

Improvised Incendiary Device: Concept Definition

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The paper discusses the lack of definition for the “improvised incendiary device” concept in current foreign and domestic methodologies and reference literature used by specialists to conduct forensic fire and technical examinations. The purpose is to define of the “improvised incendiary device” concept for its subsequent use within the framework of forensic fire and technical examinations. The method of system structural analysis has been employed to fulfill this goal. The lack of methods and methodologies for the study of improvised incendiary device preclude the attempts of forensic experts in forensic fire and technical examination to determine a specific source of ignition that has resulted in the ignition of a certain material (substance) or has sufficient energy to ignite a corresponding combustible medium at the seat of a fire. In turn, the fact that a specific ignition source cannot be identified leads to a probable rather than a categorical expert conclusion as to the true cause of a fire, and sometimes to the impossibility of determining the cause of a fire at all. According to three explanatory dictionaries compiled at various times and by different compilers, as well as three manuals (methodologies) for conducting forensic fire and technical examinations and ДСТУ 2272:2006, the author provides an in-depth analysis for interpreting terms related to the formation of the “improvised incendiary device” concept. The definition for this concept has been provided. This will further promote the development of relevant methods and methodologies for researching overall structure of improvised incendiary devices, their design elements, and the principle

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of operation in the context of carrying out forensic fire and technical examinations.

Keywords: fire; fire research; forensic fire and technical examination; ignition source; improvised incendiary device; arson; fire investigation.

Research Problem Formulation

The relevance of performing research on improvised incendiary device is due to the increased number of facts of their use for the purpose of intentional destruction and damage to the property of citizens by committing illegal actions: arsons.

Statistically, arson has accounted for from $\approx 1.8\%$ to more than 3% of the total number of fires in our country over the last few years (see table).

Arson as a cause of fires in Ukraine (2019–2023) ¹

Year	Total number of fires	Number of arsons	Number of arsons in the total number of fires, %
2019	95 915	2964	3,09023615
2020	101 279	3746	3,69869371
2021	79 457	2656	3,34268850
2022	80 652	1419	1,75941080
2023	67 934	2112	3,10889981

The analysis of current methodologies and reference literature, which should be utilized by specialists during forensic fire and technical examinations, has shown that the *improvised incendiary device* concept is not defined in these sources. Avail-

ability of the *improvised incendiary device* concept in the legal regulations governing forensic expert activities and officially registered methodologies will give a boost to the development of research methods discussing the overall structure of improvised incendiary devices, elements of their design, and the principle of operation, which is an urgent need for timely and high-quality conduct of forensic fire and technical examinations and provision of well-grounded categorial expert conclusions.

Article Purpose

To propose a definition for the *improvised incendiary device* concept in order to develop research methods associated with its overall structure, design elements, and principle of operation within the framework of forensic fire and technical examinations.

To accomplish this goal, it is necessary to:

- analyze the definition for the constituent components of the *improvised incendiary device* concept ² in conformity with explanatory dictionaries of the Ukrainian language compiled at various times by different

1 Статистика пожеж / Інститут державного управління та наукових досліджень з цивільного захисту : офіц. сайт. URL: <https://idundcz.dsns.gov.ua/uk/statistika-pozhezh> (date accessed: 13.06.2024).

2 Since this study stems from the analysis of Ukrainian language terms, and in English the same concepts change meaning depending on the context (two or three terms may even have the same meaning), we are unable to fully convey the meaning intended by the author in the translation – Ed.

compilers ³, manuals (methodologies) for performing forensic fire and technical examinations ⁴ and ДСТУ 2272:2006⁵;

- differentiate between found interpretations;
- delineate differences between industrial and improvised manufacturing of incendiary device;
- define the *improvised incendiary device* concept in the framework of forensic fire and technical examinations.

Research Methods

To reach this goal, the method of system structural analysis has been employed.

Analysis of Essential Researches and Publications

The section of the *Fire Research* Reference Methodological Manual (hereinafter referred to as the *Manual-1999*), which includes the procedure for conducting research into the occurrence of combustion

due to arson, states only that technical, electrical or chemical means of arson ⁶ can be identified during the inspection of the fire scene. This section also covers devices capable of igniting their own design or other combustible substances (materials). What is more, devices capable of triggering an ignition device have been described.

At the same time, definitions of ignition devices and improvised incendiary device are not provided in the 1999 Manual ⁷.

The *Fire Investigations and Forensic Examinations* Reference and Methodological Manual (hereinafter referred to as the *Manual-2007*) outlines questions divided into two groups which must be addressed by forensic experts in the course of forensic fire and technical examination. They discuss diagnostics of the causes of fires with arson signs according to: 1) specific peculiarities of developing ignition sources means (*"Which means of arson belongs to the development factor of ignition source in this case?"*, *"Could the aid [device, instrument, etc.] seized from the scene be utilized as a means of arson?"*) and 2) means of ar-

- 3 Академічний тлумачний словник української мови. В 11 т. / за ред. І. К. Білодіда. Київ, 1970—1980. URL: <https://sum.in.ua> (date accessed: 25.06.2024) ; Короткий тлумачний словник української мови / уклад.: Д. Г. Гринчишин, Л. Л. Гумецька, В. Л. Карпова та ін. ; відп. ред. Л. Л. Гумецька. Київ, 1978. 296 с. URL: https://shron1.chtyvo.org.ua/Humetska_LL/Korotkyi_tlumachnyi_slovnyk_ukrainskoi_movy.pdf?PHPSESSID=1oe6h4aoc7e9sl8cd7jonpcr65 (date accessed: 25.06.2024) ; Тлумачний словник української мови / за ред. В. С. Калашника. 2-ге вид., випр. і допов. Харків, 2005. 992 с. URL: <https://archive.org/details/tlumachny2005/page/n987/mode/2up> (date accessed: 25.06.2024).
- 4 Степаненко С. Г., Білкун Д. Г., Яник Я. М., Тимошук Ю. Т. Дослідження пожеж : довідк.-метод. посіб. Київ, 1999. 224 с. ; Безвесільний В. Д., Дьяченко О. Ф. Розслідування та судові експертизи пожеж : довідк.-метод. посіб. Харків, 2007. 360 с. ; Шмерего О. Б., Лисенко О. В., Кучинський В. В., Полешко Л. І., Форіс Ю. Б., Цвик Л. В., Гаврилюк О. М., Фонрабе В. В., Стельмашов І. В., Сабадаш В. В., Супрун В. С., Шебалков І. Л., Гусейнов Р. Н., Беліков А. С. Методика з теоретичних та практичних основ проведення судових пожежно-технічних експертиз. КНДІСЕ ; ХНДІСЕ ; ДніпроНДІСЕ, 2019. 88 с.
- 5 ДСТУ 2272:2006 Пожежна безпека. Терміни та визначення основних понять [Чинний від 01.07.2007]. Київ, 2007. 32 с. URL: https://antifire.ua/dbn/19-DSTU_2272_2006.pdf (date accessed: 25.06.2024).
- 6 Степаненко С. Г., Білкун Д. Г., Яник Я. М., Тимошук Ю. Т. Зазнач. твір.
- 7 Там само.

son used (“Could not the objects found at the scene of a fire and submitted for forensic examination constitute an aid, a device, or an instrument for starting a fire?”, “Is not this device an ignition device? What is the principle of its operation?”)⁸.

