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SHEET MATERIAL

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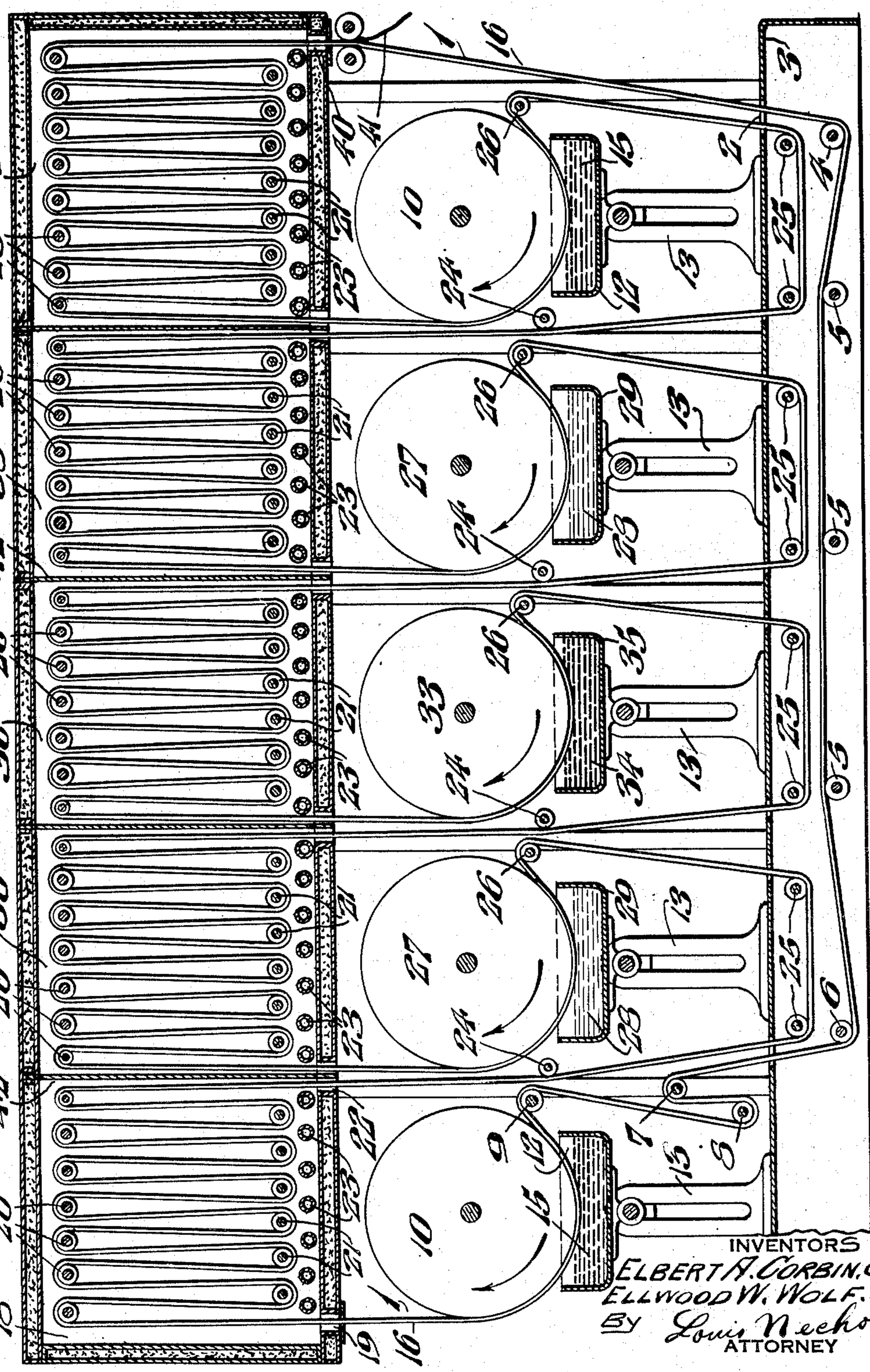

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SHEET MATERIAL

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1 Claim. (Cl. 154—46)

Our invention relates to a new and useful sheet material and method of making the same whereby a thin, transparent or translucent, water-proof sheet material is used, of the type now generally used for wrapping goods on display counters hermetically to seal the goods and at the same time to display the same to the best advantage.

