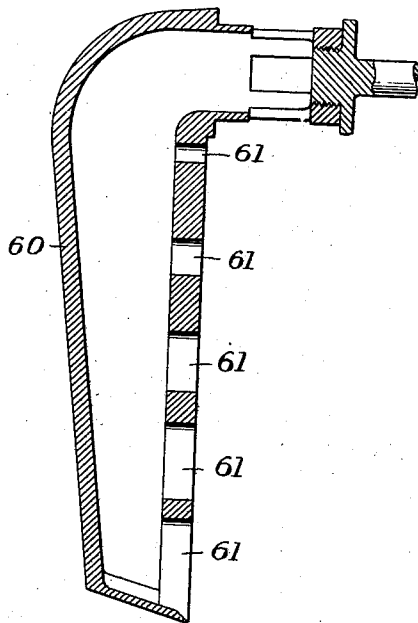


Fig. 9.

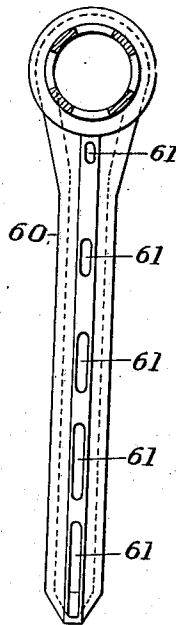


Fig. 10.

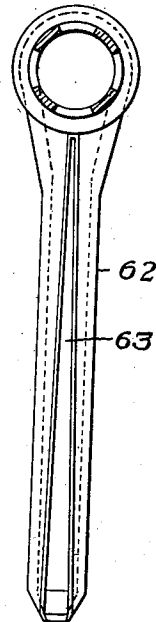
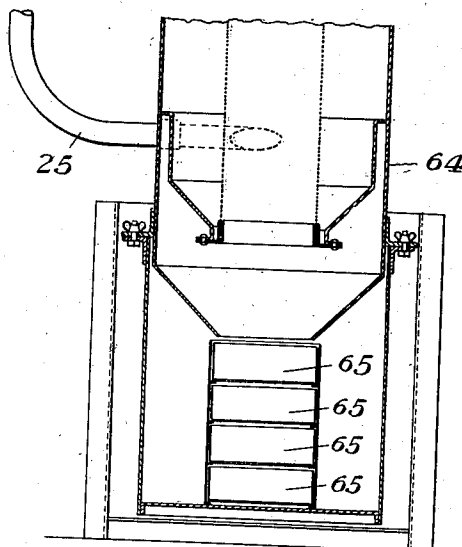


Fig. 11.



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2,020,529

APPARATUS FOR SAMPLING

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Application June 23, 1931, Serial No. 546,282

19 Claims. (Cl. 73—21)

This invention relates to the sampling of materials and is especially concerned with the removal of a sample from a fluid stream.

Various types of materials in a finely divided state are conveyed in a current of air through a pipe or other conduit. For instance, powdered coal is frequently transported from one place to another suspended in a current of air.

For various reasons it is desirable to select representative samples of the material being conveyed. For instance, with powdered coal it is desirable to secure samples of the coal, first, in order that its quality may be determined; and secondly, in order that the fineness of the crushing may be ascertained; and thirdly, in order that it can be determined whether the boiler is being operated at the highest efficiency with the coal being burned. Other finely pulverized materials also have to be sampled, as for instance, flour and various finely divided mineral materials, as for example, cement.

When suspended particles are being carried along by a fluid current stratification occurs at different points, depending upon the presence of curves in the conveyor pipe or conduit, the presence of obstructions, and other causes. For instance, in some cases there may be some stratification caused by the action of gravity. In other cases the air may rotate at a considerable speed, tending to cause the heavier particles to be thrown against the outer walls of the conduit. In still other cases a bend in the pipe or conduit may cause stratification due to the greater inertia of larger or heavier particles over that of smaller and lighter particles.

According to the present invention an apparatus for sampling is provided according to which a truly representative sample may be obtained under any condition of stratification of the material.

