

March 28, 1939.

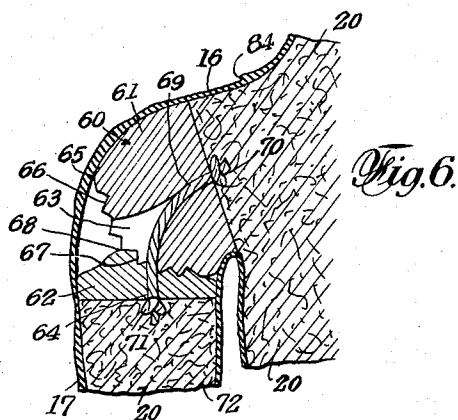
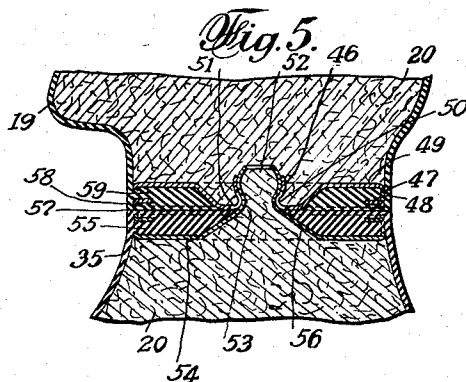
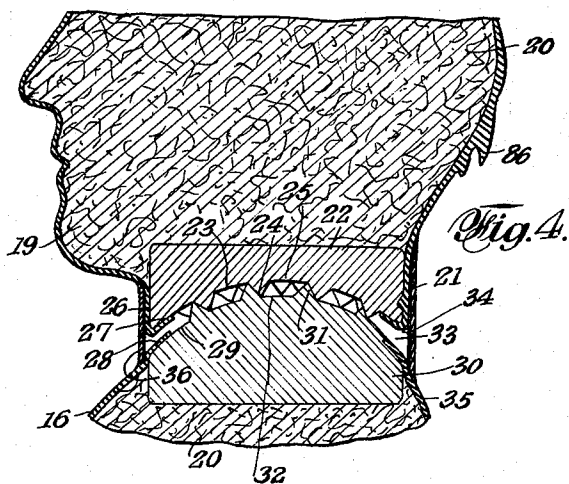
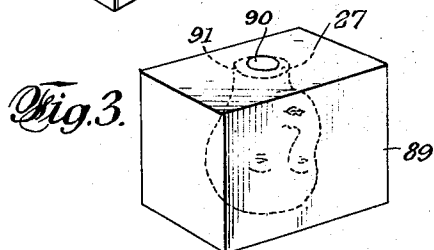
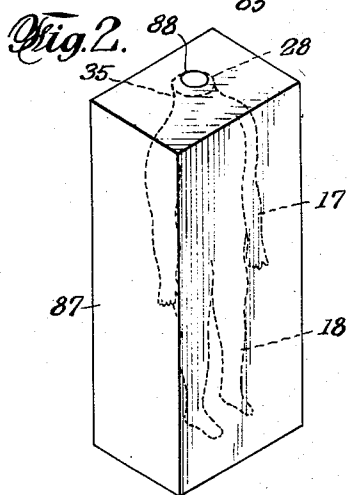
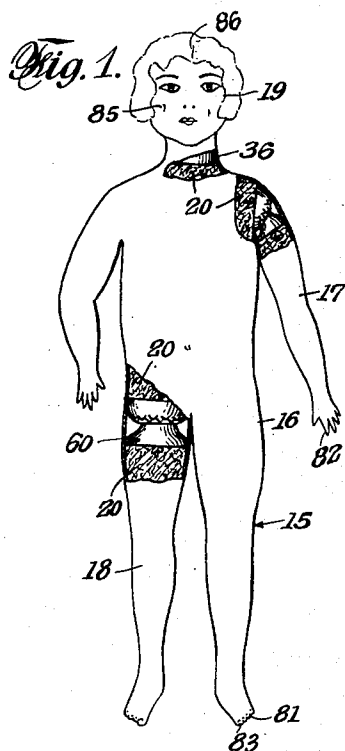
E. JACOBSON

