June 8, 1937. A. B. ANDREWS 2,083,418

SAMPLING TOOL FOR PULP OR THE LIKE

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Fig.1

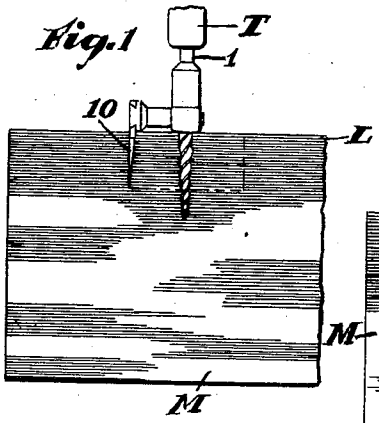


Fig.2

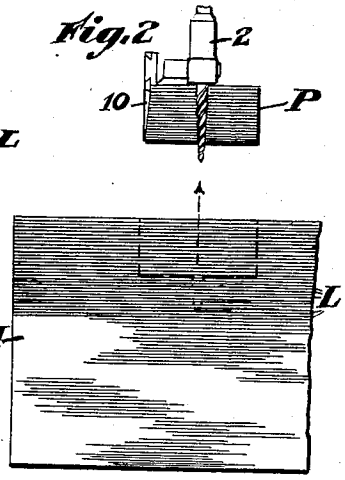


Fig.3

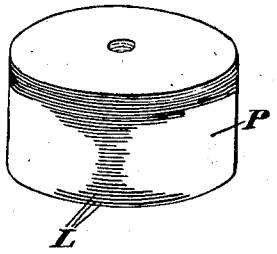


Fig.4

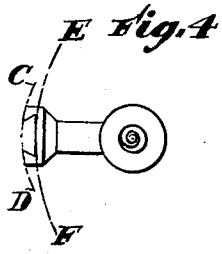


Fig.5

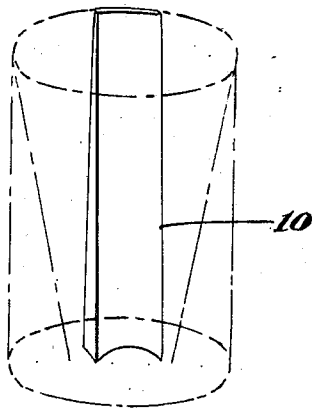
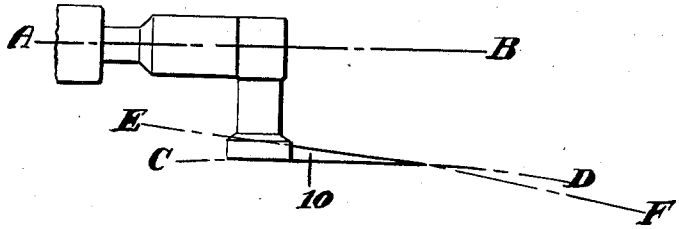


Fig.6



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SAMPLING TOOL FOR PULP OR THE LIKE