The invention may be readily understood by reference to the accompanying drawings in which

Figure 1 represents a typical installation of a mechanism for sampling in accordance with my invention;

Figure 2 represents a horizontal section in the plane of line II—II of Figure 1;

Figure 3 is a vertical section on a larger scale through the sample selecting element of the installation;

Figure 4 is a section in the plane of line IV—IV of Figure 3 showing the sample selecting unit in elevation;

Figure 5 is a horizontal section in the plane of line V—V of Figure 3, the view being on a larger scale;

Figure 6 is a view similar to Figure 1 showing the sampling mechanism built into a pipe section especially adapted to receive it;

Figure 7 is a view similar to Figure 1 wherein the sample is discharged into a different type of receiving container;

Figure 8 is a section through a modified form of collector arm;

Figure 9 is a front elevation of the arm shown in Figure 8;

Figure 10 is a view similar to Figure 9 of still a further modification; and

Figure 11 represents a section, more or less diagrammatic, of a sample collector provided for grading of the sample.

In the drawings, 1 designates a conduit or pipe through which a fluid is adapted to be conveyed, the fluid travelling in the direction of the arrow shown in the drawings. For the purpose of describing the invention, it may be assumed that the fluid is a gaseous fluid, more particularly a current of air, and that it is carrying suspended solid particles, say for instance, powdered coal.

The sample removing unit is designated generally by the reference numeral 2. It comprises a vertical post 3 having the front portion thereof stream-lined as indicated at 4, and as shown in Figure 5. Within the post 3 is a vertical passage 5. The post also has a vertically extending bore or hole 6 therein in which is a vertically extending rotatable shaft 7. At the top of the post is a head portion 8 having a hollow chamber 9 therein. The top of the shaft 7 extends into this chamber and is provided with a bevel gear 10 thereon. Journalled in the head portion 8 is a hub member 11 having a shaft 12 thereon, the shaft 12 being provided with a bevel gear 13 meshing with the bevel gear 10. The arrangement is such that upon rotation of the shaft 6 the shaft 12 with its attached hub 11 will be rotated. The sample selecting element is rotated by means of this hub.

This sample selecting element comprises a radial arm 14 having a sleeve portion 15 thereon extending at right angles thereto, this sleeve portion being hollow and being attached to the hub 11. The sleeve portion 15 has a bearing in the head portion 8 at points 16 and 17. Between the bearing portions 16 and 17 the sleeve portion 15 is provided with an annular series of openings 18 through which fluid may flow from the interior of the sleeve 15 into the vertical passage 5 within the post 3.

The arm 14 is also stream-lined, and has a passageway 19 extending throughout its length, this passageway leading into the interior of the sleeve portion 15. The arm tapers toward its outer end so that the passageway 19 is of outwardly diminishing cross-section. In the radial edge of the arm 14 on the side thereof toward the post 3 so as to open toward the stream of fluid, is a slot 20. The slot 20 may extend throughout substantially the entire length of the

arm, the outer end of the arm being tapered off at 21 in order to bring the outermost extremity of the slot into the closest possible relation to the interior wall of the conduit 1.

5 The edges of the slot 20 have thin forwardly projecting lips 20', as shown in Figure 5, these lips extending almost against the rear wall of the vertical post 3.

For the purpose of convenience, the sample selecting unit is carried on a base 22 adapted to be positioned against the outside of the conduit 1, the conduit having an opening 23 therein to permit the insertion of the post 3 with its attached parts. The post 3 is carried down below the base to provide a pipe connector portion 24 and the passage 5 is continued down into this portion 24, the continuation of the passage being designated 5' in Figure 3. A discharge pipe 25 is coupled to the connector portion 24.

20 On the base 22 is an electric motor or other driving mechanism 26 geared to the shaft 6 through a reducing gear 27 and bevel gears 28.

The motor 26 may be continuously driven, although I prefer that it shall be intermittently operated and for this purpose a time switch or other periodic circuit-closing device of any well-known or preferred construction can be connected in circuit with the motor to control its operation. This will be hereinafter more fully described.

