

Sept. 28, 1971

W. H. CHAFFEE ET AL

3,608,418

KETTLEDRUM

Filed May 7, 1969

3 Sheets-Sheet 1

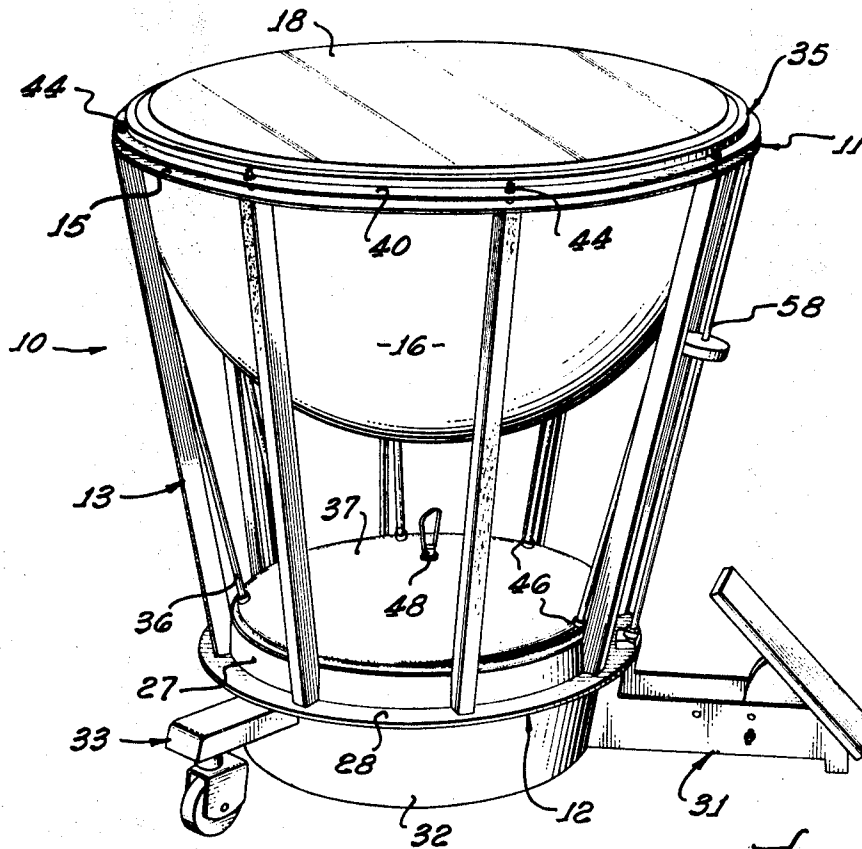


FIG. 1.

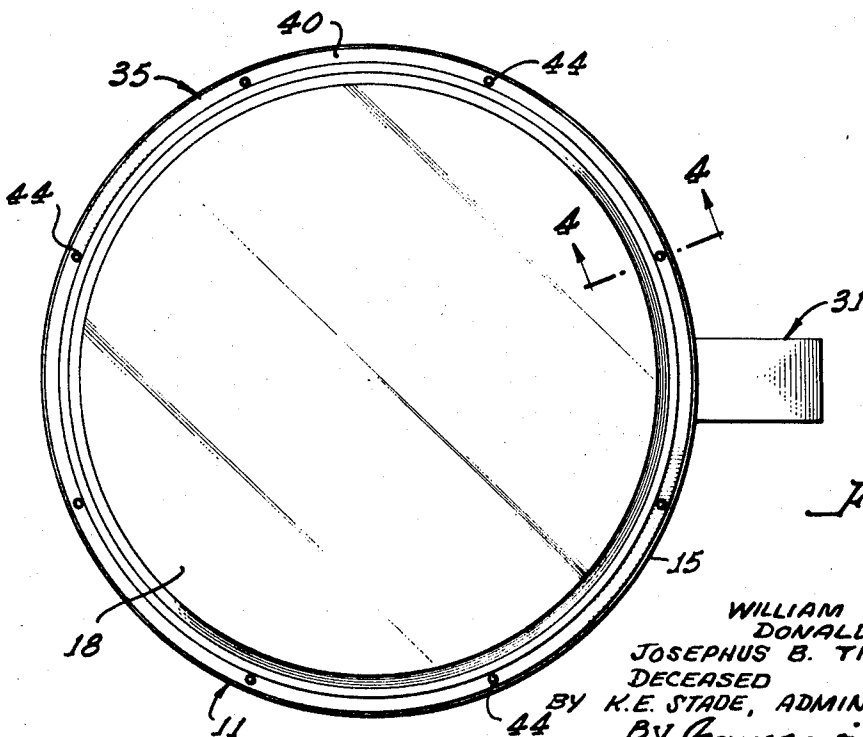


FIG. 2.
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FIG. 3.

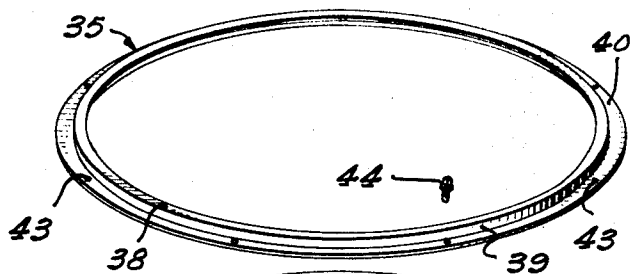


FIG. 5.