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Fig. 7

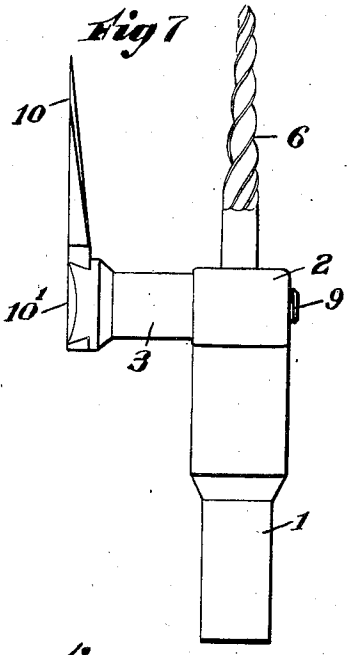


Fig. 8

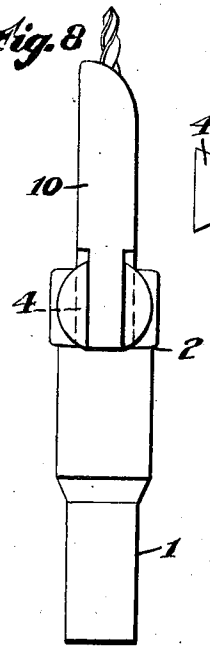


Fig. 9

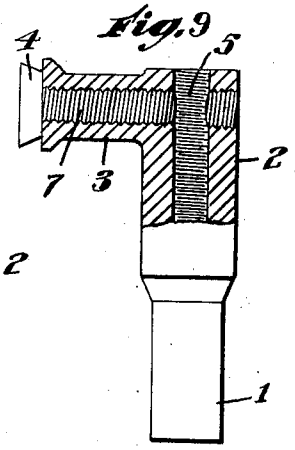


Fig. 10

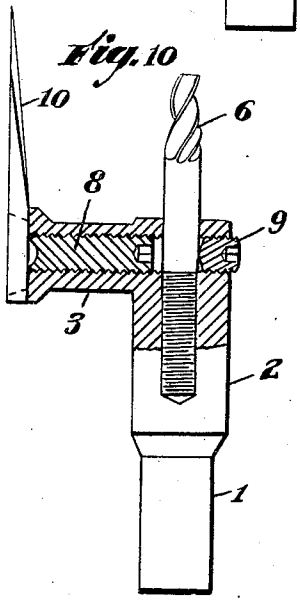


Fig. 11

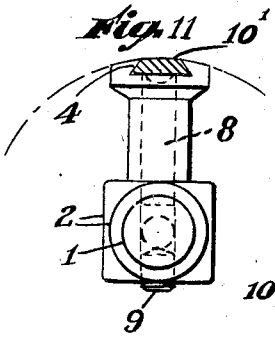


Fig. 12

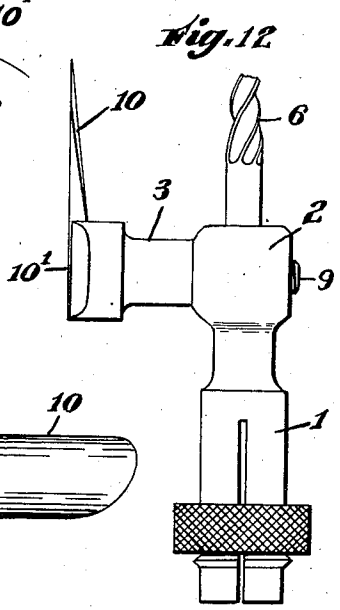


Fig. 13

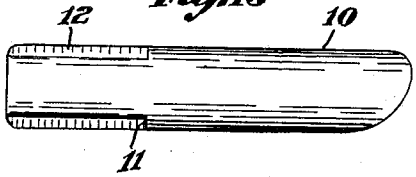
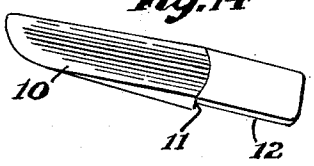


Fig. 14



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Patented June 8, 1937 2,083,418

UNITED STATES PATENT OFFICE

2,083,418

SAMPLING TOOL FOR PULP OR THE LIKE

Arthur B. Andrews, Auburn, Maine

Application December 11, 1933, Serial No. 701,859

2 Claims. (Cl. 83—15)

This invention relates to a sampling tool and is a continuation in part of my prior application Serial No. 581,418, filed December 16, 1931, which matured as Patent No. 1,939,430 on December 12, 1933.

My present invention is particularly adapted for the sampling of pulp in which use it finds a field of immediate importance. For the purposes of this application therefore I shall discuss my invention in such use although it will be understood that this treatment is purely illustrative and in no way limited.

