Aug. 12, 1941. A. M. KATZ 2,252,077

DOLL AND METHOD OF MAKING THE SAME

Filed Feb. 29, 1940

Fig. 1

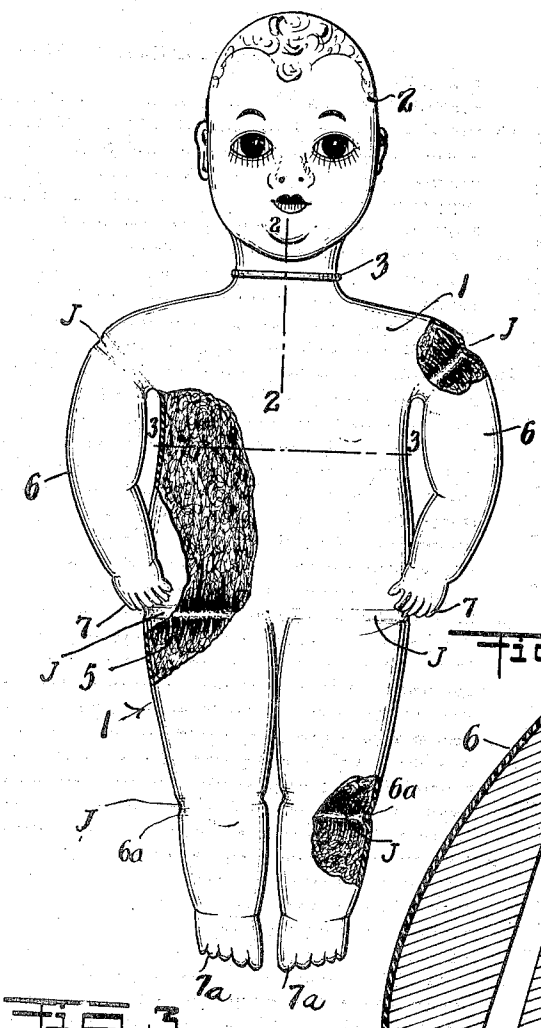


Fig. 2

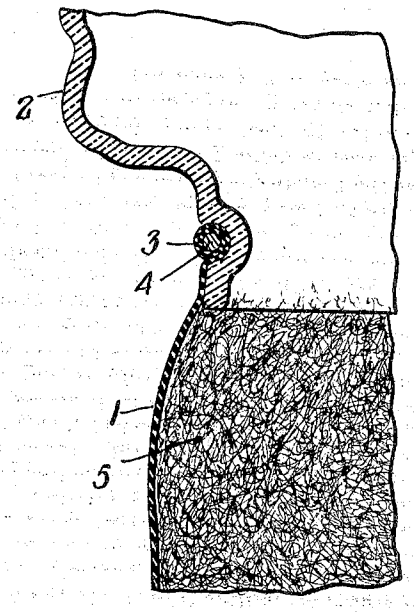


Fig. 3

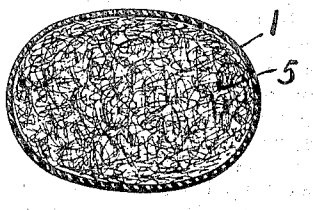


Fig. 4

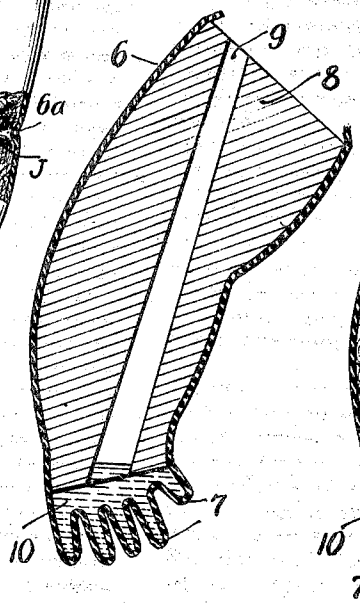
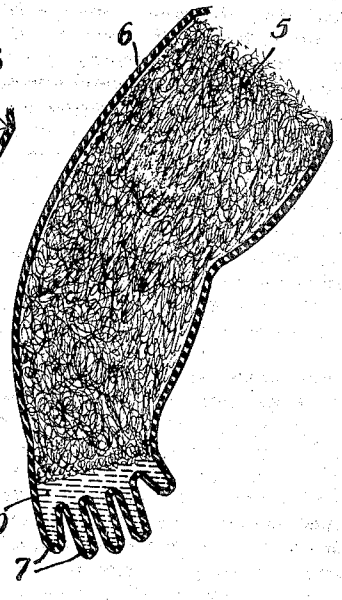


Fig. 5



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ATTORNEYS

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DOLL AND METHOD OF MAKING THE SAME

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3 Claims. (Cl. 46—156)

My invention relates to a new and improved doll, and a new and improved method for making the same.