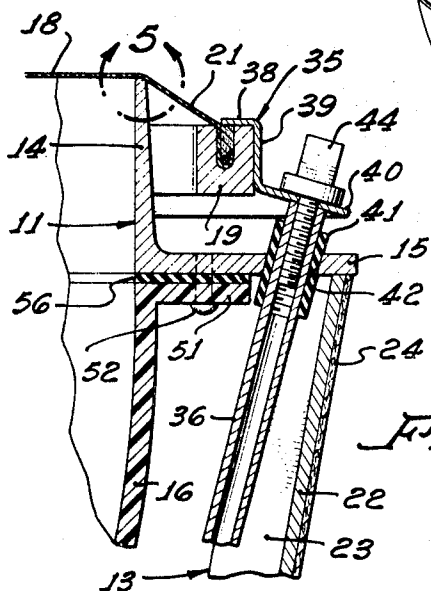
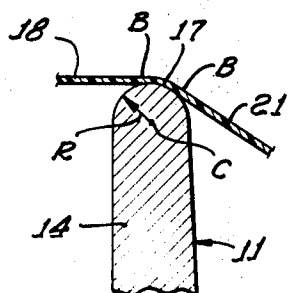
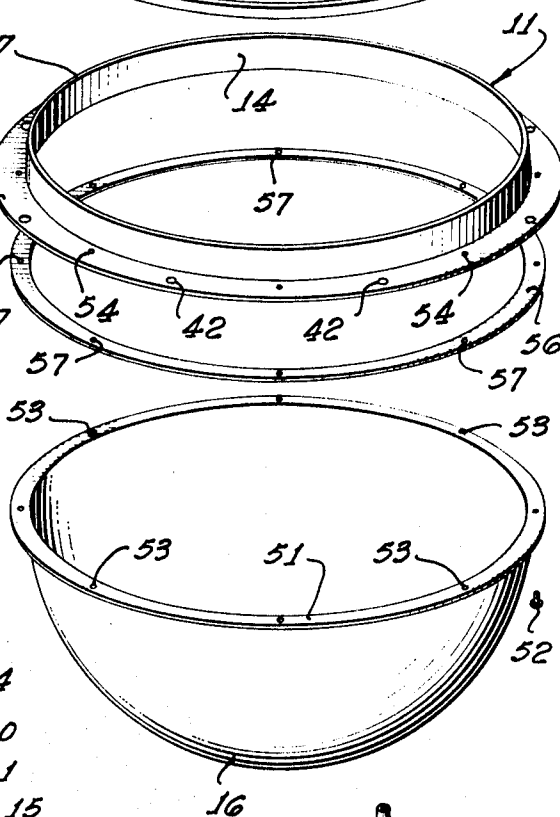


FIG. 4.



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FIG. 6.

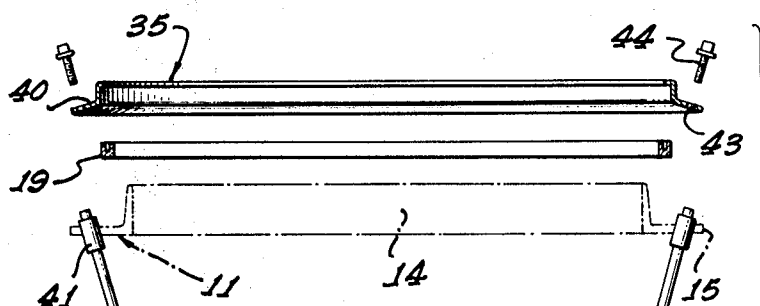
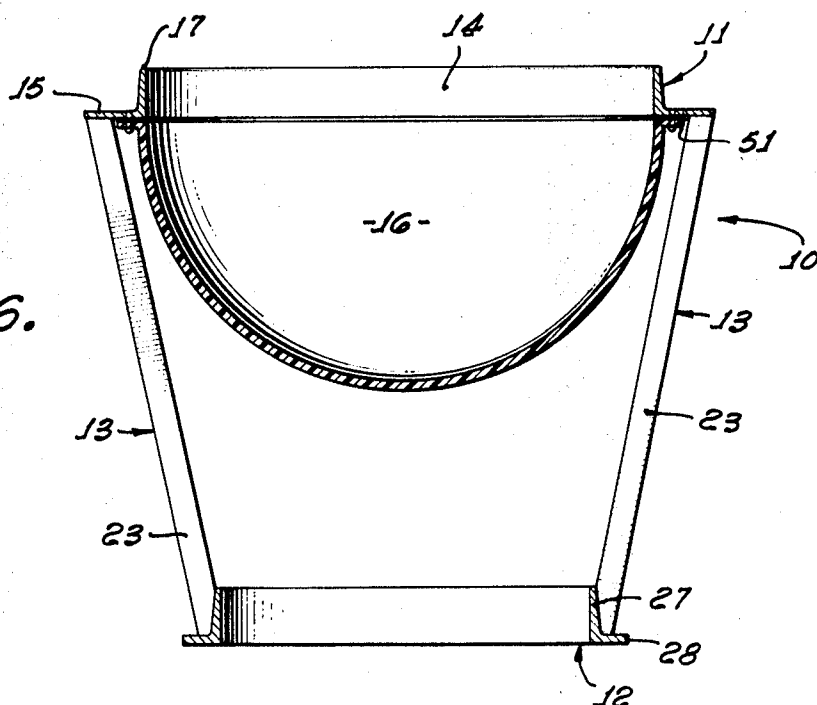
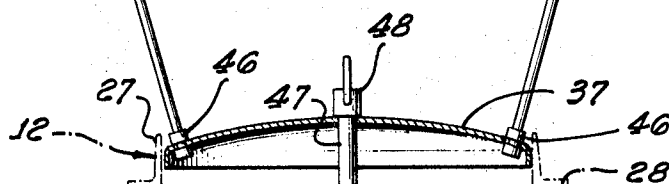


