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EUROPEAN PATENT APPLICATION

⑳ Application number: **87401365.9**

⑥① Int. Cl.⁴: **A 44 C 11/00**

㉔ Date of filing: **17.06.87**

③⑩ Priority: **17.06.86 JP 141165/86**

④③ Date of publication of application:
23.12.87 Bulletin 87/52

⑥④ Designated Contracting States:
BE CH DE ES FR GB IT LI NL

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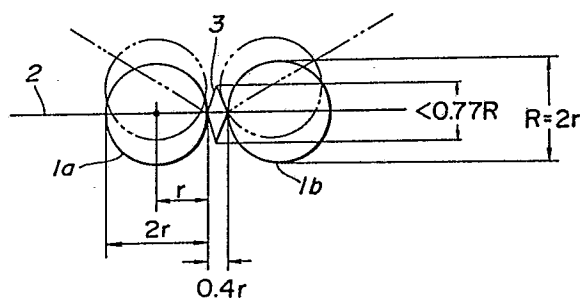
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⑤④ Ornamental article.

⑤⑦ An ornamental article such as a pearl necklace has a plurality of gem objects each having a spherical surface and a through hole extending substantially perpendicularly to the spherical surface, a string threaded through the gem objects to interconnect them, and a plurality of spacers of an elastomeric material interposed between adjacent ones of the gem objects and having through holes through which the string extends. The spherical surface of each of the adjacent gem objects has a radius of curvature of r . The thicker central portion having a thickness of at most $0.4r$, each spacer having a radius of at most $0.77r$. The string may be nonstretchable and coated with synthetic resin or natural resin. With this arrangement, the gem objects can easily be threaded on the string. The string is prevented from being subjected to undue tension even when bent strongly, so that the string and the gem objects are protected against damage in use or sale.

FIG. 1



Description

ORNAMENTAL ARTICLE

The present invention relates to an ornamental article comprising a multiplicity of gem objects interconnected by a string passing through holes defined in the gem objects. The present invention is applicable to annular ornamental articles such as a necklace, a pendant, a bracelet, a hair band, a string of beads, an anklet ring, and the like.

The term "gem objects" used throughout the specification means precious stones, semiprecious stones, pearls, pieces of coral, amber, tortoise shell, and ivory, synthetic stones, imitation stones, and precious metals.

The gem objects, when finished, are generally of a spherical shape or in the form of a particulate body or small mass having a spherical surface.

FIG. 15 of the accompanying drawings illustrates three spherical gem objects 1a, 1b, 1c having respective through holes through which a string 2 passes. Each of the gem objects has a radius r . The length L of the string 2 which is inserted in the three gem objects is therefore equal to $6r$.

These strung gem objects are generally used as a necklace, for example, in an annular or arcuate form and worn by the user. When in use, the string 2 is subjected to a strong tensile force.

FIG. 16 shows the manner in which the three strung gem objects are used in an arcuate form. It is empirically known that the maximum angle α through which adjacent two of the strung gem objects are angularly displaced, or the string is bent, when the chain of the gem objects flexes, is 45 degrees. This requires manufacturers of ornamental articles to thread the gem objects on the string so that they can withstand damaging stresses even when two adjacent gem objects are angularly displaced through 45 degrees. Stated otherwise, the strung gem objects are practically usable sufficiently if they can withstand stresses arising from bending through 45 degrees. However, there are some technical difficulties in meeting the above requirement.

More specifically, unless the string 2 is tensioned to an appropriate extent under the condition of FIG. 15, there are gaps formed between the gem objects 1a, 1b, 1c, making the overall chain unsightly and lowering its commercial value.

If the string 2 is kept under suitable tension in FIG. 15, the string 2 tends to be excessively tensioned and at times cut off or elongated when bent as shown in FIG. 16. The unduly tensioned string 2 imposes localized forces on ends of the hole of the gem object, with the result that the ends of the hole of the gem object are highly likely to be damaged especially when the gem objects are easily damageable pieces such as pearls. Therefore, the procedure for threading gem objects requires much skill on the part of the worker who assembles chains of gem objects. Furthermore, the string used is limited in terms of material and performance. Even if a chain of gem objects is assembled with the required degree of skill and a desired string, the string is still apt to rupture when the chain of gem objects is strongly

bent over or caused to flex.

As disclosed in Japanese Utility Model Publication No. 57(1982)-60341, there is known an ornamental article design in which an elastomeric spacer is placed as a spring member between two adjacent gem objects. With this conventional arrangement, when the chain of interconnected gem objects is bent over, the string on which the gem objects are threaded is excessively tensioned, and tends to be cut off or elongated. The gem objects are also prone to damage since undue localized forces are imposed on ends of the holes in the gem objects. More specifically, as shown in FIG. 17, two spherical gem objects 1a, 1b each of a radius r are interconnected by a string 2 with a flat spacer 9 of a thickness s being interposed between the gem objects 1a, 1b. While the string 2 remains straight as indicated by the solid line, the distance L between the centers of the two gem stones 1a, 1b is expressed by $L = 2r + s$. When the string 2 is bent over as indicated by the dot-and-dash line, the distance L' between the centers of the gem stones 1a, 1b is expressed by $L' = 2r + s + 2\ell'$, which is greater than the distance L by $2\ell'$. As a consequence, the string 2 is pulled under a force commensurate with $2\ell'$, and the reactive force produced by the string 2 acts on the gem objects.

Some strung gem objects have conventionally been threaded on stretchable strings. FIGS. 18 through 21 show a conventional process of stringing a series of gem objects 42 and securing them to a stretchable string 41. As shown in FIG. 18, a string 41 is threaded successively through holes 43 of the gem objects, and the end 41a of the string 41 is passed through a ring 44 and then folded back. The string 41 is firmly joined to the ring 44 by a knot 45, and passed successively through the gem objects 42 backwards while under strong tension. Each time the string 41 is passed through one gem object 42, a knot 46 is formed on the string 41 to keep the gem object 42 in position on the tensioned string 41, as shown in FIGS. 19 through 21. The string 41 is knotted in this manner until all of the gem objects 42 are securely fastened in place. Therefore, the gem objects 42 are strung by and fixed in place on two strings.

It is also known to use a nonstretchable string such as a metal wire for stringing gem objects, as disclosed in Japanese Utility Model Publication No. 57(1982)-60341.

When selling a string of ornamental gem objects, it is customary to adjust the length of the string according to the preference of the customer and to meet the customer's physical requirements. Where a stretchable string is employed, it is highly tedious and time-consuming for even a skilled worker to insert two strings through gem objects, and make firm knots between the gem objects to fasten them on the string.

Since the gem objects are fixed in place by the knots of the tensioned string, the string tends to be

elongated during usage and with time, leaving gaps between the gem objects, which are then loosened and become unsightly. As a stretchable string or a metal wire is inserted successively through gem objects, the tip end of the string or wire is apt to be frayed and the frayed string or wire would not be threaded easily through the gem objects. It would be impossible to mechanically thread a string through a succession of gem objects. Even after the gem objects have been strung, the tip end of the string tends to be frayed, and the frayed string end may be responsible for loosening of the gem objects and is poor in appearance.

It therefore poses problems for a jeweler to make finished strung products prior to sale. It is general practice for the seller to string gem objects after they have been ordered, and deliver them to the purchaser at least two or three hours later or usually on the next day. This practice is however disadvantageous from the standpoint of consumer protection in that the purchaser cannot obtain her selected goods upon purchase, and is forced to wonder whether the very goods her ordered will be delivered or not.

Since gem objects are threaded on two strings, the product may be not so graceful and smooth as it should be, and its movement may be somewhat sluggish.

Where a metal wire is employed to string gem objects, the open ends of the through holes of the gem objects are worn by the metal wire as they rotated during usage over a long period of time. The worn gem objects are quite unsightly, and, above all, it is intolerable to the consumers to find their expensive gem objects damaged.

It is an object of the present invention to provide a ornamental article of strung gem objects which can easily and quickly be threaded on and fixed to a string by anyone.

Another object of the present invention is to provide an ornamental article of strung gem objects which is so designed that no excessive tensile forces will be applied to the string even when the article is strongly bent over, for protection of the string and the gem objects against damage.

Still another object of the present invention to provide an ornamental article of strung gem objects which can be adjusted in length even after it is completed.

