United States Patent Application Publication	20250262749
Kind Code	A1
Publication Date	August 21, 2025
Inventor(s)	Verduin; Jacob Ethan

TRIM GAUGE

Abstract

A trim gauge for inspecting the dimension of a workpiece includes a body having a first body portion and a second body portion, the second body portion having a thickness smaller than the first body portion. The trim gauge also includes a first flange coupled to the second body portion and extending radially outwardly of the second body portion. A thickness of the first flange corresponds to a lower acceptable limit for the measured dimension of the workpiece. The trim gauge further includes a second flange coupled to the second body portion and extending radially outwardly from the second body portion. A thickness of the second flange is smaller than the first flange and corresponds to an upper acceptable limit for the measured dimension of the workpiece.

Inventors: **Verduin; Jacob Ethan (Byron Center, MI)**

Applicant: **Verduin; Jacob Ethan** (Byron Center, MI)

Family ID: **1000007773065**

Appl. No.: **18/443831**

Filed: **February 16, 2024**

Publication Classification

Int. Cl.: **B25H7/04** (20060101)

U.S. Cl.:

CPC **B25H7/04** (20130101);

Background/Summary

BACKGROUND

1. Field of the Invention

[0001] The present invention relates generally to a gauge. More particularly, the presentation invention pertains to a trim gauge used to inspect the trim length of a workpiece.

2. Description of the Prior Art

[0002] It is known in the field of manufacturing that a trim gauge is an instrument used to inspect dimensions of workpieces to determine whether the dimensions of the workpieces are within desired tolerance limits. However, known gauges used to verify the trim of workpieces tend to be rather large, unintuitive, and unwieldy to enable quick measurement.

SUMMARY

[0003] A trim gauge for inspecting dimensions of a workpiece is disclosed.

[0004] The trim gauge comprises a body having a first end and a second end, the body further having a first body portion located proximally to the first end, a second body portion, a first flange, and a second flange, the second body portion, the first flange, and the second flange each being located distally from the first end and proximate to the second end, the second body portion having a thickness smaller than the first body portion; [0005] the first flange having a larger thickness than the second body portion, wherein the thickness of the first flange corresponds to a lower acceptable limit for the measured dimension of the workpiece; and [0006] the second flange having a smaller thickness than the first flange, wherein the thickness of the second flange corresponds to an upper acceptable limit for the measured dimension of the workpiece.

[0007] Optionally, the cross section of the body is circular.

[0008] In an embodiment, the first flange is located at the second end of the body, and the second flange is positioned between the first flange and the second body portion.

[0009] In an embodiment, the first flange is located at the second end of the body, and the second flange is positioned between the first body portion and the second body portion.

[0010] In an embodiment, the second flange is located at the second end of the body, and the first flange is positioned between the first body portion and the second body portion.

[0011] Additionally, a method of measuring a trim dimension on a workpiece retained by an inspection fixture using a trim gauge is disclosed. The method comprises: [0012] providing the trim gauge having a body having a first end and a second end, the body further having a first body portion located proximally to the first end, a second body portion, a first flange, and a second flange, the second body portion, the first flange, and the second flange each being located distally from the first end and proximate to the second end, the second body portion having a thickness smaller than the first body portion; [0013] the first flange having a larger thickness than the second body portion, wherein the thickness of the first flange corresponds to a lower acceptable limit for the measured trim dimension of the workpiece; and [0014] the second flange having a smaller thickness than the first flange, wherein the thickness of the second flange corresponds to an upper acceptable limit for the measured trim dimension of the workpiece; [0015] providing the inspection fixture, the inspection fixture having a fixture for retaining the workpiece, and an inspection gauge surface located adjacent to the fixture; [0016] providing the workpiece, the workpiece having a form which extends from the fixture toward the inspection gauge surface of the inspection fixture, the form terminating at a trim edge; [0017] placing the workpiece against the fixture of the inspection fixture such that the form extends in a direction with the trim edge being arranged proximate to the inspection gauge surface of the inspection fixture; [0018] placing the trim gauge against the inspection gauge surface of the inspection fixture such that the first body portion is arranged adjacent the inspection gauge surface of the inspection fixture, and the second body portion extends from the inspection gauge surface toward the fixture such that the first flange and the second flange are positioned proximate to the fixture; [0019] moving the trim gauge along the inspection gauge surface in a lateral direction substantially parallel to an elongation of the body,

