May 15, 1934. C. BATEHOLTS 1,958,841

FLEXIBLE MOLDED ARTICLE

Filed May 4, 1932

Fig. 1.

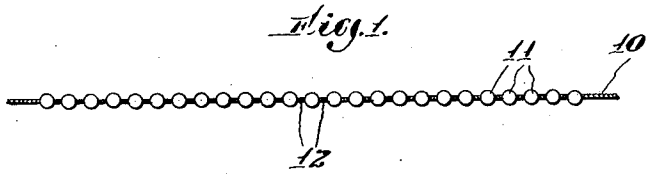



Fig. 2.

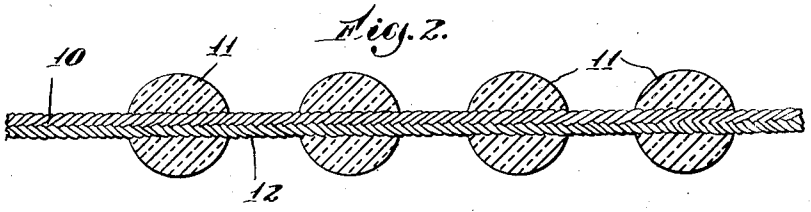



Fig. 3.

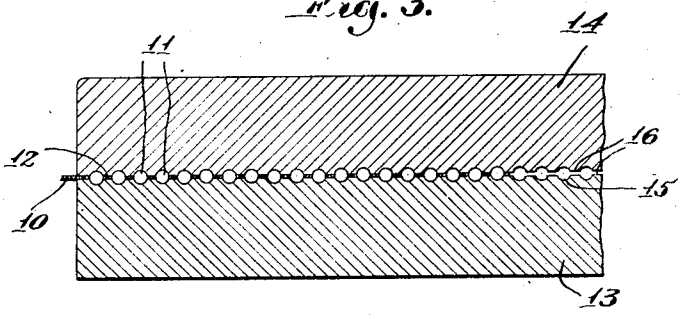
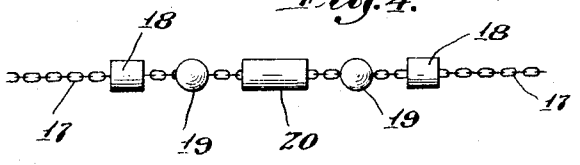



Fig. 4.




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1,958,841

# UNITED STATES PATENT OFFICE

1,958,841

## FLEXIBLE MOLDED ARTICLE

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Application May 4, 1932, Serial No. 609,066

2 Claims. (Cl. 63—2)

This invention relates to flexible molded articles.

More particularly, it relates to tenuous beaded structures, examples of which are found in pulls and "chains" for operating electric switches on lamps and other apparatus; necklaces; beaded ornaments, and the like. Essentially the invention provides an article wherein the flexibility and strength of a cord, or other ligamentary body, are combined inseparably with the bulks of bodies which are distributed in a series along it,—whether it be for the utility of affording a firm hand grip or for ornamental beauty, as in the case of a string of beads.

For convenience, the term "beaded cord" will be used herein with a significance broadly including all such, whatever be the material or structure of the cord itself,—whether twine, chain, or membrane—and whatever be the shape or primary utility of the train of separate bodies which are secured along it. Inasmuch as the invention is well exemplified by the manufacture of a simple pull, as for operating an electric switch, or a gas cock, or the like, it will be described more particularly with reference to its embodiment in such an article; but it should be kept in mind that in scope the invention is applicable to many other devices.

As applied in the case of the pull above mentioned, the invention provides an inexpensive, flexible cord of insulating material. It is characteristic of pulls now in use that they are made of a succession of metal units, usually an alternation of short rods and short metal globes, interlocked by a bending of the metal; that the metal is a conductor both of electricity and of heat; that they are easily crushed; that they are expensive in that they are relatively difficult to make; and that their life is limited. These various objections are avoided in the molded pull which constitutes one example of the various devices which can be made by my invention. Moreover, although the rods and balls have to be made into a chain by being added singly and in selective alternation, and either the said metal chain,—or any string of beads,—can ordinarily be built only by single file growth at its end, the invention permits of the assembling and securing of the beads broadside and in multiple.

As applied to other articles than pulls, it is an object of the invention to manufacture the completed cord with ease, economy and rapidity. Another object is to provide for the use of varied shapes, as may particularly be desired, for example, in necklaces, all at a comparatively low cost. The molded material grips and to a degree impregnates the flexible core, and encloses the same to such an extent that all frictional or abrasive wear at its connection thereto is eliminated. This is an important feature with necklaces and pulls. The native flexibility of the core, in the portions thereof which extend between the beads, provides sufficient flexibility for the article as a whole.

In the accompanying drawing:

Figure 1 shows, in elevation view, a pull embodying the present invention, in approximately the proportions in which it would be made for use;

Figure 2 shows a part of Figure 1 on a very much larger scale;

Figure 3 shows, in elevation, a cross-section of a mold in which the device of the invention can be made;

Figure 4 shows a plan of a necklace made in accordance with the invention.

As shown more particularly in Figure 1, pulls made in accordance with the present invention may be of much the same proportions as the metallic pulls now in common use. Within the pull is the core 10, which may consist of cotton, linen, silk, or other twine, impregnated with special material if desired, or of wire, or braided wires, or chain links, or of any combination of those or similar materials. The core is prepared as preferred, with respect to twisting, braiding or the like, being shown as braided. On this core the beads 11 are formed and secured by being molded and severely compressed thereon, at locations separated from each other by small spaces 12 and disposed at regular intervals along the core 10. The purpose of spacing the beads 11 is to permit the inherent flexibility of the core 10 to contribute flexibility to the final product.

