

the flange 105. The embodiments depicted in FIGS. 4-8 may also be less costly to implement than other configurations that include the upper brace bar 302. The following describes analyses to determine if the Coriolis deflections are isolated from the flange 105. It is appreciated that any appropriate analysis may be employed to determine if an embodiment provided in accordance with the present invention isolates the vibratory meter 100.

FIG. 4 shows a first apparatus 400 for the vibratory meter 100 provided in accordance with an embodiment of the invention. As depicted in FIG. 4, the first apparatus 400 includes a lower isolation bar 402 that is coupled to the inner brace bar 203 and the outer end brace bar 204. The lower isolation bar 402 is depicted as attached (e.g., welded, soldered, etc.) to the inner brace bar 203 and the outer brace bar 204. Any suitable means of attaching the lower isolation bar 402 may be employed. In this or other embodiments, the lower isolation bar 402 may be formed (e.g., bent, forged, or the like) from the same piece of material as the inner brace bar 203 and the outer brace bar 204.

The lower isolation bar 402 may be adapted (e.g., designed, fabricated, and/or assembled) to isolate the vibratory meter 100. For example, the lower isolation bar 402 may, when coupled to the brace bars (203, 204), isolate the vibratory meter 100. The isolation may be in the form of isolating the vibratory meter 100 from vibrations. In the same or alternative embodiments, the lower isolation bar 402 may also isolate the Coriolis deflections from the flange 105. Also, parameters of the lower isolation bar 402 such as the dimensions (e.g., width, thickness, etc.) or the material properties may be selected to isolate the vibratory meter 100. Additionally or alternatively, the lower isolation bar 402 may be positioned (e.g., placed in a particular location on the brace bars (203, 204)) to isolate the vibratory meter 101.

Such selection of the parameters or the position of the lower isolation bar 402 may be performed in a software simulation, a prototype, and/or a fabrication of the vibratory meter 100. For example, a finite element analysis (FEA) model of the first apparatus 400 may include simulated flow tubes 101 and 102 that are vibrated by a simulated driver D. The software performing this simulation may then measure reaction forces at the flange 105. The greater the reaction forces at the flange 105 the more the Coriolis deflections are coupled to the flange 105. The more the Coriolis deflections are

FIG. 6 shows a third apparatus 600 for the vibratory meter 100 provided in accordance with the present invention. As depicted, the third apparatus 600 includes a first side isolation bar 602 and a second side isolation bar 604. The third apparatus 600 also includes the lower isolation bar 402 depicted previously in FIGS. 4 and 5. However, the third apparatus 600 does not include the upper isolation bar 502 depicted in FIG. 5. The first side isolation bar 602 and the second side isolation bar 604 are depicted as coupled to the inner brace bar 203 and the outer brace bar 204. The first side isolation bar 602 and the second side isolation bar 604 are about the height of the inner brace bar 203 and the outer brace bar 203. In alternative embodiments, the heights of the first side isolation bar 602 and the second side isolation bar 604 may be different heights to isolate the flow meter 100. For example, the first side isolation bar 602 may have a height that is smaller than the height of the inner brace bar 203 and the outer brace bar 203. Also, more or fewer side isolation bars may be selected to isolate the vibratory meter 100.

FIG. 7 shows a fourth apparatus 700 for a vibratory meter 100 provided in accordance with the present invention. As depicted, the fourth apparatus 700 includes the first side isolation bar 602 and the second side isolation bar 604 but does not include the lower isolation bar 402 depicted in FIG. 6.

