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CABLE MOULDING – MOVEMENT AND DYNAMISM IN ORNAMENT ART

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Rezumat. *Lucrarea îşi propune să prezinte un ornament destul de puţin utilizat în ornamentică din cauza dificultăţilor în realizarea practică, fie manual, fie în sistem industrial. Sunt prezentate elemente privind proiectarea (geometria) torsadelor cu pas constant şi variabil, precum şi elemente de cinematica generării acestor ornamente. În final sunt prezentate scheme de lucru – în sistem industrial – de realizare a acestor ornamente, în industria de prelucrare a lemnului, ornamentele fiind folosite la decorarea pieselor de mobilă. Ornamentele de tip torsadă conferă produselor de mobilă şi construcţiilor un dinamism şi o vigurozitate specifică, motiv pentru care rămân permanent în atenţia proiectanţilor din construcţii, mobilă şi decoraţiuni interioare.*

Abstract. *The paper intends to present an ornament, less used in decoration because of the practical difficulties in manufacturing, either manually or in the industrial system. In the paper are presented the elements related to the design (geometry) of the cable mouldings, both for constant and variable pitch type and also the kinematics of generating these ornaments. Finally the working schemes of processing these ornaments in the wood industrial system are presented, the ornaments being used to decorate pieces of furniture. The cable moulding type decoration gives to furniture and building products a certain dynamism and vigor, wherefore remains permanently in the attention of designers in construction and furniture fields and also of the interior designers*.

Keywords: ornament, cable moulding, kinematics, furniture, building

1. Introduction

Incessant study enabled humans noticing that nature follows specific "embellishment cycles". The vine adorns its aspect with tendrils, then with clusters, and becomes therefore much more interesting than a stalk with leafs. Other plants and trees adorn their aspect with flowers and fruit, or even with beautiful canopies. The water surface of a lake adorns its aspect with waves at the lightest waft; the mountain rocks modify their rough forms by erosion and obtain forms of great beauty and interest, for us to admire and compare (Fig. 1) etc.

In an attempt to "duplicate" nature, humans have always toiled to embellish their existence, and endeavoured to create and keep ornaments close to themselves, as replicas of nature's elements; or, by intellectual processing, to use the natural ones

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and bring them to forms of interest for smaller or larger groups of individuals. Humans have noticed that regularly used objects acquire other valences, while beheld, admired and even turned to good account, if provided with ornaments.

Fig. 1. Forms of great beauty, obtained by rock erosion.
a. Provincial Park of the Rocks from New Brunswick, Canada; **b.** Babele, Bucegi, Romania.

The ornaments applied on the objects of usefulness and within reach (swords, saddles, campaign chests) awakened recollections and even constituted defining elements for one's social status, wealth, position etc. In this way, the primary forms of the ornaments followed an on-going process of change, reaching a very high value level (by the materials resorted to – gold, gemstones, ivory, etc.); the precision and complexity of the ornaments turned them into art works. Genuine ornament-art schools were set up and supported, with a view to adorning personal objects; which led thereby to their being customized at the level of the individual, family, geographical area, country, historical epoch, etc.

The flourishing of the localities, the population's settling on geographical territories and the establishment of human communities – with their administrative and management structures – had, as important effect, the development of the dwellings and, implicitly, the public constructions. The wealth level, the social position and the profession were highlighted, in civil engineering, by the effects of the ornament art; which, by means of differentiated adornment, likewise made a difference, in terms of aesthetics and value – depending on the material resources of the landlord.

Under these circumstances, the artists started to dwell on Antiquity's ideas – Greece, Egypt, Rome – to "intellectually process" the ornament-art elements and to adapt them to the processing techniques and materials of their time, paying special attention to the "human claims" as an outcome of the evolution of human taste and intellectual instruction. Under these circumstances, the constructions were supported on pillars decorated with column heads, grooves, pedestals, cable mouldings etc., depending on the artist's inspiration and on the landlord's taste, all correlated to the tendency and orientation in ornamentation art, specific to the respective historical period (Fig. 2).

