Sept. 21, 1954 M. A. MIRANDO 2,689,400

KNIFE HANDLE AND TO METHOD AND APPARATUS FOR MAKING THE SAME

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Fig. 13.

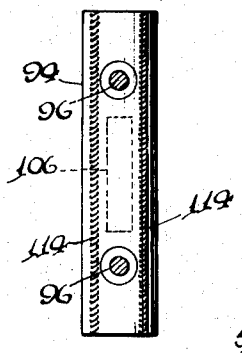


Fig. 6.

Fig. 4.

Fig. 1.

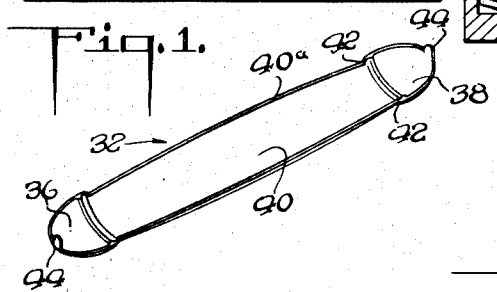


Fig. 2.

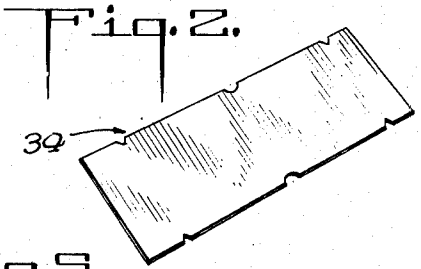


Fig. 3.

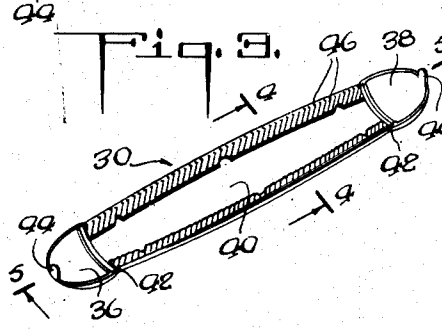
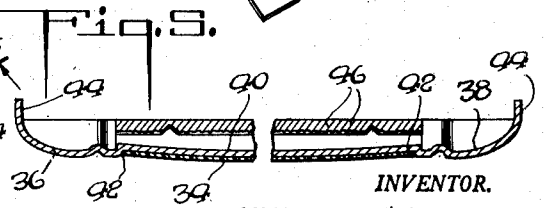


Fig. 5.



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Fig. 11.

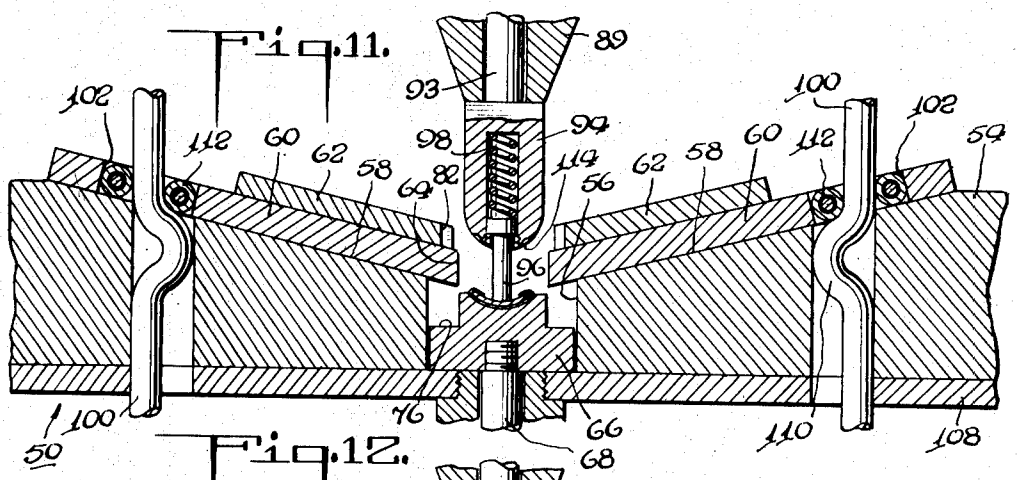
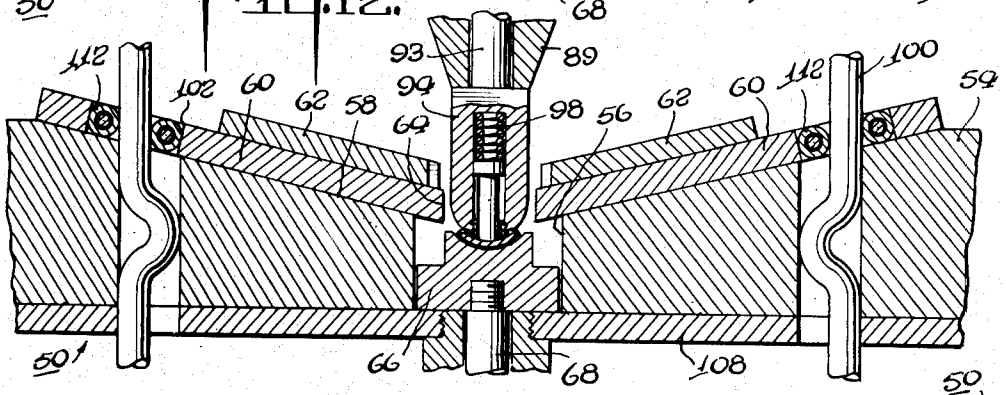