2,152,311

SEAMLESS RUBBER FIGURE

Filed June 11, 1935

2 Sheets-Sheet 1



INVENTOR
Emanuel Jacobson

BY *Harry Jacobson*
ATTORNEY

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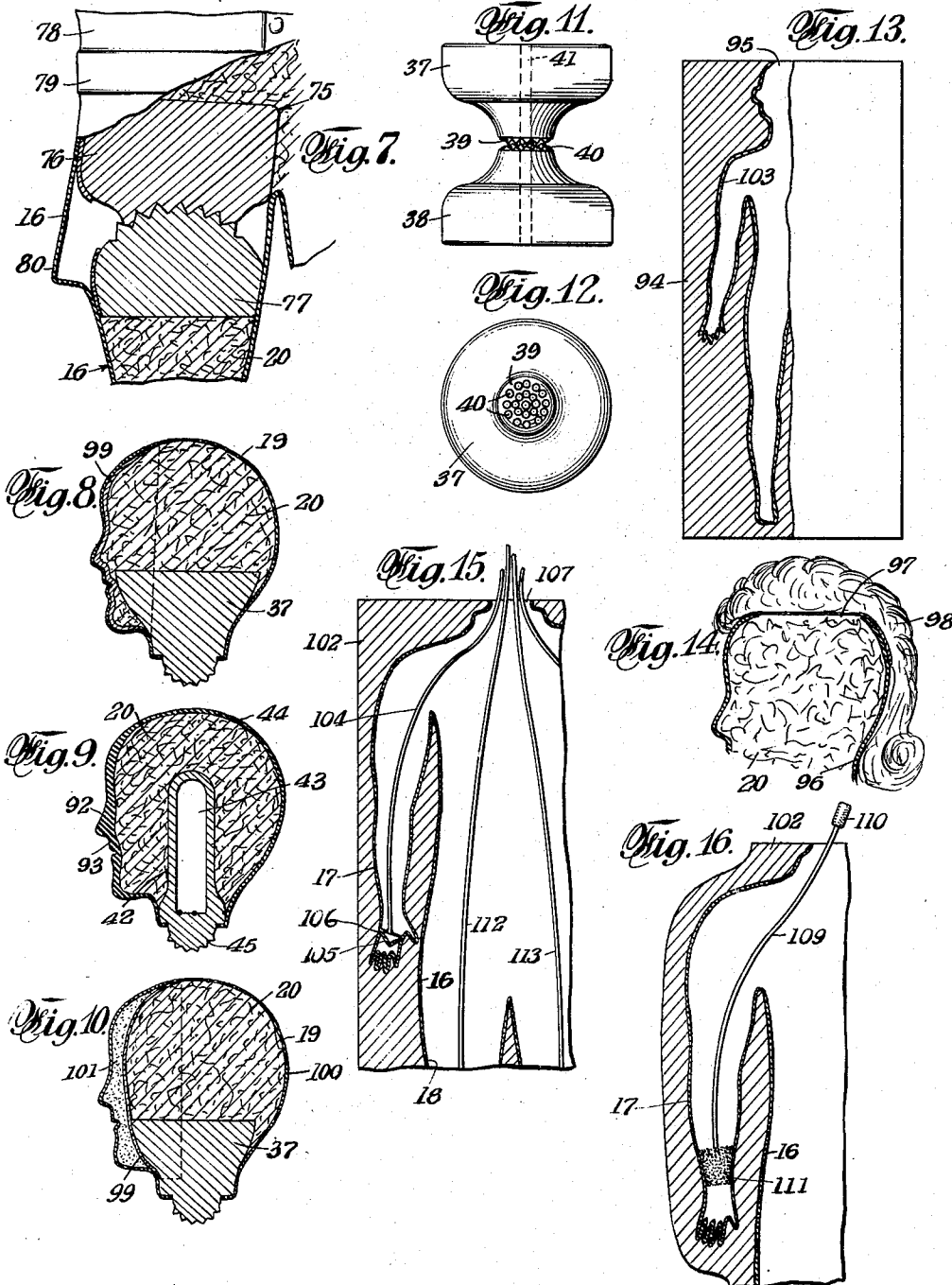
E. JACOBSON

2,152,311

SEAMLESS RUBBER FIGURE

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2 Sheets-Sheet 2



INVENTOR
Emanuel Jacobson

BY *Harry Jacobson*
ATTORNEY

UNITED STATES PATENT OFFICE

2,152,311

SEAMLESS RUBBER FIGURE

Emanuel Jacobson, New York, N. Y.

Application June 11, 1935, Serial No. 25,982

10 Claims. (Cl. 46—156)

This invention relates to and is applicable to various types of inanimate figures such as dolls simulating a human or animal form, marionettes, mannikins, window advertising or display figures, artists' dummies, puppets, statuettes and the like, and to the method of making such figures.

My invention contemplates the provision of a doll or the like figure in which the body, limbs and head are either seamless and made in one integral piece, or in which the head or limbs or both are joined to the body by concealed and water-proof joints, whereby the entrance of water or other washing liquid into the interior of the figure is prevented.

In what follows and hereinbefore, by the word "seamless" figure or part of such figure is meant a figure or part of a single integral piece of material free of any joints, whether welded, cemented, or not, free of any overlap, and free of any ridges or ribs, projections or overflow or excess materials such as would be formed in a molding operation by the use of a multiple part mold. The joining together of two or more sheets or portions of material as practiced in the art of molding objects hitherto is unnecessary by my method and hence there is no line, ridge or excess material indicating the juncture of such separate sheets. A seamless rubber head made by my method has no seam or marking of any kind such as is visible in ordinary rubber dolls which are made by vulcanizing together two parts of the doll or by using two-piece molds.

The line of juncture or demarcation between the two parts of the material or the two parts of the mold is in such cases distinctly visible. Not only are such seams detrimental because of their unattractive appearance, but they require trimming and hence add to the cost of production. By making rubber dolls and doll parts seamless, therefore, I have solved an important problem that has been present in the art.

My invention further contemplates the provision of such a figure, that is, either seamless or integrally joined, in which the limbs and head are movable to various desired positions, and which is comparatively light, floats upon water and uses a minimum amount of material.

My invention further contemplates the provision of a simple and efficient joint between the movable parts of such figures.

My invention further contemplates the provision of an integral figure, accurately simulating the appearance, feel and details, to as high a degree as is desired, of a life-like original, imaginary, improved or legendary figure, and which

can be painted or colored in any suitable life-like colors, and wherein the painted surfaces are permanently protected against wear or deterioration over long periods of time and which surfaces are unaffected by washing or other manipulation.

My invention further contemplates the provision of a figure having an extremely thin, separately formed rubber skin or casing, stuffed with suitable material to maintain its contour, said skin or casing being preformed into the desired shape and embodying the desired details of the features, limbs and extremities of the corresponding animate or other figure, including such details as wrinkles, hair, toes, toe nails, folds, dimples and even clothing of various types.