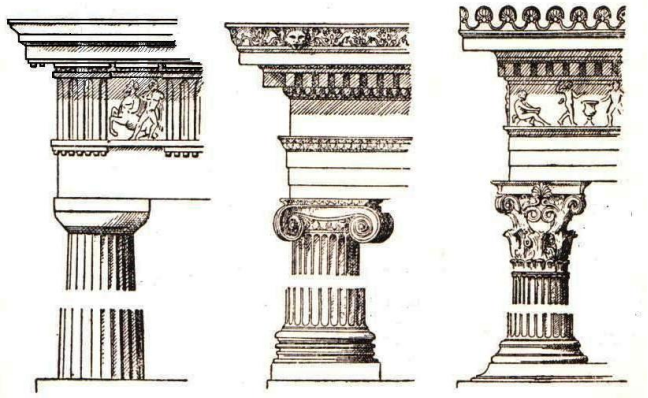

Fig. 2. Architectural forms of the Greek columns.
a. Ionic style. **b.** Doric style. **c.** Corinthian style.

Royal houses or some rich families' houses were of great importance in the history of the ornament art; their owners encouraged and materially supported individual artists or groups of artists or schools to this effect, creating thereby artistic currents, artistic styles, art and civil-engineering works, which lasted over millennia and which are nowadays world values by their ornament art, structure, forms, which are enigmatic in terms of accomplishment. Human mind permanently "worked and created", with a view to embellishing human existence; albeit humans have recently focused on streamlining existence and less on ornamentation art, the latter has not yet reached its final point.

2. Cable moulding – ornament imposed by the historical period's specificity

Human society has gone through variegated situations along its evolutionary path. Some of them encouraged and supported knowledge development; some others blocked evolution and compelled human beings to accept blind submission to the dogmas invented by more or less sane minds. From the perspective of ornament art, in terms of development and applicability, the period of European Renaissance constituted an important step in social evolution. During this time of "great restlessness", in quest of solutions for society's evolution, there were established many centres destined for searching and solving military, social, civil-engineering problems, for discovering new geographical territories etc. One can posit that Renaissance was the "vortex" that pulled humankind out of an evolutionary deadlock and set it in operation at another social-progress speed. This "mechanical" feature of society was implicitly reflected by the specificity of the ornament art, created and applied both in civil-engineering and in interior decoration, in sculptural art, in painting etc. Cable moulding is one of the Renaissance dynamic ornaments, inspired by the analysis of the winding and ascension of a liana round a tree trunk. Cable mouldings suggest dynamism, ascension, restlessness; in a word, they suggest movement and firmness, durability (Fig. 3).

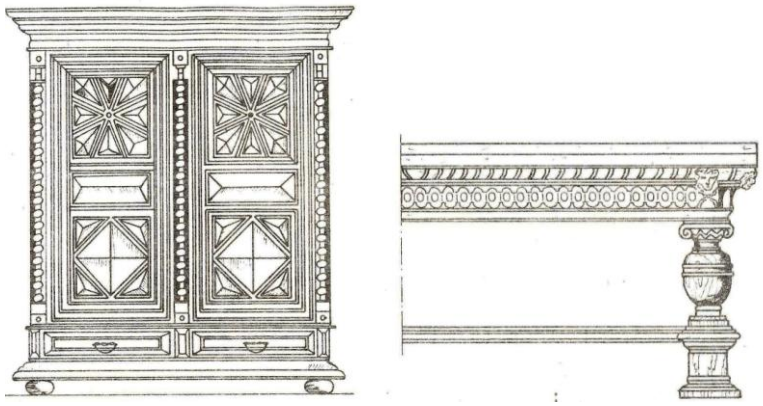

Fig. 3. Renaissance furniture parts ornamented with cable moulding.

The cable-moulding type ornament is shaped as "ropes" helically wound on a cylindrical, frustoconical, paraboloid, hyperboloid or even spherical surface, as shown in Fig. 4. The cable moulding is characterized by the following geometrical elements: form of the winding section (semicircular, ogive, triangular, trapezoidal, complex), the winding pitch and the winding angle.