FIG. 7.



BASE AND
TUNING MEANS

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3,608,418

KETTLEDRUM

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Int. Cl. G10d 13/04

U.S. Cl. 84-419

26 Claims

ABSTRACT OF THE DISCLOSURE

A kettledrum incorporating a ring which acts as a bridge over which the drumhead is stretched, as a means to mount the bowl in sealed and dependent relationship, as a means to minimize transmission of vibrations from the drumhead to the bowl, as a guide for pull rods which are utilized in changing the pitch of the drumhead, and as a protective element preventing any shifting of the counterhoop or flesh hoop despite rough handling of the instrument. The upper or bearing edge of such ring (which may be termed, for convenience, the "bridge ring") has a predetermined shape and thickness adapted to improve the quality of the generated sounds while at the same time preventing cutting of the drumhead. The indicated bridge ring is supported by combination guide and support struts the lower ends of which are connected to a base ring. Such base ring provides a mounting function and also serves to enclose and protect a spider and cover element through which drumhead-tuning forces are transmitted directly to the pull rods. The pull rods are associated with the counterhoop through screws adapted to permit very fast initial tuning of the instrument. The bowl is a flanged hemisphere devoid of holes and smooth on the inside, such hemisphere being formed by blowing a heated sheet of acrylic plastic or the like.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to the field of timpani.

Description of the prior art

It is conventional to mount the drumhead of a kettledrum over a relatively wide or thick bearing edge. Such edge is frequently rolled-over or bent-over in order to increase thickness. As examples, Pat. 2,502,733 shows in FIG. 3 a flat upper bearing edge; Pat. 2,587,310 shows a rolled-over edge; and resissue Patent Re. 16,226 shows what may be termed a bent-over edge. The various edges of prior devices do not permit generation of sounds having qualities as favorable as those generated by timpani incorporating the critically thin bearing edge region of the present invention.

It is known to construct timpani with tuning mechanisms which are external to the bowl, reference being made to Pats. 355,970; 1,312,771; 2,070,082; 3,021,743; and 3,279,299 which exemplify prior art. However the timpani of prior art are deficient in one or more of the following and other respects. Difficulty of tuning, inability to remain in tuned condition despite shocks and rough handling, deficiency in quality of sound, and high expense of manufacture and assembly.

Various timpani, as well as other and distinctly different types of drums, incorporate separate ring elements on which the drumhead is mounted. Reference is made, for example, to Pats. 874,050; 1,054,009; 2,261,119; 3,240,096; and the above-cited Re. 16,226. In no case, however, do prior art rings perform the different functions of the present bridge ring, including (among others) substan-

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tial vibrational isolation from the drumhead of a bowl formed of synthetic resin.

SUMMARY OF THE INVENTION

The present kettledrum overcomes numerous disadvantages of the prior art, in respect to such factors as sound, tuning, practicality, ruggedness, economy, etc., by providing a bridge ring the upper bearing edge of which is sufficiently thin and rounded to permit generation of sounds having greatly improved characteristics, but sufficiently thick to prevent cutting or excessive wear of the drumhead. Mounted to the bridge ring in dependent relationship, and spaced from the drumhead, is a bowl formed of synthetic resin. Such bowl is flanged to facilitate mounting to the bridge ring, and is connected to the bridge ring in a sealed and vibration-isolating manner. The counterhoop of the kettledrum is connected to the upper ends of pull rods by pre-set fasteners. The pull rods extend through, and are guided by, the bridge ring in such manner that the bridge ring protects the counterhoop, etc., from shocks and bumps. The pull rods extend convergently through support struts and down to a spider and cover pan. Such spider pan is mounted movably within a support ring for the struts, and is connected to the tuning means for the drumhead. The synthetic resin bowl is formed by blowing, and is smooth and uncluttered both on the inside and outside.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a kettledrum constructed in accordance with the present invention;

FIG. 2 is a plan view of the drum;

FIG. 3 is an exploded perspective view illustrating various portions of the upper part of the kettledrum;

FIG. 4 is a fragmentary vertical sectional view, on line 4-4 of FIG. 2, showing the bridge ring in section and illustrating the manner of cooperation thereof with various other elements;

FIG. 5 is a greatly enlarged sectional view taken at the region indicated at 5 in FIG. 4;

FIG. 6 is a schematic view illustrating various stationary components of the present kettledrum; and

FIG. 7 is a schematic view illustrating in solid lines various movable components of the drum, stationary components being illustrated in phantom.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The present kettledrum comprises a stationary frame 10 capable of withstanding the high loads imposed thereon when the drumhead is tensioned. Frame 10 is formed by a bridge ring 11, a base ring 12, and a plurality of circumferentially spaced inclined struts 13 which rigidly interconnect the rings 11 and 12.