In the process of manufacture, I prefer, for many purposes, the molding material disclosed in Patents 1,251,862 and 1,251,863 of January 1, 1918. The rubber substitute disclosed in these patents gives a very satisfactory product when molded on a core of the type herein described. However, it is not necessary that this particular material be employed, but it is possible to use practically any molding material which in final stage affords a body of desired hardness and durability.

In the practice of the invention I find it convenient, although not necessary, to employ a flat-molding process, wherein, for making spherical beads, a mold comprising an upper member 14 and lower member 13 may be provided with a

series of hemi-spherical cavities 15 in each half of the mold. The core 10 is laid in a groove 16 over the lower row of cavities, to which there is then introduced molding material of any of the various suitable kinds, many of which are already known. When the two halves are put together, and pressure and heat are applied in the usual way, and the necessary time allowed for the molding, the core 10 will be found to have become permanently and securely enclosed within a series of beads 11, made by integration together of the two halves of the molding material, enveloping the core and in the case of most core materials penetrating the body thereof to a greater or less extent. By this penetration they become autogenously and securely attached to the core.

It is possible either to hold the material under compression between the dies until the molded material has set, completed its chemical changes and fully solidified, or to expedite the process, by giving the beads a preliminary forming set in the mold and then to complete the solidification by subjecting the mass to merely a species of heat treatment, thus permitting the core 10, which is preferably a continuous length of the string or cord, wire or the like, to be moved on from the mold while a succeeding length thereof takes its place. Permitting the beads to acquire their permanent set within the mold may be considered preferable, and this may be made on the whole more expeditious by providing dies which have cavities for making a considerable number of successive beads at once. The cord 10 can be moved through step by step at regular time intervals, each step producing a multiplicity of the beads and a corresponding substantial length of the beaded cord.

The material employed for the core 10 should preferably, altho not necessarily, be flexible and of a fibrous, or at least filamentary character, as fine braided wire. The reason for employing a fibrous core is that the molding material penetrates more readily, and clings more tenaciously to such a core than to one which is entirely smooth. For the core 10 there may be employed any of various materials as stated above, for example a combination of silk and linen, as in fish line. Preferably the core should be of stout material and if this is not waterproof initially it may be subjected to an enameling or other process before or after molding, to impart any desired waterproofing or other qualities. Where the core 10 is of wire, it will not be a non-conductor of electricity, but in this form it is especially suitable for use in place of the link or globular metal chains now employed for drain plugs in basins, sinks and the like, and for operating flushing tanks; and a waxed or enameled core of textile material also has especial advantages in a beaded cord of this nature.

Where a stout textile cord is employed and the beads are formed directly thereon, the resulting material is entirely a non-conductor of electricity and therefore is specially valuable for use in certain electrical apparatus. It is characteristic of the invention that the beads formed on the core 10 cover, keep the same clean, and give it an enhanced strength, in that the individual fibres are at frequent intervals tightly compressed and encased. The fibres which end within a bead are permitted no looseness or freedom after once being enclosed with the molding material. The ends of those fibres that pass between adjacent beads are firmly held; and the parts of cord between beads are therefore stronger. By forming the beads 11 as a series of regularly spaced globular bodies, a desirable uniformity may be obtained.

Where the cord is to be used in conjunction with an article of ornamentation, as, for example, a necklace, the cord may be a chain or other support, of material of any desired color, and with any preferred other properties including, for example, such colors and properties as are obtainable with any material which is moldable by heat and pressure, known in the trade as "high-heat material," as the various compositions and combinations of phenol-formaldehyde condensation products. And the invention makes it easily possible to vary or alternate the shapes of the beads so that some are round and others are of other shapes. In Figure 4, the beads 18, 19 and 20, of differing shapes, and suitably arranged, are molded on a small chain 17.

Thus the invention may take a variety of forms and may be used in a great number of different connections. It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty exist in the invention.

I claim as my invention:

1. As a new article of manufacture a combined flexible tie and grip, comprising a braided cord, or the like fibrous tensile element, flexible in all transverse directions and having inter-fibrous spaces, combined with a multiplicity of separate hard bodies comprising products of chemical condensation of high-heat material, mounted on the cord in close succession and each having a part of its hard substance impregnated into said spaces and being thereby permanently secured on the cord; the said successive bodies being severally arranged covering and bulging globularly out from that part of the cord which they respectively cover, to constitute a grip therefor, and being so close together that a plurality of their successive bulges falls within the grip of human fingers when applied at any place, pinching toward the axis of the tie; and the said successive bodies being mutually separated, along the cord, by small spaces by which they leave the cord uncovered and flexible.

2. As a new article of manufacture, a combined flexible tie and grip comprising a cord or the like flexible tensile element having spaces within the general outline of its continuity, combined with a multiplicity of separate hard bodies comprising products of chemical condensation of high-heat material, mounted on the cord in close succession and each having a part of its hard substance impregnated into said spaces and being thereby permanently secured on the cord; the said successive bodies being severally arranged covering and bulging out from that part of the cord which they respectively cover, to constitute a grip therefor, and being so close together that a plurality of their successive bulges falls within the grip of human fingers when applied at any place, pinching toward the axis of the tie; and the said successive bodies being mutually separated along the cord, by small spaces at which they leave the cord uncovered and flexible.

CLINTON BATEHOLTS.