FIG. 8 shows a fifth apparatus 800 for a vibratory meter 100 provided in accordance with the present invention. As depicted, the fifth apparatus 800 includes a first side aperture isolation bar 802 and a second side aperture isolation bar 804 that are similar to the first side isolation bar 602 and the second side isolation bar 604 coupled to the inner brace bar 203 and the outer brace bar 204. The second side aperture isolation bar 804 includes apertures 806a, 806b, and 806c. The apertures 806a, 806b, and 806c are oval in shape. Apertures in the first side aperture isolation bar 802 are not shown. Parameters such as dimensions or shapes of the apertures 806a, 806b, and 806c may be selected to isolate the flow meter 100. For example, a length of a major axis of the oval shape of the apertures 806a, 806b, and 806c may be selected to isolate the flow meter 100. Although three apertures 806a, 806b, and 806c are depicted, more or fewer apertures may be selected to isolate the vibratory meter 100. Also, other aperture shapes may be selected such as square, circular, triangular, etc. The shapes may also be dissimilar. For example, triangle shaped apertures may be in the same isolation bar as

What is claimed is:

1. A vibratory meter (100) having one or more flow tubes (101, 102) adapted to vibrate, comprising an apparatus (400) having:
 - two or more brace bars (203, 204) adapted to couple to the one or more flow tubes (101, 102); and
 - an isolation bar (402) coupled to the two or more brace bars (203, 204);
 - a first side isolation bar (602) attached to each of the two or more brace bars (203, 204); and
 - a second side isolation bar (604) attached to each of the two or more brace bars (203, 204), wherein the first and second isolation bars (602, 604) comprise a trapezoidal profile.
2. The vibratory meter (100) of claim 1 wherein the two or more brace bars (203, 204) are coupled to the one or more flow tubes (101, 102).
3. The vibratory meter (100) of claim 1 wherein the isolation bar (402) is adapted to isolate the vibratory meter (100) from undesirable vibrations.
4. The vibratory meter (100) of claim 3 wherein the isolation bar (402) is adapted to isolate the vibratory meter (100) from undesirable vibrations by one or more parameters selected to isolate the vibratory meter (100).
5. The isolation bar (402) of claim 4 wherein the one or more parameters selected includes a dimension of the isolation bar (402) selected to isolate the vibratory meter (100).
6. The vibratory meter (100) of claim 1 wherein the isolation bar (402) is positioned to isolate the vibratory meter (100).
7. The vibratory meter (100) of claim 1 wherein the isolation bar (402) is adapted to isolate the one or more flow tubes (101, 102) from undesirable vibrations.

8. A method for a vibratory meter (100) having one or more flow tubes (101, 102) adapted to vibrate, comprising:

forming two or more brace bars (203, 204) adapted to couple to the one or more flow tubes (101, 102); and

5 forming and coupling two or more side isolation bars (602, 604) comprising a trapezoidal profile to the two or more brace bars (203, 204).

9. The method of claim 8 further comprising coupling the two or more brace bars (203, 204) to the one or more flow tubes (101, 102).

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10. The method of claim 8 wherein the forming and coupling the isolation bar (402) to the two or more brace bars (203, 204) includes adapting the isolation bar (402) to isolate the vibratory meter (100).

15 11. The method of claim 10 wherein the adapting the isolation bar (402) includes selecting one or more parameters of the isolation bar (402) to isolate the vibratory meter (100).

20 12. The method of claim 11 wherein the selecting the one or more parameters of the isolation bar (402) includes selecting a dimension of the isolation bar (402) to isolate the vibratory meter (100).

25 13. The method of claim 8 wherein the forming and coupling the isolation bar (402) to the two or more brace bars (203, 204) includes positioning the isolation bar (402) to isolate the vibratory meter (100).

30 14. The method of claim 8 wherein forming and coupling the isolation bar (402) to the two or more brace bars (203, 204) includes isolating the one or more flow tubes (101, 102).

15. The method of claim 8 wherein forming and coupling the isolation bar (402) to the two or more brace bars (203, 204) includes isolating the vibratory meter (100).

the flange 105. The embodiments depicted in FIGS. 4-8 may also be less costly to implement than other configurations that include the upper brace bar 302. The following describes analyses to determine if the Coriolis deflections are isolated from the flange 105. It is appreciated that any appropriate analysis may be employed to determine if an embodiment provided in accordance with the present invention isolates the vibratory meter 100.