A further object of the present invention is to provide an ornamental article of strung gem objects which are prevented from being loosened, has its string end prevented from being frayed, and prevents the through holes of the gem objects from being worn during usage over an extended period of time, so that the ornamental article will be kept graceful and smooth over a long period of time.

According to the present invention, the above object can be achieved by an ornamental article comprising a plurality of gem objects each having a spherical surface and a through hole extending substantially perpendicularly to the spherical surface, a string threaded through the gem objects to interconnect them, and a plurality of spacers of an elastomeric material interposed between adjacent

ones of the gem objects and having through holes through which the string extends, the spherical surface of each of the adjacent gem objects having a radius of curvature of r , the thicker central portion having a thickness of at most $0.4r$, each spacer having a radius of at most $0.77r$.

The above and further objects, details and advantages of the present invention will become apparent from the following detailed description of preferred embodiments thereof, when taken in conjunction with the accompanying drawings.

FIG. 1 is a schematic view of an ornamental article according to an embodiment of the present invention;

FIGS. 2 through 6 are schematic views of ornamental articles according to other embodiments of the present invention;

FIG. 7 is a schematic view illustrative of the principles of the present invention;

FIG. 8 is a perspective view, partly omitted from illustration and partly in cross section, of an ornamental article according to still another embodiment of the present invention;

FIG. 9 is a perspective view, partly omitted from illustration, of an ornamental article with accent rings interposed between gem objects;

FIG. 10A is a fragmentary view showing a pendant coupled to an annular member interposed between two adjacent strung gem objects;

FIG. 10B is a fragmentary view showing a brooch coupled to an annular member interposed between two adjacent strung gem objects;

FIG. 10C is a fragmentary view showing an earwire attached to an annular member interposed between two adjacent strung gem objects;

FIG. 10D is a fragmentary view showing a brooch coupled directly to a string of gem objects;

FIG. 10E is a fragmentary view showing an ornamental object coupled directly to a string of gem objects;

FIGS. 11 through 14 are views showing a process of making a string of gem objects according to the present invention;

FIGS. 15 and 16 are schematic views explanatory of problems associated with a conventional ornamental article;

FIG. 17 is a schematic view explanatory of problems of another conventional ornamental article; and

FIGS. 18 through 21 show a conventional process of stringing gem objects.

FIG. 7 shows the principles of the present invention. Two small spherical gem objects 1d, 1e each having a radius r are angularly displaced so that the through holes in the gem objects 1d, 1e have their central axes 1d-1, 1e-1 intersecting at 45 degrees. The through holes have exit ends A, B, respectively. The gem objects 1d, 1e are held in contact with each other at a point C.

A perpendicular from the point C to a line AB has a foot H. At this time, $AB = 0.4r$ and $CH = 0.77r$.

Where a thin abacus-bead-shaped member is interposed between the gem objects $1d$, $1e$ as a spacer between the points A, B, the spacer would prevent the strung ornamental article from flexing unless the spacer had a thickness of $0.4r$ or smaller and a radius of $0.77r$.

The string threaded through the gem objects $1d$, $1e$ can be kept at constant tension without preventing the strung ornamental article from flexing, by placing, between the gem objects $1d$, $1e$, an elastomeric thin abacus-bead-shaped spacer having a thickness of $0.4r$ or smaller and a radius of $0.77r$ or smaller.

FIG. 1 shows an ornamental article according to an embodiment of the present invention. The ornamental article has a multiplicity of spherical gem objects threaded on a string 2. Only adjacent two $1a$, $1b$ out of the strung gem objects are illustrated in FIG. 1, the gem objects $1a$, $1b$ each having a radius r . A thin abacus-bead-shaped spacer 3 made of rubber is interposed between the gem objects $1a$, $1b$ and threaded on the string 2. The spacer 3 has a maximum thickness of $0.4r$ and a radius of $0.77r$ or less. Assuming that each of the gem objects $1a$, $1b$ has a diameter R , the diameter of the spacer 3 is $0.77R$ or smaller. However, it is preferable that the radius of the spacer 3 be $0.4r$ or less to make the spacer 3 less conspicuous. The spacer 3 is required to be thicker in its central portion and a thinner in its outer circumferential edge.

With the ornamental article thus constructed as shown in FIG. 1, the spacer 3 serves to keep the string 2 under substantially constant tension without preventing the ornamental article from flexing even when the gem objects $1a$, $1b$ are angularly displaced or bent as indicated by the imaginary lines.

Where the outer profile of the spacer is defined by straight lines AC, BC in FIG. 9, it physically interferes with arcs AC, BC. By constructing the spacer 3 of rubber, however, such physical interference can be absorbed by elastic deformation and displacement of the spacer 3.

FIG. 2 shows another embodiment of the present invention. A spacer 4 interposed between the gem objects $1a$, $1b$ has its circumferential edge cut off or chamfered. The spacer 4 has a central hole with its open ends enlarged for facilitating the threading of the string therethrough.

According to still another embodiment shown in FIG. 3, two spacers 5 are placed side by side between the gem objects $1a$, $1b$. The combined thickness of the two spacers 5 is selected to be $0.4r$ or less.

FIG. 4 illustrates an ornamental article according to a still further embodiment of the present invention. A spacer 6 interposed between the gem objects $1a$, $1b$ is shaped like a double-convex lens.

FIG. 5 shows a modification of the ornamental article of FIG. 4. A spacer 7 is constructed of a combination of conical and frustoconical layers having an outer profile inscribed in a reference surface $6'$ (indicated by the imaginary lines) of a double-convex-lens form. The outer circumferential edge of the spacer 7 may be cut off or chamfered as indicated by the dotted lines $7'$.

Where the two gem objects between which a spacer is to be interposed have difference radii, no practical problems would arise by calculating the dimensions of the spacer based on the arithmetic mean of the radii of the gem objects.

According to still another embodiment shown in FIG. 6, gem objects $1f$, $1g$ are substantially cylindrical in shape and have respective end surfaces $1f-1$, $1g-1$ which are near-plane spherical surfaces (their radii of curvature are quite large). The gem objects $1f$, $1g$ have respective through holes $1f-2$, $1g-2$ through which a string is inserted, the holes $1f-2$, $1g-2$ extending substantially perpendicularly to the spherical surfaces $1f-1$, $1g-1$. A spacer 8 interposed between the gem objects $1f$, $1g$ is of a double-convex shape with its outer circumferential edge chamfered.

The ratio of the number of spacers to the number of gem objects, and the positions where the spacers are placed may be varied to enable the spacers to function properly.

With the arrangement of the present invention, gem objects can easily be threaded on a string without requiring much skill on the part of the worker. Even when the strung ornamental article is caused to flex, the string is kept under substantially constant tension without the danger of getting broken, elongated, or loosened. Since the string is prevented from being cut off, elongated, or loosened, undesirable accidents are reduced during use or in sale. Therefore, the ornamental article of the invention is highly effective for greater consumer protection and smoother distribution in the gem market. Inasmuch as the string is not subjected to strong tensile forces, a range of strings that can be used is widened, i.e., more and less stretchable strings can be employed. In the absence of undue tensile forces on the string, the strung gem objects are of higher durability as they are free of damage which would otherwise arise from undue tension of the string.

FIG. 8 shows an ornamental article according to still another embodiment of the present invention. The ornamental article, generally denoted by the reference numeral 10, includes a nonstretchable string 11 threaded through gem objects 12. The string 11 is in the form of a metal wire of steel (for example, of SAS 304 or SAS 316) coated with synthetic resin such as vinyl, nylon, Teflon, or the like or natural resin such as lacquer, or inserted through a slender tube made of any of these resins. Instead of the steel wire, a silk thread or a non-stretchable thread may be used and coated with any of the above resins. The string 11 may be colored to match the color of the gem objects 12.

The gem objects 12 are of a spherical shape such as pearls, for example, and have diametrical through holes 13 extending substantially perpendicularly to the spherical surface of the gem objects 12, which are interconnected by the string 11 inserted through the holes 13.

An O-ring-shaped or annular spacer 14 made of an elastomeric material such as silicone rubber is interposed between two adjacent gem objects 12 and threaded on the string 11. The spacer 14 has a

maximum thickness of $0.4r$ and a radius of $0.77r$.

In the illustrated embodiment of FIG. 8, the spacer 14 is disposed in each space between two adjacent gem objects 12. However, the spacer 14 may be constructed of larger and smaller spacer members, and may be interposed between gem objects of different diameters or different shapes. A spherical spacer having a radius of $0.4r$ or less may be interposed between two adjacent gem objects 12.

