Ottomans' Mechanical Science Books in the 19th Century

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Abstract. From the 18th century onwards, Ottomans tried to catch up with the new technologies, especially in the military. Various expeditions were made to investigate the reasons for the Western world's military superiority; for that, various books were translated from Western sources at this time. Some experts were invited to teach in the military academies, and some Ottoman students were sent abroad for education. Mechanics education in military academies was an important part of transferring information about new technologies. Therefore, understanding its content is very important for the history of science and technology in Türkiye. In this article, all the mechanics textbooks written and compiled for the Ottoman military academies in the 19th century are examined, and information is given about their authors and the contents of these books. Some of these books have been reviewed by historians of science before, and some have not been examined. While preparing this article, the original Ottoman texts of these books mentioned were examined, and secondary sources were also used.

Keywords: Ottoman Science · Ottoman mechanics · Ottoman modernization · Fenn-i Makine · Cerr-i Eskâl

1 Introduction

Unlike many Western European countries, the Industrial Revolution in the 18th and 19th centuries had a negative effect on Ottomans. Goods produced with new technologies in Europe quickly invaded the Ottoman market, disrupting the Ottomans' traditional local production. On the other hand, the Ottomans initiated industrialization by imitating Europe and receiving technical and administrative help from them. However, this attempt was insufficient, and as a result, the empire experienced an economic crisis [1]. Adopting Western technologies has not replaced an industry that develops from within.

The Ottomans also lost their superiority on the battlefield due to their inability to follow new technologies from the 18th century onwards. Various expeditions were made to investigate the reasons for the military superiority of the Western world. In 1721, Yirmisekiz Mehmed Çelebi Efendi (d.1732) was sent to Paris as a diplomat and wrote his comprehensive report (or a travelogue) on fortifications, factories, French military schools, and training areas [2]. Ibrahim Müteferrika (1674–1745), who was an eminent printer, author, and translator, posed the question that was troubling the minds of the

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Ottomans in his treatise on *The Rational Principles of The Political Orders of Nations* (*Usûlü'l-Hikem fî Nizâmi'l-Ümem*), which he presented to Sultan Mahmud I in 1732: "How did Christian nations come to rule many countries within a century and even defeat the once victorious Ottoman armies?" his answer was comprehensive, but his main point was "Ottomans had to learn new military sciences and apply them properly" [2]. To resolve this problem, experts and consultants were invited to the court, such as Count Claude Alexandre Comte de Bonneval (1675–1747), Baron François de Tott (1733–1793), Campbell Mustafa (Le Comte Ramsey) (alive in 1775), Colmar von der Goltz (1843–1916) and many more [2]. The second solution to this problem was to translate and compile new books, mainly textbooks for the students of the military engineering academies. With these motivations, the Ottomans had a breakthrough in the publication of "Fenn-i Makine," which might be translated as "Machine Science" in the 19th century. For instance, Mehmed Nureddin translated Charles Bossut's Mechanics book in 1834.

In this article, these books will be introduced briefly, and general information about the context of these books will be given. This study examined the original Ottoman text of each book mentioned. In addition, previous studies on these books, if any, are also used.

2 The Difference Between Cerr-i Eskal and Fenn-i Mihanik

Both phrases, *Cerr-i Eskal* and *Fenn-i Makine* were used to state machine science in Ottomans. The word "Cerr-i Eskal" is derived from the Arabic words "cerr" and "eskal". *Cerr* means pulling, and dragging, while *eskal* means heavy loads. These words together mean pulling or lifting heavy loads [3, 4]. In the early Ottoman science terminology, this word was used as the equivalent of mechanical sciences and considered a branch of geometrical sciences. We may find many proofs for that definition, but one of the earliest proofs of mechanics was regarded as a part of geometry in the 16th century. Taşköprülüzâde Mehmet Efendi wrote about construction, the center of gravity, dragging weights, surveying, water extraction, war instruments, clocks, navigation, weighing and scales, etc., in a chapter about "geometry" in his book *Mevzûatü'l-Ulûm* (*Topics about Sciences*). Therefore, geometry topics in Ottomans involved engineering and architecture at least since the 16th century [5].