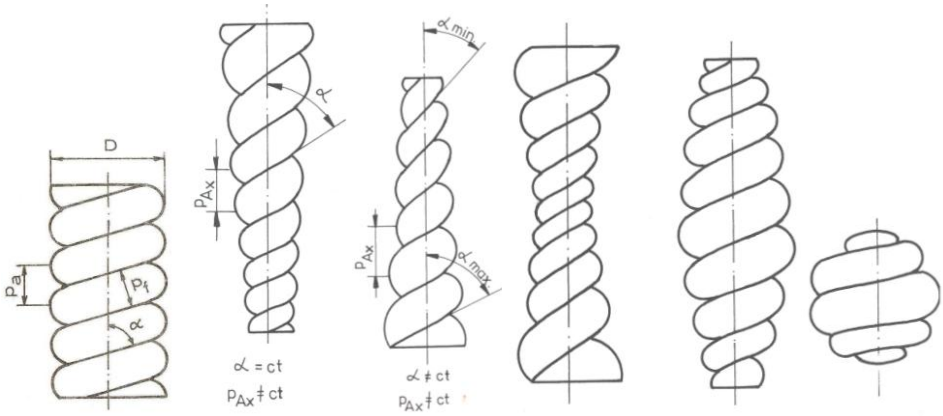

Fig. 4. Shapes of benchmarks in the wood-product structure, with cable mouldings
a. cable moulding at constant pitch. **b.** **c.** **d.** **e.** **f.** b-f. at variable pitch.

The shape of the section, characteristic of windings, is generally defined by the artistic style resorted to, with a view to applying this decorative element. The winding pitch is the "speed" of the movement; this way, great pitches give the impression of low, "wide-encompassing" movement; whereas small pitches suggest rapid, "restless" movement.

The winding angle suggests rapidity, vigorousness, ascension – in the case of the large angles (over 45º); and calmness, stability, safety, reason – in the case of the small angles (below 45º).

All these characteristics of the cable moulding, with the sensations they suggest, recommended them as ornaments, especially for the vertical elements in civil engineering – in the first stage – and subsequently in furniture manufacturing and interior design.

Despite all aforementioned decorative characteristics and advantages, cable mouldings were only occasionally used, because of the difficulties raised during the execution.

The formwork – in civil engineering – raises high difficulties, because of the spatial forms and dimensions, specific to the cable mouldings achieved on the pillars or pylons of the constructions. In wood engineering, respectively furniture manufacturing, the manual generation of these ornaments does not ensure shape rigorousness for all cable mouldings on a product, which has a negative effect on its "aesthetic quality".

Although the cable-moulding-type ornament assigns high artistic value, a certain "reticence" has always existed in tackling, for manufacturing purposes, products provided with cable moulding (furniture, stairs, interior design – floor lamps, table lamps, partitioning columns).

The manual generation by marking (drawing) the ornament and then by manual sculpture raises a high difficulty level, both for the cable moulding at constant pitch, and especially for the cable mouldings at variable pitch, therefore the wood-product market is trading few such products.

3. Cable moulding – in industrial systems

Wood engineering has been evolving for 40 years at a spectacular rate, orienting its evolution towards wood valorisation, productivity, quality, at fairly good indices, as against other materials. In this industry, there were laid the bases of mechanized, automated processing, by computerization, of high-performance technological lines.

The research in wood engineering was also oriented towards exploiting less valuable wood species, or with restricted range of distribution. Surface-refining technologies, dimension- and form-stability increasing technologies, intended for wood benchmarks, likewise high-performance and non-polluting binder-achieving technologies were designed and implemented – enabling the passage to complex, layered, agglomerate structures etc. All researches envisaged higher wood valorisation, even when its flaws do not allow its natural use, as massive wood. Research in wood engineering also aimed at creating machine-tools for individual processing (on technological operations) as well as complex, of the CNC type (for processing varied forms and dimensions, and for successively executing several technological operations). One can say that, nowadays, "anything" can be achieved in wood engineering, including cable mouldings.