My invention further contemplates the provision of a method for making such figures or the parts thereof, of the latex of rubber and of a method of joining the parts of the figure together by a latex film in such a manner as to form an integral whole.

My invention further contemplates the provision of means and a method for effectively removing the one-piece figure or part thereof from the mold in which it is formed without danger of damage to the mold or the figure and at minimum cost and labor.

The various objects of my invention will be clear from the description which follows, and from the drawings, in which,

Fig. 1 is a perspective view, partly broken away to show the interior structure, of a figure embodying my invention.

Fig. 2 is a similar view of a one-piece mold by means of which the body of the figure or doll of Fig. 1 may be made.

Fig. 3 is a similar view of a similar mold by means of which the head for the figure or doll may be made.

Fig. 4 is a vertical fragmentary section of the head and part of the body showing one form of the means for adjustably and movably joining the head to the body and for integrally connecting the head casing to the body casing.

Fig. 5 is a similar view of the same showing a modified form of said means.

Fig. 6 is a similar view of another form of joint between the parts of the figure applied particularly to the shoulder or arm joint.

Fig. 7 is a similar view of the same showing a somewhat modified form of the joint as it appears embodied in a leg joint, and further showing

ing clothing details integrally formed in the casing.

Figs. 8, 9 and 10 are vertical sections of the head of the figure, showing modified forms thereof.

Fig. 11 is a vertical section of one form of the joint parts adapted for use for any joint of the figure.

Fig. 12 is a top plan view of one of said parts. Fig. 13 is a vertical section of a one-piece mold in which the entire figure may be cast of latex, an opening being left for the removal of the figure from the mold, which opening is intended later to be sealed by a wig, hat or other suitable means after the figure has been stuffed.

Fig. 14 is a similar section of part of a head formed in the mold of Fig. 13, showing the sealing of the resulting opening of the figure by a wig.

Fig. 15 is a vertical section of a one-piece mold in which a casing has been formed showing means for separating the casing from the walls of the mold and for removing the casing from said mold.

Fig. 16 is a similar section of an arm as it appears cast in a one-piece mold and showing how a resilient brush may be used for separating and removing the arm from the mold.

In that practical embodiment of my invention which I have shown by way of example, the figure designated generally by the numeral 15, Fig. 1, is illustrated as being a simulation of the human figure though it will be understood that the figure 15 may take any form desired, such as that of an animal.

As shown in Fig. 1, the figure 15 comprises the independent preformed separate rubber casing 16 constituting the body and limbs of the figure and having integral arms 17 and integral legs 18. As shown in Fig. 13, however, an entire figure including the head may be made in a single piece in a suitable mold. The head casing 19 of the figure 15, however, is preferably separately cast and joined to the body casing 16 after the body and head have been stuffed with suitable stuffing material as 20. Said stuffing may consist of cotton, wool, kapok, loose sponge rubber particles, cork dust, saw dust, excelsior or any other similar material customarily used for stuffing dolls, mannikins, or window display forms, though I prefer to use stuffing material lighter than water to insure that the stuffed figure can float.

The head casing 19, in that form of my invention now being described, is preferably formed separately from the body casing 16 and is provided with all the desired surface and embossed detail cast integrally thereon such as nose, eyes, lips, hair, teeth, ears, tongue and the like and may be made of the same latex compound as the corresponding body casing 16 or of a different compound of latex compounded in such a manner as to produce a harder or softer rubber as may be found best suited for the particular figure.

In any case, however, both of the casings 16 and 19 are extremely thin and seamless though provided with whatever detail it is desired to incorporate into the outer surface of the casing. Said detail in addition to or in place of simulating the various parts of the corresponding animate figure may also take the form of articles of apparel, as will be more fully described hereinafter.

It will be appreciated that the casings comprising the rubber figure may be as thin or as thick as is found convenient or desirable. Thicknesses

within the range of $\frac{1}{100}$ inch up to $\frac{1}{32}$ inch are most practical, using a minimum amount of material while giving sufficient strength to support the stuffing and providing sufficient material for the introduction of considerable surface detail such as wrinkles, clothing or the like, as has been hereinbefore indicated.

A figure produced of the proper compound of latex by my improved methods later to be described, though extremely thin, may be made self-supporting against collapse even though unstuffed, if desired. Toward this end, I prefer to use a latex having a concentration of at least 30% rubber though it will be understood that latex of a lower concentration may be used with corresponding diminishment of the self-supporting properties of the figure.

Referring now to Figs. 1 and 4, I have there shown the head casing 19 integrally but movably joined to the body casing 16 to form an integral figure free of such joints as would permit the entrance of water therethrough into the interior of the figure. The joint 21 between the head and the body of the figure at the neck thereof, permits the tilting and rotation of the head to a substantial extent in any direction. Said joint 21 comprises the upper solid or hollow block 22 of any suitable comparatively hard and rigid material such as wood, cork, rubber, fibre, sheet metal or the like having a preferably concave lower surface 23 provided with a series of projections, serrations or corrugations 24 of any suitable shape, such as conical, and spaced apart to provide a series of depressions 25 therebetween.