30 When the motor 26 is not operating the parts occupy the position shown in Figures 3 and 5, the arm 14 being directly behind the post 3 so that the slot 20 is not openly exposed to the current of air and suspended solids flowing along the pipe. When the motor 26 is operated to drive the shaft 7, the arm 14 is caused to rotate in a circle. In Figure 4 two positions of this arm have been indicated and in both of these positions the arm is not directly behind the post 3. One position of the arm is shown in full lines and one in dotted lines and it may be assumed that the arm is rotating in a clockwise direction, although this is immaterial. The height of the post 3 is such that the axis of the shaft 12 is at the center of the conduit 1 so that when the arm 14 swings in a circle it will sweep around the entire interior of the pipe with the tapered portion 21 always close to the inner wall of the conduit.

50 The arrangement for driving the motor 26 is preferably such that the sampling arm 14 will make one complete revolution and then come to a stop directly behind the post 3 and remain in such position until the motor 26 is again energized.

During the time that the arm 14 is sweeping around the interior of the conduit the slot 20 will be exposed to the oncoming stream of fluid and solids. If the pressure in the discharge pipe 25 is maintained below the pressure in the conduit 21, there will be a flow of fluid with the suspended particles into the slot 20, through the sleeve portion 15, down the passage 5, and into the pipe 25.

65 The pipe 25 leads into a dust collector designated generally by the reference numeral 30. The dust collector may be of any usual or preferred construction. I have shown it as comprising an upper member 31 and a lower member 32, the two being joined together and sealed by meeting flange portions at 33 through which bolts provided with thumb nuts are passed. In the upper member 31 is an annular deflector 34 having a conical extension 35 and to the lower end of the extension 35 is secured a ring 36. Secured to

the ring 36 is a bag 37 to the top of which is attached a bolt 38. The bolt 38 passes through the top of the member 31 and is surrounded by a compression spring 39, while a nut and washer, indicated at 40, hold the spring in compression. This arrangement serves to hold the bag 37 taut and at the same time enables the bag to be shaken by jarring the bolt 38. The pipe 25 opens tangentially into the lower part of the member 31 under the deflector 34 so that the current of air circles around the member 34 and the conical extension 35, causing the dust or solid particles to fall into the receptacle 32. The current of air then flows up into the bag 37, where any entrained particles are trapped while the air passes through the bag into the space surrounding the bag and escapes through an outlet 41. This outlet is shown as having a pressure regulating cap 42 which is adjustable. If it is desirable or necessary to create suction at the outlet 41, a pipe 20' connection to a suitable pump may be made at this point.

If the pressure in the pipe 1 is above atmospheric pressure, it will be seen that this flow of air through the pipe 25 will be set up even though the passage 41 opens to the atmosphere rather than to a suction pump.

Before opening the dust collector to remove the sample, the bolt 38 may be jarred to shake the screen or bag 37 and cause the adhering small particles to fall down into the receptacle 32. The entire sample is thus collected in the receptacle 32 and when a sufficient amount has been accumulated the dust collector can be opened and the sample removed.

75 The frequency with which the motor 26 will be operated, or rather the frequency at which the arm 14 will be rotated, will depend upon the nature of the material being sampled and the frequency with which it is desirable or necessary to take samples. Only a relatively small sample is removed at each operation so that preferably the container 32 is sufficient to receive the entire sample for a day's run, and before the sample is analyzed the contents of the receptacle 32 are, of course, thoroughly mixed.

In order that the sample will be removed only during the time that the sampling element is revolving inside the pipe 1, a valve 45 is preferably provided in the pipe 25. I have shown this valve as being a common butterfly valve provided with an operating lever 46. A solenoid 47 is provided for operating the valve in one direction, and the solenoid is opposed by a spring 48. The arrangement is such that when the solenoid is de-energized the valve 45 is closed and when it is energized the valve is open. The solenoid may be in circuit with the motor, as diagrammatically indicated, so that when the motor is operating the solenoid 47 will be energized. At this time then the pipe 25 will be open and the sample can flow through the pipe. When the motor 26 is deenergized the spring 48 functions to close the valve; thus the flow of fluid through the pipe 25 is stopped except when the motor is operating to drive the sampling element. One arrangement for effecting the timed operation of the motor and causing the arm to be stopped at a predetermined position is diagrammatically illustrated in Figure 6 and will be hereinafter more fully described.

