April 6, 1937. E. C. EMANUEL 2,076,401

JOINT PACKING AND MANUFACTURE THEREOF

Filed Sept. 28, 1932

Fig 1

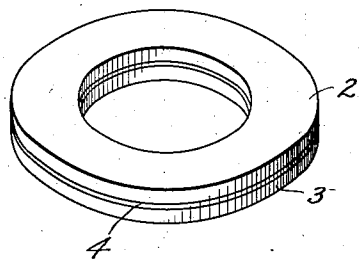


Fig 2

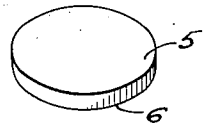
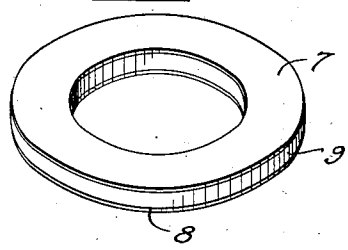


Fig 3



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Patented Apr. 6, 1937

2,076,401

UNITED STATES PATENT OFFICE

2,076,401

JOINT PACKING AND MANUFACTURE THEREOF

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Application September 28, 1932, Serial No. 635,149

18 Claims. (Cl. 18—48)

This application is in part a continuation of my application, Serial No. 488,691, filed October 14, 1930, and entitled "Composition of matter and manufacture thereof."

This invention relates to a joint packing and the manufacture thereof and more particularly to a gasket which is particularly adapted for use where organic solvents may come into contact therewith.

My gasket is highly resistant to attack by organic solvents and hence may be used in many places where ordinary gaskets, washers or other joint packings cannot be used. My gasket, for example, may be used on pipe flanges or as pump packings through which dry cleaning fluids are transmitted or as manhole gaskets on cleaning drums or the like used in dry cleaning establishments.

In sealing liquids such as collodion or the like, containing low boiling organic solvents, the ordinary gasket or washer will be cemented to the lip of the container and the seal will be spoiled when the closure is removed, since it is necessary to tear away the gasket material to expose the contents of the container. Most joint packings now on the market are not satisfactory for use under the severe action of low boiling solvents such as the esters, ethers, ketones, alcohols, halogen derivatives, chlorinated products and the like, where as my packing is admirably suited for such uses.

The material may be made of any desired flexibility over a relatively wide range if certain factors of control are carefully maintained, such as temperature, milling time, etc. My material may be made into any thickness or shape encountered in packings or gaskets.

I employ a gelatinous binder which forms the base of my composition and a filler which contains or carries a tanning agent, such, for example, as cork flour. Natural cork contains a fair amount of tannin and I have found that by milling the same with the gelatinous base, the tannin in the cork brings about a tanning of the gelatin. In order to expose an effective amount of this tannin, it is essential that the cork be reduced to a relatively fine powder and preferably to what is known as cork flour. If relatively large cork granules are used, little or no tanning will result since the major portion of the tannin will be unexposed and cannot, therefore, act upon the gelatin. I have obtained good results when using cork which has been ground so fine that all of the particles will pass through a 40 mesh to the inch screen. This material is known commercially as "40 to dust". A typical screen analysis of such a grade of cork is as follows:

Mesh screen	Percent which will pass through
40	100.0
50	91.5
60	77.0
80	64.3
100	52.0
150	36.4
200	24.5

Excellent results will be obtained when using "200 to dust" cork, although a somewhat more dense product will result when such cork is employed. Any finely comminuted cork such as 40–80 granulation or 100–200 granulation will work satisfactorily.

In order that my invention may be more readily understood, I will describe the manufacture of a sheet material suitable for fabrication into packings or gaskets for flanges or the like. I take 100 pounds of gelatin glue and add thereto about 105 pounds of glycerin and sufficient water to aid the glycerin to react with the glue to form a soft, spongy mass. I have found that about 30 pounds of water is sufficient under ordinary conditions. This mixture is allowed to stand for about 12 hours or until a spongy relatively stiff jelly-like mass is obtained. This jelly-like mass is then placed on a rubber mill, or a friction mill of similar construction, and milled until a smooth, homogeneous mass is had. It is imperative that the temperature of the milling rolls be carefully controlled when producing a relatively soft, flexible material suitable for fabrication into packings. There is considerable frictional heat developed during the milling and I have found it advantageous to circulate cold water or brine through the rolls in order to prevent any undue rise in temperature. In producing flexible material for gasket use, the temperature of the rolls should preferably be maintained below 120° F. Excellent results are obtained when the rolls are maintained at 100° F. When operating as above described, a smooth, uniform film is obtained on the milling rolls after about ½ hour of working. The duration of the milling, will, of course, depend to some extent upon the atmospheric conditions, milling temperatures and other variables.