The opposite ends of the string 11 are folded back to form rings 11a and tubular clamps 15 of synthetic resin are fitted respectively over folded back portions 11c. The tubular clamps 15 are fixed by fusing or bonding to an intermediate portion of the string 11 adjacent to the rings 11a. Alternatively, the clamps 15 of synthetic resin may be dispensed with, and the resin on the string 11 may be fused or bonded to fix the folded back portion of the string 11 to the intermediate portion thereof. Although the tubular clamps 15 are shown as being fixed to the folded string portions, the clamps 15 are actually concealed from view as they are positioned in through holes 13 of the endmost gem objects 12 during usage of the ornamental article 10. The clamps 15 may be of metal rather than synthetic resin, and may be fixed in place by staking which may preferably be followed by bonding for increased strength. To prevent the clamps 15 from becoming loose in use, one or two knots may be formed on the string 11 at the folded-back ends thereof. If a conventional string or a metal wire were employed in this case, it should be knotted firmly as it is slippery. Since the string 11 of the invention is coated, the coated surfaces are brought into intimate contact with each other even when the string 11 is lightly knotted, and the string 11 remains firmly knotted. The string 11 can easily be unknotted because it is lightly knotted.

The ring 11a on the end of the string 11 is coupled via a C ring 16 to a ring 17a or directly to a ring 17a integrally formed with a clasp member 17b, which may be connected to a companion clasp member 17c coupled to the other ring 17a.

The gem objects 12 can easily and quickly be placed on the string 11 simply by threading the string 11 through the gem objects 12 alternating with the spacers 14. The assembling process is highly efficient and can be carried out by an unskilled worker. Since the string 11 is protected by the resin coating, its end is not frayed during the threading operation and also usage, and the string 11 can smoothly be threaded successively through the gem objects 12 and the spacers 14 while the string 11 itself is serving as a guide needle. The string 11 can thus automatically be threaded through the gem objects 12 and the spacers 14 on an automatic assembling machine.

Since the folded-back ends of the string 11 are secured by the tubular clamps 15, the length of the string 11 can be adjusted even after the ornamental article has been completed. The strung gem objects 12 of the present invention are prevented from being loosened during usage for a long period of time, and the ends of the string 11 are also prevented from being frayed, so that the string of gem objects will remain graceful and smooth for an extended

period of time.

FIG. 9 shows an ornamental article with accent rings 21 each interposed between two adjacent gem objects 12. Each of the accent rings 21 includes diamonds or other precious stones 22 set on a side wall 21a of the ring. The rings 21 are located in one or more angularly spaced positions on the ornamental article 10 to give the latter an accent in appearance. Each of the accent rings 21 has a slant groove 21b defined in the side wall 21a, and can be brought into or out of a position between two adjacent gem objects 12 by inserting the string 11 through the groove 21b. The rings 21 are prevented from being accidentally detached since the groove 21b extends obliquely to the axis thereof. Instead of inserting the string 11 through the groove 21b, the ring 21 may itself be spread out so as to be removed from the ornamental article. Each of the accent rings 21 may be disposed over one of the spacers 14, or may be positioned between one of the spacers 14 and an adjacent gem object 12. Each of the accent rings 21 has spherical recesses defined in its opposite axial ends for contact with the gem object 12 and the spacer 14 so that the accent ring 21 is fixed stably in position and the gem object 12 and the spacer 14 are prevented from damage.

FIG. 10A shows a pendant 33 suspended from an annular member 31 supported on the string and interposed between two adjacent gem objects 12. The pendant 33 is suspended by a C ring 22 from the annular member 31 to give the strung gem objects 12 an accent in appearance. The annular member 31 may have a groove defined in its side wall or may be spread out so that it can be removed from the ornamental article. Instead of the annular member 31, a member similar to a paper clip may be interposed between the gem objects 12 and the pendant 33 may be hung from such a member.

FIG. 10B illustrates a brooch 34 coupled to an annular member 35 suspended from the string between two adjacent gem objects. The annular member 35 has a groove 35a defined in its side portion and two through holes 35b defined in portions spaced from the groove 35a in opposite directions and aligned with each other. The brooch 34 has an engaging pin 34a extending through the holes 35b to prevent the string from slipping out of the annular member 35 through the groove 35a. The brooch 34 thus attached to the ornamental article gives an additional ornamental effect to the ornamental article.

FIG. 10C shows an earwire 36 for attachment to a pierced ear. The earwire 36 has an engaging pin 36a extending through the holes 35b defined in the annular member 35 hanging from the string between two adjacent gem objects.

FIG. 10D shows a brooch 37 including an integral annular member for directly attaching the brooch 37 to the ornamental article. The brooch 37 also includes an engaging pin 37a pivotally joined to its back by a pivot member 37b having an integral ring 37c serving as the annular member. The ring 37c has a slit 37d through which the string is inserted into the ring 37c to couple the brooch 37 directly to the ornamental article between two adjacent gem ob-

jects thereof.

FIG. 10E depicts an ornamental spherical gem object 38 including an engaging pin 38a inserted therein and a ring 39 mounted on the outer end of the engaging pin 38a and suspended from the string of the ornamental article. The ring 39 has a slit 39a through which the string is inserted into the ring 39 to couple the spherical gem object 38 to the ornamental article between two adjacent gem objects thereof.

According to the embodiments shown in FIGS. 10A through 10E, various ornamental pieces such as a pendant, a brooch, an earwire and the like may be attached to strings of gem objects to give the latter an added ornamental effect.

A process of making a string of gem objects according to the present invention will be described by way of example with reference to FIGS. 11 through 14.

As shown in FIG. 11, one end 1b of a non-stretchable string I coated on its outer surface with synthetic resin or natural resin is folded back to form a ring 1a. Tubular clamps 15 of synthetic resin are fitted over a folded-back portion 1c adjacent to the ring 1a, and fused or bonded to secure the string end 1b to an intermediate portion 1d of the string II. Alternatively, tubular clamps of metal may be fitted over the folded-back portion 1c and secured by staking to secure the string end 1b to the intermediate portion 1d. While two tubular clamps 15 are shown, only one tubular clamp may be used to secure the string end 1b.

Then, as shown in FIG. 12, a C ring 6 is coupled to the ring 1a, and as shown in FIG. 13, a desired number of gem objects 12 alternating with O-ring-shaped spacers 14 of elastomeric material such as silicone rubber are successively threaded on the string II from the other end thereof.

After the string II has been threaded through all of the gem objects 12 and the spacers 14, as illustrated in FIG. 14, the other end of the string II is folded back to form a ring 1a, and the folded-back portion of the string II is inserted into the hole 13 of the endmost gem object 12. Thereafter, the end of the string II is secured to the intermediate portion of the string II by tubular clamps 15.

Although there have been described what are at present considered to be the preferred embodiments of the present invention, it will be understood that the invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all aspects as illustrative, and not restrictive. The scope of the invention is indicated by the appended claims rather than by the foregoing description.

Claims

1. An ornamental article comprising:

a plurality of gem objects each having a spherical surface and a through hole extending substantially perpendicularly to said spherical

surface;

a string threaded through said gem objects to interconnect them; and

a plurality of spacers of an elastomeric material interposed between adjacent ones of said gem objects and having through holes through which said string extends, the spherical surface of each of said adjacent gem objects having a radius of curvature of r , said thicker central portion having a thickness of at most $0.4r$, each said spacer having a radius of at most $0.77r$.

2. An ornamental article according to claim 1, wherein each of said spacers is in the form of an abacus bead.

3. An ornamental article according to claim 2, wherein each of said spacers is chamfered at its outer circumferential edge.

4. An ornamental article according to claim 3, wherein said through hole of each said spacer is enlarged at its ends.

5. An ornamental article according to claim 1, wherein two of said spacers are interposed side by side between said adjacent gem objects.

6. An ornamental article according to claim 1, wherein each of said spacers is double-convex in shape.

7. An ornamental article according to claim 1, wherein each of said spacers comprises a combination of conical and frustoconical layers having an outer profile inscribed in a reference surface of a double-convex-lens form.

8. An ornamental article according to claim 1, wherein each of said spacers is double-convex in shape and is chamfered at its outer circumferential edge.

