Innovative design solution for a blockade immobilizing long-barrel Mauser-type and related firearms

I T Dziubek, A Kołodziej and K Talaśka

The President Stanisław Wojciechowski State University of Applied Sciences in Kalisz, Nowy Świat 4, 62-800 Kalisz, Poland

E-mail: ktsmk@interia.pl

Abstract. The paper presents the design characteristics of a blockade immobilizing long-barrel Mauser-type and related firearms. The main functional feature of the blockade is securing the weapon from unauthorized use. This stems from the legal regulations that require each owner to secure the weapon from access by unauthorized persons. The design solution presented in this work, together with the assembly and disassembly kit, as well as the method of activation and deactivation are protected by patents: PL 230049, PL 229706 and PL 229807. The design features of the individual elements of the blockade, through which the entire assembly obtains its expected functionality, have been defined. The influence of changes in the selected geometric parameters of the main elements on the efficiency of the blockade is presented. The presented results of design work confirm the effectiveness and reliability of the presented weapon blockade.

1. The essence of the research hypothesis

Weapons is one of those areas of the human civilization which largely determines its position and level of development.

In a more or less conscious way, it is also used for a broad understanding and diagnosis of the existing or expected level of safety. In some situations, whether or not you possess a weapon, is associated with the status of freedom or guarantees of peaceful existence. Following the American attitude to weapons, one can also encounter the point of view best summed up as: "What is the difference between a free man and a slave? A free man has a weapon" [1].

Many experts on the problem argue that the issue of weapons should be considered in terms of the "national defence" and "national defence education". In the latter case, it should be considered in accordance with properly selected evaluation standards, including those contained in the system "knowledge - skills - social competence". This also applies to the content located in the modules regarding, respectively, the subjectivity of weapons possession, security and risks associated with it ("knowledge"); the necessary segments of education and service ("skills"); possible directions of change, prevention and various grassroots initiatives ("social competence") [2].

Some of the researchers relate the questions of gun ownership with historical transformations and the functions weapons have played. In this state of affairs, since ancient times, they have been hunting tools used to capture food and other necessary living resources. It has also been used for fighting - both offensive and defensive. Over time, it has been elevated to perform an additional function - indicating the wealth status of the owner. In addition to the material world, it has also been elevated in the spiritual world. Thus, it has become a symbol of potency, rule over others, also a sign of power and justice,
a ritual, magical, representative or collectible item as well as a trophy. At the same time, it has always been combined with the level of technological progress, resilience and representativeness. This last point often becomes the subject of artistic endeavours and makes weapons a valuable work of art [3].

With regard to the reality presented above, it is not surprising that weapons have become not only an object of admiration, but above all a desirable item to possess. Home-grown artisans have stopped producing it. Over time, it has become a strategic product, protected from the production side – the monopoly of state institutions. Improvised weapons were declared illegal because they could be turned against the current government or to commit crimes [4].

The latter aspects described above have become the subject of regulatory and legal interest and the subject of group research in forensic prevention. This has a simple underlying goal – directed on prevention or complication of committing crimes with use of the weapons [5].

Today, the need to secure weapons is associated with legal regulations present in every developed democratic country – the legal regulations that require each holder to secure the weapon from takeover by third or unauthorized persons. Appropriately adapted legislation define the duties and responsibilities of persons with access to hunting, sports and government weapons differently.

Their selection is related to the specifics of the problem. For example, what is taken into account is both the safety of the gun owner and those around him when there is a risk that an unauthorized person may use the weapon against the owner to commit criminal acts or other prohibited acts. In addition, it is about preserving and protecting your property (in this case valuable property in the form of weapons) from damage or loss.

The facts presented above have given the authors a foundation for a decision to consider the issue of needs related to the protection of weapons from unauthorized use. The research results indicate, among other things, that it would be advisable to supplement existing equipment with the accessory in the form of a simple set for temporary immobilization of weapons. The set operates on the principle of an adequately assembled lock-type mechanism.

When working on the above, the assumption was also taken into account that the proposed process of securing and neutralizing weapons should not generate large costs and take a very long time.

2. The choice of the weapon to be immobilized
Modern individual small firearms come in many different variants and types. The authors believe that among the existing units the Mauser system deserves special attention.

