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2,587,771

APPARATUS FOR DETERMINING MOISTURE CONTENT OF TOBACCO

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FIG. 1

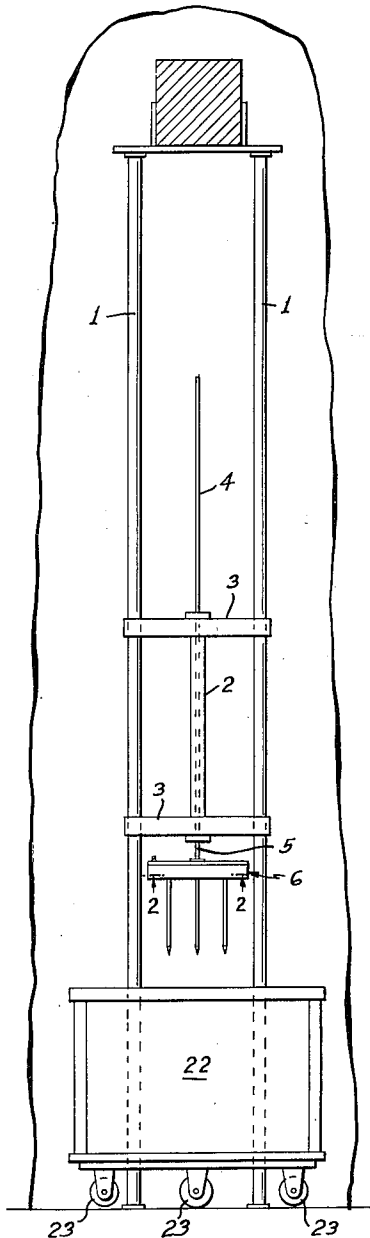


FIG. 2

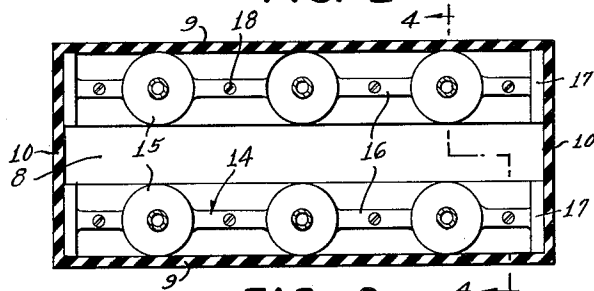


FIG. 3

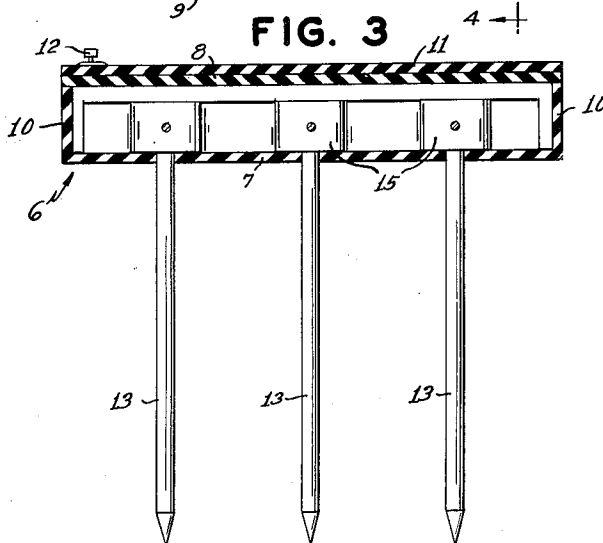
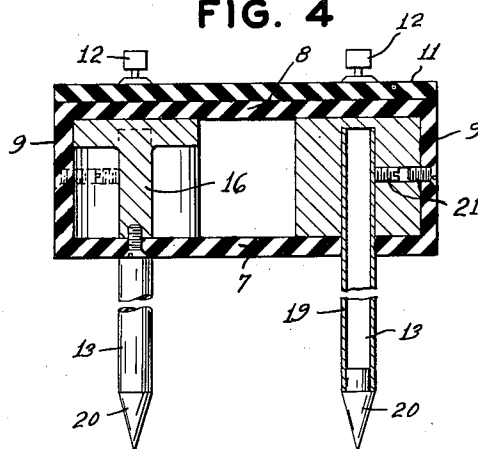