After a smooth and uniform film is obtained on the milling rolls, the cork is gradually worked into the mass. In the above example 125 pounds of 40 to dust cork is worked in by feeding small

amounts to the mill periodically. After the cork has been incorporated, the milling is continued until a homogeneous mass is obtained. It is essential, during the incorporation of the cork and during any milling that may be carried on thereafter, that the temperature of the mix be kept relatively low, which for best results should be below 145° F. if a flexible product is desired. The tanning action is accelerated by heat and if careful control of the temperature is not had, a hard, inflexible product will result. The milling should be substantially completed prior to incorporation of the tannin carrying material and only sufficient working carried on thereafter to insure a uniform distribution thereof.

The milling action is discontinued after a material having the desired flexibility is obtained. Continued working, even at low temperatures, will result in the composition becoming so stiff that it will resist further shaping when taken from the mill. A fine, soft textured fawn colored material is obtained after about 45 minutes total milling time, which material I have found to be admirably suited for packing or gasketing use.

The material may be stripped from the mill and the final forms fabricated therefrom. I prefer, however, to place the mass in pans and allow it to lie dormant for an extended period of time. This permits of a more uniform distribution of the glycerin throughout the mass. I believe that the glycerin migrates throughout the mix upon standing and I have found that a more uniform, easily calendered material is obtained when the mix is allowed to remain standing for about 12 hours.

The mass may then be broken down on a friction mill, warmed to about 100° F., and after a preliminary working just sufficient to soften the mass and permit ready calendering, the material is stripped from the mill and fed to a three roll calender which reduces the material to a sheet of uniform thickness throughout. From this sheet, the desired gaskets may be punched or otherwise formed. In some instances it is desirable to produce a sheet on the calender somewhat thicker than the desired final thickness of the gaskets or packings, in which case, the material is cut to the desired gauge on a slitting machine such, for example, as a leather splitter.

In producing some shapes it will be found practical to mould or otherwise press the composition into the final shape. This should be accomplished without excessive heating if flexible products are desired.

The material, either before or after fabrication, may be hardened to a leather like consistency or texture by heating the same in an oven. Baking at a temperature of about 180° F. for three to six hours is usually sufficient if the material is to be used for gaskets or the like. To some extent, the baking time is governed by the condition of the material as it leaves the rubber mill. Compositions which come from the rubber mill soft and limp will require more baking to attain a desired consistency than will be the case if further milling is resorted to.

In most cases the material as it comes from the calender rolls, as outlined above, will be satisfactory for packings and gaskets. In certain unusual instances the baking is resorted to in order to produce a harder material. If milling is continued, for an extended period of time it is difficult to shape the material which is removed from the rolls; calendering being almost impossible. It is much more economical to calender the sheet and thereafter bake in a stove or oven to produce the final hardness than to manipulate a difficultly workable material on a calender.

The glycerin in the above mix is a plasticizer and is required to make the composition flexible. Diethylene glycol, castor oil, or other plasticizers may be substituted in whole or in part for the glycerin. Sulphonated oils may be employed but these are not as desirable as the glycol group.

The ratio of the various ingredients may be varied considerably, but I have found it desirable to use a minor portion by weight of ground cork to base mix in order that each particle of cork will be fairly heavily coated. The cork is somewhat reacted upon by organic solvents and for that reason it is desirable to thoroughly coat each particle with the gelatin-glycerin composition which upon tanning becomes impervious to and unaffected by organic solvents and thereby protects the cork from such action. The cork adds resiliency to the composition and acts as a filler. Any woody filler which bears natural tanning agents may be employed in place of the cork such for example as red wood bark.

If desired an inert filler may be employed such as wood flour. The wood flour may be steeped in a tanning agent such as tannic acid, pyrogallic acid, aldol or the like prior to incorporation into the base mix.

My material may be made relatively compressible and will deform readily under pressure. This makes it an ideal material for gasketing purposes wherein the surfaces to be gasketed are irregular or rough.

The sheet material thus produced may be readily fabricated into the various types of packings commonly used.

In order to illustrate certain preferred types of packings, in the accompanying drawing,

Figure 1 is an isometric view illustrating a flange packing,

Figure 2 is a similar view showing a packing or liner suitable for use in bottle closures, and

Figure 3 is also an isometric view showing another type of packing.

