

# UNITED STATES PATENT OFFICE.

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## CORK COMPOUND AND PROCESS OF MAKING SAME.

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*To all whom it may concern:*

Be it known that we, JOHN J. C. SMITH and MICHAEL SMITH, both of the city and county of Passaic, State of New Jersey, have made new and useful Improvements in Cork Compounds and Processes of Making Same; and in order that others skilled in the art may make, understand, and practice our invention we give the following specification thereof.

Our invention relates to the production of a cork compound and process of making the same, said compound possessing all the advantages possessed by natural cork and having in addition characteristics and properties superior to natural cork and possessing advantages in use for such purposes as sealing material and jar and bottle stoppers not possessed by natural cork.

In order to serve the purposes of a commercial article as a substitute for natural cork, the artificially prepared cork compound must possess the following properties: It must be as soft and resilient as good natural cork; it must remain insoluble, resisting the action of fluids of all kinds, such as are usually put up in sealed vessels, bottles or jars; it must retain its resiliency and softness indefinitely; if after lapse of time the compound becomes harder and less resilient, it must have the property, like cork, of regaining its softness and resiliency by placing in warm water for a short time; it must be free from ingredients having objectionable or obnoxious odors and must not impart a flavor or taste to the contents of the vessels, bottles &c., on which it is used; it must also be free from ingredients injurious to health; it must cost less to make than the natural cork; it must be of uniform and homogeneous texture and free from porosities such as would permit of the escape of gas from aerated or carbonated beverages.

The object of our invention is to produce a cork compound possessing the above mentioned qualities.

In order to carry out our invention, we take the waste cuttings, chips or offal from cork factories and remove therefrom the rough hard outside crust or rind which may still remain on such waste cork and grind such material in a suitable mill to grains of a size which will pass through a twenty-five mesh sieve. From this material which has passed through the sieve, we separate by

means of a sieve of about forty mesh the finer grains and dust associated therewith. By these means we obtain grains of cork of a practically uniform size, which are clean and free from impurities and dust. It is known that cork has a very rough hard and brittle crust on the outside and that the holes and pores therein contain a hard and brittle substance. The grinding process, above described, disintegrates and pulverizes this hard outside crust portion and the substance filling the pores, and as a result of the shifting process, we obtain the clean soft particles of cork which possess in the highest degree the resiliency, softness and other characteristics which render cork a valuable material. The clean cork grains so obtained are next to be converted into a compact but resilient mass in the shape of a block or sheet from which stoppers, sealing disks, rings and the like may be cut. This is accomplished as follows:—We prepare a binding material consisting of an elastic composition formed of glue, glycerin and saccharine material, such for instance as molasses. This binding material is preferably composed of the following proportions of the ingredients and in the following manner, viz: 25 lbs. of the best quality glue is softened in cold water; when properly softened, the glue is melted in a convenient manner as in a steam heated vessel. When melted, 15 lbs. of glycerin are added thereto and thoroughly mixed therewith. To this is then added about 10 lbs. of the saccharine material—molasses—and the mixture is boiled for about one hour, with a repeated stirring of the mass from time to time. The mixture thus formed is a thick fluid, tenacious and sticky mass which, when cooled, is soft and elastic and will remain so for an indefinite period. This elastic glue composition we employ as a binding medium for the cork grains.

As illustrative of the manner of compounding the cork compound forming our invention, we give the following example: 5 lbs. of the above described elastic glue composition are taken and melted in a vessel, which may be heated by steam. To this is then added about 2½ lbs. of water in order to reduce and dilute the thick melted glue compound to a thin fluid. Then about 8 lbs. of the cork grains, obtained as before described, are added to this thin fluid and thoroughly



mixed therewith, while still hot, by active stirring of the mass, the temperature of the mass being about 212° F. This diluting and thinning of the glue compound is of especial importance, as it makes it possible to obtain a thin coating of the cork grains, which is necessary for the sake of economy. If the glue compound were used without previous thinning, it would not run so freely into the small spaces between the particles of cork and form the thin coating around them, because as before stated, the glue compound is a thick and tenacious mass.

It will be understood that cork being light as regards a given bulk, 8 lbs. of the cork grains will have considerable bulk and therefore does not form a plastic and coherent mass when mixed with the relatively small bulk of the glue compound. The object of the above described mixing and active stirring of the cork grains into the glue compound is for the purpose of insuring that each individual cork grain will be coated with a film of the elastic glue compound, so that by the hereinafter described process the cork can be united into a compact mass of uniform texture and cohesion.