Bridge ring 11 is (as indicated above) so termed for purposes of identification only, since it performs various other functions in addition to that of a bridge for the drumhead. Such ring is illustrated to have an angle-shaped cross section, there being an upwardly-extending cylindrical body 14 (FIG. 4) and a radially-outwardly extending horizontal flange 15. The bridge ring is preferably an aluminum extrusion which is rolled and then welded into ring shape.

The bowl 16 of the kettledrum is mounted to and within the stationary frame 10. More specifically, such bowl is connected, as described below, to bridge ring 11 in sealed, dependent relationship relative thereto and spaced from the drumhead.

A bearing edge 17 is formed on the upper (rim) portion of ring body 14 as best illustrated in FIGS. 4 and 5. Such edge is rounded (upwardly convex) throughout the entire circumference thereof, as illustrated in FIG. 5,

being radiused about a center C and having a radius R. The edge 17 is highly polished, and has coated thereon a very thin layer of lubricant, in order to provide a minimum-friction support for the drumhead which is indicated at 18.

The peripheral edge of drumhead 18 is suitably mounted in a flesh hoop 19 (FIGS. 3 and 4) the diameter of which is substantially greater than that of ring body 14. Thus, the portion 21 of the drumhead, which is located radially-outwardly of bearing edge 17 and is generally frustoconical in shape, is inclined downwardly and away from ring body 14 at an angle which varies in accordance with drumhead tension but may be on the order of about 60 degrees from the vertical.

The ring body 14 and its bearing edge 17 are adapted to act as a bridge for the drumhead 18, much as the bridge of a guitar or violin cooperates with the strings thereof. The portion of the bearing edge 17 which is engaged by drumhead 18 (FIG. 5) is caused to be sufficiently wide that the drumhead will not be cut or torn despite the extreme tensioning which occurs in order to cause the drumhead to generate a relatively high-pitched sound. Very importantly, however, the portion of bearing edge 17 which is engaged by drumhead 18 is sufficiently narrow and is so shaped that the generated sounds will have long dwell, long-lasting overtones, strong and clear fundamentals, and excellent projection with much percussive effect. Because only a narrow region of bearing edge 17 is actually engaged by drumhead 18, there is relatively little tendency to damp out either the fundamentals or the overtones.

Applicants have discovered that the radius R (FIG. 5) should be approximately $\frac{1}{16}$ inch. Thus, the drumhead only contacts bearing edge 17 over a radial distance of approximately $\frac{1}{16}$ inch, it being pointed out that (as shown in FIG. 5) much of the rim of ring body 14 is not contacted by the drumhead. Stated otherwise, the portions of bearing edge 17 actually contacted by the drumhead 18 are those between points B and B (FIG. 5), and have a radial dimension approximately equal to R or substantially $\frac{1}{16}$ inch. The portions of the rim of ring body 14 not contacted by the drumhead may be shaped in ways other than that illustrated in FIG. 5.

The drumhead 18 is made of a polyester synthetic resin film made from polyethylene terephthalate (the polymer formed by the condensation reaction of ethylene glycol and terephthalic acid). More specifically, the drumheads are formed of "Mylar" polyester resin manufactured by E. I. du Pont de Nemours, Inc., and designated "Type A." Other such "Mylar" films may also be used, such as one made by Du Pont and sold by Remo, Inc., North Hollywood, Calif., under the designation "Code No. 6." The thickness of the drumhead may be about 0.0075 inch.

The radial flange 15 on bridge ring 11 is relatively wide in order to permit such ring to perform additional functions such as mounting the bowl 16 of the kettledrum, guiding the pull rods thereof, and protecting the counterhoop and the flesh hoop 19 from bumping or jarring, as indicated hereinafter.

The struts 13 are secured to the outermost regions of the flange 15 in order to provide room for effective mounting of the bowl in sealed and vibration-isolating relationship. Such struts are (FIG. 4) channel shaped, with the webs 22 outermost and the flanges 23 extending inwardly. The outer surfaces of the webs 22 are decorated by wood strips as indicated at 24.

The connection of the upper ends of struts 13 to bridge ring 11 is preferably by means of screws, not shown, which extend downwardly through flange 15 into tapped holes in flanges 23. Welded or other connections may also be employed if desired.

The base ring 12 of stationary frame 10 is also angularly-shaped in cross section, and has a diameter substantially smaller than that of bridge ring 11. Such base ring has an upwardly-extending cylindrical body 27

(FIGS. 1 and 6) and a radially-outwardly extending flange 28. The lower ends of struts 13 are secured to such body 27 and flange 28, by means of suitable screws (not shown) or by welded connections. Since the base ring 12 has a smaller diameter than that of the bridge ring 11, the struts 13 converge downwardly as illustrated.

