US010699680B2

(12) **United States Patent**
Trowers

(10) **Patent No.: US 10,699,680 B2**
(45) **Date of Patent: Jun. 30, 2020**

(54) **ELLIPTICAL HIGH-MASS MOUTHPIECE FOR BRASS MUSICAL INSTRUMENTS**

(71) Applicant: **Robert Trowers**, Durham, NC (US)

(72) Inventor: **Robert Trowers**, Durham, NC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/655,916**

(22) Filed: **Oct. 17, 2019**

(65) **Prior Publication Data**

US 2020/0126522 A1 Apr. 23, 2020

Related U.S. Application Data

(60) Provisional application No. 62/746,902, filed on Oct. 17, 2018.

(51) **Int. Cl.**
G10D 9/03 (2020.01)

(52) **U.S. Cl.**
CPC ***G10D 9/03*** (2020.02)

(58) **Field of Classification Search**
CPC G10D 9/03
See application file for complete search history.

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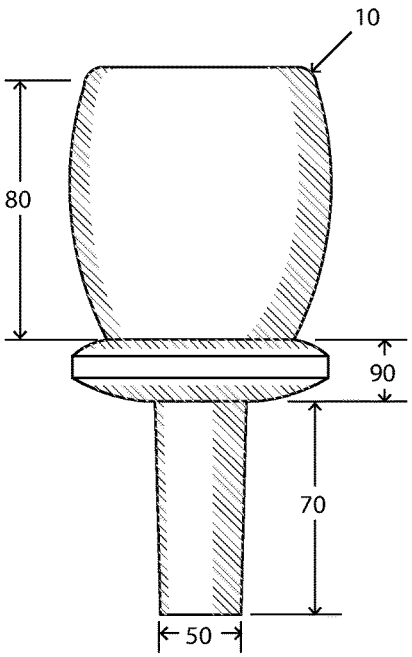
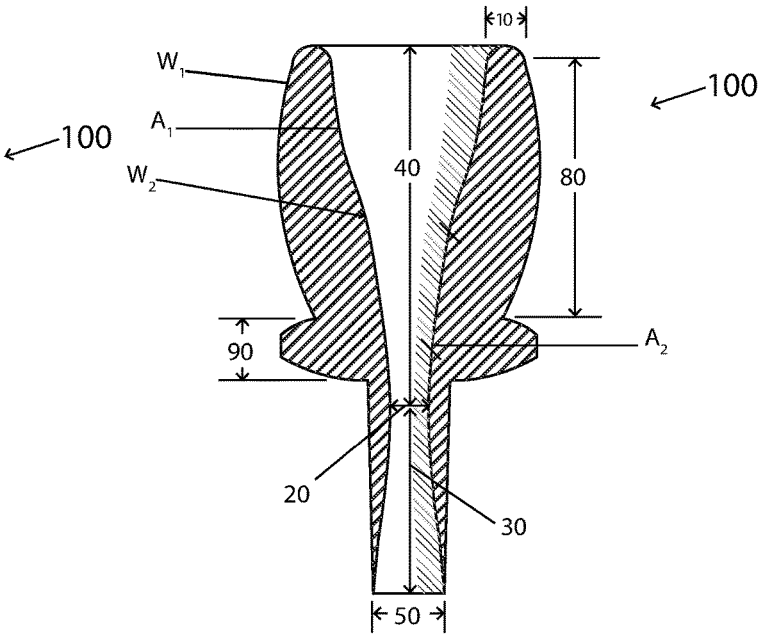
Primary Examiner — Robert W Horn
(74) *Attorney, Agent, or Firm* — NCCU School of Law-IP Clinic; Dana Sisk

(57) **ABSTRACT**

A mouthpiece for use with brass-wind musical instruments includes a double-elliptical internal contour, and a high-mass design.