Figure 1 illustrates a reenforced flange packing. Under normal operating conditions my sheet material possesses sufficient structural strength and tear resisting qualities to be used without a reenforcing layer. In some cases where the material is put to severe use, a reenforcing layer has been found desirable. Layers **2** and **3** of the composition are applied to a lamella **4** which may be reticulated metal, tough kraft paper, fabric, vulcanized fiber or similar reenforcement. The layers of my composition may be applied to the reenforcing layer by suitable adhesives such as a gelatin-glue or casein adhesive both of which are unaffected by organic solvents or the composition may be calendered directly onto the reenforcing web. If desired, the layers **2** and **3** may be formed of split sheets, or they may have cut faces.

Figure 2 illustrates the usual type of bottle closure liner made of my composition. Either or both sides **5** and **6** may be provided with cut faces formed by splitting the material on a splitting machine or by grinding down the surface with suitable grinding equipment.

Figure 3 illustrates a modified packing flange provided with layers **7** and **8** of paper, impregnated fabric or the like between which is dis-

posed a layer 9 of my composition. This particular type of packing is suitable for use as a sealing gasket on drums in which considerable frictional engagement with consequent abrasion is had between the gasket and the flange type screw closure therefor. The layers 7 and 8 should therefore preferably be relatively tough and resistant to abrasion.

In some types of gaskets, it will be found desirable to apply a single reenforcing layer on one face of the packing. Any of the well known reenforcing materials may be used and the composition may be molded therearound, adhesively secured thereto or calendered thereon as desired.

While I have illustrated and described certain preferred embodiments of my invention, it will be understood that the invention is applicable to a wide range of packing structures and that the examples given are by way of illustration only and that the invention may be otherwise embodied and practiced within the scope of the following claims.

I claim:

1. In a process of making joint packings, the steps consisting in milling together a relatively stiff, jelly-like, plasticized gelatinous binder and a minor portion by weight of tannin carrying filler of such fineness that substantially all will pass through a 40 mesh/inch screen, forming a homogeneous mass in which the binder is tanned by the tannin carried by the filler while preventing the temperature of the mass from rising substantially above 145° F., removing the mass from the mill and shaping the same.

2. In a process of making joint packings, the steps consisting in milling together a relatively stiff, jelly-like, plasticized gelatinous binder and a minor portion by weight of tannin bearing material divided finely enough to expose sufficient tannin to effectively tan the gelatinous binder until a homogeneous mass is formed in which the gelatinous binder encases the filler particles and is tanned by the tannin of said filler particles, removing the mass from the mill and shaping the same.

3. In a process of making joint packings, the steps consisting in milling a relatively stiff, jelly-like, plasticized gelatinous binder, and a minor portion by weight of cork comminuted to such fineness as to expose sufficient tannin to effectively tan the gelatinous binder, while preventing excess tanning and consequent hardening of the gelatinous binder by heat or continued working inducing a tanning action of the gelatinous binder by the tannin of the cork, removing the material from the mill, shaping and thereafter hardening the material by tanning the gelatin under the application of heat.

4. In a process of making joint packings, the steps consisting in cold milling a relatively stiff, jelly-like binder, including gelatin-glue and a plasticizer therefor, gradually working into said mixture a minor portion by weight of tannin carrying filler of such fineness that substantially all will pass through a 40 mesh/inch screen, continuing the milling until a product of the desired flexibility is obtained while preventing any substantial rise in temperature of the mixture, said milling step inducing tanning of the gelatin-glue by the tannin carried by the filler, removing the mass from the mill and shaping the same.

5. In a process of making joint packings, the steps consisting in mixing together gelatin-glue and a plasticizer therefor, permitting the mass to become spongy upon setting, milling the mass with a minor portion by weight of cork ground to such fineness that substantially all will pass through a 40 mesh/inch screen on a friction mill which is regulated to maintain a temperature of the mix at a point below that where tanning by the natural tannin of the cork is accelerated, removing the mass from the mill and calendering to form a sheet.

6. In a process of making joint packings, the steps consisting in mixing together gelatin-glue, glycerin and water, permitting the mass to become spongy upon setting, milling to form a smooth, homogeneous mixture on the milling rolls, after milling is substantially completed working in cork ground to such fineness that substantially all will pass through a 40 mesh/inch screen while preventing any substantial rise in temperature due to frictional heat developed during the milling to induce a tanning action by the natural tannin of the cork, removing the mass from the mill, cooling and thereafter warming and shaping the mass.