Simultaneously, the dictionary of some common and special terms from Appendix 2 to the Manual–2007 contains only the *means* concept (“a tool, an aid, a device by which action is performed”) and a note that the offenders can use, for example, an ignition source, such as a heated coil of an electric stove, etc., to commit arson⁹.

However, the Manual–2007 as well as *Manual–1999* lack definitions of the terms *ignition devices* and *improvised incendiary device*.

The current Methodology on the theoretical and practical bases for conducting forensic fire and technical examinations¹⁰ (hereinafter referred to as the *Methodology*) establishes the procedure for conducting investigations into the circumstances surrounding the cause of a fire, according to which the investigation into the circumstances surrounding the cause of a fire includes successive stages by a forensic expert, which are outlined in the reference manuals, of which the above-mentioned Manual–1999 is the only one currently in force.

Therefore, the Methodology for researching causes of fires refers to the

procedure provided in the Manual–1999, where, as indicated above, there are no definitions of the terms *ignition devices* and *improvised incendiary devices*. What is more, clause 3.2 of this Methodology envisages an algorithm for researching the causes of fires that have nothing to do with electrical equipment. It is similar to the algorithm established in clause 3.1 but presupposes the use of other methods. However, this clause does not include the procedure for conducting research on ignition devices, devices, means, aids, etc., whereas the objects of research in forensic fire and technical examinations are precisely devices for igniting substances and materials¹¹.

Meanwhile, clause 1.1 of the Methodology lists the main terms of forensic fire and technical examination, although the definition of such terms as *ignition devices* and *improvised incendiary device* is not contained in it¹². They are also not included in ДСТУ 2272:2006¹³, which contains terms and definitions of the main fire safety concepts. Probably it is specifically because of this that there is no procedure for conducting studies of ignition devices, devices, means, and aids, etc., in the domestic regulatory-legal and expert-methodological framework. Incidentally, foreign sources of information on the results of research into fires and arson do not have any interpretation of these terms¹⁴.

8 Безвесільний В. Д., Дьяченко О. Ф. Зазнач. твір.

9 Там само.

10 Шмерего О. Б., Лисенко О. В., Кучинський В. В. та ін. Зазнач. твір.

11 Там само.

12 Шмерего О. Б., Лисенко О. В., Кучинський В. В. та ін. Зазнач. твір.

13 ДСТУ 2272:2006 Пожежна безпека. Терміни та визначення основних понять [Чинний від 01.07.2007]. Київ, 2007. 32 с. URL: https://antifire.ua/dbn/19-DSTU_2272_2006.pdf (date accessed: 25.06.2024).

14 Eroglu Y. Text Mining Approach for Trend Tracking in Scientific Research: A Case Study on Forest Fire. *Fire*. 2023. 6(1):33. DOI: [10.3390/fire6010033](https://doi.org/10.3390/fire6010033) (date accessed: 25.06.2024) ; Gales J., McNamee R. Fire research for timber structures. *Fire and Materials*. 2023. Vol. 47. Is. 4. Pp. 413–414. DOI: [10.1002/fam.3140](https://doi.org/10.1002/fam.3140) (date accessed: 25.06.2024) ; Perry J. Innovative Fire Fighting

The absence of a definition for *improvised incendiary devices* in methodologies and reference literature used during forensic fire and technical examinations hinders the development of methods for studying their overall structure, design elements, and principle of operation. This, in turn, impedes the identification of a specific ignition source (in the case of the use of an improvised incendiary device that resulted in the ignition of a certain material [substance] or had enough energy to ignite the corresponding combustible medium) at the seat of fire. If it is impossible to find out the specific source of ignition, then the expert conclusion about the causes of a fire will have a probable, not a categorical form. Furthermore, in such cases it is sometimes impossible to determine the cause of the fire.

Even after employing the exclusion method outlined in the Manual–1999¹⁵, given the impossibility of thoroughly and comprehensively investigating all possible versions of the cause of a fire and the impossibility of logically refuting the facts of two or more versions of such a cause, assuming that the remnants of the improvised incendiary device are found, the lack of an approved algorithm for their investigation leads only to assumptions about the source of ignition that led to the ignition of the material or substance at the seat of a fire, which hinders the determination of the cause of a fire.

As stated previously, this Paper's Purpose is to formulate a definition of *improvised incendiary devices* for the purpose of further developing methods for studying their overall structure, design elements, and principle of operation within the