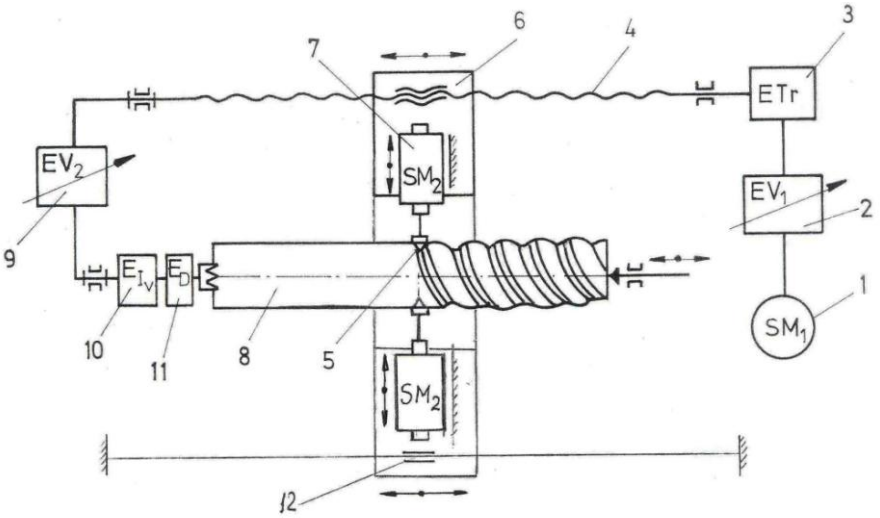

Fig. 5. General mechanical scheme for simultaneously processing two windings for cable mouldings at constant pitch; 1, 7 – movement sources; 2, 9 – adjusting elements for the characteristics of movement; 3, 4 – movement-transfer elements; 5 – processing tool; 10, 11 – movement-reversal elements and processing-division elements.

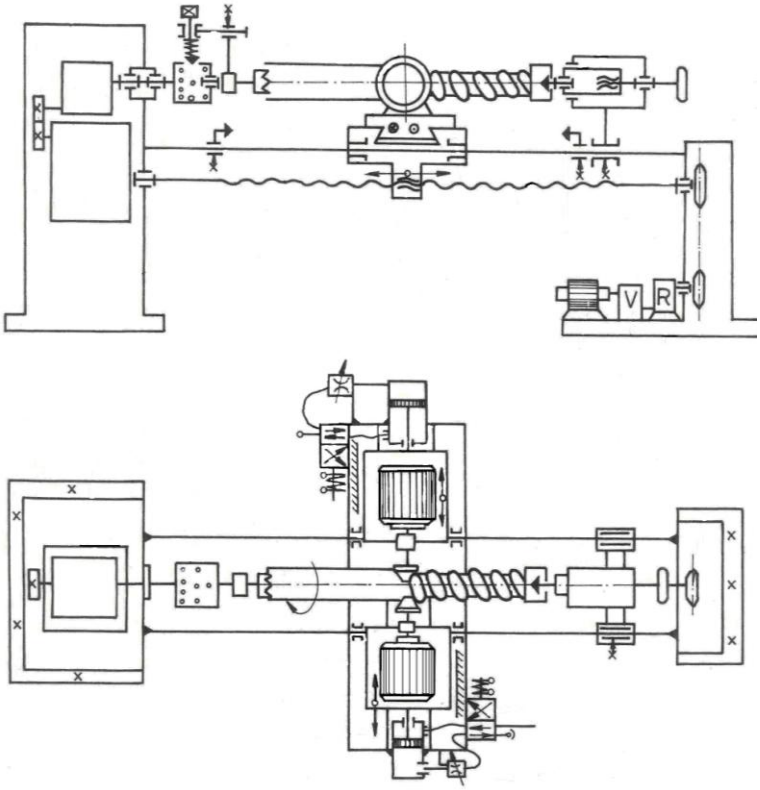

Fig. 6. Mechanical structure for simultaneously processing two windings for cable mouldings at constant pitch.

To the purpose of enhancing the decorative characteristics of cable mouldings, the bases were laid for designing and manufacturing mechanical structures that might process cable mouldings at variable or constant pitch, on furniture elements. A mechanical structure for processing cable mouldings at constant pitch is shown in Fig. 5, where one can see that either one winding at a time may be processed (when a single working-head is set in operation), or several windings may be simultaneously processed, depending on the number of working heads that operate in concert. The cinematic scheme of cable-moulding processing machine-tools, according to the principle of the overall scheme in Fig. 5, is shown in Fig. 6.

Another cinematic scheme, shown in Fig. 7, based on the general scheme in Fig. 5 shows the possibility of simultaneously processing two cable mouldings at constant pitch, which ensures the processing in pairs (in terms of the tilt direction), of consequence for the symmetry in furniture decoration.