20 Claims, 2 Drawing Sheets





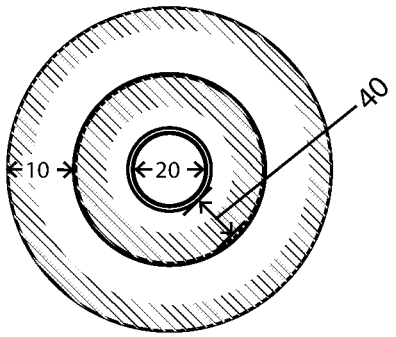


FIG. 1

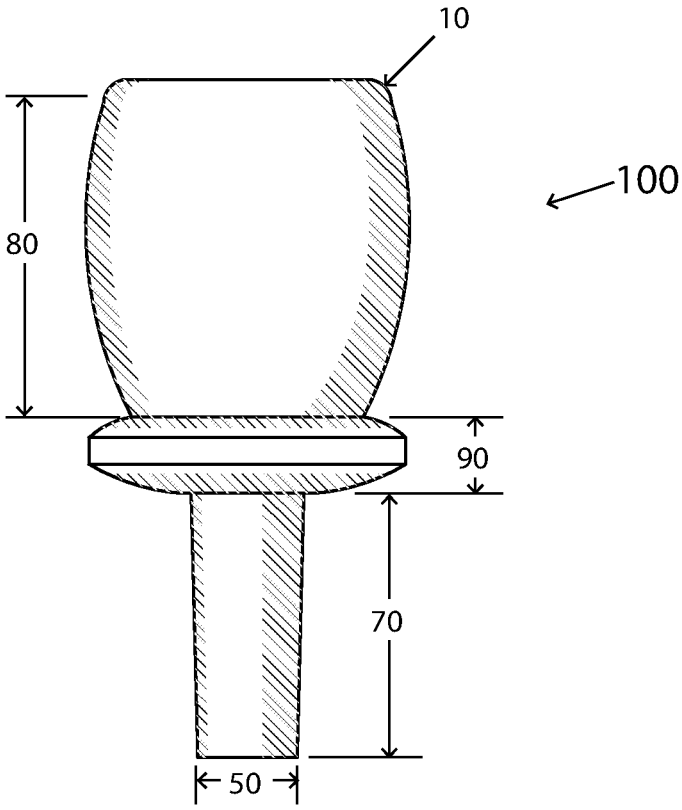


FIG. 2

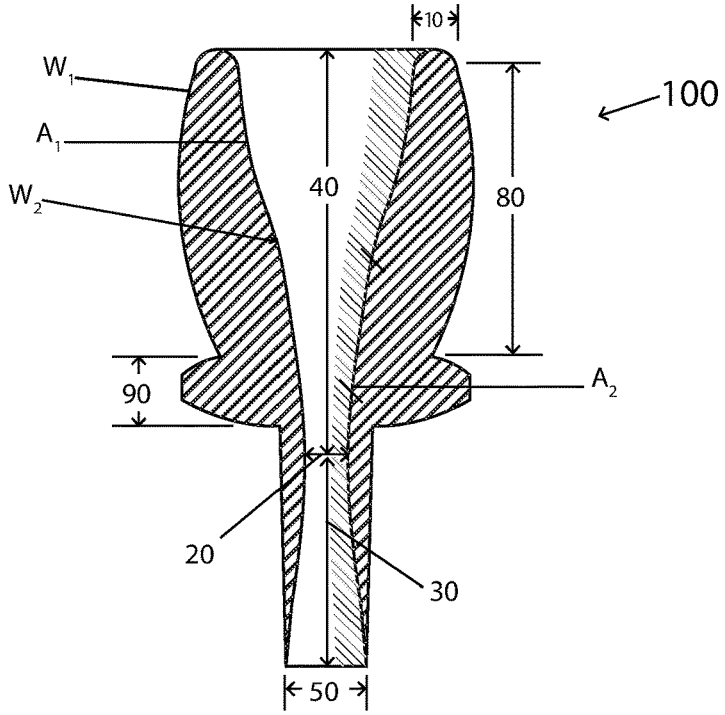


FIG. 3

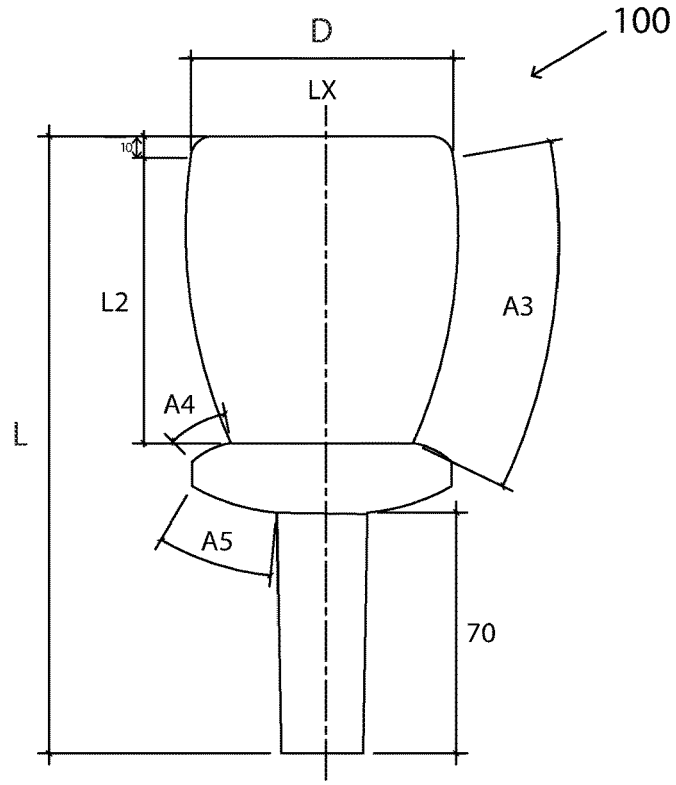


FIG. 4

ELLIPTICAL HIGH-MASS MOUTHPIECE FOR BRASS MUSICAL INSTRUMENTS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application No. 62/746,902 filed on Oct. 17, 2018, which is hereby incorporated in its entirety.

FIELD OF THE INVENTION

The present invention relates generally to a mouthpiece for use with brass-wind musical instruments. More particularly, the present application is directed to a mouthpiece to improve performance through providing a warm, centered sound while affording enhanced flexibility.

BACKGROUND OF THE INVENTION

The mouthpiece on a brass-wind instrument plays an important role in producing the sound the instrument makes when performing. It is well known that in order to produce notes of different frequencies a player of a brass musical instrument applies his/her lips with varying degrees of pressure to a generally cup-shaped mouthpiece and blows to cause vibration of the front portion of his/her lips. These vibrations are transferred to the air column in the bowl or cavity of the mouthpiece and thence to the instrument itself to produce notes of different frequencies. The typical mouthpiece for brass instruments consists of one of the following two internal contours: a "V" cup, or a "bowl" or "funnel" shaped cup. The shape of the cup affects the tone that is ultimately projected. The "V cup" has advantages in note flexibility and note attacking. Note attacking is known generally as the time it takes for the instrument to produce sound after the air has been blown into the mouthpiece by the player. The "V cup" mouthpiece requires less effort to move between the different registers of the horn but tend toward making a player's tone sound thin or airy, which demands more effort to counteract. The "bowl-shaped cup" provides a warmer, more sonorous tone. However, "bowl-shaped cup" mouthpieces require more effort to move between the different registers of the horn.

Practically all conventional mouthpieces have a bowl or funnel-shaped cup that ends with the "throat" or small opening at the bottom of the cup. From the throat, the mouthpieces follow a gradual increase in diameter that terminates where the mouthpiece fits into the instrument, known as the "backbore." The "backbore" has a conical shape.