Strategy / Advances in Forest Fire Research. Ed. D. X. Viegas, L. M. Ribeiro. Universidade de Coimbra, 2022. Pp. 1675–1681. DOI: [10.14195/978-989-26-2298-9_257](https://doi.org/10.14195/978-989-26-2298-9_257) (date accessed: 22.06.2024) ; Yang Y., Du H., Yao G. A Scientometric Research on Applications and Advances of Fire Safety Evacuation in Buildings. *Fire*. 2023. 6(3):83. DOI: [10.3390/fire6030083](https://doi.org/10.3390/fire6030083) (date accessed: 25.06.2024) ; Lim O. K. Bibliometric Analysis of Research Topics on Fire Safety. *Fire Science and Engineering*. 2023. Vol. 37. Is. 1. Pp. 129–137. DOI: [10.7731/KIFSE.6a32f1fd](https://doi.org/10.7731/KIFSE.6a32f1fd) (date accessed: 25.06.2024) ; Christ S., Schwarz N., Sliuzas R. Measuring fire risk perception of residents before and after a fire / Advances in Forest ... Pp. 682–688. DOI: [10.14195/978-989-26-2298-9_104](https://doi.org/10.14195/978-989-26-2298-9_104) (date accessed: 25.06.2024) ; Scribner C. F. A Is for Arson: A History of Vandalism in American Education. Ithaca, NY : Cornell University Press, 2023. 240 p. DOI: [10.1515/9781501770739](https://doi.org/10.1515/9781501770739) (date accessed: 25.06.2024) ; Arson, n.¹. Arson, n.² / Oxford English Dictionary. 3rd ed. Oxford University Press, 2024. URL: <https://www.oed.com/search/dictionary/?scope=Entries&q=arson> (date accessed: 25.06.2024) ; Woods R. Wildfire Arson Prevention Guide. 1st ed. CRC Press, 2023. 128 p. DOI: [10.4324/9781003353843](https://doi.org/10.4324/9781003353843) (date accessed: 25.06.2024) ; Kwon H., Kim S., Seo J. The Typology of Korean Arson and Predictive Factor for Serial Arson. *Journal of The Korean Data Analysis Society*. 2020. Vol. 22. Is. 1. Pp. 387–401. DOI: [10.37727/jkdas.2020.22.1.387](https://doi.org/10.37727/jkdas.2020.22.1.387) (date accessed: 25.06.2024) ; Noon R. K. Introduction to Forensic Engineering. 1st ed. CRC Press, 1992. 220 p. ; Horsley F. K. New Perspectives on Arson and Firesetting: The Human-Fire Relationship. Taylor & Francis Group, 2021. 132 p. DOI: [10.4324/9780367808648](https://doi.org/10.4324/9780367808648) (date accessed: 25.06.2024) ; Stanley J. R. Preventing rural arson / Rural Crime Prevention. Theory, Tactics and Techniques ; Ed. by A. Harkness. 1st ed. London, 2020. Pp. 299–312. DOI: [10.4324/9780429460135-33](https://doi.org/10.4324/9780429460135-33) (date accessed: 25.06.2024) ; Tao X. Research on Innovative Model of Fire Management in Universities — Take Fire Safety Education as an Example. *Frontiers in Educational Research*. 2021. Vol. 4. Is. 12. Pp. 40–43. DOI: [10.25236/FER.2021.041208](https://doi.org/10.25236/FER.2021.041208) (date accessed: 25.06.2024) ; Fenoff R., Fish J. T., Miller L. S., Wallace E. W. Arson and Explosives / R. Fenoff et al. Crime Scene Investigation. 4th ed. NY, 2022. Pp. 209–235. DOI: [10.4324/9780429261657-9](https://doi.org/10.4324/9780429261657-9) (date accessed: 25.06.2024).

15 Степаненко С. Г., Білкун Д. Г., Яник Я. М., Тимошук Ю. Т. Зазнач. твір.

framework of forensic fire and technical examinations.

Main Content Presentation

To define the *improvised incendiary device* concept, let us clarify the interpretation of each of the words in accordance with three explanatory dictionaries of the Ukrainian language from different years and edited by various authors.

Thus, firstly, let's define the *improvised* concept.

As stated in the *Concise Explanatory Dictionary of the Ukrainian Language* (1978; hereinafter referred to as the CED), **improvised** means “*made by hand, made by handcraft at home*”¹⁶. The adjective *handcraft* is not contained in this dictionary, but there is an interpretation of the noun *handcrafter*: “1. A small commodity producer who works for the market; craftsman. 2. fig. “A person who works in a disorganized way in isolation from others”¹⁷. Academic Explanatory Dictionary of the Ukrainian Language (1970–1980; hereinafter referred to as the AED UL) contains the definition of the *handcraft* word: “1. *handcraft industry, handicrafter's occupation*. <...> 2. fig. *Unorganized, primitive work*”¹⁸.

At the same time, industrial production involves the regulated assembly of objects (devices, instruments, mechanisms, etc.), which is due to certain requirements

of the relevant technical specifications for their manufacture (installation).

It is worth pointing out that handcrafters and handicraft, considering the above quotes, refer to the production of certain goods by craftsmen for the purpose of selling, exchanging, etc. In the aspect we are studying, there is no sale, and the manufactured incendiary device (instrument, mechanism, etc.) is used for a specific purpose: to cause a fire.

Therefore, in the context of conducting forensic fire and technical examinations, it is expedient to use the *improvised* word when defining the *improvised incendiary device* concept, and not *handcrafted*.

Secondly, let's define the *incendiary* (ignition) concept.

Based on the preceding, the Manual–2007 diagnostics on the causes of fires with signs of arson based on the means of ignition used stipulates the question “Is this an ignition device and how does it work?” as well as the word *ignition*¹⁹.

The interpretation of this concept can be found only in one of the Ukrainian language dictionaries analyzed by us: **ignition** – “which is used for **igniting** (in the first meaning)”²⁰. In turn, *igniting* is “1. An action intended to ignite”²¹, and **ignite** is defined as “1. To cause burning or to make a fire” <...> 2. fig. To entice someone with an idea, one's own example, etc., to spark enthusiasm, yearning for something. <...> 3. fig.

16 Саморобний / Короткий тлумачний С. 243. URL: https://shron1.chtyvo.org.ua/Humetska_LL/Korotkyi_tlumachnyi_slovyk_ukrainskoi_movy.pdf?PHPSESSID=10e6h4aoc7e9sl8cd7jonpcr65 (date accessed: 25.06.2024).

17 Кустар / Короткий тлумачний С. 125.

18 Кустарництво / Академічний тлумачний Т. 4: І–М; ред. тому: А. А. Бурячок, П. П. Доценко, П. Й. Горецький. 1973. С. 417. URL: <https://sum.in.ua/s/kustarnyctvo> (date accessed: 25.06.2024).

19 Безвесільний В. Д., Дьяченко О. Ф. Знач. твір.

20 Запалювальний / Академічний тлумачний Т. 3: 3; ред. тому: Г. М. Гнатюк, Т. К. Черторизька. 1972. С. 241. URL: <https://sum.in.ua/s/zapaljuvaljnyj> (date accessed: 25.06.2024).

21 Запалювання / Там само. URL: <https://sum.in.ua/s/zapaljuvannja> (date accessed: 25.06.2024).

To provoke any strong emotion. <...> 4. <...>
4. fig. To cause something to glitz and shine
<...> 6. med. To cause inflammation of an
organ or part of the body”²². At the same
time, **incendiary** is “1. Sth used for igniting.
2. fig. Sb who is passionate about something,
ardent, passionate, hot. 3. med. Associated
with inflammation: disease process <...>”²³,
“avid, impulsive, crusty”²⁴ and “1. The same
as ignition”²⁵, and **incendiary** — “Has some-
thing to do with ignition”²⁶.

Therefore, only one of the analyzed
dictionaries contains the *ignition* concept:
Academic Explanatory Dictionary of the
Ukrainian Language²⁷.

