HAIR STYLING DEVICE

Inventor: Masood Habibi, Beverly Hills, CA (US)

Correspondence Address:
THELEN LLP
P. O. BOX 640640
SAN JOSE, CA 95164-0640 (US)

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ABSTRACT

A hair styling apparatus includes a pair of mating surfaces which engage one another and a handle which guides them into engagement at the manual control of a user. Hair to be styled is placed between the engaged surfaces. A plurality of pins extend from both of the surfaces and engage holes in the other of the surfaces. One or both surfaces may incorporate a source of dry heat. In another aspect of the invention, a source of steam is provided together with a trigger for discharging the steam through holes in at least one of the surfaces as an aid to hair styling.
HAIR STYLING DEVICE

TECHNICAL FIELD

[0001] The present invention relates generally to the field of hair care and styling.

BACKGROUND

[0002] Many devices have been devised over the ages to aid in styling hair. Hair curlers, for example, are used to impart curls into hair. They may be used on dry hair but work best on wet hair. Steam may be applied to assist in setting the hair to the curl of the curlers. Curling irons typically incorporate an electrical heating element to heat one or both sides of a smooth but curved pair of mating surfaces between which hair is placed to be curled. The hair may preferably be pulled through the interface of the mating surfaces of the curling iron to aid in curling the hair. On the other hand, hair straighteners and smoothers operate much like curling irons, but they have flat or curved, smooth mating surfaces which act more like a clothes iron to straighten and/or smooth, or curve or curl the hair when compressed against and pulled along the hair.

[0003] Many examples of such irons and straighteners comprise a pair of smooth untextured surfaces for engaging the hair. As a result, the hair can become tangled, or require much additional brushing with another apparatus such as a brush in order to achieve the desired style. This additional brushing can undesirably disrupt the style imparted by the irons and straighteners. Furthermore, it would be beneficial to obviate this need for an additional implement because the time required to style the hair could be reduced and less heat would need to be imparted to the hair because the styling process would take less time.

[0004] Accordingly, it would be desirable to provide hair styling devices capable of use in curling, straightening, smoothing, curving and/or waving hair.

BRIEF DESCRIPTION

[0005] In one embodiment a device for styling hair includes a first housing having a first face, a second housing having a second face, a hinged frame coupled to the first and second housings and hinged to permit a user to bring the first face and the second face together into a closed position where the hair is engaged between the first and second faces. A first plate coupled to a first section of the first face includes first pins extending therefrom. A second plate coupled to a first section of the second face includes holes for engaging the first pins. Second pins disposed on a second section of the second face engage second holes formed in a second section of the first face.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] The accompanying drawings, which are incorporated into and constitute a part of this specification, illustrate one or more embodiments of the present invention and, together with the detailed description, serve to explain the principles and implementations of the invention.

[0007] In the drawings:

[0008] FIG. 1 is a side view of a hair styling device in accordance with one embodiment.

[0009] FIG. 2 is a top view of a hair styling device in accordance with one embodiment.

[0010] FIG. 3 is a side view of a hair styling device in accordance with one embodiment shown in an open position.

[0011] FIG. 4 is a front end view of a hair styling device in accordance with one embodiment.

[0012] FIG. 5 is a rear end view of a hair styling device in accordance with one embodiment.

[0013] FIG. 6 is a top plan view of one face of a hair styling device in accordance with one embodiment.

[0014] FIG. 7 is a cross sectional view of the surface shown in FIG. 6 taken along line 7-7 of FIG. 6.

[0015] FIG. 8 is a plan view of one face of a hair styling device in accordance with one embodiment.

[0016] FIG. 9 is a cross sectional view of the surface shown in FIG. 8 taken along line 9-9 of FIG. 8.

[0017] FIGS. 10-11 are drawings illustrating the dimensions of a hair styling apparatus in accordance with various embodiments of the present invention.

[0018] FIG. 12 is a cross sectional view of the device shown in FIG. 1, taken along line 12-12 of FIG. 1.