One of the objects of my invention is to provide a doll having a body which is provided with integral limbs, said body and limbs being made of flexible and resilient rubber. Said body and limbs are provided with a suitable compressible and resilient stuffing.

Another object of the invention consists in providing a limb with separate fingers or toes, so as to simulate a human hand or foot, and to provide said fingers or toes with resilient filling material.

Another object of the invention is to provide an improved method of applying the filling material to the fingers and toes of the limb-members of the body.

Another object of the invention is to provide an improved doll-head having an outer covering or skin of rubber.

Whenever I refer to rubber herein, I include a synthetic or substitute rubber.

Another object of the invention is to provide a doll having a life-like feel and appearance and an improved method of making the same.

Other objects of my invention will be set forth in the following description and drawing which illustrates a preferred embodiment, it being understood that the above statement of the objects of my invention is intended to generally explain the same without limiting it in any manner.

Fig. 1 is a front elevation, partially broken away, of the improved doll.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view on the line 3—3 of Fig. 1.

Fig. 4 illustrates the improved method of applying a liquid or viscous filling material to the fingers of an arm-member.

Fig. 5 is a sectional view of an arm-member showing the different kinds of filling material.

The doll body 1 is integral with arms 6 and with legs 6a. This doll body 1, including the integral arms and legs, consists preferably of a thin casing of resilient and vulcanized rubber.

A form or mold which has the desired shape of the body, including the integral arms and legs, can be dipped into latex or other suitable suspension or dispersion or solution of rubber, so as to form a thin rubber skin. Various well-known dipping methods may be used. Each coating of the latex or the like can be dried and the thickness of the coating can be increased by a series of dipping operations. After a rubber skin of proper thickness has thus been formed, the dried rubber skin is vulcanized in any suitable manner. I prefer to vulcanize the rubber skin by means of steam or hot air as distinguished from a cold cure.

After the rubber skin has thus been vulcanized, it is stripped from the mold. The mold is preferably made of aluminum or other metal so that it can withstand the temperature of vulcanization.

The rubber body can then be stuffed through the neck opening with any suitable soft and compressible material, such as kapok or the like. This kapok stuffing is preferably omitted at the junctions between the limb-members 6, 6a and the body, so as to form natural bendable joints at said junctions. Instead of wholly omitting the stuffing at said junctions, the stuffing can be made relatively thin at said junctions, so that the limbs of the doll can be bent readily relative to the body thereof. The rubber skin has sufficient thickness and elasticity and resilience so as to maintain the arms and legs in normal position. Therefore, if a leg is bent relative to the body of the doll, the natural resilience of the rubber skin will return the leg to the normal position illustrated in Fig. 1.

According to this method of manufacture, the fingers 7 and the toes 7a are separated from each other, thus simulating the human body. It is very difficult to stuff material such as wadded or felted kapok or similar stuffing material, into the fingers 7 and the toes 7a. Likewise, it is objectionable to fill the hollows of the fingers 7 and of the toes 7a with coagulated latex or the like, after the body has been stripped from its aluminum mold. The use of latex or other form of unvulcanized rubber would require a second vulcanization treatment. The original rubber skin is preferably vulcanized by heating the same on the mold in steam. Over-vulcanization of the rubber is objectionable. Therefore, if the fingers and toes of the doll body were filled with unvulcanized rubber, a second vulcanization treatment would be necessary in order to vulcanize the rubber filling material and this would result in a double vulcanization of the remainder or skin-portion of the body, which would be objectionable. I therefore prefer to fill the fingers 7 with a composition 10 which may be of the type used for making printing rollers.

Various compositions of this type are known and the following formula is therefore merely illustrative:

	Parts
Powdered hide glue	1
Glycerine	1½
Water	1
Sugar	½

The above proportions are by weight. The water and glycerine are mixed, and the glue and the sugar are added to said mixture with constant stirring. The mixture is then allowed to

stand until the glue has been thoroughly soaked. The mass is then subjected to gentle heat, as for example by means of a water bath, until the glue has melted. When the mass is completely molten and it has been freed of all air bubbles, the mixture is ready for use.

The auxiliary mold 8, made of aluminum or other suitable material, and having a bore 9, is located in the arm 6, for example. Such an auxiliary mold is inserted into an arm or leg, after the rubber skin has been vulcanized and then stripped from the original dipping mold. The aforesaid melted mass is poured or forced under suitable pressure through the bore 9 until it fills the fingers 7. For this purpose, a plunger may be operated in the bore 9, so as to force the glue material into the fingers, and to maintain the glue material in the fingers until the material has set. Said mass may also fill a portion of the hand. The composition is then allowed to set in the usual manner. The felted or wadded filling 5 is then inserted into the arm as illustrated in Fig. 5, after the auxiliary mold 8 has been removed.