The base ring 12, and thus the entire frame 10, are supported on a combination base and tuning means schematically represented at 30 in FIG. 7. Such means may be the same as are described in detail in co-pending application Ser. No. 822,542 filed on even date herewith for a Kettledrum and Tuning Mechanism Therefor, inventor Alfred M. Rubio, and assigned to the assignee of the present application. The means described in the indicated co-pending application include a foot pedal mechanism 31 (FIG. 1), a base housing 32, and suitable caster means 33.

Proceeding next to a description of the movable elements which interconnect the tuning means with drumhead 18 in order to change the pitch of the latter, and with particular reference to FIGS. 4 and 7, these comprise a counterhoop 35, pull rods 36 and a spider and cover pan 37.

Counterhoop 35 has a Z-shaped cross section the upper flange portion 38 (FIG. 4) of which seats over flesh hoop 19. More specifically, the upper flange 38 seats over a means which secures the peripheral portion of drumhead 18 in a groove in the upper surface of flesh hoop 19. Horizontal flange 38 is integral with a cylindrical riser element 39 which seats snugly over a corresponding cylindrical outer surface of the flesh hoop.

The remaining element of the counterhoop 35 is a radially-outwardly and downwardly-inclined flange 40 which is spaced above flange 15 of bridge ring 11. Such flange 40 has an outer diameter less than that of the flange 15 in order that such flange 15 will prevent contacting of the counterhoop 35 by a door frame, etc., during movement of the kettledrum. The angle of downward inclination of flange 40 corresponds to the angle of downward convergence of the pull rods 36 next to be described.

Pull rods 36 preferably comprise elongated steel tubes the upper ends of which are internally threaded as illustrated in FIG. 4. Such upper ends extend slidably through bushings 41 provided in openings 42 in the outer regions of flange 15. The upper pull rod ends are registered with relatively small holes 43 (FIG. 3) in flange 40. Screws 44 are extended downwardly through holes 43 and threaded into the upper ends of the pull rods, the degree of threading being normally such that the flange 40 is seated firmly against the upper pull rod ends. The heads of the screws are shaped to be turned by conventional drum keys.

The spider and cover pan 37 is an inverted rigid pan the downwardly-extending cylindrical rim of which has an outer diameter somewhat smaller than the inner diameter of body 27 of base ring 12. Thus, the pan 37 is adapted to move vertically within the base ring 12 without contacting the same to any substantial extent. A plurality of holes are provided in the peripheral portion of the radial "bottom" of the pan 37 to receive the lower ends of pull rods 36. Suitable means, such as the cooperating nuts 46 (FIG. 7) are provided to lock the lower ends of the pull rods against movement relative to the pan 37. Other suitable means, such as cross pins, etc., may be employed for the same purpose.

A master pull bar 47 extends through the center of spider pan 37 and has mounted on the externally-threaded upper end thereof a coarse or master-tuning nut 48. Elements 47 and 48 connect the pan 37 to the base and tuning means 30 (FIG. 7), namely to the foot pedal mechanism 31 (FIG. 1) described in detail in the cited co-pending patent application. Operation of the tuning means to lower the bar 47 effects a corresponding lowering of the plan 37 and thus pulls all of rods 36 downwardly in their bushings 41. Counterhoop 35 and flesh hoop 19 are correspondingly lowered in order to stretch

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the drumhead 18 and thereby raise the pitch of the generated sound.

The radial flange 15 of bridge ring 11 operates in the manner described above to effect mounting and guiding of the upper ends of pull rods 36. Furthermore, as previously indicated, the peripheral edge of flange 15 protects the peripheral edge of counterhoop flange 40 against shifting. In prior-art apparatus, such shifting has been a frequent cause of detuning of the drumhead.

Even if the counterhoop 35 of the present apparatus were in some manner bumped, despite the presence of protective and guide flange 15, the counterhoop 35 could not be shifted laterally due to the fact that it is effectively locked against substantial horizontal motion in either direction due to the interrelationship between the pull rods 36, bushings 41 and the walls of openings 42 in flange 15. Since the counterhoop is maintained against substantial horizontal movement, flesh hoop 19 is also maintained against horizontal movement since it seats closely against the cylindrical portion 39 of the counterhoop.

Not only are the counterhoop 35 and associated parts of the present kettledrum effectively protected against jars and bumps, but the pull rods 36 are also protected as is the pan 37. The openings 42 in flange 15 are registered with the interior portions of the channel-shaped struts 13 (FIG. 4). Thus, the pull rods extend downwardly within the respective struts for protection thereby. However, the angle of convergence of the pull rods is greater than the angle of convergence of the struts, by an amount sufficient that the lower ends of the pull rods are within the base ring 12 (FIGS. 1 and 7) whereas the lower ends of the struts are outside of such base ring (FIGS. 1 and 6).

The stated relationship eliminates the necessity of passing the lower pull rod ends through any frame apparatus, such ends instead maintaining the pan 37 in a floating relationship which from a visual standpoint simulates the upper portion of the base means 30. Thus, the spider pan 37 serves as an effective and attractive cover for the mechanism forming the tuning means. Furthermore, the pan 37 is protected by the base ring 12 against any unintentional contacting by the timpanist or by any object against which the instrument may be moved.

