

UNITED STATES PATENT OFFICE

2,114,220

MANUFACTURE OF ARTIFICIAL SAUSAGE
SKINS OR CASINGSHans Freudenberg and Oskar Walter Becker,
Weinheim, GermanyNo Drawing. Application October 26, 1932, Serial
No. 695,376. In Germany November 28, 1932

10 Claims. (Cl. 92-176)

The object of this invention is a process for the manufacture of artificial sausage skins or casings from skins or hides, hide parts, splits, leather scraps, parings and the like.

The fundamental discovery on which this invention is based consists in converting the skin or hide by the action of chemical swelling reagents and by mechanical treatment into a highly swollen plastic material containing at least 75% of swelling water (non-expressible or colloiddally bound water), bringing this material into tubular form in a manner known per se, and imparting to the structures so obtained the necessary resistance to mechanical and other strains.

In order to convert the hide into the fibrous masses suitable for being further worked up, the hide is subjected to a treatment with swelling agents and thereafter to a mechanical resolving and teasing out treatment.

As chemical swelling agents there may be employed alkaline substances, such as milk of lime, dilute soda lye, ammonia and the like, or acid substances, such as hydrochloric acid, sulphurous acid, formic acid, acetic acid, lactic acid and the like, or salt solutions, such as solutions of ammonium chloride, calcium chloride and the like. The treatment of the hide with swelling agents may be carried out in one or more steps, if desired with the use of different swelling agents. The pieces of hide, after treatment with the swelling agents, are subjected in a swollen or more or less unswollen condition to the mechanical resolving and teasing out treatment.

The process of resolving and teasing out the hide pretreated with swelling agents may be carried out in one or more stages, for example by first subjecting the hide material to a resolving treatment on spiked rollers, openers and the like and then subjecting the material, which has been loosened and already more or less resolved thereby, to a treatment, with the aid of which the fibre bundles or fibres are set free without being damaged. This may, for example, be effected with the aid of devices having a grinding, rubbing or kneading action, for example crushing rollers, friction rollers, edge mills and the like. The resolving treatment may, for example, be followed by a treatment in mixers, kneading machines or the like apparatus, in order to convert the fibrous material into a uniform mass suitable for further working up to the desired structure, for example into a pasty or viscous fibrous mass.

An alternative procedure is, for example, to introduce the hide pieces, reduced to a suitable size, into kneading machines or the like appa-

ratus, the kneading members of which are provided with teeth, spikes or the like. When employing such apparatus the mechanical treatment may be carried out in only one stage.

The hide, after pretreatment with swelling agents, may be subjected to further mechanical treatment, for example by reducing the same to suitably sized pieces and forcing the latter through sieve plates, tubes, nozzles and the like. One mode of procedure is, for example, to reduce the hide material to relatively small pieces, the size of which may be adjusted to the desired length of fibre, to introduce these pieces into a press and to force them under high pressures e. g. 1000 atms., with the aid of stamps or dies and the like through tubes, which are constricted in the direction of the discharge opening. The fibres in the sausage-like or rod-shaped structures discharging from the mouth of the tube are to a very considerable extent present in a free condition. This treatment may, for example, be followed by a mixing or kneading treatment.

The mechanical treatment of the hide material may, if desired, also be carried out in such a way that other desired results, besides the liberation of the fibres, are also obtained. Thus, for example, by pressing the fibrous material through tubes, gaps, nozzles or the like, it is possible to effect a certain arrangement of the fibres in the direction of flow of the mass.

Skins or hides or parts thereof, which have been subjected to the usual liming process, are especially suitable as starting material for the process of this invention. These materials must be subjected to an additional treatment with swelling agents. This additional treatment may consist in subjecting the hide to the action of alkaline substances, such as milk of lime or soda lye, to the action of acids, such as hydrochloric acid, or to the action of salts, such as calcium chloride; it may be carried out in one or more stages, if desired with the use of different swelling agents. An advantageous procedure is to convert the skin into such a swollen condition, that the adhesion of the fibre bundles and fibres is loosened to such an extent that the fibres can be readily set free without incurring substantial damage by a subsequent mechanical treatment.

