

## The Design of Jewelry with Transformation Element

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**Abstract:** In study described transformation element-swivel mechanism that provides multifunctionality to jewelry which can be either a pendant or a ring. A similar function has a spring-loaded mechanism of men's cufflinks locks. When the lock is opens or closes, the fixing tappet pushes the elastic surface of the plate, after which the plate restores. Such effect allows you to fix the product only in two positions as presented in our case. Moreover, it is possible to apply a democratic pricing policy for the valuation of collections using the developed mechanism in the manufacture of jewelry. The analysis of the well-known transformable adornment of famous jewelry houses and also the handiwork products of famous artists gave a direction for this research. The advantages and disadvantages of such mechanisms were determined, the superiorities of developed swivel mechanism which provides multifunctionality to the product are revealed. Restrictions of the proposed mechanism usage in the jewelry production are given. According to the analysis of physical and mechanical properties, the recommended material is gold as the main material for jewelry production with the usage of the developed mechanism. The experimental sample was made of albata-alloy of copper and nickel. All of the above has determined the relevance and prospects of the research. The implantation of the experimental developed samples let us to solve a number of financial problems connected with the profitability of the production.

**Key words:** Multifunctionality, swivel mechanism, ring, pendant, product-transformer, jewelry production, adornment

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### INTRODUCTION

Today the jewelry rialto is large enough, everyone can find something on one's taste that will correspond with internal requests and individual opportunities. But the main consumed product is the jewelry of traditional design. There are no riddle and sparkle in it, only luxury. But not everyone can afford an expensive, luxurious adornment. It's not a surprise that fashion and jewelry design go hand by hand. But it should be remembered that one or another era set its rules concerning the economic component. So, now in the conditions of the economic crisis, the jewelry must correspond with following requirements: original design, multifunctionality and accessibility at price.

Existence of firms that are engaged in a variety of jewelry production is determined by history of jewelry art. Only some of them are oriented on the production of jewelry with movable mechanisms. Such famous jewelry houses as "Bvlgari", "Van Cleef and Arpels" offer interesting products-transformers but as a rule such products are issued in a single copy that is custom-made or manufactured in small batches and limited edition.

Almost complete absence of available multifunctional jewelry in spite of high demand for it, determined the purpose of our research.

In this research, we offer the design of a swivel-mechanism that allows the product to be rigidly fixed in two positions, thus, forming two products a ring and a pendant. We may expand the boundaries of jewelry design by receiving two products in one. The design and mechanism of the product are easy to manufacture, so, the cost of the product-transformer will not be high. When the rialto of jewelry products in decline and the sale of products are reduced in the conditions of the economic crisis, it is a very important fact. All of the above proves the prospects and relevance of our research. This confirms the necessity for further study of this direction.

**Analysis of the research problem:** In the research there are carried out a historical analysis of jewelry product-transformers. So, such products were already known at the beginning of the 19th century. At that time there were very popular necklaces with removable pendants in the form of brooches or earrings, diadems that turned into a necklace or with a detachable brooch.



Fig. 1: Tiara George III

The most famous of the adornment-transformers created in that century is “Diadem of Pushkin’s granddaughter” or “small crown of the Romanov’s house” (Anonymous, 2004). In the middle of the 19th century were fashionable diadems “Russian Fringe”. Such tiara is in the collection of the English Queen and called Tiara George III that is shown in Fig. 1 (Anonymous, 2013). The diadem had a removable rim and structures for fixing decorative elements. It could be used as a necklace in disassembled condition. The using of the transformation elements in the history of jewelry is not a new direction. In 1965 the “Fairy Necklace” with a ring was created. It was designed by Salvador Dali with a removable part performed by Charles Valliont. The whole set includes 175 rectangular diamonds with a total weight of about 20000 carats, 100 round diamonds with weight about 15000 carats and 184 round peridots and of emerald cut. The removable part of decoration is also with peridot (Zheleznyakova, 2014). The famous Espri company which began to produce high-class adornment since the 20th century also used the transformation in its products.