There will next be described the bowl 16 together with the means for mounting the same in sealed and vibration-isolating suspended relationship beneath bridge ring 11. Thus, the bridge ring not only aids in mounting and protecting the pull rods 36, etc., but also mounts the bowl 16.

The bowl is a hollow hemisphere formed of rigid material and having a radially-outwardly extending flange 51 at the rim thereof. The interior diameter of the hemisphere at such rim is equal to the inner diameter of ring body 14 as shown in FIG. 4. The mounting of the hemisphere to the bridge ring 11 is effected by means of screws 52 one of which is shown in FIG. 3. Such screws extend upwardly through holes 53 in flange 51 and are threaded into interiorly-threaded holes 54 in bridge ring flange 15.

A soft gasket 56 is interposed between flange 51 and flange 15 in order to provide an effective seal therebetween, and to aid in minimizing transmission of vibrations from the drumhead to the bowl. The gasket 56 has holes 57 therein for reception of the screws 52. Since there are no holes at any portion of bowl 16, and since the drumhead 18 sits in sealing relationship on bearing edge 17 of ring 11, it follows that the chamber within the bowl is effectively sealed. This causes the generated vibrations to retain energy for longer periods of time, and also causes more efficient projection of sound from the instrument.

Instead of employing a gasket 56 formed of solid but soft material, such as soft rubber, a suitably putty-like

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substance may be employed. Such a substance does not harden even after long use.

The bowl 16 is formed of a suitable synthetic resin, such as an acrylic resin, and may be formed economically by blowing in the absence of molds. Thus, a sheet of acrylic is heated to a forming temperature, following which a gas is introduced into a chamber formed between the sheet and a backup means, thus blowing up the resin into hemispherical shape. During such blowing, flange 51 is suitably confined.

The resin forming bowl 16 is preferably transparent and is painted on the interior surface thereof so that the paint shows through the transparent plastic in a long-lasting and attractive relationship which requires no polishing of the exterior bowl surface. Because the bowl is suspended beneath the ring 11 and is nested between the struts 13, there is very little likelihood of damaging engagement between the bowl and any object or person.

The interior surface of the rigid bowl is smooth and operates effectively to reflect sounds generated by striking of drumhead 18. Furthermore, because the ring 11 and gasket 56 operate to effect a large measure of isolation between the drumhead 18 and the bowl 16, the bowl is caused to be relatively free of vibrational energy. This further enhances its ability to cooperate with the drumhead in producing the desired sound. Stated otherwise, the bowl is caused to operate as a reflector and not as a vibrator, as is desired for the most efficient generation of sounds by the kettledrum.

It is emphasized that both the exterior and interior surfaces of the bowl 16 are free of any objects, brackets, etc. This is another factor in permitting the bowl to operate most efficiently in aiding in sound generation.

DESCRIPTION OF TUNING, AND OPERATION

The lengths of the pull rods 36 above pan 37 are so determined at the factory that the drumhead 18 will be very close to being in proper adjustment when screws 44 are tightened to cause counterhoop flange 40 to seat on the upper ends of the rods 36, as shown in FIG. 4. To illustrate the ease of mounting the head and then tuning the present instrument, let it be assumed that the pedal mechanism 31 (FIG. 1) is locked in an upwardly-pivoted position (as described in the cited co-pending application), and that the coarse tuning nut 48 is backed off in order to permit elevation of pan 37. Let it also be assumed that the subassembly comprising the drumhead 18 and counterhoop 35 has not been mounted on the instrument.

It is then merely necessary to position the drumhead 18 on the bearing edge 17 of bridge ring 11, nest the counterhoop 35 over the flesh hoop 19, insert the screws 44 through openings 43 and fully tighten all such screws 44 in the interiorly-threaded upper ends of pull rods 36. The nut 48 (FIGS. 1 and 7) is then manually turned by the timpanist in order to lower spider pan 37 and thus operate through pull rods 36 to tension the drumhead 18 until approximately the lowest-pitched note in the range of operation is achieved.

The lock of the pedal portion of mechanism 31 is then released and the pedal is pivoted downwardly a few degrees. Slight adjustments are then made in the nut 48, and (if desired) in an associated fine tuning mechanism 58 (FIG. 1) described in the co-pending application, in order that the precise low pitch will be achieved. In addition, one or more of the screws 44 may be backed off slightly in order to make sure that all portions of the drumhead are under uniform tension. Head mounting and tuning are then complete, in a small fraction of the time required in conventional timpani.

It is a major feature of the present kettledrum that alignment problems are eliminated. It is not possible to mount the counterhoop 35 (and thus flesh hoop 19) in anything but the properly aligned condition concentric with the body 14 of ring 11. This is because the fixedly-

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mounted bushings 41 and associated rods 36 insure that the counterhoop 35 will automatically and easily assume the position shown in FIG. 4.

It is also very important, as noted above, that the flange 15, struts 13 and base ring 12 prevent jarring of the counterhoop, pull rods or spider pan 37 during movement of the timpani onto a stage (for example), or during shipment or playing thereof, or even should the kettledrum be knocked over. It follows that the kettledrum remains perfectly aligned and in tune despite very adverse handling such as may frequently occur in school timpani.

