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A PENROSE THAT CANNOT BE OPENED WITHOUT THREE HANDS LOCK AND ITS GEOMETRIC STRUCTURE

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A B S T R A C T	**K E Y W O R D S**
The scientific article highlights the material about the types of locks and their device, about the positive impact of conducting geometric studies on the forms of the details of the lock to the development of technical creative abilities of a person.	Lock, padlock, mortise lock, bolt, lever, cheek, spring, latch, locks, puzzle locks made of wood.

INTRODUCTION

Before starting the geometrical analysis of the structure of the lock, which cannot be closed or opened without three hands, let's stop on what you need to know about the word "lock". We turn to the dictionaries and read: a lock is a device used to lock a door, gate, chest, shelf, etc. "Qulf" is an Arabic word, written as "qufl" in Arabic. A lock is one of the first great inventions made by the human mind, such as a rope, a rainbow, a lock, a handle, a wheel, and a wheel [3]. In the history books, the lock is in the centers of ancient cultures such as Assyria, Babylon and Egypt. avv. It is noted that it was created in the 2nd millennium.

The lock is usually installed on the door or cover. The function of the door and cover is to keep the inside and the outside tightly separated from each other. But both the door and the cover should be opened when needed and closed when not. Such a possibility is the responsibility of the lock. It can be imagined that the structure of locks changed and developed over time, depending on the level of sophistication of the technical idea based on the construction, the level of reliability and ease of use..

б)

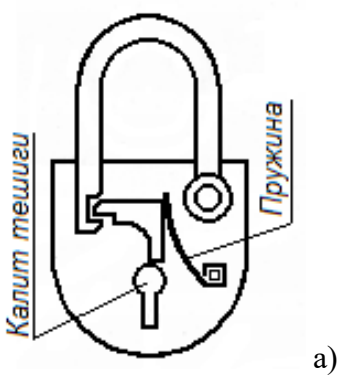
а)

в)

г)

Figure 1. The simplest locks.

In the past, a simple bolt was considered sufficient to ensure that the doors were tightly closed, but later it was replaced by a latch (Fig. 1-a) [4], a hook (Fig. 1-b), spingalet - Spanish: sliding latch (Fig. 1-v), chain (Constructions such as Fig. 1-g) are occupied. In a chain lock, after the zulfin tin is inserted into a square hole in the chain, a simple peg is pushed into it. With that, it became a lock.



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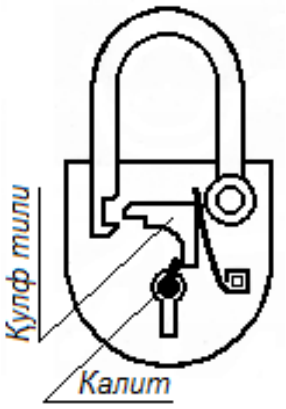

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Figure 2. Padlock.

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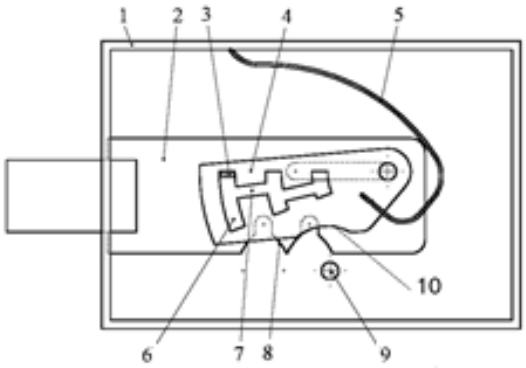
Figure 3. Monuments of Jiroft culture.

In the last version, what should be done so that only one person can open the lock with a key, a padlock that can be opened with a key was thought of instead of a key. Figure 2 shows the locked (a) and unlocked (b) cases of the padlock. As soon as one looks at the padlock, one thinks of the south-eastern regions of Iran. avv. A type of monuments belonging to the Joyraft (Jiroft or Halilrud) culture, which ruled in the III-I millennia, begins to appear (Fig. 3) [8]. It is not surprising that these masterpieces of art, made of stone and amounting to hundreds of pieces, are monuments built in honor of the guardians of secrets - padlocks invented in those times.

Whether it was the desire to install a lock that was completely invisible, or the desire to make the key completely invisible, they created the mortise lock



1 – body of the lock
2 – a sliding frame consisting of a tail and a head part
3 – a stake attached to the body
4 – in question
5 – spring
6 – window depending on the pile
7 – movement stream along the pile
8 – key slot
9 – key pin

Figure 4. Engraved lock.