The word *fen* means positive sciences, and *mihanik* is obviously used for mechanics. So together, "fenn-i mihanik" can be translated as the science of mechanics or mechanical science. This phrase was widely used in the 19th century. Before that cerr-i eskal was much more common to use. Therefore, we can conclude that the main difference between these two phrases was related to timing more than meaning, and both meant the mechanics. We should also mention one more phrase to distinguish this terminology i.e. *fenn-i makine*. This phrase can be translated as machine science. Near the end of the 19th century, we can see some books preferring this name with mechanics context and some additional parts about machinery focusing on movement [3].

3 Textbooks Written on Machine and Mechanical Sciences in 19th Century Ottomans

There are many books written on this subject, and there are more books that have some parts related to mechanics and machines but, in this article, we limited our investigation to the book titles cerr-i eskal, fenn-i mihanik and fenn-i makine written in 19th century. This means we are going to examine the contexts of the books specifically titled Machine or Mechanics. Machine gun books written in this period, which have similar titles as "machinery," are out of the scope of this article.

3.1 Seyid Mehmed Eşref

Seyid Mehmed Eşref (d. 1878) graduated from the Mekteb-i Bahriye (Naval Military Academy) and started to teach in the same institute in 1840. He remained on this duty for years, and his book on mechanics was taught as a textbook in this academy from 1862 until 1895 [3, 6] (Fig. 1).

Fig. 1. Cerr-i Eskâl's first page [7]

Cerr-i Eskâl was written in 1862 in Istanbul using an unknown French source. As mentioned above, Cerr-i Eskâl described mechanics up to the 19th century. It was then replaced by the time fenn-i mihanik.

In his introduction, Seyid Mehmed Eşref describes cerr-i eskâl as "knowledge of motion and balance of objects and the reasons for these". He gave five definitions at

the beginning of his book. Then he explains the subject, such as the amount of force and movement, solids and elasticity, collision of elastic objects, summarizing the force released in the collision of objects, composition and analysis of forces, projectile motion, parallel forces, center of force, balance end rotational movement, motion and balance of an object affected by forces in different directions, balance and movement of a solid object on a fixed surface, ropes, pulley, block and pulley, lever, gears, clamp, wedge, capstan, pendulum movement, centrifugal force, oblateness of the Earth's globe [7].

3.2 Bostanîzâde Seyyid Mehmed Tâhir Pasha

Seyyid Mehmed Tâhir Pasha (1811–1867), also known as Küçük Tâhir Pasha, was a well-known mathematician in Ottoman land in the 19th century. In 1833, he started his education in Mühendishane-i Berri Hümâyun (Imperial School of Military Engineering). In 1835, he was sent to England to receive his education. After completing his education, he started his teaching career. He was a teacher of Vidinli Tevfik Pasha, who is considered the most brilliant Ottoman mathematician of the 19th century. He wrote books on cosmography, mathematics, physics, and mechanics [8] (Fig. 2).

Fig. 2. Cover page of 'İlm-i Cerr-i Eskâl [9]

'İlm-i Cerr-i Eskâl written in 1862 in Istanbul. The book is handwritten, and it is very challenging to read. The book begins with a nine-page table of contents and an introduction. The introduction starts with an extended praise and thanks to the Sultan of the time, and it continues with general information on why this book was needed in the Mekteb-i Harbiye (Military Academy). According to Tâhir Pasha, until then, there were no printed books in the military school, and students were using the notes they took in the lectures as lecture materials. Therefore, he prepared this book for the students.

The book has two main chapters. The definition of force and resistance, the effect of force, the motion of an object, the definition of stability, the work of force, the intensity, direction, and application of force are some main topics that *'İlm-i Cerr-i Eskâl* includes.

