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Kousens et al.

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- (54) **COMPENSATING FACE PLATE VISE JAWS AND RELATED METHODS**
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- (72) Inventors: **William Kousens, El Cajon, CA (US); Zachary Kousens, Carlsbad, CA (US); Tam Nguyen, San Diego, CA (US)**
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 435 days.

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2017/0190007 A1 *	7/2017	Kousens	B23Q 3/061	

(21) Appl. No.: **14/985,983**

(22) Filed: **Dec. 31, 2015**

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- (51) **Int. Cl.**
B25B 1/24 (2006.01)
B23Q 3/06 (2006.01)

- (52) **U.S. Cl.**
CPC **B23Q 3/061** (2013.01); **B25B 1/241** (2013.01); **B25B 1/2452** (2013.01); **B23Q 2703/08** (2013.01)

- (58) **Field of Classification Search**
CPC B25B 1/00; B25B 1/02; B25B 1/08; B25B 1/2452; B25B 1/2457
See application file for complete search history.

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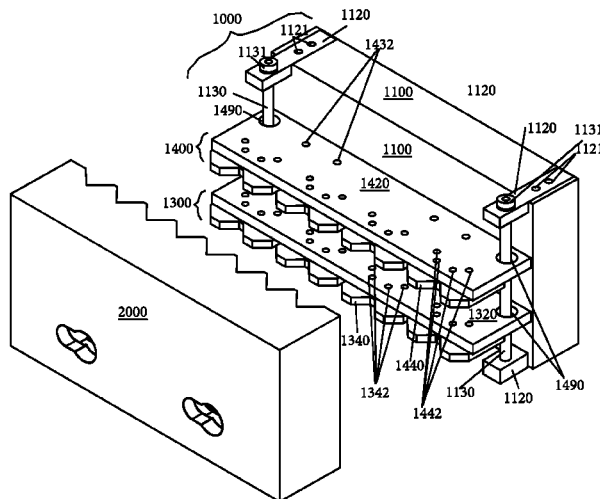
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Primary Examiner — Lee D Wilson
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(57) **ABSTRACT**

Disclosed generally is a face plate for a vise that is capable of gripping multiple work-pieces of different sizes at the same time. In one embodiment, the disclosed subject matter may be a vise face plate comprising: a base with an upper compensation structure and a lower compensation structure; and, wherein the upper and lower compensation structures define two sets of working surfaces. In use, the plate may be secured to a movable jaw so that the working surfaces may be employed to clamp a plurality of work pieces between the working surfaces and a fixed jaw.

5 Claims, 22 Drawing Sheets



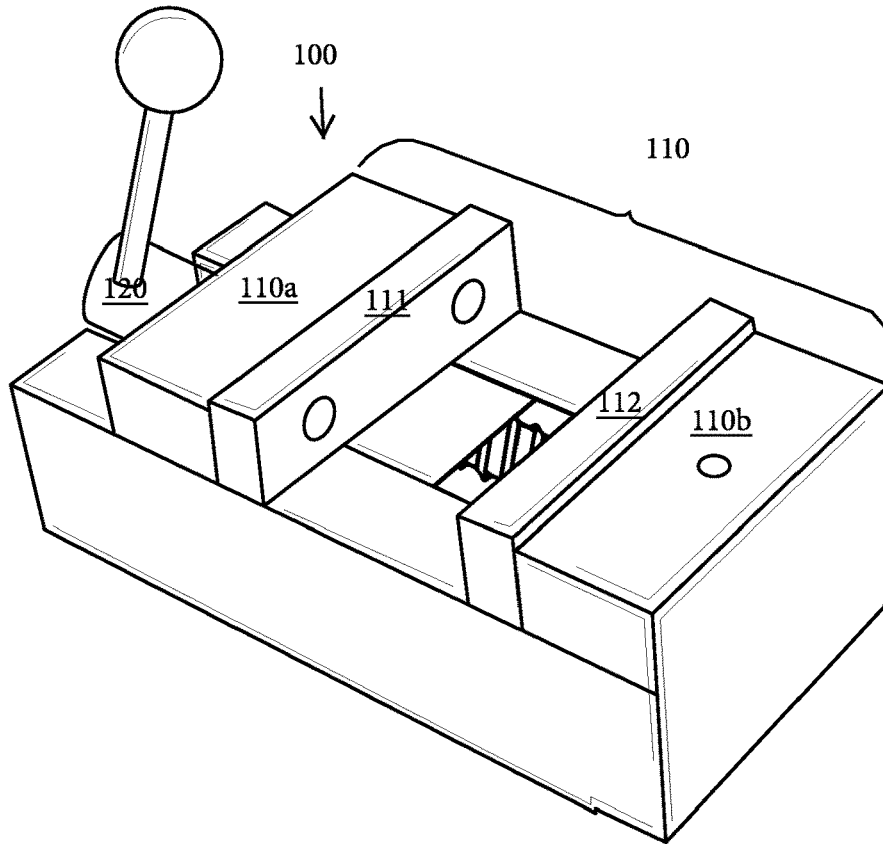


FIG. 1
(Prior Art)

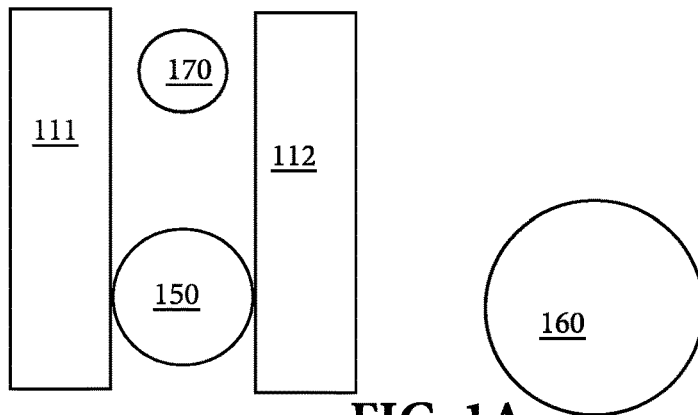


FIG. 1A
(Prior Art)