Mouthpieces with bowls or cavities of various shapes have been used to improve the quality and the range of the notes produced. But none of these modifications have been successful in improving performance.

SUMMARY OF THE INVENTION

The object of the present invention is to overcome the foregoing problems existing with conventional mouthpieces, by providing a mouthpiece with a "high-mass" design and a unique double elliptical internal contour. The present invention is directed to brass instruments that require removable mouthpieces. In addition, the present invention is directed to a mouthpiece that delivers the optimal combination of increased endurance, ease of play and tonal quality.

The present invention is designed to provide a warm, centered sound while affording enhanced flexibility. The double-elliptical design of the present invention facilitates easy transitions between the low and high registers of the horn (flexibility) while eliminating the quality known as "airiness" from the tone. Elliptical shapes are chosen for this design because they provide a straighter path than the traditional "bowl shaped" mouthpieces (known for their warmer sound) but are more gently curved than "V cup" mouthpieces (known for their crisp attack and flexibility). The present invention provides a smoother air passage from the player's lips into the instrument. This design is helpful to trombonists who have "range" or "flexibility" issues, or who are striving for a warmer, more sonorous tone. The design is also adapted to other brass instruments such as trumpet, baritone, French horn, or tuba.

In one embodiment, the mouthpiece is removable and can be adapted for use in other brass instruments. In an embodiment, the present invention provides a mouthpiece fabricated with a "high-mass" design (or using a high-mass material) and includes one single device including a semi-circular rim, cup, collar, shank, and backbore. The cup is constructed by four wall sections of differing angularity with respect to the longitudinal axis of the mouthpiece. The present invention includes an internal contour, two elliptical curves: one convex and one concave. The cup portion is the smaller diameter convex ellipse, while the concave elliptical curve meets the smaller curve and smoothly terminates at the backbore.

In another embodiment, the present invention uses a semi-circular shaped rim, in contrast to conventional mouthpiece rims that are either flat or less aggressively curved. The rim design offers the user a tight and secure seal on the lips while exerting less pressure or force.

Another unique feature of the current invention is the "high-mass" design. The "high-mass" design helps the musician lock in partial notes with more ease, compared with traditional mouthpieces. Further, the "high-mass" design aids in centering the tone of the instrument. The use of additional weight or mass provides a centering effect on the resonant frequencies of brass instruments (known as partials), which constitutes the different tones produced by the instruments. Centering means that the partials, or tones produced, feel more secure to the player when the mass, or weight of the mouthpiece is increased.

In one embodiment, a mouthpiece for a brass-wind musical instrument comprises an upper section, wherein the upper section comprises an inner wall and outer wall of differing angularity with respect to a longitudinal axis of the mouthpiece forming a concave ellipse; a cup located within the upper portion; a rim, wherein the rim comprises the uppermost point of the mouthpiece; a collar situated immediately below and adjacent to the cup; a shank located immediately below and adjacent to the collar along the longitudinal axis; a throat located internally centered along the longitudinal axis in the collar, immediately below and adjacent to the cup; and a backbore situated at the bottom endpoint of the shank.

In an embodiment, the collar comprises a three-dimensional elliptical structure with a hollow opening situated perpendicular to the longitudinal axis.

In yet another embodiment, the shank comprises external left and right sides of equal length and internal sides with a convex ellipse contour forming a hollow opening running parallel to the longitudinal axis.

In one embodiment, the thickness between the inner wall and outer wall of the upper section is of about ¼ inch to about ½ inch.

In a different embodiment, the mouthpiece is constructed of brass, high-density plastic, or other high-mass material.

In a further embodiment, the is constructed from a solid piece of material.

In one embodiment, the cup is in fluid communication the throat.

In yet another embodiment, the collar is constructed of brass, high-density plastic, or other high-mass material.

In still another embodiment, the rim is semicircular and is configured to provide a user a tight seal on the lips.

