Oct. 17, 1961 J. E. MARSDEN ET AL 3,004,516

FORM FOR GLOVE DIPPING

Filed Jan. 10, 1958 5 Sheets-Sheet 1

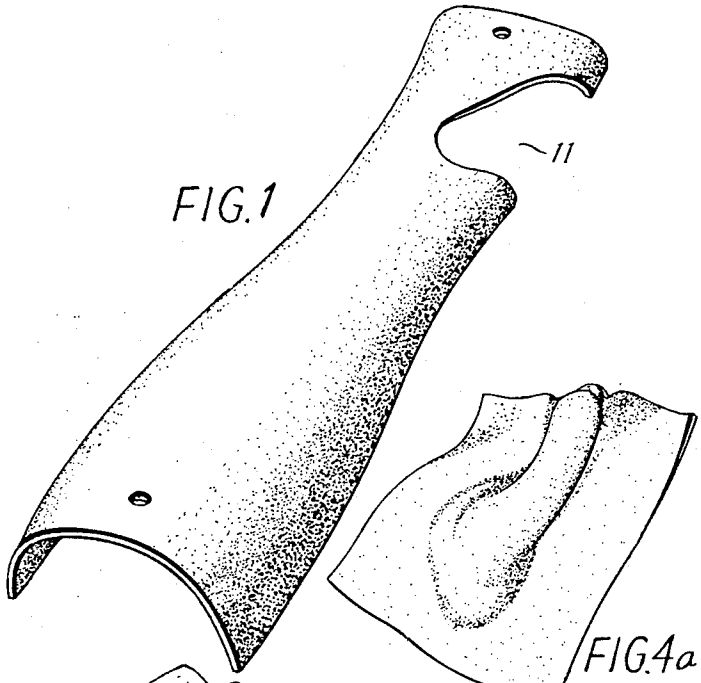


FIG. 1

FIG. 4a

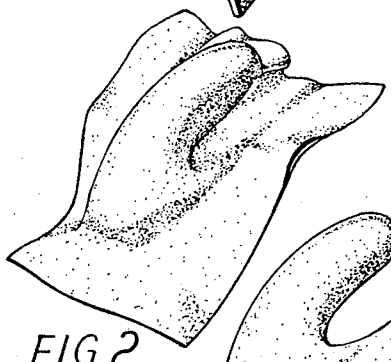


FIG. 2

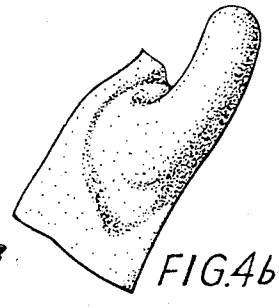


FIG. 4b

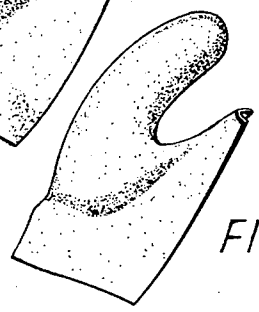


FIG. 3

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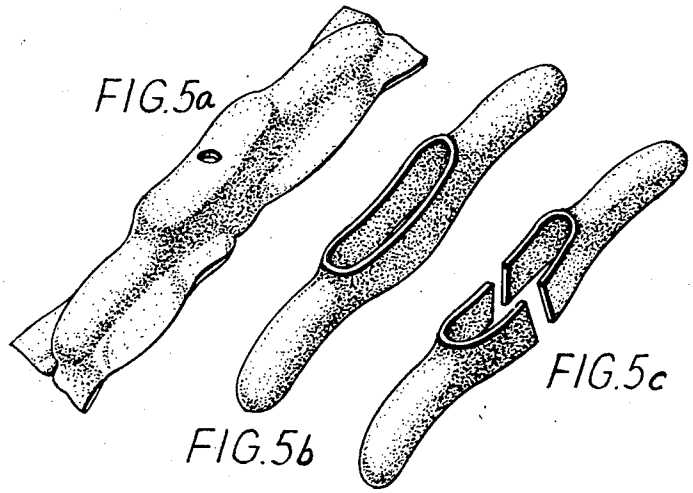
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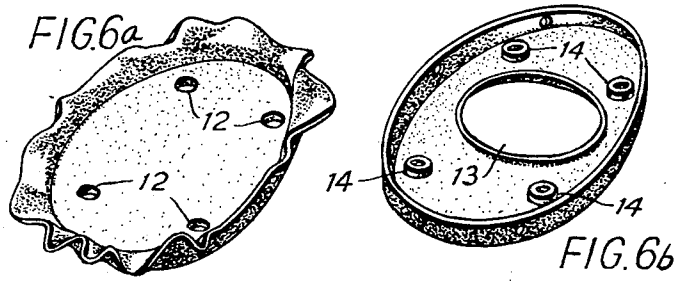
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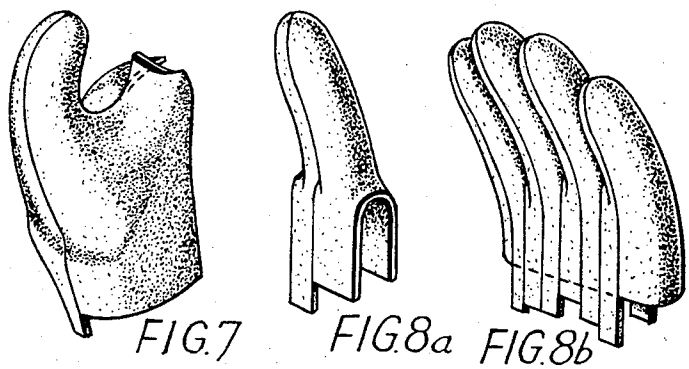
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FORM FOR GLOVE DIPPING