The first chapter is about motionless objects. The resultant of forces applied to a point, the resultant of forces applied in a direction, the resultant of forces with an angle between them, forces applied to a point on a plane, the resultant of forces applied to different points in the same plane, the center of gravity of a line, area and some solids explained. Under the title of industrial tools, levers, scales, gear wheels, pulleys, and their mechanisms are also included in the first chapter.

In the second chapter, laws regarding the center of motion and inertia of objects, speed, the third law of motion, collision of objects, elasticity, calculating the distance traveled by objects moving with equal speed in a particular time, movement of the earth, movement on an inclined plane, pendulum, projectile motion, velocity at any point in the bullet's motion, way to estimate the traveling time of a bullet over an arbitrary surface, discussed in detail. At the end of the book, there are also sections on civil engineering topics, such as calculating the weight on the bases of house roofs, the loads carried by beams, and the construction and balance of arches [9].

3.3 Aram Margosyan

Aram Margosyan (1853–1931) was born in Istanbul as a son of Kikor Margosyan. He was an Armenian-originated Ottoman scholar. He completed his education in 1878 at the École des Ponts et Chaussées. After completing his education, he returned to Ottoman land and worked as an engineer at the Ministry of Public Works and later at the railway administration. He worked as an engineer in the cities such as Edirne (1877) and Aydın (1878). Then, he was assigned to Turuk-u Maabir İdaresi (Civil Engineering administration office) as a chief engineer. He also lectured at the Hendese-i Mülkiye (School of Civil Engineering) and later Turuk-u Maabir Mektebi (The Ottoman Empire's first civilian engineering school) [10, 11]. Margosyan mostly gave mathematical analysis and machinery courses and prepared books in these fields. In addition, he also worked on agricultural accounting, a field that was beginning to develop at that time [12] (Fig. 3).

His book on mechanics, *Fenn-i Mihânik-i Riyâziye* (Mathematical Mechanical Science), was published in 1886 in Mühendishane-i Berri Hümâyun Publishing House. This book was prepared for third graders of Hendese-i Mülkiye (School of Civil Engineering). He begins his book by defining mechanics as the force of motion. He begins his book by giving some basic definitions. He first started by describing mechanics as the force of motion. He divided this subject into two main parts: the science of movement and the science of force. He also claimed that the science of force has two sections: equilibrium and dynamics. The book consists of three main chapters. In the first chapter, the movement of a point in various situations, such as uniform linear motion and the movement of a point on a circle, etc., is explained. Also, topics such as speed, road, variable motion, drawing speed, and road graphs are mentioned in this chapter. In the second chapter, drawing the motion, uniform linear motion, relative motion, translational motion, rotating motion, movement occurring on the surface of a geometric shape, conchoid and cycloid curves, calculation of acceleration in case of relative motion, application examples such as rotation of the world and planets around the Sun, Kepler's Laws of motion examined in detail. Finally, in the last chapter, the relative motion of Solids was discussed. This chapter explains topics such as the resultant translational and rotational motion, the speed of any point of an object, the resultant of a rotating motion, and a

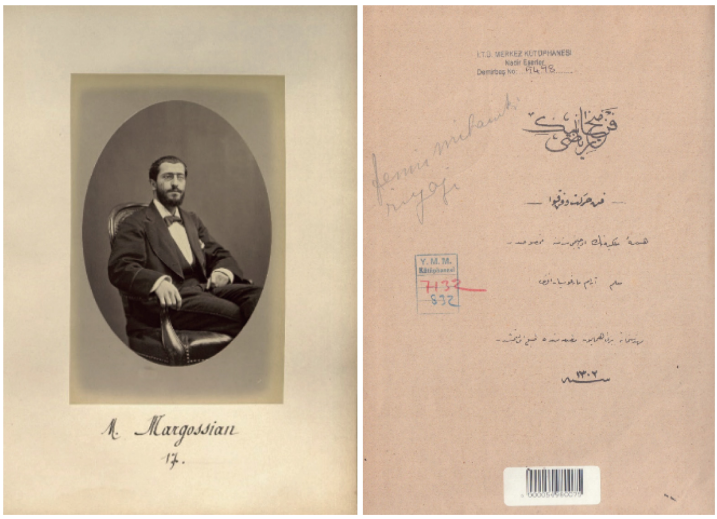

Fig. 3. Margossian's Picture [10]; Cover of his Mechanics Book [13]

translational motion perpendicular to the rotation axis. In this section, problems and issues are discussed with the help of the three-dimensional coordinate system [13].