The ideas of multifunctionality develop and new demountable structures appear over time. For example, slat-bracelets which consist of several movably attached links, each of which is an independent jewelry: pendant, hair clip or medallion. Such bracelets appeared in England in the Victorian era.

In the 20th century the Art Deco style appears-this is the new empire of jewelry fashion, jewelry product-transformers occupy a particular place here. At that time brooches-clips were also in fashion and also the brooch “duet” appeared-these are two symmetrically made clips that can be fastened to one common buckle for using as a brooch. In the middle of the 20th century, the artist Van Cleff and Arpels, Renee Sim Lozer, created the most famous transformer necklace-zip bracelet. The design of necklace bases on the principle of zipper. In the closed position the zipper is used as a bracelet in the open position like a necklace as shown on Fig. 2.

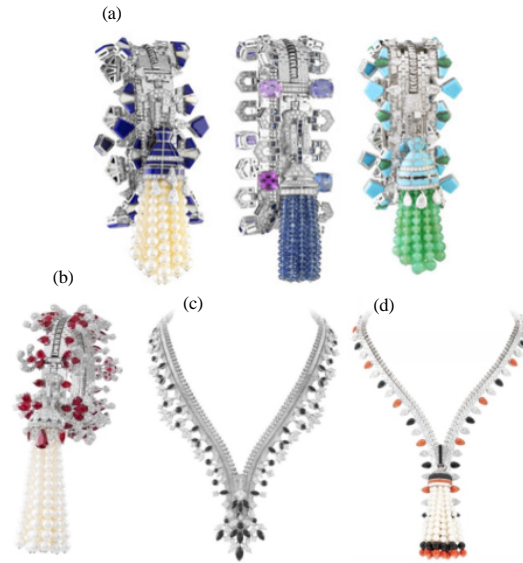


Fig. 2a-d): Assortment of the zip necklace

The most striking representative of the transformed products is the jewelry house “Van Cliff and Arpel”. All the times, the company demonstrated a fascinating originality with a very high level of performing skills and elegance. Most of the innovative designs of the company’s products have become the classic of jewelry business.

The works of Van Cleef and Arpel celebrate the world of nature, characterized by constant changes, transformations and continuous renewal. Jewelers of the house have always felt a special affection for butterflies, trying to capture and convey their natural splendor in the most unconstrained and inartificial manner. The image of butterflies has become an inexhaustible source of inspiration for the jewelry creation of this company and a unique element of recognizability of products.

In the present rialto of jewelry, product-transformers marked out into a separate segment but it still occupy a very small part, only about 1% of these type products. A lot of copies were seen, repeating unique jewelry created by jewelry houses during the searching and studying the transformable products that can be purchased in present conditions. And also it was noticed a large number of earrings with detachable pendants made of silver, for example, the production of the Saha Republic. The traditional form of jewelry of the Yakutia peoples is cascade earrings with detachable decorative part. So, it is the whole range of the transformable jewelry products. That’s why it can be assumed that chosen direction is relevant in present conditions and requires more detailed research. Based on this analysis of jewelry-transformers, it was decided to develop an experimental sample with transformation-elements.

In this research, the experimental sample of a jewelry product-transformer was made of albata-alloy of copper and nickel (Voynich and Kaukina, 2016). Within the framework of jewelry production, the recommended metal is gold and its alloys because the physical and mechanical properties of gold alloys (grade of 585°) will ensure the quality work of the lock, particularly the strength indicators and the tendency to hardenability during machining. In research was used such investigation methods as the method of expert evaluation, experiment, analysis that allowed to implant the developed sample in the jewelry manufacture.

## MATERIALS AND METHODS

In the research, the experimental sample was made of albata-alloy of copper and nickel because this element has necessary physical and mechanical properties. The experiment was carried out on the basis of the high school workshops. A master model was developed for further implementation in jewelry production. Within the framework of jewelry production, the recommended metal is gold. For the qualitative work of the developed cam lock mechanism in the conditions of the multiserries production, it is necessary to use a gold alloy (grade of 585°) with sufficient hardness and strength (1870 HV, 2440 MPa) (Kumanin and Livshits, 2012). In particular, the strength indicators and the tendency to hardenability during machining will provide the necessary qualities to the alloy. Also were used the following research methods: the method of expert evaluation, experiment, analysis.