9. An ornamental article according to claim 1, wherein each of said gem objects is spherical in shape.

10. An ornamental article according to claim 1, wherein each of said gem objects is substantially cylindrical in shape and has an end surface as said spherical surface.

11. An ornamental article according to claim 1, wherein each of said spacers has a thicker central portion and a thinner outer circumferential edge.

12. An ornamental article according to claim 1, wherein each of said spacers is annular in shape.

13. An ornamental article according to claim 1, wherein said string is nonstretchable.

14. An ornamental article according to claim 1, wherein said string has opposite ends each folded back to form a ring, each of said folded ends being fixed to an intermediate portion of the string.

15. An ornamental article according to claim 14, further including clamps fitted respectively over the folded ends to secure the latter.

16. An ornamental article according to claim 1, wherein said string is coated with resin.

17. An ornamental article according to claim 1, further including a tube through which said string is inserted.

18. An ornamental article according to claim 1, wherein said string is colored.

19. An ornamental article according to claim 1, wherein each of said spacers comprises at least one O ring.

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20. An ornamental article according to claim 1, further including at least one detachable annular member interposed between two adjacent gem objects.

21. An ornamental article according to claim 20, wherein said annular member has a groove defined in a side wall thereof.

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22. An ornamental article according to claim 20, wherein said annular member is spreadable.

23. A method of making an ornamental article of strung gem objects each having a spherical surface and a through hole substantially perpendicular to said spherical surface, the gem objects being interconnected by a nonstretchable string coated with resin which is inserted through the holes thereof, said method comprising the steps of:

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folding back one end of said string to form a ring;

fixing said folded end of the string to an intermediate portion of said string;

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threading said string through the holes of the gem objects from the opposite end of said string with spacers of an elastomeric material being interposed between the gem objects, the spherical surface of each of said adjacent gem objects having a radius of curvature of r , said thicker central portion having a thickness of at most $0.4r$, each said spacer having a radius of at most $0.7\bar{r}$;

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thereafter folding back the opposite end of said string to form a ring;

inserting said opposite end of the string into the hole of the gem object adjacent to said second-mentioned ring; and

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fixing said opposite end to an intermediate portion of said string.

24. A method according to claim 23, wherein each of said ends of the string is fixed to the intermediate portion thereof by fusing the coated resin on the string.

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25. A method according to claim 23, wherein each of said ends of the string is fixed to the intermediate portion thereof by bonding the coated resin on the string.

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26. A method according to claim 23, wherein each of said ends of the string is fixed to the intermediate portion thereof by at least one clamp of synthetic resin attached by fusing to said string.

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27. A method according to claim 23, wherein each of said ends of the string is fixed to the intermediate portion thereof by at least one clamp of synthetic resin attached by bonding to said string.

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28. A method according to claim 23, wherein each of said ends of the string is fixed to the intermediate portion thereof by at least one clamp of metal attached by staking to said string.