3.4 Ali Rıza

He was born in the Beyoğlu district of Istanbul. He graduated from the Military Academy (Mekteb-i Habiye) Infantry Class in 1872. He taught military geography at the Military Academy and machine science at Mekteb-i Mülkiye (School of Civil Engineering). He died in Istanbul in 1920 [6].

He has many books about mechanics. He translated two books from French sources, mentioning his sources as Pisot and Banz and Delaunay. He published the first translation in Istanbul in 1886 and the second in 1888 [1, 6]. Which exact books he used as a source still needs to be determined. He also wrote three books on machines and mechanics. The first of these books was published in 1889 in Istanbul *Fenn-i Makine* (Machine Science). In this book, there are five chapters. The first chapter consists of movement subjects such as uniform linear motion, motion with constant acceleration, compound motion, and projectile motion. The second chapter examines movement subjects such as the composition of forces, relative motion, force and balance, and inertia force. The third chapter discussed stability, center of gravity, and balance issues addressed. The fourth chapter is dedicated to Balance in Simple machines. The last chapter explains the work of forces and the applications of the work in machines. Movement by liquids, wind, steam machines, locomotive machines, and Watt's low-pressure engines are examined in this part for the students [1, 14].

The second book, *Muhtasar Mihanik* (Brief Mechanics), published in 1889/1890 by Karabet Publishing House in Istanbul, has four main chapters. In the first chapter, the subject of movement is explained in detail. This chapter includes topics such as types of motion, speed, geometric interpretation of motion, inertia, lifting of objects, uniform

motion, and relative motion. In the second chapter, the subject of force is explained. In this section, general force principles are first discussed, and then Newton's and Kepler's laws are elucidated. Issues such as the influence area of forces, dynamometers, motion with constant force, motion when the force is not constant, projectile motion on an inclined plane, Galileo's laws, pendulum, and work are included in this chapter. In the third chapter, topics such as forces applied to a solid object, parallel force, the center of gravity of geometric objects, suspension bridges, fluid mechanics, the pressure of a fluid, the balance of fluids, the pressure applied by fluids on the surface of a container, and the balance of an object immersed in a fluid are explained. The fourth chapter is titled as machines. Work in machines, machine movement, ordinary speed, propellers, perpetual motion, lever, fulcrum, scales, weighbridge, bascule, and piston are discussed in this chapter. The balance of forces applied to pulleys and spinning wheels, fixed pulley, block and pulley, inclined plane, gear wheel, and screw are also explained [15] (Fig. 4).