The head casing 19 is preferably formed with an integral neck portion 26 terminating in an inwardly extending annular peripheral portion 27, which may be omitted if desired. The annular portion 27 is adapted to fit on to the concave surface 23 of the block 22 and in retaining said block in place, the block being inserted into the neck by stretching the neck portion 27 where such portion is used. Said block 22 may be cemented to the inner surface of the neck 26 being additionally retained in place by the stuffing 20 of the head and the tension of the stretched rubber. Similarly, the body casing 16 is preformed with the inwardly extending peripheral portion 28 adapted to rest on or to be secured to the upper convex surface 29 of the block 30 which cooperates with the block 22. On said convex surface 29 is formed the series of spaced projections 31 similar to the projections 24 and similarly providing suitable indentations or depressions as 32 therebetween, it being understood that the projections 31 are intended to enter the depressions 25 and that the projections 24 are similarly intended to enter the depressions 32.

To secure the head to the body after said head and body have been suitably stuffed and after the blocks 22 and 30, respectively, have been arranged therein, the separately formed and completed head and body are brought together into their desired final positions with the projections of each of the blocks engaged in the depressions of the other block. The open space 33 between said blocks is then closed by a sheet as 34 of suitable thin flexible and frangible material such as paper or the like. Thereafter, latex is sprayed or otherwise coated upon the sheet 34 and on to the respective adjacent neck portions 26 and 35 of the head and body to bridge the space 33 and to coalesce with the respective neck portions 26 and 35 of the head and body and to form a single integral piece therewith. It will be understood

that I prefer to spray the bridging coat 36 of the neck, to join the head and body together, preferably at a time before the casings 16 and 19 have become thoroughly dried for the reason that a partly dried film will permit the additional layer of the vulcanized latex to coalesce with the film to form an integral sheet of rubber therewith.

When the bridging coat 36 of latex has dried, it becomes practically an integral part of the casings 16 and 19 and tends to maintain said casings in the positions in which those parts have been first assembled, thereby holding the blocks 22 and 30 in their normal positions shown in Fig. 4. It will be seen, however, that since the bridging coat 36 is of thin rubber, it is sufficiently elastic to permit the vertical separation of said blocks apart a sufficient distance to withdraw the projections 24 and 31 from the corresponding depressions 25 and 32, whereby the head may be turned relatively to the body in any desired direction or tilted forwardly or backwardly. When the head and body are relatively released, the contraction of the bridging layer 36 carries the blocks 22 and 30 together, the various projections 24 and 31 entering the adjacent depressions in the adjacent block. During the rotating or tilting operation or both, it will be understood that the thin rubber layer 36 may be somewhat distorted or wrinkled, thereby enhancing the life-like appearance of the figure by more accurately simulating the wrinkles and folds assumed by the skin of an animate figure on the tilting or turning of its head.

It will also be understood that while I have described the method of forming and the use of the bridging coat or layer 36 in connection with a head casing and a body casing to join said casings integrally together, the same method and structure is also intended for joining a limb casing such as an arm or leg, when made separately, to a torso casing, in an obvious manner.

In Figs. 11 and 12, I have shown the blocks 37 and 38 constituting a joint adapted to be arranged anywhere in the figures where a joint is desirable. Said blocks are substantially identical, each being constricted to form a convex surface 39 provided with spaced projections 40. If desired, an opening as 41 may be made through each of the blocks for the reception of a member tending to hold said blocks together. By constricting the convex surfaces 39 relatively to the remaining dimensions of the block, it becomes possible to obtain a substantial degree of relative adjustment between the blocks whereby the arms, legs or head may be tilted or rotated into any desired position relatively to the body of the figure, the thus adjusted parts being maintained in their adjusted positions by the interengagement of the projections 40 of the blocks.

As shown in Fig. 9, the block 42 constituting one part of the joint may take the form of an elongated member which may be made hollow as at 43 if desired, and entering the head casing 44 to a substantial extent and thereby permitting better manipulation of the head when the head is to be tilted. At its lower end, the block 42 is provided with the convex surface 45 toothed, roughened or corrugated or provided with suitable projections in the manner hereinbefore described in connection with the blocks 22, 30, 37 and 38. It will be understood that the block 42 is designed to cooperate with a block such as 30 or 38 to maintain the parts in their adjusted positions.

In Fig. 5 I have shown another form of at-

taching means for securing the head rotatably to the body of the doll. In this form of my invention, a snap fastener arrangement such as the socket 46 is provided with an annular outer wall 47 from which are pressed a number of inwardly turned lugs 48. The base 49 of the socket, serves to connect the outer wall 47 to the socket proper, said base being preferably inclined downwardly and inwardly toward the socket, to provide an annular space 59 into which liquid rubber may be poured in a manner soon to be described. At the bend 50 of the socket a number of spaced slits 51 are made to permit the socket to yield under the pressure of a cooperating stud.

The stud 52 is preferably open at its top and may be of the resilient or non-resilient type as may be found convenient or desirable. The head of the stud is of greater outermost diameter than the smallest innermost diameter of the socket 46 but the outer diameter of the neck 53 of the stud is substantially equal to the innermost diameter of the socket. The base 54 of the stud is similar to the base of the socket and is similarly provided with inwardly bent lugs and with a space 55 for the reception of liquid rubber. The base is further provided with an upwardly and inwardly inclined wall 56 of generally conical shape connecting it to the neck of the stud.