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FIG. 1

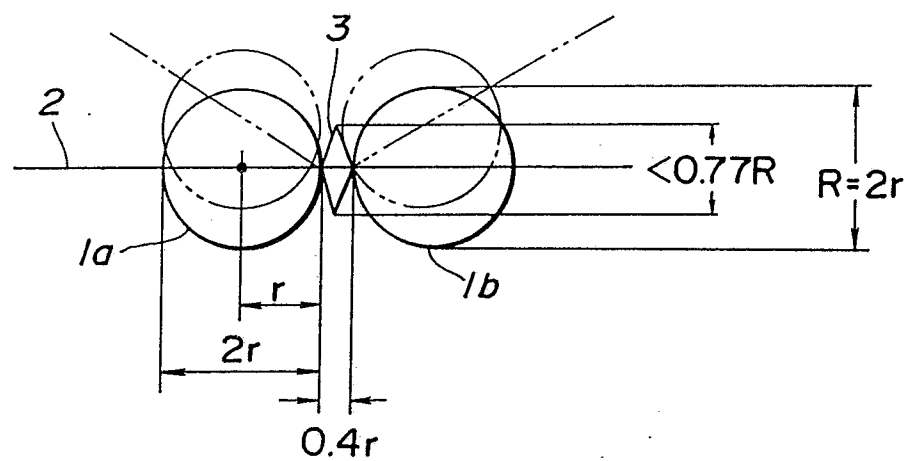


FIG. 2

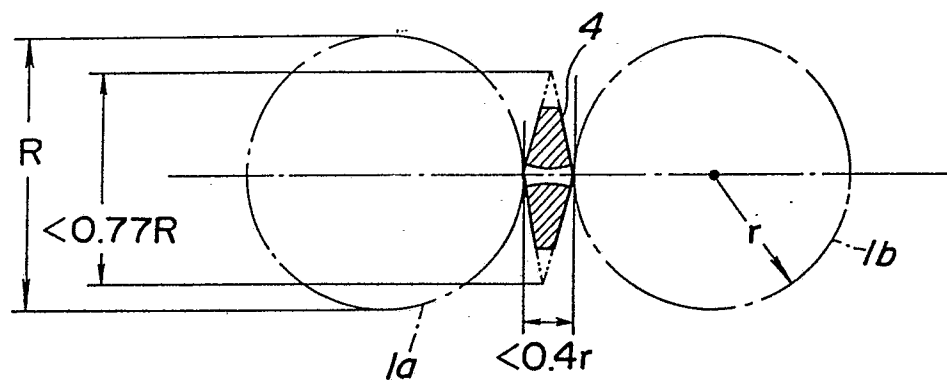


FIG.3

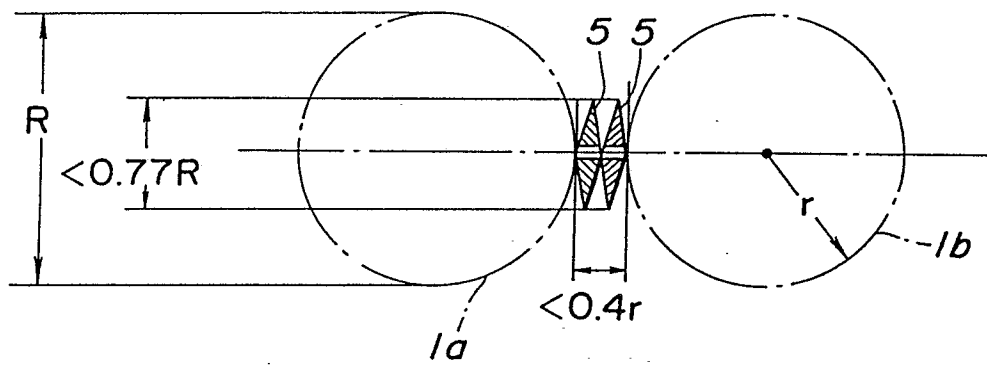


FIG.4

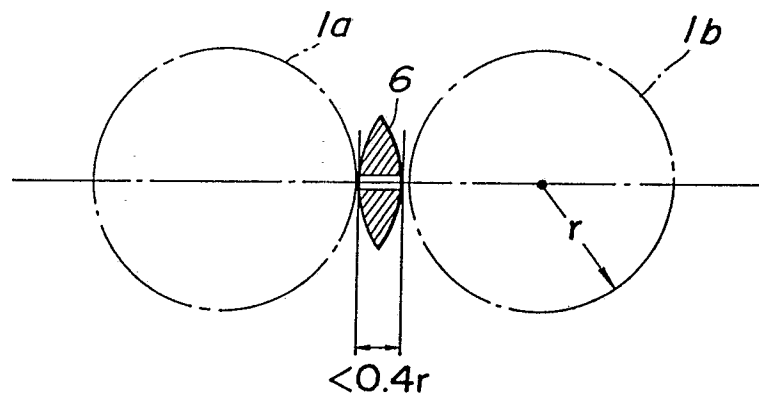


FIG.5

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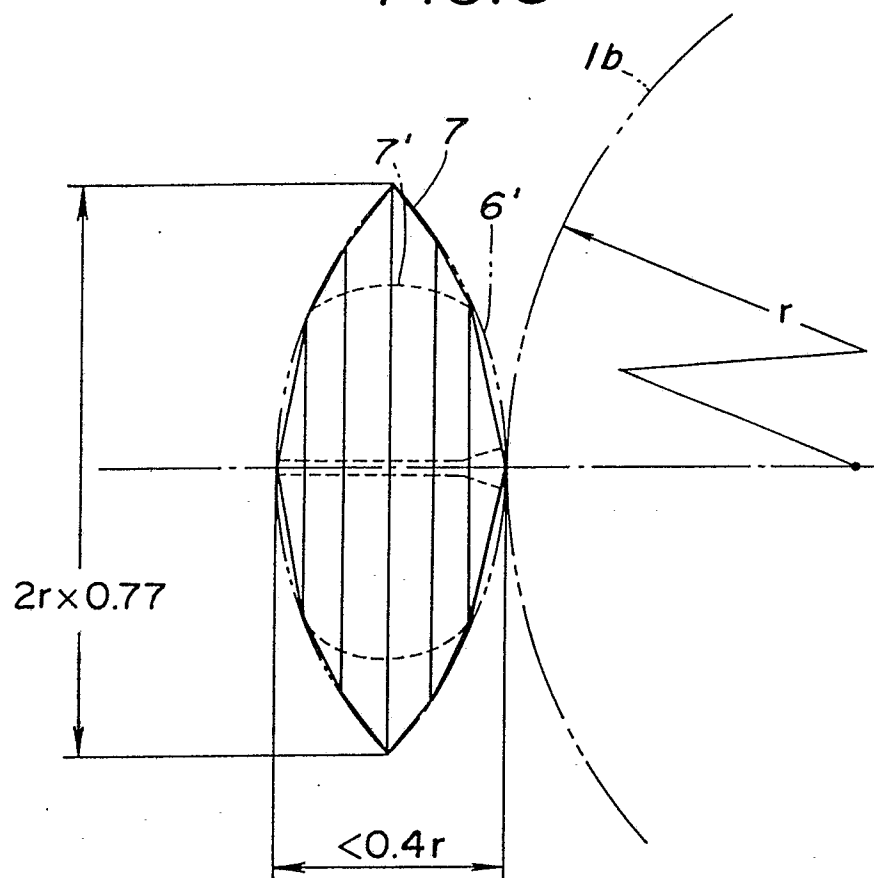