Considering the sampling of pulp as typical, it is the usual practice to ship pulp in bales. Each bale is made up of a number of sheets of pulp which have been compressed under heavy pressure and then covered and wired together in their compressed condition. The pulp bale is therefore a dense, compact mass which is highly resistant to penetration by the cutter blade of the sampling tool.

In testing the bales, a number of standard samples in the form of plugs or cores are cut from different areas of the bale so as to obtain an average of the entire bale. Each plug consists of an assembly of discs representing the depth of penetration of the cutter blade through the laminae of the bale.

It is of the utmost importance that these discs be preserved in the order in which they were cut as the sampling tool is withdrawn from the bale, since the testing operation consists in selecting from the several plugs taken from the bale at various known areas discs which were cut at predetermined depths and testing these to obtain an average for the entire bale.

My invention therefore contemplates a construction wherein the cut discs are positively retained on the sampling tool in the exact order in which they were cut as the plug is withdrawn from the bale.

On account of the resistance of the material to the cutting action, breakages of the cutter blade are frequent and constitute a considerable item of both expense and delay. This is due in part to the construction of the blade itself and in part to the mounting of the blade on the tool. My invention therefore further contemplates a construction of blade and method of blade attachment which will enable the tool to be rapidly and continuously used with the minimum of blade breakage and with the maximum of convenience of replacement in the event of blade breakage or in substituting resharpened blades.

In the accompanying drawings I have shown several embodiments of my invention which I have found highly satisfactory under actual service conditions.

In such drawings:—

Fig. 1 is a fragmentary view showing a sampling tool in accordance with my invention at work.

Fig. 2 is a similar view showing such tool withdrawn from the material, the cut discs constituting the plug or core being retained on the tool in the order in which the laminae were cut so that they may be subsequently removed, stacked and tested.

Fig. 3 is a view of a standard plug as cut by the tool from the bale, and after removal from the tool itself.

Figs. 4, 5 and 6 are views in the nature of diagrams particularly illustrating the construction of the cutter blade as a blade having its external surface cylindrical and its inner surface a conic section.

Fig. 7 is an elevation of one embodiment of my sampling tool.

Fig. 8 is a view at right angles to Fig. 7.

Fig. 9 is a section through the tool head with the worm and cutter blade removed.

Fig. 10 is a similar view with said parts indicated.

Fig. 11 is an end view, partly in section.

Fig. 12 is an elevation of a modification, and Figs. 13 and 14 are detail views of the cutter blade removed.

Referring to Fig. 1 I have indicated at M a mass of material to be sampled. This may be considered as a bale of pulp made up of pulp sheets which have been compressed under heavy pressure and covered and wired together as a dense compact resistant mass.

The standard samples cut from said bale at selected regions are in the form of plugs or cores P (Fig. 3) and are usually four inches in diameter and three inches long.

Fig. 2 shows such a plug being removed from the bale. The discs resulting from cutting through the laminae of the bale are indicated at L. These discs are retained on my sampling tool in the order in which they were cut so that they may be later removed from the tool, stacked and tested.

My sampling tool is a power driven tool, consisting essentially of a shank adapted to be rotated about an axis of rotation, a combination guide and retainer member coaxial with said shank, and a cutter blade fixed to said shank in such position as to describe a path having the combination guide and retainer as a center when said shank is rotated.

The shank is adapted to be chucked in an electric or other power drill T and accordingly the shank design is such as to adapt the tool to the several different power tools available.

Because of the resistance offered by the pulp M to the cutting action, the cutter blade although a relatively thin blade is of maximum mechanical strength and is so mounted on the tool as to resist any tendency to twist or spring while at work. Preferably the blade has a slight divergence, usually about 2° from the axis of the tool so as to afford clearance as the tool is penetrated into the bale.

In such penetration, the combination guide and retainer member acts somewhat as a feed screw although its essential function is to maintain the tool on a true center during the cutting action and after the plug has been cut, to retain the cut laminae in their proper order as the tool is withdrawn from the bale. In such removal the cut laminae lie within the cutter blade and buckle slightly so as to present no difficulty to withdrawal.