Fig. 12.



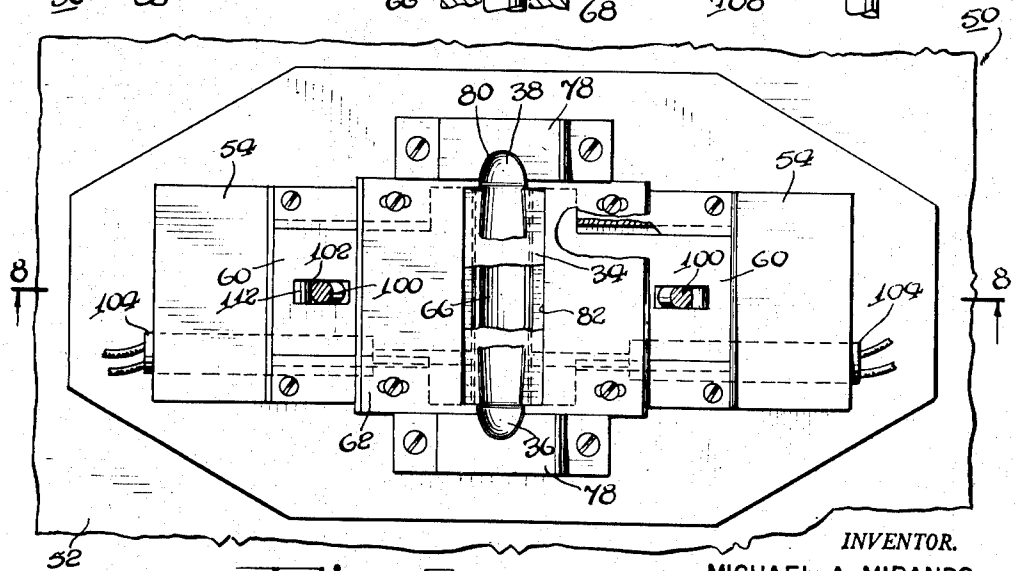


Fig. 7.

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KNIFE HANDLE AND TO METHOD AND APPARATUS FOR MAKING THE SAME

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Fig. 8.

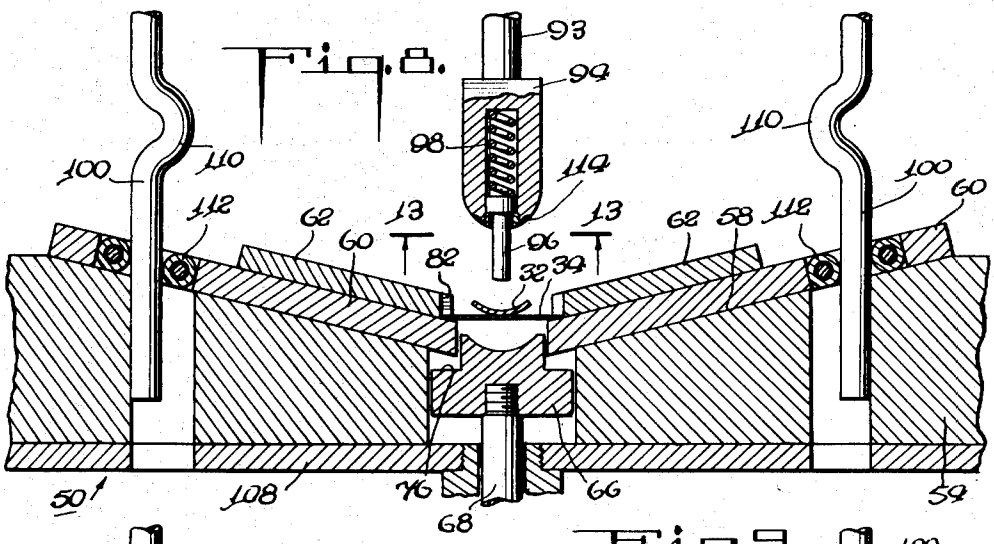


Fig. 9.

