United States Patent [19]

Ploeger

[11] E **Re. 30,300**

[45] Reissued **Jun. 10, 1980**

[54] **ACOUSTICAL REFLECTOR FOR WIND INSTRUMENTS**

[76] Inventor: **Thomas L. Ploeger**, 38457 James Dr., Mt. Clemens, Mich. 48043

[21] Appl. No.: **957,037**

[22] Filed: **Nov. 2, 1978**

Related U.S. Patent Documents

Reissue of:

[64] Patent No.: **4,012,983**
Issued: **Mar. 22, 1977**
Appl. No.: **611,700**
Filed: **Sep. 9, 1975**

[51] **Int. Cl.**[2] **G10D 9/06**

[52] **U.S. Cl.** **84/400**; 181/155; 181/191

[58] **Field of Search** 84/400, 385; 181/153, 181/155, 191

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,099,183	7/1963	Alles	84/400
3,429,215	2/1969	Finch	84/400
3,500,953	3/1970	Lahti	181/153

FOREIGN PATENT DOCUMENTS

374187	4/1923	Fed. Rep. of Germany	84/400

Primary Examiner—Stephen J. Tomsky

Attorney, Agent, or Firm—Barnes, Kisselle, Raisch & Choate

[57] **ABSTRACT**

A panel of acoustically reflective material is removably supported on the bell of a wind instrument by a bracket which is jointed so that selectively the panel can be, (1) angularly positioned to reflect the sound back to the player or in other directions, (2) moved toward and away from the bell to adjust reflection of the sound, (3) moved to a muting position, and (4) moved to a non-reflecting location.