Instead of using a liquid to fill the hollows of the toes and fingers, and then setting said liquid, I can also use finely divided solid materials such as cork particles, and finely divided fibers of all kinds, such as cotton, silk, rayon, mineral wool, natural wool, etc. Said fibers can be introduced under suitable pressure through the bore 9 of the mold 8, while the rubber skin is held against the surface of the mold 8, by any suitable means. The resilient filling composition 10 can therefore consist of finely divided resilient particles or fibers, such as cork and the like. These particles may be connected to each other and to the inner walls of the fingers. These particles or fibers are held in place by the main filling 5. The particles of cork can be connected to each other and to the inner surface of the finger-portions and toe-portions by any suitable binder.

Such a binder may consist of one part of granulated glue and one part of glycerine (95%). The glycerine can be warmed over a steam bath. The glue is then added and the mixture is thoroughly stirred and allowed to stand for a suitable period, such as 24 hours. This product is a tough and rubber-like material and it may be used either alone, or as a binder for the cork composition. If this product is used as a binder, it is mixed with the finely divided particles, which can be injected through bore 9 by an air blast, or by using a suitable plunger or nozzle which is inserted into bore 9.

I can also use egg albumen or other albumen or heat-coagulable adhesive as a binder for finely divided cork particles and the like, since the egg albumen can be readily dissolved in water and it coagulates quickly at a temperature of 140° F. This temperature is too low to injure the rubber. The cork particles or the fibers can be mixed with a binding solution of the egg albumen to form a mass which is inserted into the fingers and toes.

The head 2 of the doll is provided with a groove in which a retaining wire 4 is located. This wire 4 holds the neck-portion of the casing to the neck-portion of the head. The rubber skin is wound at 3 around the wire 4, in order to conceal the wire.

The head 2 is preferably made of cellulose acetate or other suitable moldable material, or it can be molded out of the usual wood flour composition. If the head is covered with a rubber skin by means of a dipping operation, and said skin is subsequently vulcanized, the rubber skin does not adhere uniformly to the outer surface of the head. The skin therefore separates, forming objectionable wrinkles. I therefore prefer to coat the head, prior to dipping, with a thermoprene cement. This cement is well-known per se and it is derived by reacting rubber with phenol sulphonic acid and other reagents. This cement is known under the trade name of "Vulcalack." I can also coat the head, prior to dipping into the latex or the like, with an aqueous solution of egg albumen, or other suitable albumen or heat-coagulable adhesive. After said aqueous solution has dried, either wholly, or partially, the head is dipped into the latex.

It is customary to finish a doll head which is made of wood composition with a coating of varnish or the like. Since this varnish waterproofs the outer surface of the head, it is difficult to get good adhesion between a head which has been thus finished, and the film of latex. If the thermoprene cement is used, this can be applied to a head made of wood composition which has been finished with a water-repellent varnish. The solution of the albumen can also be applied to the wood-composition head, after said head has been finished with a water-repellent varnish or lacquer. However I prefer to omit the finishing varnish or lacquer for the wood-composition head and to apply the albumen solution to the unfinished head, so that the solution penetrates the material of the head to some extent. The albumen is compatible with the latex during the dipping operation and the coagulated albumen produces firm adhesion between the head and the rubber skin. The albumen may form a thin coating or layer upon the wood-composition head, in addition to penetrating said head. If a head is made of cellulose acetate or other non-porous material, the layer of coagulated albumen forms a binder between such material and the outer rubber skin.

The original mold which is used for dipping into the latex, in order to produce the body of the doll is preferably wholly integral and rigid.

The rubber skin does not have sufficient rigidity to maintain the same in the stuffed shape shown in Fig. 1. This shape is yieldingly maintained by the filling, while permitting the easy compression of the body and the arms and legs so as to simulate the softness of the human body. However, and after the filling has been applied, the rubber skin has sufficient resilience at the joints between the body and the limbs, to maintain said limbs yieldingly in the position shown in Fig. 1. The effect is the same as though each limb were connected to the body by means of a universal joint, so that the arms can be raised and lowered relative to the body. The arms can also be moved sideways relative to the body and they can be turned or twisted relative to the body. The legs are also freely movable relative to the body in all directions, including a twisting movement. However, upon releasing a limb, it is moved back to the normal position in Fig. 1.

The layers of the rubber skin are close to each other at the joint-portion between the body of the skin and the limb members thereof. This construction provides a flattened and reduced throat at the inner end of each limb member. This throat is normally of elliptical shape. This reduced throat maintains the mass of filling ma-

terial in the body and in the limb members, separate from each other. Likewise this contour provides a spring effect at the joint-portions between the body and the limb members, so that the limb members are held yieldingly in the normal position shown in Fig. 1.