Examples

1.—Limed and depilated hide parings are laid for about 2 to 3 weeks at ordinary temperature in milk of lime. The hide material, after being cut to suitably sized fragments (e. g. 20 x 20 cms.)

and after having, if desired, been subjected to a preliminary resolving process between pairs of spiked rollers, is introduced into an edge mill and is there teased out in such a way that the separated fibres are not damaged. After the material has been separated into fibre bundles or fibres, it may be more or less extensively freed from lime by washing or the like procedures. The material may thereafter be subjected to more extensive separation into fibres and be rendered more uniform by treatment in mixing, kneading or the like apparatus. The operation may, for example, be carried into effect by incorporating dilute (e. g. $\frac{1}{2}$ to 5%) soda lye in the mass during the treatment in the mixing or kneading apparatus and adjusting the mass to the desired water content, for example 75-90%. This operation may be promoted by gentle warming.

The resulting pastes may then be converted into the desired structures by pressing the same under high pressures through annular nozzles and the structures obtained may be thereafter converted into a permanently stable condition by suitable subsequent treatments, such as by heating.

2.—Normal limed hide parings are subjected for several days at normal temperature to a treatment in a milk of lime bath in such a way that the action of the milk of lime extends to the inner portions of the hide fragments. The hide fragments are thereafter thoroughly washed out and then treated in an acid bath, for example with hydrochloric acid. The concentration of this bath may for example lie between 1 to 10%, preferably 1 to 5%. A concentrated hydrochloric acid, containing, for example, 10% and more of HCl, may for example be first employed, if desired with gentle warming, and the acid concentration be thereafter reduced, for example to 1%. After an acid treatment lasting from one to several hours the hide fragments are thoroughly washed out with water. The colloidal hide material may, for example, be adjusted to a pH value of about 2.5 to 3.5. The hide material is converted by this treatment into a strongly swollen condition, in which the substance, disposed between the individual fibres and the bundles of fibres, is converted into a condition, which enables the fibre bundles and fibres to slide comparatively readily over one another. The attainment of this condition can be frequently recognized by the fact that the colour of the hide, which is at first white, disappears and the hide particles become transparent.

The hide fragments, reduced to suitably sized fragments, are then passed through pairs of rollers provided with spikes and thereafter subjected to a teasing out treatment, for example by pressing through sieve plates or tubes which are preferably constricted in the direction of the discharge opening. The material may thereafter be subjected to a further mechanical treatment, for example between friction rollers in kneading or the like apparatus.

Pasty fibrous masses, containing from, for example, 75-80% of water, are obtained in this way. Notwithstanding this high water content it is possible to incorporate still further quantities of water in the fibrous masses, for example in the kneading apparatus. In this way the water content may, for example, be increased to 85-90% and more.

The pasty fibrous masses, containing for example 80-90% of water, may be further worked

up into the desired structures as described in Example 1.

A particularly advantageous method of further working up the pasty masses to artificial sausage skins or casings is as follows:

The pasty mass is pressed under relatively high pressures adapted to the fluidity of the same, e. g. pressures of 350 to 450 atms., through an annular nozzle, a, for example spiral, rotatory movement about the longitudinal axis of the main direction of movement being imparted to the mass inside the nozzle space, for example by suitably disposing the introducing member, by the construction of direction guides and the like. A tubular nozzle, constricted towards the discharge end, the annular space of which rotates about the stationary core or in the annular space of which a rotating core is provided, may for example be employed.

The tube-like structures may be solidified and strengthened in a very simple manner, for example by treating the same with hot gases, such as hot air, for example by conveying them through a drying chamber. An advantageous method of carrying the process into effect is to pass the hot gases, such as hot air, discharging from the nozzle head, into the inner space of the tubular structure, whereby the tube is blown up and is conveyed in this form through the drying chamber in which hot dry air plays upon the outer surface of the tube. In order to solidify and strengthen the structures an alternative procedure is to treat the same with water-removing liquids or liquids effecting strengthening and solidification in another manner, for example aluminium sulphate, alumina or tannin, or vapours, for example wood smoke, such as are employed for smoking sausage and meat goods. If desired several strengthening and solidifying methods may be employed in conjunction with one another, for example by treating the structures successively with water-removing liquids and drying or hardening gases or vapours.