14 Claims, 7 Drawing Figures

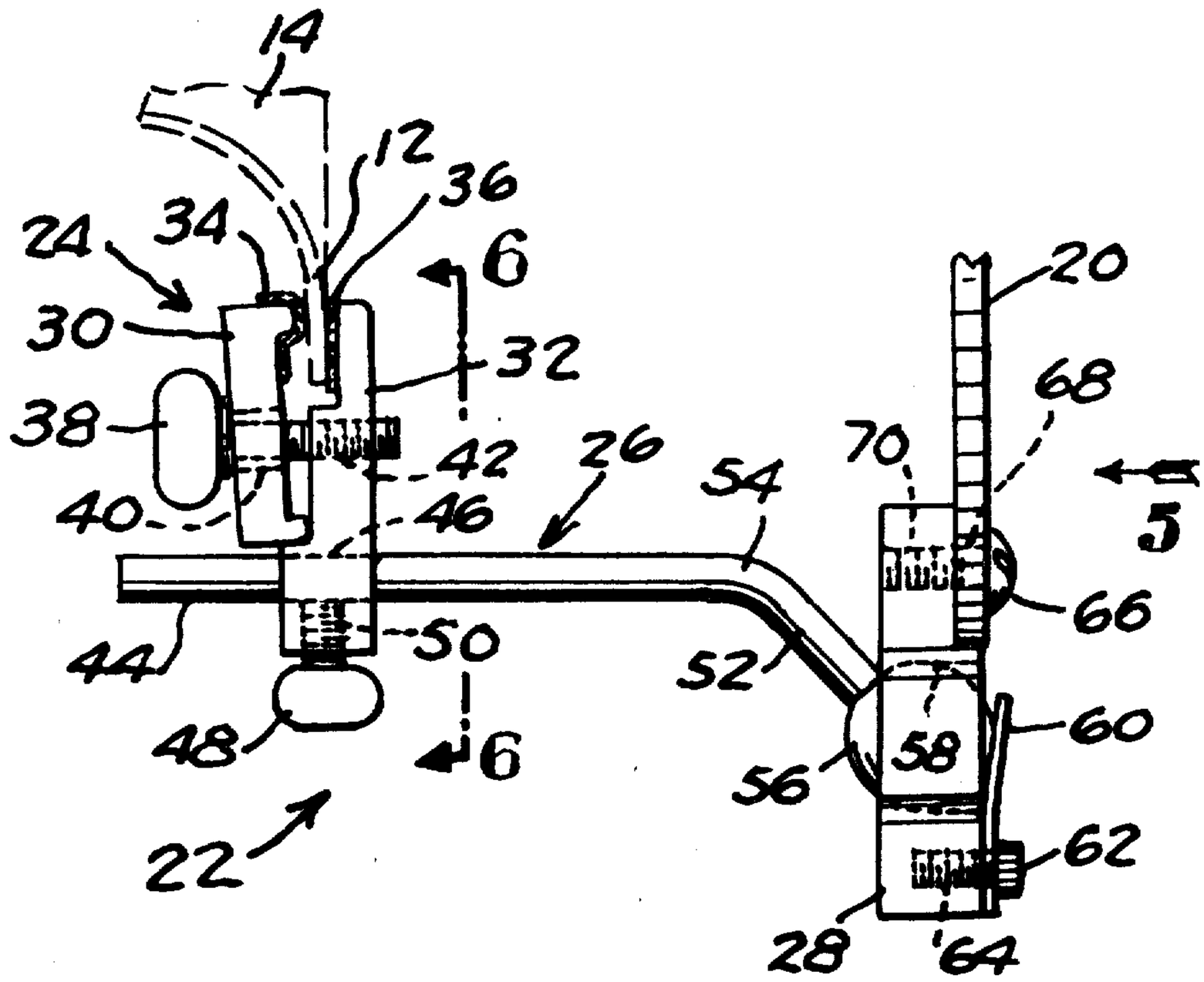


FIG. 1

