Preface

The twelfth PC Workshop on the History of Mechanism and Machine Science (MMS) was held at the Polytechnic School of the University of Palermo, Italy, in November 21–22, 2013, under the patronage of the IFToMM. It was organized by Profs. Marco Ceccarelli, Francesco Sorge, Marco Cammalleri, and Giuseppe Genchi and was hosted inside the Museum of Engines and Mechanisms of the University of Palermo, whose director and chief manager, F. Sorge and G. Genchi, respectively, are the editors of this book.

All workshops of the IFToMM Permanent Commission for the History of Mechanism and Machine Science are organized as limited-circle meetings with the aim of promoting the presentation of unpublished material and stimulating new interest in various historical developments in the fields of Mechanism and Machine Science. They want to open debates on many aspects associated with the birth and growth of mechanisms and machines from antiquity up to the present day: kinematics, dynamics, design methods, collections of models, teaching aids, historical biographies, individuals, institutions, etc. The first of these workshops was held in Admont, Austria, in 2002, and was followed nearly annually by eleven further meetings with parallel objectives. The focus of the 2013 HMMS Workshop in Palermo was, in particular, on the European History of Mechanism and Machine Science.

The idea of the present book originated after the workshop out of the desire to give a complete and extensive form to the abstracts that were proposed on that occasion. Most of these abstracts were turned into extended papers by the attending authors, collecting the information given in their oral presentations and enriching their work with new data and results from the ensuing historical researches. After acceptance from a review process, the extended papers were then distributed into separated parts of the book, collecting them in accordance with their themes, in which each paper constitutes, in practice, a chapter of the book and each section refers to a particular aspect of the history of mechanisms and machines.

- Part I is dedicated to several eminent scientists of the past, whose individual contributions may be considered as milestones in the history of MMS. In particular, this part offers a deep insight into certain advancements brought to scientific knowledge by renowned scholars such as Lagrange, Borgnis, Reuleaux, Ovazza and Frolov.
- Part II illustrates relevant aspects of the wide industrial development that has so deeply been involved in European civil life during the last two centuries. In particular, very interesting chapters are presented on various types of ancient mill installation in Abruzzo and Tuscany in Central Italy; on the sulfur mining industry of the nineteenth and twentieth centuries in Sicily; on the aviation industry in Romania at the beginning of the twentieth century; on the industrial progress in Southern Italy before the unification of the Kingdom of Italy and in Northern Italy before and after the unification.
- Part III concerns the history of machinery for fixed and moving application, and the history of transport in general. It addresses the pioneering development of technology in the field of motors and transport, and presents, in respective chapters: the collection of the Museum of Engines and Mechanisms of Palermo; the history of an ancient Spanish railway; and the devising of the first airships of the nineteenth century.
- Part IV is dedicated to human creativity in the field of mechanical and scientific devices, starting from ancient times up to the last century. The subjects cover machines built during the Renaissance on the basis of ancient designs of the Roman period; the bellows devices operated by falling water in use in the forges of the Middle Ages and the Renaissance; pendulum clock development through the centuries; the screw pumps conceived in Central Italy by Guido Ubaldo Del Monte at the dawn of the Renaissance; and the progress in the measurement methods for the shaft torsional stress state.
- Part V deals with several ingenious machines dating from the remote and recent past, all designed with the aim of relieving or replacing human manual work or setting in motion very huge structures. Starting from antiquity, very heavy carts are described in detail, together with their construction technique, the so-called Rathams or Thers, which were brought in procession by human and animal traction in ancient India. Moreover, operation of an automaton of the Hellenistic period is analyzed, which moved up and down upon a procession cart and had to be probably actuated by special mechanisms. Lastly, a survey is given on the history of robots in general, including some recent examples that were devised and built at the Polytechnic University of Milan near the end of the last century and are now exhibited in the Museum Leonardo da Vinci in Milan.

As mentioned in the brief description of Part III, the book contains a chapter on the Museum of Engines and Mechanisms of Palermo, in which collections of historical pieces are briefly described with the aid of a number of illustrative figures. The museum belongs to the museum system (Sistema Museale di Ateneo-MUSEIUNIPA) of the University of Palermo, together with the museums of Zoology, Geology, Radiology, the “Specola,” or Astronomic Observatory, and the

Botanical Garden. It was inaugurated in February 2011 and collects more than three-hundred items testifying to the development of the mechanical sciences in the last one hundred and fifty years of history. Its contents cover the fields of automotive and aircraft engines, stationary engines, hydraulic machines, laboratory, and didactic devices. Just to mention a few examples, we recall the following: the FIAT G.59 trainer aircraft of the 1950s, which has been recently restored by the Museum and represents one of the five remaining specimens in the world; the radial steam turbine Ljungstrom of the old electric power plant in Palermo; a rare Siemens Halske IIIa bi-rotary aero-engine, the crankshaft, and crankcase of which counter-rotated with opposite angular speeds. All the pieces were taken from the storerooms of the former Institute of Machines and were revived thanks to a scrupulous work of restoration, accompanied by careful historical research. The Museum is our own pride and the pride of the University of Palermo. Many scientific events have been hosted there, and many others are continuously programmed. Its choice as the venue for the twelfth PC Workshop on the History of Mechanism and Machine Science fit quite well with the themes of the meeting and it is hoped that other similar events will take place there in the future.

To sum up, despite the limited number of contributions, this volume shows a wide-ranging panorama on the historical progress of scientific and technical knowledge, mainly in the European environment. Hopefully, it may give new stimuli to all people involved in the history of Science and Technology.

Finally, the editors wish to express their gratitude to all people who have given their valuable contributions to this editorial project, and in particular, they thank all the authors and co-authors of the chapters for the enthusiasm they have put in preparing their admirable essays. Special thanks are devoted to the editorial staff of Springer for their helpful co-operation. Moreover, the editors owe a warm acknowledgment to their friend, Professor Marco Ceccarelli, for his precious suggestions during the groundwork and preparation of this book and for his assistance during the editorial process.

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