Dec. 31, 1940. P. S. BARNHART 2,226,841

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Fig. 1.

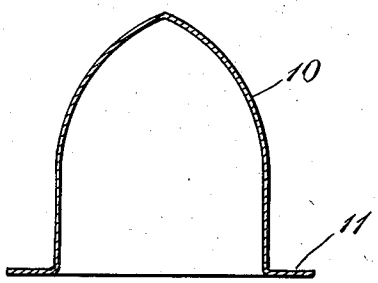
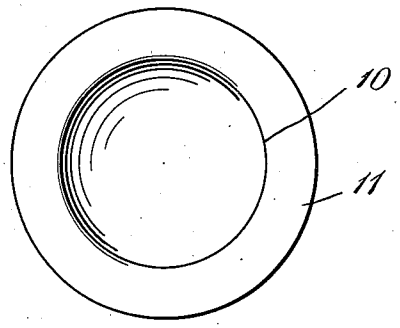


Fig. 2.



INVENTOR
Philip S. Barnhart
BY
Marshall & Melhorn
ATTORNEY

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Philip S. Barnhart, Westfield, Mass., assignor to Westfield River Paper Company, Inc., Russell, Mass., a corporation of Massachusetts

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6 Claims. (Cl. 47—29)

This invention relates to paper, and particularly to paper of the type known as Glassine.

Paper, and more especially Glassine paper, is being used as a protector for small plants or seedlings. Such protectors may be made in the form of small cones or caps which are placed over the plants. Glassine paper is particularly useful for this purpose as it is transparent or semi-transparent and permits some light to pass through, although shading to some extent the growing plant in its early growth.

These caps or protectors are provided with a small flange or rim around the base and the rim is covered with earth, thus holding the cap in position.

It has been found that when this type of protector is used in some localities where an alkali soil is present, the alkali attacks the paper which weakens and disintegrates to such an extent that the cap rim or flange will no longer hold the protector and it will blow away.

Ordinary Glassine paper has been found to be unsuitable for certain other uses. For instance, in some soap factories fresh cakes of soap are wrapped first in Glassine paper and then in a heavier printed wrapper. Unless the Glassine paper is coated with wax the outer wrapper will be discolored by the alkali in the soap which penetrates the Glassine sheet.

This invention has for its salient object to provide a paper sheet, and particularly a Glassine sheet having an acid content sufficient to counteract or neutralize alkali conditions encountered and to overcome the detrimental effect of the alkali on the paper.

Another object of the invention is to provide a plant protector formed of paper so constituted that it will not be weakened or disintegrated by the alkali in the earth in which it is used.

Another object of the invention is to provide a paper, and particularly a Glassine paper, so constituted that it can be used for plant protectors and will not be adversely affected by the alkali in the soil.

Another object of the invention is to provide a paper, and particularly a Glassine paper, for plant protectors so constituted that it will give fertilizing properties to the soil around the roots of the plant it is being used to protect.

Another object is to provide a paper, and particularly a Glassine paper, so constituted that it can be used as a wrapper for alkali soaps and will not be adversely affected by the alkali in the soap.

Further objects of the invention will appear from the following specification taken in connection with the drawing which forms a part of this application and in which there is illustrated a plant protector embodying the invention.

Fig. 1 is a vertical section.

Fig. 2 is a top plan view.

Glassine paper is well known and it is not necessary to describe herein the methods or processes used in the manufacture of this paper. The paper pulp is passed over a regular Fourdrinier machine and is pressed by press rolls to remove excess water and then dried and wound up on reels. It is subsequently redampened and passed through a supercalender where, through the action of heat and pressure, it is converted into the grade of paper known as Glassine.

Glassine paper is made chiefly from spruce wood which is beaten in special beaters until the stock is highly hydrated or gelatinized. The stock is combined with the proper amount of size and alum and pumped through a Jordan engine in order to obtain the proper length of fiber. The web is formed on a Fourdrinier wire which passes over suction boxes and a suction couch roll.

The wet web is subsequently pressed at three different points to squeeze out excess water and is then passed over a series of drum driers, the temperature of which is regulated so as to remove the moisture from the paper gradually until the paper is wound on a roll at the end of the machine with a moisture content of approximately six percent (6%). At this point the paper is redampened with water to a percentage of 17–25% and is supercalendered on a fourteen roll stack, the temperature of which reaches 135° C. and the pressure approximately thirty-five tons. This pressure and heat convert the white paper made on the paper machine to the product known as Glassine.

As stated at the outset of the specification, Glassine paper as usually constituted is not suitable for use in protectors for plant seedlings due to the alkalinity of the soil, since the alkali weakens and disintegrates the paper.

This condition can be overcome by the addition of an acid or acid salt to the paper so that the total acidity in the finished sheet has been brought to such a proportion as to overcome the alkali condition encountered by using the paper in an alkali soil. This proportion may vary and it has been found that an approximate proportion of 0.30–0.40% calculated to SO_3, figured on a bone dry basis, is satisfactory. Throughout the specification the total acidities

are expressed in terms of percentages of SO_3 on a bone dry basis.

This acid or acid salt can be added at any suitable point in the manufacture, as for instance, in the final dampening operation, before the paper is passed through the supercalender. It would also be possible to increase the acidity of the finished sheet by making additions of acidifying agents to the beaters, but this method would not be as satisfactory since a greater proportion of the acidifying material would be lost when the sheet is being formed. Moreover, if desired, the acidifying agents can be added to the paper on the size tub.

It is necessary to select an acid or acid salt which will not injure or weaken the paper and, secondly, one which will not in any way damage the roots of the plants or seedlings. Alkali soils contain chloride, sulphate and nitrate of sodium, in addition to the carbonate and bicarbonate of sodium. In certain localities these salts are present to such a degree and in such concentration as to make it difficult to grow certain kinds of plants. Therefore, the acidifying material to be added should be of a different acid radical from the ones above mentioned.