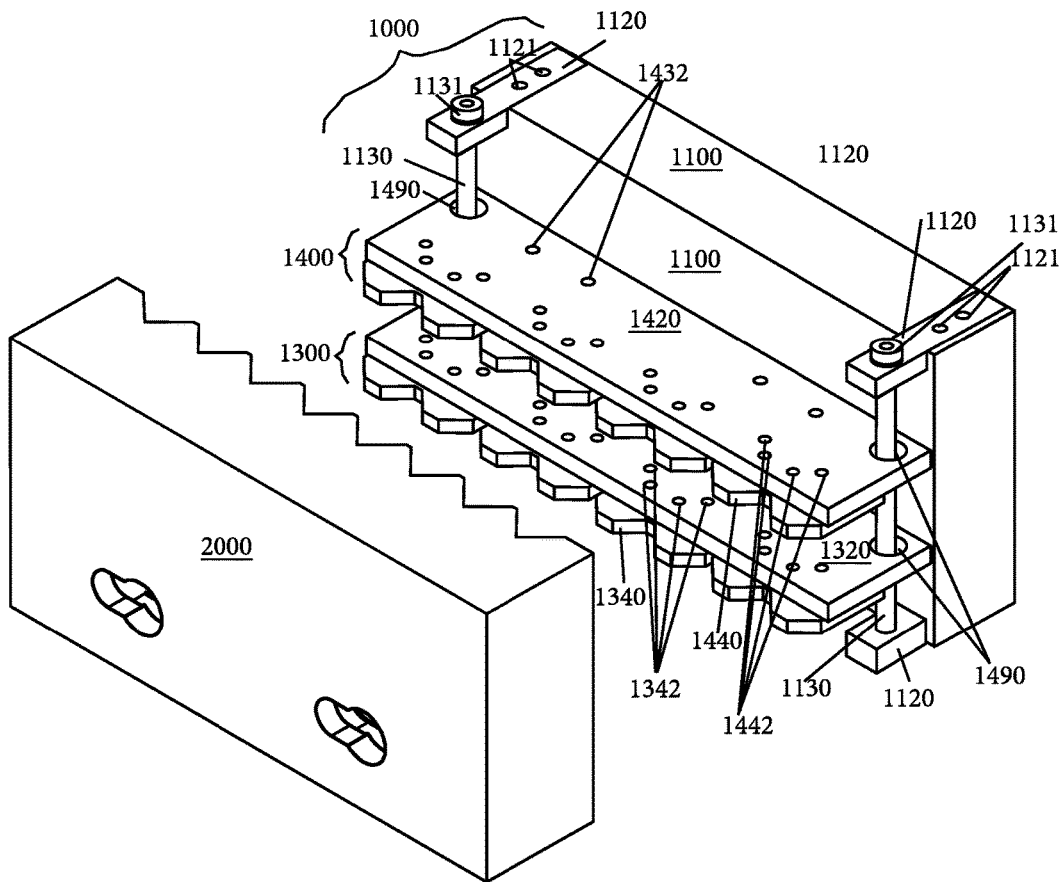


FIG. 2

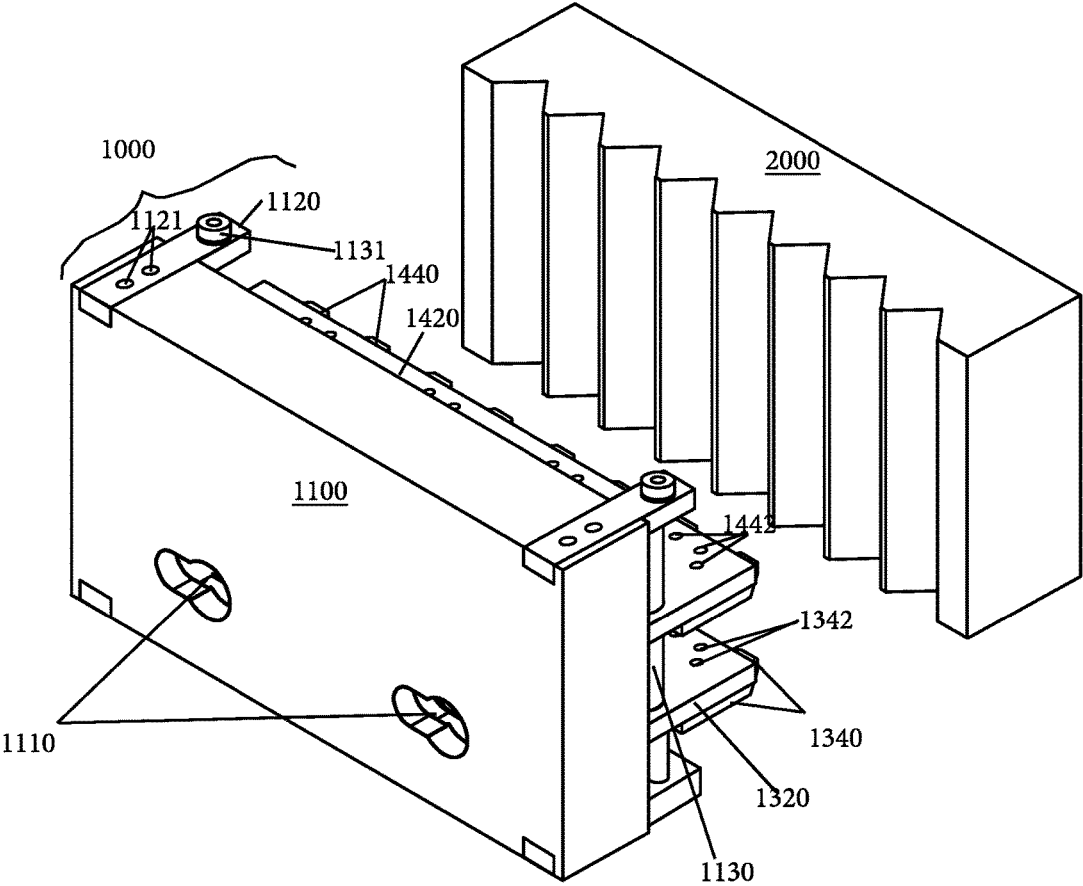


FIG. 3

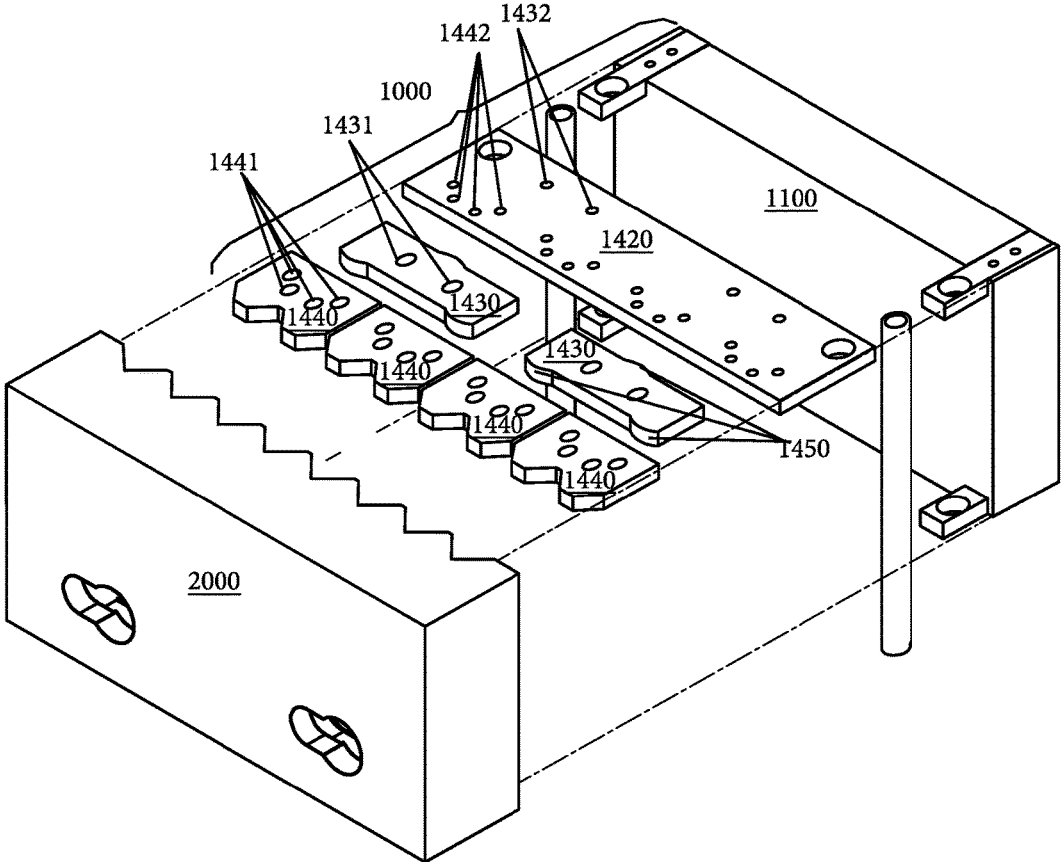


FIG. 4

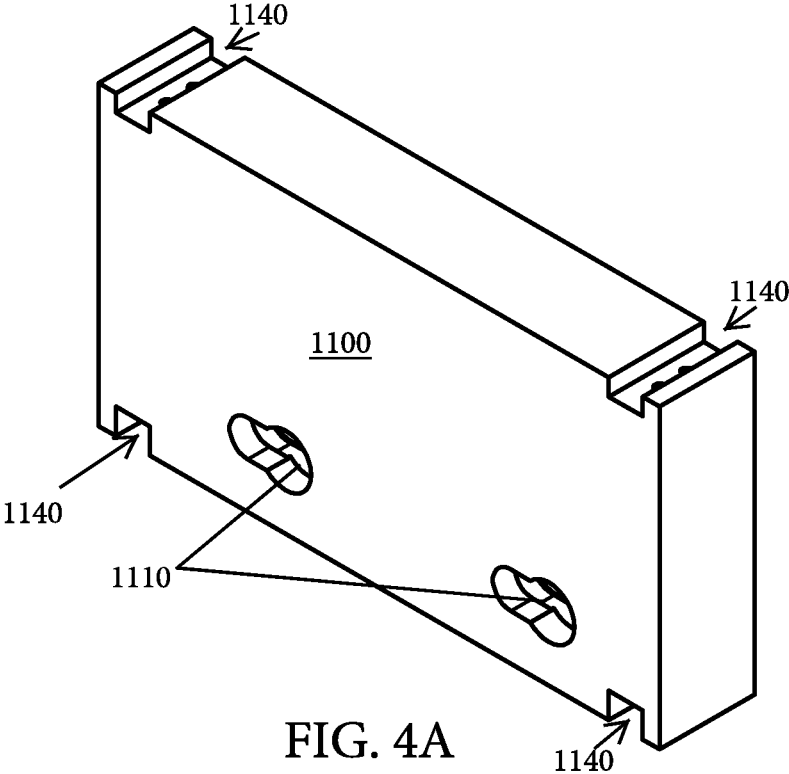


FIG. 4A

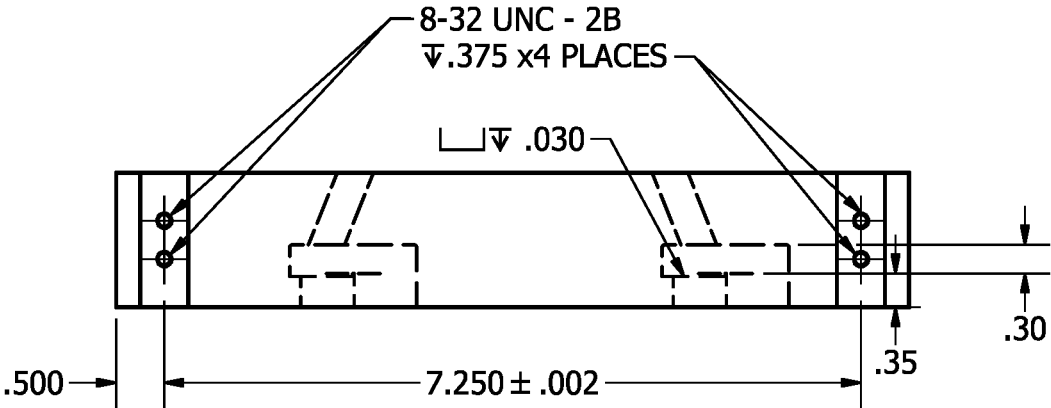


FIG. 4B

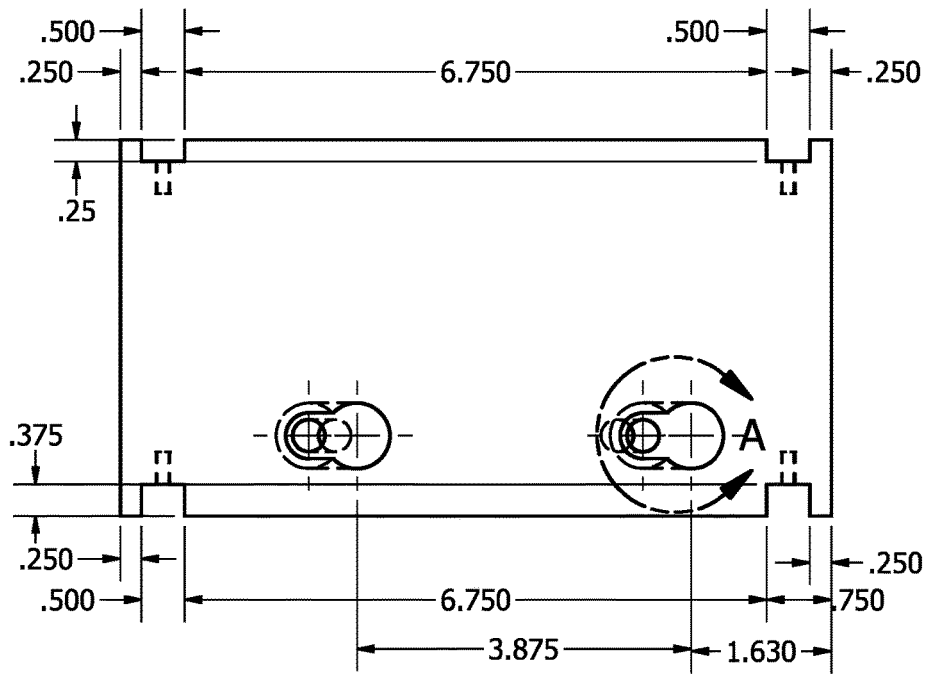
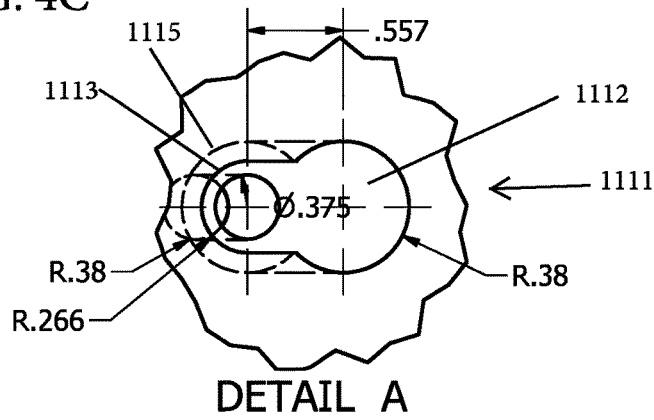