Basing on the analysis of physical and mechanical properties in particular strength and hardness parameters of hardened and annealed non-ferrous and precious alloys, it became possible to determine the most appropriate material for further replication of the experimental sample (Kovaleva *et al.*, 2000). The following research methods were used for the implantation of the sample into the jewelry production: the method of expert evaluations which allow to determine the aesthetics of the developed product (Kaukina and Naumov, 2013). Different variations of the ring decorative element were proposed in the form of sketch images an expert Soviet was created that is consist of members of the Union of Artists, members of the Union of Designers, representatives from manufacture. According to the majority opinion was determined the most successful version of the proposed variations.

## RESULTS AND DISCUSSION

Due to the analysis of the present jewelry rialto, especially of the rings-transformers was identified the



Fig. 3: General view of the ring-pendant “Fairy”

main types of transformation. They were combined according to the design features of each type. The aim of transformation was defined: to develop a ring-transformer with a replaceable function a ring-pendant. There are three types of rings according to the analysis:

- Ring-transformers with changing function
- Rings that folding according to the principle of harmonic with detachable decorative element
- Ring-pendants with a swivel shin

Rings with a detachable element and folding according to the harmonic principle have a number of disadvantages: the fragility of the connection mechanism, the possibility of losing one of the elements. There are no detachable elements in ring-pendants with a swivel shin which eliminates the loss of the removable part. In developed sample was chosen the principle of elements rotation around the axis. The underside of the product must be flat to use it as a pendant. So, the shin of the ring will rotate over to the axis of rotation located in the plane of connection of the ring decorative part and the shin. Analysis of similar models has shown that a hinged movable joint was incorporated in their design. But such a connection does not allow fixing the shin of the ring parallel to the decorative part for using it as a pendant because the shin will constantly fall down during the exploitation of the product. Therefore, it is necessary to find a mechanism that allows fixing the shin in two positions over the decorative part: in parallel for using it as a pendant and perpendicularly for using it as a ring (Fig. 3).

A similar function has a spring-loaded mechanism of men’s cufflinks locks. When the lock is opens or closes, the fixing tappet pushes the elastic surface of the plate,

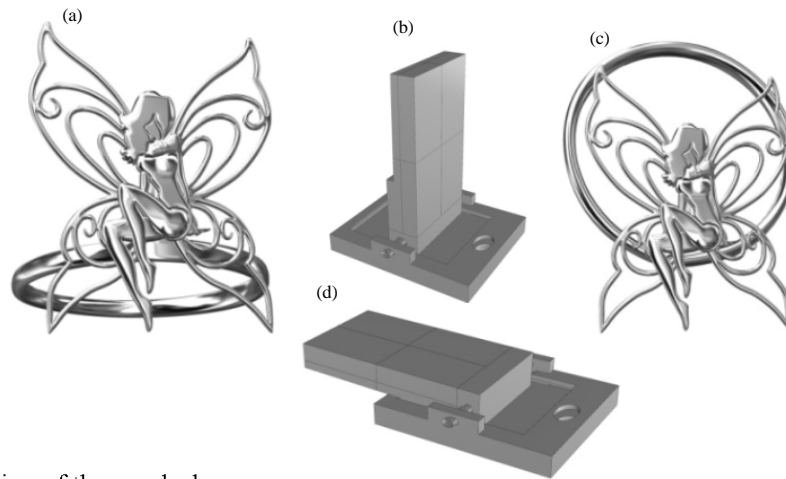


Fig. 4a-d): Mechanism of the cam lock

after which the plate restores. Such effect allows you to fix the product only in two positions. Basing on the analysis of the Van Cleff and Aprels jewelry house products was used as an example, the main stylistic trend-natural motives, the main symbol of the jewelry house is dragonfly fairy. So, it was decided to design a ring-pendant in the form of a fairy with butterfly wings as shown on Fig. 3.