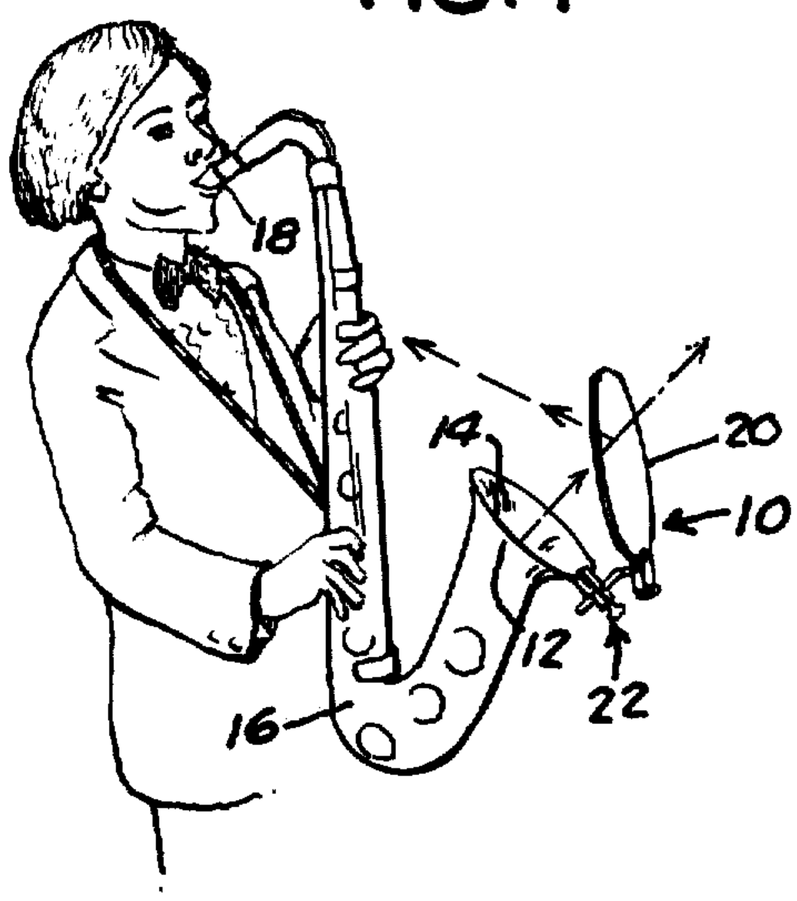
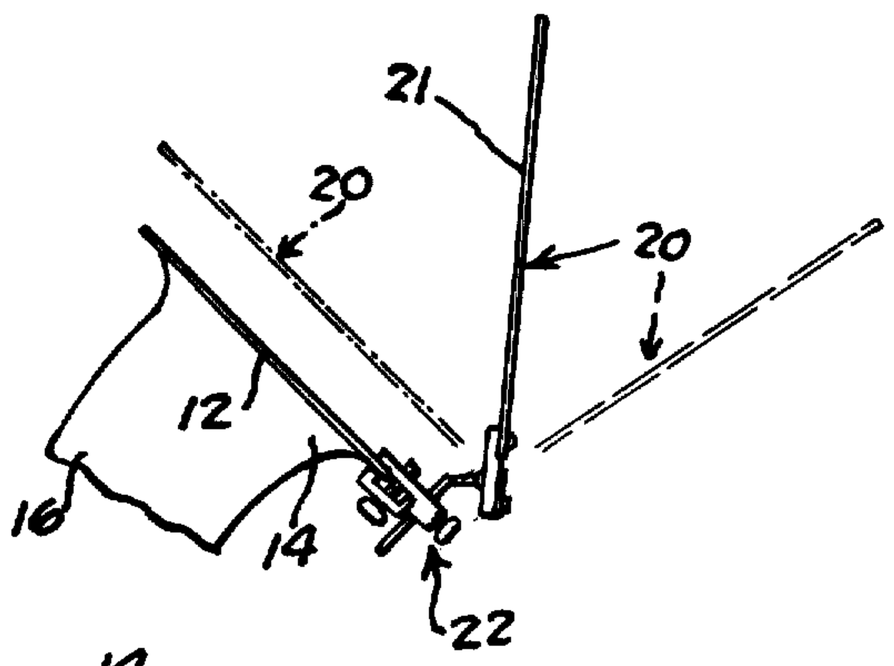