[0019] FIG. 13 is a cross sectional view of the device shown in FIG. 1, taken along line 13-13 of FIG. 1.

[0020] FIG. 14 is a detailed perspective view of a heater and steam generator of a hair styling apparatus in accordance with one embodiment of the present invention.

[0021] FIG. 15 is another view of the heater shown in FIG. 14.

[0022] FIGS. 16-18 are schematic illustrations showing alternative embodiments of a device in accordance with the present invention.

DETAILED DESCRIPTION

[0023] Embodiments of the present invention are described herein in the context of a hair styling device. Those of ordinary skill in the art will realize that the following detailed description is illustrative only and is not intended to be in any way limiting. Other embodiments will readily suggest themselves to such skilled persons having the benefit of this disclosure. Reference will now be made in detail to implementations of various embodiments as illustrated in the accompanying drawings and described herein. The same reference indicators will be used throughout the drawings and the following detailed description to refer to the same or like parts.

[0024] In the interest of clarity, not all of the routine features of the implementations described herein are shown and described. It will, of course, be appreciated that in the development of any such actual implementation, numerous implementation-specific decisions must be made in order to achieve the developer’s specific goals, such as compliance with application- and business-related constraints, and that these specific goals will vary from one implementation to another and from one developer to another. Moreover, it will be appreciated that such a development effort might be complex and time-consuming, but would nevertheless be a routine undertaking of engineering for those of ordinary skill in the art having the benefit of this disclosure.

[0025] In one embodiment shown in FIGS. 1-5 a first housing 10 has a first face 12 and a second housing 14 has a second face 16. Proximal ends of the housings 10 and 14 are coupled to handle 18 which includes a first handle member 20 to which first housing 10 is coupled and a second handle member 22 to which second housing 14 is coupled. These housings/handle members may each, in one embodiment, be formed of a single piece of a material such as a plastic capable of withstanding the operating temperatures of the hair styling device.
[0026] The first handle member 20 and second handle member 22 are coupled together at their proximal ends by hinge 24 and optionally biased toward an open position as, for example, with a spring or other biasing element (not shown). An operator may press the handle members 20 and 22 together to locate the first face 12 and second face 16 in opposed relationship with each other as shown in FIG. 1. This may be referred to as the “closed” position. The length of the pins and the depth of the holes may be configured to leave a minimum gap between the first and second plates in the closed position to avoid pinching the hair. Alternatively, the hinge 24 may be so configured.

[0027] The first housing 10 includes a side member 26 and an end member 28. Likewise the second housing 14 includes a side member 30 and an end member 32. A plurality of fins 34 are coupled to the side member 26 and end member 28 of the first housing 10, and a plurality of fins 34 are coupled to the side member 30 and end member 32 of the second housing 14. Each of the fins 34 comprises in one embodiment of the present invention a substantially flat, thin ridge of constant height, having one edge coupled to a side member or end member and terminating in a rounded end spaced apart from the side member or end member. The fins on a side member are in one embodiment of the present invention all substantially parallel to one another and spaced apart from each other a constant distance throughout their length. Likewise the fins on an end member are in one embodiment of the present invention all substantially parallel to one another and spaced apart from each other a constant distance throughout their length.

[0028] During normal operation of the hair styling device the side members 26 and 30 and the end members 28 and 32 become hot. However, the exposed ends of the fins 34 do not get significantly hotter than ambient temperature. All of the fins 34 are spaced apart from one another a distance less than the width of a human finger (less than approx. 0.5 in) so that a user of the apparatus may grasp it or inadvertently touch it without touching the side members 26 or 30 or the end members 28 or 32. Thus the fins 34 help protect the user from coming into direct contact with hot side members or end members.

[0029] The handle 18, in one embodiment, includes a proximal guide 36 and a distal guide 38 which assist in alignment of the first and second plates 12 and 16 when a user closes the device. As best shown in FIGS. 12 and 13, the proximal guide 36 includes a proximal male alignment part 40 coupled to the second handle member 22 and a proximal female alignment part 42 coupled to the first handle member 20. Similarly, the distal guide 38 includes a distal male alignment part 44 coupled to the second handle member 22 and a distal female alignment part 46 coupled to the first handle member 20.