FIG. 4 shows a first apparatus 400 for the vibratory meter 100 provided in accordance with an embodiment of the invention. As depicted in FIG. 4, the first apparatus 400 includes a lower isolation bar 402 that is coupled to the inner brace bar 203 and the outer end brace bar 204. The lower isolation bar 402 is depicted as attached (*e.g.*, welded, soldered, etc.) to the inner brace bar 203 and the outer brace bar 204. Any suitable means of attaching the lower isolation bar 402 may be employed. In this or other embodiments, the lower isolation bar 402 may be formed (*e.g.*, bent, forged, or the like) from the same piece of material as the inner brace bar 203 and the outer brace bar 204.

The lower isolation bar 402 may be adapted (*e.g.*, designed, fabricated, and/or assembled) to isolate the vibratory meter 100. For example, the lower isolation bar 402 may, when coupled to the brace bars (203, 204), isolate the vibratory meter 100. The isolation may be in the form of isolating the vibratory meter 100 from vibrations. In the same or alternative embodiments, the lower isolation bar 402 may also isolate the Coriolis deflections from the flange 105. Also, parameters of the lower isolation bar 402 such as the dimensions (*e.g.*, width, thickness, etc.) or the material properties may be selected to isolate the vibratory meter 100. Additionally or alternatively, the lower isolation bar 402 may be positioned (*e.g.*, placed in a particular location on the brace bars (203, 204)) to isolate the vibratory meter 100.

Such selection of the parameters or the position of the lower isolation bar 402 may be performed in a software simulation, a prototype, and/or a fabrication of the vibratory meter 100. For example, a finite element analysis (FEA) model of the first apparatus 400 may include simulated flow tubes 101 and 102 that are vibrated by a simulated driver D. The software performing this simulation may then measure reaction forces at the flange 105. The greater the reaction forces at the flange 105 the more the Coriolis deflections are coupled to the flange 105. The more the Coriolis deflections are

FIG. 6 shows a third apparatus 600 for the vibratory meter 100 provided in accordance with the present invention. As depicted, the third apparatus 600 includes a first side isolation bar 602 and a second side isolation bar 604. The third apparatus 600 also includes the lower isolation bar 402 depicted previously in FIGS. 4 and 5. However, the third apparatus 600 does not include the upper isolation bar 502 depicted in FIG. 5. The first side isolation bar 602 and the second side isolation bar 604 are depicted as coupled to the inner brace bar 203 and the outer brace bar 204. The first side isolation bar 602 and the second side isolation bar 604 are about the height of the inner brace bar 203 and the outer brace bar 204. In alternative embodiments, the heights of the first side isolation bar 602 and the second side isolation bar 604 may be different heights to isolate the flow meter 100. For example, the first side isolation bar 602 may have a height that is smaller than the height of the inner brace bar 203 and the outer brace bar 204. Also, more or fewer side isolation bars may be selected to isolate the vibratory meter 100.

FIG. 7 shows a fourth apparatus 700 for a vibratory meter 100 provided in accordance with the present invention. As depicted, the fourth apparatus 700 includes the first side isolation bar 602 and the second side isolation bar 604 but does not include the lower isolation bar 402 depicted in FIG. 6.

FIG. 8 shows a fifth apparatus 800 for a vibratory meter 100 provided in accordance with the present invention. As depicted, the fifth apparatus 800 includes a first side aperture isolation bar 802 and a second side aperture isolation bar 804 that are similar to the first side isolation bar 602 and the second side isolation bar 604 coupled to the inner brace bar 203 and the outer brace bar 204. The second side aperture isolation bar 804 includes apertures 806a, 806b, and 806c. The apertures 806a, 806b, and 806c are oval in shape. Apertures in the first side aperture isolation bar 802 are not shown. Parameters such as dimensions or shapes of the apertures 806a, 806b, and 806c may be selected to isolate the flow meter 100. For example, a length of a major axis of the oval shape of the apertures 806a, 806b, and 806c may be selected to isolate the flow meter 100. Although three apertures 806a, 806b, and 806c are depicted, more or fewer apertures may be selected to isolate the vibratory meter 100. Also, other aperture shapes may be selected such as square, circular, triangular, etc. The shapes may also be dissimilar. For example, triangle shaped apertures may be in the same isolation bar as