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FIG. 9

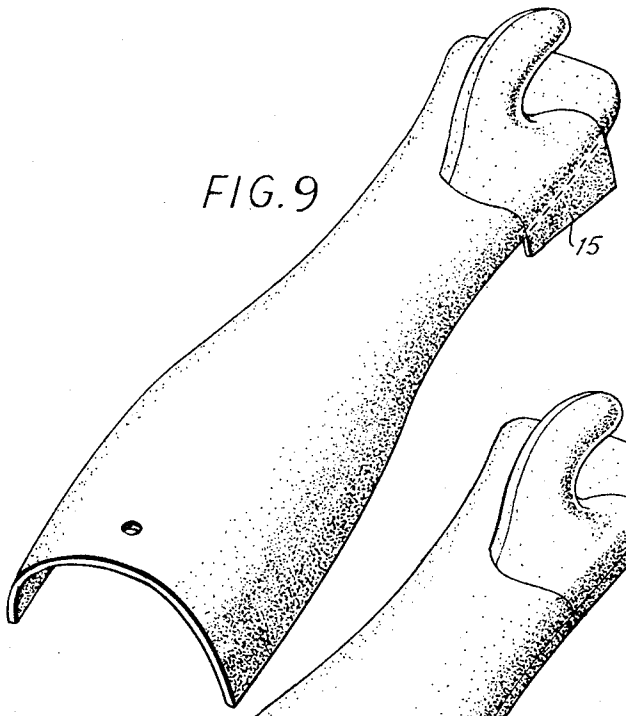
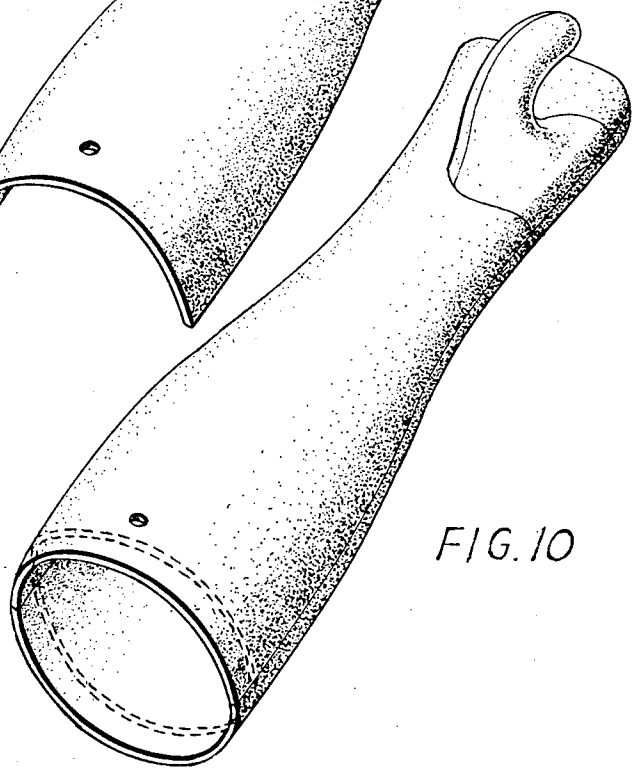


