July 17, 1934. O. W. FISHER ET AL 1,966,712

GRAIN SAMPLING DEVICE

Filed June 10, 1930 2 Sheets-Sheet 1

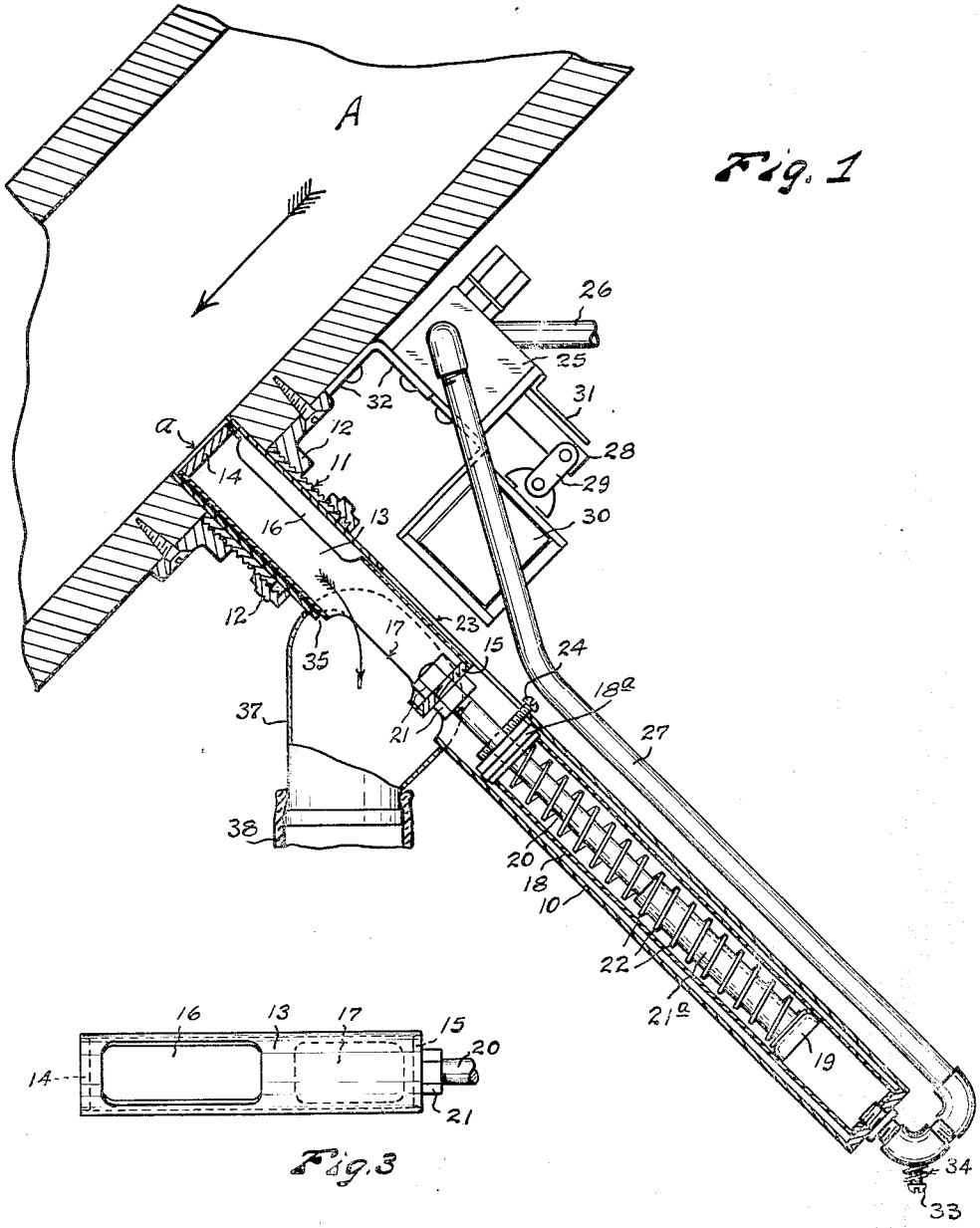


Fig. 1

Fig. 3

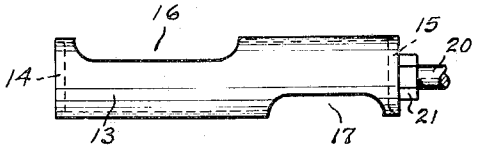


Fig. 2

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GRAIN SAMPLING DEVICE

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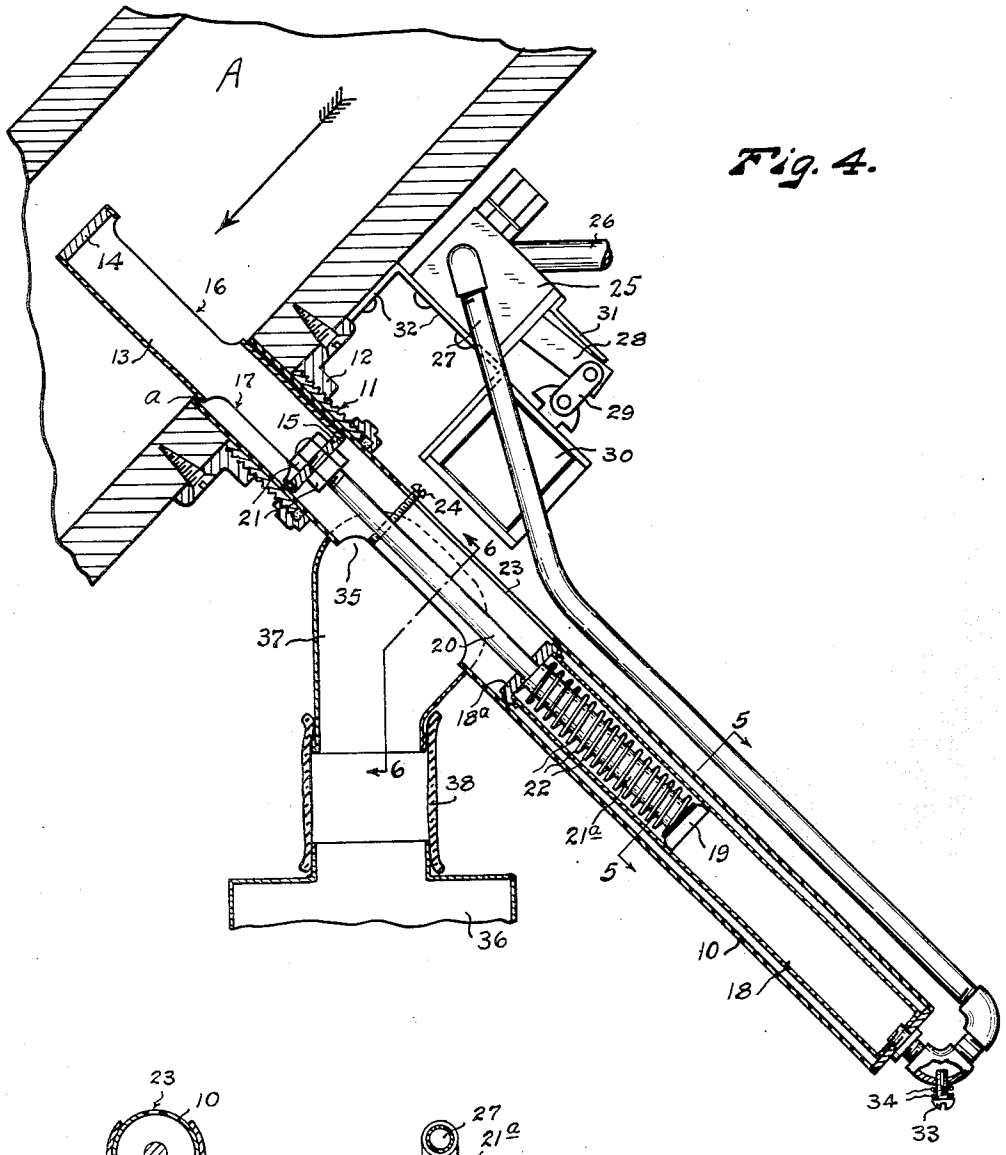


Fig. 4.

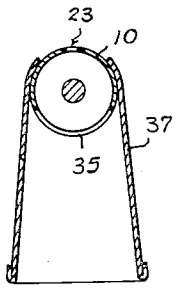


Fig. 6

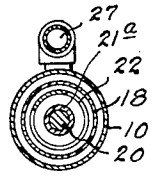


Fig. 5



Fig. 7

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GRAIN SAMPLING DEVICE

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7 Claims. (Cl. 73—21)

Our invention relates to a grain sampling device. More particularly, it relates to a device that is to operate in connection with a chute through which grain is passing in a stream and to withdraw from said stream samples of grain periodically.

It is common practice to take at comparatively frequent intervals, samples of grain from a supply that is flowing into bins in order that from such samples a comprehensive estimate may be made of the grain as a whole and to thereby determine its quality and value in the making of flour of a predetermined standard.