FIG. 4C



DETAIL A

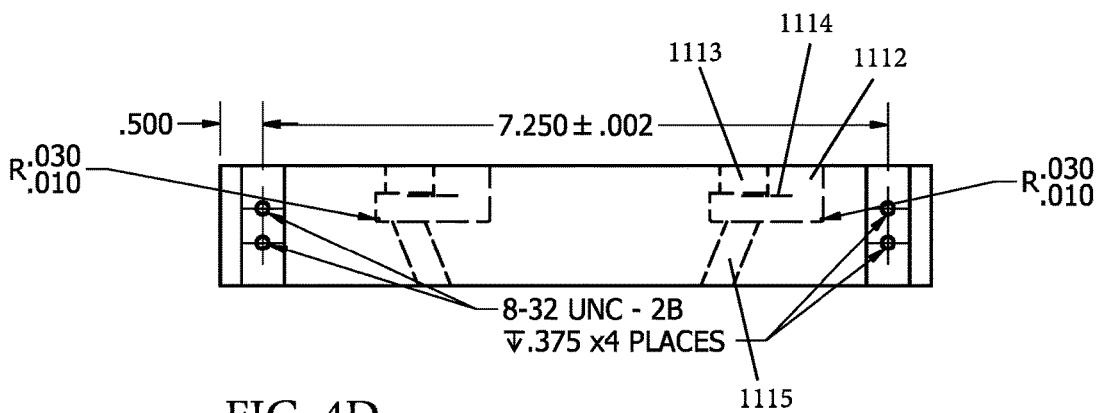


FIG. 4D

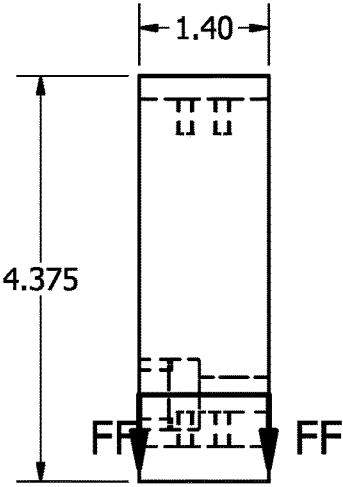


FIG. 4E

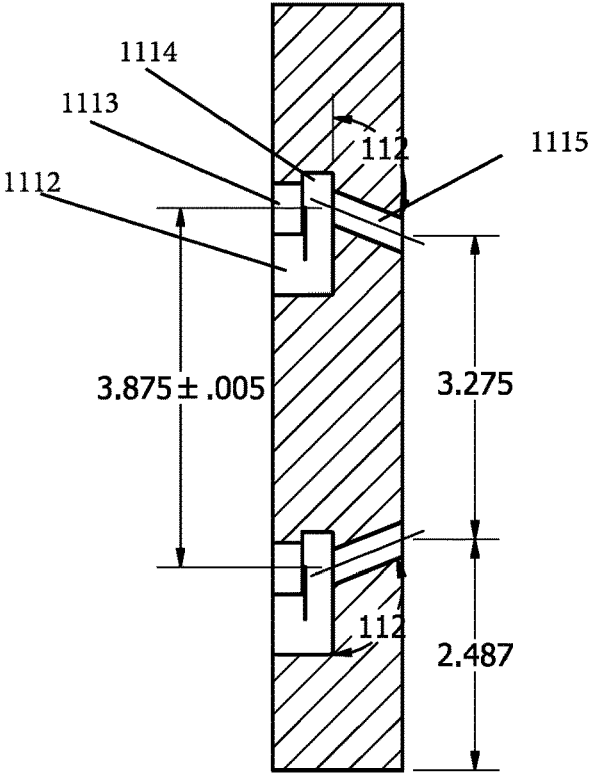


FIG. 4F

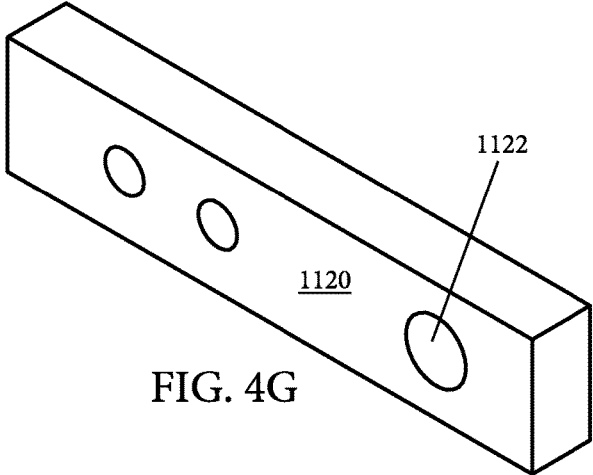


FIG. 4G

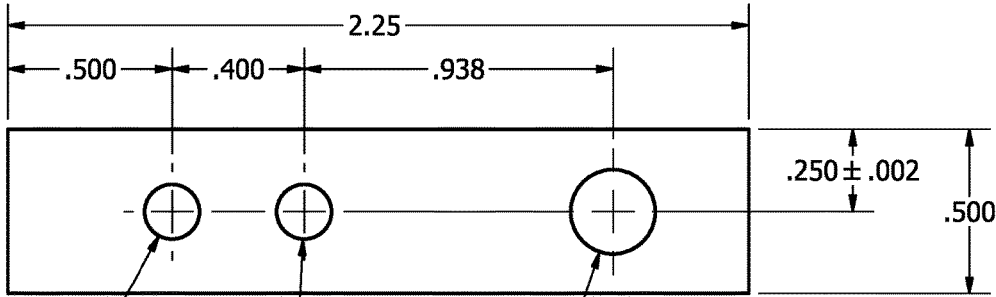


FIG. 4H

$\text{Ø}.166 \text{ THRU}$

$\text{Ø}.166 \text{ THRU}$

$\text{Ø}.257 \text{ THRU}$



FIG. 4I

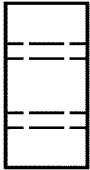


FIG. 4J

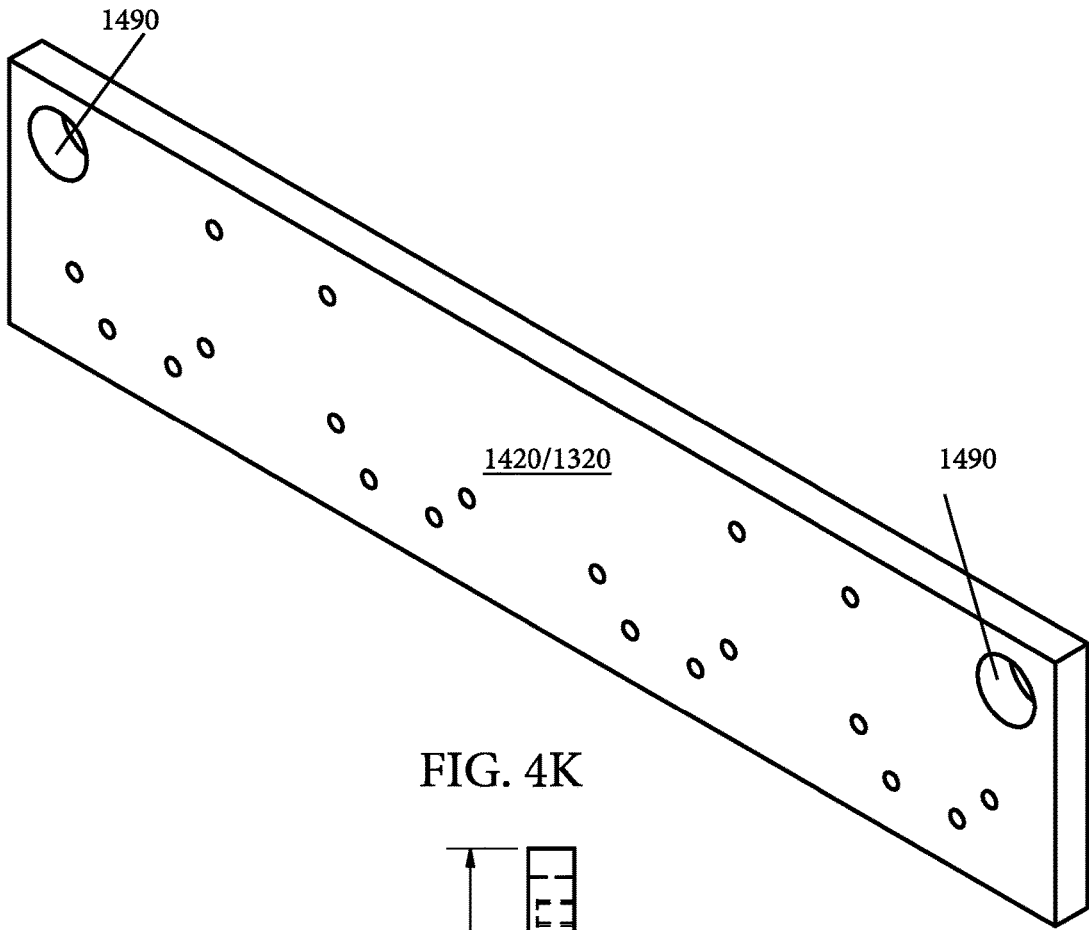


FIG. 4K

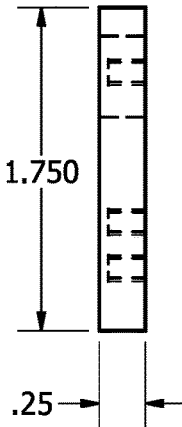


FIG. 4L

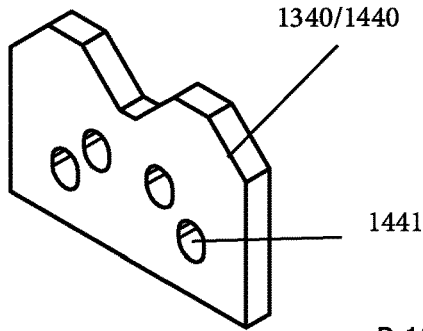
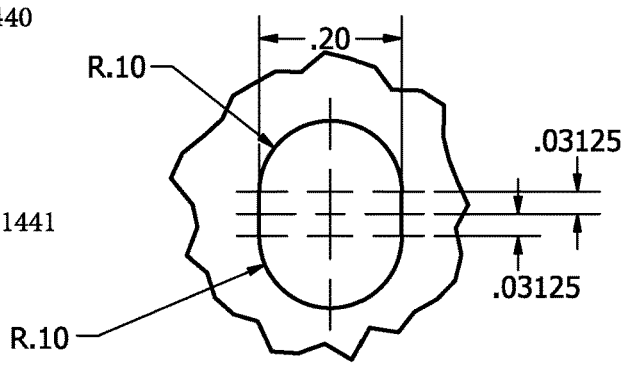