To assemble the securing means in place, the wall 47 of the socket is arranged within the neck with the outermost peripheral edge 58 of the wall spaced slightly from the extreme end edge 57 of the neck. The head is turned upside down and liquid rubber then poured into the space 59 to fill said space and to cohere and adhere to the inner wall of the neck. It will be seen that when the liquid rubber has dried it forms substantially a single piece of rubber with the neck and substantially encloses the greater part of the socket. The lugs 48 become imbedded in the rubber thus formed and assist in resisting strain upon the socket, and in preventing the socket from being pulled out of the rubber filled compartment 59. Similarly the stud portion may be arranged at the upper end of the body and liquid rubber poured into the compartment 55. The rubber when dry adequately holds the stud in position to the body, the lugs 48 gripping the rubber as hereinbefore described. The head and body may now be assembled by relative axial movement, the stud expanding the resilient socket sufficiently to permit the passage of the enlarged head after which the socket part snaps into the constricted neck of the stud and resists separation of the parts. It will be seen, nevertheless, that the head may be rotated relatively to the body through any desired angle. It will also be understood that this form of attaching means may be used in connection with other body parts, such as for example to connect the legs to the body, or the arms to the body.

In Fig. 6, I have shown a joint 60 similar to that disclosed in Fig. 4 but used at the shoulder of a figure. It will be understood that the joint 60 as well as the joints hereinbefore described may be used elsewhere in the figure such as at the knees, ankles, wrists, elbows and elsewhere if desired without any material change in the structure thereof.

The joint 60 comprises the blocks 61, 62 having respective openings 63 and 64 therethrough. The block 61 is toothed, serrated, corrugated or roughened at its outermost convex surface 65 as at 66, the block 62 being similarly serrated, 75

toothed, roughened or corrugated on its concave surface 67 as at 68. The curvature of the surfaces 65 and 67 are preferably of the same radius so that the blocks may be fitted together and rotated relatively to each other in any direction in the manner of a universal joint.

To prevent displacement of the blocks 61 and 62 within the figure, said blocks may be cemented to the adjacent inner surface of the casing 16 and may also be secured together by suitable elastic means. As shown, the elastic means takes the form of an elastic member 69 passing through the openings 63 and 64 of the blocks and formed with an enlargement or knot as 70 and 71 at the respective ends thereof to prevent the member from being drawn into the openings when stretched. After said member 69 has been passed through the opening 64 and stretched, it is knotted at 71, so that it pulls the blocks together and maintains them in contact.

To adjust the arm 17 relatively to the body of the figure, the arm is pulled by slightly grasping the block 62 and pulling it. The casing 17 and the member 69 are thereby stretched sufficiently to permit separation of the blocks 62 and 61 and disengagement of the teeth or roughened surfaces thereof. The arm may then be turned about its own axis or tilted to the desired position after which it is released whereby contraction of the casing and of the member 69 carries the blocks into engagement, the serrated or roughened surfaces of said blocks holding the blocks and the arm in their adjusted positions. If the arm 17 is made separate from the body, a suitable bridging coat, such as has been hereinbefore described in connection with Fig. 4 may be used to join the arm casing to the body casing.

As shown in Fig. 7, the joint 75, similar to the joint 60, but with the member 69 omitted, has been applied to the hip or leg joint of a figure. Since the blocks 76, 77 of said joint are similar to and operate like the blocks 37, 38 of Fig. 11, a detailed description of the joint 75 is deemed unnecessary. It will be noted that as shown in Fig. 7, the casing 16 may have formed thereon clothing details such as a blouse 78, belt 79, skirt 80 and the like. Said clothing and other details are formed on the casing 16 as has been hereinbefore indicated, by correspondingly shaping the operative surface of the mold or form used in producing the casing. Other details may be cast integrally with the casings 16 and 19 as, for example, the toes 81, toe nails 83, fingers 82 (Fig. 1), wrinkles or folds 84 (Fig. 6), dimples 85 (Fig. 1), hair lines 86 (Fig. 4), and many other more or less intricate contours enhancing the artistic effect of the figure. The features, body parts or clothing may be suitably colored if desired, in a manner to be later described.

In order to form the rubber casings 16 and 19 in the desired shape, each as a seamless one-piece entity, I prefer to employ a seamless one-piece mold as 87 (Fig. 2). The mold may be made of plaster of Paris, porcelain or other compositions customarily used for forming latex rubber articles. I have found that plaster of Paris of the type adapted to receive and retain a smooth finish is satisfactory for my purpose. To produce the mold in one piece without the necessity for joints, seams or separate pieces therein, I prefer to first make a pattern figure in the form of the desired rubber casing but of material which can be molten or disintegrated for removal from the mold. I have found paraffin mixed with wax having a low melting point and containing rosin

to give it strength suitable for this purpose though it will be understood that any suitable smooth disintegrable core material such as is frequently employed in the molding or casting of molds and other materials may be used if desired. The pattern figure is encased, except at the extreme top surface thereof, with plaster of Paris, an opening being preferably left in the mold at the neck either of the head or of the body, as the case may be, through which the casing may be removed from the mold.

After the mold has thus been made in one piece and is properly set, it is warmed until the pattern figure melts. The molten material is then poured out of the mold through the opening therein, or otherwise removed, by pouring hot water into the mold and thus disintegrating the pattern figure.

As shown in Fig. 2, the mold 87 for the casing 16 contains impressions for the arms 17, the legs 18 and the neck 26. At the top of the neck, however, an undercut is made in the pattern figure to provide for the casting of the integral flange 28, the neck opening terminating in a constricted opening 88.

As shown in Fig. 3, the mold 89 is made from a removable pattern head having the various facial features thereon. The opening 90 of the mold through which the pattern figure is removed after it has been melted or disintegrated, is smaller than the neck opening in the finished head casing 19, being undercut as at 91 to provide the annular portion 27 of the head casing.