The mass resulting from the stirring and mixing of the cork grains with the diluted glue compound is loose and incoherent and resembles in some degree wet sawdust. This mass is then spread out in a thin layer upon a floor or suitable surface for a length of time sufficient to allow the water added to the glue composition to evaporate. This will be effected in most cases within a period of forty-eight hours, but a longer period may be allowed for the mass is not injured in any way by prolongation of this drying period, since, as before explained, the elastic glue composition is practically permanent in its character and consistency. After the drying the mass is still incoherent and requires treatment as now to be described to be formed into a compact coherent mass. In order to form the mass thus obtained into a material suitable for use, said mass is formed into a block or sheet from which the stoppers, disk, rings or other desired articles may be cut or stamped. As an example of this, the instance of forming a block will be described. For example, if it be desired to form a block from the prepared cork grains, said block to be of a size 3" thick by 12" long by 12" wide, a suitable quantity of the prepared cork mass is filled into a strong iron frame or box of corresponding dimensions, *i. e.*, 12" long by 12" wide but having a depth of 18". The box is provided with a removable bottom and a follower or plunger of a size to fit inside the same. In practice, the bottom of the box or frame may consist of a table upon which the box is placed and if desired, the table may be made to accommodate a number of boxes which may be filled in succession

with the prepared cork grains and the contents successively compressed. The depth of the box above specified is required on account of the large bulk occupied by the mass of loose cork grains which, under compression, in order to make a firmly coherent block, are reduced to about one-sixth of the bulk. The operation of forming the block is as follows: A sufficient quantity of the cork grains, as above prepared, are put into a vessel which is capable of being heated by steam or boiling water and the temperature of the mass is brought to about 212° F. The mass is constantly stirred in order that the heating may be uniform throughout. This re-heating of the cork grains softens and remelts the thin film of elastic glue composition which coats each grain and makes it adhesive and causes it to operate as the binding medium. When this condition is reached the loose heated mass is charged into the mold, as above described, the follower or plunger is adjusted and the whole placed under a strong press. The degree of pressure applied should be about 200 lbs. to the square inch. As a result of this pressure, the loose mass of cork grains is reduced about one-sixth in bulk and converted into a compact firmly coherent block, the several grains of which are firmly held together by the elastic glue composition. The pressure upon the mass in the mold should be maintained until the same is cooled, in order that the binding medium may attain its full binding power. When the mass has cooled to about 70° F. it may be removed from the mold and it is ready to be cut into slices or sheets for stoppers, for sealing disks for metal caps, in the same manner as is done when such articles are formed of natural cork, wood or bark, and the same machinery and appliances for this purpose may be used as is used for operating upon the natural cork.

It is to be noted as a feature of advantage of the invention that all the waste material formed by cutting up the compressed cork block is capable of being used again by reheating the same as with the mass of cork grains from which the block was formed. And it is further to be noted that such waste, although in larger or smaller pieces, will, under the action of the heat to which they are subjected, as above described, become granular and loose again and may be readily mixed with a fresh batch for compression, so that it may be said that there is no waste in the material forming the invention.

From the above it will appear that in the process so far as described the disks, stoppers etc., made from the compressed cork grains are soluble or subject to disintegration by the action of water or heat, that is to say, the action of water or heat at about 200° F. would loosen or dissolve the elastic glue composition and the disk, block or other article



would disintegrate and become useless. In order to make the disks, stoppers or the like impervious and resistant to the action of water and heat and ready for use for sealing purposes, they are subjected to the following treatment: A bath is formed consisting of commercial formalin diluted with water. The degree of dilution which we have found satisfactory is 2 lbs. of the formalin to 50 lbs. of water. The stoppers, disks or the like are immersed in this bath for a period of about two hours, during which they are stirred from time to time, so that every stopper or disk is thoroughly reached and acted upon by the fluid of the bath. The temperature of the bath should not much exceed 70° F., as it is found that if a much higher temperature is employed the action of the bath is too rapid and the disks become too hard and do not possess the requisite elasticity and resiliency. The result of this treatment is a sort of tanning action upon the glue composition and renders the same insoluble in cold or hot water and in all fluids so far as is known. By operating the bath so that the action thereof upon the glue composition is gradual, the soft resilient condition of the disks is preserved, while at the same time the binding material is rendered insoluble and the disks are made impervious to either hot or cold fluids. After being subjected to treatment in the bath as described, the disks, stoppers and the like are removed therefrom and exposed to the air to dry for a period of from two to three days.