What is claimed is:

1. A kettledrum, which comprises:

a rigid frame adapted to be supported on the floor of a room,

a bridge ring connected to the upper portion of said frame and supported thereby,

said bridge ring having an annular bearing edge, a sound-reflecting bowl,

means to connect the rim portion of said bowl to said bridge ring whereby to mount said bowl on said bridge ring in suspended relationship,

a drumhead mounted over said bridge ring in bearing engagement with said bearing edge, and means operable by the timpanist to effect rapid changes in the tension of said drumhead.

2. The invention as claimed in claim 1, in which said bowl is connected to said bridge ring at regions thereof spaced from said drumhead, whereby said bridge ring aids in defining the chamber formed within said bowl and beneath said drumhead.

3. The invention as claimed in claim 1, in which means are provided to seal the chamber formed within said bowl and beneath said drumhead.

4. The invention as claimed in claim 3, in which said sealing is effected by a sealing and vibration-absorbing ring provided between said bridge ring and said bowl.

5. The invention as claimed in claim 1, in which said bowl is a hollow hemisphere formed of synthetic resin and having a radially-outwardly extending flange at the rim thereof, and in which said means to connect said bridge ring to said bowl comprises means to connect said flange to said bridge ring in spaced relationship from said drumhead.

6. A kettledrum, which comprises:

a bowl,

means to form a protective and guide flange extending outwardly from said bowl adjacent the rim portion thereof,

said flange encompassing said bowl,

means to form an annular bearing edge to support a drumhead in stretched relationship over said bowl, said bearing edge having a diameter much smaller than the outer diameter of said flange,

a disc-shaped drumhead mounted over said bearing edge and having a flesh hoop at the peripheral edge thereof,

the inner diameter of said flesh hoop being larger than that of said bearing edge but smaller than that of said flange,

a counterhoop seated over said flesh hoop,

a plurality of pull rods connected to said counterhoop and extending downwardly through openings in said flange, and

tuning means connected to the lower ends of said pull rods to change the tension applied thereto and thus the pitch of said drumhead.

7. The invention as claimed in claim 6, in which said openings in said flange are sufficiently small that said flange will effect guiding of said pull rods and also positioning of said counterhoop and thus said flesh hoop, and in which the upper ends of said pull rods are directly connected to said counterhoop in the absence of levers therebetween.

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8. The invention as claimed in claim 7, in which said flange is formed on an angle-sectioned bridge ring the body of which extends upwardly and has said bearing edge at the upper portion thereof, said flange extending radially-outwardly from said body, in which means are provided to mount the rim of said bowl to said bridge ring, in which support means are connected to said bridge ring to mount the same in spaced relationship above the floor, and in which the outer diameter of said counterhoop is smaller than the outer diameter of said flange.

9. The invention as claimed in claim 6, in which said flange is formed on an angle-sectioned bridge ring the body of which extends upwardly and has said bearing edge at the upper portion thereof, said flange extending radially-outwardly from said body, in which means are provided to mount the rim of said bowl to said bridge ring, and in which support means are connected to said bridge ring to mount the same in spaced relationship above the floor.

10. The invention as claimed in claim 9, in which said support means are disposed to protect said pull rods and at least a portion of said tuning means from accidental engagement by the timpanist or by structures against which the kettledrum may be moved.

11. The invention as claimed in claim 6, in which the outer diameter of said counterhoop is smaller than the outer diameter of said flange.

12. A kettledrum, which comprises:

a bridge, protective, guide and mounting ring having a generally cylindrical hollow body,

said ring also having a radially-outwardly extending flange provided on said body,

the upper end of said body forming a bearing edge for a drumhead,

frame means to support said bridge ring in spaced relationship above a floor,

a bowl connected at the rim thereof to the lower portion of said bridge ring,

a disc-shaped drumhead having a flesh hoop connected around the periphery thereof,

said drumhead seating concentrically on said bearing edge,

a counterhoop nested over said flesh hoop to actuate the same,

the outer diameter of said counterhoop being no greater than that of said flange,

a plurality of pull rods connected directly to said counterhoop and extending downwardly and movably through corresponding mounting and guide portions of said flange, and

tuning means connected to the lower ends of said pull rods to actuate the same.

13. The invention as claimed in claim 12, in which the diameter of said bowl rim corresponds generally to the diameter of said body of said bridge ring, in which said support frame means is connected to said flange at points located radially-outwardly from said rim of said bowl, and in which said flesh hoop has an inner diameter substantially larger than the other diameter of said bearing edge, and has an outer diameter substantially smaller than that of said flange.

14. The invention as claimed in claim 13, in which said support frame means includes upstanding strut portions, and in which said pull rods extend through at least parts of said strut portions for guiding thereby.

15. The invention as claimed in claim 12, in which said bridge ring is formed of metal, and in which said bowl is formed of synthetic resin.

16. The invention as claimed in claim 15, in which said bridge ring is an aluminum extrusion.

17. The invention as claimed in claim 15, in which said bowl is a hemisphere formed by blowing heated resin into hemispherical shape, said hemisphere having a radially-outwardly extending flange seated against the under side of said bridge ring flange and connected thereto, and

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in which said flange of said bridge ring is provided at the lower end of said body thereof.