It should be emphasized that in ac-
cordance with ДСТУ 2272:2006, *ignition* is
the initiation of combustion²⁸. Combustion,
in turn, is an exothermic process
involving the redox transformation of
substances and/or materials and is char-
acterized by the presence of volatile prod-
ucts and/or light radiation. The note to
the definition of combustion also states
that signs of combustion include heat,
light, ultraviolet radiation, the presence
of smoke, deterioration of gaseous me-

dium composition, and an increase in its
temperature²⁹.

Thus, *ignition* is a process that takes
place after a certain action, and *incendiary*:
something serving as a source of igni-
tion and is associated with fire. That is
why the *incendiary* term in the context of
forensic fire and technical examinations
is proposed to be applied to devices (in-
struments, mechanisms, etc.) that initiate
combustion, which subsequently leads to
fire. Therefore, we suggest using the ap-
propriate adjective *incendiary* rather than
ignition when defining an *improvised incen-
diary device*.

Thirdly, it is required to define the *de-
vice* concept.

In the Manual-2007, in the provi-
ded diagnostics regarding the causes of
fires with signs of arson by applied arson
means, there is the question “Is not this *de-
vice* an *ignition device* and what is the *princi-
ple of its operation*?” that contains the word
*device*³⁰.

As defined by one dictionary, a **device**
is “an apparatus, a mechanism”³¹. Another
dictionary states that it is “a tool, equip-

22 Запалювати / Академічний тлумачний Т. 3 URL: <https://sum.in.ua/s/zapaljuvaty>
(date accessed: 25.06.2024).

23 Запальний / Короткий тлумачний С. 83. URL: https://shron1.chtyvo.org.ua/Humetska_LL/Korotkyi_tlumachnyi_slovnyk_ukrainskoi_movy.pdf?PHPSESSID=10e6h4aoc7e9sl8cd7jonpcr65 (date accessed: 25.06.2024).

24 Запальний / Тлумачний словник С. 920. URL: <https://archive.org/details/tlumachny2005/page/n987/mode/2up> (date accessed: 25.06.2024).

25 Запальний / Академічний тлумачний Т. 3 С. 242. URL: <https://sum.in.ua/s/zapaljnnyj>
(date accessed: 25.06.2024).

26 Запальний / Там само. URL: <https://sum.in.ua/s/zapaljnnyj> (date accessed: 25.06.2024).

27 Запалювальний / Там само. С. 241. URL: <https://sum.in.ua/s/zapaljuvaljnnyj> (date accessed: 25.06.2024).

28 ДСТУ 2272:2006. С. 3. URL: https://antifire.ua/dbn/19-DSTU_2272_2006.pdf (date accessed: 25.06.2024).

29 Там само. С. 2.

30 Безвесільний В. Д., Дьяченко О. Ф. Зазнач. твір.

31 Пристрій / Тлумачний словник С. 966. URL: <https://archive.org/details/tlumachny2005/page/n987/mode/2up> (date accessed: 25.06.2024).

ment, which helps to do some work and simplifies/facilitates production process”³².

Thus, the *device* definition presupposes the following concepts: *aid*, *equipment*, *instrument*, *mechanism*, which are designed for a specific purpose.

Since one concept contains several others, let us illustrate this in Diagram 1.

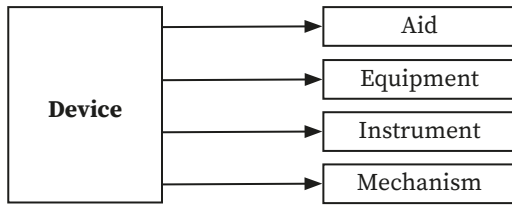


Diagram 1. Constituent components of the *device* concept

Next, we will analyze separately all the concepts contained in the *device* definition.

Among the three analyzed dictionaries, the definition of the *device* concept is available in the ATC UM and the 2005 Dictionary (hereinafter referred to as the Dictionary–2005) and is defined as follows: “1. Action in the sense of adapting, adjusting. <...> 2. A device, an instrument which helps to carry out or facilitate certain work. <...> A natural formation in plants and animals serving for self-preservation, protection,

etc.”³³ and “adaptation, apparatus”³⁴. The definition of the terms *to adapt* (*to adjust*) can be found in all three dictionaries: “1. To make something suitable for a specific purpose, under certain conditions. <...> 2. colloq. To attach, to place something somewhere”³⁵, “to prepare for a specific use”³⁶, “to adapt”³⁷.

Constituent components of the *adapt* (*adjust*) concept are illustrated in Diagram 2.

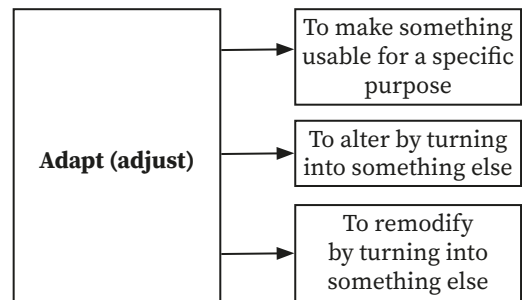


Diagram 2. Constituent components of the *adapt* (*adjust*) concept

Thus, to *adapt* (*adjust*) is a process occurring after a certain action. As a result, this concept is incorrectly used.

Let us define the meaning of the *equipment* term³⁸.

Of the three dictionaries, only the AED UL contains the *equipment* concept (ukr. обладнання). It is: “1. A set of mechanisms,

32 Пристрій / Академічний тлумачний Т. 8 : Природа — Ряхтливий ; ред. тому: В. О. Винник, В. В. Жайворонок, Л. О. Родніна, Т. К. Черторизька. 1977. С. 45. URL: <https://sum.in.ua/s/prystrij> (date accessed: 25.06.2024).

33 Пристосування / Там само. С. 43. URL: <https://sum.in.ua/s/prystosuvannja> (дата звернення: 25.06.2024).

34 Пристосування / Тлумачний словник С. 966. URL: <https://archive.org/details/tlumachny2005/page/n987/mode/2up> (date accessed: 25.06.2024).

35 Пристосовувати, пристосувати / Академічний тлумачний Т. 8 С. 42. URL: <https://sum.in.ua/s/prystosovuvaty> (date accessed: 25.06.2024).

36 Пристосовувати / Короткий тлумачний С. 216. URL: https://shron1.chtyvo.org.ua/Humetska_LL/Korotkyi_tlumachnyi_slovyk_ukrainskoi_movy.pdf?PHPSESSID=10e6h4aoc7e9sl8cd7jonpcr65 (date accessed: 25.06.2024).