[0030] Turning now to FIGS. 6-9, the first face 12 has a plurality of pins or tangs 48 disposed thereon and a plurality of holes 50 disposed therein. The second face 16 has a plurality of holes 50 disposed therein and a plurality of pins or tangs 48 disposed thereon. Pins 48 and holes 50 are formed and disposed so that pins 48 enter holes 50 when first face 12 and second face 16 are in close relationship when the apparatus is in the “closed” configuration. There is no requirement that pins and holes correspond in a one-to-one fashion. A plurality of pins can be configured to enter a single “hole” as in the case of a hole elongated in one or both planar dimensions to form a slot or a large aperture.

[0031] The first face 12 comprises a first plate 52 coupled to a section of the first face to form a first covered zone 54 and a first uncovered zone 56 which is not covered by first plate 52. Pins 48 extend from both first covered zone 54 and first uncovered zone 56 of the first face 12. Also, holes 50 are formed in both the first covered zone 54 and the first uncovered zone 56 of the first face 12. A conventional electrical heating coil 58, ceramic heater, or the like is configured to heat first plate 52.

[0032] The second face 16 comprises a second plate 60 coupled to a section of the second face to form a second covered zone 62 and a second uncovered zone 64 which is not covered by second plate 60. In one embodiment, holes 50 are formed in both the second covered zone 62 and the second uncovered zone 64 of the second face 16. Also, pins 48 extend from both second covered zone 62 and second uncovered zone 64 of the second face 16. Optionally, a second conventional electrical heating coil, ceramic heater, or the like, not shown (but similar to that shown in FIG. 7 at reference number 58), may be configured to heat second plate 60. As those of ordinary skill in the art will now realize, the plates, faces, pins and the like may be fabricated of any suitable heat-resistant materials such as high-temperature plastic, metal, coated metal, ceramic, ceramic-coated materials, and the like.

[0033] Those of ordinary skill in the art will now realize that the diameter, especially the entry diameter, of holes 50, the length and thickness of pins 48, and the length and orientation of first face 12 and the second face 16 need to be coordinated so that pins 48 will engage holes 50. There is no requirement that each pin engage only a corresponding hole, and, for example, a plurality of pins may engage a single “hole” if the “hole” is shaped accordingly, e.g., as a lengthwise slot.

[0034] In one embodiment the location of the pins 48 relative to one another and similarly the relationship of the holes 50 relative to one another can be configured to improve operation of the device. FIGS. 10 and 11 illustrate the relative location of the holes 50 in accordance with one such embodiment, and it should be understood that the location of the pins in this embodiment is in mirror image to the location of the holes, so that they will engage in the closed position. Accordingly, the relative location of the pins will not be shown in another figure. The holes are disposed in 4 rows, labeled R1 through R4, which are parallel to first edge 66 of the face 16. Also, in one embodiment, the rows R1 through R4 extend from the distal end of the face 16, which is labeled 70.

[0035] In FIG. 11 the location of the holes is shown. The following dimensions are in millimeters and are to the centers of the holes in accordance with this embodiment. A=10.10, B=8.80, C=6.10, D=4.80, G=7.90, H=21.20, I=15.40, J=9.60, K=3.20, and L=3.95. Two of these dimensions should be emphasized. Distance L is the distance between the centers of each of the holes in row R1, namely 3.95 mm, and distance G is the distance between the centers of each of the holes in all other rows, i.e., rows R2 through R4, namely 7.90 mm. An important point to note is that the distances between the holes in rows R1 and R4 are significantly less than the distances between the holes in the other rows. It is believed that this spacing is helpful to detangling curly or wavy hair and that drawing curly or wavy hair through the device is facilitated by such spacing. Those of ordinary skill in the art will now realize that other pin/hole arrangements may also be usefully employed.
It should be understood that the holes are spaced as described below. The first row of holes R1 is spaced apart from the nearest edge of the second face 14 by a first distance. The second row of holes R2 is spaced apart from the first row R1 by a second distance. The third row of holes R3 is spaced apart from the second row R2 by a third distance, and the fourth row of holes R4 is spaced apart from the third row R3 by a fourth distance. The second distance is greater than the first distance and the third distance is substantially equal to the fourth distance.