By reason of the fact that the sampling element is substantially coextensive with the radius of the pipe 1, and moves in a complete circle around the interior of the pipe in a plane trans-

verse to the direction of the flow of fluid, a sample selected in this manner will be truly representative of the entire stream in the pipe, irrespective of the stratification of the material. The stream is of course deflected from the center of the pipe and to each side of the post E. This portion of the stream is therefore not missed in the selecting of the sample.

The extended lip portions 20' at each side of the slot 20 serve to assure a more accurate removal of the sample. When a stream-lined surface is placed in a moving stream of fluid, an eddy is set up immediately in front of the stream-lined surface where the stream starts to divide, so that the actual division of the stream occurs slightly in advance of the stream-lined surface. The thin lips 20', however, projecting forwardly into the stream reach a point where substantially little deflection of the stream has occurred and beyond this point of eddy so that the portion of the stream which is projected into the slot 20 is a substantially normal stream. By reason of the taper of the arm 14 the flow into the slot 20 is substantially uniform along the entire length of the slot.

The front end of the shaft 12 has a bearing in a removable stream-lined cap 8a forming a part of the head 8. This cap 8a can be removed for filling the chamber 9 with grease and for giving access to the mitre gears within the chamber 9. The cap is of course a tight-fitting cap, and the bearing at 17 is a close bearing so that dust or solid particles cannot work themselves into the chamber 9. In order to further exclude dust and dirt, a washer may be provided in the chamber 9, this washer being shown at 8b.

To apply the sample removing unit to an air pipe, it is merely necessary to cut a hole in the pipe and secure the base 22 in place by welding or by means of screws, bolts or any other conventional or desired manner.

Due to the fact that the sample removing element 14 is normally behind the post 3, the slot 20 is not apt to become clogged by the impingement of materials against it when the arm is in the normal stationary position.

Where a more accurate removal of the sample is desired, the arrangement shown in Figure 6 may be used. In this arrangement the sample selecting unit is mounted on a pipe section 50 adapted to be inserted bodily into the conduit. The pipe section 50 has an annular recess 51 therein, and the sampling arm 14 is made slightly longer than shown in Figure 3 so that the slot 20 actually terminates in the recess 51. With this arrangement a more accurate sample of the material flowing immediately adjacent the inner wall of the pipe can be obtained than with the arrangement shown in Figure 3 because the end of the slot in the sample selecting arm may terminate flush with the inside diameter of the pipe, although for most practical purposes the arrangement shown in Figure 3 is sufficiently accurate.

In Figure 6 I have also shown one arrangement applicable to operating the solenoid and the sample removing element at timed intervals and for causing the sample selecting arm 14 to always be returned to a normal position behind the post 13. In this figure the shaft 7 is shown as having a downwardly projecting extension 7a on which is a contact disc 7b, the periphery of which is of conducting material except for one small segment at 7c. At 7d is a brush that contacts with this disc. The current supply lines are designated A and B. Line B has one lead B' leading directly to

the motor, and a second lead B'' leading to one side of the solenoid 47. Line A has a lead A' in which is a time switch A². I have shown this switch as being of the type in which a cam A³ driven by a clock A⁴ periodically closes the switch. The other side of the switch leads to the motor through the wire A⁵. Line A has a second branch or lead A⁶ leading to the disc 7b. The brush 7d connects back to the line A⁵. The time operated circuit closer A² and the motor driven circuit closer 7d—7c are thus in parallel. The insulating segment 7c in the disc 7b is so positioned that when the arm 14 is back of the support 3 the brush 7d is on this segment and the circuit is open. When the clock A⁴ operates to close the switch A² the motor is initially energized. This effects a rotation of the contact disc 7b so that the circuit will be closed from the line A to the motor through the contact disc 7b and the brush 7d. When this condition has arisen, the time switch will open, but the motor will continue to operate until the insulating segment 7c again moves around to the brush, at which time both circuit closers will be open and the motor will consequently be deenergized.