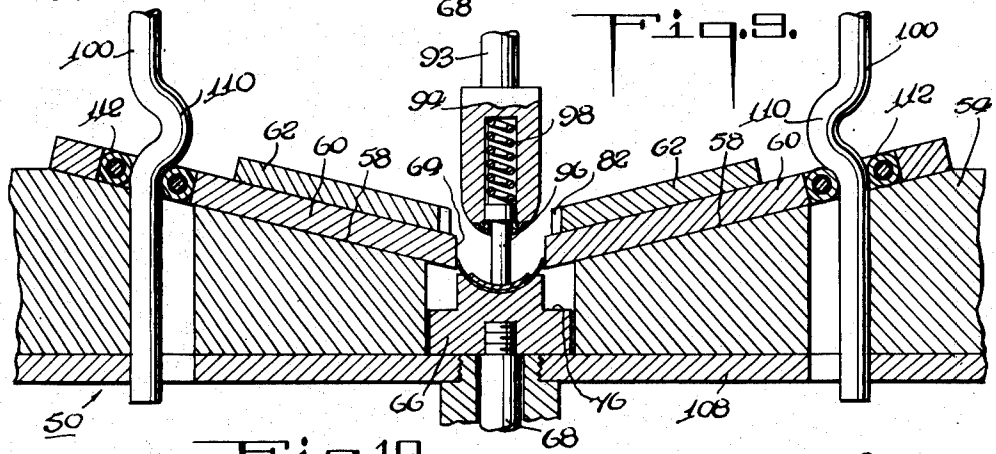
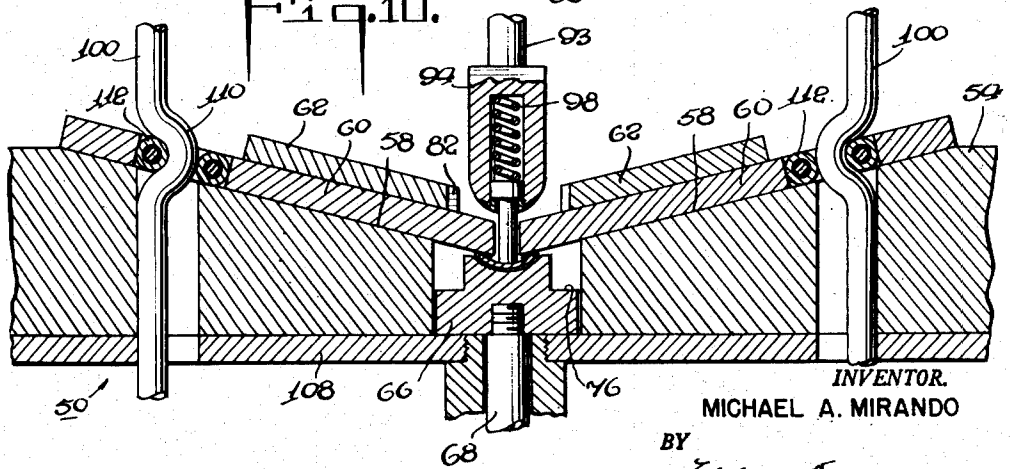


Fig. 10.



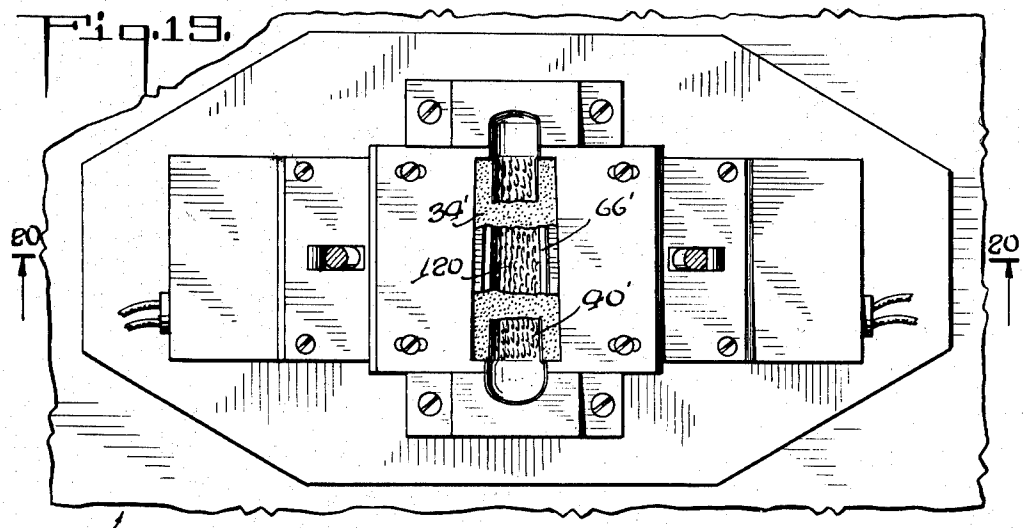
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KNIFE HANDLE AND TO METHOD AND APPARATUS FOR MAKING THE SAME

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Fig. 19.