The Mauser weapon factory in Oberndorf, Germany, on the Neckar river in Baden-Württemberg is world famous. In 1888, the company developed the Gewehr 88 rifle, which was not only introduced to the army equipment of the then Germany, but also other countries. It was a weapon with an unusual design and unique fighting qualities. Mauser's four-stage sliding rotary lock proved to be fast and reliable. After the experiences of the Spanish-American war of 1898, the Americans copied its solutions and introduced under the name Springfield M1903. However, the American government was forced to pay Mauser compensation for violation of patent rights. German military experiences later led to the introduction of a modified version (designated as Gewehr 98) to the army, and in 1904 also the introduction of its shortened version [6].

In 1935, this shortened version, designated as the model 98 k, (figure 1 and figure 2) began to be produced in countless versions – military, sporting and hunting. In the country of the largest producer – Germany – only between 1935–1945 almost 11.5 million pieces were manufactured. It is not surprising, therefore, that despite the passage of time, not only is it used successfully (figure 3), but it is also a subject of collectors' interest.
3. The state of the known technical solutions

There is a number of commercial security solutions offered to individual firearm users. The first to mention is the lock with a steel cable of suitable length. This protection type is called "CABLELOCK"
method. The loop of the steel cable is long enough to put it through the lock chamber and in the trigger area. The ends of the cable are connected with a key lock (figure 4 and figure 5).

Figure 4. Sample CABLELOCK offered by the MOSSBERG company [10–12].

Figure 5. CABLELOCK and the protection mechanism for the Mauser weapon system [10-12].

Another solution is the weapon trigger lock consisting of two parts that connect to each other by a patented cylindrical lock (figure 6). After separating this protection, it is mounted on both sides of the trigger cover and then secured with the lock (figure 7). This protection method is called "TRIGGERLOCK" by users.

Figure 6. General view of TRIGGERLOCK weapon protection type [10–12].
Both the first and the second solution have a number of disadvantages. Both are external protection types, which makes it easy to access them. In the first case, cutting through the steel cable, which is not characterized by a large diameter, is very easy. In the second case, the intervention in the design of both the whole protection mechanism as well as the lock itself, is also very simple. It is enough to unscrew two mounting bolts to remove the magazine box together with the trigger cover and the TRIGGERLOCK installed on this device – and, thus, it is easy to disable all the protection for the given weapon unit [10–12].

The weapon protection in the form of a special trigger cover that makes it impossible to access it is also known from the patent description FR2950961A1. This solution is characterized by similar drawbacks as the ones above. Namely, free access to the structure of this device makes it easy to damage or deactivate it.

Another solution known from the patent description DE4125008A1 is the weapon protection in the form of a multi-part cartridge placed in the bullet chamber. The main parts in the form of a hollow case and the element placed in this case are connected with a special key through mutual locking. Although this solution is characterized by an internal structure that impedes access and deactivation, it has a number of disadvantages. The first one is that the protection is difficult to install as it is necessary to combine the protection components inside the weapon, which can cause problems with the introduction of the protection core into the hollow case. Another drawback is that the protection can only be used for one specific weapon calibre.

4. The essence and design of the presented solution
The essence of the presented solution is a blockade immobilizing long Mauser system and related firearms to protect against unauthorized use, which is installed in the lock compartment consisting of an adequately shared nut and sleeve in the form of a rotary sliding element. All this is connected with each other by a screw with a head prepared in such a way that it only fits an individually selected key so that the screw driven into the nut causes radial movement of the sleeve and blockade inside the barrel.

In detail (figure 8), the blockade that immobilizes long Mauser action firearms and related weapons preventing access by unauthorized persons is built into the weapon case 1 in the area of the front bolt of the lock and the barrel A. The locking element 3 is placed in the front bolt of the lock 9. The locking element 3 has a blind threaded hole 8, into which the screw 4 is entered through the revolving/sliding element 2. The screw 4 has a cylindrical head with a polygonal socket 6 and a spike 7. In addition, the locking element 3 has a socket 5 on its outer face.
The essence of the invention [10–12].

