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2,668,439

PROCESS AND MEANS FOR DETERMINING THE TRUE SPECIFIC GRAVITY OF WOOD

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FIG. 1

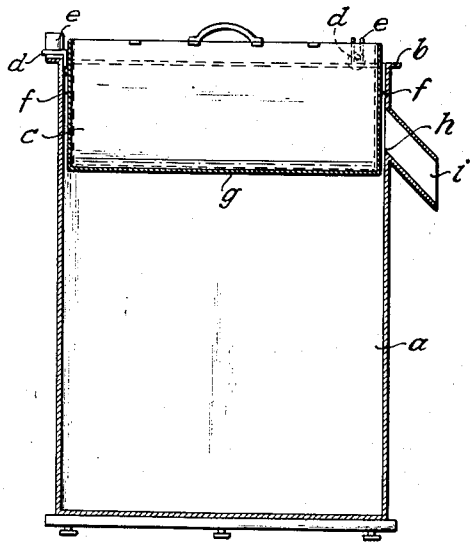


FIG. 3

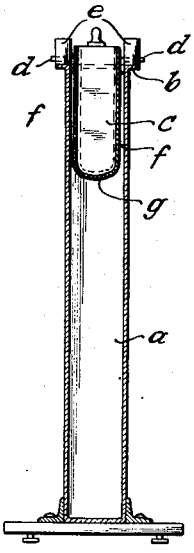


FIG. 2

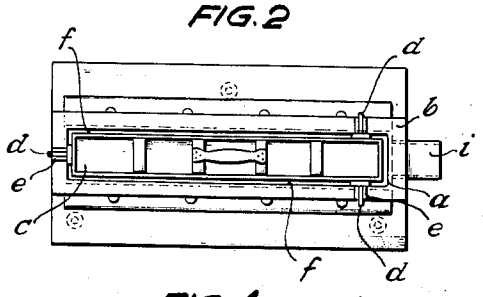


FIG. 4

FIG. 5

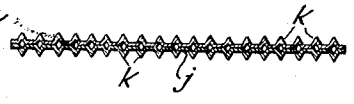
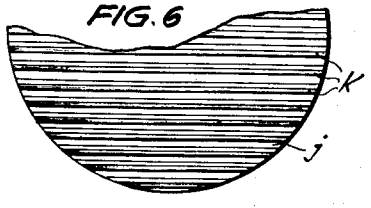


FIG. 6



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PROCESS AND MEANS FOR DETERMINING THE TRUE SPECIFIC GRAVITY OF WOOD

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3 Claims. (Cl. 73—32)

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My invention relates to method and means to determine the true specific gravity of wood (i. e. the oven dry weight or kiln-dry weight per cubic meter of trunk timber and per cubic meter of piled wood) as well as the original degree of density not only in green condition of the wood but also after any period of storing.

More especially, the invention relates to a method and means for determining certain properties of wood, among these properties being the specific gravity having special reference to the true specific gravity, the specific weight, the true specific density, and the timber ratio.

By true specific gravity as herein used is to be understood the specific gravity of the particular wood freed from all sap content whether the latter be the sap content of green wood or the sap content of wood which has been subjected to oven drying or other drying process. By the specific weight is meant the weight of one cubic volume of the poreless substance of timber as expressed in units of weight. By true specific density is meant the number of units of weight of the dry substance of timber contained in a unit volume of absolutely dry solid timber. By timber ratio as used herein is meant the percentage of solid timber contained in a cubic volume of piled timber. By piled timber is meant the timber in the form of trunks or logs as it is usually piled up, the total dimensions of such a pile often containing at least 25% of cavities between the individual pieces of timber and by solid timber is meant timber so cut that the individual pieces may be laid side by side or on top of one another with no appreciable cavities between individual pieces.

The numerical values, as herein referred to, are the various properties above noted as expressed in numerals. For instance, the specific gravity value is related to the volume of water as one and is expressed in the usual way for woods lighter than water as a decimal value, such as point .70. The numerical value relating to the specific weight may be expressed as the weight in grams of one cubic centimeter of the poreless substance of timber. The true specific density may represent by the number of kilograms the dry substance of timber contained in one cubic meter of absolutely dry solid timber. The timber ratio may be expressed as the percentage ratio of the space occupied by one cubic meter of piled timber in relation to the same volume of solid timber.

Prior art processes and means for measuring the true mass of wood are based on the determination of specific numerical values such as volume and degree of density per cubic meter of piled wood, weight per cubic meter of piled wood, moisture of wood under test conditions, dry substance weight per cubic meter of trunk timber or piled wood according to the special percentage of moisture and, percentage of water of xylometrically treated wood. These processes require the conversion of values given in cubic meters of green piled wood into values giving the cubic meters of trunk timber by means of more or less inexact coefficients which do not consider the different composition of the wood with respect to its percentages of cellulose and lignin. The well-known xylometric process, moreover, is inconvenient inasmuch as changes of volume due to absorbed water and shrinkage, different swelling, and formation of airtight cavities will appear thus limiting said process to tests of green wood, apart from the requirement to cut out a plurality of test discs having a thickness of 2 cm.

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With the foregoing in mind, it is an important object of the instant invention to provide a wood testing process and means wherein the true specific gravity, i. e. the real dry wood substance to be contained in a cubic meter of green trunk wood or green piled wood, is determined directly, even with respect to seasoned wood.

A further object of the instant invention is the provision of a wood testing process and means wherein under any conditions of moisture the characteristic numerical values of wood such as moisture, degree of density, true specific gravity, oven dry weight, green volume, shrinkage, and specific gravity may be determined directly or by means of tables and diagrams without employing an additional examination as to moisture.