50'

Fig. 20.

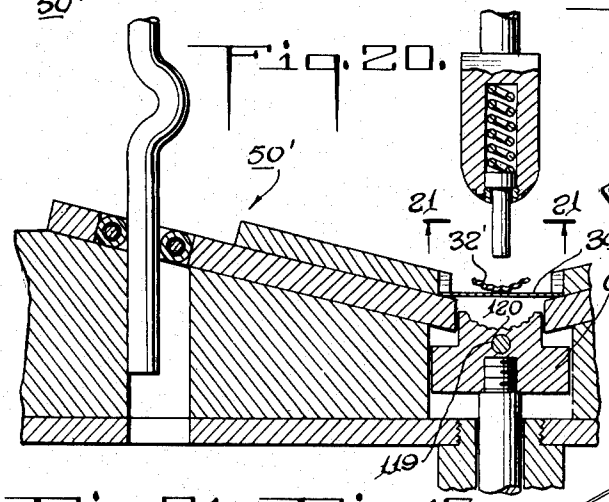


Fig. 15.

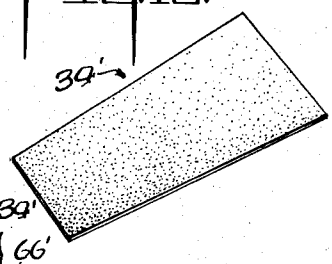


Fig. 14.

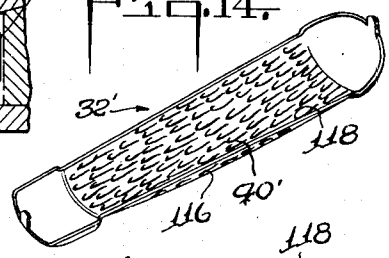


Fig. 21.

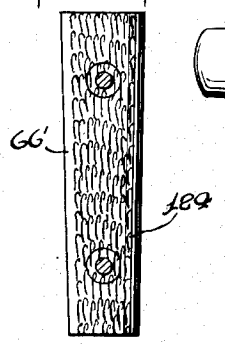


Fig. 17.

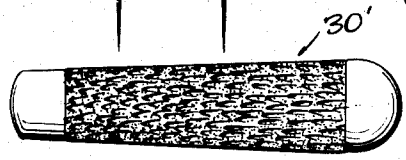


Fig. 18.

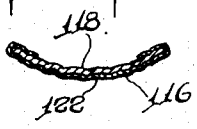
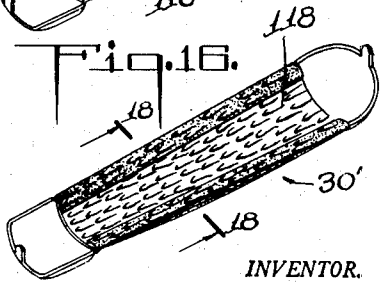


Fig. 16.



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Patented Sept. 21, 1954 2,689,400

UNITED STATES PATENT OFFICE

2,689,400

KNIFE HANDLE AND TO METHOD AND APPARATUS FOR MAKING THE SAME

Michael A. Mirando, Providence, R. I., assignor to Imperial Knife Company, Inc., Providence, R. I., a corporation of Rhode Island

Application August 21, 1951, Serial No. 242,874

7 Claims. (Cl. 30—164)

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This invention relates to knife handles and to methods and apparatuses for making the same.

More particularly, the invention pertains to a knife handle having ornamental scale covering members.

The present invention is an improvement over the invention shown, described and claimed in United States Letters Patent No. 2,170,537, issued August 22, 1939, for Knife Handle and Component Parts Thereof, and United States Letters Patent No. 2,284,833, issued June 2, 1942, for Method and Apparatus for Making Knife Handles and Component Parts Thereof.

A knife handle of the type to which the present invention relates usually consists of a sheet metal scale having bolsters on the ends thereof, the scale being overlain by a thin ornamental cover between the bolsters whereby the handle appears to constitute a solid ornamental side piece.

In a knife handle of the character described the ornamental cover is made from a sheet of synthetic plastic material having edge portions folded around the edges of the scale and locally plasticized at the folds in order to hold the cover tightly in place. Although such knife handles have had widespread commercial acceptance, it has been noted that the cover tended to relax its initial glovelike fit on the scale and the plasticized folds tended to increase their curvature somewhat instead of remaining sharply curved around the edges of the scale thereby detracting from the resemblance of the handle to a solid side piece.