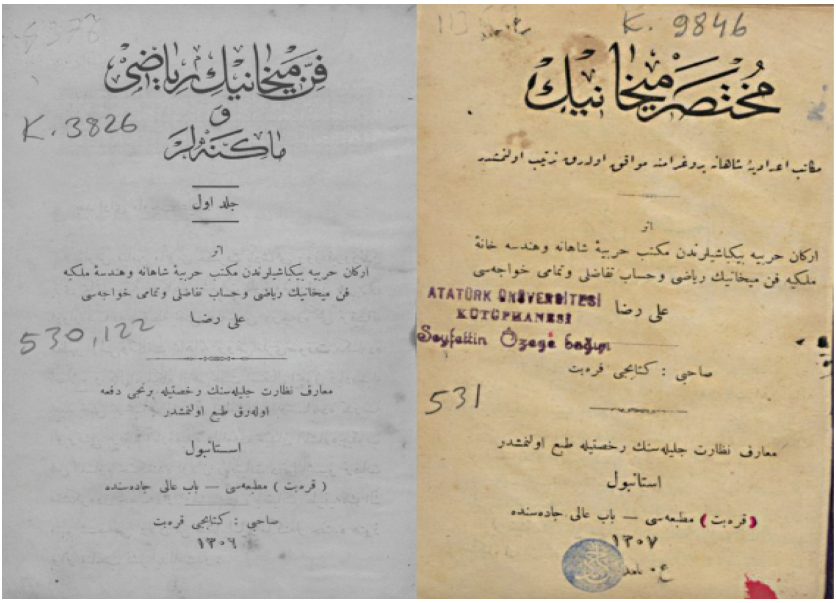

Fig. 4. The cover pages of Fenn-i Mihanik-i Riyazi and Muhtasar Mihanik [15, 16]

The third book he wrote, published in 2 volumes in 1889–1895 in Istanbul, was named *Fenn-i Mihanik-i Riyazi ve Makineler* (Mathematical Science of Mechanics). The first volume was about machines and was published in 1889 by Karabet Publishing House in Istanbul. In the introduction part of the book, the author mentions that he decided to write this book because the two previous books he wrote only included some simple topics of mechanical science and were noted for lower-level classes and would not be sufficient for Military Academy students (Mekteb-i Fûnûn-u Harbiye-yi Şahane and Hendese-i Mülkiye). He also explained the book's content: "I prepared this work under the name of Mathematical Science of Mechanics, based on the introduction to industrial mechanics, applied mechanics, celestial sciences, and machines". He prepared the book

in two parts. Part one examines the subject of movement in two chapters: theoretical and applied motion. After explaining the theories in the first part, he pursued and applied these theories to simple machines, gear wheels, wheels, etc. In part two, Ali Rıza again divided the issues into two chapters. The first chapter is about fundamental issues regarding forces and the effects of one object on another. The name of the second chapter is General Matters. This part has many mathematical subjects, such as the derivative equation of the motion of a free point, amount of movement or amount of movement illustrated, surface area measurement theory, movement of a point on a curve and a surface, and equilibrium. At the book's end is a chapter for application examples. Among these examples are astronomical ones, such as Kepler's law of motion of the planets around the sun and its consequences, and some examples are about pendulums and cycloid pendulums [16] (Fig. 5).

3.5 Mehmet İzzet

Fig. 5. Mehmet İzzet [17]

Mehmet İzzet born in 1867/68 in Istanbul. He was a prominent mathematician in the late 19th century and early 20th century, coinciding with the Ottoman Empire's last and republic's first periods. After the Surname Law was adopted in 1934 in the Turkish Republic, he took the surname Özarun, meaning good-natured people. He lived in Istanbul all his life. He took his education from Dârüşşafaka. After school, he worked as a translator for a while. He gave lectures in schools such as Dârüşşafaka, Mekteb-i Mülkiye-i Şâhâne, Dârülfünun, Mercan Îdâdîsi, Istanbul Highschool, Maliye Mektebi ve Dârülmuallimîn-i Âliye. He knew French and English fluently. Mehmed İzzet started his teaching career at Darüşşafaka in 1888; he received an honorary degree to teach the mechanical engineering course there. He taught many lessons there, especially mathematics, astronomy, and mechanics, until 1935. He died in 1940 [17].

He wrote two books on machines and mechanical sciences. The first one of these books is *Mebâdî-i Fenn-i Makine* (Fundamental Machine Science), which was about

machines. It was published in two volumes in the 1890s in Istanbul, Mirhan Publishing House. He donated all his income from the sale of this book to Dârüşşafaka [17]. This book was prepared for the senior students of Darüşşafaka for educational purposes. The first volume of the book was devoted to the balance in mechanics. Two main parts were dedicated to the balance of forces, the resultant of force and simple machines. The subject of motion and force was explained in the second volume, and complex devices such as steam engines, steamboat machines, and railway machines were also considered [17, 18] (Fig. 6).