There is at present available on the market thin, transparent sheet material known as "cellophane" which is generally a glycerinated sheet of regenerated cellulose which is extensively used for wrapping all kinds of merchandise, such as candies, cigars, cigarette packages, shirts, stockings, handkerchiefs, etc., this sheet material being however only water repellent or resistant, but not water-proof, and being relatively expensive due to the cost involved in the complicated chemical manufacturing steps by which this sheet material is produced. Furthermore, the sheet material referred to is of a limited toughness and flexibility.

It is the object of our invention to produce a sheet material of this character which is water-proof and which possesses great toughness and resiliency and which can be made at much less cost than sheet material of this type now available.

Our invention also relates to the novel method of manufacturing our novel sheet material by means of a continuous process utilizing ready made, relatively inexpensive ingredients, thus obviating the necessity of expensive and complicated chemical processes.

The accompanying drawing is a diagrammatic representation of the form of machine by means of which our novel continuous process of making the sheet material forming the subject of our invention may be carried out.

Our novel transparent sheet material is formed of a body substance, a glossing substance, and a water-proofing, resilient and strengthening substance either intermingled in the original composition or applied together successively to form laminations of thin films of the substances used in any desired order. In actual practice we have found that liquid latex or a similar compound may be used to add strength and resiliency to the finished sheet material as well as thoroughly and positively to water-proof the finished product. We also found that a gelatine or similar compound is an inexpensive, convenient and practical body substance which can be utilized to give the sheet material the desired thickness, and we also found that shellac or a similar drying glossy compound can practically and conveniently be used to give the outer surface of the sheet material the desired "finished" and lustrous appearance. In carrying out our invention we preferably utilize a continuous belt, one face or surface of which is made to dip into or pass through a series or succession of vats containing the different ingredients of which the sheet material is to be made, properly arranged, whereby a film is formed on said belt, which film when stripped of the belt constitutes a sheet material of our invention.

In order more clearly to illustrate our invention, we refer to the accompanying drawing in which 1 designates a continuous belt which passes through an aperture 2 in the working platform or floor 3 of the room and under the roll 4, over one or more rolls 5, under the roll 6, over the roll 7, under the roll 8, over the roll 9, and under the drum 10. Under and registering with the drum 10 is a tub 12 adjustably mounted on the leg 13 and containing one of the materials used in forming the sheet material of our invention in a liquid form, which in this instance is shellac 15. The outer surface 16 of the belt 1 is then coated with a film of shellac, the thickness of which can be predetermined by the nature of the surface 16 of the belt 1, the viscosity of the liquid 15, as well as the rate of travel of the belt during its contact with the liquid 15. The film thus formed on the surface 16 of the belt 1 is so thin as not to permit illustration in the drawing, since the finished product is perhaps less than one-thousandth of an inch thick. The belt 1 then enters the heating chamber or oven 18 through the aperture 19 and passes alternately over and under the rollers 20 and 21, respectively, and emerges from the chamber 18 through the aperture 22. The chamber 18 may be heated by means of the heating elements 23 or the rollers 20 and 21 may themselves be made hollow and supplied with steam, hot air or other heating medium. In the heating chamber 18 the film of shellac applied to the surface 16 of the belt 1 is dried by the heat from the chamber 18 and is "calendered" by its passage over and under the rolls 20 and 21. The belt 1 then passes over the guide roll 24, under the guide rolls 25, over the guide rolls 26, and under the next adjacent drum 27, to come in contact with the liquid 28 in the vat or tub 29, which liquid in this instance is preferably a solution of gelatine calculated to give body to the sheet material to be formed. After being coated with a film of a gelatinous solution the belt enters the heating chamber 30 which is also supplied with the rollers 20 and 21 and which is similarly