It is the primary object of the present invention to provide an improved knife handle of the character described and a method and apparatus for making the same which will overcome the foregoing drawbacks.

It is another object of the present invention to provide an improved knife handle of the character described and a method and apparatus for making the same which are such that the cover will remain sharply curved where it is folded around the lateral edges of the knife.

It is another object of the present invention to provide an improved knife handle of the character described and a method and apparatus for making the same which are such as to enhance the grip of the cover on the scale whereby even after a long period of time the cover will remain in intimate contact with the scale and thereby retain its resemblance to a solid ornamental side piece.

It is another object of the present invention to provide an improved knife handle of the character described which may include an irregular outer surface instead of the smooth outer surface presently characteristic of such handles.

Other objects of the invention will in part be obvious and in part will be pointed out hereinafter.

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The invention accordingly consists in the features of construction, combinations of elements, arrangements of parts and series of steps which will be exemplified in the handle units, apparatuses and methods hereinafter described and of which the scope of application will be indicated in the appended claims.

In the accompanying drawings in which are shown several of the various possible embodiments of the invention,

Fig. 1 is a rear perspective view of a scale;

Fig. 2 is a perspective view of a cover;

Fig. 3 is a rear perspective view of a handle unit consisting of a scale and cover combined in accordance with the present invention;

Fig. 4 is an enlarged sectional view taken substantially along the line 4—4 of Fig. 3;

Fig. 5 is an enlarged longitudinal central sectional view taken substantially along the line 5—5 of Fig. 4;

Fig. 6 is a front elevational view of an apparatus embodying the instant invention for mounting the cover on the scale, said apparatus being shown in its idle, i. e. starting, position;

Fig. 7 is a sectional view taken substantially along the line 7—7 of Fig. 6;

Fig. 8 is an enlarged sectional view taken substantially along the line 8—8 of Fig. 7;

Figs. 9, 10, 11 and 12 are views similar to Fig. 8 but showing the apparatus at progressively later stages of its operation;

Fig. 13 is a sectional view taken substantially along the line 13—13 of Fig. 8;

Fig. 14 is a rear perspective view of a scale embodying a modified form of the invention;

Fig. 15 is a perspective view of a cover adapted to be mounted on the scale of Fig. 14;

Fig. 16 is a rear perspective view of a handle unit consisting of the scale of Fig. 14 and cover of Fig. 15 combined in accordance with a modified form of the invention;

Fig. 17 is a front view of the handle unit shown in Fig. 16;

Fig. 18 is an enlarged sectional view taken substantially along the line 18—18 of Fig. 16;

Fig. 19 is a view similar to Fig. 7 of an apparatus for mounting a cover on a scale to make a handle unit such as shown in Fig. 16;

Fig. 20 is an enlarged fragmentary sectional view taken substantially along the line 20—20 of Fig. 19; and

Fig. 21 is a sectional view taken substantially along the line 21—21 of Fig. 20.

Referring now in detail to the drawings, and more particularly to Figs. 1–13, the reference numeral 30 denotes a knife handle unit constructed in accordance with the present invention, the unit including a scale 32 (Fig. 1) and a cover 34 (Fig. 2).

The scale is conventional, the same being fully shown and described in said Letters Patent Nos.

2,170,537 and 2,284,833. By way of example the scale is stamped or pressed from sheet metal to an elongated shallow cup shape including a pair of raised arched end portions **36, 38** which form the bolsters of the handle unit and a depressed, i. e. inset, central arched portion **40** intermediate the bolsters. The lateral edges of the depressed central portion are inset from the peripheral edges of the bolsters to provide shoulders **42**. The depth of the shoulders and the extent to which the central portion is depressed are substantially the same, being about equal to the thickness of the cover **34**.

Although, as shown, the lateral edges of the cover may be symmetrical with respect to its longitudinal axis, it is within the scope of this invention to employ asymmetrically arranged edges of the kind customarily used in certain types of knives.

Suitable means may be provided, as for example, rearwardly extending tabs **44** at the tips of the scale, to aid in securing the handle unit to a knife frame.

The cover **34** preferably is fabricated from heat-plasticizable self-form-maintaining sheet material, for example, a synthetic thermoplastic resin such as cellulose nitrate, cellulose acetate, cellulose acetate butyrate, an acrylic resin, a polyamide resin, a polyester resin, or a vinyl polymer or copolymer. It also is within the scope of the invention to employ a thermosetting resin, for example, a phenol or urea formaldehyde condensation product, although in such case in lieu of the heating means hereinafter described for plasticization, an equivalent means such as a solvent applicator is employed.