In one embodiment, the collar is an oval, circular, semi-circular, or rectangular shaped disk.

In an exemplary embodiment, a mouthpiece for a brass-wind musical instrument, comprises an upper section, wherein the upper section comprises an inner wall and outer wall of differing angularity with respect to a longitudinal axis of the mouthpiece forming a concave ellipse; a cup located within the upper portion; a semi-circular rim, wherein the rim comprises the uppermost point of the mouthpiece; a collar situated immediately below and adjacent to the cup, wherein the collar comprises a three-dimensional elliptical structure with a hollow opening situated perpendicular to the longitudinal axis; a shank located immediately below and adjacent to the collar along the longitudinal axis, wherein the shank comprises external left and right sides of equal length and internal sides with a convex ellipse contour forming a hollow opening running parallel to the longitudinal axis; a throat located internally centered along the longitudinal axis in the collar, immediately below and adjacent to the cup; and a backbore situated at the bottom endpoint of the shank.

In one embodiment, the mouthpiece is constructed of brass, high-density plastic, or other high-mass material.

In another embodiment, the mouthpiece is constructed from a solid piece of material.

In one embodiment, the cup is in fluid communication with the throat.

In yet another embodiment, the collar is constructed of brass, high-density plastic, or other high-mass material.

In still another embodiment, the collar is an oval, circular, semi-circular, or rectangular shaped disk.

In another exemplary embodiment, an elliptical mouthpiece for a brass-wind musical instrument, comprises an upper section; a cup located within the upper portion; a semi-circular rim, wherein the rim comprises the uppermost point of the mouthpiece; a collar situated immediately below and adjacent to the cup, wherein the collar comprises a three-dimensional elliptical structure with a hollow opening situated perpendicular to the longitudinal axis; a shank located immediately below and adjacent to the collar along the longitudinal axis, wherein the shank comprises external left and right sides of equal length and internal sides with a convex ellipse contour forming a hollow opening running parallel to the longitudinal axis; a throat located internally centered along the longitudinal axis in the collar, immediately below and adjacent to the cup; and a backbore situated at the bottom endpoint of the shank.

In one embodiment, the upper portion is configured to provide an overall internal cavity that downwardly progresses from a wider portion to a relatively narrower portion in the direction from the rim toward the collar.

In one further embodiment, the upper portion comprises an internal concave ellipse.

In still another embodiment, the collar is constructed of brass, high-density plastic, or other high-mass material and wherein the collar is an oval, circular, semi-circular, or rectangular shaped disk.

Various objects, features, aspects and advantages of the inventive subject matter will become more apparent from the following detailed description of exemplary embodiments, along with the accompanying figures in which like numerals represent like components.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** depicts a top view of an exemplary configuration of the mouthpiece according to the present invention, and depicts the cup, semi-circular rim, and throat.

FIG. **2** depicts an external side view of an exemplary configuration of the mouthpiece according to the present invention, with high-mass design, cup, rim, collar, shank, and backbore.

FIG. **3** depicts a cross-section of the internal contour and body configuration of an exemplary configuration of the elliptical mouthpiece, with high-mass design, cup, rim, collar, shank, and backbore.

FIG. **4** depicts an external view of an exemplary configuration of the elliptical mouthpiece.

DETAILED DESCRIPTION

As used in the description herein and throughout the claims that follow, the meaning of "a," "an," and "the" includes plural rreference unless the context clearly dictates otherwise.

As used herein, the term "about" in conjunction with a numeral refers to a range of that numeral starting from 10% below the absolute of the numeral to 10% above the absolute of the numeral, inclusive.

As used herein, the term "high-mass" refers to the actual weight of the mouthpiece relative to the average weight of a standard mouthpiece, which is lower. For example, whereas the mouthpiece of the present invention weighs about 13 ounces, whereas a standard mouthpiece weighs about 5.4 ounces (a 2.4 ratio). The terms "mass" and "weight" are used interchangeably.