FIG. 10



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FORM FOR GLOVE DIPPING

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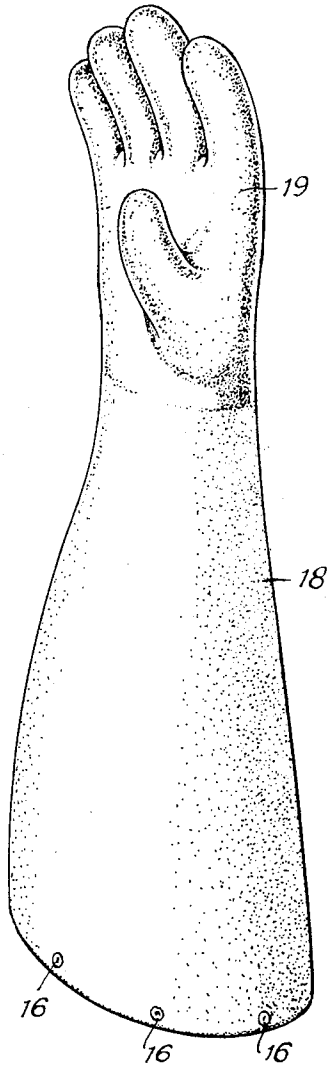


FIG. 11

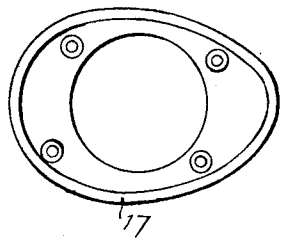


FIG. 12

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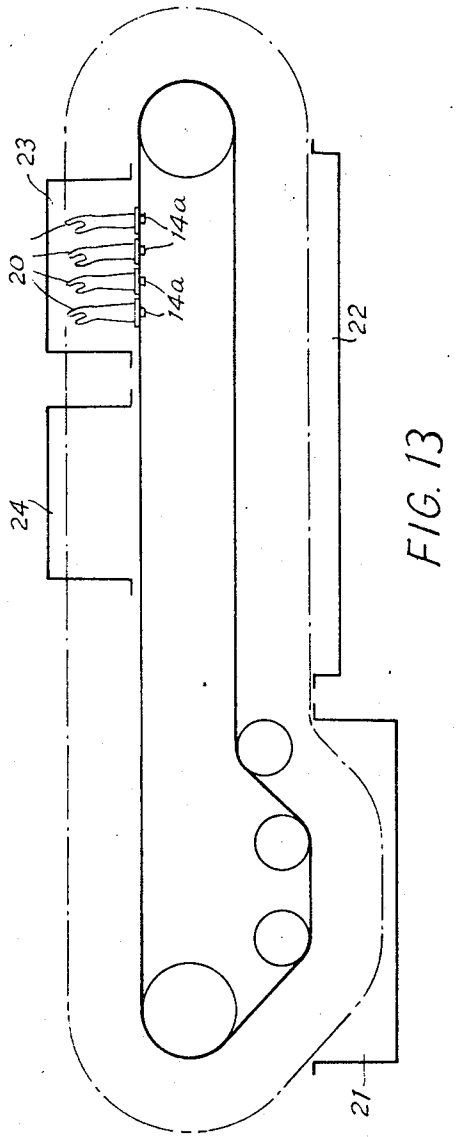


FIG. 13

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United States Patent Office 3,004,516 Patented Oct. 17, 1961

3,004,516

FORM FOR GLOVE DIPPING

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6 Claims. (Cl. 118—500)

This invention relates to a process for manufacturing articles of clothing or like articles which includes arranging base fabric on a suitably shaped support, applying a flowable coating material to said fabric, and heating said coating material with the fabric in position on the support, the coating material and heating conditions being so chosen and arranged that the coating material becomes converted into a coherent coating on the base fabric (hereinafter referred to as a process of the type described).

The present invention comprises a process of the type described wherein the wall of the said support at those parts over which the said conversion takes place is of thin metal. By the expression "thin metal" as used herein is meant metal which has a thickness great enough for adequate strength of the support but not greater than four millimetres. Preferably the said thin metal parts of the wall of the support are of substantially uniform thickness. According to a further feature the thickness of the said parts of the support is not greater than two and a quarter millimetres at any point.