It will be understood that a hollow, seamless rubber figure filled with paraffine, cork dust or dry powdered plaster of Paris, kapok, or other similar dry filler or with a flowing pasty material or with liquid may be used as a permanent pattern for making molds in quantity, the paraffine, filler, paste or liquid being poured out of the rubber pattern figure with or without the aid of heat or water to permit removal of said figure from the seamless mold after the mold material has set around the pattern figure.

The rubber casing forming the covering of my new figure is formed by pouring or spraying preferably vulcanized liquid latex into the hollow seamless mold 87, 89, to fill the entire mold and to permit some of the latex to overflow the openings 88, 90. The latex, however, may be vulcanizable, that is, containing sulphur or other vulcanizing agents. The preferably vulcanized latex is allowed to remain in the mold for a few minutes, after which all of it which is pourable, is poured out of the mold into a suitable container.

A film of coagulated latex, however, adheres to the walls of the mold cavity. Said film may be allowed to dry and then removed, but I prefer to build up another layer of latex immediately before complete drying of the first film to insure a greater thickness of the resulting casing. The same process may be used with vulcanizable latex. As many additional films or layers may be added or thus built up as may be found desirable by repeating the filling and emptying of the mold successively before or after the drying of the previous film. When the casing has been built up to the required thickness, it is permitted to dry. Evaporation of the moisture in the vulcanized latex in the mold leaves a vulcanized rubber film and may be completed within one to three hours dependent upon the temperature and the air currents in the vicinity of the mold. Ordinary room temperature and pressure is sufficient to effect proper evaporation of the moisture

in the latex. If it is desired to hasten the drying of the casing, warm air may be forced into and circulated within the mold as by means of a suitable nozzle.

Where vulcanizable latex is used, heat is applied to the mold or the coagulated layer to vulcanize the rubber or any other methods well known in the art of vulcanizing latex films may be employed and hence need not be described.

After the casing in the mold has become sufficiently dry, or after the vulcanizable latex layer has been vulcanized, it may be removed from the mold by gripping the overflow rubber at the mold opening 88 or 90 and separating it from the walls of the mold cavity.

By first separating the neck of the casing from the mold wall and then pulling evenly on the casing, the various parts of the casing may be separated from the cavity walls until the entire casing is released whereupon it may be removed in its collapsed state. In order to reach into the mold to better remove the casing, I have shown in Figs. 15 and 16, different types of casing-engaging means.

After a film of latex 17 has formed on the mold 102, as shown in Fig. 15, the flexible strings or tapes 104 each having a weight 105 at its end such as solid rubber, leather or the like, may be inserted into the mold through the neck opening 107 and allowed to drop to the extremity of the arm 17 and to come in contact with the film and to adhere thereto as at 106, coalescing with said film when the latex dries. Similarly, strings or tapes 112 and 113 may be inserted into the leg portions. After the weight 105 has coalesced with the casing 17 and sufficient time has elapsed for the rubber to thoroughly dry, the arm portions of the rubber figure are separated from the mold by pulling on the string imbedded in the arm portion of the figure. The rubber arm may then be pulled out of the arm of the mold manually. Similarly, the leg portions of the figure may be separated from the mold and the entire figure may then be pulled out manually by gripping the figure at the neck portion and pulling said figure out of the mold.

Another method for separating the finished rubber casing from the mold 102 comprises inserting a brush (Fig. 16) into the limbs of the mold through the opening of the mold, said brush having a long wire portion 109, stiff radiating bristles 111 and a handle 110, the stiff bristles engaging the casing firmly at a constricted portion of the arm. By pulling the brush by means of the handle, the bristles being in tight engagement with the rubber casing, said bristles tend to pull the rubber off the walls of the mold, thus separating the casing from the mold. The arms of the figure may then be withdrawn from the arm portions of the mold by pulling said rubber arms out manually. The same process may be repeated with the leg portions of the casing and the entire figure may then be drawn out of the mold manually.

It is advantageous to use a mold material which is smooth since the smoother the mold cavity, the easier it is to release the casing. The completely seamless mold which I have described is better, therefore, than a seamed mold because the seamless mold has no cracks in which the rubber overflow may become engaged. It also eliminates the overflow entirely, and hence eliminates the process of cutting off the overflow.

It will be understood that if desired, the legs and arms of the figure may be separately cast

in seamless molds and secured with or without a joint to the torso or remainder of the body as by the means described in Fig. 4 for securing the head casing to the body casing, that is, by a bridging coat or film of latex or cement.

By bringing the outer surface of the casing into intimate and direct contact with the walls of the mold cavity, it becomes possible to duplicate exactly the details on the mold cavity wall. It is obvious that the detail could not be so exactly duplicated if a form were dipped into a quantity of latex since it would be the inner surface of the figure produced by dipping which would have the detail while on the outer exposed surface, the details would be partly obliterated by the intervening layer of rubber between the formed surface and the exposed surface of the figure. Such details as hands and feet and head features have therefore customarily been produced by expensive metal molds in hot presses from dry rubber or plastic unvulcanized rubber and consequently, have resulted in the production of objects or figures made of comparatively thick rubber with little or no undercut detail. By means of my improved method as above described, however, a casing is produced out of a minimum amount of material with as much detail, undercut or otherwise, as exists in the mold itself and in the original pattern figure.

