

UDC 536 (091) + 53 (092)

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## I. P. PULYUY APPARATUS FOR DETERMINING THE MECHANICAL EQUIVALENT OF HEAT: HISTORY AND MODERNITY

During the independence of Ukraine, domestic researchers devoted many publications to I. Pulyuy, a man with encyclopedic knowledge. These include, first of all, such researchers as O. Vlokh, R. Gaida, R. Plyatsko, O. Rokitsky, V. Shenderovsky and others. They made a significant contribution to the disclosure of many aspects of the life and work of I. Pulyuy. And sometimes you wonder if this topic is exhausted after the work of these and other researchers. But each new appeal to the figure of I. Pulyuy refutes this idea.

At one time, the author of these theses, probably for the first time in independent Ukraine in a report published in 1995 at an international scientific conference dedicated to the 150th anniversary of the birth of the outstanding Ukrainian physicist and electrical engineer Ivan Pulyuy, voiced two important points concerning the device for determining the mechanical equivalent of heat. The first is that the significance of the present invention and the advantages of the method used were recognized in the scientific community of the Russian Empire. This was evidenced by the demonstration speeches of the famous physicist-methodologist G.G. de Metz at the physics and mathematics section of the Society of Natural Researchers at Odessa University and its publication in the journal "Bulletin of Experimental Physics and Elementary Mathematics" [3]. And the second point, which showed that the accuracy of the results of determining the mechanical equivalent of heat in the experiments of I. Pulyuy, conducted with the help of a device designed by him, was not less than in the experiments of the American scientist G. Rowland, and even greater. To date, the accepted value of the mechanical equivalent of heat is 426.935, the result of G. Rowland is 426.2 (1879-1880), and the result of I. Pulyuy is 426.6–426.7 (1875).

The results obtained by G. Rowland are noted in the historical and scientific literature, for example [2], as the most accurate in the XIX century. But as we see, from the point of view of modernity this is not the case, and G. Rowland received them in 1879 – 1880, and I. Pulyuy had even more accurate results in 1875. Unfortunately, as rightly noted, R. Gaida and R. Plyatsko, "Soviet literature about him (I.P. Pulyuy – Author) did not mention. In this connection, only the Swede E. Edmund and the American G. Rowland are named in the GSE" [1, p. 49]. But this situation is typical not only for Soviet but also foreign literature. If we take, for example, the famous book by M. L'ozzi "History of Physics", its author highlights "the study by G. Rowland (1880), which by the method of Joule received the value of the equivalent of 427, which is considered today accurate" [4, p. 234].

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level, with the structure and properties of molecules. It seems that this could be put an end to. But there was a very interesting question, from the point of view of the historian of science and technology. To what extent did the technical solution of I.P. Pulyuy's invention influence (and did it influence at all) the further development of measuring equipment for the study of thermal processes? In particular, the creation of new designs of devices and apparatus for determining the mechanical equivalent of heat.

A search was made for instruments for measuring the mechanical equivalent of heat, created at the level of inventions in the twentieth century. It turned out that although in Soviet times

I.P. Pulyuy and his works were hardly mentioned, but his inventions were known and used as prototypes in some applications for inventions. Thus, July 20, 1936 in the USSR was declared as an invention "Device for determining the mechanical equivalent of heat", as prototypes of which were considered several previous inventions on this topic. Including the device of I.P. Pulyuy. Anyone who has dealt with the invention knows that it is necessary to provide a critical review of the prototype. Thus, with regard to the Pulyuy device, it was noted "Other devices (for example, the Pulyuy device) being more suitable for practical work, require accurate installation of individual parts, which complicates their use "[4]. The author of the application also expressed an opinion on the devices of Collender and Joule, believing that they "being more accurate than the device of Pulyuy, are bulky installations and complex in design" [4]. Therefore, the author of the application in his invention used the idea of I. Pulyuy to use the friction of two bodies to determine the mechanical equivalent of heat. Without going into a discussion with the author of the application now, I will point out something else. Half a century has passed since I.P. Pulyuy invented his device, but the author of the application refers as an analogue, namely to the Pulyuy device, the description of which was difficult to find at that time, because Pulyuy's works in Soviet times were not translated, and access to them was almost impossible. But the relevance of Pulyuy's inventive idea lasted a long time and attracted attention. According to our data, this idea of I.P. Pulyuy is being developed by modern scientists.

### **References**

1. Гайда Р., Пляцко Р. Іван Пулюй. Життя і творчість: Монографія / Видання друге, уточнене і доповнене. Львів: Дослідно-видавничий центр Наукового товариства ім. Шевченка. 2019. 220 с.
2. Гельфер Я. М. История и методология термодинамики и статистической физики. Т. 1. Учебн. пособие. М. Высшая школа, 1969. 476 с.
3. Де-Метц Г. Определение механического эквивалента тепла, как классный опыт. Вестник опытной физики и элементарной математики. 1892. № 146. С. 25–32.
4. Клейнман З. Я. Прибор для определения механического эквивалента теплоты. Заявлено 20 июля 1936 г. за № 198165. Опубликовано 31 августа 1937 года.
4. Льюци М. История физики. Москва: издательство «Мир», 1970. 460 с.
5. Савчук В. С. Прилади І. П. Пулюя і їх використання фізиками України. Міжнародна наук. конфер., присвячена 150-річчю від дня народження видатного українського фізика і електротехніка Івана Пулюя. Тези доповідей. Львів. 23-26 травня 1995 р. Львів, 1995. С. 39–40.