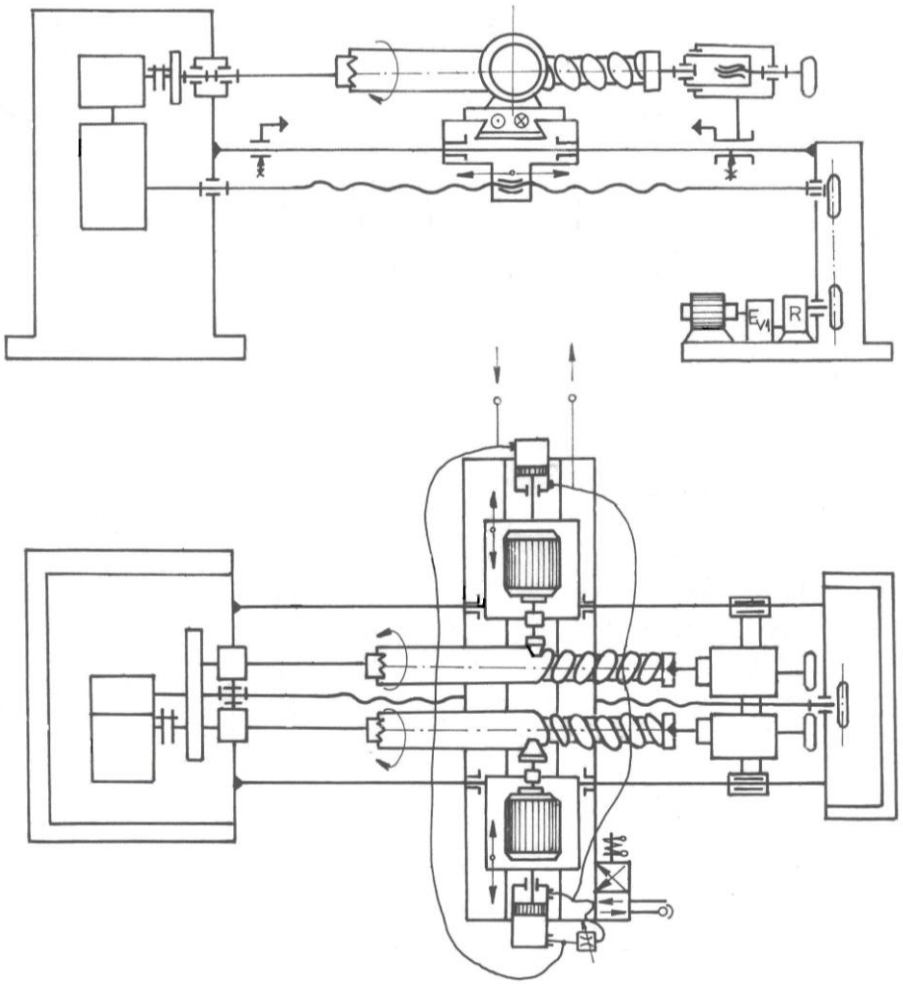

Fig. 7. Mechanical structure for simultaneously processing two cable mouldings.

The analysis of the schemes in Fig. 5, Fig. 6 and Fig. 7 shows that generating cable mouldings at constant pitch supposes permanently maintaining (and in a well-defined manner) a (constant) rotation movement of the wooden piece processed by linear (constant) shift of the processing tool.

The performance ratio between the values of the two movements ensures in fact the size of the pitch and tilting angle of the cable moulding, so that the structures presented beforehand (which constitute Romanian patent specifications) enable adjustments in the "aesthetics" of the cable mouldings within wide ranges.

4. **Cable moulding at variable pitch** – technical complexity in execution

If, when manufacturing cable mouldings at constant pitch, the rotational movement of the work piece and the linear shift of the processing tool remain constant over the processing, after having been adjusted at well defined values that might yield a certain pitch and tilting angle, when manufacturing cable mouldings at variable speed, the values of the two movements are no longer constant, but modify according to a law defined by the variation in the pitch of cable mouldings, along the work piece, so that the proportionality between pitch and the layout diameter might be kept (Fig. 8).