Although the amount of acid in the treated paper is small, the water soluble compounds in the paper are slowly absorbed by the soil and consequently have a bearing on the growth of the plants. Bearing this in mind, it is desirable to add to the paper an acid salt of the fertilizer type which will be non-injurious to the paper and will give small fertilizing properties to the soil around the roots of the plant.

It has been found by experimentation that an acid salt like di-hydrogen ammonium phosphate can be used with good results in making up this type of paper. This salt can be used in a 3% water solution as dampening water prior to the supercalendering of the sheet in the regular Glassine process. When used in this proportion a sheet will be obtained having approximately the 0.30% total acidity calculated to SO_3 and figured on a bone dry basis.

The percentage of di-hydrogen ammonium phosphate in the water can be varied, however, depending on whether the sheet is dampened on one side or both sides.

It should be understood that the invention is not limited to the particular percentages specified, but that other percentages of this material can be used to meet other conditions. Furthermore, other acids and acid salts can be used to give the desired acidity to the paper. For example, acids such as phosphoric, acetic, boric, etc., can be utilized without injury to the paper, and other acid salts, such as acid potassium phosphate, primary calcium phosphate, ammonium phosphite, or other suitable combinations.

Acid salts which have been found particularly desirable are inorganic salts, although certain organic acids or acid salts may be found suitable. In any case it is desirable that water soluble acid or acid salts be used.

The following examples are given of solutions suitable for acidifying the Glassine paper, although it should be understood that applicant does not intend to be limited to the particular acid substances mentioned, nor to the weights or percentages set forth:

(1) To 404 pounds of water add 12.5 pounds of di-hydrogen ammonium phosphate. This totals 416½ pounds and the di-hydrogen ammonium phosphate is 3% of the total.

(2) To 401½ pounds of water add 15 pounds of di-hydrogen potassium phosphate making a total of 416½ pounds. The acid salt present is 3.6%.

(3) To 402.25 pounds of water add 14.25 pounds of ammonium phosphite. This totals 416.5 pounds or 3.4% of acid salt.

(4) To 410 pounds of water add 6.5 pounds of phosphoric acid. This totals 416.5 pounds, of which 1.56% is phosphoric acid.

The acid substances set forth in the foregoing examples are thoroughly dissolved and the solution is used as a dampening solution in the regular dampening operation. Example #1 recites the preferred solution.

In the drawing there is illustrated one type of protector for seedlings or plants that may be formed of the Glassine paper having the acid properties above described. This protector consists of a cone or cover 10 having a flange or rim 11 at the bottom thereof and when the protector is used the rim 11 is buried in the earth and prevents the cap or protector from being blown away. When constructed of Glassine paper having the characteristics above specified it has been found that the alkali in the soil does not disintegrate or weaken the paper structure and, furthermore, that the water soluble salts in the paper have a beneficial fertilizing effect on the roots of the plant.

In addition to its use in plant protectors, Glassine paper having the characteristics specified, has other uses. For instance, in certain factories newly formed or fresh cakes of soap are wrapped first in Glassine paper and then in a heavier paper which is printed, sometimes in colors. Heretofore, it has been found necessary to coat one side of the Glassine sheet with wax in order to protect the outside wrapper from discoloration due to the alkali in the soap coming through the Glassine sheet and the outer wrapper. However, by using a Glassine sheet treated with a suitable acid or acid salt, such for instance, as di-hydrogen ammonium phosphate, the alkali in the soap that would normally attack the paper, is counteracted and no discoloration occurs on the outside wrapper. Furthermore, the Glassine sheet is not injuriously affected in any way by the alkali.

It is apparent, however, that when the Glassine sheet is to be used in wrapping soap cakes, it is not necessary that the acids or acid salts in the paper have fertilizing properties, and other acid salts or acids can be used. However, the total acidity of the paper should be greater than 0.14%, calculated to SO_3, figured on a bone dry basis.

The method employed for determining the total acidity of the paper is taken from the standards issued by the Technical Association of Pulp & Paper Industry, which includes testing methods, recommended practices and specifications. The specifications referred to covering the analysis or test utilized in this instance is identified as T428M–36. This method was adopted in 1936 and at the present time is the standard procedure for determining the total acidity in paper.

From the foregoing specification it will be evident that paper, or more particularly Glassine paper, having the acid characteristics set forth, can be used successfully for plant protectors or caps and also for other uses where an alkali con-

dition exists, such for instance, as in wrapping cakes of soap.

Although certain specific embodiments of the invention have been particularly shown and described, it will be understood that the invention is capable of modification and that changes in the construction and in the arrangement of the various cooperating parts may be made without departing from the spirit or scope of the invention, as expressed in the following claims.

What I claim is:

1. A semi-transparent paper having incorporated therein an acid substance, having fertilizing properties, in such proportion as to give the paper an alkali resistant property.

2. A Glassine paper having incorporated therein an acid substance, having fertilizing properties, in such proportion as to give the paper an alkali resistant property.

3. A Glassine paper having incorporated therein di-hydrogen ammonium phosphate having a total acidity in excess of 0.14% calculated to SO_3 on a bone dry basis.

4. A plant protector formed of Glassine paper having a total acidity in excess of 0.14% calculated to SO_3 on a bone dry basis.

5. A plant protector formed of Glassine paper treated with an acid fertilizer salt.

6. A Glassine paper having incorporated therein an acid substance having fertilizing properties in such proportion as to give the paper a total acidity of 0.14%–0.45% calculated to SO_3 on a bone dry basis.

PHILIP S. BARNHART.