HISTORY OF ROMANIAN TECHNOLOGY AND INDUSTRY
A short presentation of the treatise

DOREL BANABIC

Abstract. Along the decades, the history of Romanian technology has been tackled in Romanian specialised literature in several books authored by historians, engineers, industrialists, and sociologists. Nevertheless, it is scarcely known outside the borders of Romania. This is due, among other reasons, to the insufficient popularisation in widely spoken languages of the history of Romanian technology and main Romanian contributions to the world's technological heritage. Romania is mentioned in encyclopaedias of the history of technology and of world inventions especially for its contributions in the fields of aviation and aeronautics. Such publications leave out numerous names of Romanian engineers and inventors who have had significant contributions to the development of Romanian and global technology. The History of Romanian Technology and Industry treatise aims to contribute to promoting the valuable achievements of Romanian technology both at home and abroad (through its English edition).

Key words: History, Technology, Industry.

1. INTRODUCTION

The History of Romanian Technology and Industry treatise was published in Romanian in the Romanian Civilization series of the Romanian Academy Publishing House (see below) (https://academiaromana.ro/sectii/sectia08_tehnica/doc2020/IstoriaTehnicii/24IstoriaTehnicii-Vol1.pdf; https://academiaromana.ro/sectii/sectia08_tehnica/doc2020/IstoriaTehnicii/25IstoriaTehnicii-Vol2.pdf).

The treatise will be published in English in 2020. It consists of two volumes titled as follows: The History of Mechanics, Processing Technologies and Construction and The History of Electrical Engineering, Energetics, Transport and Engineering Education, respectively. Each volume comprises multiple chapters pertaining to the fields specified in the subtitle.