such that the second flange is translated across the trim edge of the form, whereby a length of the form is determined to be out of tolerance and too long when the trim edge contacts the second flange; [0020] moving the trim gauge along the inspection gauge surface in a lateral direction substantially parallel to an elongation of the body, such that the first flange is translated across the trim edge of the form, whereby a length of the form is determined to be out of tolerance and too short when the trim edge does not contact the second flange; and [0021] determining that the length of the form of the workpiece is within tolerance when both the second flange does not contact the trim edge of the form and the first flange does contact the trim edge of the form.
[0022] For a more complete understanding of the disclosure, reference is made to the following detailed description and accompanying drawings. In the drawings, like reference characters refer to like parts throughout the views in which:

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0023] FIG. **1** illustrates a trim gauge positioned on a fixture to inspect a dimension of a trim edge on a form of a workpiece retained by the fixture, in accordance with an embodiment of the disclosure;
[0024] FIG. **2** illustrates the trim gauge depicting a first flange arranged in contact with the form, while the second flange is arranged at a distance from the trim edge of the form illustrating that a length of the form is within the upper limit and the lower limit, in accordance with an embodiment of the disclosure;
[0025] FIG. **3** illustrates a trim gauge, in accordance with an alternative embodiment of the disclosure; and
[0026] FIG. **4** illustrates a trim gauge, in accordance with yet another embodiment of the disclosure.
DETAILED DESCRIPTION
[0027] Referring to FIG. **1**, a trim gauge **100** (hereinafter referred to as gauge) for inspecting the trim dimensions of a workpiece **200**, arranged on an inspection fixture **300** is shown. As shown, the inspection fixture **300** includes a fixture **302** for retaining the workpiece **200** for inspection, and an inspection gauge surface **304** adjacent to the fixture **302** which supports the gauge **100** during inspection of the workpiece **200**.
[0028] The fixture **302** shown in FIG. **1** defines a cavity in which the workpiece **200** is nested. As shown, a form **202** of the workpiece **200** extends generally upwardly and terminates at a trim edge **204**. The trim gauge **100** is used to measure whether the length of the form **202** (as measured by the position of the trim edge **204**) is within tolerance. The trim gauge **100** is placed against the inspection gauge surface **304** during the inspection process. However, it is understood by those having ordinary skill in the art that the orientation of the gauge **100** and the inspection gauge surface **304** may vary for each application, and are dependent on the geometry of the workpiece **200** and the trim edge **204** to be measured. For example, it is to be understood that the fixture **302** does not need to be a cavity, and the fixture **302** may instead be relatively flat in nature and include detents or other physical features to complement and retain the workpiece **200** for inspection. Likewise, the form **202** of the workpiece may be substantially co-planar with the body of the workpiece **200**, or the form **202** may be at any other angle or orientation. The geometry of the workpiece **200** and the trim edge **204** to be measured will dictate the orientation of the inspection gauge surface **304** and the gauge **100**. But regardless of the orientation, it is to be understood that the inspection gauge surface **304** is typically perpendicular to the plane of the form **202** to allow the gauge **100** to accurately measure the location of the trim edge **204**.
[0029] Turning back to the gauge **100** as shown in FIGS. **1** and **2**, the gauge **100** preferably

includes a substantially cylindrical body **102** having a first end **104**, a second end **106**, a first body portion **108** extending in an axial direction of the body **102** from the first end **104** towards the second end **106**, and a second body portion **110** extending from the first body portion **108** to the second end **106**. As shown, the second body portion **110** has a diameter (or thickness or girth) smaller than a diameter (or thickness or girth) of the first body portion **108**. During inspection, the first body portion **108** is arranged on an inspection gauge surface **304** of the inspection fixture **300**, while the second body portion **110** extends, at least partially, toward the trim edge **204** of the workpiece **200** retained by the fixture **302**.

[0030] The body **102** of the gauge **100** has been described hereinabove as preferably being substantially cylindrical and having a circular or oval cross-section along the axial length thereof. However, the body **102** can alternatively have a cross-sectional shape which is square, rectangular, triangular, pentagonal, or any other suitable type of shape.