37 Пристосовувати / Тлумачний словник С. 966. URL: <https://archive.org/details/tlumachny2005/page/n987/mode/2up> (дата звернення: 25.06.2024).

38 In English, the Ukrainian terms *обладнання* and *устаткування* are both translated as *equipment*, although their meanings differ in Ukrainian.— Ed.

instruments, devices, etc. required for something: kit. <...>. 2. Furniture that furnishes a room; furnishings. <...> Interior decoration of a room, premises” and “Action related to furnishing/equipping”³⁹. Constituent components of the *equipment* concept are illustrated in Diagram 3.

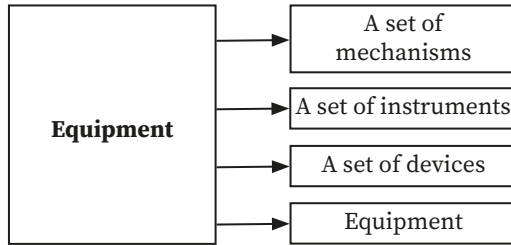


Diagram 3. Con.stituent components of the *equipment* concept

Now we will consider further interpret all the words that make up the *equipment* definition. Let's define the meaning of the *mechanism* term.

As stated in dictionaries, a ***mechanism*** is: “1. A device that transmits or converts motion. <...> The same as a machine. 2. fig. The internal structure, system of something. <...> 3. A set of states and processes that make up a certain physical, chemical, etc. phenomenon”⁴⁰, “1. A device that starts a machine or apparatus. 2. fig. The internal structure, system of something”⁴¹ and, finally, “1. A device that transmits or transforms the motion of bodies. <...> 2. Internal structure, system of

something. [synonym —] organization. <...> 3. The sequence of the course, causes, consequences, inner essence of a certain phenomenon”⁴². Constituent components of the *mechanism* concept are presented in Diagram 4.

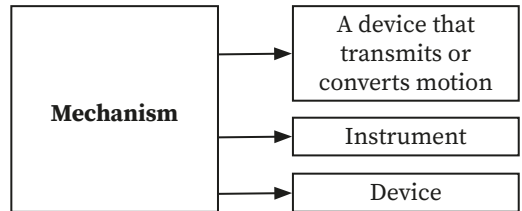


Diagram 4. Constituent components of the *mechanism* concept

Consequently, the *mechanism* concept is explained using the terms *device* and *instrument*. At the same time, a mechanism transmits or converts motion to start machines or apparatus. In our context, the action must cause a fire. It is therefore inappropriate to use the *mechanism* term in this case.

Now let's find out the meaning of the *instrument* term.

According to the dictionaries, an ***instrument*** is: “1. A special device designed for a specific purpose. 2. A tool that is used when performing a certain action. [Synonym] *instrumentation*”⁴³, “1. Equipment, a device for controlling machines, plants, for regulating technological processes, calculations, etc. 2. A special device for a machine tool, machine, etc., which performs independently”⁴⁴

39 Обладнання / Академічний тлумачний Т. 5 : Н—О ; ред. тому: Л. А. Юрчук, В. О. Винник. 1974. С. 517, 518. URL: <https://sum.in.ua/s/oblalnannja> (date accessed: 25.06.2024).

40 Механізм / Академічний тлумачний Т. 4 С. 695. URL: <https://sum.in.ua/s/MEKhA-NIZM> (date accessed: 25.06.2024).

41 Механізм / Короткий тлумачний С. 141. URL: https://shron1.chtyvo.org.ua/Humetska_LL/Korotkyi_tlumachnyi_slovnyk_ukrainskoi_movy.pdf?PHPSESSID=10e6h4aoc7e9sl8cd7jonpcr65 (date accessed: 25.06.2024).

42 Механізм / Тлумачний словник С. 516—517. URL: <https://archive.org/details/tlumachny2005/page/n987/mode/2up> (date accessed: 25.06.2024).

43 Прилад / Там само. С. 654—655. URL: <https://archive.org/details/tlumachny2005/page/n987/mode/2up> (date accessed: 25.06.2024).

44 Прилад / Короткий тлумачний С. 214. URL: https://shron1.chtyvo.org.ua/Humetska_LL/Korotkyi_tlumachnyi_slovnyk_ukrainskoi_movy.pdf?PHPSESSID=10e6h4aoc7e9sl8cd7jonpcr65 (date accessed: 25.06.2024).

and “1. A special device designated for a specific purpose (measuring, controlling, monitoring something, etc.). <...> Mechanical device, device. <...> 2. A tool, an object that is utilized when carrying out a particular action. <...>

An item that is part of some equipment, equipment. <...> 3. coll. A set of corresponding tools, items necessary to perform a certain work”⁴⁵. Constituent components of the *device* concept are illustrated in Diagram 5.

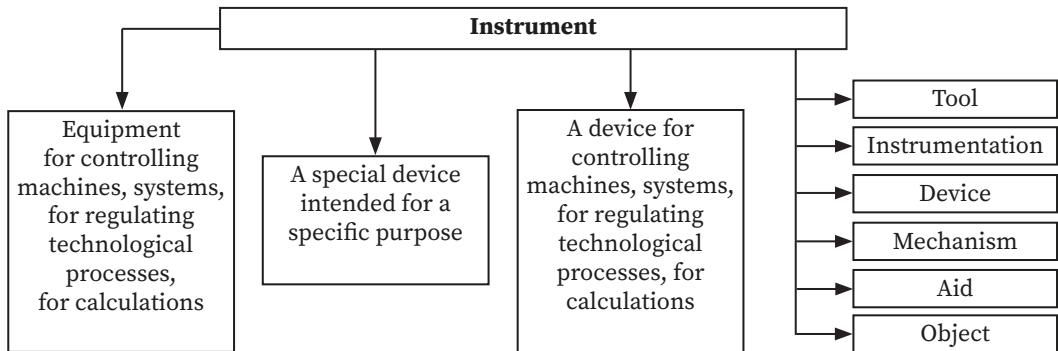


Diagram 5. Constituent components of the *device* concept

As to equipment and devices for calculations and control of machines and plants, there is no doubt: they are associated with regulation of certain technological processes. Therefore, these concepts cannot be used either, since the outcome should be a fire.

Next, let's clarify the *tool* concept.

As defined by explanatory dictionaries, a **tool**⁴⁶ (ukr. *інструмент*) is: “1. <...> A hand tool for performing any work. 2. <...> coll. A collection of tools for work. 3. <...> Audio device”⁴⁷, “Tools (e.g., a device for processing materials, measurements, conducting surgical operations, reproducing musical sounds, etc.). 2. <...> A set of such tools. <...>

3. fig. A means, a way to accomplish something”⁴⁸ and “1. <...> Tools for work. <...> 2. <...> coll. A set of such tools. <...> 3. <...> Same as *Musical instrument*”⁴⁹. Constituent components of the *tool* concept are presented in Diagram 6.