The invention structure as illustrated in FIGS. **1-4** will be specifically explained in greater detail. The similar numbers contained within FIGS. **1-4** refer to corresponding parts of mouthpiece **100**. In one embodiment, as depicted in FIG. **1**, mouthpiece **100** comprises throat **20**, a cavity called cup **40**, with semi-circular rim **10** that is configured for placement of a musician's mouth, comprising a circular inner edge and circular outer edge (see FIG. **1**). In an embodiment, throat **20** is defined as the narrowest portion of cup **40** of mouthpiece **100**. In one embodiment, the width of throat **20** measures about ¼ inch. Shading in FIG. **1** is just to differentiate the three different diameters.

The exemplary embodiment in FIG. **2** depicts the front view of the body of mouthpiece **100**, that is symmetrical along longitudinal axis LX (see FIG. **4**). In this embodiment, mouthpiece **100** comprises semi-circular rim **10**, upper section **80**, cup **40**, collar **90**, shank **70**, and backbore **50** (FIG. **3**). Cup **40** is in fluid communication with throat **20**. In one embodiment, mouthpiece **100** comprises passage **30** to throat **20** and backbore **50**. In one embodiment, FIG. **3** shows a generally downward-sloping transition curve from the wider to narrower portion of cup **40**. In an embodiment, upper portion **80** provides an overall internal cavity that

downwardly progresses from a wider portion to a relatively narrower portion in the direction from rim **10** toward collar **90**.

In one embodiment, rim **10** is located atop upper section **80**, which is immediately followed by collar **90** and then shank **70** forms the bottom-most component. In one embodiment, mouthpiece **100** is about 3½ inches long and about 1½ inches wide. In another embodiment, mouthpiece **100** is about 3 to 4 inches long and about 1 to 2 inches wide. In another embodiment, shank **70** is configured to be inserted into a brass-wind instrument. In an embodiment, backbore **50** is an opening in shank **70** where mouthpiece **100** fits into a brass-wind instrument. In one embodiment of mouthpiece **100**, components are tooled separately. In this embodiment, collar **90** can be connected via a plurality of screws to upper section **80** and shank **70** (not shown). This embodiment enables a user to have different options for collar **90** for different sound effect as desired. In another embodiment, mouthpiece **100** is formed as a single unit.

The exemplary embodiment depicted in FIG. **3**, mouthpiece **100** comprises upper section **80**, two component ellipses, with radius A**1** and A**2**, respectively, rim **10**, disk-shaped collar **90**, shank **70** and backbore **50**. In one embodiment, A**1** is about 4⅞ inches and A**2** is about 4 1/32 inches. In another embodiment, collar **90** is an oval, circular, semi-circular, or rectangular shaped disk. Inclusion of collar **90** adds further high-mass material to mouthpiece **100**. Collar **90** of different thicknesses provides additional mass to mouthpiece **100**. Collar **90** is also configured to afford sufficient surface area to affix markings, including engraving characters or other images onto collar **90**.

In one embodiment, upper section **80** is about 1¾ inches long, wherein rim **10** is about ⅛ inch thick. In one embodiment, rim **10** is also configured to add a high mass to mouthpiece **100** by increasing the thickness of rim **10**. In another embodiment, upper section **80** is about 1½ to 2 inches long and rim **10** is about 1/16 to ¼ inch thick. In one embodiment, the concave curve A**3** of outer wall W**1** of upper section **80** is about 36 degrees and the concave curve A**4** of the inner wall W**2** of upper section **80** is about 33 degrees. In another embodiment, the concave curve of outer wall W**1** of upper section **80** is about 30 to 40 degrees. In one embodiment, cup **40** is about 1½ inches wide. In another embodiment, cup **40** is about 1 to 2 inches wide. In an embodiment, collar **90** is located immediately below and adjacent to upper section **80** and terminates at shank **70**, with shank **70** serving to connect mouthpiece **100** to the desired instrument. In one embodiment, there is 3/32 inches blending in the transfer from the curve of cup **40** to the curve of throat **20**. In another embodiment, there is no blending from the curve of cup **40** to the curve of throat **20**.