FIG. 4



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APPARATUS FOR DETERMINING MOISTURE
CONTENT OF TOBACCO

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2 Claims. (Cl. 175—183)

1

This invention relates to a method and apparatus for testing the moisture content of tobacco.

In the handling of tobacco it is frequently necessary to determine the moisture content. Thus in the manufacture of cigarettes, the cut, blended tobacco is adjusted to proper moisture content before it is delivered to the cigarette making machines. The tobacco is delivered to the cigarette making machine in bins or containers mounted on wheels or casters. It has heretofore been the custom to test the moisture content of small samples taken from these bins by the "Tag Heppenstall" method. In making such test, several samples are taken from the different portions of the bin in a 1½" sampling thief and placed in a mixing container. The samples are then mixed, poured into the cylinder of the machine and packed firmly by hand. The cylinder is then transferred to the press and the press adjusted to maintain a pressure of 150 pounds upon the sample for one minute. The head of the press is provided with a pair of electrodes connected in circuit with a galvanometer. The deflection of the galvanometer is noted together with the temperature of the tobacco and the moisture content then obtained from suitable conversion tables.

In testing the moisture content of uncut tobacco such as strips and tobacco in "bulk," thief samples are taken as heretofore described and the sample must then be milled or ground before it is placed in the "Tag" press. Loss of moisture during the grinding operation may thus result in an incorrect moisture determination.

In the present invention we provide a method of testing in which the test, when applied to tobacco for cigarette manufacture, is carried out in the bin or container. We employ an electrode connected to the galvanometer in the same manner as the electrode of the Tag press consisting of a number of prongs mounted on a plate or support of fairly large area. This plate or support is carried by the piston rod of a piston mounted in an air cylinder. The electrode is lowered on to the tobacco and allowed to stand until the tobacco beneath the electrode has been held under the desired pressure for a determined period of time. A reading of the galvanometer deflection and the temperature is then taken, which is converted to moisture content by the methods heretofore employed.

Our proposed method thus eliminates several of the steps heretofore employed and also provides more accurate information. By employing

2

relatively large electrode prongs extending at least one-half of the height of the bin or container and by testing the moisture content of a much larger sample of the tobacco in the bin or container, more accurate information is obtained.

The test may be similarly applied to tobacco entering cut storage, to strips in tobacco stemmeries and to tobacco in bulk.

In the accompanying drawings we have shown, 10 more or less diagrammatically, apparatus suitable for use in practicing the process and forming a part of the invention. In this showing:

Fig. 1 is a side elevation showing the electrode device associated with the air cylinder and showing a tobacco bin in position for a moisture test;

Fig. 2 is a horizontal, sectional view on line 2—2 of Fig. 1;

Fig. 3 is a vertical, longitudinal, sectional view of the prong electrode; and

Fig. 4 is a transverse, sectional view on line 4—4 of Fig. 2.

Referring to the drawings, the reference numeral 1 designates a pair of vertical guides adapted to support an air cylinder 2 by means of suitable transverse members 3. The air cylinder is connected to a source of air under pressure by a line 4 having suitable control valves and a pressure gauge (not shown) arranged therein. A piston is mounted in the cylinder and is connected to a piston rod 5 extending from the bottom of the cylinder.

The electrode structure, designated generally by the reference numeral 6, is secured to the piston rod. It consists of a box-like structure having a bottom 7, top 8, side walls 9 and end walls 10 formed of any suitable material. As shown, it is of relatively large area so that when it is lowered into a bin of tobacco under a predetermined pressure a relatively large sample of tobacco will be maintained at that pressure.