In an important application of the invention the coating material comprises plasticized polyvinyl chloride. If desired, the base fabric may be prefashioned into the approximate shape of the required article before it is arranged on the support and has the coating material applied to it. Where the article is a glove or other article of clothing the inner layer (i.e. the base fabric) may advantageously be made of wool or other flexible absorptive material. In many cases it is desirable that the coating material shall penetrate into the inner layer but shall not penetrate right through to the inner surface. The attainment of this result can be assisted by arranging that the heating conditions are such as to raise the temperature of the coating material suddenly up to or above the temperature necessary for conversion. For example with a coating material of polyvinyl chloride (P.V.C.) the article for heat treatment may be introduced suddenly into an oven at a temperature of from 350° F. to 450° F.

Hitherto, shaped supports made from a ceramic material such as porcelain have been used, in processes of the general type with which the invention is concerned. By using thin-walled metal supports in accordance with the present invention substantial and surprising advantages may be obtained.

Thin-walled metal supports can be made light yet robust and be easily supported and secured for handling as compared with usual ceramic supports. Moreover the brittleness of ceramic supports is a serious disadvantage since it is the cause of a high breakage rate whereas a thin-walled metal support is not so easily broken, and, even if broken, can usually be repaired quite easily. In this connexion also, ceramic material cannot be easily shaped, for example by drilling and tapping, for attachment members. Furthermore ceramic supports are subject, during manufacture, to shrinkage, which cannot be precisely controlled. As a result ceramic supports of theoretically identical shape and size, in fact vary in shape and size, with corresponding variations in the articles manufactured thereon.

A further advantage inherent in a thin-walled metal support is that it can be produced with a very even wall thickness, whilst ceramic supports have substantial variations in wall-thickness, if hollow, or if solid have an undesirably high heat capacity. With the use of a metal former with an even thin wall as compared with the use of a ceramic former with an uneven, and often considerable, wall thickness, less heat is required and the said conversion can be speeded up and reduced in cost. Surprising improvements can also be achieved in the quality of the final article. For example, if a coated glove is being produced on a ceramic support and the heating conditions are adjusted to give the optimum conversion over the middle part of the glove the fingers will often be overheated (and sometimes burnt) at the tips, whilst the wrist or gauntlet portion may be underheated. When a glove is made on a thin-walled metal support, on the other hand, even conversion of the coating material may be obtained and the result of this can be clearly seen since the coating surface has an even high gloss without any discolouration. Furthermore, we have found that this evenness of conversion can extend also to parts of the glove where the fabric base does not fit the support as closely as might be desired. Thus, in the case of a glove, it is sometimes difficult to fit the fabric base closely to the support across the palm, which has a slight concavity. When using a porcelain support the coating material on this part of the glove is converted more quickly than on the other parts of the base fabric which are in close contact with the support, because less heat is conducted away by the support. But with a metal support having a thin and even wall this trouble can be avoided. Not only therefore can the quality of the coating in the finished article be better when a metal support, of thin and even wall thickness, is used but, as mentioned, the heat required is less. Thus the heating time may be reduced by half or more and production materially increased, with a corresponding reduction in cost per article.

The reduction in heating time which is possible when practising the present invention has been found to allow of another important economy. In a known process of the type described, using a ceramic support, it was found that a base fabric of dense structure, e.g. a closely-knit fabric had to be used to reduce the penetration of the coating material to the desired degree. With a thin-walled metal support it has been found that, by suitable choice of coating material and by bringing the support sufficiently rapidly to the temperature required for conversion, a less dense, and therefore cheaper fabric may be used without undesirable penetration occurring.

A further material advantage resulting from more rapid and even conversion when using a thin-walled metal support is that, for a given amount of, for example, P.V.C. in the coating, a greater thickness of P.V.C. is obtainable above the fabric surface. This enables a thinner fabric to be used without reduction in any of the essential qualities of the glove. This means a further saving in cost.

The preferred method of producing articles of protective clothing can be economically carried out in continuous manner, and for this purpose a machine may be used which consists essentially of an endless conveyor means secured to which, in transverse parallel rows, are a plurality of supports and a dipping tank, a draining trough, an oven, and a cooler through which, when the conveyor is moving, the supports are caused to pass successively and continuously. The cooler is provided to cool down the hot supports with the articles (e.g. gloves) mounted thereon, as they come from the oven, to a temperature which is suitable for stripping off the articles. It has been found that with ceramic supports another cooler has been necessary just before dipping in order to ensure that the supports which are still warm if the conveyor circuit is kept to reasonable dimensions, do not raise the temperature of the substance in the dipping tank

too much. Such a "secondary" cooler has been found unnecessary with in-walled metal supports since they cool down themselves sufficiently rapidly.