FIG. 4N



DETAIL E
SCALE 4 : 1

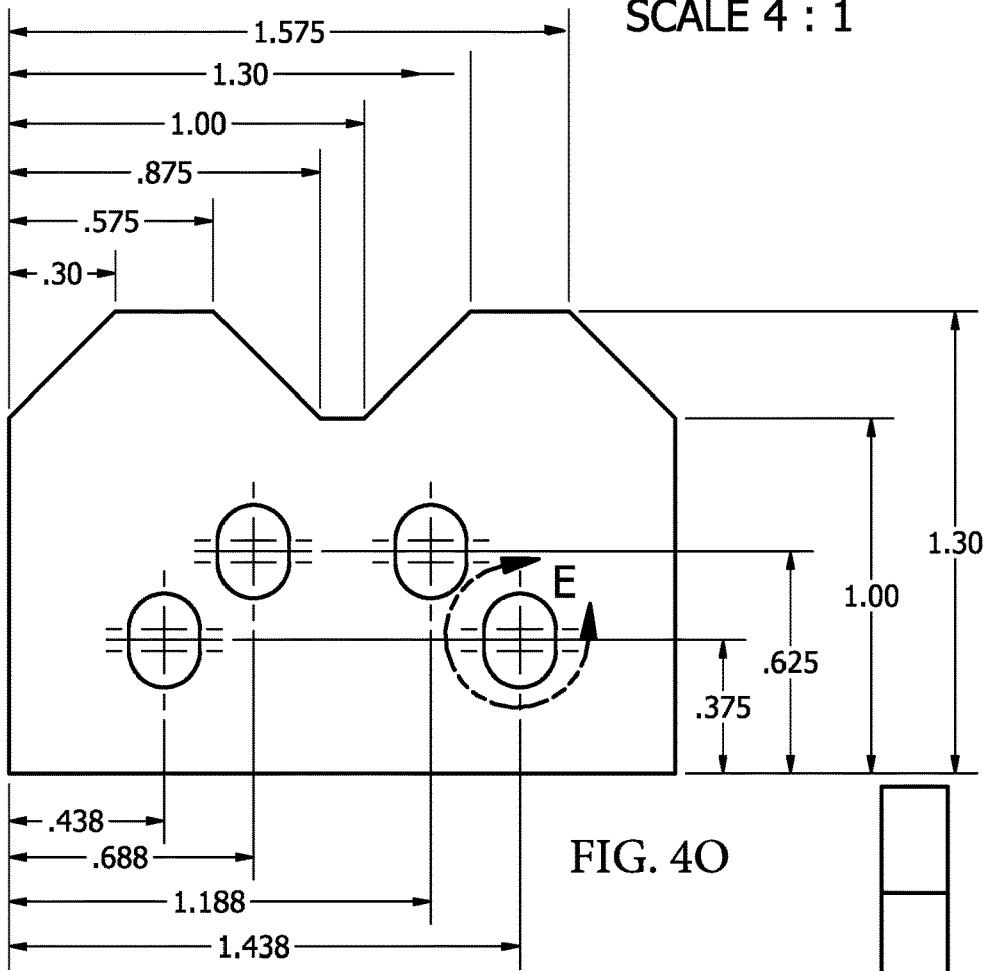


FIG. 4O

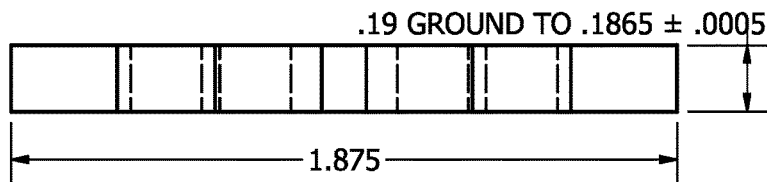


FIG. 4P



FIG. 4Q

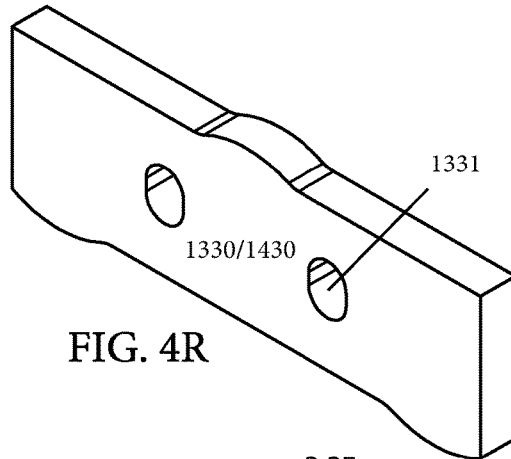


FIG. 4R

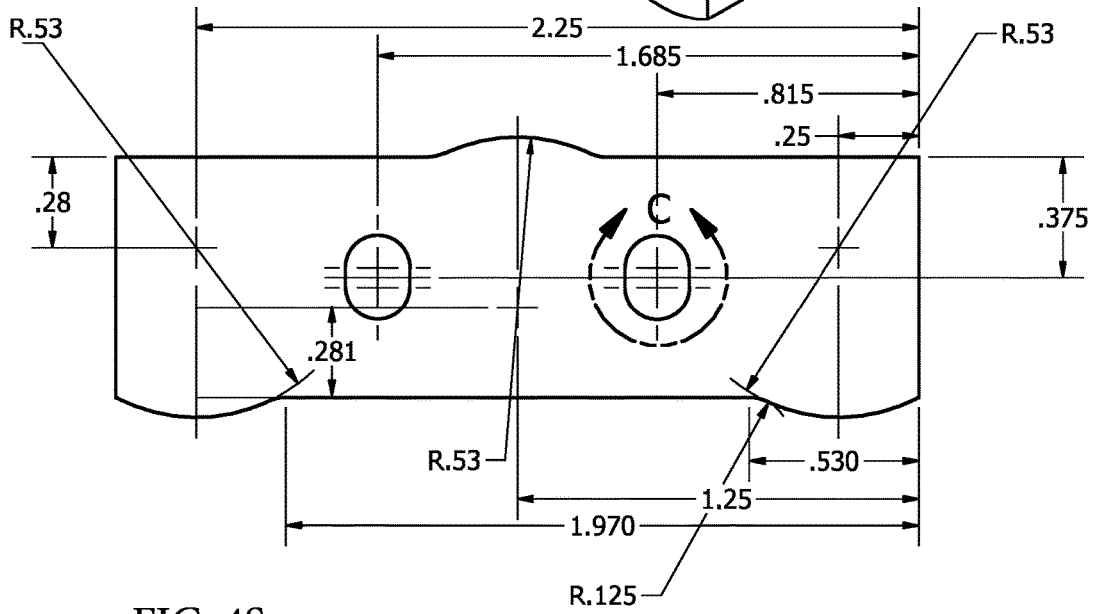
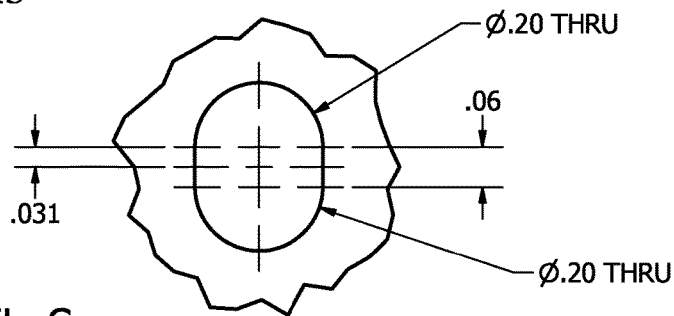


FIG. 4S



DETAIL C
SCALE 4 : 1

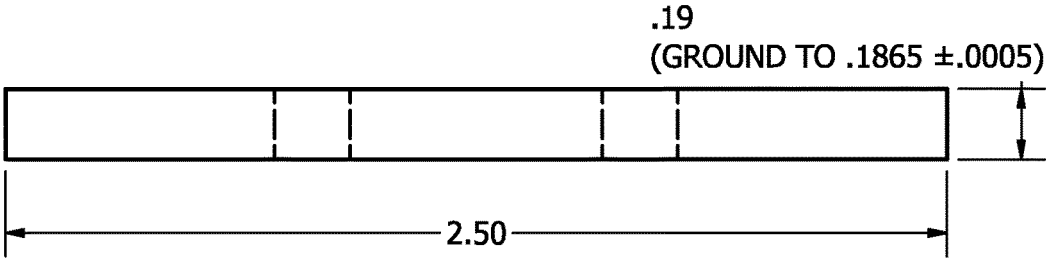


FIG. 4T

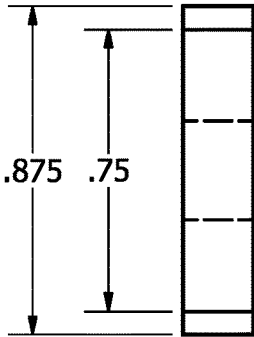


FIG. 4U

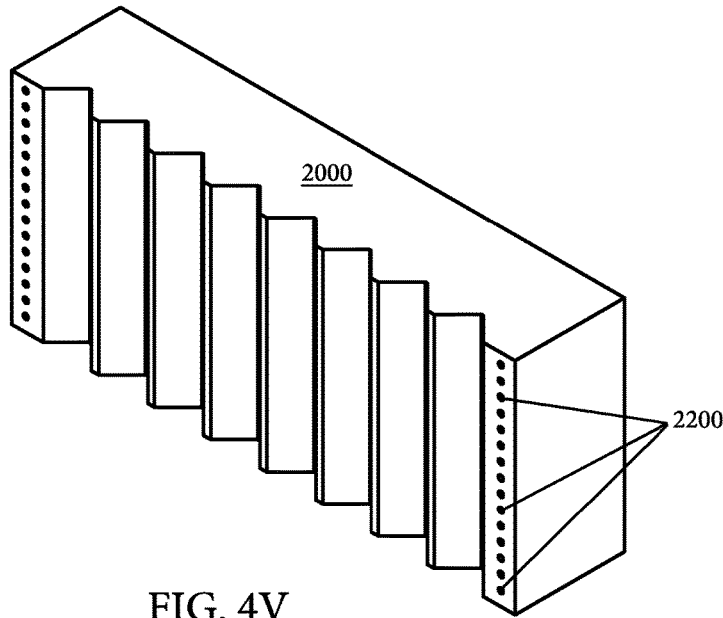


FIG. 4V

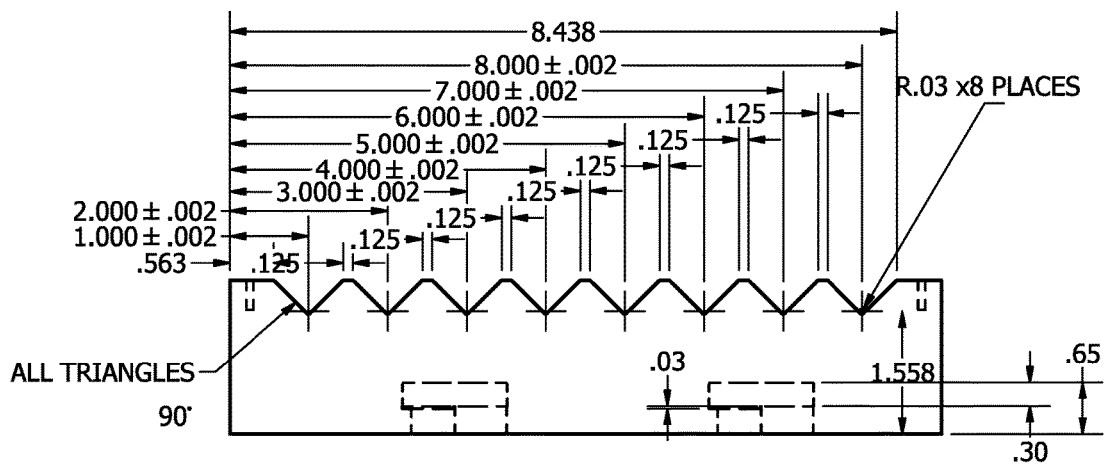


FIG. 4W

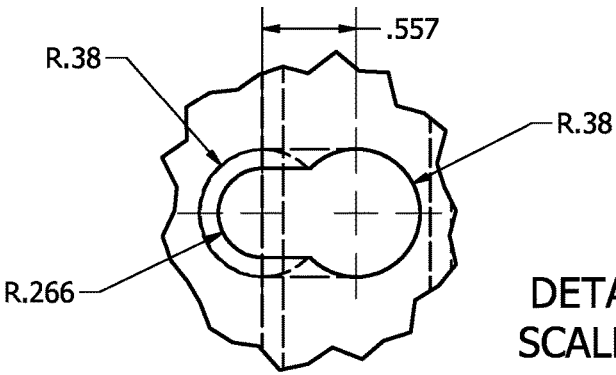
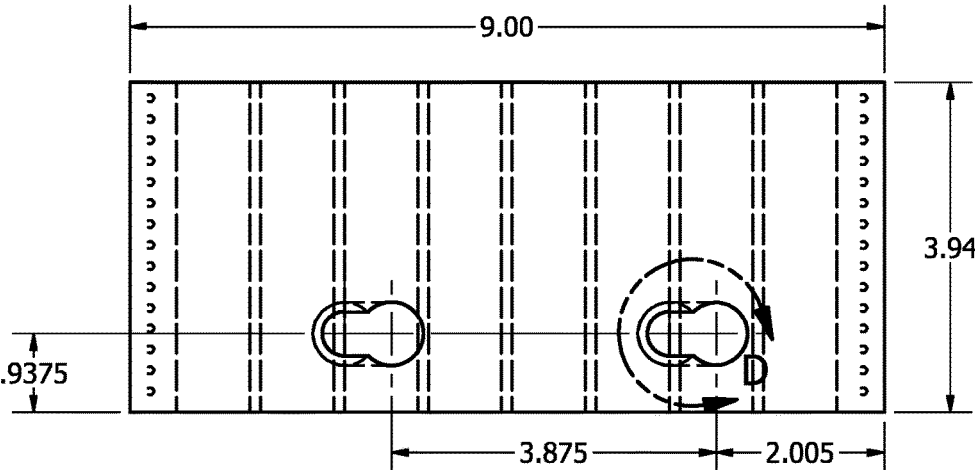