5. Patent protection
The adopted solution for protecting Mauser and related weapon systems from access by unauthorized persons has three patent protections:

- Dziubek I T, Kołodziej A, Talaśka K *Blockade that immobilizes a long cartridge arms of Mauser type and related ones – protecting them against the access of unauthorized persons*, application number: PL 417956, application date: 14.07.2016, patent number: 230049, patent granted on: 28.09.2018

- Dziubek I T, Kołodziej A, Talaśka K *Set for assembly and disassembly of the blockade that immobilizes the long cartridge arms of Mauser type and related ones – protecting them against the access of unauthorized persons*, application number: PL 417962, application date: 14.07.2016, patent number: 229706, patent granted on: 31.08.2018

- Dziubek I T, Kołodziej A, Talaśka K *Method for activation and deactivation of the blockade that immobilizes the long cartridge arms of Mauser type and related ones – protecting them against the access of unauthorized persons*, application number: PL 417962, application date: 14.07.2016, patent number: 229706, patent granted on: 31.08.2018.

6. Prototype – implementation
The culmination of the research process presented above and the comprehensive completion of the work on solving the problems related to the protection of the Mauser system and related weapons from unauthorized use was the production of a prototype copy, verification of its functioning and thus implementation (figures 9–13).
Figure 9. Full protection set (general view) [10-12].

Figure 10. General view of the blockade immobilizing Mauser and related weapon systems [10–12].

Figure 11. A representation of the adopted method of immobilization [10–12].

Figure 12. A representation of mounting from the side of bullet chamber [10–12].
Figure 13. A representation of mounting from the barrel side [10-12].

7. Conclusion
Due to the use of the presented solution the following technical and operational effects were obtained according to the author's team:

- additional weapon protection – on top of general required conditions for storing and protecting weapons from access by third parties;
- basic protection when transporting the weapon, leaving it in the car or in other conditions, for example, at the shooting range;
- application for safe non-shooting training, at the same time preventing loading and triggering the gun;
- application by museum institutions and others, for example, in relation to the various needs and requirements of exhibitions;
- protection from immediate use of the weapon directed at the owner after the weapon loss.

Last but not least:
- easy blockade installation;
- small blockade size;
- visual demonstration of weapon immobilization – it is impossible to threaten that it is ready for shooting;
- high complexity of removal without the use of specialized tools;
- possibility of application in a wide range in weapon calibre from 7.92 mm upwards;
- dual-use capability – as a weapon cleaning kit (ramrod, brushes, etc.).

Most importantly, all the above research activities have been funded by the President Stanisław Wojciechowski State University of Applied Sciences in Kalisz.

8. References
[1] Korwin-Mikke J 2019 Slave cannot own weapons (Warsaw: Fakt_redakcja_zrodlo_tematy Czech Republic, Janusz Korwin-Mikke, weapons possession, terrorism)
[2] Dziubek I T 2013 National defence education in Poland (Poznań: Wydawnictwo ZYSK I S-KA)
[3] Jagodziński Z K 2003 Combinatorial and antique weapons XVI-XIX century (Warsaw: RYTM Publishing House) pp 13
[4] Kasprzak J 2013 Illegal manufacture of firearms and ammunition: Legal and forensic problems (Szczyno: WSPol) pp 5
[5] Hołyst B 2007 Criminology (Warsaw: PWN Legal Publishing) pp 1261
[6] Hartnik A E 2002 Rifles encyclopedia (Warsaw: BELLONA Publishing House) pp 188–189
[7] Mauser 98K rifle system 2019 Available from: https://steemit.com/polish/@photograph/gewehr-98 [25.08.2019]
[8] The design of Mauser model 98k weapon system 2019 Available from: https://www.lasegundaguerra.com/ [25.08.2019].
[9] Hunting weapon 2018 Available from: https://coltkrotoszyn.pl/repetiery/ [25.08.2019]
[10] Dziubek I T, Kołodziej A, Talańska K Blockade that immobilizes a long cartridge arms of Mauser type and related ones – protecting them against the access of unauthorized persons,
application number: PL 417956, application date: 14.07.2016, patent number: 230049, patent granted on: 28.09.2018

[11] Dziubek I T, Kołodziej A, Talaśka K Set for assembly and disassembly of the blockade that immobilizes the long cartridge arms of Mauser type and related ones – protecting them against the access of unauthorized persons, application number: PL 417962, application date: 14.07.2016, patent number: 229706, patent granted on: 31.08.2018

[12] Dziubek I T, Kołodziej A, Talaśka K Method for activation and deactivation of the blockade that immobilizes the long cartridge arms of Mauser type and related ones – protecting them against the access of unauthorized persons, application number: PL 417962, application date: 14.07.2016, patent number: 229706, patent granted on: 31.08.2018