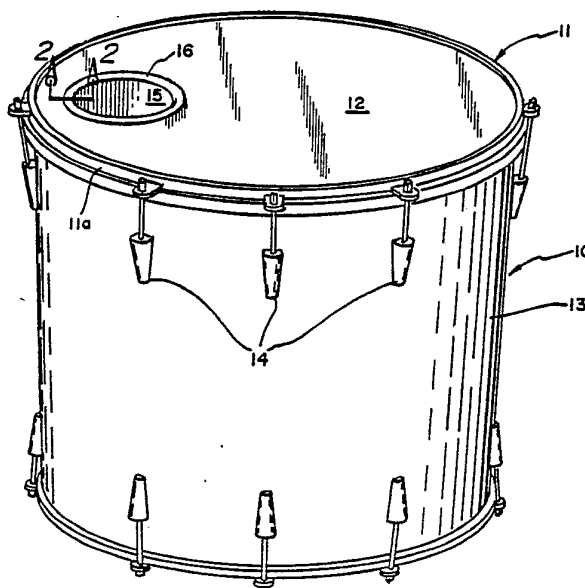




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁴ : G10D 13/02	A1	(11) International Publication Number: WO 89/ 03572 (43) International Publication Date: 20 April 1989 (20.04.89)
(21) International Application Number: PCT/US88/03412 (22) International Filing Date: 3 October 1988 (03.10.88) (31) Priority Application Number: 106,173 (32) Priority Date: 7 October 1987 (07.10.87) (33) Priority Country: US (71)(72) Applicant and Inventor: SPEED, Zay, J. [US/US]; 4412 Beechwood Road, Salt Lake City, UT 84123 (US). (74) Agent: MALLINCKRODT, Philip, A.; Mallinckrodt & Mallinckrodt, 10 Exchange Place, Suite 510, Salt Lake City, UT 84111 (US).		(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: DRUMHEAD WITH FRAMED APERTURE**(57) Abstract**

The flexible diaphragm sheet (12) of a drumhead (11) of a drum (10) as a musical instrument is apertured in a manner often done by drummers to enhance the sound emitted by the drum, but, in accordance with the invention, the aperture (15) is rigidly framed about its defining margin to substantially reestablish the vibrational integrity of the diaphragm (12) and to protect it against splitting and cracking. Framing may be accomplished integrally with the diaphragm sheet (12) in drum fabrication originally or may be accomplished by securely clamping a frame (16) in place about the defining margin of the aperture in existing drumheads or during original fabrication of drumheads.

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Drumhead with Framed Aperture

S P E C I F I C A T I O NBACKGROUND OF THE INVENTION

Field: The invention has to do with tensioned flexible heads of drums of all kinds as musical instruments.

State of the Art: Drums as musical instruments are normally made with flexible heads of various sheet materials, usually a plastic such as a Mylar, arranged to be tensioned after installation on the hollow body of the drum. As customarily produced, such drumheads may be single sheets, or they may be double sheets with a liquid therebetween.

It has been the practice with some drummers to cut a circular aperture in the flexible diaphragm sheet of a single sheet drumhead for the purpose of releasing air lock and sonic charge within the hollow interior of the drum to augment and beneficially modify sound characteristics, but this has had a tendency to distort vibration of such sheet and to result in relative short life for the drumhead by reason of splitting and cracking of the sheet marginally of the aperture.

BRIEF SUMMARY OF THE INVENTION

For remedying the problems associated with the practice of aperturing drumhead diaphragm sheets and for obtaining true musical tones along with all the values sought by such practice, it is a primary feature of the invention that the aperture be substantially rigidly framed marginally. This also enables double sheet drumheads to be apertured, without loss of the liquid inserted between the sheets or with vibration of the individual sheets relative to one another which would produce extraneous sounds.

An advantageous way of carrying out the invention, especially for the drumhead diaphragm of an existing drum, is by applying an annular clamp to the margin of the drumhead sheet or sheets which define the aperture. Tightening of the upper and lower annular sections of the clamp, which in some forms of the invention are joined by screw threading for clamping purposes, protects the sheet margin or margins and largely restores the vibrational integration of the sheet or sheets. However, the sheet or sheets may have framing molded integrally therewith about aperturing provided during manufacture of the sheet or sheets, or framing members may be secured by adhesive, such as a strong glue, to opposite faces of the sheet or

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sheets marginal to the aperture or to one or the other of the opposite faces thereof.