FIG. 4X

DETAIL D
SCALE 1 : 1

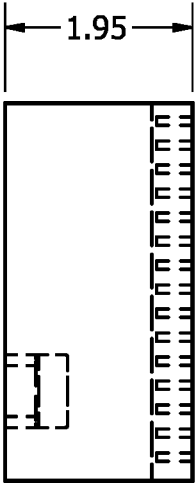


FIG. 4Y

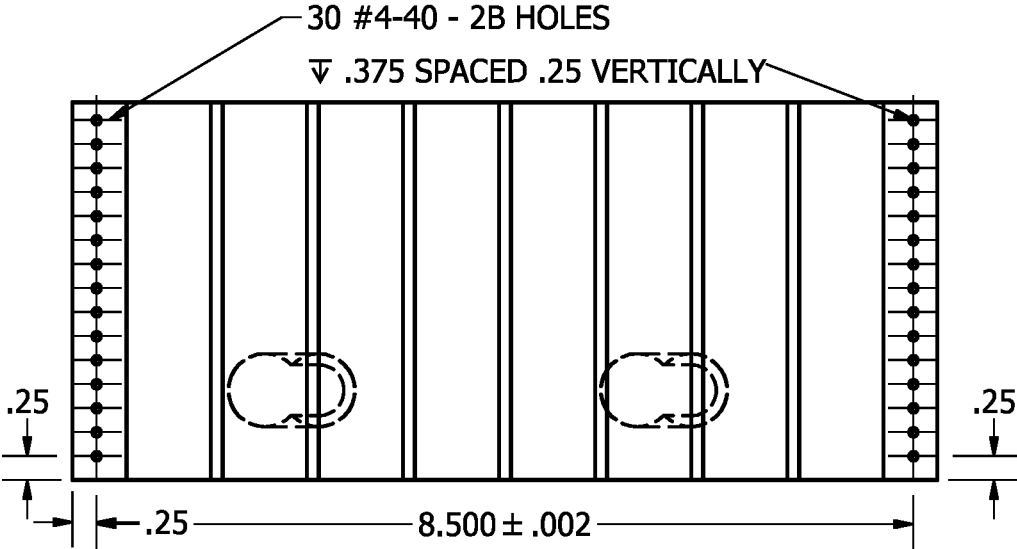


FIG. 4Z

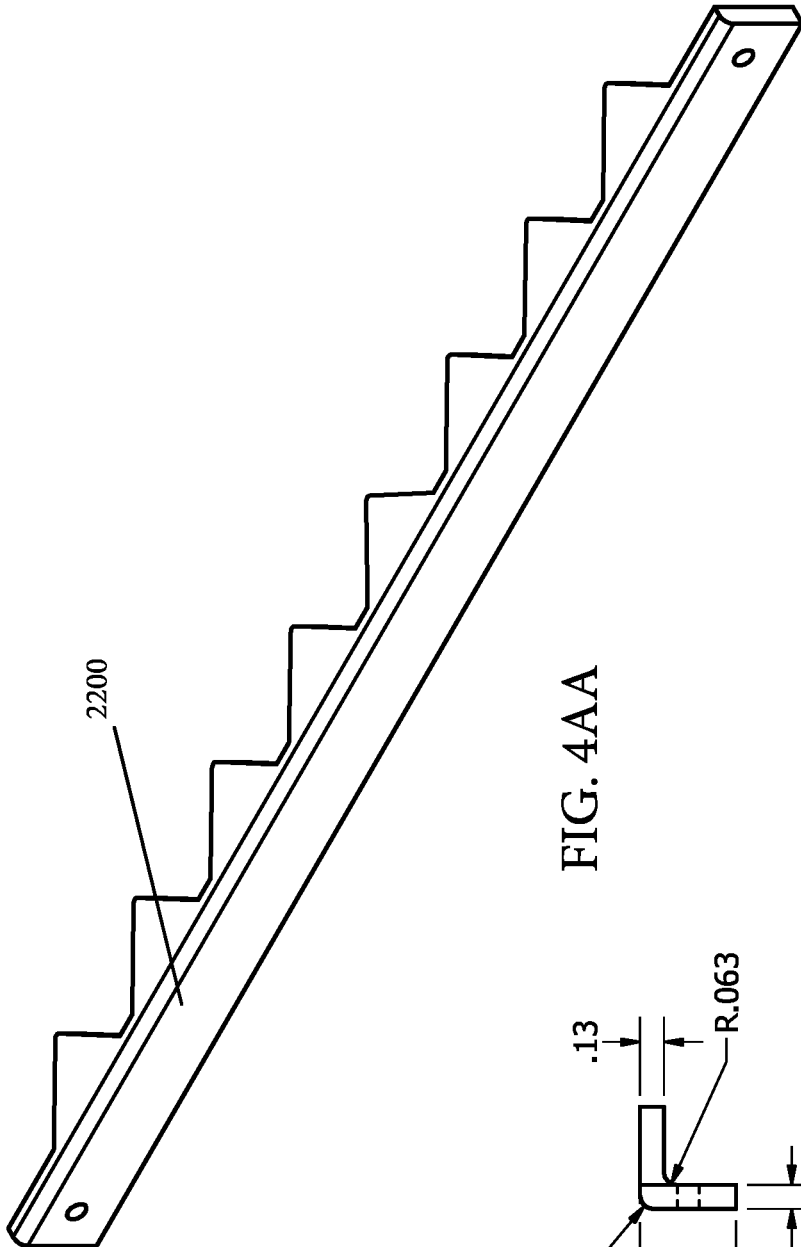


FIG. 4AA

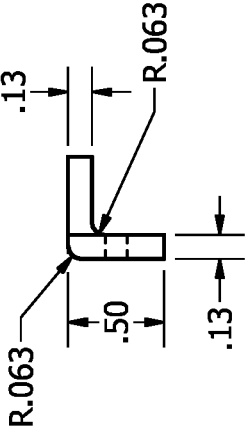
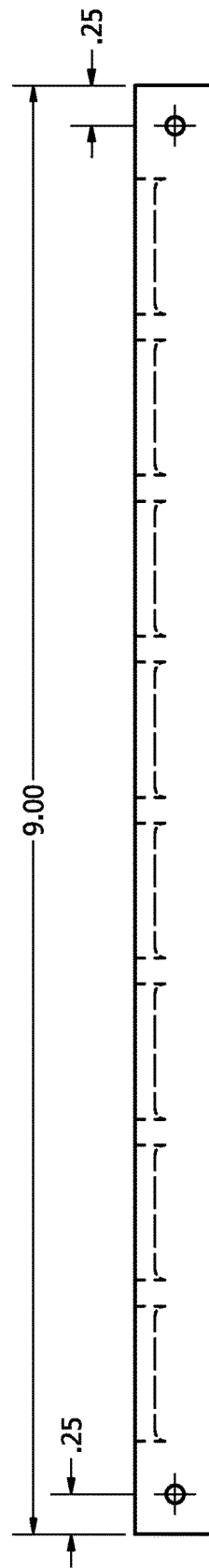
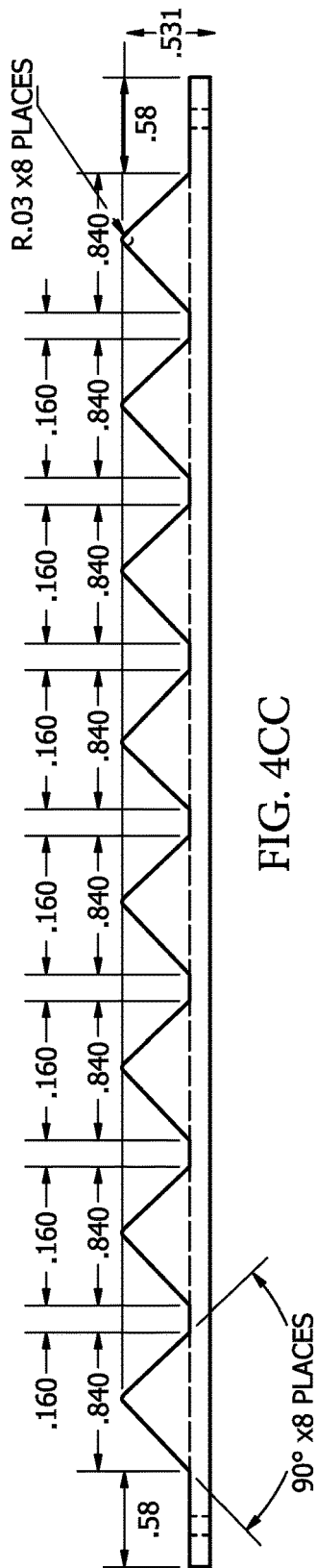