[0031] Furthermore, the gauge **100** includes a first flange **112** extending radially outwardly from the second body portion **110** and arranged circularly around a central axis of the body **102**. In the illustrated embodiment, the first flange **112** is located at an end, i.e., a second end **106** of the body **102**. Additionally, the gauge **100** includes a second flange **114** extending radially outwardly from the second body portion **110** and arranged circularly around the central axis of the body **102**. In the embodiment, the second flange **114** is arranged contacting the first flange **112**, and being positioned between the first body portion **108** and the first flange **112**.

[0032] As shown, a diameter (or thickness or girth) of the second flange **114** is smaller than a diameter (or thickness or girth) of the first flange **112**. It may be appreciated that the diameter (or thickness or girth) of the first flange **112** is selected so as to correspond to a first allowable limit (i.e., lower limit) for the dimension (e.g., height, length, depth, etc.) of a feature of the workpiece **200**, namely, the form **202**, while the diameter (or thickness or girth) of the second flange **114** is selected so as to correspond to a second allowable limit (i.e., upper limit) for the dimension of the form **202** of the workpiece **200** being inspected. Accordingly, the trim dimension of the workpiece **200** is considered to be within the acceptable limit when the form **202** of the workpiece **200** does not contact the second flange **114**, and while the form **202** of the workpiece **200** does contact the first flange **112** as the gauge **100** is moved in a lateral direction ‘A’ of the inspection fixture **300** during inspection, as shown in FIGS. **1** and **2**. It is noted that the lateral direction ‘A’ is substantially parallel to the elongation of the body **102**.

[0033] Referring to FIG. **3**, a trim gauge **100′** is shown, according to an alternative embodiment of the disclosure. The trim gauge **100′** is similar to the trim gauge **100** except that a second flange **114′** of the trim gauge **100′** is arranged at a distance from the first flange **112**, and contacts the first body portion **108**. Accordingly, the second flange **114′** is arranged at an interface/junction of (or between) the first body portion **108** and the second body portion **110**.

[0034] Referring to FIG. **4**, a trim gauge **100″** according to an embodiment is shown. The trim gauge **100″** is similar to the trim gauge **100′** shown in FIG. **3** except that the trim gauge **100″** includes a first flange **112″** positioned at an interface of (or between) the first body portion **108** and the second body portion **110**, while a second flange **114″** is arranged at the second end **106** of the body **102** of the trim gauge **100″**.

[0035] A method for inspecting the trim dimensions of the form **202** of the workpiece **200** using the gauge **100** is described below. To inspect the trim dimensions, a user positions or seats the workpiece **200** onto the fixture **302** of the inspection fixture **300** such that the form **202** extends in a first direction with a trim edge **204** being arranged proximate to the inspection gauge surface **304** of the inspection fixture **300**, as shown in FIG. **1**. The user then positions the gauge **100** adjacent the inspection fixture **300** such that the first body portion **108** is arranged against the inspection gauge surface **304** of the inspection fixture **300**, and the second body portion **110** extends away from the inspection gauge surface **304**, toward the form **202**, and is spaced from the fixture **302** such that the first flange **112** and the second flange **114** are proximate to the fixture **302**. Next, the

user moves the gauge **100** along the inspection gauge surface **304** in a lateral direction, such as in the lateral direction ‘A’ as shown in FIGS. **1** and **2**. As the user moves the gauge in the lateral direction ‘A’, the trim edge **204** of the workpiece **200** may contact the second flange **114** indicating that a length or dimension of the form **202** is above the upper limit, or stated otherwise, that the form **202** is too long. However, if the trim edge **204** remains spaced from the second flange **114** and the second flange **114** passes the trim edge **204** without contacting the form **202**, then the length of the form **202** is below the upper limit, as shown in FIG. **2**.

[0036] As the gauge **100** is then further moved in the lateral direction ‘A’, the trim edge **204** of the form **202** may contact the first flange **112** indicating that the length or the dimension of the form **202** is greater than the lower limit, as shown in FIG. **2**. However, the length of the form **202** is less than the lower limit of the trim edge **204** does not contact the first flange **112** when the gauge is moved in the lateral direction ‘A’. In this manner, the trim gauge **100** facilitates the inspection of the trim dimensions of a workpiece and determines whether the trim dimensions are within the acceptable limits i.e., between the upper limit and the lower limit.