What is claimed is:

1. A vibratory meter (100) having one or more flow tubes (101, 102) adapted to vibrate, comprising an apparatus (400) having:

two or more brace bars (203, 204) adapted to couple to the one or more flow tubes (101, 102); and

an isolation bar (402) coupled to the two or more brace bars (203, 204);

a first side isolation bar (602) attached to each of the two or more brace bars (203, 204); and

a second side isolation bar (604)) attached to each of the two or more brace bars (203, 204), wherein the first and second isolation bars (602, 604) comprise a trapezoidal profile.

2. The vibratory meter (100) of claim 1 wherein the two or more brace bars (203, 204) are coupled to the one or more flow tubes (101, 102).

3. The vibratory meter (100) of claim 1 wherein the isolation bar (402) isolates the vibratory meter (100) from undesirable vibrations by isolating the one or more flow tubes (101, 102) from a flange (104, 105).

4. The vibratory meter (100) of claim 3 wherein the isolation bar (402) isolates the vibratory meter (100) from undesirable vibrations by one or more parameters selected to isolate the vibratory meter (100) vibrations by isolating the one or more flow tubes (101, 102) from a flange (104, 105).

5. The isolation bar (402) of claim 4 wherein the one or more parameters selected includes a dimension of the isolation bar (402) selected to isolate the vibratory meter (100).

6. The vibratory meter (100) of claim 1 wherein the isolation bar (402) is positioned on one or more flow tubes (101, 102) to isolate the vibratory meter (100).

7. The vibratory meter (100) of claim 1 wherein the isolation bar (402) is adapted to isolate the one or more flow tubes (101, 102) from undesirable vibrations by isolating the one or more flow tubes (101, 102) from a flange (104, 105).

5 8. A method for a vibratory meter (100) having one or more flow tubes (101, 102) adapted to vibrate, comprising:

forming two or more brace bars (203, 204) adapted to couple to the one or more flow tubes (101, 102); and

10 forming and coupling two or more side isolation bars (602, 604) comprising a trapezoidal profile to the two or more brace bars (203, 204).

9. The method of claim 8 further comprising coupling the two or more brace bars (203, 204) to the one or more flow tubes (101, 102).

15 10. The method of claim 8 wherein the forming and coupling the isolation bar (402) to the two or more brace bars (203, 204) includes adapting the isolation bar (402) to isolate the vibratory meter (100) by isolating the one or more flow tubes (101, 102) from a flange (104, 105).

20 11. The method of claim 10 wherein the adapting the isolation bar (402) includes selecting one or more parameters of the isolation bar (402) to isolate the vibratory meter (100) by isolating the one or more flow tubes (101, 102) from a flange (104, 105).

25 12. The method of claim 11 wherein the selecting the one or more parameters of the isolation bar (402) includes selecting a dimension of the isolation bar (402) to isolate the vibratory meter (100).

30 13. The method of claim 8 wherein the forming and coupling the isolation bar (402) to the two or more brace bars (203, 204) includes positioning the isolation bar (402) on one or more flow tubes (101, 102) to isolate the vibratory meter (100).

14. The method of claim 8 wherein forming and coupling the isolation bar (402) to the two or more brace bars (203, 204) includes isolating the one or more flow tubes (101, 102).
- 5 15. The method of claim 8 wherein forming and coupling the isolation bar (402) to the two or more brace bars (203, 204) includes isolating the vibratory meter (100).