FIG. 4BB



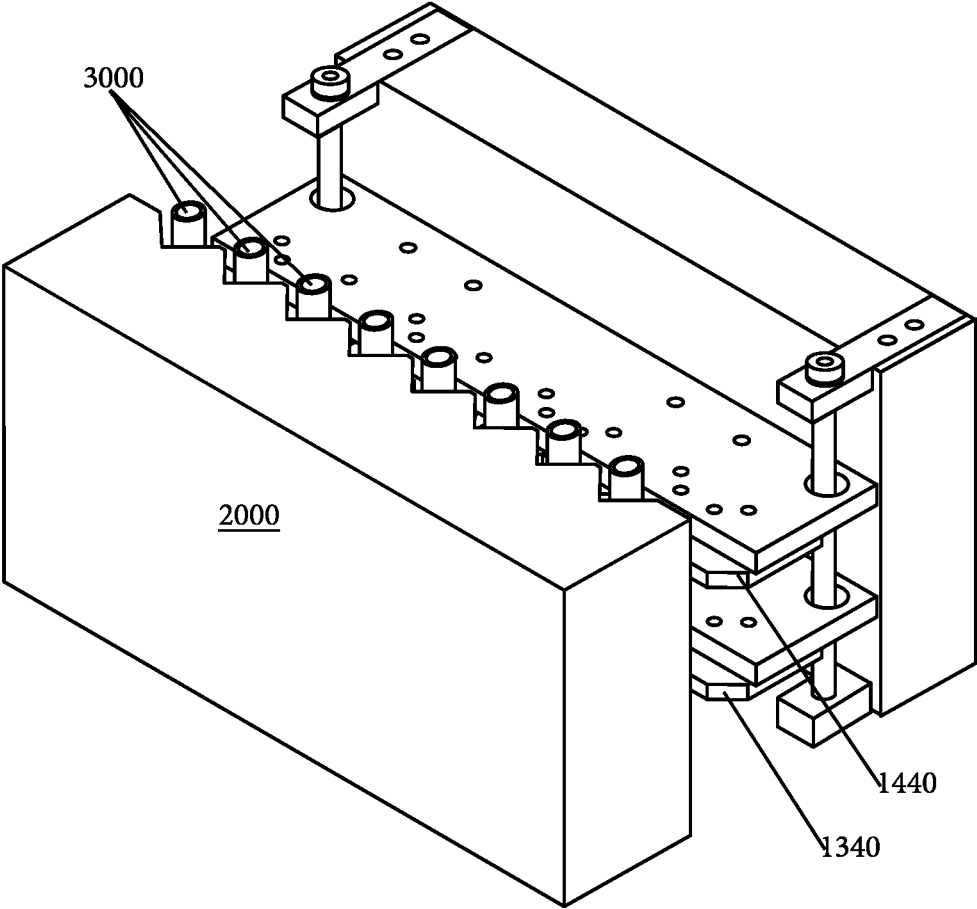


FIG. 5

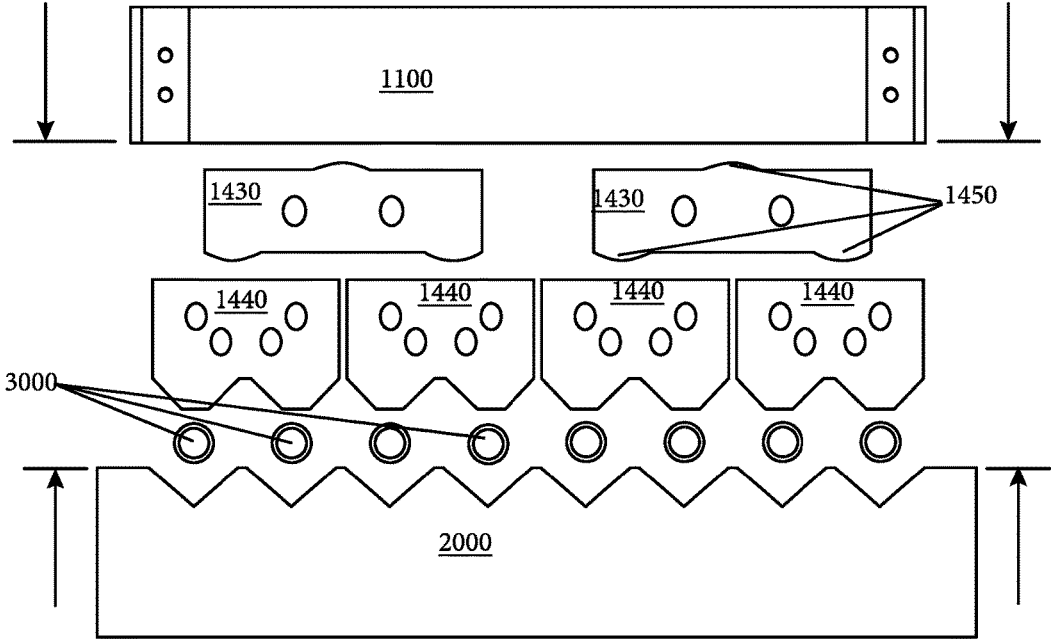


FIG. 6

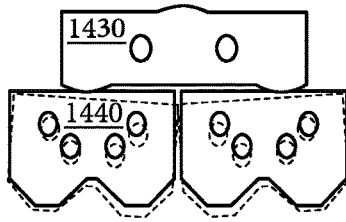


FIG. 7A

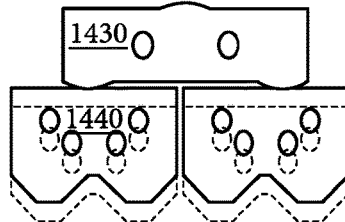


FIG. 7B

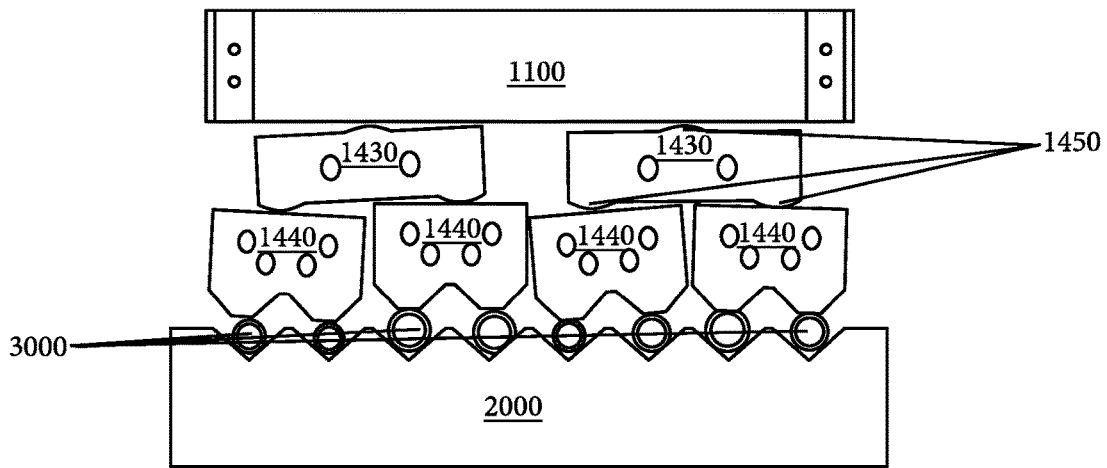


FIG. 7C

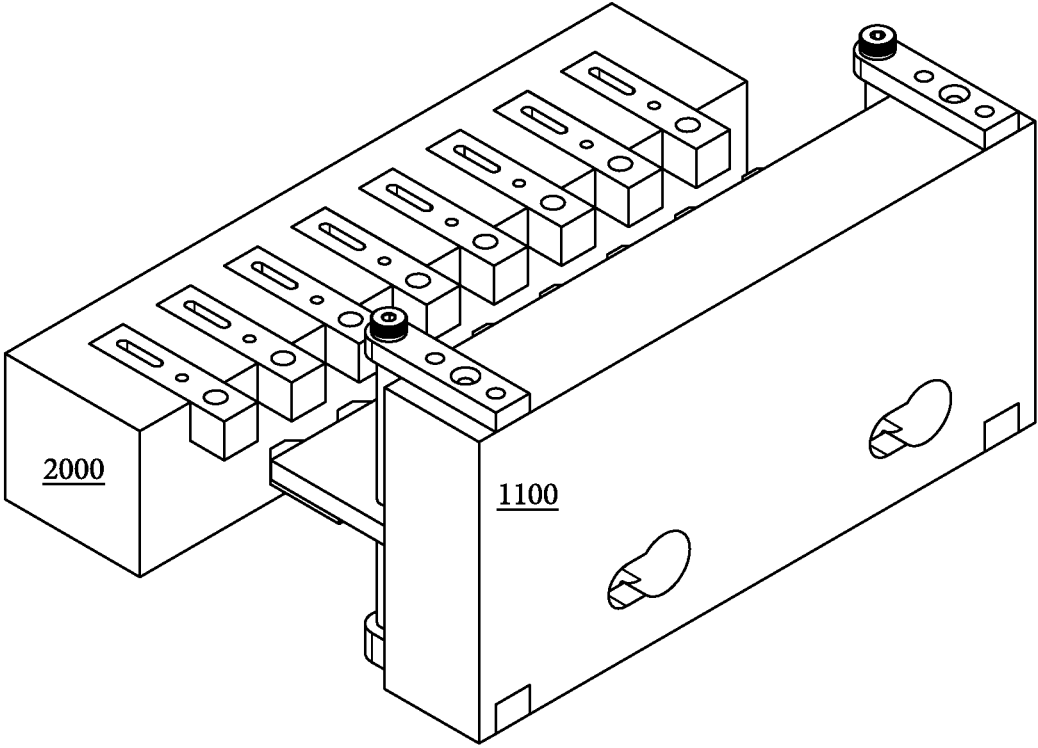


FIG. 8

COMPENSATING FACE PLATE VISE JAWS AND RELATED METHODS

CROSS-REFERENCE TO RELATED APPLICATIONS

Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable.

BACKGROUND OF THE INVENTION

Field of Invention

The disclosed subject matter relates generally to a vise for machining work pieces. More particularly, said subject matter is a vise jaw for supporting and securing multiple work pieces for machining.

Background of the Invention

Work pieces are customarily secured against movement between the jaws of a vise during machining. FIG. 1 illustrates a common vise **100** with: a jaw **110** and two face plates **111**, **112**; and a crank **120** for moving the movable jaw **110** between open and closed positions. In the most basic scenario, a work piece (not shown) is simply clamped or pressed between the two-face plates **111**, **112** by turning the crank **120** to drive the movable jaw **110a** toward the stationary jaw **110b**. Frequently, face plates with differing work-surface qualities or characteristics are required for particular work pieces. For this reason, face plates **111**, **112** of common vises **100**, are preferably interchangeable (e.g., via removing screws) to enable a user to swap face plates having a variety of working surfaces for customized holding of a particular work piece.

One important limitation of the common vise **100** of FIG. 1 is that only one work piece (e.g., elements **150**, **160** or **170** in FIG. 1A) at a time can be reliably secured against movement when pressed between the two face plates **111**, **112**. Referring to the schematic of face plates **111**, **112** shown in FIG. 1A, this limitation is due to each of the face plates **111**, **112** having only a single-plane working surface for contacting work pieces, and since once a first work piece **150** is held fast between the planes (as shown) any larger additional work pieces **160** cannot fit between the planes of the face plates **111**, **112**; and, any smaller additional work pieces **170** fall through the space between the two face plates **111**, **112**.

In the past, multiple work pieces have been held fast by compensating jaw mechanisms. For instance, U.S. Pat. No. 3,077,346 (issued Feb. 12, 1963) by Lassy discloses a "fixture for holding a plurality of work pieces." Referring to Lassy's figures, Lassy's disclosed device features a compensating jaw assembly **15** which is cooperable with a fixed jaw member **16**. Lassy, col. 3:15-20. The jaw assembly **15** is placed on rails **11**, **12** and coupled to a crank **58** to drive the jaw assembly **15** along the rails **11**, **12** toward or away from the fixed jaw member **16**. *Id.*, col. 4:7-30. Ultimately, the working surface of the compensating jaw assembly **15** is defined by a plurality of surfaces (**84**, **85**, **86**, **87**, **88**, **89**, **90**, and **91**) that are each capable of retaining a separate work piece (**94**, **95**, **96**, **98**, **99**, **100**, and **101**). *Id.*, col. 4: 50-59. Internally, the compensating jaw assembly **15** features stages of pivotable members that allow the surfaces **84**, **85**,

86, **87**, **88**, **89**, **90**, and **91** to yield (i.e., compensate) in response to varying sizes of work pieces (**94**, **95**, **96**, **98**, **99**, **100**, and **101**).

Although suitable for holding multiple work pieces at once, compensating jaw mechanisms like the one disclosed by Lassy have several inadequacies. First, such compensating jaw mechanisms cannot, with reference to FIG. 1, readily be used on a common vise **100** without removal of the entire moving jaw **110a** and replacing the same with a compensating jaw assembly and rails. In other words, known compensating jaw mechanisms cannot be easily retrofitted to common vises. Second, the working surfaces of a compensating jaw assembly cannot quickly be interchanged to meet the holding needs of differing work pieces. In known compensating jaw assemblies, changing the working surfaces is difficult because that action requires either the separate swapping out of each of the underlying compensating elements or swapping out the whole jaw assembly. Thus, a need exists for compensating mechanisms that are easily retrofit to modern vises and that facilitate interchangeability of working surfaces for gripping work pieces.

SUMMARY OF THE INVENTION

In view of the forgoing, it is an objective of this specification to disclose a face plate for a vise that is capable of gripping multiple work-pieces of different sizes at the same time. In one embodiment, the disclosed subject matter may be a vise face plate comprising: a base with an upper compensation structure and a lower compensation structure that project from a face of the base and that are movable in a vertical direction along the front of the base relative to each other; wherein the upper compensation structure is defined by a first carrier plate that suspends a first stage of compensating members; wherein the lower compensation structure is defined by a second carrier plate that suspends a second stage of compensating members; wherein the first stage of compensating members in the upper compensation structure are exposed at one end thereof to define a first set of working surfaces; and wherein the second stage of compensating members in the lower compensation structure are exposed at one end thereof to define a second set of working surfaces. In use, the base may be secured to a movable jaw so that the working surfaces may be employed to clamp a plurality of work pieces between the working surface and a fixed jaw.

BRIEF DESCRIPTION OF THE FIGURES

Other objectives of the disclosure will become apparent to those skilled in the art once the invention has been shown and described. The manner in which these objectives and other desirable characteristics can be obtained is explained in the following description and attached figures in which:

FIG. 1 is a perspective view of a common vise **100** of a prior art vise;

FIG. 1A is a diagram of a prior art vise that illustrates the holding of a work piece **150** between face plates **111**, **112**;

FIG. 2 is a rear perspective of a compensating face plate **1000**;

FIG. 3 is a front perspective of the compensating face plate **1000** of FIG. 2;

FIG. 4 an exploded perspective of the compensating face plate **1000** of FIGS. 2 and 3;

FIG. 4A is a rear perspective view of an base **1100**;

FIG. 4B is a top view of the base **1100** of FIG. 4A;

FIG. 4C is a rear view of the base **1100** of FIG. 4A;

FIG. 4D is a bottom view of the base **1100** of FIG. 4A;
 FIG. 4E is a side view of the base **1100** of FIG. 4A;
 FIG. 4F is a cross section view of the base **1100** of FIG. 4A through line F-F in FIG. 4E;
 FIG. 4G is a perspective view of a joint **1120**;
 FIG. 4H is a top or bottom view of the joint **1120** of FIG. 4G;
 FIG. 4I is an either side view of the joint **1120** of FIG. 4G;
 FIG. 4J is a front or back view of the joint **1120** of FIG. 4G;
 FIG. 4K is a perspective view of a carrier plate **1410/1310**;
 FIG. 4L is an either side view of the carrier plate **1410/1310** of FIG. 4K;
 FIG. 4M is a top or bottom view of the carrier plate **1410/1310** of FIG. 4M;
 FIG. 4N is a perspective view of a compensating plate **1340/1440**;
 FIG. 4O is a top or bottom view of a compensating plate **1340/1440** of FIG. 4N;
 FIG. 4P is a front view of a compensating plate **1340/1440** of FIG. 4N;
 FIG. 4Q is an either side view of a compensating plate **1340/1440** of FIG. 4N;
 FIG. 4R is a perspective view of a compensating element **1330/1430**;
 FIG. 4S is a top or bottom view of a compensating element **1330/1430** of FIG. 4R;
 FIG. 4T is a front or back view of a compensating element **1330/1430** of FIG. 4R;
 FIG. 4U is an either side view of a compensating element **1330/1430** of FIG. 4R;
 FIG. 4V is a perspective view of a front jaw **2000**;
 FIG. 4W a top or bottom view of the front jaw **2000** of FIG. 4V;
 FIG. 4X is a back view of the front jaw **2000** of FIG. 4V;
 FIG. 4Y is a side view of the front jaw **2000** of FIG. 4V;
 FIG. 4Z is a front view of the front jaw **2000** of FIG. 4V;
 FIG. 4AA is a perspective view of a stop offset **2100**;
 FIG. 4BB is a left side view of the stop offset **2100** of FIG. 4AA;
 FIG. 4CC is a top view of the stop offset **2100** of FIG. 4AA;
 FIG. 4DD is a front view of the stop offset **2100** of FIG. 4AA;
 FIG. 5 is an environmental view of the compensating face plate **1000** of FIGS. 1 through 5;
 FIG. 6 is a diagram of the compensating face plate **1000** of FIG. 5;
 FIG. 7A is another diagram of the compensating face plate **1000** of FIG. 5;
 FIG. 7B is another diagram of the compensating face plate **1000** of FIG. 5; and
 FIG. 7C is another diagram of the compensating face plate **1000** of FIG. 5; and
 FIG. 8 is an alternate embodiment of a face plate **2000** used in connection with the compensating face plate **1000** of the earlier figures.