It is the leading object of our invention to provide novel means for the withdrawal of such desired samples from a stream of grain that is flowing to a bin. Briefly and rather broadly stated we accomplish this object by providing a sample holding device adapted to be projected into the part of a body of grain as it is flowing to a bin and then withdrawing the same to automatically discharge its contents into a suitable receptacle, the projection of such sampling member being caused by the application thereto of air under pressure and its return or withdrawal movement being caused by the influence of a spring which had been compressed by such pressure during the projection of the sampler toward and into the spout or conduit through which the stream of grain is flowing.

The above mentioned general objects of our invention, together with others inherent in the same, are attained by the device illustrated in the following drawings, the same being a preferred exemplary form or embodiment of our invention, throughout which drawings like reference numerals indicate like parts:

Figure 1 is a view showing the sample holding device and the parts cooperating therewith in the positions they occupy preparatory to taking a sample of grain from the spout or conduit with which the apparatus as a whole is shown as being connected, the view being for the most part a vertical central section, some portions, however, being shown in side elevation;

Fig. 2 is a detail, being a side elevation of the sample-holding device, and showing also a portion of the rod that is connected to its inner end wall of that device;

Fig. 3 is a plan view of the same parts that are shown in Fig. 2;

Fig. 4 is a view substantially like that of Fig. 1 but showing the position of the parts when the sample-holding device has been forced forward into position to receive and withdraw a sample of grain from the stream that flows through the grain spout or conduit to a receptacle therefor;

Fig. 5 is a cross-section taken at the line 5—5 of Fig. 4;

Fig. 6 is a cross-section taken at the line 6—6 of Fig. 4; and

Fig. 7 is a detail being a view of the adjustable screw that controls the escape of the compressed air when the sample-holding device is being withdrawn from the spout or conduit.

Referring to the drawings, A indicates an inclined conduit of any approved construction down which grain is adapted to pass to a bin, as in a flour mill, or to any other storage space. In the wall of the conduit is an opening *a* into which projects the open inner end of a comparatively long tube 10 that, adjacent to such end, passes through and is supported by a close-fitting heavy sleeve 11, such sleeve being exteriorly screw-threaded and screwed into a boss 12 that is flanged to adapt it to be secured to the outer face of the conduit A, as indicated. Preferably, also, there is provided a nut 12 between a flange of which and the outer end of the sleeve is compressed a packing material which by its pressure against the tube 10 aids in holding such tube immovable.

Within the tube 10 is slidingly mounted the sample-holding device that will hereinafter be referred to as the "sample cup". This cup is indicated by 13, and, as clearly shown in Fig. 5, is tubular and sufficiently less in diameter than the tube 10 to permit it to move freely lengthwise of such tube. Its front and rear ends are closed by heads indicated, respectively, by 14 and 15. In the upper portion of its wall and near its forward end is a grain-receiving opening 16 and in the lower portion of such wall is a discharge opening 17.

Concentrically disposed in the tube 10 is a cylinder 18 that is materially shorter than the tube 10. It has its rear or outer end wall located against and secured to the corresponding end wall of the tube 10; the other end of the tube 18, in the construction shown, being closed by a head 18*a*, of sufficiently large diameter to fit snugly against the wall of the enclosing tube 10. In this cylinder 18 is slidingly mounted a piston 19 that has secured to it one end of a piston rod 20, the other or forward end thereof being secured to the rear end head 15 of the sample cup 13, the connection to the said cup preferably being an adjustable one as by nuts 21 screwed to the rod upon opposite sides of the said end head 15. The piston 19 also has secured to it one end of a

hollow stem 21a, such stem surrounding the rod 20 for a portion of the length of the rod, and, by coming in contact with the head 18a acting to limit the extent of forward movement of the piston, its rod, and the sample cup that is connected with the rod when fluid pressure is exerted against said piston as hereinafter described.

A coiled spring 22 extends between and bears against the fixed head 18a and the piston 19, such spring surrounding the piston rod and the hollow stem that is carried by and projects forward from the piston. This spring will, of course be contracted, as shown in Fig. 4, when the piston is pushed forward to effect a movement of the cup 13 into sample-receiving position, and upon the release of such pressure will, as will be understood, cause a reverse movement of the piston to withdraw the cup from the path of movement of the grain passing down the spout A.

Secured to the piston rod 20 and projecting through a longitudinal slot 23 is a stud 24, that is preferably in the form of a screw as shown. This stud performs two functions, one of them being to act as a stop to limit the rearward or cup-withdrawal movement of the piston 19 under the action of the coiled spring 22, thereby preventing such piston from contacting with the end wall of the cylinder 18 or the end of the air pipe 27, hereinafter described, which end may project slightly through such wall. The other function performed by the stud is to insure the rod against any possibility of axial turning that would tend to turn the sample cup out of perfect operative position.