FIG.6

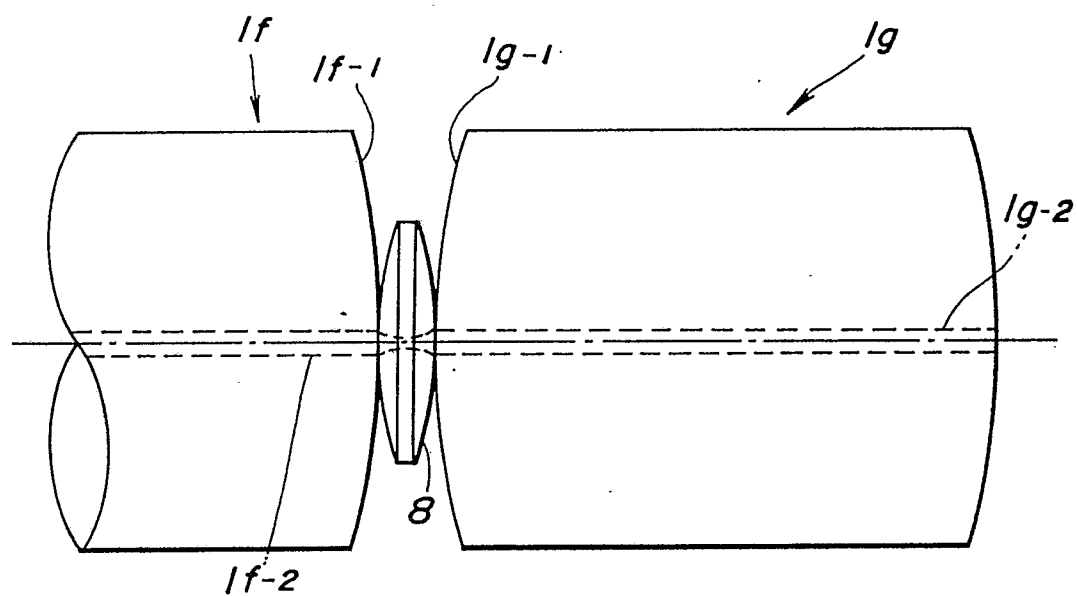


FIG. 7

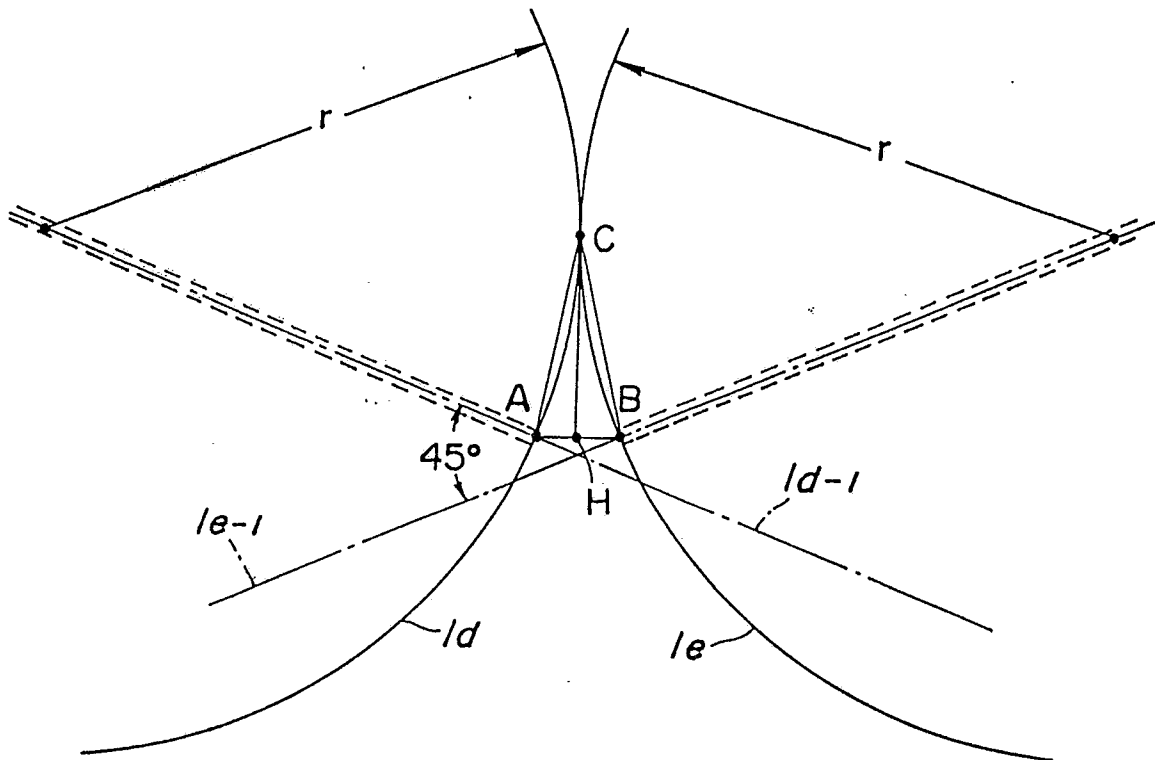


FIG. 8

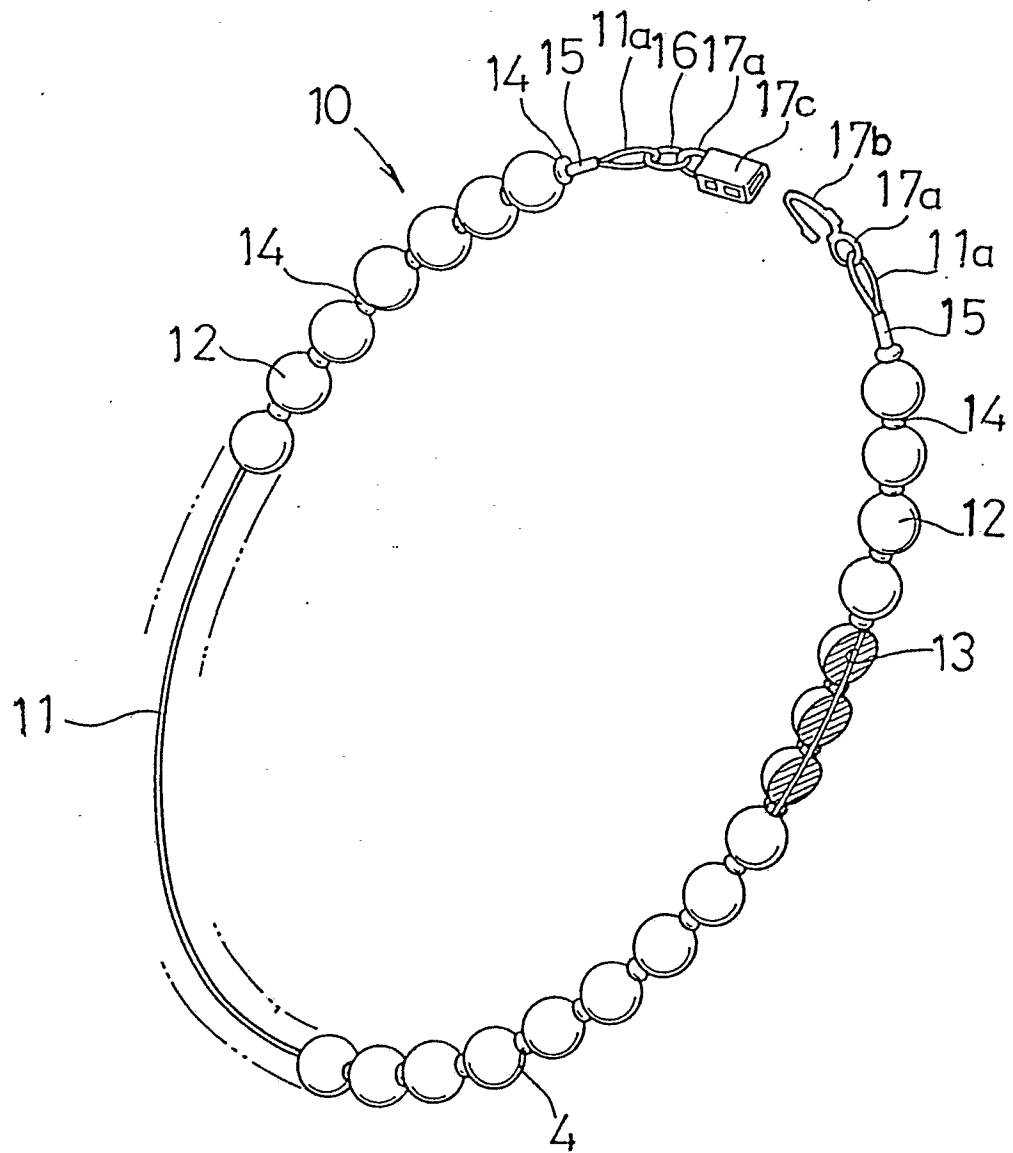


FIG. 9

0250321

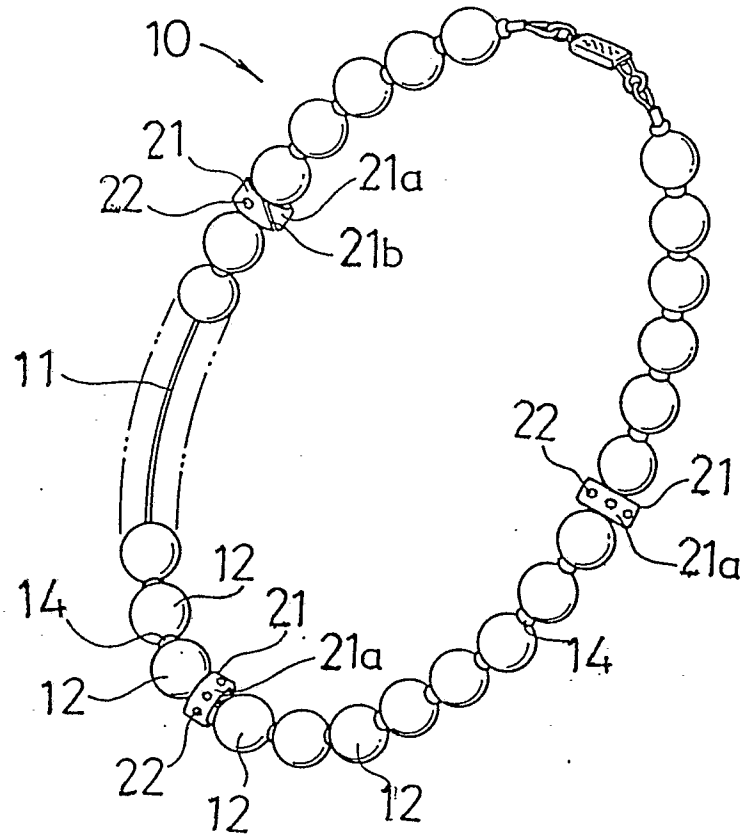


FIG. 10A

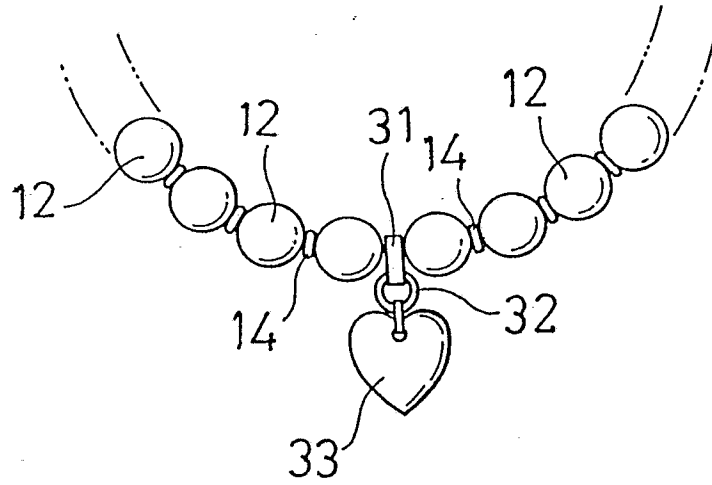


FIG. 10B