The process hereinbefore described and illustrated with the aid of examples can be modified and improved in several directions. Thus, for example, the treatment of the hide with swelling agents, such as milk of lime, may be effected under movement, for example rolling, of the hide material or of the liquid. The process may, for example, be carried into effect by treating the hide fragments in a perforated rotating drum, if desired provided with engaging members, which rotates in a vessel containing milk of lime, the drum being with advantage only partially charged with hide fragments.

During the swelling treatment or after the conversion into the swollen condition or during the mechanical treatment or between the individual stages of the mechanical treatment, the hide may also be treated with agents which are capable of favourably influencing the resolving of the same into fibres or of promoting the flowing capabilities of the fibrous material formed or of exerting advantages in other directions. Suitable admixtures of the aforesaid kind are, for example, glycerine, fats, oils, wetting agents or the like.

Substances, which are capable of influencing the properties of the fibrous material or the structures prepared therefrom in the desired manner, may, further, be added to the fibrous material during the mechanical treatment or between the treatment stages. One or more of the following substances may, for example, be added for this purpose: binders, softening agents, fillers, such as

viscose and other cellulose derivatives, as well as animal or vegetable fibres, artificial fibres and the like. The aforesaid substances may, for example, be introduced during the treatment of the fibrous material in the mixing, kneading and the like apparatus and be uniformly distributed in or upon the fibrous material.

The invention enables artificial gut to be produced, which in appearance and properties corresponds exactly with natural gut, but possesses considerable advantages over the latter, for example with regard to uniformity, odourlessness, tensile strength and the like. The resistance to tearing or tensile strength may be a multiple of that of natural gut.

What we claim is:

1. In a process for the manufacture of artificial sausage skins, the steps of converting animal hide, by the action of swelling reagents selected from the group consisting of solutions of acids and bases in water and by a mechanical treatment adapted to tease out the hide, into a material at least 75% of which consists of swelling water which is of pasty to plastic consistency and in which the fibers have been retained, shaping the fibrous material into the form of tubes, and dehydrating the resulting tube-like structure.

2. In a process as claimed in claim 1, the swelling part of the process consisting of first treating the hide with a solution of a base in water and thereafter with a solution of an acid in water.

3. In a process as claimed in claim 1, said step of subjecting the hide to a mechanical resolving and teasing out treatment occurring while the hide is in a swollen condition, thereby enabling the fibers to be easily loosened.

4. In a process as claimed in claim 1, the step of teasing out the hide including mixing and kneading the hide material.

5. In a process as claimed in claim 1, the step of dehydrating consisting in drying the tube-like structures by the action of heat.

6. In a process for the manufacture of artificial sausage skins, the steps of subjecting animal hide to the action of liquids having a swelling action selected from the group consisting of solutions of acids and bases in water, converting the resulting fibrous material into a plastic mass at least 75% of which consists of swelling water, converting the said plastic mass by pressing through annular nozzles into tube-like structures, and dehydrating the said tube-like structures.

7. In a process as claimed in claim 6, the step of improving the properties of the sausage skins by smoking.

8. In a process according to claim 1, the dehydrating part of the process consisting of introducing a hot gas into the interior of the shaped tube, thereby blowing up the tube, and bringing hot gas into contact with the outer surface of the blown-up tube.

9. In a process for the manufacture of artificial sausage skins, the steps of converting animal hide, by the action of swelling reagents selected from the group consisting of solutions of bases and acids in water and by mechanical treatment adapted to tease out the hide, into a material at least 75% of which consists of swelling water, which is of pasty to plastic consistency, and in which the fibers have been retained, shaping the fibrous material into the form of tubes, and dehydrating the resulting tube-like structures by treating them with dehydrating liquids.

10. In a process for the manufacture of artificial sausage skins, the steps of converting animal hide, by the action of swelling reagents selected from the group consisting of solutions of bases and acids in water and by mechanical treatment adapted to tease out the hide, into a material at least 75% of which consists of swelling water, which is of pasty to plastic consistency, and in which the fibers have been retained, shaping the fibrous material into the form of tubes, and dehydrating the tube-like structures by treating them with strengthening and solidifying substances.

HANS FREUDENBERG.
OSKAR WALTER BECKER.