A related design application, Serial No. 066,103, filed June 24, 1987, jointly by myself, as Jeffrey Brian Howcroft, and by Isaac Levi Alldredge is
5 concerned strictly with ornamental design for the mechanical arrangement invented solely by me as here disclosed.

THE DRAWINGS

The best modes presently contemplated for carrying out the invention
10 in practice are shown in the accompanying drawings in which:

Fig. 1 is a view in perspective of a typical musical drum having a diaphragm single sheet drumhead with circular aperture framed by a screw clamp;

Fig. 2, a transverse section taken on the line 2-2 of Fig. 1, through one
15 side of the clamp, the view being considerably enlarged and showing drum head portions broken off at both sides;

Figs. 3 and 4, views similar to that of Fig. 2, but with alternative, confronting, sheet clamping faces, respectively;

Fig. 5, another similar view but showing a single ring glued to the top
20 face of the drum head sheet;

Fig. 6, a fragmentary view corresponding to the upper portion of Fig. 1, but with integral marginal enlargement molded about a metal ring;

Fig. 7, a view similar to that of Fig. 2 but taken on the line 7-7 of Fig. 6;

25 Figs. 8-10, similar views showing alternative forms, respectively, of integrally molded margin, without metal insert;

Figs. 11 and 12, similar views showing alternate forms, respectively, of double diaphragm sheet drumhead according to the invention; and

Fig. 13, a view similar to that of Fig. 2 but showing still another
30 alternative form of the invention.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

In the form of the invention illustrated in Fig. 1, a musical instrument drum 10 has a drumhead 11 of flexible sheet drumhead material 12, such as
35 the plastic sheet material known as "Mylar", a polyester film characterized by high tensile strength, from which most drumheads are now made.

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Drumhead 11 is attached to the hollow cylindrical body 13 of drum 10 in customary manner for stretching taut by means of usual tensioning elements 14.

5 Sheet drumhead material 12 is cut or molded to provide a relatively minor aperture 15 therein at a strategic location for the purposes for which such apertures have been used in the past, here shown in Fig. 1 as being close to the retaining ring 11a of the drumhead.

10 In accordance with the invention, the aperture 15 is framed about its periphery substantially rigidly relative to the drumhead sheet or sheets to, in effect, restabilize the integrity of such sheet or sheets. Since in this illustrated instance, and as it usually will be, aperture 15 is circular, the aperture framing is of annular configuration, and, if for existing drums altered in accordance with the invention the frame will be of clamp formation.

15 As illustrated in Figs. 1 and 2, frame 16 is made up of two annular, mating, substantially rigid ring parts or sections, an upper ring 17 and a lower ring 18 matingly screw threaded as at 19 for tight clamping to received margins of sheet material 12 which define aperture 15. Rings 17 and 18 are rigid and made of any suitable material, such as metal or even wood.
20 However, it is preferred to make such rings of a strong and rigid plastic material, such as polyethelene, as indicated in the alternative forms shown in Figs. 3-5 and 13 where like parts are indicated by like reference numbers.

25 The confronting clamping faces of the clamping rings may be entirely flat, as in Fig. 13, or may be variously matingly ribbed, as in Figs. 2-4 at 20, 21, and 22, respectively. For simplifying installation, knurling 17a and 18a may be provided as illustrated on lower surfaces of screw clamping rings 17 and 18, respectively.

30 It is presently preferred, for the sake of economy in manufacture, to construct the framing clamp as in Fig. 13, wherein the two clamping rings 17 and 18 are clamped together upon drumhead sheet 12 by means of screws 23, which desirably have standard drum key heads 23a and shanks 23b with sheet metal screw threading. Four of the screws 23, evenly spaced about rings 17 and 18, are usually adequate but more may be employed. The rings are injected molded with slightly undersize screw-receiving holes.