It is to be noted, however, that the appended figures illustrate only typical embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments that will be appreciated by those reasonably skilled in the relevant arts. Also, figures are not necessarily made to scale but are representative.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Disclosed generally is a vise that is capable of gripping multiple work-pieces of different sizes at the same time. In one embodiment, the disclosed subject matter may be a vise face plate comprising: a base with an upper compensation structure and a lower compensation structure that project from a face of the base and that are movable in a vertical direction along the front of the base relative to each other; wherein the upper compensation structure is defined by a first carrier plate that suspends a first stage of compensating members; wherein the lower compensation structure is defined by a second carrier plate that suspends a second stage of compensating members; wherein the first stage of compensating members in the upper compensation structure are exposed at one end thereof to define a first set of working surfaces; and wherein the second stage of compensating members in the lower compensation structure are exposed at one end thereof to define a second set of working surfaces. In use, the base may be secured to a movable jaw so that the working surfaces may be employed to clamp a plurality of work pieces between the working surface and a fixed jaw. The more specific details of the disclosed face plate are described in connection with the figures.

FIG. 2 is a front perspective of a compensating face plate **1000**. FIG. 3 is a rear perspective of the compensating face plate **1000** of FIG. 2. FIG. 4 an exploded perspective of the compensating face plate **1000** of FIGS. 2 and 3. In these figures, the compensating face plate **1000** is shown being opposed to a standard face plate **2000**, as would be the case when the face plates **1000**, **2000** are installed on a common vise of the type shown in FIG. 1). As shown in FIGS. 2 through 4 the compensating face plate **1000** generally comprises a base **1100**, an upper compensating structure **1400** and a lower compensating structure **1300**.

Referring to FIGS. 2 and 3, preferably, the base **1100** is a standard block with two apertures **1110** for securing the base **1100** to a jaw of a standard vise (not shown). In one embodiment, the apertures **1110** allow for a user to interchange the compensating face plate **1000** on a standard vise and enable the bolting of the device **1000** to the jaw of a standard vise (not shown). A preferred embodiment of the apertures are discussed in connection with FIGS. 4A through 4F below. Other securing means known to those of skill in the art may be used for securing the base **1100** to a jaw of a vise (not shown).

As shown in FIGS. 2 and 3, the upper compensating structure **1400** and lower compensating structure **1300** project from the upper and lower portions of the face of the base **1100**. Suitably, the base **1100** may be a rectangular block where the upper and lower compensating structures **1300/1400** preferably sit on two dowels **1130** that are secured to the front of the base **1100** along the sides via joints **1120** that extend forward from the base's **1100** four corners. Suitably, the compensating structures **1300/1400** are movable relative to one another along the dowels **1130** in a vertical direction and over the front of the base **1100**. Preferably, the compensating structures may be releasably set or locked in a position along the dowels **1130** by virtue of the dowels **1130** residing in slip-fit bores **1490** in the compensating structures **1300/1400**. Suitably, the slip-fit of the bore **1490** may be accomplished via providing a rubber ring or o-ring around the bore **1490**. The dowels **1130** may suitably be held fast relative to the base **1100** via bolts **1131** (e.g., stripper bolts) over and through the joints **1120**. In a preferred embodiment, the benefit of having an upper and lower compensating

structure **1400**, **1300** with a gap between the two for access to the aperture **1110** is that it allows for (i) a user to interchange the compensating face plate **1000** from the jaw of one standard vise to another and (ii) a user to adjust the working surface of the face plate **1000** to shorter or taller work pieces (i.e. adjustments in the vertical dimension). Referring to FIG. 2, the joints **1120** on the top of the base **1100** are secured to the base **1100** by rivets **1121** fastened through the joints **1120** into the base **1100**. Also displayed in FIG. 2 are compensating plates **1440**, which are loosely suspended from the carrier plate **1420** of the upper compensating structure **1400** via rivets **1442**. Additionally shown are compensating plates **1340**, which are loosely suspended from the carrier plate **1320** of the lower compensating structure **1300** via rivets **1342**.

Referring to FIG. 4, the upper compensating structure **1400** is defined by a carrier plate **1420** that loosely suspends a first stage of compensating elements **1430** and a second stage of compensating elements or plates **1440**. Preferably, the first stage comprises two compensating elements **1430** and the second stage comprises four compensating elements or plates **1440**. Referring to FIG. 2, each of the compensating elements **1430** (not shown in FIG. 2) are loosely and movably suspended from the carrier plate **1420** via a rivet or pin **1432**. Similarly, each of the compensating elements **1440** are loosely and movably suspended from the carrier plate **1420** via a rivets or pins **1442**. Referring to FIG. 4, the loose and movable mounting of the compensating members **1430**, **1440** may suitably be provided with openings **1431**, **1441** for receiving the corresponding rivets or pins **1432**, **1442**. Still referring to FIG. 4, the rear and the front of the compensating members **1430** feature nubs **1450** that are medially positioned in the back and side positioned on the front so that interaction therewith will cause the compensating members **1440**, **1430** to pivot around the nubs **1450**. This interaction is described in better detail in connection with FIGS. 7A through 7B. In one embodiment, the nubs **1450** may be arcuated, semi-circle, triangular, or any other shape that accomplishes a pivot point.

Although not shown in FIG. 4, FIGS. 2 and 3 show that the lower compensating structure **1300** is also defined by a carrier plate **1320** that loosely and movably suspends a first stage of compensating elements **1330** (not shown) and a second stage of compensating elements **1340**. Referring to FIG. 3, each of the compensating elements **1330** (not shown) are loosely and movably suspended from the carrier plate **1320** via rivets or pins **1332** (not shown). Similarly, each of the compensating elements **1340** are loosely and movably suspended from the carrier plate **1420** via rivets or pins **1342**. The structures and operations of the lower compensating structure **1300** and **1400** are the same and differ only by reference numerals in the drawings.

FIG. 4A is a rear perspective view of the base **1100**. FIG. 4B is a top view of the base **1100** of FIG. 4A. FIG. 4C is a rear view of the base **1100** of FIG. 4A. FIG. 4D is a bottom view of the base **1100** of FIG. 4A. FIG. 4E is a side view of the base **1100** of FIG. 4A. Finally, FIG. 4F is a cross section view of the base **1100** of FIG. 4A through line F-F in FIG. 4E. As shown, the base **1100** is preferably a standard block with two apertures **1110** for securing the base **1100** to a jaw of a standard vise (not shown). The base also features four cutouts **1140** on the top and bottom corners for receiving the joints **1120** as discussed above. Suitably, a preferred embodiment of the base **1100** is a four and a half inch by one and a half inch by eight and a half inch "1018 cold rolled" block that is otherwise dimensioned as shown in the drawings, where numbers in the form of: X.X have a tolerance of

plus or minus 0.050; X.XX have a tolerance of plus or minus 0.030; and X.XXX have a tolerance of plus or minus 0.010.

Still referring to FIGS. 4A through F, in one embodiment, the apertures **1110** allow for a user to interchange the compensating face plate **1000** on a standard vise and enable the bolting of the device **1000** to the jaw of a standard vise (not shown). A preferred embodiment of the apertures **1110** are discussed in connection with FIGS. 4B through 4F below. Other securing means known to those of skill in the art may be used for securing the base **1100** to a jaw of a vise (not shown). Referring to FIGS. 4B, 4C (DETAIL A), 4D, 4E (LINE F-F) and 4F, the apertures **1110** define a modified "keyhole" connection. Keyhole connections are well known in the art as an expedient for rapidly joining a pair of members. See, e.g., U.S. Pat. No. 2,810,600 by Kendrick (circa 1954) and U.S. Pat. No. 6,022,010 by Bernstein (issued Feb. 8, 2000). Ordinary keyhole connections incorporate one or more slots in a first member which is adapted to be secured to a second member by screws or bolts. In these old keyholes, the slots are each formed with an enlarged portion which will pass the bolt head and a portion which is reduced in width to pass the bolt shank but not the head. Applying the general principles of a keyhole connection, the preferred embodiment of the base **1100** shown in the figures features the apertures **1110** that are defined by slot **1111** (see FIG. 4C, detail A) with an enlarged portion **1112** (see FIG. 4C, detail A) that will pass the head of a bolt (not shown) and a portion **1113** (see FIG. 4C, detail A) which is reduced in width to receive the shank so that a bolt head fit into the keyhole may be tightened down over a collar **1114** (FIGS. 4E (LINE F-F) and 4F) via inserting a tool through the passage **1115** (FIGS. 4E (LINE F-F) and 4F). The slots **1111** may suitably be completely enclosed and within the periphery of the base **1100** with the enlarged portion **1112** spaced apart the same distance corresponding connection points on a vice jaw (not shown). To install the base **1100** on a vise jaw (not shown), bolts (not shown) with a head and shank are provided to the jaw (not shown) and are loosened so that the heads are protruding sufficiently far from the jaw surface (not shown) so that the heads (not shown) can be provided into the large portion **1112** of the slots **1111** of the base **1100**. Then the base **1100** may be slid so that the shanks of the bolts are provided through the reduced portions **1113** of the slots **1111** with the heads of the bolts (not shown) internally positioned within the slots **1111** and abutting the collar **1114**. Finally, the bolts (not shown) may be tightened down against the collar **1114** via a tool (e.g., an Allen wrench) provided diagonally through the passage **1115**. In the preferred embodiment, the passage is diagonal so that a tool provide thereto may be easily operated without conflicting mechanically with the dowels **1130** when the face plate is fully assembled.

FIG. 4G is a perspective view of a joint **1120**. FIG. 4H is a top or bottom view of the joint **1120** of FIG. 4G. FIG. 4I is an either side view of the joint **1120** of FIG. 4G. FIG. 4J is a front or back view of the joint **1120** of FIG. 4G. The joint **1120** is configured to fit within the cutouts **1140** on the top and bottom corners of the base **1100** (see FIGS. 2 and 3) as discussed above. The joint **1120** suitably features two apertures for receiving rivets **1121** (see FIGS. 2 and 3) and an aperture **1122** for receiving the dowel **1130** (see FIG. 4) as discussed above. Suitably, a preferred embodiment of the joint **1120** is a half inch by quarter inch by two and a quarter inch "1018 cold rolled" plate that is otherwise dimensioned as shown in the drawings, where numbers in the form of: X.X have a tolerance of plus or minus 0.050; X.XX have a

tolerance of plus or minus 0.030; and X.XXX have a tolerance of plus or minus 0.010.

FIG. 4K is a perspective view of a carrier plate 1420/1320. FIG. 4L is an either side view of the carrier plate 1420/1320 of FIG. 4K. FIG. 4M is a top or bottom view of the carrier plate 1420/1320 of FIG. 4M. The carrier plate 1420/1320 features bores 1490 for slip fit retention of a dowel 1130 (not shown) and bores for loosely and adjustably securing compensating elements 1430/1330 (see FIGS. 2 and 3) and compensating plates 1440/1340 (see FIGS. 2 and 3) via rivets or pins 1432/1442/1332/1342 (see FIGS. 2 and 3). Suitably, a preferred embodiment of the joint carrier plate 1420/1320 is a half inch by quarter inch by two and a quarter inch "1018 cold rolled" plate that is otherwise dimensioned as shown in the drawings, where numbers in the form of: X.X have a tolerance of plus or minus 0.050; X.XX have a tolerance of plus or minus 0.030; and X.XXX have a tolerance of plus or minus 0.010.