FIG. 2



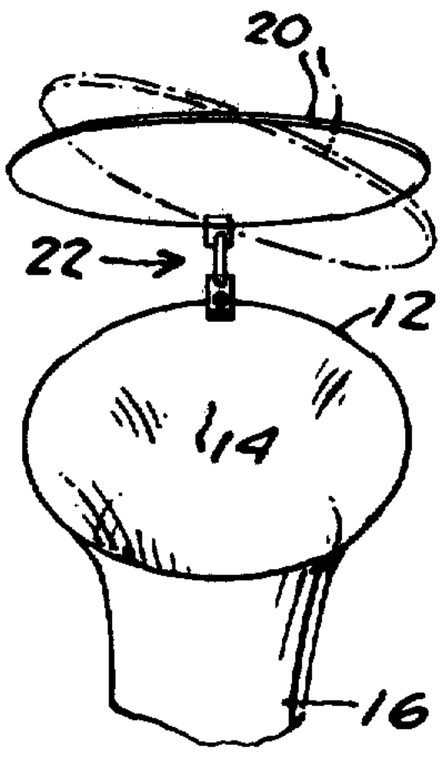


FIG. 3

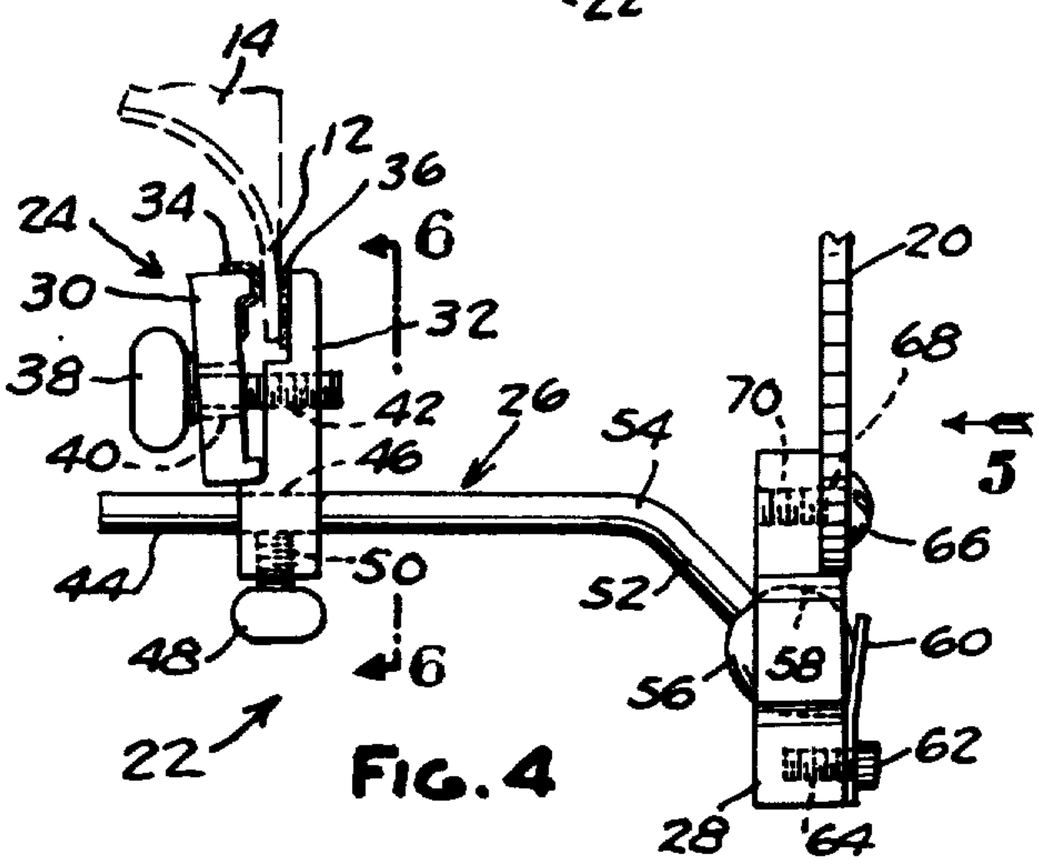


FIG. 4

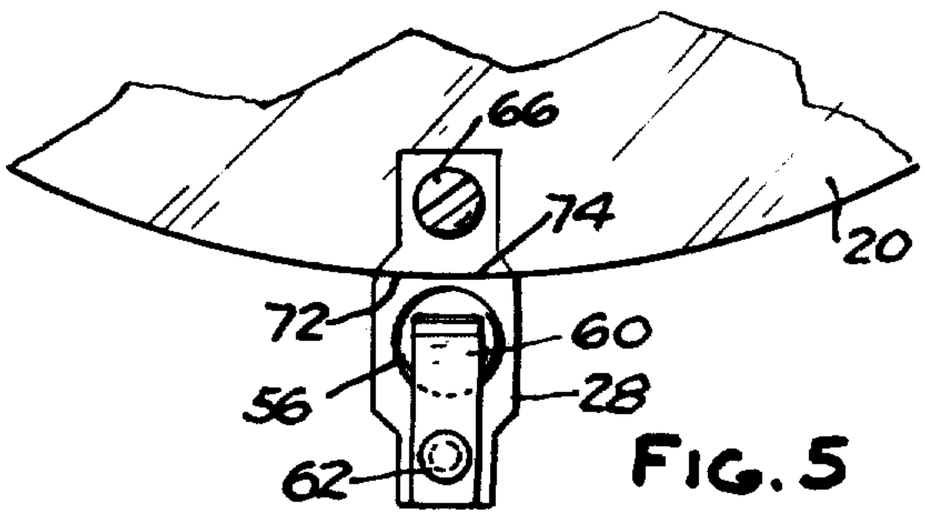


FIG. 5

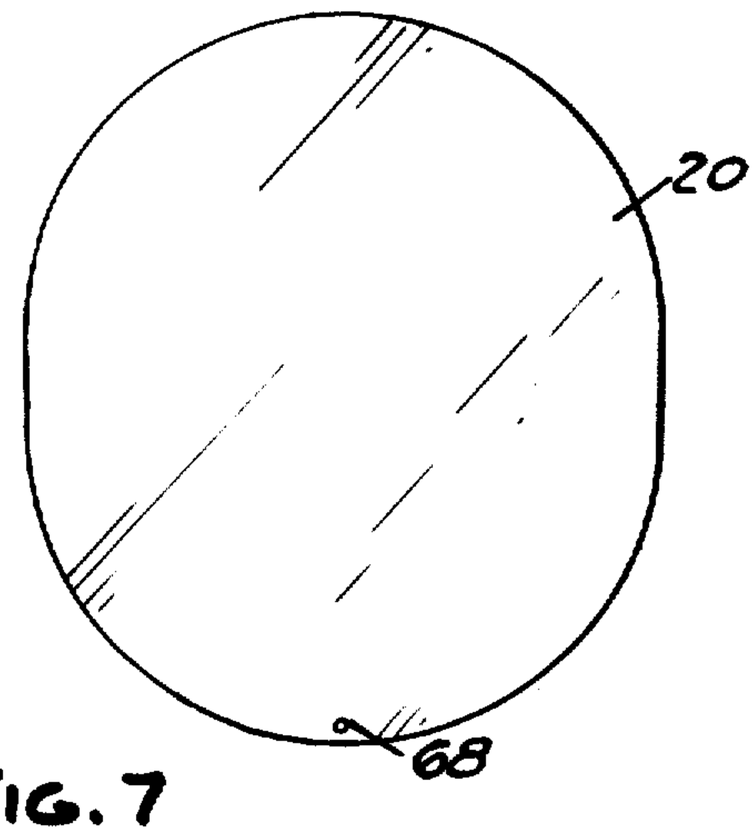


FIG. 7

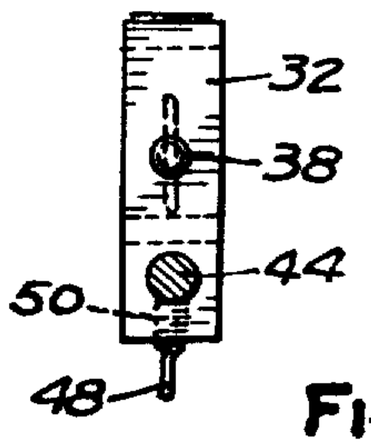


FIG. 6

ACOUSTICAL REFLECTOR FOR WIND INSTRUMENTS

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

This invention relates generally to wind instruments and, more particularly, to an acoustical reflector which enables the instrumentalist to reflect controllably the sound emanating from the bell of his instrument.

For a band, orchestra or other instrumental group to produce satisfactory sound, the various instruments must be played with accurate pitch, proper volume balance and proper tonal blend. This requires that each instrumentalist be able to hear his own instrument in relation to the other instruments in the group, which is difficult to do in locations such as the outdoors or in large halls where the acoustics are poor. The problem is aggravated where the instrument has a voice which is relatively soft in comparison to other instruments in the group. Even under relatively favorable conditions, it is sometimes difficult for an instrumentalist to hear his own instrument, if it is soft voiced. Insofar as I am aware, prior to my invention there existed no means for alleviating these problems.

