United States Patent [19]

Herbold

[11] **3,774,561**

[45] **Nov. 27, 1973**

[54] **ARTICLE OF MANUFACTURE AND MANUFACTURING OF SUCH ARTICLE**

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[73] Assignee: **Blance & Co.**, Oberderdingen, Germany

[22] Filed: **Nov. 19, 1971**

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[30] **Foreign Application Priority Data**

Nov. 21, 1970 Germany ..... P 20 57 339.1

[52] **U.S. Cl.** ..... **113/120 B,** 72/349

[51] **Int. Cl.** **B21d 51/18**

[58] **Field of Search** ..... 113/120 B, 120 R; 72/348, 349, 350, 351

[56] **References Cited**

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Primary Examiner—Richard J. Herbst

Attorney—Michael S. Striker

[57] **ABSTRACT**

A sink unit is deep-drawn from a one-piece seamless stainless steel sheet, being provided with two basins which are laterally adjacent one another and with a work surface which is laterally adjacent one of the basins. A method of deep-drawing such a sink unit, and an arrangement for engaging it during deep-drawing are also disclosed.

6 Claims, 8 Drawing Figures

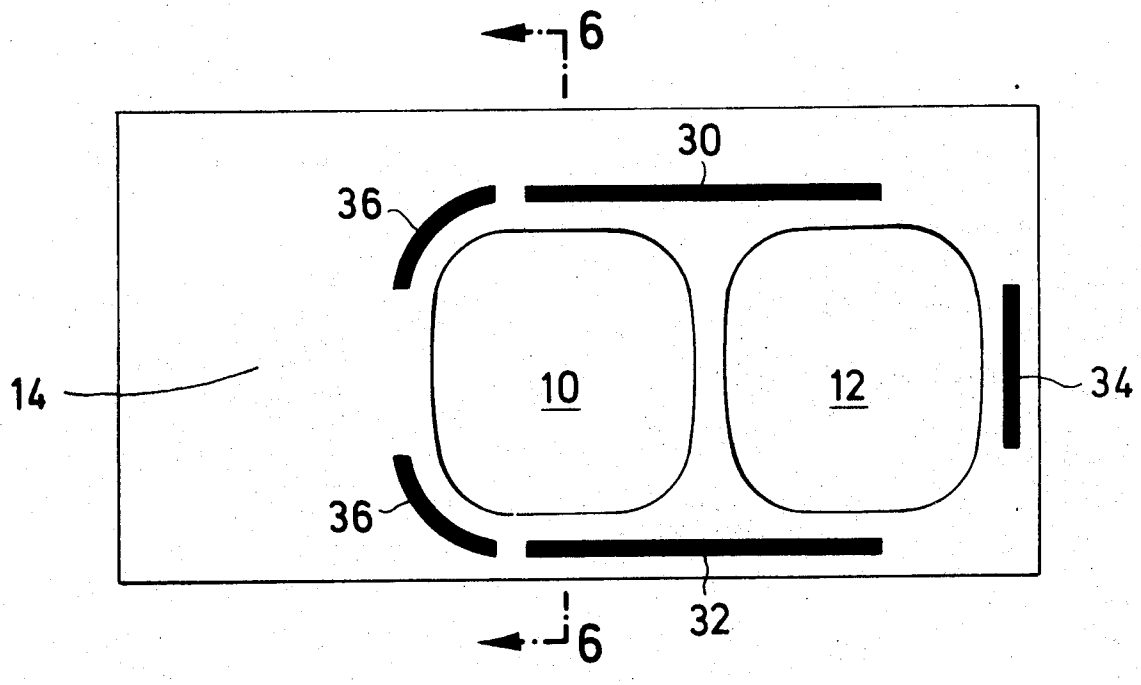


Fig. 1

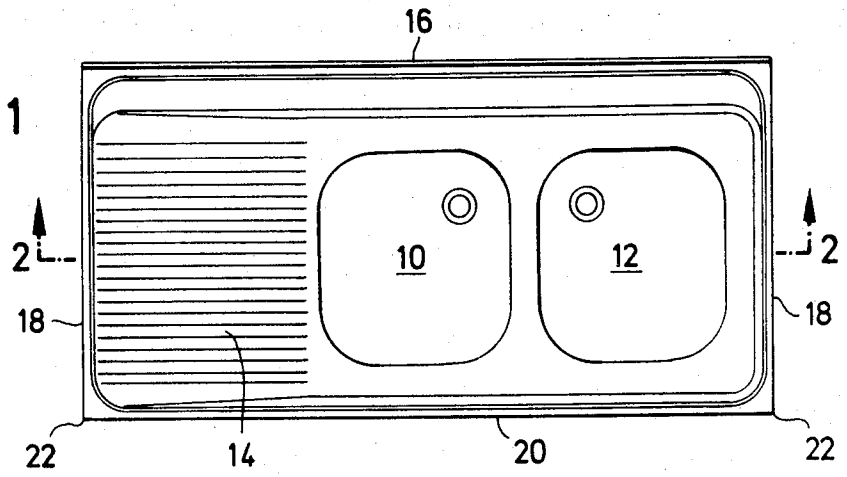


Fig. 2

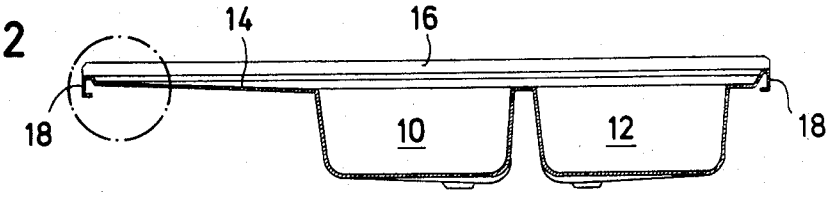


Fig. 3

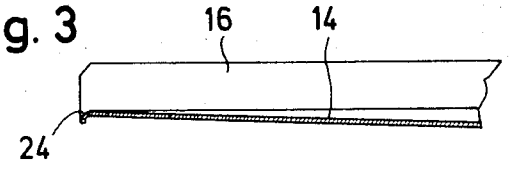
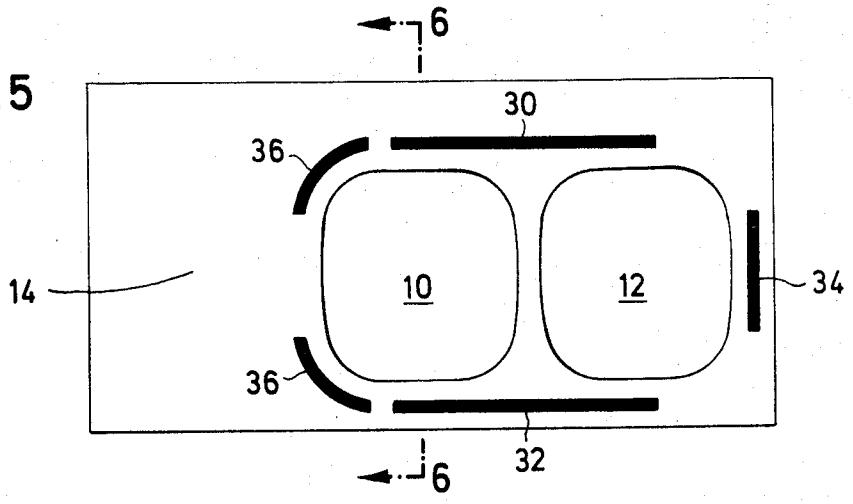