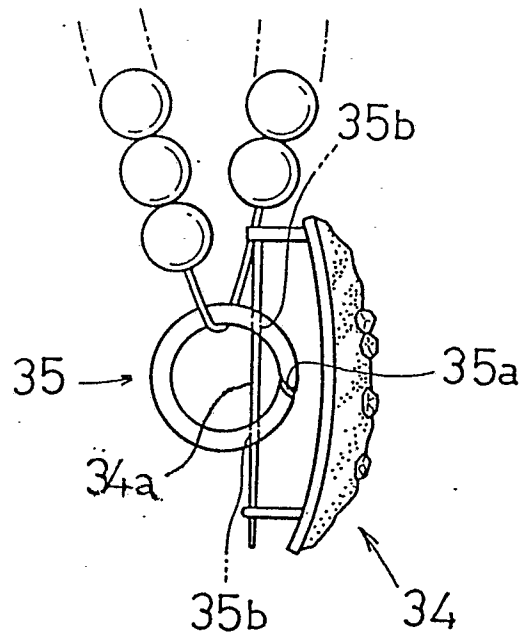


FIG. 10C

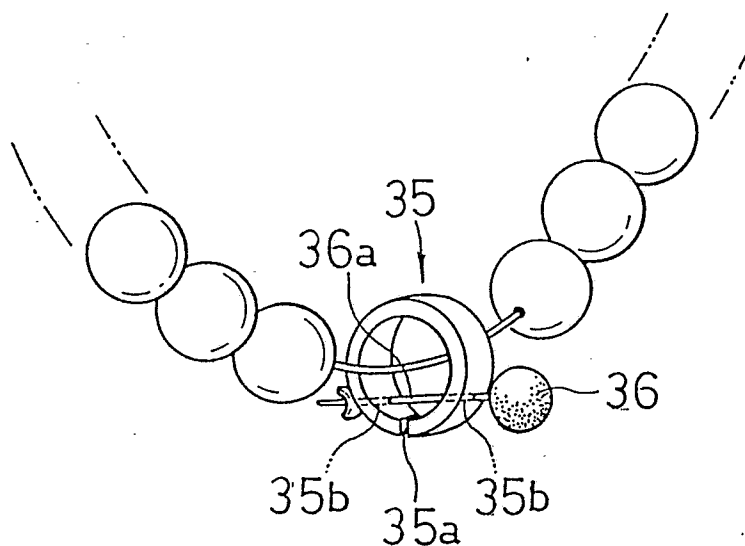


FIG. 10E

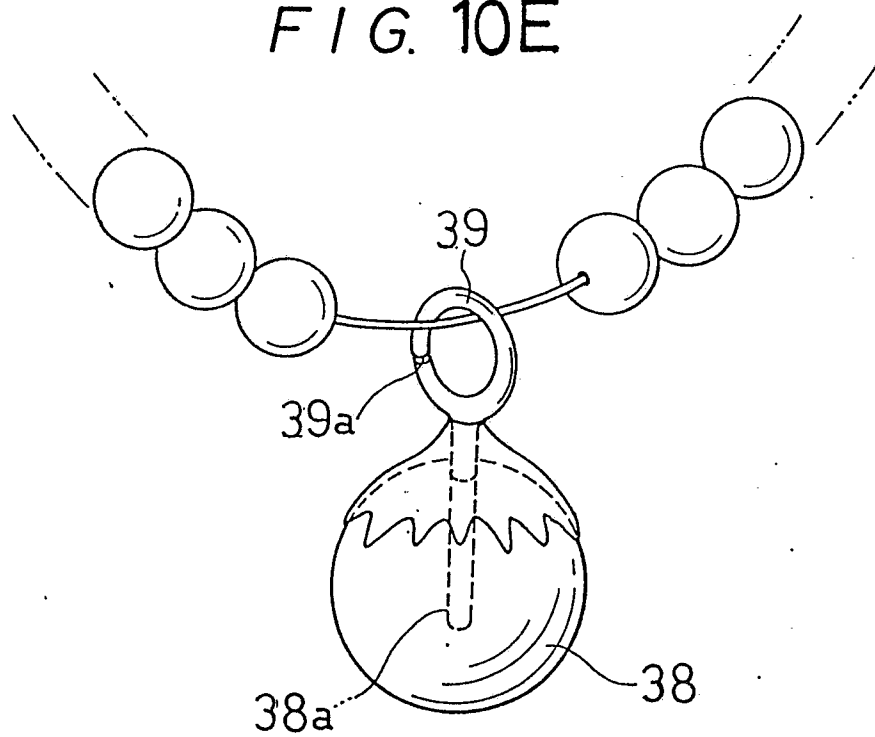


FIG. 10D

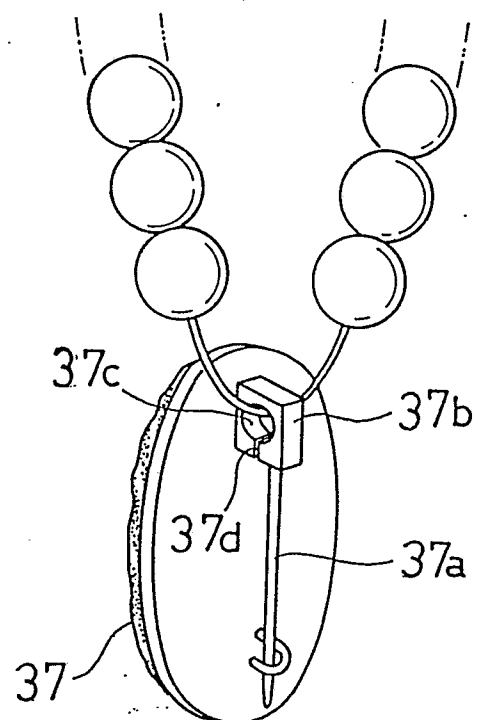


FIG. 11

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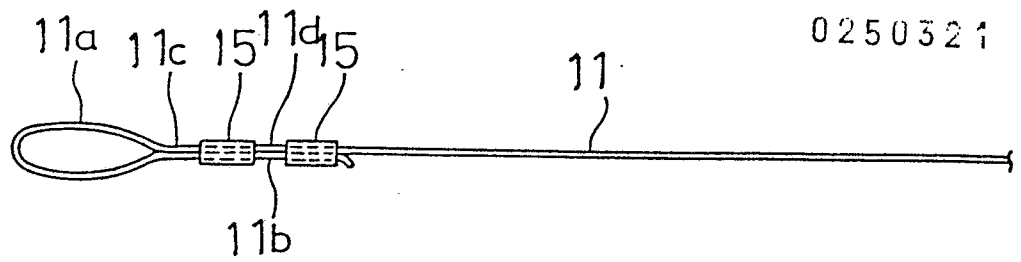