A further advantage can be obtained when using a thin-walled metal support as compared with a ceramic support. It has been the practice to roughen at least a part of the surface of a ceramic support in order to prevent the fabric base from being displaced during and after the coating steps, where this step is carried out with the support downwardly directed. When making gloves, for example, and applying the coating by dipping, with the fingers pointing downwards, it has been usual to roughen the wrist or gauntlet part of the support since otherwise the weight of the coating material has tended to cause slipping of the base fabric on the support. Although slipping has been prevented thereby, difficulties have arisen because the rough part of the support has made it difficult to fit the base fabric on the support. The base fabric has usually had to be carefully shaped to fit the support, and even so the operative fitting the base fabric on the support has often experienced soreness of the fingers due to repeated contact with the roughened surface. When using a thin-walled metal support with a similarly roughened part it has been found, surprisingly, that with many fabrics, such difficulties have not been experienced in fitting the base fabric over the support. This has been so marked that in some cases it has been found possible to simplify the shape of the base fabric with consequent saving in material and time.

The manufacture of a thin-walled metal support, especially in the case where the shape is complex (e.g. for a glove) presents some difficulties, and a further object of the invention is to provide a convenient and satisfactory method of manufacturing such a support.

According to a further feature of the invention, therefore, a support is made from two or more pieces of thin sheet metal which are appropriately shaped, assembled and secured together. In the case of a support for the manufacture of a glove the following method has been found very suitable, namely, cutting from sheet aluminium a back hand and wrist piece, a front hand and wrist piece, and thumb and finger pieces, shaping said pieces, securing said pieces together in jig means, for example by welding, and applying finishing operations, such as planishing, anodising and shot blasting, as may be necessary or desirable.

The invention will now be described further, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of a front hand and wrist piece;

FIG. 2 is a perspective view of a back thumb piece at one stage of manufacture;

FIG. 3 is a perspective view of a back thumb piece at a later stage of manufacture;

FIGS. 4*a* and 4*b* are perspective views of a front thumb piece at successive stages of manufacture;

FIGS. 5*a*, 5*b* and 5*c* are perspective views of the front and back pieces for one finger at successive stages of manufacture;

FIGS. 6*a* and 6*b* are perspective views of the former base at successive stages of manufacture;

FIG. 7 is a perspective view of the completed thumb;

FIGS. 8*a* and 8*b* are perspective views of single complete finger and a completed set of fingers, respectively;

FIG. 9 is a perspective view of the completed front hand and wrist piece and thumb;

FIG. 10 is a perspective view of the support before the fingers are welded on;

FIG. 11 is a perspective view of the completed support;

FIG. 12 is an inverted plan view of the completed support, and

FIG. 13 is a diagram of an apparatus suitable for

continuously manufacturing gloves according to the preferred method.

The support now described is intended to be used for the manufacture by the preferred method of right-hand gloves having a long gauntlet. Only a right hand support is described, but a left hand support is made in like manner.

The first steps comprise the cutting of appropriately sized flat blanks from 18' S.W.G. aluminium (i.e. of a thickness of .080 inch or 2.032 millimetres) from which can be formed:

(*a*) A back hand and wrist piece
(*b*) A front hand and wrist piece
(*c*) A back thumb piece
(*d*) A front thumb piece
(*e*) The front and back pieces for four fingers
(*f*) A base.

The blanks for the hand and wrist pieces, the thumb pieces, the finger pieces and the base are first processed separately as will now be described.

The back hand and wrist piece blank is first pressed in a press tool to the desired shape. Then a large part of the excess metal around the edges is cut away by sawing, the piece being manipulated by hand, before the piece is mounted on a suitable jig and band-sawn to depth.

The front hand and wrist piece blank is first pressed in a press tool to the desired shape. Then it is rough-sawn and finished to depth. A thumb (completed in the manner hereinafter described) is then used to mark out the metal at the appropriate side, the two parts being suitably jigged for this purpose, and marked for the later convenience of the welder. Finally the space **11** is formed by cutting away the metal so marked out by sawing (FIG. 1).

The back and front thumb piece blanks are each pressed to shape in a press tool (FIGS 2 and 4*a*), rough trimmed by sawing, and finally (FIGS 3 and 4*b*) cut to depth by band-sawing whilst suitably supported in a jig.

Each finger piece blank is pressed to shape in a press tool (FIG. 5*a*), then both sides are band-sawn, whilst supported in a jig, to give the correct depth (FIG. 5*b*), and finally sawn in half (FIG. 5*c*).