In one embodiment, L**2** is the length of collar **90** with respect to outer wall W**1** of upper section **80**. In one embodiment, L**2** sits about 5/32 inches below the outer wall of upper section **80**. In another embodiment, the horizontal center line of collar **90** is located about 1/32 to 9/32 inches below the lowest point of outer wall W**1** of upper section **80** (not shown.) In one embodiment, collar **90** comprises an elliptical shape, where each side protrudes from underneath upper section **80** at an approximate 33-degree angle (A**4**) and the concave elliptical sides of collar **90** join shank **70** at an approximate angle of 25 degrees (A**5**). In another embodiment, the sides of collar **90** protrude from underneath upper section **80** at an approximate 28 to 38-degree angle and the concave elliptical sides of collar **90** join shank **70** at an approximate angle of 20 to 30 degrees. In another embodiment, the sides of shank **70** reside immediately below and adjacent to collar **90** along the longitudinal axis LX of mouthpiece **100**. In one embodiment, the vertical sides of shank **70** measure about 1⅜ inches from the top intersection point with collar **90** to the bottom of mouthpiece **100**. In an embodiment, shank **70** measures about ½ inch across. In another embodiment, the vertical sides of shank **70** measure about 1 to 2 inches from the top intersection point with collar **90** to the bottom of mouthpiece **100**. In this embodiment, shank **70** measures about ⅛ to about ¾ inch across.

In another embodiment, mouthpiece **100** may be formed from any high-mass material, such as brass, high-density plastic, or other high-density material. Mouthpiece **100** may be constructed by 3D printing, lathe turning, casting or any combination thereof.

In an embodiment, FIG. **3** illustrates the cross section of mouthpiece **100**. In this embodiment, cup **40** is located within upper section **80**. The unique internal contour of mouthpiece **100** is formed as follows: once the curve from the semi-circular mouthpiece rim **10** ends, cup **40** is formed of two ellipses. In one embodiment, upper section **80** is formed from inner wall W**2** and outer wall W**1** of differing angularity with respect to the longitudinal axis LX, forming a concave ellipse having internal and external contour with the widest point D. The convex ellipse of the upper section **80** begins and slopes slightly inward, where it meets the larger concave elliptical curve which ends at collar **90**. The remaining sweep of the convex ellipse runs through shank **70** and terminates at backbore **50**. In one embodiment, the diameter of backbore **50** measures about ¼ to 2 inches. In an embodiment, the thickness between inner wall W**2** and outer wall W**1** of upper section **80** is of about ¼ inch about ½ inch. In another embodiment, the thickness between inner wall W**2** and outer wall W**1** of upper section **80** is about ½ to ⅞ inches.

Thus, exemplary embodiments of a mouthpiece for use with brass-wind instruments have been disclosed. It should be apparent, however, to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the spirit of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms "comprises" and "comprising" should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not expressly referenced.

The invention claimed is:

1. A mouthpiece for a brass-wind musical instrument, comprising:

i. an upper section, wherein said upper section comprises an inner wall and outer wall of differing angularity with respect to a longitudinal axis of said mouthpiece forming a concave ellipse;

ii. a cup located within said upper portion;

iii. a rim, wherein said rim comprises the uppermost point of said mouthpiece;

iv. a collar situated immediately below and adjacent to said cup;

v. a shank located immediately below and adjacent to said collar along said longitudinal axis;

vi. a throat located internally centered along the longitudinal axis in said collar, immediately below and adjacent to said cup; and

vii. a backbore located at the bottom endpoint of said shank.