FIG. 12

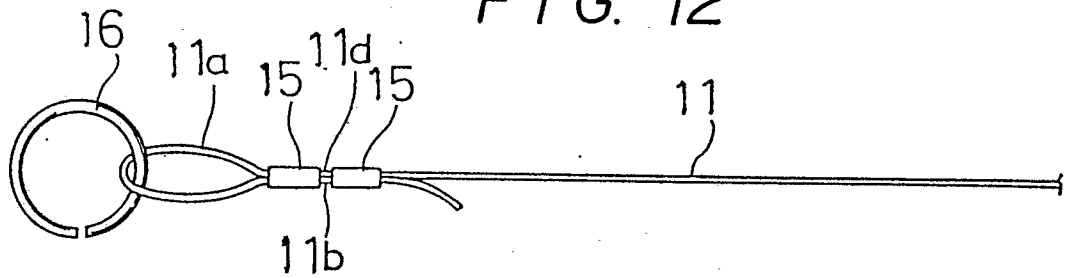


FIG. 13

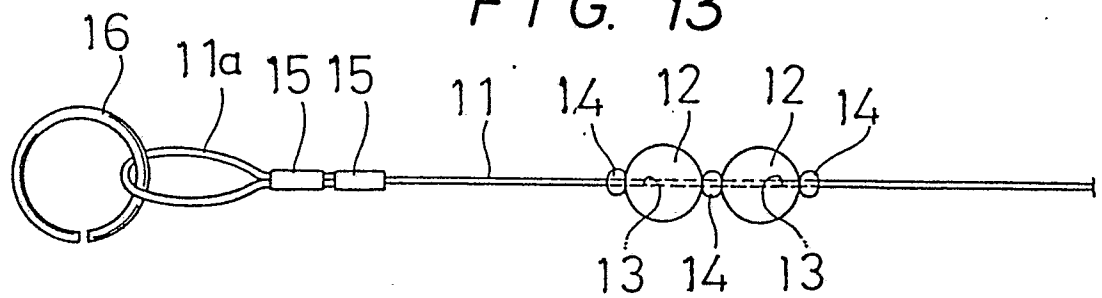


FIG. 14

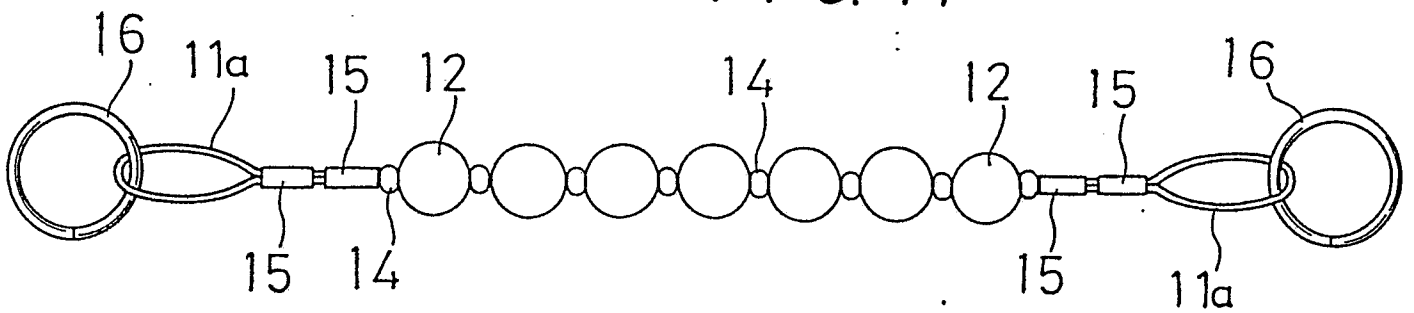


FIG. 15

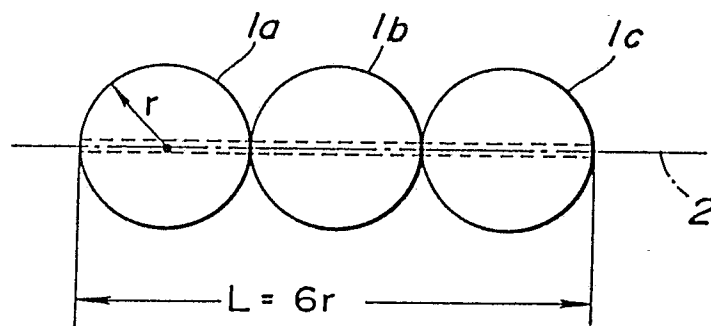


FIG. 16

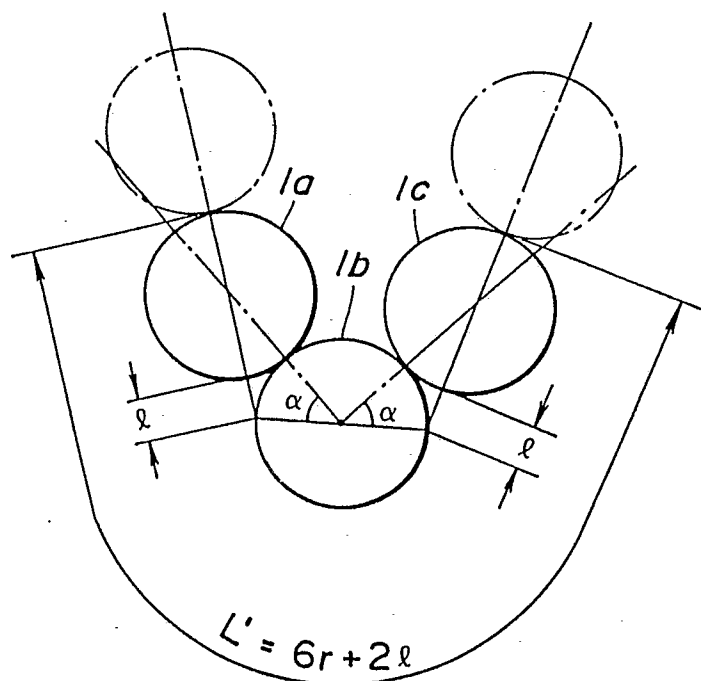


FIG. 17

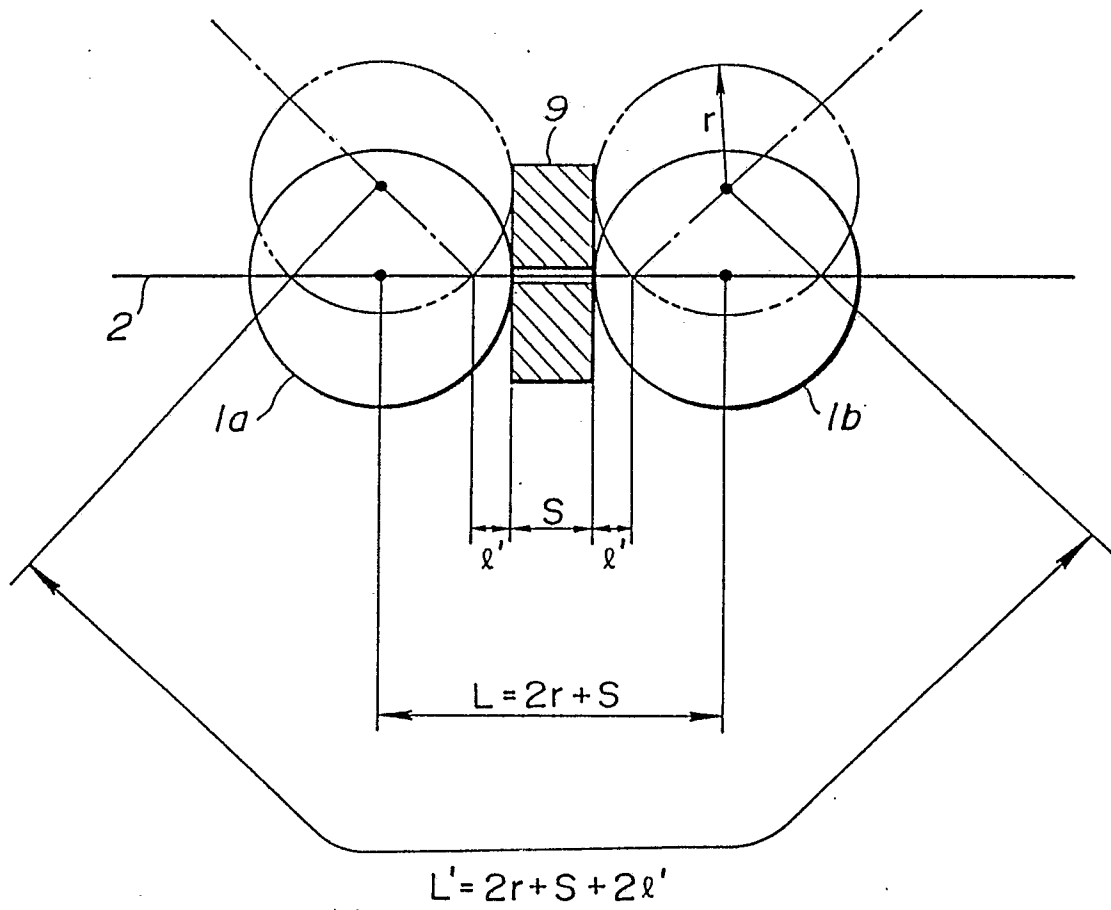


FIG. 18

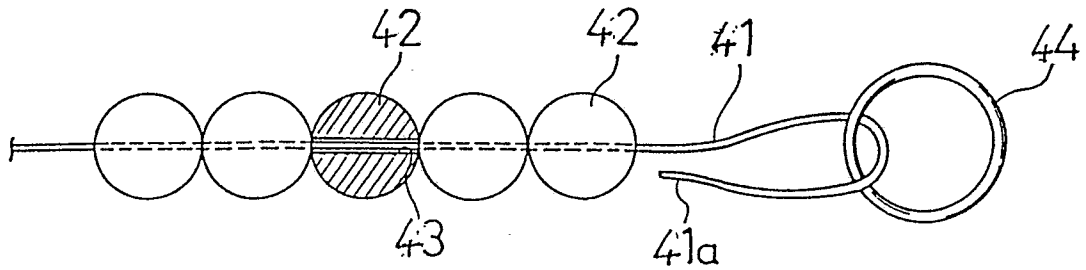


FIG. 19

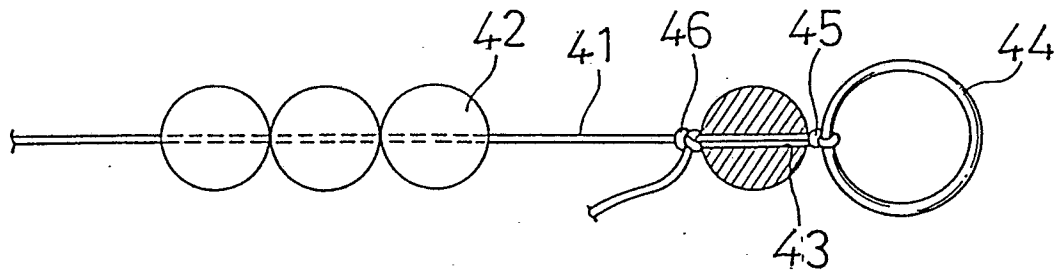


FIG. 20

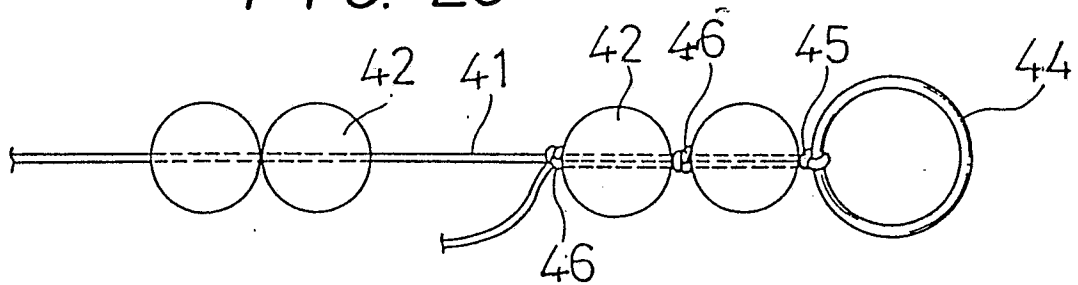


FIG. 21

