

An effective method to improve the security of locking systems against brute-force tampering methods

Rather simple but effective methods to make significantly difficult brute-force unlocking of mortise locks provide additional fixation of the outer end of the bolt to the door frame after its full insertion into the hole of the strike plate.

Thus, for example, the ABLOY BODAGUARD SL905+961 mortise lock of high reliability (comparable with security grade 7 according to EN 12209, security grade 4 according to GOST 5089-2003) is equipped with a hardened *hook* bolt (Fig. 1). Such shape of the bolt ensures its reliable fixation to the door frame when the lock is fully closed what makes it very difficult to open the lock by pushing out the door leaf.

Fig. 2 depicts an example of a lock system that comprises a lock and an *additional* device that is disposed in the door frame and locks the bolt when it is fully extended (see U.S. Patent 3,919,869 published on 1975-11-18). As a result, the bolt becomes a rigid *tie* between the door leaf and the door frame that not only prevents effectively the door leaf from being pushed out, but also keeps the bolt in the strike plate in case of the break of the lock mechanism^{*)}.

An important advantage of this method is that it increases the security of the lock + locker locking system not only against *brute-force* methods but also against manipulative methods of criminal unlocking, for the locking device has its own mechanism of secrecy that complements the mechanism of lock secrecy.

Fig. 3 shows a locking system with an innovative *Device for blocking the lock bolt* (Ukrainian Patent No. 114136) the locking member whereof is configured in the form of a vertically movable rod. The rod design makes it possible to decrease the size of the device and, as a result, the size of the cavity necessary for its installation in a door frame, as well as to transfer the force, which acts on the locking member of the rod during the attempt of a crude-force unlocking of the lock, through the strong metal body of the blocker to the lock strike plate and/or a metal section of the door frame in an optimal way.

The electronic control unit (hereinafter called the "CU") to control the **Lock-security** device is configured in the form of a removable board fixed directly at the body of the lock, which allows to minimize the length of the leads connected to the CU from the position sensors of the rod and the bolt that are installed in the body, as well as from the electromagnet. The CU board is protected from criminal influence by an armor plate attached to the body of the blocker.

The blockers depicted schematically in Figs. 2 and 3 can operate with virtually any mortise locks (including those installed in users' doors for a long time as well) that do not have any members protruding beyond the faceplate (for example, latches) located directly above the upper bolt of the lock.

Absence of strict restrictions of the overall dimensions of the CU board of the **Lock-security** device (as it is the case, for example, with the electronic stuff of the ABLOY Protec2 CLIQ cylinder) makes it possible to dispose additional electronic components and inputs for connecting *external* devices to them (the connection being made by a usual wire loop, laid under the inner casing of the door frame or even in its hollow section), which allowed to take the next step in the improvement of locking systems, namely to increase appreciably their functionality without a noticeable increase in their cost. As a result, a *multifunctional burglar alarm device for doors equipped with a bolt lock* was created (Ukrainian patent No. 112511), which provides not only reliable locking of the bolt of the lock, but also implements a number of additional *security* functions very useful for users (see more detail see *Technologii Bezpeki* magazine Nos. 5-6, 2018, as well as go to <http://www.hag.com.ua/view.php?p=62>).

^{*)} Interstate Standard GOST 5089-2011, **Locks, latches and cylinder mechanisms – Specifications** specifies (under 5.7.4.7) the basic requirement to door locks as follows: The design of mortise and rim locks should be such that at an attempt to unlock them in a destructive way the lock has to withstand and remain operable or be destroyed but so as to exclude entry to the protected space.

Such a unique locking device as *Lock-security* ensures the operation of the Lock + *Lock-security* locking system in 13 modes, ten of which are its *basic modes* and three of which are its *emergency modes* (see Table 1 in **PS** *Lock-security multifunctional device for locking the bolt of locks*). The basic modes are assigned automatically by the CU microcontroller depending on the external command devices connected to it. The device also switches automatically to the emergency operation mode when there are problems with the command devices and/or the power supply and automatically returns to the operation mode that preceded the emergency one, after these problems have been eliminated.

With all this, *Lock-security* remains a low-budget device quite affordable to most average citizens. For example, the cost of a locking system kit containing the *Lock-security* locking device, the Guardian 12.01 lock, an uninterruptible power supply, and various sets of external *command devices* and *actuators* is between about 120 USD and about 180 USD. And even a set of a locking system of a high security against both crude-force methods and manipulative methods of criminal tampering with such a powerful lock as ISEO D 61800280n01 or Cisa B 7984, will cost no more than 300 USD.

Summary:

Ever increasing requirements for front door locking systems predetermine the appearance of new lines of their development among which the creation of multifunctional electronically controlled electromechanical locking devices, which make it possible to ensure extremely high security against criminal unlocking, are disposed beyond the lock body, cooperate with the free end of the bolt during its closing and, therefore, are capable of operating with mortise locks of various designs from different manufacturers, is one of the most perspective ones.



Fig.1

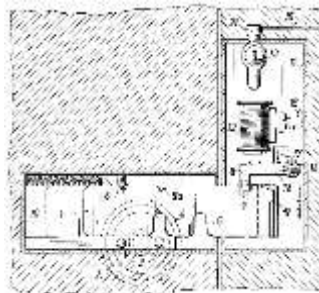


Fig.2



Fig.3