It is well known that such substances as bichromate of potash, alum, tannin, &c. have an action on glue similar to formalin or formaldehyde, but while formalin is preferable for the purposes of our invention as giving the best result, our invention is not to be regarded as limited in this respect.

The sealing material made by the foregoing process and treatment will be found superior, stronger and more flexible than the best selected natural cork, particularly when cut into thin sections, such as are used for sealing disks. It is free from porosities and therefore gives better results when employed for sealing vessels containing aerated or carbonated liquids and it is less subject to deterioration and disintegration. While we have specified sealing material as a use for the material produced according to our invention, it is to be understood that it may be used with advantage for all purposes for which natural cork is employed. It may be molded into blocks or other shapes of any desired form and dimensions or may be rolled into sheets of desired thickness or produced in any form desired.

It is to be understood that the above mentioned proportions and temperatures are given by way of illustration only and that changes may be made therein to suit varying

conditions and proportions without departing from the invention.

We are aware that cork compounds have heretofore been made in which oxidized oils are employed as the binding material, similar to the well known linoleum floor covering composition; but such cork compounds differ essentially from our present invention in that they are of a sticky and pasty nature and are objectionable for the reason that, as is well known, oxidized oils have at all times a disagreeable odor and also impart to the contents of vessels to which such material is applied their peculiar and disagreeable odor and flavor and this is especially so where the contents of the bottle, jar or other vessel are required to be sterilized or subjected to a heating operation after sealing. A further disadvantage of such cork compositions is that while they may be resilient and soft when newly made, they rapidly lose these properties and become hard and brittle and, for the most part, useless as a good sealing medium. A further disadvantage of such oxidized oil compounds lies in their relatively higher cost and this is an important feature, since the sealing material is required to be used in very large quantities, as for instance, when used in connection with metal caps, and in order for a cork composition to be practically useful, the cost of production must be reduced to a minimum.

What we claim is:—

1. A compound for sealing material consisting of cork grains coated with a compound of glue, glycerin and molasses, and united into a homogeneous material by means of said coating, said coating being finally rendered insoluble.

2. A composition of matter for sealing material consisting of the following materials in substantially the proportions stated, viz. glue twenty-five pounds, glycerin fifteen pounds and molasses ten pounds, and granulated cork in the proportion of eight pounds of the cork to five pounds of the said glue-glycerin-molasses composition.

3. A cork compound consisting of cork grains coated with an elastic glue composition and united in a homogeneous material by means of said coating.

4. A sealing material for the purposes described, consisting of cork grains freed from hard, brittle and pulverulent constituents and coated superficially with an elastic glue composition, and united into a coherent homogeneous material by means of said coating, said material having the texture and characteristics of cork and free from pores.

5. The herein described process, which consists in granulating cork, coating the individual grains superficially with a film of elastic glue composition, heating the mass and compressing the same into desired form.



6. The herein described process which consists in granulating cork, coating the cork grains superficially with a composition of glue, glycerin, saccharine material and  
5 water, evaporating the surplus water, heating the mass and compressing the same into desired form.

7. The herein described process which consists in coating cork grains with a film of  
10 a mixture of glue, glycerine and saccharine material, heating and compressing the mass to desired form, shaping said compressed compound to finished form and treating the finished product with dilute formalin solu-  
15 tion.

8. The herein described process, which consists in granulating cork, separating therefrom the hard and brittle material associated therewith, forming a mixture of  
20 glue, glycerin and molasses, coating the individual cork particles with said composi-

tion diluted with water, evaporating the surplus water, heating the mass, compressing the same into the desired form and treating the finished product with formalin  
25 solution.

9. The process of producing a cork compound which consists in mixing together in suitable proportions glue, glycerin and molasses, boiling the mixture and allowing it to  
30 cool, melting said mixture, diluting the same with water, coating cork grains with said diluted mixture and allowing the surplus water to evaporate, heating the mass and  
35 molding the same under pressure and subsequently treating the finished product with diluted formalin.

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Witnesses:

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