Fig. 5



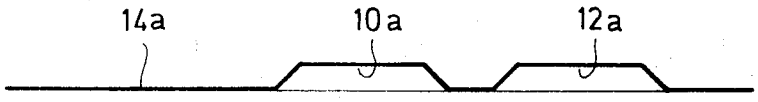


Fig. 4a

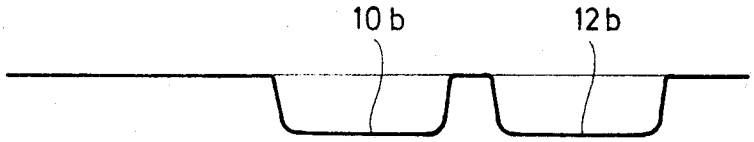


Fig. 4b

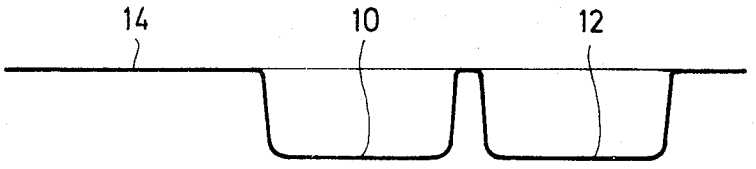


Fig. 4c

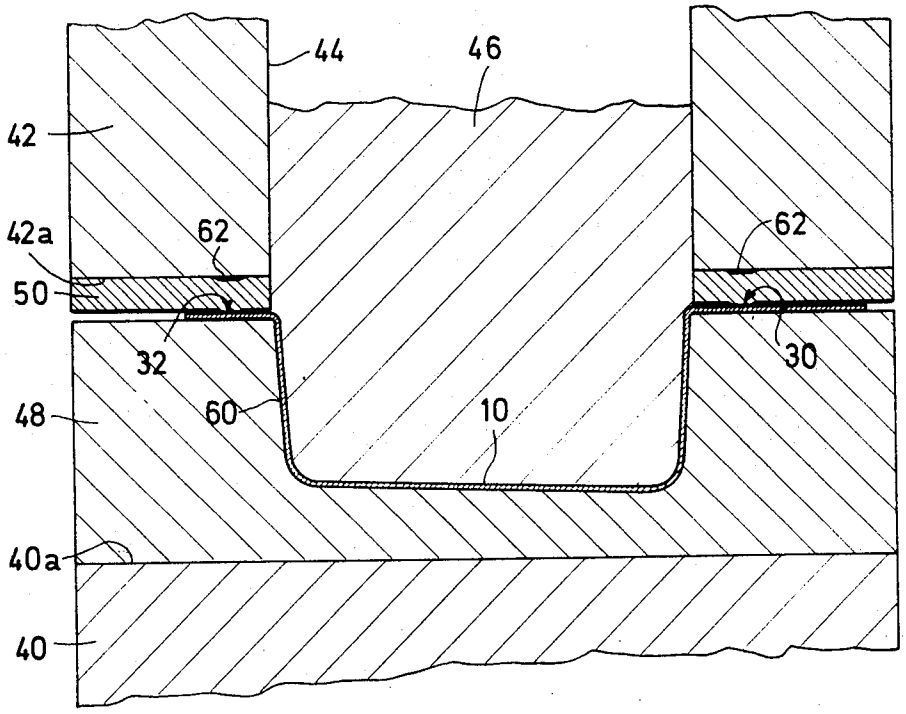


Fig. 6

ARTICLE OF MANUFACTURE AND MANUFACTURING OF SUCH ARTICLE

BACKGROUND OF THE INVENTION

The present invention relates generally to a sink unit and more particularly to a multiple-basin sink unit and a method of making the same.

Sink units are already known. They are so constructed that they can usually be inserted into a cut-out of a counter top or the like, and are quite frequently made of rust-free stainless steel sheet. Many such sink units have two basins which are located laterally adjacent one another, being separated by a narrow strip of sheet material. Such sink units are produced in that each separate basin is separately produced by deep-drawing from a sheet of stainless steel, and then the two separate basins are welded together so that a welded seam extends intermediate them in the narrow sheet material strip which is located between them and which separates them. Another known sink unit utilizes a single basin, laterally of which there is located a work and/or drain surface. This construction does not require a welded seam because only a single basin is produced by deep-drawing from a single sheet of stainless steel.