Fig. 6. Cover pages of Mehmet İzzet's Books on Machines and Mechanics [18, 19].

The 2nd book Mehmet İzzet wrote on mechanical science is *Fenn-i Mihanik* (Mechanical Science). Its first edition was published in 1893 by Karabet Publishing House in Istanbul [17, 19]. 2nd edition of this book was an extended form of the first one, and it was published two years later. Mehmet İzzet mentions in his introduction that mechanics as a word comes from Greek origin. Its main objective was making and using specific tools, but in modern times, this science collects the rules of the entire machinery industry [5]. He describes this science as "Knowledge about the force of motion for the balance and movement of objects, as well as the rules for the purpose and use of machines…" [19]. He mentions Newton's law of motion in the introduction. He also claims that most mechanical theories derive from geometry and are an essential part of the applications transferred from astronomy. His combination of three disciplines is especially interesting since he was giving lectures on these disciplines, as we mentioned above. He also says that he examined the subject by dividing it into three main parts: equilibrium, motion, and force. At the end of the work, a French-Turkish dictionary contains the terms used in the book [17, 19].

3.6 Ahmet Kâzım

Ahmet Kâzım graduated from Mekteb-i Harbiye (Military Academy) as an infantryman in 1882. He started teaching mechanics and mathematics in 1892 in the same school. He also was a lecturer at Mahmudiye Rüşdiyesi. Besides his book that will be mentioned below, he has a book on spherical triangles. His birthday and date of death are unknown, but it is known that he was still alive in 1895 [6, 8] (Fig. 7).

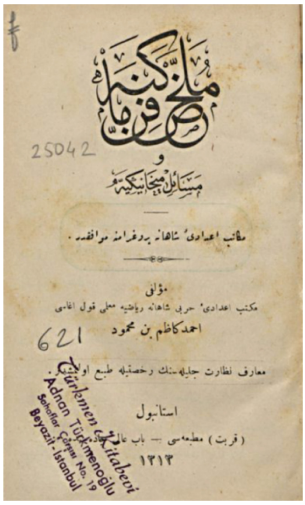

Fig. 7. Mülahhas-ı Fenn-i Mesail-i Mikanik's Cover Page [20]

The book *Mülahhas-ı Fenn-i Mesail-i Mikanik* (Summarized Machine Science and Mechanical Issues), also known as Mülahhas Fenni Makine (Summarized Machine Science). It was published in 1896 by Karabet Publishing House in Istanbul. Ahmet Kâzım says in his introduction that this work, prepared with the encouragement of the Sultan, was based on the author's fifteen years of education and experience. Ahmet Kâzım also stated that, in the compilation and interpretation of the book, attention was paid to using examples that students could understand [20].

The book contains eleven chapters. The first chapter is about basic properties. It includes the definitions of force, machines, movement, inertia, relative motion, absolute motion, road-time comparison, gravitation, etc. In the second chapter, strength and resistance issues were discussed. The direction of force, intensity, measurement of force, dynamometer, resultant forces, inertia, and equilibrium were explained within the scope of this chapter. The third chapter explains objects' centers of gravity and the balance of solid objects. In the fourth chapter, topics like the work of forces, the work of the machine, kilogram-meter, force-speed relationship, revenue of a machine, moving machines, brakes, and dynamometrics were discussed with applied problems. The fifth chapter defines the force that sets the machine in motion. As the motive force, human, animal, steam, water, and wind forces were briefly compared. Also, levers, various scales, weighbridges, and scales, as well as their applications, were explained for multiple cases.

In addition, applications of other machines such as pulley, block and tackle, spinning wheels, capstan, gear wheels, windlass, cranes, inclined planes, wedges, and screws were also included in the fifth chapter. The sixth chapter discusses air use for movement and air-powered machines such as sailboats, fans, and windmills. The seventh chapter was about the moving force of water. Rivers, embankments, a device that changes the direction of water, embankment gates, water wheels, and ships with paddle wheels and propellers were mentioned in this chapter.