FIG. 4N is a perspective view of a compensating plate 1340/1440. FIG. 4O is a top or bottom view of a compensating plate 1340/1440 of FIG. 4N. FIG. 4P is a front view of a compensating plate 1340/1440 of FIG. 4N. FIG. 4Q is an either side view of a compensating plate 1340/1440 of FIG. 4N. As shown, the plate 1340/1440 features bores 1441 so that the same may be movably suspended on a carrier plate 1320/1420 (not shown). Suitably, a preferred embodiment of the compensating plate 1340/1440 is a 0-1 tool steel plate that is otherwise dimensioned as shown in the drawings, where numbers in the form of: X.X have a tolerance of plus or minus 0.050; X.XX have a tolerance of plus or minus 0.030; and X.XXX have a tolerance of plus or minus 0.010.

FIG. 4R is a perspective view of a compensating element 1330/1430. FIG. 4S is a top or bottom view of a compensating element 1330/1430 of FIG. 4R. FIG. 4T is a front or back view of a compensating element 1330/1430 of FIG. 4R. FIG. 4U is an either side view of a compensating element 1330/1430 of FIG. 4R. As shown, the elements 1330/1430 features bores 1331 so that the same may be movably suspended on a carrier plate 1320/1420 (not shown). Suitably, a preferred embodiment of the compensating element 1330/1430 is a 0-1 tool steel plate that is otherwise dimensioned as shown in the drawings, where numbers in the form of: X.X have a tolerance of plus or minus 0.050; X.XX have a tolerance of plus or minus 0.030; and X.XXX have a tolerance of plus or minus 0.010.

FIG. 4V is a perspective view of a front jaw 2000. FIG. 4W is a top or bottom view of the front jaw 2000 of FIG. 4V. FIG. 4X is a back view of the front jaw 2000 of FIG. 4V. FIG. 4Y is a side view of the front jaw 2000 of FIG. 4V. FIG. 4Z is a front view of the front jaw 2000 of FIG. 4V. As shown, the front jaw 2000 may feature a working surface that can be customized to the shape of a work piece. Suitably, the front or work surface feature apertures 2200 along either end thereof so that a stage or stop offset 2100 (not shown; see FIG. 4AA) may be movably mounted at various vertical positions along the working surface of the front jaw 2000 for supporting work pieces at a desired vertical position during operation. Suitably, the back of the front jaw 2000 features keyhole connection slots, as discussed above. Suitably, a preferred embodiment of the front jaw 2000 is a four inch by two and a quarter inch by nine and an eighth inch "1018 cold rolled" stock that is otherwise dimensioned as shown in the drawings, where numbers in the form of: X.X have a tolerance of plus or minus 0.050; X.XX have a tolerance of plus or minus 0.030; and X.XXX have a tolerance of plus or minus 0.010.

FIG. 4AA is a perspective view of a stop offset 2100. FIG. 4BB is a left side view of the stop offset 2100 of FIG. 4AA. FIG. 4CC is a top view of the stop offset 2100 of FIG. 4AA. FIG. 4DD is a front view of the stop offset 2100 of FIG. 4AA. Suitably, the stop offset 2100 feature cooperates with the working surface of a front jaw 2000 (not shown) and apertures 2200 (not shown; see FIGS. V through Z) of the front jaw 2000 (not shown) along either end thereof said working surface so that the stop offset 2100 may be movably mounted at various vertical positions along the working surface of the front jaw 2000 for supporting work pieces at a desired vertical position during operation. Suitably, a preferred embodiment of the stop offset 2200 is a half inch by three quarters inch by nine and an eighth inch "1018 cold rolled" plate that is otherwise dimensioned as shown in the drawings, where numbers in the form of: X.X have a tolerance of plus or minus 0.050; X.XX have a tolerance of plus or minus 0.030; and X.XXX have a tolerance of plus or minus 0.010.

FIG. 5 is an environmental view of the compensating face plate 1000 of FIGS. 1 through 5. As shown, the second stages of compensating members 1440, 1340 may each be used to secure two work pieces 3000 against the face plate 2000. FIG. 6 is a diagram of the compensating elements 1430, 1440 of the upper structure 1400 of the compensating face plate 1000 of FIG. 5. The compensating elements 1430 may also exemplify the operation of compensating elements 1330, 1340 of the lower structure 1300. Referring to FIG. 6, the nubs 1450 are substantially medially posited on the rear and on the front ends of the compensating elements 1430, 1440 wherein (a) the nubs 1450 on the rear of the first stage of compensating elements 1430 interface with the front face of the base 1100 while (b) the nubs 1450 of the on the front of the compensating elements 1430 interface with the back face of the compensating elements of the second stage of compensating elements 1440.

From the descriptions of FIGS. 1 through 5, it will be readily apparent that the first and second stages of the compensating elements (e.g., 1430, 1440) are operatively suspended in position from the carrier plates (e.g., 1420, 1430) by the several rivets or pins (e.g., 1432, 1442), and that the enlarged openings or bores (e.g., 1431, 1441) through the individual compensating members (e.g., 1430, 1440). It is to be noted however, that the pins or rivets (e.g., 1432, 1442) are of substantially smaller diameter than the respective openings (e.g., 1431, 1441) in the compensating jaw members (e.g., 1440, 1430) so that relative movement between the compensating elements (e.g., 1440, 1430) and the pins (e.g., 1442, 1432) in the plane between the panels (e.g., 1410, 1420) is enabled. This is to account for variations in size and slight variations in shape of several work pieces 3000 and to permit the shifting or pivoting of the compensating members (e.g., 1430, 1440) in any direction to accommodate for the variations within the work pieces 3000 and yet still permit pivoting of the compensating members (e.g., 1430, 1440) to exert a uniform and equal force on all of the work pieces 3000.

This above described operation is generally illustrated by FIG. 7, which is another diagram of the compensating face plate of FIG. 5 and illustrates the operation of the compensating face plate 1000. Referring first to FIGS. 7A and 7B, the second stage of compensating elements 1440 are configured to shift or pivot in response to interaction between the nubs 1450 and the front face of the first stage of compensating elements 1430. This pivoting or shifting is generally shown in broken lines. The first stage of compensating elements 1430 is similarly configured for pivoting in

response to interactions with the front face of the base **1100**. When so configured, each compensating panel in the first stage may be used to grip two work pieces against the face plate **2000**, as shown in FIG. 7C.

FIG. 8 is an alternate embodiment of a face plate **2000** used in connection with the compensating face plate **1000** of the earlier figures. In certain circumstances, it is desirable for the faceplate **2000** to be customized to the holding of certain work pieces and FIG. 8 illustrates a faceplate **2000** that has been so customized.

The utility model is described according to one embodiment. Without departing from the principles of the utility model, the device can be adjusted to accomplish various other embodiments. It should be pointed out that any technical solution or equivalent transformation all fall within the scope of the protection of utility models. It is to also be noted, however, that the appended figures illustrate only typical embodiments of the disclosed assemblies, and therefore, are not to be considered limiting of their scope, for the disclosed assemblies may admit to other equally effective embodiments that will be appreciated by those reasonably skilled in the relevant arts. Also, figures are not necessarily made to scale.

While the invention has been shown in a preferred embodiment, including a generally tubular or inverted truncated cone-shaped cup, it is recognized that departures may be made in the form of the cup and the mating matching rings to accommodate a square-shaped cup, for example; and it is further recognized that departures may be made from the invention as described within the spirit of this invention which is therefore not to be limited except as set forth in the claims which follow.

Although the method and apparatus is described above in terms of various exemplary embodiments and implementations, it should be understood that the various features, aspects and functionality described in one or more of the individual embodiments are not limited in their applicability to the particular embodiment with which they are described, but instead might be applied, alone or in various combinations, to one or more of the other embodiments of the disclosed method and apparatus, whether or not such embodiments are described and whether or not such features are presented as being a part of a described embodiment. Thus the breadth and scope of the claimed invention should not be limited by any of the above-described embodiments.

Terms and phrases used in this document, and variations thereof, unless otherwise expressly stated, should be construed as open-ended as opposed to limiting. As examples of the foregoing: the term “including” should be read as meaning “including, without limitation” or the like, the term “example” is used to provide exemplary instances of the item in discussion, not an exhaustive or limiting list thereof, the terms “a” or “an” should be read as meaning “at least one,” “one or more,” or the like, and adjectives such as “conventional,” “traditional,” “normal,” “standard,” “known” and terms of similar meaning should not be construed as limiting the item described to a given time period or to an item available as of a given time, but instead should be read to encompass conventional, traditional, normal, or standard technologies that might be available or known now or at any time in the future. Likewise, where this document refers to technologies that would be apparent or known to one of ordinary skill in the art, such technologies encompass those apparent or known to the skilled artisan now or at any time in the future.

The presence of broadening words and phrases such as “one or more,” “at least,” “but not limited to” or other like

phrases in some instances shall not be read to mean that the narrower case is intended or required in instances where such broadening phrases might be absent. The use of the term “assembly” does not imply that the components or functionality described or claimed as part of the module are all configured in a common package. Indeed, any or all of the various components of a module, whether control logic or other components, might be combined in a single package or separately maintained and might further be distributed across multiple locations.

Additionally, the various embodiments set forth herein are described in terms of exemplary block diagrams, flow charts and other illustrations. As will become apparent to one of ordinary skill in the art after reading this document, the illustrated embodiments and their various alternatives might be implemented without confinement to the illustrated examples. For example, block diagrams and their accompanying description should not be construed as mandating a particular architecture or configuration.

All original claims submitted with this specification are incorporated by reference in their entirety as if fully set forth herein.

We claim:

1. Jaws for a vise operationally configured to grip multiple work pieces at the same time, said jaws comprising:
 - a compensating face plate assembly comprising:
 - a base with at least one aperture disposed for securing the base to a first jaw of the vise;
 - at least one dowel vertically secured to the front of a base via a joint that extends from the base;
 - at least one carrier plate that is movably securable along the dowel and perpendicular relative to the base;
 - a first stage of at least one compensating elements that is loosely suspended from and pivotally secured to said at least one carrier plate by a pin or rivet;
 - a second stage of at least two compensating elements each of said compensating elements in the second stage being loosely suspended from and pivotally secured to said at least one carrier plate by a pin or rivet;
 - one of said compensating elements of the second stage having at least one surface for interfacing a first workpiece;
 - another one of said compensating elements of the second stage having at least one surface for interfacing a second workpiece;
 - said compensating element of the first stage having a first nub that abuts the base, a second nub that abuts one of the compensating elements from the second stage, and a third nub that abuts another one of the compensating elements from the second stage; and,
 - a face plate secured to a second jaw of the vise, said face plate with a first surface for interfacing the first workpiece and a second surface for interfacing the second workpiece.
2. The compensating face plate assembly of 1, wherein the base is removably secured to a movable vise jaw.
3. Vise jaws comprising:
 - A compensating face plate assembly comprising: a base with at least one aperture;
 - at least one dowel perpendicularly secured to the front of a base via a joint that extends from the base;
 - an upper compensation structure defined by a first carrier plate and at least one set of compensation elements,

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wherein the carrier plate is secured to the base that is movably securable along the dowel and perpendicular relative to the base;

a first stage of at least one compensating elements that is loosely suspended from and pivotally secured to said at least one carrier plate by a pin or rivet;

a second stage of at least two compensating elements each of said compensating elements in the second stage being loosely suspended from and pivotally secured to said at least one carrier plate by a pin or rivet;

one of said compensating elements of the second stage having at least one surface for interfacing a first workpiece;

another one of said compensating elements of the second stage having at least one surface for interfacing a second workpiece;

said compensating element of the first stage having a first nub that abuts the base, a second nub that abuts one of the compensating elements from the second stage, and

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a third nub that abuts another one of the compensating elements from the second stage; and,

a lower compensation structure defined by a second carrier plate and at least one stage of compensating elements, wherein the carrier plate is secured to the base via the dowel;

a face plate secured to a second jaw of the vise, said face plate with a first surface for interfacing the first workpiece and a second surface for interfacing the second workpiece.

4. The compensating face plate assembly of claim 3, wherein the stages of compensating elements are pivotally mounted between the upper plate and the lower plate.

5. The compensating face plate assembly of claim 3, wherein the compensating elements are pivotally mounted to the second carrier plate via fasteners that are smaller in diameter than at least one bore that is disposed along the compensating element.

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