It has been a long-held expert opinion that this single-basin type of sink unit is the only type that can be produced by deep-drawing without requiring the subsequent provision of a welded seam to connect two components of the unit together.

SUMMARY OF THE INVENTION

It is an object of the present invention to overcome the disadvantages of the prior art.

More particularly it is an object of the present invention to provide a sink unit of the type under discussion, having two basins and being capable of being produced in a much simpler manner than the units known from the art.

A concomitant object of the invention is to provide such a sink unit which can be produced by deep-drawing from a single piece of stainless steel sheet material without requiring any welding operations or the like.

In the pursuance of the above objects, and others which will become apparent hereafter, one feature of the invention resides accordingly in a sink unit as a novel article of manufacture, such sink unit being of a seamless one-piece sheet of stainless steel which defines a pair of closely laterally adjacent basins and a work surface laterally adjacent one of these basins.

Contrary to the expert opinion heretofore prevailing, which because of the relatively narrow sheet material strip between the two basins, and especially because of the relatively large sheet material work and drain surface adjacent one of the basins, considered it impossible to produce such sink units by deep-drawing of one piece and without seaming, I have found that I can produce such a unit according to the present invention. The invention thus has the advantage that the heretofore necessary welding operation and the subsequent grinding and polishing of the welded seam can be omitted, thereby saving time and labor and having less scrap produced because only a single sheet material element need be trimmed at its edges after the deep-drawing process is completed.

If at least in the region of its two front corners the edge of the sink unit is flattened, then the heretofore necessary welded seams at the junctures of the downwardly bent edge flanges can also be omitted, so that the sink unit according to the present invention can be constructed in its entirety without ever having to resort to any welding operations whatsoever.

The invention is all the more interesting because expert opinion has always held that a sink unit according to the present invention could not be produced by a deep-drawing for various reasons, including the assumption that at the narrow strip of sheet material between the laterally adjacent basis the sheet material was thought not to be capable of withstanding the stresses resulting during deep-drawing deformation. The invention is all the more surprising because it is feasible despite these expert reservations, and even more so because the deep-drawing process is of course made more difficult by the fact that laterally adjacent one of the basins there is the relatively large work and/or drain surface whose provision was thought in expert opinion to add further obstacles to the production of a one-piece sink unit of the type herein disclosed.

Known sink units which are seamless and of one piece but have only a single basin are deep-drawn in two or three deep-drawing steps. The essential sheet material deformation is effected during the first deep-drawing step, and if for instance the basin is to have a finished depth of 160 mm, then in a two-step deep-drawing operation the basin is deep-drawn to approximately 150 mm in the first step, and if the deep-drawing operation is of the three-step type, the basin is deep-drawn to approximately 145 mm in the first step. In the second step it is then drawn to approximately 150 mm, and in the third and final step to the finished depth of 160 mm. This means that in either the two-step or three-step operation, the finished depth of the basin is almost reached during the first deep-drawing step.

The present invention proposes, contrary to the teaching of the prior art, to utilize deep-drawing operations of the three-step type or of a type having more than three steps. It has been found particularly advantageous to anneal the sheet of stainless steel between the second and third deep-drawing step, an important feature in the method according to the present invention for making the novel article. I have also found it advantageous to deep-draw the sheet in one direction and to one side during the first deep-drawing step, and to reverse the thus-obtained deformation in the second step and to deep-draw it to the opposite side to a depth greater than that achieved in the first step. In this manner tearing of the sheet material can be avoided with great reliability.

The invention also proposes, contrary to the teaching of the prior art, to produce only a relatively small portion of the final desired depth of the basin during the first deep-drawing step. It is particularly advantageous to deep-draw the basins in the first deep-drawing step to only approximately 20–25 percent of the final desired depth. In the second deep-drawing step the basins are then drawn to approximately 70–75 percent of their final desired depth. If, following the earlier-mentioned example, it is assumed that the final desired depth of the basins is to be approximately 160 mm, then the basins are deep-drawn in the first deep-drawing step to approximately 35 mm depth, with a tolerance of ±2–3 mm, and in the second step to approximately 115 mm with a tolerance of +5 mm.