The length of the cover is substantially equal to or slightly less than that of the inset arched elongated central portion **40** of the scale and the width of the cover is in excess of the width of said portion so that the ends of the cover can be fitted between the bolsters and the marginal edge portions of the cover can be folded around the lateral edges of the scale and tucked in back of the same.

The cover is placed on the external surface of the arched central portion and the marginal edge portions of the cover are folded around the lateral edges of the scale and brought beneath the same. The folds are locally plasticized, as by the application of heat and pressure, so as to permanently set the folds and so that upon deplasticization a controlled slight transverse shrinkage of the cover will take place whereby to render the cover drumtight.

To make certain that there is no relaxation from this tensed condition and that the folds in the cover closely follow the thin lateral edges of the scale, pursuant to the invention the infolded marginal edge portions of the cover between the folds and the lateral edges of the cover are also plasticized and are pressed during plasticization into intimate contact with the marginal edge portions of the undersurface of the scale, without, however, plasticizing the portion of the cover on the front of the scale. Additionally to insure that such intimate contact will be maintained for a long period of time, in further pursuance of the invention the infolded marginal edge portions of the cover are provided during plasticization with a large number of closely spaced grooves **46**, i. e. indentations, on their undersurfaces. These are believed to have the effect of stretching the exposed undersurfaces of said edge portions during plasticization to an extent greater than the surfaces of said portions in contact with the scale whereby to set up a stress upon deplasticization which urges said edge portions into contact with the back of the scale.

As best shown in Fig. 3, said grooves are so oriented that their longitudinal axes have a substantial transverse component, being at a slight angle, e. g. 30°, to a line normal to the lateral edges of the scale. In the form of the invention being described the grooves are small and closely spaced, there being approximately thirty grooves to the inch. The depth of the grooves is .025 to .030 of an inch.

Although the method just outlined is particularly advantageous for maintaining a plastic sheet in drumtight condition over the inset central portion **40** only of a scale, it also can be employed for covering the entire surface of such a scale not provided with bolsters.

The cover preferably is placed on the inset central portion when the cover is in a semi-plastic condition. The lateral edges of the cover then can be readily folded over the inset edges **40***a* of the central portion, and suitable plasticizing heat and pressure applied to the folds and, subsequently, against the undersurface of the inturned marginal edge portions, the latter heat and pressure being applied for plasticization by a shaped die which forms grooves in said edge portions while pressing the edge portions firmly against the back of the scale.

The scale and cover are formed in a manner well known to the art, such for instance as is described in detail in Patent No. 2,284,833.

The cover is rendered semi-plastic in any suitable manner, a satisfactory method being illustrated and described in said Letters Patent No. 2,284,833. After the cover has been rendered semi-plastic and the scale optionally preheated as mentioned in the said Letters Patent, the cover and scale are placed in an assembly machine where the marginal edge portions of the cover are folded over the lateral edges of the scale and thereafter the grooves are impressed during plasticization in the exposed surfaces of said marginal edge portions.

An apparatus **50** constructed in accordance with the present invention for carrying out the aforesaid method is shown in Figs. 6, 7 and 8. Said apparatus includes a support **52** on which a block **54** is rigidly secured. The block has a substantially oblong vertical hole **56** extending centrally therethrough, the length and width of the hole being slightly in excess of the length and width of the elongated central inset portion **40** of the scale. The upper surface **58** of the block slopes downwardly from both ends toward the hole **56**. Said sloping surfaces are flat and support folding plates **60** which are captively secured for movement toward and away from the hole by guide plates **62** that permit the inner edges **64** of the folding plates to be moved from an outermost position, shown in Fig. 8, to an innermost position, shown in Fig. 10.

A forming die **66** is yieldably resiliently mounted on the support **52** for vertical reciprocation within the oblong hole **56**. More particularly the forming die is secured on the upper ends of a pair of vertically guided spindles **68** whose lower ends carry pistons **70** slidable in cylinders **72** and biased upwardly by springs **74**. The upper, i. e. operative, surface of the forming die is shaped to match the surface of a completed knife handle unit between the bolsters, i. e. the shape of the cover after the same has been secured to the

scale. Accordingly the operative surface of said die constitutes a transversely concave elongated groove.

In the idle position of the machine (see Fig. 8) the forming die is in its uppermost position, defined by abutment of the pistons 70 against the upper ends of the cylinders 72. In said position the operative surface of the forming die is slightly below the upper corners of the inner edges 64 of the folding plates. Inasmuch as in said idle position of the machine the folding plates project over the hole 56, the upper corners of the forming die are cut away as at 76 to prevent interference between the forming die and said plates.

