To all whom it may concern:

Be it known that we, Henri Dogny, residing at 13 Avenue d'Eylau, Paris, Victor Henri, residing at 82 Rue Claude Bernard, Paris, and Edmond Veil-Picard, residing at 76 Avenue Wagram, Paris, in the Republic of France, citizens of the Republic of France, engineers, have invented certain new and useful Improvements in and Relating to the Manufacture of Products from India-Rubber, of which the following is a specification.

This invention has reference to improvements in the manufacture of products from India-rubber or other suitable resilient material, of the kind which are composed of either perforated sheets or perforated and unperforated sheets of such material, which are united together and have the cavities so formed filled with gas or air whereby a pneumatic and resilient structure is obtained.

The object of our invention is to provide multi-cellular structures of this nature, which shall possess important technical advantages over those hitherto constructed, and which shall be of simple construction and efficient in operation.

To this end, our invention broadly consists in uniting perforated sheets of India-rubber or other appropriate resilient material, with the interposition of unperforated sheets if desired, and in incorporating with the mass of material, substances which when heated will decompose into gas or vapor. The result obtained by this process is extremely important, the substances which liberate the gas are incorporated with the substance of the resilient sheets, and dissociation takes place under the influence of heat, but as the India-rubber is partly permeable when it is heated, a portion of the gases passes from the mass of India-rubber into the empty cells, while the other portion remains inclosed in the mass; subsequent to this and upon cooling, the material becomes impermeable and the dissociated gases remain, consequently the pressure obtained is persistent.

By this process it will be seen that a product is obtained which presents numerous advantages as compared with the known elastic article. In the first place it may be constituted by pure rubber of the best quality and its cavities are filled with gas which is constantly imprisoned therein. In addition, the size of the cavities and their distribution may conform exactly to the ideas of the manufacturer, in the sense that he can arrange the perforations at appropriate places on the sheets and give them any desired dimensions and forms which he may consider useful for the purpose in view; by this means it is readily possible to produce in the same object parts which are more or less pliable and more or less elastic according to requirements.

In carrying out the process, the perforated and unperforated sheets may be superposed flat or on a mandrel or any appropriate form. A sufficient number of them may be provided to cause the total thickness of the block to correspond to the thickness of the article to be manufactured. A sheet may also be taken in the form of a band either a single band or one composed of any desired number of superposed sheets, and this band may be wound or bent upon itself in order to obtain the desired thickness.

The employment of unperforated sheets between the perforated sheets may be avoided in certain cases; for example, when the perforated sheets can be superposed directly without their holes registering. It is also possible to superpose perforated sheets with their holes registering wholly or in part, in such a manner as to create cavities of all shapes.

In order to unite the sheets one with the other, they may be coated when they are being superposed, with a suitable solvent such as benzine or the like, or with any other appropriate agglutinant or adhesive substance. The articles are then heated to temperatures which vary according to the nature of the materials employed, and the dimensions of the articles to be manufactured. During this heating, which may be effected in the open air or under pressure, the gases or vapors inclosed in the cavities, will tend to expand and may produce a certain permanent deformation of the walls of these cavities as shown in Figure 1 of accompanying drawing which represents a partial cross section of a finished article. Fig. 2 of this drawing is a partial plan view of this article broken away stepwise.

The substances which decompose and liberate gases are incorporated with the re-
silient material in any convenient manner during the course of manufacture. For example, solid substances such as carbonates, hydrochlorates, carbids, and the like or liquids such as ether, ammonia water, benzine, or the like, which are capable of liberating gases or vapors after a lapse of time under the influence of heat or by simple decomposition, by mutual reaction with other substances by vaporization and so forth, may be introduced. By varying the quantity of the substances thus introduced the pressure in the cavities will be varied. This incorporation of the substances may be effected either throughout the entire mass or in a part thereof only, and if desirable it may be distributed in accordance with the result to be obtained. In any event the elastic character and the advantages of the productions obtained by means of this invention will be secured. In addition, subsequent to the manufacture the elastic resistance of the manufactured article may be increased; with this object it is surrounded by an envelop of some suitable kind and of appropriate form which will permit of compressing it, by a pressure proportionate to the elastic resistances that it is desired to obtain. For example, for wheel tires the elastic resistances of an air chamber thus manufactured may be varied by confining it in an envelop or cover which may be tightened on to the rim of the wheel to a greater or less extent. Among the numerous applications to which the present invention lends itself, buffers and shock absorbers elastic cushions, cushions for billiard tables, the air chambers or tires of wheels, may be cited.

Claims—
1. A process for the manufacture of articles from india rubber which consists in forming perforated sheets of rubber having incorporated therein one or more substances capable of liberating gases under the effect of heating, in uniting the perforated sheets in such a manner that the perforations form independent cavities, and lastly in applying heat to the structure thus formed, for the purpose of liberating gases which may fill the said cavities.
2. A process for the manufacture of articles of india-rubber which consists in forming perforated and unperforated sheets of rubber having incorporated therein one or more substances capable of liberating gases under the effect of heating, in uniting the perforated and unperforated sheets in such a manner that the perforations form independent cavities, and in applying heat to the structure thus formed, for the purpose of liberating gases which may fill the said cavities.

In testimony, that we claim the foregoing as our invention, we have signed our names in presence of two subscribing witnesses.

HENRI DOGNY.
VICTOR HENRI.
EDMOND VEIL-PICARD.

Witnesses:
CAMILLE BLETRY,
MAURICE RAU.