The tools for the deep-drawing operation may be variously configurated in accordance with principles well known to those skilled in the art. A possible and inexpensive solution has been found in utilizing the same tool or die for the first and second deep-drawing step, whereas a different die, giving the final desired form for the basins, is utilized for the third deep-drawing step.

Devices are of course also known for holding the sheet during deep drawing operations. The present invention, however, proposes a device which is to assure the miminum formation of folds during the deep-drawing and tp provide maximum assurance against tearing of the sheet. This device is to engage the sheet during the deep-drawing operation with different strength at different locations, and in particular the arrangement according to the present invention engages the sheet most firmly along lines extending in parallelism and with spacing along the front and rear edges of the two laterally adjacent basins, but not to the respective outermost edges thereof, and an additional region of firmest engagement is along one lateral side of that basin which is remote from the work surface. The sheet is engaged with lesser firmness in the region of those edges of the basin adjacent the work surface which face towards the latter.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a somewhat diagrammatic top-plan view of a sink unit according to the present invention;

FIG. **2** is a section taken on line II—II of FIG. **1**;

FIG. **3** is a fragmentary detail view, on an enlarged scale, of the corner of the edge portion which is encircled in FIG. **2**;

FIGS. **4***a*–**4***c* are schematic views corresponding to the section of FIG. **2** but illustrating the sheet of stainless steel during the first, second, and third deep-drawing steps, respectively;

FIG. **5** is a diagrammatic top-plan view illustrating a sheet of steel and an arrangement for engaging it in accordance with the invention during deep-drawing; and FIG. **6** is a schematic section of a drawing tool providing the arrangement according to FIG. **5**, the section being taken according to line **6**—**6** of FIG. **5**.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Discussing now the drawing in detail, and firstly FIGS. **1**—**3** thereof, it will be seen that reference numerals **10** and **12** define two basins provided in a sink unit according to the present invention, with a work and/or drain surface **14** being provided laterally adjacent the basin **10**. The two basins **10** and **12** are separated by the illustrated narrow sheet material strip.

The sink unit illustrated in FIGS. **1**—**3** is deep-drawn of a single seamless sheet of stainless steel and is provided along its rear edge with an upwardly extending portion **16**, and at its side edges and front edge with downwardly angled L-shaped flanges **18** and **20**. Although the juncture of the corners of the flanges **18** and **20** may be welded at **22**, as shown in FIG. **1** and in accordance with the practice of the prior art, it is currently preferred to utilize the construction shown in FIG. **3** in which these flanges or edges are flattened in the region of these junctures, as indicated at **24** in FIG. **3**, so that any need for producing welded seams is avoided, and the entire sink unit is produced without any welding at all.

Having thus illustrated and described the novel sink unit per se, FIGS. **4***a*, **4***b* and **4***c* now show a possible and currently preferred deep-drawing method for making the sink unit according to the present invention. During the initial deep-drawing step shown in FIG. **4***a*, two upwardly directed bulges **10***a* and **12***a* are formed in a one-piece stainless steel sheet, with a sheet portion **14***a* remaining which will subsequently will form the work and drain surface **14** illustrated in FIG. **1**. The same deep-drawing tool or die used for producing the bulges **10***a* and **12***a* can be utilized for the second deep-drawing step illustrated in FIG. **4***b*, in which the direction of the bulges **10***a* and **12***a* is reversed so that the material of the sheet now bulges to the opposite side (that is downwardly in the illustrated embodiment) forming bulges **10***b* and **12***b* whose depth is greater than that of the original bulges **10***a* and **12***a*. Thereupon the sheet is annealed in accordance with well-known annealing technique, and there follows the final deep-drawing step shown in FIG. **4***c* in whcih the bulges **10***b* and **12***b* are subjected to further deep-drawing until the final shape and depth of the basins **10** and **12** is reached. If desired, during this step the surface **14** can also be provided with ribs or the like for drain purposes.

