

UNITED STATES PATENT OFFICE

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ENVELOP OF AIR-PROOF MATERIAL.

No. 913,058.

Specification of Letters Patent.

Patented Feb. 23, 1909.

Application filed April 22, 1903. Serial No. 153,761.

To all whom it may concern:

Be it known that I, ADDISON T. SAUNDERS, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented a certain new and useful Envelop of Air-Proof Material, of which the following is a specification.

My invention relates to pneumatic articles of manufacture such as pneumatic tires, mattresses, playing balls and the like, capable of holding air or gas under high pressure comprising an air-holding envelop or lining of a gelatinous compound capable of uniting under heat at points of contact and of being rendered non-fluent while retaining the properties of pliability and adhesiveness when heated.

As is well known, caoutchouc or rubber, of even the best quality, is a very imperfect container of air under pressure, and much impairment and loss attend its use in many pneumatic articles of manufacture, from the escape or leaking of the compressed air through the sheet or layer of the substance forming the chamber designed to retain it.

I prefer to render my gelatinous air-holding envelop non-liquefiable by heat by the addition of albumen for I have discovered that a quantity of albumen, small in proportion to a quantity of gelatin with which is combined sufficient glycerin to render the compound pliable and soft, imparts to the whole the property of "setting" when the albumen therein is coagulated by heat,—an action somewhat analogous to that produced by caoutchouc by vulcanization,—whereby it becomes practically a fixed substance, non-flowing under subsequent heat. In addition the compound is pliable, free from rapid deterioration, possesses the qualities of adhesion at points of contact when heated, thus enabling the joining up of parts as with raw rubber and is, finally, perfectly impervious to air under pressures up to as high as 1,000 or 1,200 pounds per square inch which I habitually employ. A good way to mix this compound is as follows: In a vessel surrounded with hot water,—practically a glue kettle,—heat the glycerin to about the point of boiling water; and, after immersing the sheet gelatin in cold water long enough to slightly soften it, allow the surface water to drain off and add it to the hot glycerin, stirring until thoroughly mixed. Reduce

the temperature of this mixture to about 130 degrees F. so that the added albumen may not be coagulated in the process of manufacture, and then add the albumen (preferably the desiccated, previously dissolved in only sufficient cold water to accomplish that result), stirring as before. Maintain the temperature until it is well deaerated by the rising of the air to the surface, skim off the scum and pour the residue into shallow trays. When it has cooled it is easily handled. Support it upon screens and desiccate in a dry-room.

The exact proportions in which the three ingredients are combined will depend somewhat upon conditions of climate, and the particular article or use for which the compound is intended, and I do not therefore limit myself to any fixed proportions. In this connection I note a fact which I have discovered that whereas a certain quantity of glycerin is required to produce, with a given quantity of gelatin, a mixture having a certain degree of softness and pliability, the addition of a relatively small quantity of albumen to the gelatin demands the addition of a much larger quantity of glycerin to produce a mixture having the same degree of softness and pliability. This difference in what might be called the strength of the albumen and gelatin relative to the glycerin being borne in mind, considerable latitude in the proportions of these two first named ingredients is made possible by varying the quantity of glycerin correspondingly. I have found that for general use a mixture in the proportions of nine pounds of glycerin, fourteen pounds of gelatin and one pound of albumen, (desiccated, or its equivalent of undessicated egg albumen) gives good results, and is well adapted to be shaped and molded under gentle heat and to be formed by various methods into hollow linings for retaining air in pneumatic articles, to be joined up as in segments requiring edgewise adhesion, and to be so "set" by coagulation of the albumen under heat as to prevent its melting and running under subsequent heat while retaining its pliability, imperviousness to air, and adhesiveness when hot.

I note that the admixture of pigments and graphite or other comminuted substances or the like are to be avoided, as far as it is possible so to do, for I have discovered that such

substances, in a gelatinous compound, form paths through which the air under a high pressure will escape and, when used in sufficient quantities, thus render the compound
5 pervious to air.

From the properties of my compound, as I have described them, the manner of forming the air-holding envelop or lining will be sufficiently clear. A sheet of the material,
10 with the albumen uncoagulated, may be cut, bent and molded into the desired, say hemispherical, form. By softening the parts to be united under heat, the process of edgewise adhesion may be brought into play to join
15 two hemispheres or the edges of sheeted pieces of the desired shape to constitute a closed envelop or lining, these terms being used as practically synonymous herein, which may thereupon be subjected to a heat
20 sufficient to mold or shape the article and thereafter to a heat sufficient to coagulate the albumen to "set" the compound and render it non-fluent under subsequent heat. Thereupon the envelop may be inflated with
25 air or other suitable gas, which I include in the term air, by means of the usual hypodermic inflation needle.

I claim,—

1. A pneumatic article of manufacture
30 comprising an envelop containing compressed air, composed of a pliable gelatinous

compound non-liquefiable by but adhesive under heat, substantially as described.

2. A pneumatic article of manufacture comprising an envelop containing com- 35 pressed air, composed of a pliable gelatinous compound adhesive under heat but rendered non-liquefiable by heat by the presence of coagulated albumen, substantially as described. 40

3. A pneumatic article of manufacture, comprising an envelop, holding air under pressure, composed of a compound of gelatin and glycerin, adhesive under heat, but rendered non-liquefiable by heat by the pres- 45 ence of coagulated albumen, substantially as described.

4. A closed envelop or lining for holding air under pressure composed of gelatin, glycerin and albumen, adapted to be shaped 50 under gentle heat, capable of uniting under heat at points of contact and of being rendered, through coagulation of the albumen by heat, non-fluent under subsequent heat while retaining the properties of pliability, 55 adhesiveness when heated and imperviousness to air, substantially as described.

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Witnesses:

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