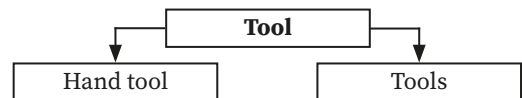


Diagram 6. Constituent components of the *tool* concept

Accordingly, a tool is a hand tool for performing a certain work. Now let's further clarify the *tools* concept (ukr. *знаряддя*).

45 Прилад / Академічний тлумачний Т. 7 : Поїхати — Приробляти ; ред. тому: О. П. Петровська, М. М. Пилинський, Л. О. Родніна, Н. І. Швидка. 1976. С. 653. URL: <https://sum.in.ua/s/PRYLAD> (date accessed: 25.06.2024).

46 In English, the Ukrainian terms *інструмент* and *знаряддя* are both translated as *equipment*, although their meanings differ in Ukrainian.— Ed.

47 Інструмент / Короткий тлумачний С. 99. URL: https://shron1.chtyvo.org.ua/Humetska_LL/Korotkyi_tlumachnyi_slovyk_ukrainskoi_movy.pdf?PHPSESSID=10e6h4aoc7e9sl8cd7jonpcr65 (date accessed: 25.06.2024).

48 Інструмент / Тлумачний словник С. 405. URL: <https://archive.org/details/tlumachny2005/page/n987/mode/2up> (date accessed: 25.06.2024).

49 Інструмент / Академічний тлумачний Т. 4 С. 34. URL: <https://sum.in.ua/s/instrument> (date accessed: 25.06.2024).

In 1dictionaries, *tools* are interpreted as follows: “1. *Aids, instruments, mechanisms, etc., which help to perform a certain action.* <...> **Production tools:** *aids, instruments, mechanisms, etc., used in production.* <...> 2. *fig. Sth that serves as a means of doing something*”⁵⁰, “1. *Technical aids helping to perform some work.* <...> 2. *fig. A means to reach a goal*”⁵¹ and “1. *A technical aid facilitating the execution of a certain action.* [Synonyms] *Household item, tackle, supplies, tool (a set of items for a specific job).* [Set expressions] *Production tools: aids, devices, mechanisms, etc., utilized in production.* 2. *fig. A means to fulfil a certain goal*”⁵². Constituent components of the *tools* concept are illustrated in Diagram 7.

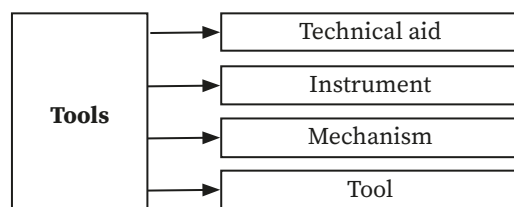


Diagram 7. Constituent components of the *tools* concept

Thus, *tools* are devices, instruments, mechanisms, etc., which help to perform a certain work, as well as a *tool*.

It is clear from the meaning of the *tools* term that it involves the performance of a certain action using a technical aid, in-

strument, mechanism, tool (for example: if the lock of the front door is broken with the help of a tool and money is stolen from the house, then this tool is an instrument of crime). In our case, it is necessary to use something that initiates combustion and will further lead to a fire.

According to explanatory dictionaries, **work** is: “1. *A certain range of occupation, activity.* [Synonyms] *business, job, task.* <...> 2. *Labor, occupation, job at an enterprise or an institution as a means of subsistence, a source of income.* <...> 3. *Output.* <...> 4. *Defined as a method, manner, style of performing, making something.* <...> 5. *phys. Quantitative characteristic of transforming any type of energy into other types of energy*”⁵³, “1. *A certain range of activities, responsibilities; job, labor* <...> 2. *Work output*”⁵⁴ and “1. *An Action in the sense of doing* <...>. <...> 2. *Someone’s performance of any activities/action, someone’s labor.* 3. <...> *Defined as doing, making, processing something.* <...> 4. *The range of activities, duties someone is involved in; business, task.* <...> 5. *Labor, occupation, job at an enterprise or an institution as a means of subsistence, a source of income.* <...> 6. *Sth that is subject to execution, implementation.* <...> 7. *Defined a method, manner, style of performing, making something.* <...> 8. *The product of someone’s labor; a product, a piece.* <...> 9. *phys. Quantitative characteristic of trans-*

50 Знряддя / Академічний тлумачний Т. 3 С. 642. URL: <https://sum.in.ua/s/ZNARJaD-DJa> (date accessed: 25.06.2024).

51 Знряддя / Короткий тлумачний С. 93. URL: https://shron1.chtyvo.org.ua/Humetska_LL/Korotkyi_tlumachnyi_slovnyk_ukrainskoi_movy.pdf?PHPSESSID=1oe6h4aoc7e9sl8cd7jonpcr65 (date accessed: 25.06.2024).

52 Знряддя / Тлумачний словник С. 386. URL: <https://archive.org/details/tlumachny2005/page/n987/mode/2up> (date accessed: 25.06.2024).

53 Робота / Там само. С. 696. URL: <https://archive.org/details/tlumachny2005/page/n987/mode/2up> (date accessed: 25.06.2024).

54 Робота / Короткий тлумачний С. 233. URL: https://shron1.chtyvo.org.ua/Humetska_LL/Korotkyi_tlumachnyi_slovnyk_ukrainskoi_movy.pdf?PHPSESSID=1oe6h4aoc7e9sl8cd7jonpcr65 (date accessed: 25.06.2024).

forming any type of energy into other types of energy”⁵⁵.

It is worth noting that the work of initiating combustion, which would cause a fire in the future, does not exist.

Therefore, the *tool* concept (ukr. *знаряддя*) as well as the *tool* concept (ukr. *інструмент*) cannot be applied in this case, so let's define the interpretation of the *instrument* word

Among the dictionaries we have analyzed, only the AED UL includes a definition of the *instrumentation* term: “1. Collectively for an *instrument/a device* <...>. <...> 2. An item that is part of any equipment, gear. <...> A necessary item when performing a certain action”⁵⁶, and the *fit* concept is defined by the AED UL and the CED (absent only in Dictionary–2005) as follows: “1. The same as *adapting* <...>. <...> 2. The same as *adjusting*. <...> 3. The same as *making suitable*”⁵⁷ and “to adjust in size, adapt, make appropriate for a specific purpose, attach”⁵⁸.