[0037] The foregoing descriptions of specific embodiments of the present disclosure have been presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the present disclosure to the precise forms disclosed, and obviously many modifications and variations are possible in light of the above teaching. The exemplary embodiment was chosen and described in order to best explain the principles of the present disclosure and its practical application, to thereby enable others skilled in the art to best utilize the present disclosure and various embodiments with various modifications as are suited to the particular use contemplated.

Claims

1. A trim gauge for inspecting the dimension of a workpiece, the trim gauge comprising: a body having a first end and a second end, the body further having a first body portion located proximally to the first end, a second body portion, a first flange, and a second flange, the second body portion, the first flange, and the second flange each being located distally from the first end and proximate to the second end, the second body portion having a thickness smaller than the first body portion; the first flange having a larger thickness than the second body portion, wherein the thickness of the first flange corresponds to a lower acceptable limit for the measured dimension of the workpiece; and the second flange having a smaller thickness than the first flange, wherein the thickness of the second flange corresponds to an upper acceptable limit for the measured dimension of the workpiece.

2. The trim gauge of claim 1 wherein the cross section of the body is circular.

3. The trim gauge of claim 1 wherein the first flange is located at the second end of the body, and the second flange is positioned between the first flange and the second body portion.

4. The trim gauge of claim 3 wherein the cross section of the body is circular.

5. The trim gauge of claim 1 wherein the first flange is located at the second end of the body, and the second flange is positioned between the first body portion and the second body portion.

6. The trim gauge of claim 5 wherein the cross section of the body is circular.

7. The trim gauge of claim 1 wherein the second flange is located at the second end of the body, and the first flange is positioned between the first body portion and the second body portion.

8. The trim gauge of claim 7 wherein the cross section of the body is circular.

9. A method of measuring a trim dimension on a workpiece seated in an inspection fixture using a trim gauge, the method comprising: providing the trim gauge having a body having a first end and a second end, the body further having a first body portion located proximally to the first end, a second body portion, a first flange, and a second flange, the second body portion, the first flange, and the second flange each being located distally from the first end and proximate to the second end, the second body portion having a thickness smaller than the first body portion; the first flange

having a larger thickness than the second body portion, wherein the thickness of the first flange corresponds to a lower acceptable limit for the measured trim dimension of the workpiece; and the second flange having a smaller thickness than the first flange, wherein the thickness of the second flange corresponds to an upper acceptable limit for the measured trim dimension of the workpiece; providing the inspection fixture, the inspection fixture having a fixture for retaining the workpiece, and an inspection gauge surface located adjacent to the fixture; providing the workpiece, the workpiece having a form which extends from the fixture toward the inspection gauge surface of the inspection fixture, the form terminating at a trim edge; placing the workpiece against the fixture of the inspection fixture such that the form extends in a direction with the trim edge being arranged proximate to the inspection gauge surface of the inspection fixture; placing the trim gauge against the inspection gauge surface of the inspection fixture such that the first body portion is arranged adjacent the inspection gauge surface of the inspection fixture, and the second body portion extends from the inspection gauge surface toward the fixture such that the first flange and the second flange are positioned proximate to the fixture; moving the trim gauge along the inspection gauge surface in a lateral direction substantially parallel to an elongation of the body, such that the second flange is translated across the trim edge of the form, whereby a length of the form is determined to be out of tolerance and too long when the trim edge contacts the second flange; moving the trim gauge along the inspection gauge surface in a lateral direction substantially parallel to an elongation of the body, such that the first flange is translated across the trim edge of the form, whereby a length of the form is determined to be out of tolerance and too short when the trim edge does not contact the second flange; and determining that the length of the form of the workpiece is within tolerance when both the second flange does not contact the trim edge of the form and the first flange does contact the trim edge of the form.

10. The method of claim 9 wherein the cross section of the body is circular.

11. The method of claim 9 wherein the first flange is located at the second end of the body, and the second flange is positioned between the first flange and the second body portion.

12. The method of claim 11 wherein the cross section of the body is circular.

13. The method of claim 9 wherein the first flange is located at the second end of the body, and the second flange is positioned between the first body portion and the second body portion.

14. The method of claim 13 wherein the cross section of the body is circular.

15. The method of claim 9 wherein the second flange is located at the second end of the body, and the first flange is positioned between the first body portion and the second body portion.

16. The method of claim 15 wherein the cross section of the body is circular.