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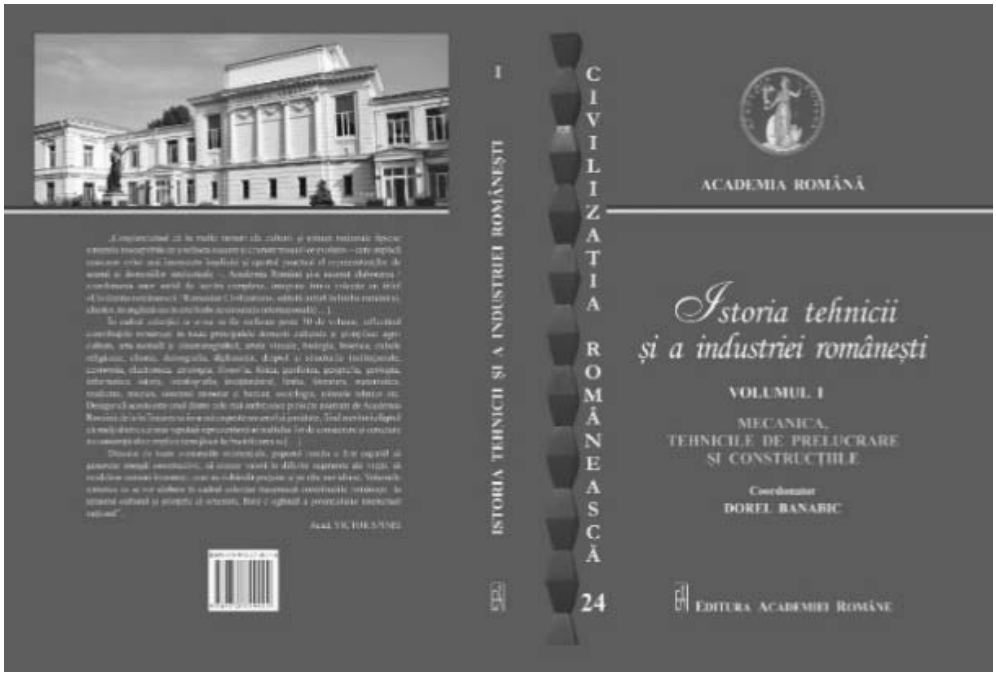
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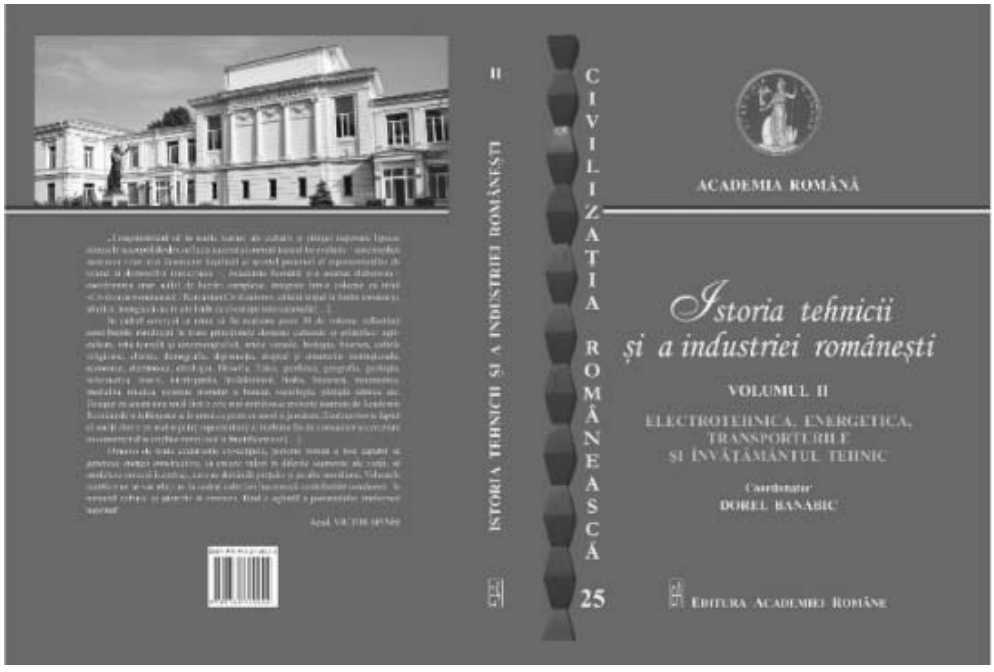
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Why we published the History of Romanian Technology and Industry? The first argument is that there are few works in Romanian specialised literature in which the history of Romanian technology is tackled by specialists in the various branches of technology. The history of Romanian technology has been discussed along the decades by historians (Nicolae Iorga [1], Ștefan Pascu [2, 3], Constantin Giurescu [4], Volker Wollmann [5]), as well as industrialists (Dumitru Furnică [6]), engineers (the collective volume of the Polytechnic Society [7]), Ștefan Bălan [8], Remus Răduleț [9], Nicolae Iordăchescu [10], Ștefan Iancu [11]) and sociologists (Dimitrie Gusti [12]). Only three of the books written by the authors above feature a multidisciplinary approach: *History of technological development in Romania* [7] in three volumes, dedicated to the 50th anniversary of the Polytechnic Society in Romania, *Encyclopedia of Romania* (Vol. 3) [12] by Dimitrie Gusti, and the treatise by Ștefan Pascu [3]. The history of technological development in Romania by sector is tackled in a comprehensive manner in the three volumes of [7], which constitute a veritable *Encyclopedia of Romanian* industry up to 1930. The volumes add up to nearly 1500 pages and are structured into 77 chapters, each of them focusing on a specific field of technology and having been drafted by a specialist in the respective field. One cannot leave out the third volume of the *Encyclopedia of Romania* treatise, titled *National Economy* and supervised by Dimitrie Gusti. Modelled after the *Encyclopédie Française* [13], supervised by Anatole de Monzie, this treatise is the most accomplished presentation of Romanian industry up to the beginning of World War II, with each chapter being authored by specialists in the field (74 specialists were involved in drafting the treatise). These two works have constituted the main source of information as to the time before World War II. The history of science and technology in Romania was approached in a multidisciplinary manner by Ștefan Pascu in his ambitious treatise *History of Romanian scientific and technical thinking and creation*, which, unfortunately, never went further than the first volume, thus only discussing the preindustrial age (before the 18th century). It is the intention of the present volumes on the history of Romanian technology and industry to continue this enterprise.

The second argument is that the history of Romanian technology is scarcely known outside the borders of Romania. This is due, among other reasons, to the insufficient popularisation in widely spoken languages of the history of Romanian technology and main Romanian contributions to the world's technological heritage. A relevant testimony in that sense is the opinion of Jacques Attali, influential French thinker and former adviser to President Mitterand, who, in his Romanian edition of the book A Brief History of the Future [14], mentions three reasons why 'Romania never managed to become a dominant power in Europe'. Two of them have to do with the field of industrial technology, namely: "1. Romania has always privileged agriculture over the mobility industry, innovation, and technology; 2. Romania has not succeeded in forming a sufficiently numerous class of creative people (engineers, researchers, entrepreneurs, traders, etc.); it has never attracted enough scholars, bankers, and businessmen. The English-language edition of the present work aims to bridge that gap."