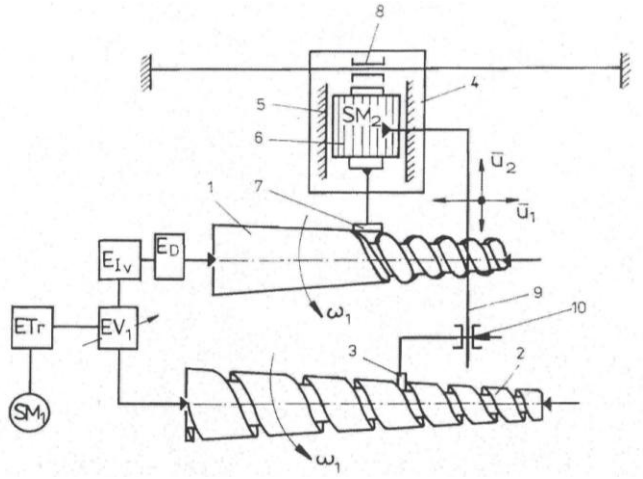

Fig. 8. General scheme for processing cable mouldings at variable pitch by following the materialized trajectory; 1 – work piece; 2, 3 – materialized trajectory with the tracking-device; 4 – mobile mass of the tool; 5, 6 – movement source and guide path of the processing tool; 7 – processing tool; 8 –linear guide; 9, 10 – lever system.

The manufacture of cable mouldings at variable pitch supposes designing and achieving mechanical structures meant to ensure the processing in compliance with a materialized trajectory – with spatial cams, as in Fig. 8, or with electronic systems for tracking the processing position of the tool and for adapting in terms of value, the rotational speed of the work piece and the progress of the working

tool, so that the cable-moulding pitch might modify by default, according to a pre-set law, as computer input, as shown in Fig. 9.

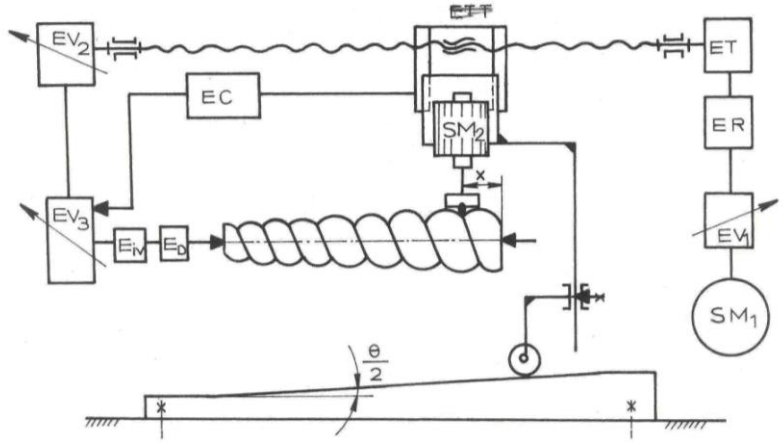

Fig. 9. General scheme for processing cable mouldings at variable pitch by cinematic generation of the trajectory

The analysis of the structures in Fig. 8 and Fig. 9 shows that processing cable mouldings at variable pitch requires complex mechanical structures, which enable adjustments of the cinematic parameters on a permanent basis, so that the pitch should modify along the work piece, with the keeping or modification of the winding angle. These structures pertain to Romanian patents and may turn into real structures, applicable where the market requires furniture or wood products decorated with cable mouldings at constant or variable pitch.

Conclusions

Cable moulding at constant or variable pitch constitutes an ornament of high importance and effect for furniture and wood-product decoration. By introducing elements of "movement", "dynamism", "restlessness", "ascension" and "vigorousness", the cable moulding may connect to the configurative specificity of current society, characterized by increased dynamism.

The passage to the industrial production of the furniture and wood products decorated with cable mouldings, requires achieving and using specific mechanical structures, specialized in the value combination of the cinematic parameters, which generate the trajectory of the windings, disposed on cylindrical, tapered, paraboloid, hyperboloid or spherical benchmarks.

The correct functioning of these structures requires mathematical studies, in order to establish the variation parameters specific to the movements of the work pieces and of the processing tools, depending on the features of cable mouldings.

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