As has been hereinbefore mentioned, the resulting casing may be of sufficient stiffness to be self-supporting against collapse, that is, if the body casing 19 is made to stand on its feet, it preferably will not collapse but will stand upright, maintaining its proper contour. Similarly, if the head casing 19 is stood up on the neck end thereof, it will not collapse but will be self-supporting. Both casings, however, are flexible and yield under pressure. To maintain the proper contours of said casings under pressure, I prefer to stuff said casings with proper stuffing material as 20 in the manner hereinbefore described, the stuffing being inserted into the casing through the neck opening thereof. In the case where the limbs are separately cast, the limbs are first stuffed with the stuffing 20 through the opening of the limb before being joined to the torso.

I have found that the latex best suitable for my purpose is vulcanized latex concentrated to a viscosity suitable for pouring or spraying.

If desired, suitable dyes, pigments or fillers may be mixed with the latex in the presence of proper stabilizers in a manner well known in the art and hence need not be described. When such vulcanized latex has evaporated, it leaves a residue of tough highly elastic vulcanized rubber which may readily be pulled out of the mold and stretched without danger of tearing.

In some cases, it may be desired to build up solid portions or thick layers at selected parts of the casing. For example, in the casing shown in Fig. 9, the nose 92, lips 93 and other parts of the head casing 44 are shown as solid or of considerable thickness. To so build up the casing, I prefer to use a mixture of vulcanized latex with vulcanized or unvulcanized powdered rubber having no affinity for water to form a paste. Said paste is applied to the selected area of the mold or to the rubber film pre-cast therein. The rubber powder may contain vulcanizing agents and an accelerator. No stabilizer is necessary since the latex does not coagulate upon the introduction of the rubber powder into the latex. The powder does not absorb any moisture from the latex. Each

particle of the powder becomes coated with vulcanized latex. The evaporation of the latex forms a film around each particle and adequately causes adhesion of said particles. The paste when dry, becomes a substantially solid rubber composition. If powdered rubber containing one or more vulcanizing agents is mixed with the latex, the composition becomes harder with age due to the action of the vulcanizing agent, especially where an accelerator is incorporated into the powder. A doughy solid feature may thus be built up at any selected area of the rubber film to simulate various features or to increase the thickness of the casing at points of excessive wear or for better maintaining the contour of any desired area.

Should it be desired to form the head casing and the body casing in a single integral piece, the mold 94 (Fig. 13) is used. Said mold is made with an opening as 95 therein near the top of the head through which the casing 103 can be removed from the mold. The resulting head portion 96 of the casing 103 (Fig. 14) has a hole as 97 therein. Said hole may be later covered if desired by a bridging coat of latex similar to the coat 36, or the opening 97 may be covered with a wig, hat or the like 98. The entire casing 103 is seamless and of a single piece having a seamless torso, seamless arms and legs and a seamless head except for the concealed covering for the opening 97.

In Fig. 8, I have shown a head with comparatively stiff or rigid features. In this case, the head casing 19 is reinforced with a comparatively stiff mask 99 shaped to conform to the contour of the front part of the inner surface of the casing 19. Said mask may be made of buckram, wood pulp composition, hard rubber, Bakelite, metal, Celluloid or the like and is inserted into the casing through the neck opening, which opening may be suitably stretched for that purpose or the mask may be folded and inserted into the head without stretching the rubber head. The stuffing material 20 may then be inserted into the head, as well as the joint member 37.

As shown in Fig. 10, the head 100 may be made with movable or plastic features 101 in accordance with the disclosure of my prior Patent No. 1,942,370 and in my copending application Serial No. 648,865, backed preferably though not necessarily, by the stiff backing 99.

Should it be found in the formation of the casing 16 or 19 that a perfectly smooth finish has not been attained, or that there are flaws or defects in the surface of the casing, such flaws or defects in the finish may be remedied by spraying or otherwise applying a thin coating of the latex to the outer surface of the figure at the flaw or over the entire limb, head or figure, and allowing the thus applied latex to dry. The new layer of latex leaves the surface of the figure smooth and glossy, making it attractive and easily washed.

Either of the casings 16 or 19 may be colored throughout to simulate flesh or as nearly as possible the color of the animate object which it is intended to represent. This is done by incorporating into the latex in its liquid state, suitable pigments or dyes though it will be understood that the color may be applied to the surface of the rubber casing, particularly on the face part of the casing 19 to represent the eyes, mouth, cheeks or other parts.

When the coloring material is applied to the surface, I prefer to use an elastic enamel or paint having a rubber base or containing rubber as one of its main ingredients. Such paint or enamel when dry flexes and stretches with the rubber. I

may also spray colored latex on such portions of the figure where coloring is desirable. Should it be desired to protect the colors applied to the surface of the figure, a layer of transparent rubber may be applied over the coloring layer by spraying, dipping or otherwise coating the casing and the colored or painted areas. The layer or coating of transparent rubber may also cover the entire figure if desired and permit the coloring material to be seen therethrough while forming a wearing coat serving as an adequate protection to the colored areas which may therefore wear indefinitely without rubbing off. While vulcanized transparent latex may be used for the protective coating, unvulcanized latex containing a vulcanizing agent may be used, the vulcanization being effected by heat or by other curing methods which are well known in the art and hence need not be further described. This method of coloring rubber dolls has many advantages over the present method of applying a colored rubber cement or a dye to the doll. The dye fades out and colored rubber cement is sticky. A rubber doll or figure colored by my method may be stretched or flexed almost indefinitely without adversely affecting the coloring material.

In place of painting with paint or enamel on the surface of the rubber casing, the surfaces may be properly colored by applying colored paper, fabric or rubber cutouts representing eyes and lips of the surface with suitable adhesive and then preferably spraying or otherwise coating the thus colored areas to sandwich the coloring sheets between the casing and the transparent layer of latex, or the selected areas may be colored by spraying thereon vulcanized latex suitably colored with the proper pigments with or without the additional cost of transparent latex.