The structure of the ring consists of four elements: the shin of the ring, the base for the decorative element (in the form of a girl figure), two symmetrical wings. The shin has a cam at the attachment point of the ring top part which will affect on the spring when the shin rotates. A perforating hole is provided in the cam to connect it with the decorative part. The size of the ring shin is recommend not  $<R-17$  or more than  $R-20$  because the small size row ( $R-14-16$ ) will not provide the necessary aesthetics to the product after conversion it into the pendant. The basis for the decorative element is the basis for the decorative part of the ring. Two symmetrically executed wings, a lock mechanism with a spring and a hinge for the pendant are fixed to it.

Figure 4 shows the locking mechanism which allows the ring to be fixed in two positions when the lock is open the product is used as a ring, when the lock is closed it can be worn as a pendant.

Figure 5 shows the component parts of the mechanism. Figure 6 shows the lock in the section. The lock consists of a plate with thickness 0.5 mm, boxes for the plate fixing, cam and pin. The cam is fastened to the shin, the box is fastened to the back side of the decorative part and this segments are connected by a pin.

The plate in the lock acts as a spring. When the machine is opening and closing, a cam moves and presses the plate, after which the plate returns to its initial position. Thus, the shin is fixing in two positions,

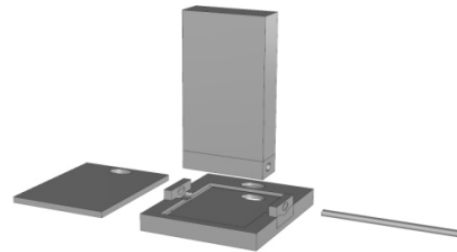


Fig. 5: Components of the lock

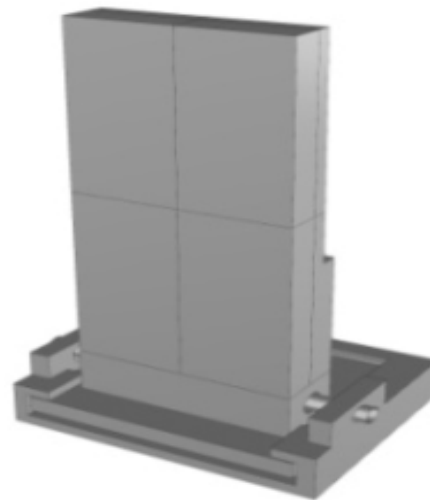


Fig. 6: Lock in section

perpendicular and parallel to the decorative cover. From the above, the following conclusions are obviously: the transformation of jewelry has a long history and it has not lost its relevance in present conditions, especially during the economic crisis.

The product-transformers constitute only 1% of the total mass of products in the jewelry rialto which proves the demand for these products.

Using the proposed rotary mechanism of transformation provides a product modification in two versions the ring and pendant which opens a new opportunities for jewelry production.

The recommended material for implementation presented sample in production is gold because of sufficient strength of this material which will ensure the reliability of the proposed mechanism.

As the main manufacturing technology is offering casting for melted models. It is necessary to use the size of the ring not <R-17 within the framework of the serial jewelry production. All of the above confirms the multifunctionality of the developed sample and the prospects of its usage in the jewelry manufacture on a production scale.

### CONCLUSION

From analysis of product-transformers follows that number and types of it are quite variedly. The peak of the jewelry transformation development goes, since, the 18th century. For the most part it was difficult in design, massive products as a rule with removable elements. The well-known companies "Bvlgari", "Van Cleef and Arpels" worked in this direction, also there were individual authorial product developed by artists-jewelers. Multifunctionality in products has not lost its relevance in the course of the jewelry industry development. Moreover, in present conditions the types of transformed elements increased this proves the prospects of this direction. As a result of the research, it can be concluded that the developed swivel mechanism solves the problem of jewelry production profitability within the economic crisis. It provides the creation of a series of jewelry-transformers which include two diverse products: a neck adornment a pendant and an adornment on a brush a ring. In our case, it is necessary to specify the identified limitations this is the size of the ring shin. It must be at least R-17 size because it ensures the harmony of the product as a whole. The usage of gold (grade of 585°) as the main material in the serial replication will ensure the reliability of the proposed mechanism due to the hardness indexes. All above confirms the prospects of using the developed swivel mechanism in the jewelry industry.

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