The eighth chapter examined the use of steam force in movement. This includes steam engines, Denis Papin's machine, James Watt's machine, air pumps, well pumps, regulators, etc. The ninth chapter was devoted directly to effective machines such as locomotives and locomobiles. The tenth chapter described steam boilers, boilers surrounded by pipes, boiler explosion, and their causes, manometers and their types, barometers, safety valves, and emergency whistles. The last chapter included electrical force and effect, coal-gas, heated air, compressed air, and automobile topics [20].

3.7 Ahmet Cemil

There is not much information on Ahmet Cemil's life. He graduated from the Mekteb-i Bahriyeyi Şâhane (Naval Military Academy) as an officer in 1876, and his father's name was Mehmet [6]. He taught calculus and mechanics at the Naval Military Academy and pursued his teaching career till the 1900s. He has books on mathematics and mechanics. His mechanic book was published in 1897 by Mahmud Bey Publishing House. It is known that he was still alive in 1911 (Fig. 8).

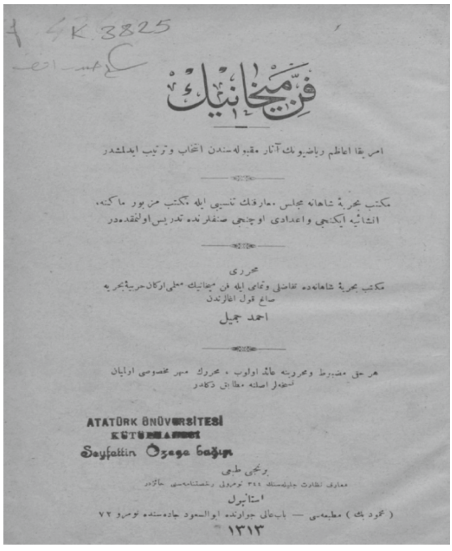

Fig. 8. Fenn-i Mihanik's Cover Page [21]

In the introduction, part of *Fenn-i Mihanik*, Ahmet Cemil talks about mechanics as a field that allows humanity to create wonders. He also mentions that he prepared

this work, taught at a high school, by translating and compiling the works of various scholars. The book has two main chapters and an additional chapter at the end of the book about fluid mechanics. The first chapter introduced the geometric properties of balance after giving the main definitions. This chapter has subsections regarding equal forces, two equivalent forces acting on various points of an object, the state and resultant of forces in the same plane, center of gravity, levers such as inclined plane, pulley, wheels, cylinders, pulley, scales, weighbridge, application method of proportional velocities to simple machines and last but not the least frictional force [21].

There are seven subheadings in the second chapter. These are as follows: equal forces, colliding objects, movement caused by a constant force, projectile motion including pendulum and movement of an object on circles and arcs, motion of an object on an inclined plane, movement of an object under the influence of a force on an axis and a plane perpendicular to this axis, the rules for the natural motion of an object.

Ahmet Cemil added a chapter on fluid mechanics at the end of the book. In this chapter, the page numbers of the book are not continued with the rest of the book; they are numbered separately from the beginning. This section covers the movement of liquid objects, the movement of liquid in long pipes, pumps, water presses, siphons, condensers, and a device called diver dome topics [21].

3.8 Vidinli Tevfik Pasha

Vidinli Tevfik Pasha was born in Vidin, which is today within the borders of Bulgaria, in 1832. After receiving his primary education there, he went to Istanbul at the age of 15–16. He graduated from Mekteb-i Harbiye (Military Academy) in 1860, where he was a student of Mehmed Tâhir Pasha. As he would later gratefully state, he acquired all his mathematical skills thanks to Tâhir Pasha. He continued his education at Erkân-i Harbiye and started teaching in 1860. He taught algebra, geometry, analysis, physics, and astronomy courses in several schools and began to rise in official positions after 1863. After 1863, he went to Paris for a while, and during his stay there, he followed the lectures of the College de France. He also served as a military attaché in Paris [22].