The rubber casing may also be colored by pouring transparent rubber latex into the mold to form the outer layer of the casing and after allowing the transparent latex film to wholly or partially dry, and then placing the preformed colored portions of the required shape and color on the film in their proper positions after first covering the pre-cut colored portions with a small quantity of latex or cement to fix the pre-cut colored portions to the transparent latex. The operation of pouring or spraying the remaining latex on to the transparent coat may then be performed in the manner hereinbefore described. When the casing thus formed is withdrawn from the mold, the colored portions are firmly secured or sandwiched between the transparent rubber film and the colored film in their proper places as though said portions were painted in the rubber.

It will be understood that the figure embodying my invention is much lighter than molded rubber figures of the same size and that while heavy molded rubber figures with articulated limbs are customarily made with fillers incorporated therein for stiffening the rubber, the casings of my improved figure may be made of substantially pure latex without impurities or fillers other than the materials used for vulcanization, stabilization, acceleration, or coloring. Regardless of how thin the casing is made, the shape thereof may be adequately maintained by the stuffing used therein. It will also be seen that I have provided a seamless figure having no exposed joints for the entrance of water when the figure is washed or bathed; that I have provided seamless limbs, head and body for a rubber latex figure; that my improved figure can float on

water; that it does not become soiled as easily as molded impure rubber; that it may be readily washed and cleaned; and that it does not require the use of hot presses and expensive dies in the manufacture thereof.

It will also be seen that by making my improved casing from an aqueous solution of rubber or latex, I am able to dispense with the necessity for such equipment as metal dies, mixers, presses, heat vulcanizers and the like.

While I have shown and described certain preferred materials and certain preferred methods for manufacturing my invention, and while I have indicated some of the uses to which my invention may be applied, it will be understood that I contemplate the use of various equivalents of the materials and of the arrangements therein before described and therefore do not intend to limit myself to the specific material, arrangements and uses hereinbefore mentioned, but intend to reserve to myself my invention in its broadest aspect consistent with the prior art and the terms of the appended claims.

I claim:

1. In a figure, a seamless cast rubber casing having integral limbs, the casing having representations thereon in the form of relative elevations and depressions, the elevations and depressions in the outer surface of the casing being more sharply defined than the corresponding elevations and depressions on the inner surface thereof, pliable stuffing material inserted in said casing and maintaining the normal contour thereof, and means inside the casing for maintaining the limbs in various set positions, said means including a pair of separable interengaging members secured to the casing.

2. In a figure, a seamless cast rubber head having facial features, a comparatively rigid backing member in the shape of a face mask inserted in said head to maintain the normal contour of the facial features, stuffing material inserted in said head to maintain the backing member in close contact with the inner face of the head, and means arranged in the neck portion of said head for movably connecting the head to a body portion.

3. In a figure, the combination of a changeable rubber doll head having facial features adapted to be moved to temporarily set positions by manual pressure on the head, pliable stuffing material in said head to maintain the contour thereof, and means in the neck portion thereof for movably connecting the head to a body for relative movement in all directions, said means comprising a pair of members each provided with spaced projections.

4. In a figure, a seamless cast rubber latex body casing having a torso, arms and legs, a seamless cast rubber latex head, means for movably joining the casing to the head, and a layer of rubber coalescing with and joining the outer surface of said casing to the outer surface of

said head, and having a smooth, uninterrupted outer surface, said rubber layer bridging any gap between the casing and the head.

5. In a figure, a first hollow seamless rubber portion of a complete figure, and a second hollow seamless rubber portion, means secured to said portions to movably connect said portions, and a layer of vulcanized latex self-held on and enclosing adjacent peripheral ends of said portions and coalesced therewith, and having a smooth, uninterrupted outer surface continuous with the outer surfaces of said portions beyond said layer.

6. In a rubber figure, a first hollow seamless portion, a second hollow seamless portion, and a layer of rubber latex adhering directly to and coalesced with said portions and constituting the sole means for joining said portions to form an integral figure.

7. In a doll, a part comprising a separately preformed seamless soft rubber casing having an opening therein, pliable stuffing material inserted into said casing and substantially enclosed thereby, and means arranged at the opening and including a member engaging the inner surface of the casing and held in place thereby for movably connecting the part to a similar casing, said member being provided with spaced projections adapted to cooperate with similar projections on a corresponding member of said similar casing.

8. A soft rubber head mask having facial characteristics, separately preformed colored flexible sheets applied to the mask at selected areas and a film of transparent rubber superimposed on and adhering to the mask and adhering to and covering said sheets, said sheets being permanently sandwiched between the film and the mask.

9. In a figure, a first part of the figure comprising a thin stretchable seamless rubber casing having an opening, stuffing material inserted in said casing and substantially enclosed thereby, a second hollow seamless rubber casing part having an opening, and cooperating means arranged in the respective openings of said parts for movably fastening said parts together, said means including a pair of members each engaging the inner surface of one of said casings and held in place thereby, and each being provided with spaced outstanding projections arranged to enter the spaces between the projections of the other member, said members being separable on the stretching of the casing.

10. In a figure, a hollow, thin, soft rubber casing stretchable to a substantial extent, and a rigid member secured to an inner wall of the casing and provided with spaced projections adapted to enter the spaces between the projections of a similar member, said rigid member being separable from the similar member to disengage said projections from those of said similar member on the tensioning and stretching of the casing.

EMANUEL JACOBSON.