18. The invention as claimed in claim 17, in which said resin is an acrylic.

19. The invention as claimed in claim 17, in which means are provided between said flange of said bridge ring and said flange of said bowl to isolate vibrations and to seal the space therebetween, thus sealing the entire chamber formed between said bowl and said drumhead.

20. The invention as claimed in claim 12, in which the portion of said bearing edge contacted by said drumhead has a radius of about $\frac{1}{16}$ inch, and in which said drumhead is formed of a polyester synthetic resin made from polyethylene terephthalate.

21. The invention as claimed in claim 12, in which said pull rods are connected to said counterhoop by means of screws inserted downwardly through holes in said counterhoop and threaded into internally-threaded axial bores in the upper ends of said pull rods, said holes in said counterhoop having smaller diameters than said pull rods whereby said counterhoop may seat on the upper ends of said pull rods.

22. The invention as claimed in claim 12, in which said counterhoop has a Z-shaped cross section, the upper flange of the Z seating over and on said flesh hoop, the riser of the Z being a cylinder and seating closely around said flesh hoop, and the bottom and radially-outwardly extending flange of the Z being connected to said pull rods.

23. A kettledrum, which comprises:

a bridge, protective, guide and mounting ring formed of metal and having a generally cylindrical hollow body,

said bridge ring also having a radially-outwardly extending flange provided at the lower end portion of said body,

the upper end of said body being relatively thin and forming a bearing edge for a drumhead,

a base ring formed of metal and having a generally cylindrical hollow body,

said base ring having a diameter smaller than that of said bridge ring,

said base ring having a radially-outwardly extending flange provided at the lower end portion of the body thereof,

a plurality of struts connected at the upper ends thereof to said flange of said bridge ring adjacent the peripheral portion of said flange,

said struts converging downwardly,

the lower ends of said struts being connected to said base ring adjacent the outer surface of the body thereof and the upper surface of the flange thereof,

a bowl formed of synthetic resin and having a radially-outwardly extending flange at the rim thereof,

the inner diameter of said bowl at said rim corresponding generally to the inner diameter of said body of said bridge ring,

means to mount said flange of said bowl to said flange of said bridge ring in sealed relationship and with the upper surface of said bowl flange disposed beneath the lower surface of said bridge ring flange,

a disc-shaped drumhead having a flesh hoop connected around the periphery thereof,

said drumhead seating concentrically on said bearing edge,

said flesh hoop having an inner diameter substantially larger than the outer diameter of said bearing edge and having an outer diameter substantially smaller than that of said flange on said bridge ring,

a counterhoop nested over said flesh hoop to actuate the same and also to determine the radial position thereof,

the outer diameter of said counterhoop being

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smaller than that of said flange of said bridge ring,

a plurality of pull rods connected directly to said counterhoop and extending downwardly through openings in said bridge ring flange at the respective portions thereof to which said struts are connected, said pull rods converging downwardly at an angle steeper than the angle of downward convergence of said struts,

the upper portions of said pull rods extending through said struts,

a spider mounted in said base ring and connected to the lower ends of said pull rods at points near the inner surface of said body of said base ring, and

actuating means at least the major portion of which is disposed beneath said spider, and which is connected to said spider to actuate the same vertically and thus operate through said pull rods to change the vertical position of said counterhoop and the tension of said drumhead.

24. The invention as claimed in claim 23, in which said struts are channel-sectioned and open inwardly, and in which said pull rods are connected to said counterhoop by means of screws which extend downwardly through openings in said counterhoop and into threaded bores in the upper ends of said pull rods.

25. A kettledrum, which comprises:

a bridge ring formed of metal and having a bearing edge at the upper portion thereof,

a drumhead mounted over said bridge ring and in bearing engagement with said bearing edge,

a sound-reflecting and sound-reinforcing bowl formed of synthetic resin,

means to connect the rim of said bowl to said bridge ring in spaced relationship from said drumhead whereby said bridge ring aids in minimizing transmission of vibrations to said bowl from said drumhead,

sealing and vibration-isolating gasket means provided between said bridge ring and said bowl, and

means to adjust the tension of said drumhead to thus alter the pitch thereof.

26. A kettledrum, which comprises:

a bowl,

a drumhead mounted over said bowl,

a counterhoop connected to the peripheral portion of said drumhead,

a base ring disposed beneath said bowl,

a plurality of struts extending upwardly from said base ring and connected to said bowl for support thereof,

said struts converging downwardly and being connected to exterior portions of said base ring,

the upper ends of said struts being located relatively near the rim of said bowl,

a spider element disposed within said base ring and protected thereby,

tuning means operated by the timpanist to effect vertical shifting of said spider element,

a plurality of pull means connected to said spider element and extending upwardly therefrom externally of said bowl,

said pull means converging downwardly at a steeper angle of convergence than the angle of convergence of said struts,

said pull means being connected to peripheral portions of said spider element radially-inwardly from said base ring,

said pull means passing respectively through at least portions of said struts for protection thereby,

the upper ends of said pull means being connected to said counterhoop to actuate the same in response to said vertical shifting of said spider element,

said pull means being rods, and

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protective and guide flange means provided around
said bowl and having a diameter larger than that
of said counterhoop,
said flange means having guide openings therein
to receive and guide said pull means.

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