The solenoid 47 is shown as being connected in parallel with the motor so that this solenoid is energized while the motor is operating and deenergized when the motor is deenergized.

Instead of selecting samples of solids contained in gases, the invention is also applicable to the sampling of a flowing stream of liquid, and the arrangement shown in Figure 7 may be used for liquids. The sample selecting unit 2 is of the construction shown in Figures 1, 2 and 3 and I have merely shown a reservoir 55 in place of the dust collector 30. The fluid withdrawn as samples collects in the reservoir 55 from whence it may be removed from time to time, which may be necessary or desirable.

In some instances it may be desirable to graduate the intake passage of the collector arm to give increased intake at one point over the intake at another point. More especially, it may be desirable to so construct the intake passage of the collector arm that the material will be taken in increasingly greater amounts from the center out. In Figure 8 one structure for accomplishing this is disclosed. The collector arm, designated 60, is of the construction previously described, but instead of having a continuous intake slot it is provided with a series of slots or openings 61. These openings are so arranged or designed that there is a relatively greater open space at the outer end of the arm than there is close to the center. The openings 61 are proportionate to the length of the arm and the sample which is collected is more truly representative in the proper proportion of the material flowing through the conduit than the sample selector previously described wherein the slot is of continuous width and length.

In the construction shown in Figure 10 a similar result is secured by making the slot of outwardly increasing width. In this figure 62 designates the collector arm and 63 is the intake slot, the edges of which instead of being parallel, are radial. Thus the intake passage is of increasing dimension outwardly. It will be obvious that the intake passages may be otherwise arranged as by being formed of a series of holes differently spaced, and all such modifications and arrangements are to be considered the equivalent of the slotted arm herein referred to and hereinafter referred to in the claims.

Frequently it is desirable to grade the sample as it is accumulated. This is particularly true of crushed fuel where the proportion of different mesh sizes should be ascertained. For accomplishing this purpose the sample collector, which is of the general type described in connection with Figure 1, delivers the sample into a series of superimposed screens. In this figure 64 is the separator and 65 designates a series of drawers or compartments having screen bottoms, the screens being of decreasing mesh downwardly, the bottom of the lowest compartment being solid. These screens can be agitated, usually being jolted and reciprocated at the same time. This type of screening mechanism is well-known in the art and for that reason I have not shown the jolting means therefor. The sample which falls into the uppermost tray is sifted and only the coarser particles are retained, while the finer particles pass through the screen and are successively separated in the succeeding screens.

The apparatus provides an extremely desirable device for securing a sample of suspended particles in a current of air or other gas. Particles are removed from practically every point in the traveling stream so that even if there is stratification in the conduit the sample will be a representative sample of all of the material in the stream. The sweep of the sample arm moving around the interior of the pipe assures this.

The apparatus itself is of simple construction and may be manufactured and installed at a reasonable cost, and secures samples which are much more representative and satisfactory than any sample selecting mechanism heretofore provided.

I claim:

1. A sampling mechanism adapted to be inserted in a fluid conduit comprising a fixed supporting post having a passageway therein, a rotatable collector arm carried on the post and having an orifice therein, the axis of rotation of the arm being at substantially right angles to the longitudinal axis of the arm, said orifice communicating with the passageway in the post, and means for rotating the collector arm.

2. A sampling mechanism adapted to be inserted in a fluid conduit comprising a supporting post having a passageway therein, a rotatable collector arm carried on the post and having an orifice therein, said orifice communicating with the passageway in the post, and means for rotating the collector arm, said collector arm extending radially from the axis of its rotation, the receiving orifice being in the form of a slot extending along the greater portion of the length of the arm.