To retain a scale in a predetermined position at the beginning of and throughout the assembly operation, the apparatus 50 includes a pair of stanchions 78 on opposite sides of the block 54 adjacent the ends of the hole 56. Vertical guide slots 80 formed in the stanchions in registry with the ends of the hole 56 match the contours of the peripheries of the bolsters for a scale which is to be assembled with a cover. The stanchions and slots extend above the hole 56.

To retain a cover in a certain predetermined position with respect to a scale at the beginning of an assembly operation, the inner edges of the guide plates 62 are formed with broad shallow notches 82 that mutually define an opening for receiving the cover. It will be observed that this permits the edges of the cover to rest on the folding plates 60, as shown in Fig. 8. Thereafter the scale is placed on top of the cover.

The apparatus further includes means to force the scale and cover against the forming die. Said means constitutes a ram 84 mounted for vertical reciprocation in guides 86 and actuated by a lever 88. The ram carries a pair of vertical cylinders 89 in each of which a piston 90 is biased slidably downwardly by a spring 92. The pistons support rods 93 whose lower ends have secured thereto a forming punch 94 the bottom surface of which is shaped to match the configuration of the back of a handle unit. A plurality of pins 96 project from said bottom surface, said pins being biased downwardly by springs 98. The springs 98 are stronger than the springs 92 and the springs 92 are stronger than the springs 74.

The apparatus 50 also includes suitable means to actuate the folding plates, said means including, for example, a pair of cam rods 100 carried by the ram and engaging cam slots 102 adjacent the outer edges of the folding plates.

Means such as electrically energizable heaters 104 is provided to maintain the folding plates 60 at a temperature sufficiently high to plasticize the material of the cover when pressure is applied. In addition other heating means such as another electric heater 106 is provided to maintain the forming punch 94 at about the same temperature.

In practising the method of the present invention the scale may be preheated to about the plasticizing temperature for the material of the cover 34, e. g. 200 to 300° Fahrenheit where the cover is cellulose acetate. Also the cover may be preheated to a temperature below its plasticizing temperature, e. g. a temperature of from about 100 to 120° Fahrenheit for the same material. The cover then is laid in the opening defined by the notches 82 and the scale placed on the cover with the bolsters riding in the guide slots 80. Next the apparatus is set into operation by depressing the lever 88.

The ram 84 descends and first causes the pins 96 to engage the center of the back surface of the inset arched portion 40 of the scale. Initially this forces the scale down against the cover to bow the latter and then jointly presses the cover and scale down between the inner edges of the folding plate 60 until the cover is seated on the forming die 66. Thereafter the cover, scale and forming die move downwardly as a unit until the forming die abuts a plate 108 extending across the bottom of the hole 56 as shown in Fig. 9. This position is reached just before cam portions 110 of the rods 100 engage rollers 112 in the slots 102.

Upon further downward movement of the ram, the cam portions engage said rollers 112 to force the heated forced plates inwardly over the forming die as shown in Fig. 10. The action of said heated plates in folding over the marginal edge portions of the cover and plasticizing the folds is described in detail in Letters Patent No. 2,284,833. Subsequent downward movement of the run causes the cam portions 110 to move the folding plates outwardly and expose the back surface of the handle unit in which the marginal edge portions of the cover now are tucked over the back of the scale (Fig. 11).

It will be observed that as the folding plates move in and out the ram moves downward but the position of the pins 96 does not change, the difference in movement being taken up by compression of the springs 92.

Near the end of the downstroke of the ram the bottoms of the cylinders 89 abut the top of the forming punch 94 and force the same downwardly against the action of the spring 98 (Fig. 12) so that the bottom surface of the heated forming punch presses against the back of the assembled handle unit to plasticize the same without, however, plasticizing the portion of the cover overlying the front of the scale. Said bottom surface of the forming punch includes a series of ribs or projections 114 (Fig. 13) which are in vertical registry with and engage the tucked in marginal edge portions of the cover to form grooves 48 therein during plasticization.

On the return stroke of the ram first the forming punch will back off to the position of Fig. 11, then the forming plates will move in and out and subsequently the forming punch will be lifted to its raised position (Fig. 8) ready for the start of a new cycle.

A modified form of the invention is illustrated in Figs. 14–21. The handle unit 30′ and apparatus 50′ of this modification is substantially similar to the unit 30 and apparatus 50 first described herein and, hence, similar parts will be denoted by the same reference numerals primed. The basic difference between the two handle units is that the scale 32′ of the handle unit 30′ has an inset central portion 40′ whose external (convex) surface includes a large number of longitudinally elongated grooves 116 known as "stags." The cover 34′ has a matching configuration when assembled on the scale (see Figs. 17 and 18). To obtain its illustrated shape, the scale 32′ at or subsequent to the blanking thereof is pressed or stamped to provide the stags 116. It will be observed that these stags which constitute elongated grooves on the outer surface of the inset central portion 40′ form corresponding projections 118 on the back of the scale.