The object of the present invention is to provide a relatively simple, inexpensive, lightweight acoustical panel structure which can be quickly and easily mounted detachably upon a wind instrument, the panel being selectively movable to various positions in front of the bell of the instrument for controllably reflecting the sound emanating from the bell to enable an instrumentalist to hear his own instrument in relation to other instruments of a group under various conditions. One form of the invention is shown in the accompanying drawings.

FIG. **1** is a perspective view of an acoustical reflector according to the present invention in use on a wind instrument.

FIG. **2** is a fragmentary, enlarged scale side elevational view of the reflector and wind instrument.

FIG. **3** is a fragmentary plan view of the reflector and wind instrument.

FIG. **4** is a further enlarged scale fragmentary view of the reflector and wind instrument.

FIG. **5** is an elevational view in the direction of arrow **5** of FIG. **4**.

FIG. **6** is a sectional view on line **6—6** of FIG. **4**.

FIG. **7** is a front elevational view of the acoustical reflector panel separate from the other parts.

Shown in FIG. **1** is an acoustical reflector assembly **10** according to the present invention mounted on the rim **12** of the bell **14** on a saxophone **16** having a mouthpiece **18**. Assembly **10** includes a panel **20** which is supported on bell **14** by means of a bracket structure **22** which includes a clamp **24**, a rod **26** supported by the clamp, and a mounting plate or block **28** to which the rod and panel **20** are connected. Panel **20** has an acoustically reflective surface **21** which in operative position faces generally toward bell **14**.

Clamp **24** includes two members **30, 32** having opposed end portions which are padded at **34, 36** respectively with felt, rubber, plastic, or the like, for noninjuriously gripping rim **12** of the saxophone bell. The clamp members are secured in assembled relation by a thumb screw **38** which passes slidably through an opening **40** in member **32** and is threaded through a tapped opening in member **32** as at **42**. Rod **26** has a leg portion **44** which passes slidably and rotatably through a socket opening **46** in clamp member **32**. A thumb screw **48** is threaded through a portion of clamp member **32** at **50** for gripping engagement against leg portion **44**.

Rod **26** has another leg portion **52** which is shorter than leg portion **44**, and the two leg portions are interconnected at a bend **54**. Leg **52** terminates in a ball **56** rotatably engaged in a spherical socket **58** in mounting plate **28** to form a universal joint between rod **26** and plate **28**. The ball is held frictionally engaged within the socket by a leaf spring **60** pressed against it by means of a screw **62** threaded into an opening in plate **28** as at **64**. Panel **20** is anchored onto plate **28** by a screw **66** which passes through an opening **68** and is threaded into plate **28** as at **70**. The panel has a lower peripheral edge **72** which is engaged against a shoulder **74** on plate **28** to secure the panel against rotational movement on the plate.

Panel **20** can be formed of any relatively lightweight material, such as wood, sheet metal or plastic, and preferably its acoustically reflective surface **21** comprises simply a face of the panel. For the sake of appearance, it may be preferable that the panel be transparent. A suitable panel material is a clear plastic such as Plexiglass. The panel can have any one of numerous different shapes, such as round, rectangular, polygonal or the oval shape shown in FIG. **7**. This shape has proven very satisfactory in use. It need not be as wide as the diameter of the mouth of bell **14**, but its vertical dimension preferably should not be substantially less than the diameter of the bell mouth. By way of example, a panel **20** having a width of 6½ inches and a length of 7¼ inches functions satisfactorily on alto, tenor and baritone saxophones whose bell mouths are respectively about 4½ inches, 6 inches and 8–9 inches in diameter.

In use to mount reflector assembly **10** on saxophone **16**, thumb screw **38** is turned to loosen clamp elements **30, 32** relative to each other. Padded ends **34, 36** of the clamp elements are positioned at opposite sides of rim **12** and screw **38** is then turned to cause the padded ends to grip rim **12** firmly therebetween.