Each hole in the first row R1 is spaced apart from the adjacent hole or holes in the first row R1 by a first distance in the direction perpendicular to the direction of the row R1, i.e., a first Y distance. Each hole in the second row of holes R2 is spaced apart from the adjacent hole or holes in the second row of holes R2 by a second Y distance, and the first Y distance is less than the second Y distance.

Like the holes, the pins are spaced as described below. The first row of pins R1 is spaced apart from the nearest edge of the first face 10 by a first distance. The second row of pins R2 is spaced apart from the first row R1 by a second distance. The third row of pins R3 is spaced apart from the second row R2 by a third distance, and the fourth row of pins R4 is spaced apart from the third row R3 by a fourth distance. The second distance is greater than the first distance and the third distance is substantially equal to the fourth distance.

Although a specific layout of pins and holes has been described and illustrated, it should be understood that this layout is only one embodiment, and the present invention is not limited to this specific layout.

It should be understood that when a user closes the handle members 20 and 22 to bring the plates 52 and 60 to bear on hair, it is critical that the pins line up with corresponding holes. In one embodiment, due to flex in the hinge 24 it is important to provide alignment of the pins and holes to insure correct alignment. Alignment of the pins and holes is accomplished in one embodiment by means of two guide members 36 and 38.

Turning now to FIGS. 3 and 12-13, the proximal guide member 36 includes a proximal male alignment part 40 coupled to the second handle member 22 and a proximal female alignment part 42 coupled to the first handle member 20. The proximal male alignment part 40 has two faces 74 and 76 which are shaped substantially as truncated triangles when viewed in FIG. 12. The two faces 74 and 76 are spaced apart from one another where they are fixed to second handle member 22, and the faces are coupled to one another at their ends which are spaced apart from second handle member 22. Accordingly, when viewed in FIG. 12, it can be seen that the faces 74 and 76 are nearer to one another in the horizontal direction when they are farther from second handle member 22 in the vertical direction. The proximal female alignment part 42 has two faces 78 and 80. The two faces 78 and 80 are spaced apart from one another where they are fixed to first handle member 20, and the faces are a greater distance from one another at their ends which are spaced apart from first handle member 20.

The proximal male alignment part 40 and the proximal female alignment part 42 are constructed and arranged so that when the handle is in the open position the alignment parts are not engaged with one another. As the user moves the handles toward the closed position the proximal male alignment part 40 and the proximal female alignment part 42 engage one another and tend to force the handles into alignment to the extent that they are out of alignment. In other words, when a user moves the handle from a partially closed position to second partially closed position and from the second partially closed position to the closed position the proximal alignment parts engage one another to cause initial alignment of the first plate 52 and the second plate 60.

The distal guide member comprises a distal male alignment part 44 coupled to second handle member 22 and a distal female alignment part 46 coupled to first handle member 20. The distal male alignment part 44 includes a substantially cone shaped structure 82 coupled to the second handle member 22 and a substantially cylindrical part 84 coupled to the lower end of the cone shaped structure 82. The distal female alignment part 46 includes a conical shaped opening 86 which is sized to fit snugly around the cone shaped structure 82.

The distal male alignment part 44 and the distal female alignment part 46 are constructed and arranged so that when the handle is in the open position the alignment parts do not engage one another. As a user moves the handles toward the closed position the handles reach a first partially closed position and the proximal alignment members 40 and 42 initially contact one another to bring about partial alignment. At this time the distal alignment members 44 and 46 do not engage one another. Hereafter, as the user continues to close the handles, and when the handles reach a second partially closed position, the distal alignment parts engage one another to cause final alignment of the first plate 52 and the second plate 60 as the user closes the device.