Also an object of the invention resides in the provision of a wood testing process and means allowing the unequivocal determination whether a quantity of wood taken over will be in accordance with the degree of density calculated by coefficients.

Still another object of this invention is to provide a wood testing process and means to improve and to simplify the examination of any wood to be tested by a few simple operations using test pieces the pores of which are saturated.

While some of the more salient features, characteristics and advantages of the instant invention have been above pointed out, others will become apparent from the following disclosures.

The process according to this invention consists in the determination of characteristic numerical values for the several species of wood by means of a few simple working operations described in the following. The process aims at ascertaining the weight of a cubic meter of piled wood or trunk timber to be tested. The test pieces having the shape of discs transversely cut off the trunk in a thickness of two centimeters are so treated with water that the pores will be totally saturated. Then weight and volume of said test piece is determined. The displacement of air out of the pores by means of water which is per se an action of long duration may be accelerated in accordance with various physical and mechanical methods, for example, by means of ultrasonic frequencies, vacuum, pulsating compression and expansion with cold and hot water. In practice, however, it is preferred to saturate the pores by means of boiling. In this boiling method for saturating the pores each species of wood has a minimum duration of boiling, for example, 2 hours for beech, 6 hours for pine and spruce. After boiling the test piece is cooled down in a cold water bath, consisting preferably of boiled off water, for a certain minimum period in accordance with the species of wood, for example, 3 hours for beech. In order to determine the weight of the test piece having now fully saturated pores it will be weighed after having cautiously removed the surface water preferably by means of blotting paper or patch. Thereafter the test piece is volumetrically analyzed by means of a specially developed precision xylometer wherein the water displaced by the test piece and collected by means of an overflow pipe is weighed. Exact coefficients have been determined empirically for the various species of wood so as to be able, on the base of the working operations described above, to take a direct reading of the true specific gravity, the moisture, and the specific gravity without having to measure the degree of moisture by means of a drying chamber or any other physical or chemical methods the range of application of which is limited. In practice, these coefficients may be tabulated and diagrammatically illustrated for the purpose of better convenience.

For realizing the measuring process mentioned above the means for boiling and saturating the test pieces comprise both a commercially used boiler the bottom of which carries an inclined grate assuring a point or line contact of the circular test piece and a xylometric measuring apparatus. By way of example, said precision xylometer according to this invention is described by the following specification illustrated by the accompanying drawing, in which

Fig. 1 shows an elevation of a precision xylometer, partly in section;

Fig. 2 shows a plan view of the same;

Fig. 3 shows a side view of the same, partly in section;

Fig. 4 is an elevation of a grate;

Fig. 5 is a sectional side view of the same; and

Fig. 6 shows a plan view of the same, partly in section.

Similar letters refer to similar parts throughout the several views.

Referring now more specifically to the drawings, there is shown a precision xylometer comprising a container *a* of any suitable cross section. A dipping tank or body *c* supporting on preferably three points of a flange *b* of the container *a* is inserted into the latter from the upper side. The dipping tank or body *c* is preferably provided with an outwardly projecting journal *d* fitted into respective bearings or supports *e*. The journals *d* are so shaped that they center the dipping tank or body *c* within the upper opening of the container *a*, thus constituting uniform spaces *f* intermediate the outer surface of the dipping tank or body *c* and the inner wall of the container *a*. The dipping tank or body *c* serves to smooth the surface of water immediately or in a quite short time so as to reduce the period of dropping to a few minutes and to obtain a better relation of the quantities of liquid held by cohesion and adhesion.

Moreover a bottom *g* of the dipping tank or body *c* has a somewhat convex shape so as to slightly project below an overflow edge *h* to which there is adjacently associated an outflow groove *i* extending downwardly. As shown in Figs. 1–3 the water overflow edge *h* has a sharp and smooth shape so as to obtain a proper separation between the water of the container *a* and the quantity of water overflowing through the groove *i*. In case of using a quadratic, circular or oval container *a* instead of a flat and rectangularly shaped one a grate *j* is put upon the bottom of the container *a* in an inclined position, as shown in Figs. 4–6. The top and bottom sides of the grate *j* are preferably provided with sharp-edged lands or conical parts *k* so as to enable the wooden test piece or disc to have point or line contact only thereupon. As a result of this design it is possible to obtain a volumetric determination of weight yielding a maximum measuring error of ± 0.2 per cent only.

It will be appreciated that the device according to the instant invention is relatively simple in construction, and economical both to make and use.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim:

1. That process of determining the true specific gravity of a wood which consists in preparing a sample of the wood by severing the wood by spaced cross-cuts to provide a disk-like portion free from air pockets and knots, boiling the sample in water until all of the sap content has been removed and full saturation of the pores has taken place, subjecting the sample to a cold water bath in the absence of air, removing the sample from the cold water, removing the surface moisture from the sample by absorption, and thereinafter xylometrically determining the specific gravity of the treated sample.

2. That process of determining the true specific gravity of a wood which consists in preparing a sample of the wood by severing the wood by spaced cross-cuts to provide a disk-like portion free from air pockets and knots, weighing the sample, boiling the sample in water until all of the sap content has been removed and full saturation of the pores has taken place, subjecting the sample to a cold water bath in the absence of air, removing the sample from the cold water, removing the surface moisture from the sample by absorption, again weighing the sample, and hereinafter xylometrically determining the specific gravity of the treated sample.

3. A xylometer comprising a container open

at the top and having an overflow lip at one side spaced below its top, a chute extending downwardly from the container at a point below and adjacent said lip, an outwardly extending flange on the top of said container, a tank removably mounted within the top portion of the tank and three-point supporting means between said tank and said flange, said supporting means being arranged to hold the sides of the tank spaced equally from the container sides.

THEOPHIL REICHERT.

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