The third argument is that studying and understanding the past is useful in prospecting the future, as Mihai Eminescu splendidly and concisely put it in his poem '*Glossă*': 'Viitorul și trecutul /Sunt a filei două fețe, /Vede-n capăt începutul /Cine știe să le-nvețe.' (Both the future and the past /Are but sides of the same page; /In beginnings, ends are cast /For whoever can be sage.).

The present volumes of *History of Romanian Technology and Industry* approach the field in the spirit of the treatise published under the aegis of the Polytechnic School in 1931 [7] and of the third volume of Dimitrie Gusti's *Encyclopedia of Romania*, adapted to present times, namely to the beginning of the fourth industrial revolution. This approach involved dividing the field of technology into multiple industrial branches, such as: mining, metallurgy, oil, natural gas, machine building, agricultural machinery, military, textiles, construction, electrical engineering, energetics, biomedicine, naval transport, railway, automotive, aviation. Traditional technology, the forming of the industrial system, mechanics, inventions, technological societies, higher education within technology are tackled in separate chapters. At the end of these volumes, a chapter was introduced which contains brief portraits of eminent figures in Romanian technology. The engineers who have contributed to advancing the fields of computers, automation, and electronics are not included here, as these fields are part of another work within the series. For each field, we engaged the collaboration of top specialists or authors who have already published a history of their field. Certain chapters were drafted with the aid of specialists who have played the part of policy makers in the elaboration of development strategies for Romania and who are familiar not only with the facts and the history of their field, but also with the 'philosophy' behind its development. Such is the case of the chapters on the history of machine building, the history of electrical engineering, the history of energetics, and the history of oil. Making the most of these 'living archives' adds to the quality of the present book. This represents a new approach as compared to the books on the history of technology written in the last 80 years, an approach which has the advantage that specialists in the field are more capable of correctly ranking the value of technological achievements along the ages. Nowadays, in the age of the Internet, when the issue is not about finding information when doing research, but about ranking it based on its value, such an approach is crucial and increases the worth of the present work. One limitation to this approach, which is inherent to any book with a large number of authors, is that the chapters are written in different manners, each author / chapter supervisor having a different style. Another element of novelty brought by the present work as compared to the ones preceding it is the fact that the authors have made full use of the extremely bountiful information found on the Internet, a source accessible to all, yet this time employed most fruitfully thanks to the ordering and ranking conducted by specialists in each field. Furthermore, archive documents published after 1990 were used, such as the ones included in the paper [15].

There is a wealth of world literature on the history of technology, published from the early 20th century onwards, first in Germany [16, 17] and, after World

War II, in Britain [18], France [19], the USSR [20], the USA [21], Italy [22], Poland [23]. A vast five-volume treatise has recently been published in Germany by the Propyläen Publishing House [24], while in the USA, the publication of a treatise began in 2010, having now reached its fourth volume [25]. These volumes mention but a few Romanian technological achievements, such as those of George Botezat (helicopters), Gogu Constantinescu (the theory of sonics and automatic transmission) and Hermann Oberth (interplanetary travel) in *A History of Technology* [18] and those of Oberth in *Propyläen Technikgeschichte* [24]. Chinese technology, with its ancient traditions and remarkable contributions to the world heritage, is presented in a plethora of books on the history of technology in Chinese, some of which have recently been translated into English, such as the ample three-volume treatise called *A History of Chinese Science and Technology* [26]. In the mid 1930s, historian Lucien Febvre, who, together with Anatole de Monzie, created the *Encyclopédie Française* [13], said about the history of technology: 'Technique: un de ces nombreux mots dont l'histoire n'est pas faite' (Technology: one of the many words whose history has yet to be made). These words have spurred historians all over the world to approach the topic of the history of technology, which has led to an avalanche of works from the 1950s onwards (as can be seen from the list above). Furthermore, series of books on the history of technology were published, by the VDI Publishing House in Germany [27] in 1909-1919 and by the Springer Publishing House in the same country from 1938 onwards [28]. In 2007, the same publishing house began issuing a series of books titled *History of Mechanism and Machine Science*, which has reached 34 volumes so far [29]. In 1964, a series of books on the history of technology started to be published by the MIT Press in the USA (so far, it comprises over 250 volumes) [30]. In 1991, the Institute of Historical Research of the University of London began issuing a series of books titled *History of Technology*, which has reached its 33rd volume [31].

As a result of the impetus given to the research on the history of technology, international professional associations were also created to bring together the efforts made by researchers in the field. The first and most well-known such association is the Society for the History of Technology [32], which was founded in 1958 and counts over 1,500 members. The society organises an annual conference, publishes a magazine titled *Technology and Culture* [33], and supervises a series of books in its field [34]. Subsequently, in 1968, the International Committee for the History of Technology (ICOHTEC) [35] was founded in Paris, as part of the International Union of History and Philosophy of Science (IUHPS). The ICOHTEC issues an annual magazine titled ICON [36]. It is worth noting that Romanian Academy Member Ștefan Bălan was the president of ICOHTEC in 1981–1989.