35 Fig. 5 shows how a single framing ring, here indicated 17, may be applied flatwise to the drumhead sheet surface marginally of the aperture

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and secured thereto by a firm setting adhesive, such as a glue, indicated at 24.

The aperture framing may be integral with the drumhead sheet. As shown in Figs. 6 and 7, flexible drumhead sheet 25 of Mylar plastic in drumhead 26 on drum body 27 is molded at 25a about a rigid annular core 28 marginally of aperture 29 to provide framing 30 for such aperture. Such core is preferably of hollow tubular formation, and may be of metal or of a plastic material.

As shown in Figs. 8-10, the aperture framing may be wholly integral with the drumhead sheet. In Fig. 8, framing 31 is wholly integral with drumhead sheet 25. In Fig. 9, framing 32 is also wholly integral with drumhead sheet 25, but encompasses the aperture margin only on the upper face of the sheet, while in Fig. 10 similar framing 33 encompasses the aperture margin only on the lower face of the sheet.

As applied to an aperture in double sheets of a double sheet drumhead, framing clamps corresponding to those shown in Figs. 1-4 and 13 may be used, or, as shown in Fig. 11, a frame 34 may be molded of any suitable material, such as a plastic, about the aperture-defining margins 35a and 36a of the apertured sheets 35 and 36 and about a sealing insert ring 37 between the sheets. In Fig. 12, a sealing insert ring 38 of generally T-shape in transverse cross-section is sealed between and to the sheet 35 and 36 by films of adhesive (not shown), the cross-head 38a of such ring insert being preferably rounded, as shown, and projecting into the aperture.

If apertures are used and variously located in the sheet or sheets of both of the opposite drumheads, respectively, of a drum, they are each framed in one or another of the several alternative forms of the invention previously described. Except for screw type clamping frames, shapes of the apertures and of corresponding framing in accordance with the invention may vary considerably, being either regular or irregular in their peripheries, such as elliptical, square, polygonal, or rain drop shape, etc.

Whereas this invention is here illustrated and described with specific reference to an embodiment thereof presently contemplated as the best mode of carrying out such invention in actual practice, it is to be understood that various changes may be made in adapting the invention to different embodiments without departing from the broader inventive concepts disclosed herein and comprehended by the claims that follow.

CLAIMS

1. A drumhead for a drum as a musical instrument, comprising a sheet of flexible drumhead material adapted to be stretched taut in a drumhead tensioning ring as a sound emitting diaphragm; a drumhead tensioning ring in which said sheet is mounted for tensioning; an aperture in said sheet; and a frame secured to said sheet marginally of and surrounding said aperture, said frame being substantially rigid relative to said sheet for substantially reestablishing the integrity of the apertured sheet.
2. A drumhead according to Claim 1, wherein the frame is a clamp closed peripherally and having upper and lower clamping sections with confronting clamping faces clamped to the defining margins of the aperture.
3. A drumhead according to Claim 2, wherein the clamp is annular and has upper and lower, mating, ring sections are screw threaded for clamping together, upon the margins of the sheet that define the aperture.
4. A drumhead according to Claim 2, wherein the confronting clamping faces of the clamp sections are planar in extent.
5. A drumhead according to Claim 2, wherein the clamping faces are matingly ribbed peripherally of the frame.
6. A drumhead according to Claim 2, wherein the clamping sections of the clamp are made of a plastic material.
7. A drumhead according to Claim 2, wherein the clamping sections of the clamp are made of metal.
8. A drumhead according to Claim 2, wherein the upper and lower clamping sections are clamped together by screws threaded thereinto.
9. A drumhead according to Claim 1, wherein the frame comprises a peripheral frame member adhesively secured to a face of the drumhead sheet.
10. A drumhead according to Claim 1, wherein the frame is at least partially of the same material as the drumhead sheet and is formed integrally therewith.
11. A drumhead according to Claim 10, wherein the frame comprises a substantially rigid core extending continuously therearound, and a covering of the same material as, and integral with, the drumhead sheet.
12. A drumhead according to Claim 10, wherein the rigid frame is formed entirely of the same material as, and is entirely integral with, the drumhead sheet.