Instead of making the body and the limb members in one piece, they can be formed in separate sections which can be connected to each other by suitable members made of elastic rubber, thus producing the same result as though the limbs were originally formed integrally with the body. However I prefer to make the entire body, including the limb members, in one piece, as this lowers labor cost. While the skin is preferably of uniform thickness throughout, said thickness may vary. The skin can be of extra thickness at the joints between the body and the limb members, so as to provide greater strength at these points. Likewise the finger and toe portions can be made of greater thickness than the remainder of the skin. By making said finger and toe portions with relatively fine bores, and by making said finger and toe portions with resilient walls of sufficient thickness, it is unnecessary to fill said finger and toe portions. Such greater thickness can be secured by increasing the number of dipping operations at the fingers and toes, or by applying additional latex to said fingers and toes in any suitable manner, as by brushing, spraying, or the like.

I have shown a preferred embodiment of my invention but it is clear that numerous changes and omissions could be made without departing from its spirit. For the purposes of the claims, a doll body which consists of a plurality of connected parts, is equivalent to a doll body in which the limbs are integral with the body portion.

When I refer to albumen, I include egg albumen, serum albumin, and lact-albumin from milk.

The heat-coagulable adhesive can contain ingredients other than the albumin.

By providing the head 2 with an elastic rubber skin, it is unnecessary to use the wire 4. After the head has been temporarily assembled with the body, a suitable adhesive can be applied to the outer surface of the head and to the outer surface of the neck-portion of the body. The head and the neck-portion of the body can then be dipped again in latex, in one or more dips, so as to provide a rubber skin for the head which will overlap the rubber skin at the neck-portion of the body. This supplemental rubber skin can then be vulcanized. This supplemental rubber skin can contain sufficient accelerators so that it can be vulcanized at a very low temperature, thus preventing the over-vulcanization of the main rubber skin. Likewise, I can use a pre-vulcanized latex for making the supplemental rubber skin, and dry the latex coating of the supplemental rubber skin at relatively low temperature. Vulcanized rubber latex is well-known in the market under the name of "Vultex" and other trade names, so that the properties of this type of latex are well-known.

An important feature of my invention is the special formation of the joint-portions or zones J between the torso and the legs and arms of the doll. Said special joint-portions J can be provided at the knee-portions of the legs of the doll. At said joint-portions the stuffing is preferably wholly omitted. Likewise the skin is of flattened contour at said joint-portions J. That is, the area of the inner cross-section of the limb-member at joint J is smaller than the area of the inner cross-section of the next adjacent portion of the limb. The opposite inner surfaces of the skin may substantially abut each other, or said inner surfaces are separated slightly from each other. This formation is secured by correspondingly shaping the mold which is used for dipping into the latex, either pre-vulcanized or not pre-vulcanized. The thickness of the mold is greatly reduced at the portions thereof which correspond to the joint-portions J. The resilience of the stuffed rubber skin thus provides natural springs at the joint-portions. These springs permit the limbs to be freely bent and twisted, and said springs normally hold the legs and arms in predetermined normal position.

I claim:

1. A hollow doll-body comprising a hollow torso and a hollow limb-member, said torso and said limb-member having an integral elastic rubber skin, said torso having a filling, said limb-member also having a filling, the joint-portion of said skin between said torso and said limb-member being flexible and being substantially empty, said skin having a normal shape in which the inner cross-section of said limb-member is of smaller area at said joint-portion relative to the inner cross-section of the next adjacent portion of said limb-member and said joint-portion being sufficiently flexible to permit the limb-member to bend freely in all directions relative to the torso, and to permit the limb-member to be twisted around its axis relative to the torso, the adjacent walls of said skin being unconnected to each other at said joint-portion.

2. A doll-body which has a torso and a limb-member, said torso and said limb-member having an integral elastic rubber skin, said torso having a filling and said limb-member having another filling, said skin having a joint-portion at the junction between the torso and the limb-member, said joint-portion being freely bendable and twistable and having sufficient resilience to assume a predetermined normal shape, when said joint-portion is unstressed, said skin having a normal shape in which the cross-section of said joint-portion is substantially elliptical, the adjacent walls of said skin being unconnected to each other at said joint-portion.

3. A doll-body which has a torso and a limb-member, said torso and said limb-member having an integral elastic rubber skin, said torso having a filling and said limb-member having another filling, said skin having a joint-portion at the junction between the torso and the limb-member, said joint-portion being freely bendable and twistable and having sufficient resilience to assume a predetermined normal shape, when said joint-portion is unstressed, said skin having a normal shape in which the cross-section of said joint-portion is substantially elliptical, the cross-section of said joint-portion being of smaller area than the next adjacent portion of the skin of the limb, the adjacent walls of said skin being unconnected to each other at said joint-portion.

ABRAHAM M. KATZ.