In accordance with one embodiment of the present invention, dry heat may be provided to one or both of plates 52 and 60 by incorporating a conventional electrical heating coil 58, a ceramic heater, or the like behind each respective plate. In this case it would be desirable to form the respective heated (and non-heated) surface of the temperature resistant materials, such as aluminum and high temperature plastics such as PTFE (also known by the trade name Teflon®). An electrical switch 88 may be conveniently disposed in the handle to control one or both electrical heating coils, ceramic heaters, or the like. Conventional AC power is provided by wires 90 to power the circuit, which is not shown.

With reference to FIGS. 14 and 15 in accordance with one embodiment, steam is provided through holes in the second plate 60. It will now be appreciated that steam may be supplied through one or both plates through special purpose holes provided for that purpose alone or through some or all holes 50.

The second handle member 22 includes a water reservoir 92, and a metered amount of water can be drawn from the reservoir 92 through tubes, not shown, by activation of a pumping mechanism by a trigger 93. The water then flows to steam generator 94 which is heated by a heating element 96. This heated water then forms steam, which then exits the steam emitting holes 98 disposed along the
lower surface of steam generator 94. Steam heating element 96 is supplied electrical current via wires 90. From the steam emitting holes 98 the steam travels, in one embodiment, through holes 50 in second plate 60.

[0049] As shown in FIG. 14, the steam generator 94 comprises a body 100 which is substantially C-shaped in cross section and extends substantially the length of second housing 14. Within the body 100 there is a steam chamber 102 wherein the water is vaporized and which is substantially C-shaped in cross section and is in communication with the steam emitting holes 98. The steam chamber 102 contains felt or a similar material 104. The purpose of the felt 104 is to reduce or eliminate the possibility of any condensation which forms in the steam chamber 102 from leaving the steam generator 94 as water droplets.

[0050] As can be seen in FIG. 15, as an alternative to a plurality of steam emitting holes 98 disposed along the bottom faces of steam generator 94, slots 106 can be formed along the bottom of the steam generator 94. In one embodiment, the water reservoir 92 is removable from second handle member 22, and the handle includes a compartment to accommodate the water reservoir. Water reservoir 92 can be removed to facilitate filling it with water.

[0051] It should be noted that while the specific layout of pins and corresponding holes or apertures is viewed as an aspect of the present invention, it is not critical to the entire invention and other aspects of the invention may be used with or without this particular aspect of the invention.

[0052] It should also be noted that while round pins are shown and described herein, other shapes of pins/holes may also be employed and will now be apparent to those of ordinary skill in the art.

[0053] Turning now to FIGS. 16 and 18, alternative embodiments of first face 12 are illustrated schematically. It should be understood that in these embodiments, second faces are not shown since it should be recognized that the second faces include holes 50 to accommodate the pins 48 regardless of where the pins 48 are disposed.

[0054] In the FIG. 16 embodiment, first face 12 comprises a first plate 52 which forms a first covered zone 54 and a pair of sections not covered by first plate 52 and which are designated first uncovered zone 56. As shown in FIG. 16 there are pins on one area of the uncovered zone 56 and holes on another. First plate 52 includes with pins and other regions with holes. There is no requirement that first plate 52 include holes or pins. Where pins/holes are shown, there may be zero, one or more rows or sets of pins/holes. In accordance with this embodiment, pins extend from both the first face 12 and the second face 14.

[0055] In the FIG. 17 embodiment, there are two first plates 52a and 52b disposed in the first covered zone 54 of first face 12. Each may have zero, one or more rows or sets of pins/holes. The first uncovered zone comprises the three regions denoted 56 and each portion of that zone may have zero, one or more rows or sets of pins 48/holes 50 as long as some pins are disposed in these regions and some pins extend from both first face 12 and second face 16.