13. A drumhead according to Claim 1, comprising double sheets similarly apertured in registry and having the defining margins of the apertures sealingly fastened together by the frame.

14. A drum musical instrument, having a drumhead in accordance with Claim 1.

15. A drumhead sheet as a sound emitting diaphragm for musical instrument drums, comprising a flexible sheet of drumhead material having an aperture therein; and a frame secured to said sheet marginally of and surrounding said aperture, said frame being substantially rigid relative to said sheet for substantially reestablishing the integrity of the apertured sheet.

16. A drumhead sheet according to Claim 15, wherein the flexible sheet is a polyester film characterized by high tensile strength.

17. A drumhead according to Claim 1, wherein the flexible sheet is a polyester film characterized by high tensile strength.

18. A clamping frame for framing an aperture in the flexible, sound emitting, diaphragm sheet of the drumhead of a musical instrument drum, comprising upper and lower clamping sections conforming in shape to the shape of the margins of said sheet that define said aperture and having confronting clamping faces; and means for screwing said clamping sections together with said margin of the sheet between said clamping faces, said clamping sections being substantially rigid relative to said sheet for substantially reestablishing the integrity of the apertured sheet.

19. A clamping frame according to Claim 18, wherein the clamping faces are matingly ribbed peripherally of the frame.

20. A drumhead according to Claim 18, wherein the clamping sections of the clamp are made of a plastic material.

21. A drumhead according to Claim 18, wherein the clamping sections of the clamp are made of metal.

22. A method of modifying the sound of a drum provided with a drumhead having an apertured diaphragm, comprising applying a rigid frame marginally of the aperture.