heated, so that when the film of gelatinous solution deposited on the belt is dried and calendered the belt emerges from the chamber 30 and goes over and under similar rolls 24, 25 and 26 to pass under the drum 33 and come into contact with the liquid 34 in the vat 35, which in this instance is liquid latex or other solution of rubber or waterproofing substance, whereupon the belt enters the heating chamber 36 where this film of waterproofing material is also calendered and dried over the films of gelatinous and lustrous substances already deposited on the belt during its passage through the vats 12 and 29. In order to make a balanced sheet, that is one of a symmetrical construction so as to prevent curling and warping of the sheet in manipulation and use, we deposit a second film of gelatinous substance 28 in a second vat 29, and a second film of shellac or lustrous substance 15 in a second vat 12, it being understood that the added films of gelatinous and shellac substances are also dried and calendered in the heating chambers 38 and 39 which are also provided with the rolls 20 and 21 in the same manner as the heating chambers 18 and 30. When the belt finally emerges from the heating chamber 39 through the outlet opening 40, the sheet material 41 composed of the central rubber or waterproofing solution 34, the films of gelatinous or body substance 28 on either side thereof and the outer films of shellac or other lustrous substance 15 is peeled off the belt and rolled on a take-up roll (not shown). The belt 1 may be continuously driven by means of the drums 10, 27 and 33 which are propelled by any suitable means (not shown), or separate driving rolls (not shown) may be employed at either or both ends of the apparatus to propel the belt, if so desired.

While we have found in practice that five "dippings", as shown, namely: the two outer shellac layers, the two intermediate gelatine layers, and the central rubber or other waterproofing layer, are sufficient to produce the sheet material of our invention, and while it is within the scope of our invention to vary the thickness of the sheet material produced by regulating speed of travel of the belt, by changing the surface tension properties of the face of the belt, or by regulating the viscosity of the various liquid ingredients used, it is to be understood that it is also within the scope of our invention to use any number of vats and subject the belt to any desired number of "dippings" so as to produce a thicker or thinner sheet at will.

Also, while we have shown our invention as consisting in placing on the belt 1 successive layers or films of lustrous, gelatinous and rubber solutions, it is within the scope of our invention to mix the rubber or water-proofing substance with the gelatinous or body forming substance in the same vat to form a single film of the desired thickness, which film is provided with outer surface coatings of any lustrous substance to give it the necessary finish.

While we have found in practice that shellac gives the proper luster, that gelatine forms a good body ingredient, and that liquid rubber forms an adequate water-proofing element, it is to be understood that other ingredients which have water-proofing qualities, which would constitute flexible and transparent body substances, and which would give the product the necessary finish, can be used without departing from the spirit or scope of our invention.

It is also to be understood that if it is desired to produce a colored sheet material according to our invention it is merely necessary to introduce a dye or combination of dyes into one or more of the substances of which the finished product is formed, thus producing a sheet material having any desired color or combination of colors.

It will further be seen that according to our invention we have produced a continuous process or operation which can be carried on indefinitely by merely taking off the finished sheet 41 as rapidly as it is turned out and by replenishing the contents of the vats 12, 29 and 35. In carrying out our process we found it advisable to separate the various heating chambers 18, 30, 36, 38 and 39 by suitable partitions 42 in order to enable us to regulate the drying capacity of each heating chamber in accordance with the requirement of the particular substance the film of which is to be dried in the particular chamber.

The gelatinous films or coatings employed on either side of the central rubber film or coating in addition to giving the finished sheet the necessary body also provide a surface having the necessary tension or cohesion to insure the uniform spreading and adhesion of the rubber film.

By utilizing the central rubber film with the outer shellac films and the intermediate gelatinous films or their equivalents we produce a "balanced" sheet, that is, one having a symmetrical cross section, thereby insuring that the sheet will remain flat in use and eliminating the possibility of the sheet curling or warping.

It will be seen that our novel product can be made at a very low price, due to the very low cost of the ingredients utilized, and that the continuous process of forming the sheet material and taking it off from the belt permits of constant operation and greatly reduces the cost of manufacture as compared with the manufacture of other synthetic sheets heretofore known which are produced by the extrusion process which involves the use of very exact and expensive machinery, if a thin, uniform product is to be made.

We claim:

A composite wrapping sheet material comprising, in integrated form, a central layer formed of a rubber compound, outer layers formed of a water-proofing resinous substance, and layers of an adhesive gelatinous substance intermediate and inter-connecting the opposite sides of said central layer with said outer layers.

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