Turning now to the means by which power is applied to and released from the piston 19 to effect the desired movements of the sample cup,—25 indicates a valve chamber to which leads a pipe 26 through which air under pressure is conducted from any suitable compressor means, (not shown) and from which leads another pipe 27 that, by the use of ordinary fittings such as shown, is formed to be brought opposite the outer end of the tube 10 and to have communication with the cylinder 18 through openings in the end walls of said tube and cylinder. Within the chamber 25 is a valve of ordinary construction for the controlling of air under pressure, the details of which we have not deemed it necessary to illustrate. The actuation of such valve is controlled through the movement of a rod or bar 28 that projects from the chamber. In the construction shown this bar 28 is pivotally connected to one end of a link 29 that depends therefrom, the other end of such link having pivotal connection with the movable member of an ordinary solenoid that is indicated generally by the numeral 30. Over the bar 28 we have shown a short arm 31 that acts as a stop for such bar when it is forced up as in Fig. 4. The chamber 25 and solenoid are shown as being supported by a bracket 32 bolted to the spout A, but, of course, they may be located and supported otherwise.

We have not deemed it necessary to show any of the means for energizing the solenoid, but, with the parts of the apparatus that have been specifically described in the position shown in Fig. 1, the operation of such parts will, upon the energizing of the solenoid be as follows: The rod or bar 28 will be moved to open the valve in the chamber 25, thus permitting a flow of air under pressure through the pipe 27 to the cylinder 18 and, by pressure against the piston 19, force said piston along the cylinder against the pressure of the coiled spring 22, and, through the rod 20 move the sample cup sufficiently far into the spout A to insure its upper opening being brought into position with respect to the descending stream of grain so that the desired quantity of grain may be abstracted for sampling purposes. It is generally sufficient to provide that the cup be projected only part way across the spout as indicated in Fig. 4, for the reason that the stream of grain in the spout will not, as a general thing, fill the spout from side to side but will run along and adjacent to the lowermost wall of that inclined spout. Projecting the cup, therefore, so that the lower end of its opening 16 is approximately in line with the inner face of the lower wall of the spout will be sufficient to insure a sample of grain being taken from the width of the stream of grain. The position of the cup may be regulated by an adjustment of the nuts 21.

Immediately after the projection of the cup into the spout as described, the air valve in the chamber 25 is to be closed by de-energizing the solenoid, whereupon the coiled spring 22 acts to force back the piston 19 which carries with it, of course, the cup 13, as will be understood. The spring will be able to accomplish this because of the provision of an opening in the air pipe 27 for the escape of air. Such opening, which, in the construction shown, is in one of the elbow members of the said pipe, is tapped to receive a screw plug 33 which, as indicated in Fig. 7, is provided in its stem portion with a tapered groove whereby the air exit may be increased or decreased in size and thus, according to the rapidity with which the air is emitted, the speed of the withdrawal movement of the cup may be regulated. Around the stem of this screw is a small spring 34 which bears against the head of the plug and the elbow fitting and by its pressure tends to hold said screw plug in any of its adjusted positions.

When the cup 13 is in its filling position, as in Fig. 4, the grain received in it will of course tend to slide down to the lower end in which is the discharge opening 17, but will be retained in the cup owing to such discharge opening being at that time opposite the wall of the long tube 10. As the cup moves down such tube, however, that discharge opening is brought over an opening in the lower side of the wall of the tube 10, permitting the discharge therethrough of the grain in the cup, and thence to any suitable receptacle. It is desirable that the various samples retain for a time the same moisture content as the body of the grain from which they are withdrawn, and with that in mind we provide means for conducting such samples directly to a metal container adapted to be tightly closed after the samples have been deposited therein. A part of such a container is shown at 36 (see Fig. 4). The grain samples will be delivered to it through a short spout 37 that at its upper end surrounds the opening 35 in the wall of the tube 10 and a flexible hose section 38 that is in close removable connection with the lower end of the short spout 37 and the neck of the container 36.

We contemplate the taking of samples automatically and at regular intervals from the grain that passes down the spout A and to that end means for automatically energizing and de-energizing the solenoid at such periods of time as may be determined upon may be employed. As solenoid-actuating means are well known we have not deemed it necessary to here illustrate or describe such a device.

While the invention has been described in con-

nection with obtaining samples of grain, it of course is well adapted for a like use in connection with other free flowing commodities.