3. A sampling device adapted to be positioned in a fluid conduit, comprising a supporting post member having a passageway therethrough, a hub member rotatable in the post member and having a passageway therein, a collector arm projecting radially from the hub member and having a receiving orifice therein directed toward the post, said receiving orifice communicating with the passage in the hub member, the post providing a shield in front of the slot when the arm is positioned behind the post, and means for swinging the collecting arm through an arc.

4. A sampling apparatus of the class described, comprising a supporting structure adapted to be positioned in a fluid conduit and having a passageway therein, a hub member rotatably carried by the supporting structure, said hub member being hollow and communicating with the pas-

sageway in the supporting structure, a radially extending arm on the hub which is slotted along the greater portion of its length, and means for rotating the hub member to cause said arm to swing through an arc of a circle.

5. A sampling apparatus of the class described, comprising a supporting member, a collecting arm rotatably carried on the supporting member and adapted to be swung through an arc, means for operating the collecting arm, said collecting arm having a passageway and a receiving orifice therein, said supporting member having a passageway communicating with the passageway in the collecting arm, and a discharge pipe leading from said passageway in the supporting member.

6. A sampling apparatus of the class described, comprising a supporting member, a collecting arm rotatably carried on the supporting member and adapted to be swung through an arc, means for operating the collecting arm, said collecting arm having a passageway and a receiving orifice therein, said supporting member having a passageway communicating with the passageway in the collecting arm, a pipe leading from said passageway in the supporting member, a collector to which the pipe delivers, a valve in the pipe, and means for effecting an opening and closing action of the valve.

7. A sampling device adapted to be used in a fluid conduit, comprising a supporting post having a passageway therein, a hub member rotatably mounted in the post, a collector arm carried on the hub member and extending in a plane transverse to the axis of the hub member, said collector arm having a slot extending throughout the greater portion of its length and having a passageway therein communicating with the interior of the hub member, said hub member having a passageway therethrough communicating with the passageway in the supporting member, a gear rigidly connected with the hub member to rotate therewith, a drive shaft within the supporting member and having a gear thereon cooperating with the said first gear, and driving means operatively connected with said second shaft.

8. In a sampling mechanism, a conduit having an annular internal groove, a supporting member within the conduit, a collecting arm rotatably carried on the supporting member and movable in a circle around the interior of the conduit, means for operating the arm, said arm having a passageway therein, a conduit in the supporting member with which the passageway in the arm communicates, said arm having a slot extending along it throughout the greater portion of its length, the tip of the arm being received in the groove on the interior of the conduit, the slot extending substantially out to the tip of the arm from a point adjacent the center of rotation of the arm.

9. In a sampling device, a supporting member, a collecting arm carried thereby rotatable through a circle transverse to the axis of the conduit in which the sampling device is positioned the arm being slightly longer than the inside diameter of the conduit, said conduit being provided with an annular groove to accommodate the arm, said arm having a slot therein extending from a point adjacent the outer tip of the arm to a point adjacent the inner end thereof, means on the supporting member for rotating the arm, said arm and said supporting member having communicating passageways, the passageway in the supporting member terminating at the ex-

terior of the conduit whereby fluid which enters the slot may be carried from the arm to the supporting member and discharged to a point exteriorly of the conduit.

10. In a sampling mechanism, a conduit of circular cross-section, a supporting member projecting into the conduit, a collector arm rotatably carried by the supporting member, the center of rotation of the arm coinciding with the center of the conduit, said arm and supporting member having communicating passageways therein, the wall of the passageway in the arm having a slot therealong which opens to the interior of the conduit, said supporting member having a portion which projects through an opening in the conduit and terminating in a discharge passage whereby fluid entering the collecting arm may be discharged outside the conduit, and a valve for controlling the discharge of fluid through said discharge pipe.