2. The mouthpiece of claim **1**, wherein said collar comprises a three-dimensional elliptical structure with a hollow opening situated perpendicular to said longitudinal axis.

3. The mouthpiece of claim **1**, wherein said shank comprises external left and right sides of equal length and internal sides with a convex ellipse contour forming a hollow opening running parallel to said longitudinal axis.

4. The mouthpiece of claim **1**, wherein the thickness between said inner wall and outer wall of said upper section is of about ¼ inch to about ½ inch.

5. The mouthpiece of claim **1**, wherein said mouthpiece is constructed of brass, high-density plastic, or other high-mass material.

6. The mouthpiece of claim **1**, wherein said mouthpiece is constructed from a solid piece of material.

7. The mouthpiece of claim **1**, whereas said cup is in fluid communication with said throat.

8. The mouthpiece of claim **1**, wherein said collar is constructed of brass, high-density plastic, or other high-mass material.

9. The mouthpiece of claim **1**, wherein said rim is semicircular and is configured to provide a user a tight seal on the lips.

10. The mouthpiece of claim **1**, wherein said collar is an oval, circular, semi-circular, or rectangular shaped disk.

11. A mouthpiece for a brass-wind musical instrument, comprising:

i. an upper section, wherein said upper section comprises an inner wall and outer wall of differing angularity with respect to a longitudinal axis of said mouthpiece forming a concave ellipse;

ii. a cup located within said upper portion;

iii. a semi-circular rim, wherein said rim comprises the uppermost point of said mouthpiece;

iv. a collar situated immediately below and adjacent to said cup, wherein said collar comprises a three-dimensional elliptical structure with a hollow opening situated perpendicular to said longitudinal axis;

v. a shank located immediately below and adjacent to said collar along said longitudinal axis, wherein said shank comprises external left and right sides of equal length and internal sides with a convex ellipse contour forming a hollow opening running parallel to said longitudinal axis;

vi. a throat located internally centered along the longitudinal axis in said collar, immediately below and adjacent to said cup; and

vii. a backbore situated at the bottom endpoint of said shank.

12. The mouthpiece of claim **11**, wherein said mouthpiece is constructed of brass, high-density plastic, or other high-mass material.

13. The mouthpiece of claim **11**, wherein said mouthpiece is constructed from a solid piece of material.

14. The mouthpiece of claim **11**, whereas said cup is in fluid communication with said throat.

15. The mouthpiece of claim **11**, wherein said collar is constructed of brass, high-density plastic, or other high-mass material.

16. The mouthpiece of claim **11**, wherein said collar is an oval, circular, semi-circular, or rectangular shaped disk.

17. An elliptical mouthpiece for a brass-wind musical instrument, comprising:

i. an upper section;

ii. a cup located within said upper portion;

iii. a semi-circular rim, wherein said rim comprises the uppermost point of said mouthpiece;

iv. a collar situated immediately below and adjacent to said cup, wherein said collar comprises a three-dimensional elliptical structure with a hollow opening situated perpendicular to said longitudinal axis;

v. a shank located immediately below and adjacent to said collar along said longitudinal axis, wherein said shank comprises external left and right sides of equal length and internal sides with a convex ellipse contour forming a hollow opening running parallel to said longitudinal axis;

vi. a throat located internally centered along the longitudinal axis in said collar, immediately below and adjacent to said cup; and

vii. a backbore situated at the bottom endpoint of said shank.

18. The mouthpiece of claim **17**, wherein said upper portion is configured to provide an overall internal cavity that downwardly progresses from a wider portion to a relatively narrower portion in the direction from said rim toward said collar.

19. The mouthpiece of claim **17**, wherein said upper portion comprises an internal concave ellipse.

20. The mouthpiece of claim **17**, wherein said collar is constructed of brass, high-density plastic, or other high-mass material and wherein said collar is an oval, circular, semi-circular, or rectangular shaped disk.

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