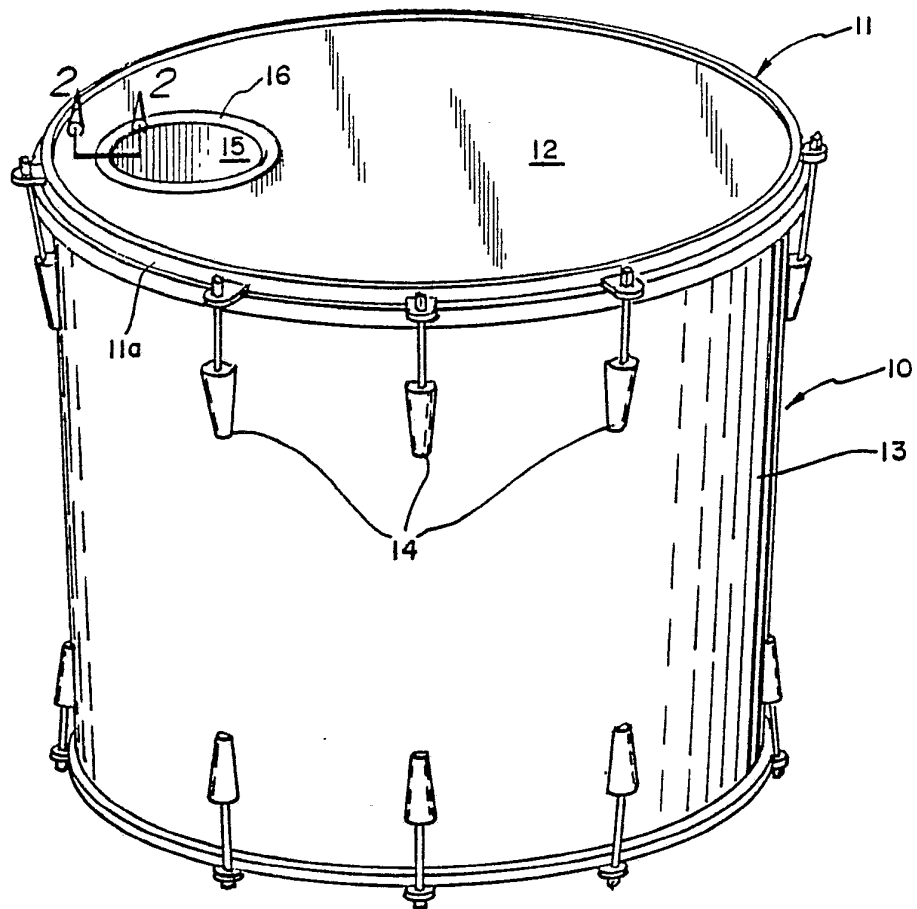


FIG. 1

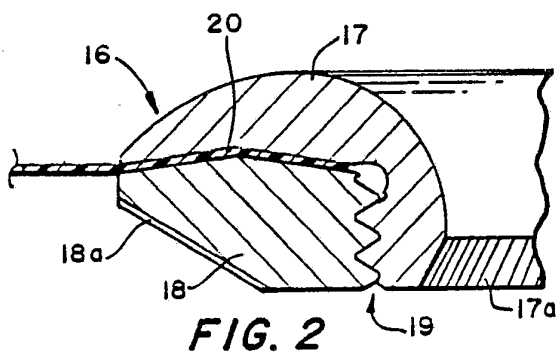


FIG. 2

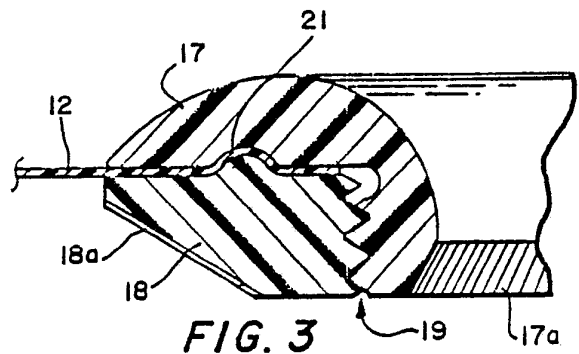


FIG. 3

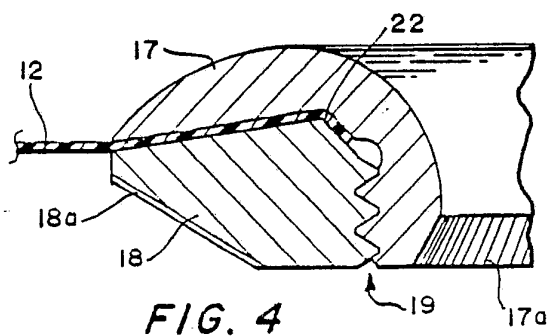


FIG. 4

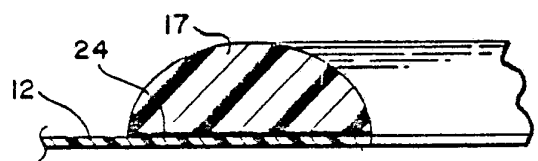


FIG. 5

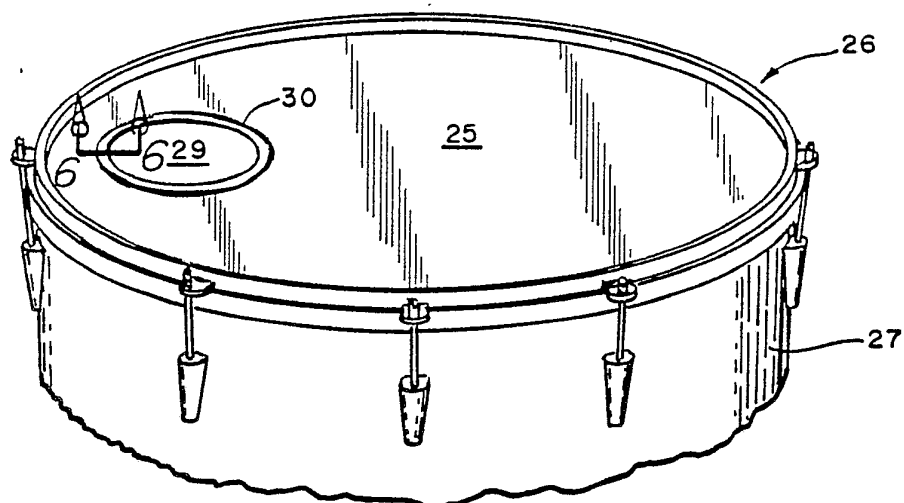


FIG. 6

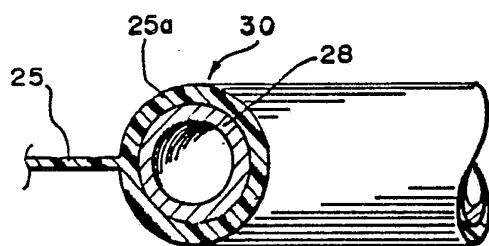


FIG. 7

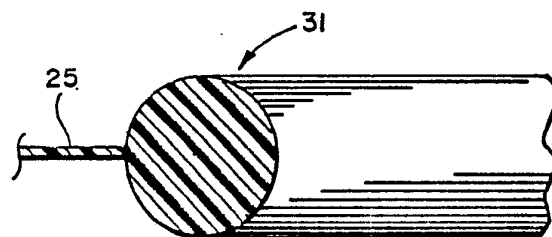


FIG. 8

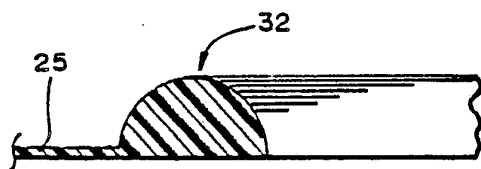


FIG. 9



FIG. 10

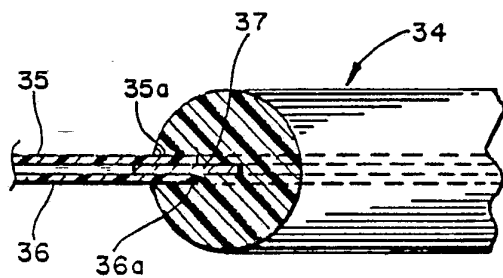


FIG. 11

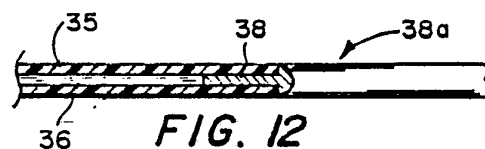


FIG. 12

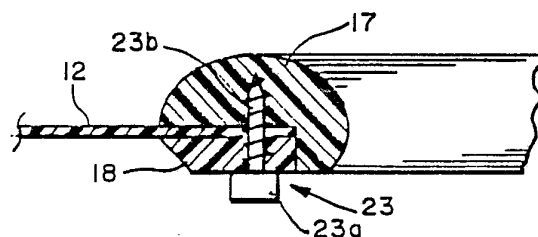
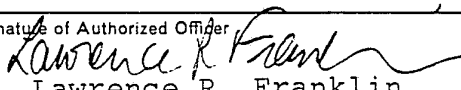


FIG. 13

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US 88/03412

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC (4): G 10 D 13/02		
U.S.Cl.: 84/414		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
U.S.	84/269-272, 411R, 414, 418	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
$\frac{Y}{X}$	US, A, 554,967, (WILKES) 13 February 1896	$\frac{1-17}{22}$
$\frac{Y}{X}$	US, A, 555,636, (CARTER), 03 March 1896	$\frac{1-17}{22}$
Y	US, A, 2,934,989, (BELLI ET AL) 03 May 1960	1-17
$\frac{Y}{X}$	US, A, 4,213,368, (COX) 22 July 1980	$\frac{1-17}{22}$
* Special categories of cited documents: ¹⁰ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
05 JANUARY 1989		07 MAR 1989
International Searching Authority		Signature of Authorized Officer
ISA/US		 Lawrence R. Franklin

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers _____, because they relate to subject matter ¹² not required to be searched by this Authority, namely:

2. ☐ Claim numbers _____, because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out ¹³, specifically:

3. ☐ Claim numbers _____, because they are dependent claims not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☒ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ²

This International Searching Authority found multiple inventions in this international application as follows:

I. DRUMHEAD: CLAIMS 1-17 AND 22

II CLAMP: CLAIMS 18-21

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:
3. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:
1-17 AND 22
4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

- ☐ The additional search fees were accompanied by applicant's protest.
☐ No protest accompanied the payment of additional search fees.