7. In a process of making joint packings, the steps consisting in milling together a relatively stiff, jelly-like, plasticized gelatinous base and cork of such fineness that substantially all will pass through a 40 mesh/inch screen, forming a homogeneous mass in which the gelatinous base is tanned by the natural tannin of the cork while preventing the temperature of the mix from rising substantially above 145° F., removing the mass from the mill and thereafter stoving the material.

8. In a process of making joint packings, the steps consisting in milling together a relatively stiff, jelly-like, plasticized gelatinous binder and cork of such fineness that substantially all will pass through a 40 mesh/inch screen, forming a homogeneous mass in which the gelatinous base is tanned by the natural tannin of the cork while preventing the temperature of the mix from rising substantially above 145° F., removing the mass from the mill, forming the material into the desired shape and stoving the same.

9. In a process of making joint packings, the steps consisting in mixing together approximately 100 pounds of gelatin-glue, 105 pounds of glycerin and 30 pounds of water, permitting the mixture to stand until a spongy, relatively stiff, jelly-like mass is obtained, milling the mass, after milling is substantially completed mixing in approximately 125 pounds of cork ground to such fineness that substantially all will pass through a 40 mesh/inch screen while maintaining the temperature of the mass below 145° F. to form a soft, leather-like material in which the gelatin-glue is tanned by the natural tannin of the cork, removing the mass from the mill and calendering the same to form a sheet of uniform thickness.

10. In a process of making joint packings, the steps consisting in milling together a major portion by weight of a relatively stiff, jelly-like mass of plasticized gelatin-glue and a minor portion by weight of cork of such fineness that substantially all will pass through a 40 mesh/inch screen to form a homogeneous mass in which the gelatin-glue is tanned by the natural tannin of the cork, preventing the temperature of the mix from rising substantially due to frictional heat developed during such milling, removing the material from the mill, cooling, calendering to form a sheet of uniform thickness and thereafter removing at least a portion of the surface whereby at least one surface is formed of severed cork particles and gelatinous material.

11. A joint packing comprising a layer of tanned gelatin-glue and a plasticizer having a minor portion by weight of finely comminuted cork uniformly dispersed therethrough, the layer containing only substantially the same amount of tanning agent as is naturally present in the cork, and reenforcing sheets secured to the faces of said layer.

12. A tough, flexible, organic solvent resistant joint packing comprising a plasticized, tanned proteid matrix encasing a minor portion by weight of finely divided filler particles containing a natural tanning agent, the finished article containing only substantially the same amount of tanning agent as naturally present in the filler particles.

13. A tough, flexible, organic solvent resistant joint packing comprising a plasticized, tanned gelatin matrix encasing a minor portion by weight of cork particles of such fineness that substantially all will pass through a 40 mesh/inch screen, the finished packing containing only substantially the same amount of tanning agent as naturally present in the cork particles.

14. A tough, flexible, organic solvent resistant joint packing comprising layers of plasticized, tanned gelatin encasing a minor portion by weight of cork particles of such fineness that substantially all will pass through a 40 mesh/inch screen, the finished packing containing only substantially the same amount of tanning agent as naturally present in the cork, and a reenforcing insert interposed between adjacent layers.

15. A tough, flexible, organic solvent resistant joint packing comprising a stratum of plasticized, tanned gelatin-glue encasing a minor portion by weight of cork particles of such fineness that substantially all will pass through a 40 mesh/inch screen, the finished packing containing only substantially the same amount of tanning agent as naturally present in the cork, and a reenforcing sheet secured to at least one face of said plasticized, gelatin-glue layer.

16. A tough, flexible, organic solvent resistant joint packing comprising a plasticized, tanned gelatinous matrix encasing a minor portion by weight of cork particles of such fineness that substantially all will pass through a 40 mesh/inch screen, the finished packing containing only substantially the same amount of tanning agent as naturally present in the cork, said packing having at least one face thereof formed by removing the outer surface therefrom.

17. In a method of making joint packings, the steps consisting in forming a mass of plasticized proteid of a relatively stiff, jelly-like consistency and a minor portion by weight of tannin carrying filler divided finely enough to expose sufficient tannin to effectively tan the proteid, the proportion of the filled by weight being less than one half of the weight of the total mix, and milling said mass until a desired degree of tanning of said proteid is effected by said tanning agent.

18. In a method of making joint packings, the step consisting in milling together a plasticized gelatin and a minor portion by weight of cork divided finely enough to expose sufficient tannin to effectively tan the gelatin and effecting tanning of the gelatin by the natural tanning of the cork resulting from the application of heat to and mechanical working of the mass.

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