FIG. **5**, finally, shows a top-plan view of a sheet of stainless steel, on which the regions **10**, **12** and **14** have been illustrated for purposes of orientation, showing how an arrangement according to the present invention is to engage the sheet during deep-drawing. In the regions **30** and **32** extending along the front and rear edges of the basins **10** and **12** firmest engagement is to be effected, suitable clamping devices or the like being provided for this purpose. A similar region **34** of firmest engagement extends along the side of the basin **12** which faces away from the area **14**. Curved regions **36**, extending around the corners of the basin **10** which are closest to the region **14**, designate areas of less firm engagement, and with an arrangement of this type—for whose engaging purposes suitable clamps known already to those skilled in the art can be utilized— the sheet is held in such a manner during deep-drawing operation that the formation of folds in the material and the possibility of tearing thereof is minimized.

FIG. **6** shows a sectionof a drawing tool suitable for manufacturing a sink unit by means of a conventional drawing press. A lower work table of this press is designated by 40, and an upper fixture, which can be moved down, is designated by **42**. The latter has an opening **44** for a die **46**, which can be moved down independent of fixture **42**. A matrix **48** and a press pad **50** are mounted by conventional means not shown on the work table **10** and the fixture **42**, respectively, engaging absolutely plane surfaces **40***a* and **42***a* of the work table and of the fixture. FIG. **6** shows a sheet **60** of stainless steel after the deep drawing process. In order to provide regions **30** and **32** of firmest engagement of the sheet **60** on both sides of basin **10** it is sufficient to place above the desired regions strips **62** of paper or cardboard be-

tween press pad **50** and fixture **42.** Under pressure of the drawing press these strips result in an elastic distortion of the press pad **50** in such a manner that the sheet **60** is gripped stronger in the regions **30** and **32** compared with adjacent regions.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the tupes described above.

While the invention has been illustrated and described as embodied in a sink unit, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. A method of making a sink unit having a pair of laterally adjacent basins and a work surface laterally adjacent one of said basins, comprising the steps of tightly engaging a sheet of stainless steel along transversely spaced parallel lines between which an area of the sheet is to be deep-drawn to form said pair of basins, but which lines have a length less that the distance between the loci where the outermost corners of the basins are to be located; tightly engaging said sheet along an additional line extending transversely to said parallel lines, at a side of said area which is remote from said work surface but which terminates short of said parallel lines less tightly engaging said sheet outside the region defined by said parallel and transverse lines for shaping said work surface; and deep-drawing said sheet intermediate said lines at least three times for each sink unit to be formed, whereby to produce said basins in, and shape said work surface on said sheet.

2. A method as defined in claim **1,** and further comprising the step of engaging said sheet with intermediate tightness in regions spaced from said additional line and where the corners of said basins adjacent the wash surface are to be located.

3. A method as defined in claim **1,** wherein the steps of deep-drawing comprise a first step in which said sheet is deep-drawn to one side and to a first depth, and a second step in which said sheet is deep-drawn to the opposite side and to a greater second depth.

4. A method as defined in claim **1,** wherein the steps of deep-drawing comprise a first step in which said basins are deep-drawn to between substantially 20–25 percent of their final desired depth, and a second step in which said basins are deep-drawn to between substantially 70–75 percent of their final desired depth.

5. A method as defined in claim **1,** wherein the final desired depth of said basins is substantially 160 mm, and wherein the steps of deep-drawing comprise a first step in which said basins are deep-drawn to substantially 35 mm depth ±2–3 mm tolerance variation, and a second step in which said basins are deep-drawn to substantially 115 mm + 5 mm tolerance variation.

6. A method as defined in claim **1,** wherein said steps comprise a first and a second deep-drawing step which are carried out with one die, and a third deep-drawing step which is carried out with an other die.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,774,561 Dated November 27, 1973

Inventor(s) Werner R. Herbold

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet, in the heading, item [73]

"Assignee: Blance & Co.," should read -- Assignee: Blanc & Co. --

Signed and sealed this 14th day of May 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

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