Obviously, changes may be made in the form, dimensions and arrangement of the parts of our invention, without departing from the principle thereof, the above setting forth only a preferred form of embodiment.

We claim:

1. A sample-obtaining mechanism comprising in combination a tubular member having communication at one end with a receptacle containing the material from which samples are to be taken, a reciprocatable cup in the end portion of said tubular member adjacent the receptacle, a cylinder in the opposite end portion of said member, a piston in said cylinder, means for admitting air under pressure to said cylinder behind the piston, a piston rod connecting said piston with the cup, and a stud carried by said piston rod and projecting through a longitudinal slot in said tubular member for preventing turning of said rod and the cup connected therewith.

2. A sample-obtaining mechanism comprising in combination a tubular member having communication at one end with a receptacle containing the material from which samples are to be taken, a reciprocatable cup in the end portion of said tubular member adjacent the receptacle, a cylinder in the opposite end portion of said member, a piston in said cylinder, means for admitting air under pressure to said cylinder behind the piston, a piston rod connecting said piston with the cup, means on that portion of the rod within the cylinder for limiting the movement of the piston and the parts connected therewith toward the receptacle, and a stud on that portion of the rod outside of said cylinder, said stud projecting into a longitudinal slot in said tubular member and serving as a limit stop for movement of the piston in its reverse movement and also as a means for preventing turning of the rod and the cup connected therewith.

3. A sample-obtaining mechanism comprising in combination a tubular member having communication at one end with a receptacle containing the material from which samples are to be taken, said member having an opening in its wall intermediate its ends, a reciprocatable cup in said member having a discharge opening in its lower side, said cup normally lying partly over said intermediate opening in the tubular member and partly forward thereof in the direction of the receptacle, air-operated means in said tubular member at the opposite side of said intermediate opening in the tubular member, and means connecting said air operated means with said cup, said air-operated means being adapted to force and retain said cup into said receptacle to receive a sample of the contents and means to return the cup to its normal position with its discharge opening over the said opening in the tubular member.

4. The combination of a receptacle, a tube communicating with, and not projecting into the receptacle, through an opening in the wall of the receptacle, said tube having an opening in the lower part of its wall at a distance from said receptacle; a sample cup slidingly mounted in said tube, said cup having a filling opening at its end adjacent the receptacle in the upper portion of its wall and a discharge opening at its other end in the lower portion of its wall; and means positioned in said tube, which means are connected with said cup for forcing into the receptacle that portion of the cup having the filling opening and thereafter withdrawing the cup to bring such filling end portion substantially flush with the wall of the receptacle and its other opening over the said opening in the tube, whereby the filling opening of said cup may be exposed to material in said receptacle, and whereby material received in said cup may be discharged therefrom through its discharge opening at times when said discharge opening is positioned over said opening in the lower part of the tube.

5. The combination of a receptacle; a downwardly inclined tube having its uppermost end communicating with and not projecting into the receptacle and having an outlet opening in its bottom wall; a sample cup slidingly mounted within said tube, said cup having a filling opening in its top wall near the end adjacent the receptacle and having a discharge opening in its bottom wall near the other end; and means to force into the receptacle that portion of the cup having the filling opening and to thereafter withdraw the cup so that its filling end portion is substantially flush with the wall of the receptacle and to register the discharge opening of the cup with the outlet opening of said tube, whereby all of the material in said cup may be discharged.

6. The combination of a receptacle, a tube having one end communicating with and not projecting into the receptacle and having an outlet opening in its bottom wall; a sample cup slidingly mounted within said tube, said cup having a filling opening in its top wall near the end adjacent the receptacle and having a discharge opening in its bottom wall near the other end; and means to force into the receptacle that portion of the cup having the filling opening and to thereafter withdraw the cup so that its filling end portion is substantially flush with the wall of the receptacle and to register the discharge opening of the cup with the outlet opening of said tube.

7. A sample-obtaining mechanism comprising in combination, a tubular member having communication at one end with and not projecting into a receptacle containing the material from which samples are to be taken, said tubular member having an opening in its bottom wall intermediate its ends; a reciprocatable cup, capable of receiving a sample of material, positioned in said tubular member having a discharge opening in its lower side, said cup normally lying partly over said intermediate opening in the tubular member and partly forward thereof in the direction of the receptacle and having its filling end portion substantially flush with the wall of the receptacle; operating means in said tubular member at the opposite side of said intermediate opening in the tubular member; means connecting said operating means with said cup, said operating means being adapted to force and retain said cup into said receptacle to receive a sample of the contents; and means to return the cup to its normal position with its discharge opening over the said opening in the tubular member.

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