[0056] The FIG. 18 embodiment is similar to the FIG. 16 embodiment except that holes 50 of various shapes and adapted to accommodate more than one pin are provided in first covered zone 54. Both pins and holes are provided in first uncovered zone 56 as shown.

[0057] It should be understood that the illustrated shapes of the holes are merely examples, and other shapes may be useful in appropriate circumstances, as can now be understood by those of ordinary skill in the art. It should be understood that in these embodiments, second faces are not shown since it should be recognized that the second faces include holes 50 to accommodate the pins 48 regardless of where the pins 48 are disposed, and the second faces may include plates in opposition to the plates comprising the first faces.

[0058] Other features may, of course, be incorporated such as the vibrating feature described in more detail in co-pending U.S. patent application Ser. No. 11/526,207, filed Sep. 22, 2006 in the name of the same inventor hereof and commonly owned herewith.

[0059] While embodiments and applications of this invention have been shown and described, it would be apparent to those skilled in the art having the benefit of this disclosure that many more modifications than mentioned above are possible without departing from the inventive concepts herein. The invention, therefore, is not to be restricted except in the spirit of the appended claims.

What is claimed is:

1. A device for styling hair, comprising:
   - a first housing having a first face;
   - a second housing having a second face;
   - a hinged frame holding the first housing and the second housing and hinged to permit a user to bring the first face and the second face into opposed relationship with one another;
   - a plurality of pins extending from the first face;
   - a plurality of holes formed in the second face;
   - a plurality of pins extending from the second face;
   - a plurality of holes formed in the first face;
   - the first plurality of pins and the first plurality of holes configured so that when the first face and the second face are disposed in opposed relationship with one another, the first plurality of pins engages the first plurality of holes;
   - the second plurality of pins and the second plurality of holes configured so that when the first face and the second face are disposed in opposed relationship with one another, the second plurality of pins engages the second plurality of holes;
   - wherein the first face comprises a first plate;
   - wherein the second face comprises a second plate; and
   - a heater configured to heat at least one of the first plate and the second plate.

2. The device of claim 1, wherein:
   - the first plate forms a first section of the first face defining a first covered zone covered by the first plate and a first uncovered zone, which is not covered by the first plate; the second plate forms a first section of the second face defining a second covered zone covered by the second plate and a second uncovered zone, which is not covered by the second plate;
   - a plurality of the first plurality of pins are configured to extend from the first plate ("first plate pins");
   - a plurality of the first plurality of pins are configured to extend from the first uncovered zone ("first uncovered zone pins");
   - a plurality of the first plurality of holes is formed in the second plate and disposed to engage the first plate pins when the first face and the second face are disposed in opposed relationship with one another;
   - a plurality of the first plurality of holes is formed in the second uncovered zone and disposed to engage the first
uncovered zone pins when the first face and the second face are disposed in opposed relationship with one another.

3. The device of claim 1, wherein:
the first plate forms a first section of the first face defining a first covered zone covered by the first plate and a first uncovered zone, which is not covered by the first plate;
the second plate forms a first section of the second face defining a second covered zone covered by the second plate and a second uncovered zone, which is not covered by the second plate;
a plurality of the first plurality of pins are configured to extend from the first plate ("first plate pins");
a plurality of the second plurality of pins are configured to extend from the second uncovered zone ("second uncovered zone pins");
a plurality of the first plurality of holes is formed in the second plate and disposed to engage the first plate pins when the first face and the second face are disposed in opposed relationship with one another;
a plurality of the second plurality of holes is formed in the first uncovered zone and disposed to engage the second uncovered zone pins when the first face and the second face are disposed in opposed relationship with one another.

4. The device of claim 1, wherein:
the first plate forms a first section of the first face to define a first covered zone covered by the first plate and a first uncovered zone, which is not covered by the first plate;
a plurality of the first plurality of pins is configured to extend from the first plate ("first plate pins");
a plurality of the first plurality of pins is configured to extend from the first uncovered zone of the first plate ("first uncovered zone pins");
a plurality of the first plurality of holes is formed in the second face and disposed to engage the first uncovered zone pins when the first face and the second face are disposed in opposed relationship with one another.