In 1872/73, he was on the commission assigned to inspect and receive the weapons ordered from the Providence Tool Company in the USA, and six months before the start of production, he went there as an inspector. He wrote a book on Linear Algebra during his stay there. Even though he returned to his hometown in between, he stayed there on and off for seven years. Vidinli became minister of finance of Ottomans twice in his lifetime. In 1883, he went to the USA once more. He died in Istanbul in 1901 [6, 22, 23] (Fig. 9).

The 318-paged *Fenn-i Makine* (Machine Science) consists of two parts. Vidinli Tevfik Pasha wrote the first part (the first 249 pages) with the exact same title as the book itself. Between pages 250–318, the second part was written by Mehmed Saadeddin (alive in 1892) and named Steam Machines. The first publication date of the book has yet to be discovered. However, there is a statement in the book that stresses it was prepared by the level of the programs of 1874–75. Therefore, the book's first printing must have been before this date [22].

The first part has two chapters. The first chapter of the book starts with the definition of machine science. The definition is based on the movement. Parts of machines, geometric

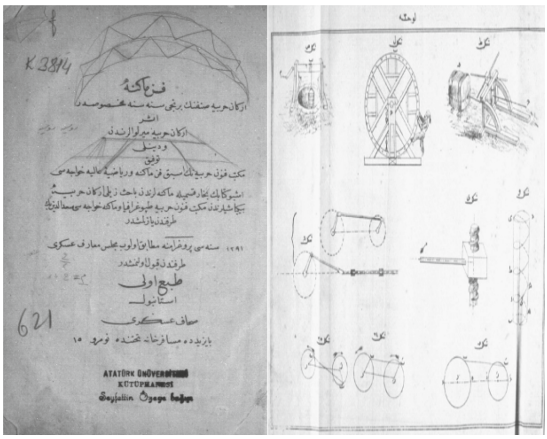

Fig. 9. Cover page and illustrations from Fenn-i Makine [24]

and mechanical methods of examining machines, absolute and relative motion, and machine parts such as belts and gear wheels are explained. The second chapter force, the relation of force and movement, resultant force, centripetal force, centrifugal force, work, measurement of the force, movement of machines and the work they do, friction, and resistance was discussed. Also, simple and compound machines such as pulley, inclined plane, block and tackle, windlass, capstan, winch, and lifting jack are mentioned. Torricelli's law, which involves devices moving with water, wind, and steam, was also explained in this part. After that, as discussed above, the book's second part was written by Saadeddin on Steam Machines [22].

4 Conclusions

The 18th and 19th centuries Industrial Revolution negatively affected the Ottoman economy, forcing them to imitate the industrialized countries and receive technical and administrative help. However, this attempt was insufficient, and as a result, the empire experienced an economic crisis. Simultaneously, Ottoman war technology needed to be updated by newly emerging technologies, and they started to lose their territories. As an urgent measure, Western-style Military Academies were founded in the middle of the 18th century. Various books were translated from Western sources from the 18th century onwards. Some experts were invited to give lectures at military academies. Some Ottoman students were sent abroad for education, and some were assigned as teachers when they returned to the country. Mechanical training at military academies was essential to transferring the new technologies. For that, understanding its entire content is crucial.

Looking at the bibliography of Ottoman Turkish books, machine literature in the Ottoman Empire started in the second half of the 19th century. Only 15 of the books written during this period are related to mechanical courses taught in engineering schools. Other than these, the rest of the books about the machine gun industry were generally written, especially at the beginning of the 20th century [1]. This data also supports the

military-oriented attitude of Ottomans. In this article, all mechanics textbooks written and compiled for the Ottoman Military Academies during the 19th century are examined, and information about the contents of these books is given with the authors' information. Most of these writers were soldiers, indicating that Ottoman officers greatly influenced technology transfer. The contents of these books were the same. In addition, the authors were both mathematics teachers and mechanics teachers. Generally, there was no distinction between these two disciplines, and mechanics was taught as a branch of mathematical physics or as a part of applied mathematics.

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