In Romania, the Romanian Committee for the History and Philosophy of Science (Comitetul Român pentru Istoria și Filosofia Științei – CRIFS) was created in 1956, under the aegis of the Romanian Academy and upon the initiative of its

president, Traian Săvulescu. The first person to be elected president of this committee was Romanian Academy Member Mihai Ralea, while Romanian Academy Member Remus Răduleț was head of the division of technological sciences. In 1957, this Romanian committee became part of the International Union of History and Philosophy of Science. The sustained activity of the Romanian committee within that international body enabled the former to organise the 16th Congress of the History of Science in Bucharest in 1981. In 1992, CRIFS is restructured into three divisions and its name is changed into the Romanian Committee for the History and Philosophy of Science and Technology (Comitetul Român pentru Istoria și Filosofia Științei și Tehnicii – CRIFST). The three divisions are dedicated to: history of science, logic, methodology and philosophy of science, and history of technology, respectively. The latter division was headed by Romanian Academy Member Horia Colan from the time of its creation until his death (2017). CRIFST is editor to two annual publications: *NOESIS*, founded in 1972, and *NOEMA*, founded in 2002 [37].

When it comes to Romanian inventions mentioned in books on the history of inventions, the situation is similar to that of the history of technology. For example, in the four-volume encyclopedia edited by Alvin Benson, titled Great Lives from History: Inventors and Inventions [38], 413 inventors from 36 countries are presented, yet none of them is Romanian. Other recently published encyclopaedias mention merely one Romanian each: in Britannica Guide to Inventions [39], Hermann Oberth is included due to his contribution to interplanetary travel; in *Ancient Engineers Inventions* [40], Conrad Haas is mentioned for his invention of the multi-stage rocket; in the *1000 Inventions and Discoveries* [41] encyclopedia, Steven Auschnitt is featured due to his invention of the ZipLoc for plastic bags. In *The Timetables of Science* [42], 5 Romanians are mentioned, 3 of whom are engineers: Traian Vuia (first flight in a self-propelling aircraft), Henri Coandă (the jet-engine aircraft), Gogu Constantinescu (sonics). In the *Larousse Dictionary of inventors and inventions* [43], 8 Romanians are mentioned, 4 of whom are engineers: Henri Coandă (the jet-engine aircraft), George Botezat (the helicopter), Hermann Oberth (interplanetary travel), Gogu Constantinescu (sonics). The same can be noted with respect to the great thematic encyclopaedias, such as *Mc Graw Hill Encyclopedia of Science and Technology* [44], or general ones: *British Encyclopedia, Encyclopedia Universalis, Larousse*, etc.

Romania is mentioned in encyclopedias of the history of technology and of world inventions especially for its contributions to the fields of aviation and aeronautics. Such publications leave out numerous names of Romanian engineers and inventors who have had significant contributions to the development of global technology, such as: Petrache Poenaru (the fountain pen), Alexandru Ciurcu (applications of the jet engine), Lazăr Edeleanu (oil refining), Ion Basgan (sonic-vibration drilling), Aurel Perșu (the aerodynamic automobile), Dumitru Daponte (3D cinematography), Augustin Maior (multiple telephony), Constantin Budeanu (electrical engineering terminology), Nicolae Vasilescu-Karpen (the thermoelectric

pile), Elie Carafoli (aerodynamics) and many more. An exhaustive list of Romanian inventors is featured in the work edited by the State Office for Inventions and Trademarks (Oficiul de Stat pentru Invenții și Mărci – OSIM) [45].

There are numerous solutions for increasing the visibility of Romanian technological achievements, such as: publishing a history of Romanian technology and industry on the website of the Romanian Academy and on that of Academy of Technical Sciences of Romania (Academia de Științe Tehnice din România), having Romanian specialists participate more frequently in conferences on the history of technology, introducing information on Romanian engineers into the English version of Wikipedia, publishing monographs on various themes in English. Several commendable initiatives have been taken by the State Office for Inventions and Trademarks (OSIM), such as the publishing of *In the World of Romanian Inventors* [45], and, more recently, by the Romanian Cultural Institute, which has lately published a book titled *100 Romanian Innovators* [46], both works having been issued as bilingual editions (Romanian and English). The *Romanian History of Technology and Industry* treatise aims to contribute to promoting the valuable achievements of Romanian technology both at home and abroad (through its English edition).

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