While the blade itself is substantially concentric to the axis of the tool, the outer face of the blade is however a cylindric surface and the inner face of the blade is a conic section, the base of the cone meeting the cylindric surface at the point end of the blade and thus determining the thickness or taper of the blade.

Preferably the blade is forged and then fitted to the very tool in which it is to be used, the tool chucked in the live spindle of a lathe or grinder, and the blade ground both inside and outside on its own center until the grinding wheel clears. The cutting edge is then rounded or beveled off according to the fancy of the particular operator who will use the tool.

I have indicated at **1** the shank of my sampling tool. Integral with the shank is a head **2** from which extends an arm **3** having at its outer end a seat **4** for a cutter blade. The seat **4** is disposed to the rotative axis of the tool and is preferably formed by dovetailing the outer face of the arm **3** from front to rear. (See Figs. 9 and 11.)

The head **2** is axially bored as at **5** to receive a combination guide and retaining member in the form of a worm **6**.

The worm **6** is threaded at its rear end into the head **2** (Fig. 10) and said head is counterbored as at **7** and threaded to receive a cutter clamping screw **8**. If desired, the outer end of the counterbore **7** may be closed, as at **9** (Fig. 4).

The outer face of the arm **4** is rounded, as indicated at **10** (Fig. 11) on an arc corresponding approximately to the arc of rotation described by the cutter blade **11**.

The outer face of the cutter blade is a cylindric surface and the inner face is a conic section. This is apparent from Figs. 4, 5 and 6 wherein the base of the cone is shown as meeting the external cylindricity at the lower or point end of the blade.

In such figures the line A—B represents the axis of rotation of the tool, the line C—D represents the cylindrical outer face of the blade and the line E—F the inner face of conic section.

Rearwardly of its cutting surface, the blade is formed as an attaching portion (Figs. 13 and 14) being shouldered as at **11** and dovetailed as at **12** to fit within the dovetailed seat **4**, and being retained therein by the clamp screw **8**, which when set up against the blade tends to force it outwardly against the dovetailed edges of the seat **4** and thus to lock it firmly in cutting position.

Thus the cutting blade is held in the tool in such manner that all torques or stresses occurring during the passage of the cutting edge through the pulp will be absorbed by the dovetailed seat and the common tendency of the blade to break or become twisted at the point of connection to the holder is overcome.

In operation the forward end of the member **6** is positioned against the bale at the selected area and the tool is rotated to cause the same to penetrate the material until the blade attacks the material. From this point the penetration of the members **6** and **10** is simultaneous, the penetration of the worm **6** tending not only to guide but to lead or draw with it the cutting blade **10** as it penetrates into the body of the stock to the desired depth.

When a plug of the desired thickness has been cut, the tool is withdrawn. The plug is retained on the worm **6**, and subsequently detached therefrom without disturbing the order of the cut laminae.

Various modifications in the construction and operation of the device may obviously be resorted to if within the limits of the appended claims.

What I therefore claim and desire to secure by Letters Patent is:—

1. A tool for cutting and withdrawing as a plug or core a sample from a bale of material under compression, comprising a rotatable shank having a head provided with an axial bore, a worm fixed in said bore and constituting both a guide and a feed element as the tool is penetrated into the material and a retainer for the cut plug or core when the tool is withdrawn from the material, said head being offset laterally to provide a cutter-carrying arm and said arm and head having a transverse bore intersecting and extending beyond said first-named bore to the opposite side of said head, the outer face of said arm being formed as an extended cutter seat disposed parallel to the axis of rotation of said shank, a cutter mounted in said seat and consisting of a straight blade having its rear end clamped in said seat and said blade traveling through a path of revolution having the worm as a center when the shank is rotated, and a rotatable clamping element insertible through said transverse bore and reactive against said cutter for clamping said cutter in said seat.

2. The tool of claim 1, and a second rotatable clamp insertible through said transverse bore and reactive against said worm.

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