A board 11, to which terminals 12 are connected, is arranged on top of the electrode member 6. Within the electrode member, and depending therefrom, we provide two rows of electrodes 13. One row of electrodes is connected to one of the terminals 12 and the other row connected to the other terminal 12 so that when the prongs 13 are lowered into the tobacco and the circuit closed, the circuit is completed from one row of electrodes to the other. Each series of electrodes is mounted in an electrode holder 14 which may be formed of aluminum or other suitable material. Each electrode holder consists of cylindrical sections 15 to receive the electrode prongs, connecting sections 16 and end

3

sections 17, the end sections abutting the end walls 10. They may be secured in place in any suitable manner as by screws 18.

The prongs 13 may be of varying length but are preferably from 10 to 15 inches long, depending on the depth of the tobacco in the container. They consist of outer shells 19 having pointed tips 20 pressed into the lower ends of the shells. They are retained in the holders 16 in any suitable manner, as by means of screws 21.

In practicing the process, a bin or container 22 in which a supply of tobacco is transported to the tobacco feeder of a cigarette making machine is placed beneath the electrode member 6. These containers are mounted on casters 23 by means of which they may be readily moved about the plant. The electrode member 6 is then lowered on to the surface of the tobacco. Being of relatively large area, the mass of tobacco, much greater than that heretofore tested in the Tag press, is brought to a uniform density, depending upon the air pressure exerted on the piston in the cylinder. In a specific embodiment of the invention, which has been used with success, the length of the electrode member is 13½ inches and the width 6 inches. After the pressure has been held on the mass of tobacco for a given period of time, such as one minute, a reading of the galvanometer deflection in the circuit connected to the terminals 12 is taken. The circuit is not shown because it is conventional. By means of a conversion table this value is converted into moisture content value, the electrical conductivity of the tobacco varying according to the type of tobacco, cut of tobacco, density of tobacco, testing time, moisture content and temperature. By maintaining all of these values constant, with the exception of the moisture content and the temperature, the moisture content can be determined by the deflection of the galvanometer. While the conversion is obtained from the reading of the galvanometer deflection in the same manner as heretofore obtained, more accurate information results because the mass of the tobacco included in the moisture test is much greater than that obtained by the sampling process. With certain cuts of tobacco it is extremely difficult to obtain a homogeneous sample for proper testing.

Another advantage of the invention is that the constant air pressure applied to the electrode member is subject to less variation than with the coil spring type in the regular Tag press. The life of the electrode prongs is also considerably greater.

In applying the process to tobacco entering

4

cut storage, tobacco strips, or tobacco in "bulk," the process is essentially the same. The number of electrodes employed, the size of the electrodes and other detailed features of the apparatus may be varied to meet particular requirements encountered in testing tobacco in various conditions, but the process is essentially as described.

We claim:

1. Apparatus of the character described comprising a pair of vertical guide members, a pair of transverse members connected to the guide members, an air cylinder supported by the transverse members, a piston in the cylinder, a piston rod connected to the piston and projecting from the bottom of the cylinder, an electrode member secured to the piston rod, the electrode member consisting of a box-like structure of appreciable area having a flat lower surface adapted to engage the surface of material to be tested, two series of electrode prongs extending downwardly from the lower surface of the electrode member, and an electric terminal connected to each set of electrodes.

2. Apparatus of the character described comprising a pair of vertical guide members, a pair of transverse members connected to the guide members, an air cylinder supported by the transverse members, a piston in the cylinder, a piston rod connected to the piston and projecting from the bottom of the cylinder, an electrode member secured to the piston rod, the electrode member consisting of a box-like structure of appreciable area having a flat lower surface adapted to engage the surface of material to be tested, two series of electrode holders mounted in the electrode member, an electrode member in each of said holders and projecting downwardly from the lower surface of the electrode member, and an electric terminal connected to each series of electrodes.

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