11. In a sampling mechanism, a conduit of circular cross-section, a supporting member projecting into the conduit, a collector arm rotatably carried by the supporting member, the center of rotation of the arm coinciding with the center of the conduit, said arm and supporting member having communicating passageways therein, the wall of the passageway in the arm having a slot therealong which opens to the interior of the conduit, said supporting member having a portion which projects through an opening in the conduit and terminates in a discharge passage whereby fluid entering the collecting arm may be discharged outside the conduit, a valve for controlling the discharge of fluid through said discharge pipe, means outside the conduit for rotating the arm, and means for operating the valve to open position only when said operating means is effective to rotate the arm.

12. A sampling mechanism adapted for use in a fluid conduit comprising a supporting post having a passageway therein, a radially positioned rotatable collector arm carried on the post in a plane parallel with the post and movable through a plane normal to the direction of flow of fluid through the conduit and having a passageway therein communicating with the passageway in the post, said passage in the arm opening through the arm to the exterior thereof to permit material in the conduit to flow into the passage in the arm, the open area increasing outwardly from the center of the arm toward the tip.

13. A sampling apparatus comprising a conduit and a radially positioned collector arm rotatably supported in the conduit for movement in a circle transverse to the longitudinal axis of the conduit, said collector arm being of a length substantially equal to the radius of the conduit, said arm having a passageway extending therealong for receiving material from the conduit, and a conduit into which the arm discharges, said arm having an orifice therethrough through which fluid may flow from the first conduit into the passageway in the arm.

14. A sampling apparatus comprising a conduit and a radially positioned collector arm rotatably supported in the conduit for movement in a circle transverse to the longitudinal axis of the conduit, said collector arm being of a length substantially equal to the radius of the conduit, said arm having a passageway extending therealong for receiving material from the conduit, and a conduit into which the arm discharges, said arm having an orifice therethrough through

which fluid may flow from the first conduit into the passageway in the arm, said orifice being in the form of a slot extending throughout the greater portion of the length of the arm.

15. A sampling apparatus comprising a conduit and a radially positioned collector arm rotatably supported in the conduit for movement in a circle transverse to the longitudinal axis of the conduit, said collector arm being of a length substantially equal to the radius of the conduit, said arm having a passageway extending therealong for receiving material from the conduit, and a conduit into which the arm discharges, said arm having an orifice therethrough through which fluid may flow from the first conduit into the passageway in the arm, said orifice being in the form of a slot extending throughout the greater portion of the length of the arm, the slot being of increasing width outwardly.

16. A sampling apparatus comprising a conduit and a collector arm rotatably supported in the conduit for movement in a circle transverse to the longitudinal axis of the conduit, said collector arm being of a length substantially equal to the radius of the conduit, said arm having a passageway extending therealong for receiving material from the conduit, and a conduit into which the arm discharges, said arm having a series of orifices therethrough at intervals from the outer end of the arm toward the center, the area of the orifices in the arm being greater adjacent the outer end thereof than toward the inner end thereof.

17. A sampling device adapted to be positioned in a fluid conduit, comprising a supporting member, an elongated sampling arm rotatably carried on the supporting member and arcuately movable in a plane transverse to the axis of the fluid conduit and normal to the direction of flow of fluid through the conduit in which the device is positioned, means for effecting arcuate movement of the collector, said collector having a receiving passageway therein throughout substantially its entire length, and a stationary conduit communicating with said passageway in the collector for receiving fluids from the collector.

18. Sampling apparatus for sampling suspended particles in a fluid medium comprising in combination a circular conveyor tube section, a sampler supported in said section and movable through a circular path in a plane normal to the longitudinal axis of the section, and means whereby material caught by the sampler is conveyed therefrom to the exterior of the conveyor section.

19. A sampling apparatus for removing samples of suspended particles in a gaseous medium, comprising in combination a pneumatic conveyor tube section, a sampler supported in said section and movable through a circular path in a plane normal to the longitudinal axis of the section, said sampler having a radius substantially as great as the radius of the pneumatic tube section and having a receiving duct throughout the greater portion of its length, a support for said sampler having means therein for effecting rotation of the sampler in said circular path, said support also having a passage therein communicating with the duct in the sampler whereby material caught in the sampler is conveyed from the sampler through said support, and a conduit into which the passageway in the support discharges.

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