5. The device of claim 1, wherein:
the first plate is disposed over a first section of the first face defining a first covered zone and a first uncovered zone, which is not covered by the first plate;
the second plate is disposed over a first section of the second face defining a second covered zone and a second uncovered zone, which is not covered by the second plate;
a plurality of the first plurality of pins is configured to extend from the first plate ("first plate pins");
a plurality of the first plurality of pins is configured to extend from the first uncovered zone ("first uncovered zone pins");
a plurality of the first plurality of holes is formed in the second plate and disposed to engage the first plate pins when the first face and the second face are disposed in opposed relationship with one another;
a plurality of the first plurality of holes is formed in the second uncovered zone of the second face and disposed to engage the first uncovered zone pins when the first face and the second face are disposed in opposed relationship with one another.

6. The device of claim 1, further comprising:
a plurality of fins coupled to at least one of the first and second housings, the members of the plurality of fins being spaced apart from one another a distance less than about the width of a human finger.

7. The device of claim 1, further comprising:
a vapor generator coupled to at least one of the first and second housings, the vapor generator configured to heat aqueous fluid to vaporization;
a refillable reservoir for containing fluid coupled in fluid flow communication with the vapor generator;
a pump coupled in fluid flow communication with the refillable reservoir and the vapor generator, the pump configured to withdraw a metered volume of fluid from the reservoir and place the metered volume of fluid in contact with the vapor generator; and
a passage coupling the vapor generator and a plurality of holes in at least one of the first and second faces so that vaporized fluid can pass from these holes.

8. The device of claim 1, wherein:
the first plurality of pins are disposed in at least two rows, each row being substantially parallel to an edge of the first plate.

9. The device of claim 8, wherein:
a first row of the first plurality of pins is spaced apart from a first edge of the first plate by a first distance,
a second row of the first plurality of pins is spaced apart from the first row by a second distance,
each pin in the first row of pins is spaced apart from adjacent pins in the first row of pins by a first Y distance,
each pin in the second row of pins is spaced apart from adjacent pins in the second row of pins by a second Y distance, and
the first Y distance is less than the second Y distance.

10. The device of claim 9, wherein:
the first plurality of pins are disposed in at least four rows, a third and fourth row also each being substantially parallel to an edge of the first plate.

11. The device of claim 10, wherein:
the third row of pins is spaced apart from the second row by a third distance,
the fourth row of pins is spaced apart from the third row by a fourth distance,
the second distance is greater than the first distance, and
the third and fourth distances are each substantially equal to each other.

12. The device of claim 1, wherein:
the hinged frame comprises a handle including a first handle member wherein a distal end of the first handle member is coupled to the first housing, the handle further including a second handle member wherein a distal end of the second handle member is coupled to the second housing, a proximal end of the first handle member being coupled to a proximal end of the second handle member by a hinge, whereby the handle is pivotally operable between an open position and a closed position, the handle including a proximal guide member and a distal guide member affixed to the first handle member and the second handle member,
the proximal guide member comprising a proximal male alignment part coupled to the first handle member and a proximal female alignment part coupled to the second handle member, the proximal male alignment part and the proximal female alignment part being constructed and arranged so that when the handle is in the open position the alignment parts are not engaged with one another, and when a user moves the handle from a first
partially closed position to a second partially closed position and from the second partially closed position to the closed position the proximal alignment parts engage one another to cause initial alignment of the first face and the second face, and

the distal guide member comprising a distal male alignment part coupled to the first handle member and a distal female alignment part coupled to the second handle member, the distal male alignment part and the distal female alignment part being constructed and arranged so that when the handle is in the open position and when the handle is between the first partially closed position and the second partially closed position, the distal alignment parts are not engaged with one another, and when a user moves the handle from the second partially closed position to the closed position the distal alignment parts engage one another to cause final alignment of the first face and the second face.