Despite the content, instrumentation is both a device and an instrument, both equipment and a mechanism, etc., but it can only become a component of something that can initiate combustion, which in turn may lead to a fire.

Therefore, the *instrumentation* concept cannot be applied in this case either.

Let's define the meaning of the *object* concept.

The compilers of explanatory dictionaries interpret an *object* as: “1. A specific tangible item perceived by the senses as a separate element of reality. 2. A particular item used for something. <...> 3. The range of knowledge shaping a separate discipline of teaching (subject). <...> 4. The focus of someone's attention or activity”⁵⁹, “A specific physical phenomenon perceived by senses. <...> 2. A logical concept that makes up the content of a thought or idea (subject). 3. The object of cognition, creativity, practice; the goal of someone's cognitive, creative, etc. activity <...> 4. The scope of knowledge constituting a separate academic discipline (subject)”⁶⁰ and “1. Sth tangible perceived by senses. <...> 2. A logical concept that constitutes the content of thought, cognition, etc. <...> 3. The purpose of someone's cognitive, creative, and similar activities <...> Object of senses, experiences, etc.; a person who arouses another person's interest, attraction, or feelings of love, etc. <...> 4. The range of knowledge that constitutes a separate teaching discipline. <...>”⁶¹. Constituent components of the *object* concept are presented in Diagram 8.

55 Робота / Академічний тлумачний Т. 8 С. 587. URL: <https://sum.in.ua/s/robota> (date accessed: 25.06.2024).

56 Приладдя / Академічний тлумачний Т. 7 С. 653. URL: <https://sum.in.ua/s/pryladdja> (date accessed: 25.06.2024).

57 Приладжувати, приладити / Академічний тлумачний Т. 7 С. 654. URL: <https://sum.in.ua/s/Pryladzhuvaty> (date accessed: 25.06.2024).

58 Приладжувати, приладити / Короткий тлумачний С. 214. URL: https://shron1.chtyvo.org.ua/Humetska_LL/Korotkyi_tlumachnyi_slovnyk_ukrainskoi_movy.pdf?PHPSESSID=1oe6h4aoc7e9sl8cd7jonpcr65 (date accessed: 25.06.2024).

59 Предмет / Короткий тлумачний С. 210. URL: https://shron1.chtyvo.org.ua/Humetska_LL/Korotkyi_tlumachnyi_slovnyk_ukrainskoi_movy.pdf?PHPSESSID=1oe6h4aoc7e9sl8cd7jonpcr65 (date accessed: 25.06.2024).

60 Предмет / Тлумачний словник С. 649. URL: <https://archive.org/details/tlumachny2005/page/n987/mode/2up> (date accessed: 25.06.2024).

61 Предмет / Академічний тлумачний Т. 7 С. 527. URL: <https://sum.in.ua/s/predmet> (date accessed: 25.06.2024).

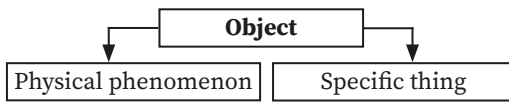


Diagram 8. Constituent components of the *object* concept

Accordingly, an object is any physical phenomenon perceived by senses, or a specific thing.

As defined by explanatory dictionaries, a **thing** (in one of its senses) is: “1. Predominately an object of household use, labor, etc. <...> Any object in general. <...> 2. A phenomenon of reality, a manifestation or result of some action, activity; a case, fact, an event. <...> Someone’s attitude towards something. <...> 3. A piece of literature, a piece of art, a scientific book. <...> 4. Work, business, etc. that someone is doing or should be doing; business. <...> 5. philos. The objective world (objects, phenomena) that exists outside of human consciousness and affects it ⁶², “Any physical object. <...> Property, belongings” ⁶³ and “1. Any physical object. <...> 2. Property, belongings. <...> 3. Phenomenon of reality, manifestation or result of some action; case, event; need for something”. <...> 4. A piece of literature, a piece of art, or a scientific book. 5. Work, business someone does. <...> 6. only plural, philos. The objective world (objects, phenomena) that exists outside of human consciousness” ⁶⁴.

The content of the *thing* concept implies a tangible physical object: specifically, the object of labor activity. Thus, under certain conditions, a thing and an object

can only become a component of something that can initiate combustion, leading to a fire. We can therefore conclude that the concepts of *object* and *thing* are not applicable in this case.

Let’s return to the interpretation of the *equipment* (ukr. *устаткування*) concept.

The AED UL defines the *equipment* concept as follows: “1. An action aimed at equipping; equipment. <...> 2. A set of mechanisms, instruments, devices, etc. necessary for something; equipment. <...> 3. Furniture, things that furnish a room” ⁶⁵. Constituent components of the *equipment* concept are illustrated in Diagram 9.

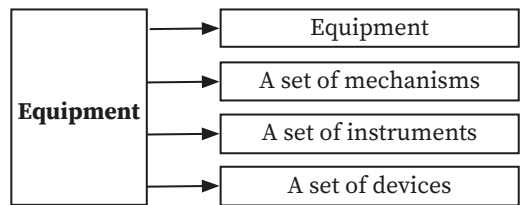


Diagram 9. Constituent components of the *equipment* concept 9.

The *equipment* concept is defined as a set of mechanisms, instruments and devices, and for our purposes, anything that can initiate combustion and cause a fire must constitute a whole, so we cannot use these concepts. Dictionaries explain the *equipment* concept by using the *equipment* concept (ukr. *обладнання*) and vice versa, so these definitions cannot be used either.

Let’s summarize the analysis of the interpretations for the above concepts: the *device*

⁶² Річ 1 / Академічний тлумачний Т. 8 С. 576. URL: <https://sum.in.ua/s/rich> (date accessed: 25.06.2024).

⁶³ Річ 2 / Короткий тлумачний С. 232. URL: https://shron1.chtyvo.org.ua/Humetska_LL/Korotkyi_tlumachnyi_slovnynk_ukrainskoi_movy.pdf?PHPSESSID=1oe6h4aoc7e9sl8cd7jonp cr65 (date accessed: 25.06.2024).

⁶⁴ Річ 1 / Тлумачний словник С. 694. URL: <https://archive.org/details/tlumachny2005/page/n987/mode/2up> (date accessed: 25.06.2024).

⁶⁵ Устаткування (встаткування) / Академічний тлумачний Т. 10 : Т—Ф ; ред. тому: А. А. Бурячок, Г. М. Гнатюк. 1979. С. 499. URL: <https://sum.in.ua/s/USTATKUVANNJa> (date accessed: 25.06.2024).

definition contains the *instrument* concept, which in turn explains the *special device* concept. Constituent components of the *device* concept are illustrated in Diagram 10.