Panel **20** can be manually turned both vertically and laterally about universal joint **56, 58**. The panel is shown in FIG. **1** and in solid lines in FIG. **2** in a position in which sound emanating from bell **14** is reflected back toward the head of the instrumentalist. From this position the panel can be swung, for example, either to the left dotted line position of FIG. **2** for muting the instrument or to the right hand dotted line position wherein the panel is removed from alignment with bell **14** and has little or no effect on sound emanating from the bell. The panel can be turned laterally from the centered solid line position of FIG. **3** to canted positions, such as that shown in broken lines in FIG. **3**, for reflecting sound to one side or the other of the instrumentalist.

Rod **26** extends generally parallel to the axis of bell **14**. The general longitudinal spacing between the panel and bell mouth is adjusted by loosening thumb screw **48**, sliding rod leg **44**, one way or the other, within socket **46** and then retightening screw **48**. From FIG. **1** will be seen that this adjustment generally raises or lowers panel **20** with respect to bell **14**. This adjustment facilitates positioning the panel to minimize the amount of sound passing unreflected over either the top or

under the bottom of the panel, thereby attaining maximum sound reflection.

When panel **20** is in a sound reflecting position such as in FIG. **1**, its laterally reflective position can also be adjusted by loosening screw **48** and tilting the panel to the left or right. This causes rotation of leg **44** within socket **46** and consequent conical movement of leg **52** about the axis of leg **44** because of bend **54**. Panel **20** follows this conical movement. For example, if the panel were tilted to the left or right from the solid line position of FIG. **3**, it would also turn to face in that direction. After such an adjustment, screw **48** is retightened to secure the panel in adjusted position. This adjustment can be effected in combination with or independently of adjustments about universal joint **56, 58**.

Bend **54** not only facilitates lateral adjustment of the panel described in the preceding paragraph, but also enables the panel to be swung to its non-reflecting position shown in the right hand dotted lines of FIG. **2** despite limitations in the extent of movement of universal joint **56, 58**.

When panel **20** is in the position of FIG. **1**, sound emanating from bell **14** and reflected from surface **21** can be clearly heard by the instrumentalist even in a poor acoustical environment and even though his instrument, in the present illustration a saxophone, has a voice which is relatively softer than other instruments in the group, such as trumpets and trombones. This ability to hear enables the instrumentalist to tune his instrument properly by adjusting the position of mouthpiece **18**, and also enables the instrumentalist to achieve proper tonal and volume balance with respect to other instruments in the group and to maintain correct pitch. By adjusting panel **20** laterally to face either to the left or right, the instrumentalist can deflect sound toward adjacent instrumentalists to further facilitate proper balance and blend of the instruments. In some situations, panel **20** may be used to deflect sound toward a microphone. Also in some situations the panel in its sound reflecting position results in improved dispersion of the sound.

To remove assembly **10** from the instrument, it is only necessary to loosen thumb screw **38** and detach clamp elements **30, 32** from rim **12** of bell **14**.

I believe that most commercial embodiments of my invention will utilize a substantially flat panel **20** and reflective surface **21**. However, surface **21** could be convex or concave and panel **20** shaped accordingly without departing from the invention. The saxophone has been selected for illustration of the invention since that instrument is relatively soft voiced and the problems discussed above are relatively acute for saxophonists. However, the invention is equally applicable to brass and woodwind instruments in general with the possible exception of transverse instruments such as the flute. A typical assembly **10** according to my invention weighs about 5 ounces, and I estimate its cost of manufacture at about 4 dollars per assembly.