The forming die 66′ of the apparatus 50′ is heated, as by a resistance cartridge 119, and has its operative surface provided with stag pro-

jections 120 matching the stag grooves 116 whereby when the cover and scale are forced against the forming die the cover will be plasticized and shaped to match the outer surface of the inset central portion of said scale, thereby forming the stag grooves 122 in the external surface of the cover. These grooves have been found to improve the maintenance of intimate contact between the cover and scale and also to inhibit longitudinal shrinkage of the cover, despite the fact that the cover must be heated to the point of plasticization in order to make its contour conform to that of the stagged scale.

The forming punch, instead of being provided with transverse ribs 114, is fashioned with stag grooves 124 which match the stag projections 118 on the back off the scale adjacent the lateral edges thereof. Thus when the heated forming punch descends it will cause the folded over marginal edge portions of the cover to conform during plasticization to the configuration of the back of the inset central portion of the scale (see Fig. 16), thereby fashioning grooves on the back surface of the tucked in marginal portions which cause said inturned cover portions to maintain intimate contact with the back of the scale.

It thus will be seen that there are provided handle units and methods and apparatuses for making the same which achieve all the objects of the invention and are well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein described, or shown in the accompanying drawings, is to be interpreted as illustrative and not in a limiting sense.

Having thus described the invention, there is claimed as new and desired to be secured by Letters Patent:

1. A knife handle unit comprising a thin self-form-maintaining sheet metal scale and a thin pastic cover, said cover having a front portion overlying the front of the scale and marginal edge portions lying against the back of the scale, said front portion and said marginal edge portions being joined by folds lying against the edges of the scale, said edge portions having grooves on the external back surfaces thereof whereby said edge portions are kept in intimate contact with the back of the scale and the folds in intimate contact with the edges of the scale.

2. A knife handle unit comprising an outwardly convex thin self-form-maintaining sheet metal scale and a thin plastic cover, said cover having a front portion overlying the front of the scale and marginal edge portions lying against the back of the scale, said front portion and said marginal edge portions being joined by folds lying against the edges of the scale, said scale having stag indentations on its convex surface and stag projections on its concave surface, the contour of said cover, including the marginal edge portions, matching the contour of the underlying surface of the scale.

3. A knife handle unit as set forth in claim 1 wherein the grooves extend transversely of the scale and are closely spaced.

4. A knife handle unit as set forth in claim 1 wherein the grooves are closely spaced and elongated and the longitudinal axes thereof have a substantial transverse component.

5. In an apparatus of the character described for manufacturing a knife handle unit including a plastic cover which is self-held to a scale: a forming die for supporting a cover with a scale thereon, resilient means to support the die for movement between an idle and an operative position, a pair of heated folding plates, means to mount said plates for movement over the edges of the scale when the die is in operative position so as to fold the marginal edge portions of the cover around the edge of the scale and plasticize said cover at the folds, a forming punch, means to mount said punch for movement toward and away from the die, said punch having an operative surface, a spring-loaded pin extending away from said operative surface, said pin being disposed to engage the scale and to press the die through the cover so as to move the die from its idle to its operative position upon movement of the punch toward the die, a reciprocable member, resilient means interconnecting said member and the punch, cam means interconnecting said member and the folding plates for moving the folding plates from idle to operative position and back to idle position while the pin extends from the operative surface of the punch and is holding the die in operative position, said member being arranged to move the operative surface of the punch into contact with the back surfaces of the folded marginal edge portions after the folding means has been restored to idle position, and means to heat said punch, the operative surface of said punch having projections for forming grooves in the back surfaces of the folded marginal edge portions of the cover.

6. In a method for manufacturing a knife handle unit including a plastic cover which is self-held to a scale and in which method the marginal edge portions of the cover are folded around the edges of the scale and plasticized at the folds: that improvement including the steps of heating and pressing the back surfaces of the folded marginal edge portions against the back surface of the scale after the same has been folded so as to plasticize said portions and force the same into intimate contact with the back of the scale, and forming grooves in said back surfaces during plasticization of said portions.

7. In a method for manufacturing a knife handle unit including a plastic cover which is self-held to a scale and in which method the marginal edge portions of the cover are folded around the edges of the scale and plasticized at the folds: that improvement including the steps of heating and pressing the back surfaces of the folded marginal edge portions against the back surface of the scale after the same has been folded so as to plasticize said portions and force the same into intimate contact with the back of the scale, and simultaneously forming grooves in said back surfaces as said portions are thus plasticized.

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