The blank for the base is first pressed to shape in a press tool (FIG. 6*a*). Four holes **12** are then drilled, the piece band-sawn to depth whilst jigged, a large central hole **13** blanked in, the edges of the hole **13** swelled (both operations being carried out in a suitable press tool) and finally internally screw-threaded bushes **14** let into the holes **12**.

The various assembly steps will now be described. The assembly of the thumb is first, and, in practice, must take place before the front hand and wrist piece can be completed. The back and front pieces as finally shaped (FIGS. 3 and 4*b*) are welded together on a jig and any excess weld is laid by hammering whilst the thumb is supported on a mandril, the finished thumb appearing as shown in FIG. 7.

The halves of each of the four fingers (see FIG. 5*c*) are welded together (FIG. 8*a*) on a jig and then the four fingers of a set welded together on a jig (FIG. 8*b*). After excess has been laid the finger assembly is cut to length along the dotted line by band-sawing whilst supported in a jig.

The next step is the attachment of the thumb to the front hand and wrist piece. This is done by welding (FIG. 9) utilising the marking referred to to locate same in position. Excess weld is then laid and finally the excess of metal **15** at the edge sawn off, as shown dotted in FIG. 9, to lie level with the edge of the hand and wrist piece.

The two wrist and hand pieces are then welded together and excess weld laid and planished (FIG. 10). The resultant assembly is then sawn to length as shown by the dotted line. Next the finger assembly is welded on

and the weld laid and planished and the base fitted to give a complete support (FIG. 11). These two final welding operations are preferably done in two stages, firstly tack-welding and then finish welding. The base is fitted by securing same with pop-rivets 16 in the base of the support, the edge 17 of which is then flanged over (FIG. 12).

The support is finished by shot blasting at the gauntlet part 18, and buffing the hand part 19 to give a high polish. An anodising operation may be employed if desired.

The thickness of the metal from which the supports are made is substantially unaffected during manufacture, the only variations being small due to slight stretching during pressing, and perhaps due to welding (or soldering or brazing if used).

In an alternative method the fingers may be formed by spinning them to their basic tubular shape and pressing them to their final slightly curved form.

The method of manufacture of the supports is not limited to the details just set out. For instance, although 18' S.W.G. aluminium sheet has been found to be suitable material, other thicknesses, and other metals may be used.

In use as shown in FIG. 13 the supports 20 are mounted in parallel rows transversely of an endless conveyor by bolts 14*a* passing through a mounting bar into the screwed bushes 14 of the support base which is arranged to convey them continuously and successively through a dipping tank 21, over a draining trough 22, through an oven 23, and through a cooler 24. After passing out from the cooler 24 finished gloves are stripped from the supports 20 and new fabric bases fitted thereto. These pass, whilst supported on the supports 20, into the dipping tank 21, which contains P.V.C. paste, and then, after excess paste has drained into the trough 22, through the oven 23 which is maintained at a temperature of approximately 380° F. to effect conversion of the P.V.C. paste, into a coherent coating on the base fabric.

What we claim is:

1. A support for a fabric glove to be coated with synthetic plastic material and then baked which comprises a thin-walled arcuate elongated member of a shape approximating that of the back of the hand and wrist of said support, a complementary thin-walled arcuate elongated member of a shape approximating that of the palm and wrist permanently united to said first member at the lateral edges of said members to form a hollow hand open at the wrist end and also at the finger end, and having a cut-out space on one side of said hand for the insertion of a thumbpiece, a thin-walled thumbpiece open at the rear thereof and of the contour of the thumb and united to said hand members at said space, a plurality of thin-walled fingers open at the rear thereof and having the shape of relaxed fingers and united to the finger end of said hand to close the opening, the contacting edges of said elements being welded, said elements being of approximately the same thickness.

2. A support according to claim 1 characterized in that said thumb consists of two half-thumb pieces united at their edges and having skirts united to said members.

3. A support according to claim 1 characterized in that a thin-walled end piece of substantially oval shape having a central opening therein is fitted on the end of said wrist.

4. A support according to claim 1 characterized in that a thin-walled end piece of substantially oval shape having a central opening therein is fitted on the end of said wrist, and a flange on said end piece.

5. A support according to claim 1 characterized in that a thin-walled end piece of substantially oval shape having a central opening therein is fitted on the end of said wrist, threaded bushes on said end piece, a support base, holding means threaded into said bushes and affixing said support on said support base.

6. A support according to claim 1 characterized in that each of said fingers consists of two complementary elongated arcuate pieces united along their lateral edges, the rear of said fingers being united to each other and to said hand.

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