I claim:

1. In an acoustical reflector of the type having a panel with an acoustically reflective surface and bracket means on said panel including a clamp adapted to be mounted on the rim of the bell of a wind instrument for supporting said panel generally in front of the bell, improved structure wherein said bracket means comprises,

a rod connected with said panel by means including an articulable joint,

said clamp having means forming a socket which supports a portion of said rod,

said socket being so oriented that when said clamp is mounted on the rim of the bell of an instrument with which said reflector is adapted to be used [when] the axis of said rod is generally parallel to the axis of the instrument bell,

said rod portion being axially movable relative to said socket through a distance sufficient to facilitate locating said panel axially clear of the bell of the instrument when said panel is positioned in axial alignment with the bell,

said rod portion being rotatable relative to said socket for swinging said panel about said rod axis when said panel is so located and positioned,

and means effective to secure said rod against axial and rotatable movement relative to said socket.

2. The structure defined in claim **1** wherein said clamp has two members, one of which is provided with said socket.

3. The structure defined in claim **2** wherein said effective means comprises a screw threaded through a portion of said one clamp member and having an end engageable with a portion of said rod within said socket.

4. The structure defined in claim **1** wherein said rod has a bend between said portion and said joint to generate conical movement of said joint and panel upon rotation of said rod portion relative to said socket.

5. The structure defined in claim **4** wherein said joint is a universal joint.

6. In an acoustical reflector of the type having a panel with an acoustically reflective surface and bracket means on said panel including a clamp adapted to be mounted on the rim of the bell of a wind instrument for supporting said panel generally in front of the bell, improved structure wherein said bracket means comprises,

a rod connected with said panel by means including an articulable joint,

said rod and clamp being cooperable to support said panel in alignment with but axially clear of the bell of an instrument with which said reflector is adapted to be used,

said rod being rotatable relative to said clamp for swinging said panel transversely of the instrument bell,

said rod having a bend between said clamp and joint to generate conical movement of said joint and panel upon rotation of said rod relative to said clamp.

7. The structure defined in claim **6** wherein said rod has an intermediate portion extending away from both ends of said bend, one intermediate portion terminating at said clamp and being longer than the other intermediate portion.

8. The structure defined in claim **7** wherein said intermediate portions are substantially straight.

9. The structure defined in claim **8** wherein said joint is a universal joint.

10. In an acoustical reflector of the type having a panel with an acoustically reflective surface and bracket means on said panel including a clamp adapted to be mounted on the rim of the bell of a wind instrument for supporting said panel generally in front of the bell, improved structure wherein said bracket means additionally comprises,

first means having a longitudinal axis and connected with said panel by means including an articulable joint,

second means in said clamp for slidably supporting a portion of said first means,

said second means being so oriented that when said clamp is mounted on the rim of the bell of an instrument with which said reflector is adapted to be used, said axis of said first means is generally parallel to the axis of the instrument bell,

said portion of said first means being axially slidable relative to said second means through a distance sufficient to facilitate locating said panel axially of the bell of the instrument when said panel is positioned in axial alignment with the bell,

said first means including said articulable joint being constructed to permit said panel to rotate relative to said clamp for swinging said panel about an axis parallel to the bell axis when said panel is so located and positioned,

and means in said bracket means effective to secure said panel against axial and rotatable movement relative to said clamp.

11. An acoustic reflector adapted to be mounted on the bell of a wind instrument comprising a panel having a

plane reflective surface and bracket means including a clamp adapted releasably to grip the rim of an instrument bell and means extending from said clamp to said panel so as to position said plane reflective surface generally in front of the bell opening when said clamp is affixed to a said bell rim, said means extending from said clamp including first means for adjustably positioning said reflective surface axially of the bell opening and second means separate from said first means both for adjusting the angular orientation of said plane reflective surface with respect to the axis of the bell opening and for rotating said reflective surface about an axis parallel to the bell axis to swing said panel and said reflective surface away from said bell opening.

12. The acoustic reflector set forth in claim 11 wherein said second means comprises a ball-in-socket universal joint.

13. The acoustic reflector set forth in claim 10, 11 or 12 wherein said panel is oval having a longer dimension cantilevered from said bracket means.

14. The acoustic reflector set forth in claim 13 wherein said panel is of transparent plastic construction.

* * * * *