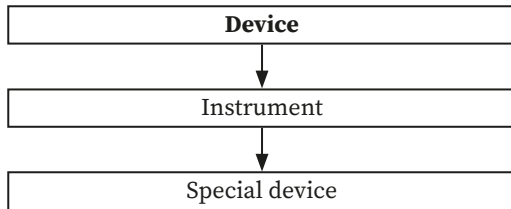


Diagram 10. Constituent components of the *device* concept

In light of the foregoing, an instrument is a special device designed for a specific purpose, that is, the *instrument* concept constitutes the *device* concept and identifies it as a *special device*.

Thus, in this case, the *device* term cannot be used. Instead, the *instrument* term is appropriate, as evidenced by the fact that a lighter, for example, is recognized as an instrument by the compilers of explanatory dictionaries: “**Lighter**, i.e., a small pocket instrument used for starting a fire”⁶⁶. Please note that the cited dictionary entry refers to a lighter as an instrument, not a device. As in the case under consideration, the end result of using a lighter is the production of fire, and according to ДСТУ 2272:2006, “**fire** is a dynamic, three-dimensional composition of hot substances in the process of

combustion”⁶⁷. Fire from a lighter ignites substances and materials for their specific use, and in the context we are studying, fire leads to the outbreak of a fire.

In compliance with ДСТУ, a **fire** is “an unregulated process of destroying or damaging property by fire, during which factors dangerous to living beings and the environment arise”⁶⁸.

In turn, **fire hazards** are “manifestations of a fire that cause or may lead to burns, poisoning by volatile products of combustion or pyrolysis, injury or death of people and/or to material, social, environmental damage”⁶⁹. The note lists the following fire hazards: “Elevated temperature, smoke, deterioration of the gas environment”⁷⁰.

ДСТУ 2272:2006 defines **volatile combustion products** as “a collection of gaseous substances, as well as aerosols, which are formed in the hearth and spread beyond it. Note. Volatile combustion products are formed as a result of complete or incomplete combustion, pyrolysis, evaporation, sublimation”⁷¹, and **hearth** as “a collection of combustible substances and (or) products of combustion and (or) structural elements that limit the space where combustion takes place”⁷², and **combustible substance** as a substance (material) capable of “participating in burning as a reducing agent”⁷³, and **pyrolysis** as “an irreversible process of thermal decomposition of a substance or material”⁷⁴.

66 Запальничка / Академічний тлумачний ... Т. 3 ... С. 243. URL: <https://sum.in.ua/s/ZAPAL-jNYChKA> (date accessed: 25.06.2024) ; Тлумачний словник ... С. 351. URL: <https://archive.org/details/tlumachny2005/page/n987/mode/2up> (date accessed: 25.06.2024).

67 ДСТУ 2272:2006. С. 2. URL: https://antifire.ua/dbn/19-DSTU_2272_2006.pdf (date accessed: 25.06.2024).

68 Там само. С. 6.

69 Там само. С. 7.

70 Там само.

71 ДСТУ 2272:2006. С. 4. URL: https://antifire.ua/dbn/19-DSTU_2272_2006.pdf (date accessed: 25.06.2024).

72 Там само. С. 5.

73 Там само.

74 Там само. С. 2.

Given the above, we propose to supplement the methods, methodologies, ДСТУ and reference literature on the issues of conducting forensic fire and technical examinations with the **improvised incendiary device** term. *“Improvised incendiary device is a device in which at least one of the design elements is made in an improvised way or its non-industrial unregulated assembly is used, i.e., the structure of the device finally prepared for ignition of combustible substance or combustible medium is not determined by the relevant technical requirements for its manufacture, installation, use, etc.”.*

Conclusions

In view of the analysis findings, it has been demonstrated that there is no concept of an *improvised incendiary device* in the current methodologies and reference literature for conducting forensic fire and technical examinations. Problems resulting from the absence of this term and, accordingly, the lack of procedures and methodologies for conducting research on improvised incendiary devices or their remnants, discovered and seized at the fire site or near human activity facilities, have been outlined. Approaches to solving the problems associated with investigating the causes of a fire caused by an improvised incendiary device have been proposed. It has been shown that today the development of methods to study the overall structure, design elements, and operating principle of improvised incendiary devices is relevant to the successful performance of forensic fire and technical examinations. To the existing methodologies and reference literature used by forensic experts when conducting forensic fire and technical examinations, the paper proposes to add a new term: **“An improvised incendiary device is a device in which**

at least one of the design elements is improvised or its non-industrial, unregulated assembly is used, i.e. the design of the device, when finally prepared to ignite a combustible substance or medium, is not determined by relevant technical specifications for its manufacture, installation, use, etc.”.

Саморобний запальний прилад: визначення поняття

Михайло Кузьменко

Зауважено відсутність визначення поняття «саморобний запальний прилад» у чинних іноземних і вітчизняних методиках та довідковій літературі, якими фахівці послуговуються для проведення судових пожежно-технічних експертиз. Мета — сформулювати визначення поняття «саморобний запальний прилад» для його подальшого вживання в межах проведення судових пожежно-технічних експертиз. Для досягнення поставленої мети застосовано метод системно-структурного аналізу. Відсутність методик і методів дослідження саморобних запальних приладів унеможливає спроби експертів у галузі судових пожежно-технічних досліджень визначити конкретне джерело запалювання, яке спричинило займання певного матеріалу (речовини) або має достатньо енергії для запалювання відповідного горючого середовища в осередку пожежі. Своєю чергою той факт, що конкретне джерело запалювання визначити неможливо, призводить до складання ймовірного, а не категоричного висновку експерта щодо з'ясування справжньої причини виникнення пожежі, а інколи й до того, що встановити причину пожежі взагалі неможливо. За трьома тлумачними словниками, складеними в різний час і різними укладачами, трьома посібниками (методиками) проведення судових пожежно-техніч-

них експертиз і ДСТУ 2272:2006 ретельно проаналізовано тлумачення термінів, дотичних до формування поняття «саморобний запальний прилад». Сформульовано визначення цього поняття, що надалі сприятиме розробленню відповідних методик і методів дослідження загальної будови саморобних запальних приладів, елементів їхньої конструкції та принципу дії в межах проведення судових пожежно-технічних експертиз.

Ключові слова: пожежа; дослідження пожеж; пожежно-технічна експертиза; джерело запалювання; саморобний запальний прилад; підпал; розслідування пожеж.

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Declaration of Competing Interest

Author declare no conflict of interest.

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