In 1778, a man named Robert Berron in England was the owner of a patent for the invention of a mortise lock. In the mortise lock (Fig. 4) the lock consists of mortise. The edges of the key tongue are turned only when they coincide with the edges of a certain thread. For such locks, different combinations of locks can be obtained, for example, 4 standard locks in a certain sequence, and 24 different locks can be obtained.

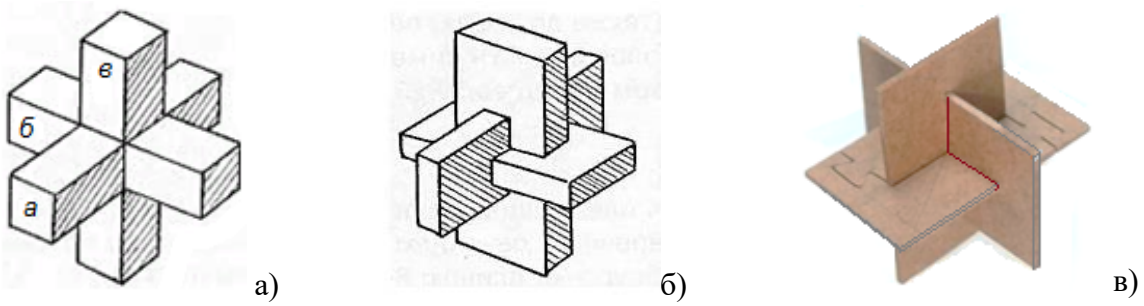


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Figure 5. Puzzle locks made of slats and boards.

In the 18th century, the word "locksmith" entered the Russian language from German. This word has the German form "Schlosser" and means "locksmith". The owners of such professions were mainly engaged in making and repairing locks and keys.

The lock turned out to be such an interesting and fascinating invention of the human society that not only locksmiths, but also other professionals began to be interested in its development. They invented amazing models of locks. Below we will get acquainted with the geometric structure of some of the locks designed by carpenters.

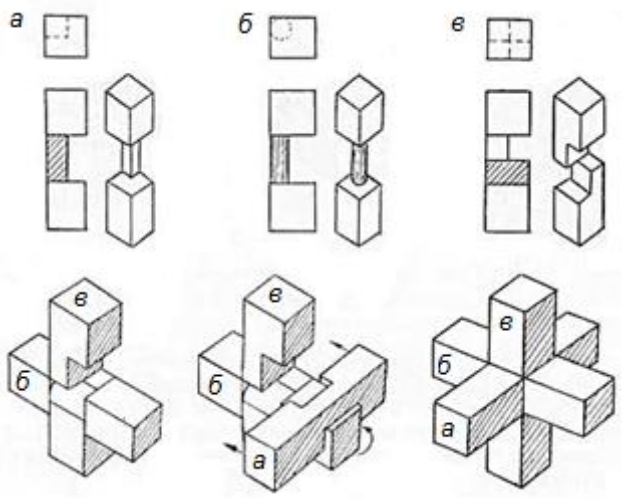

Figure 6. Details and assembly of the "hedgehog" lock in Fig. 5a.

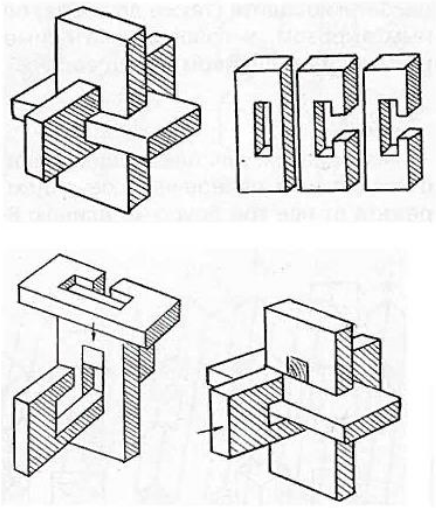

Figure 7. Details and assembly of the lock in Fig. 5-b.

Figure 5 shows pictures of locks made of wooden slats and planks. Each of the locks in Figures 5-a and 5-b appears to be made by gluing 6 parts of the same shape into a single cube on 6 sides. But they were formed by placing not 6 identical parts, but 3 different parts inside each other (Figures 6 and 7). We bring to the attention of our dear readers to determine how the lock in Fig. 5-v is formed.

Figure 8-a shows a variant of the circular plank "lock" of gold rectangular panels in Figure 5-v. Figure 8b shows the shape of these spherical circles. Figure 9 shows a wooden lock called "Admiral Makarov lock" in books. Information about what forms these lock details can have is available in the relevant literature [7]. In this regard, we recommend our readers to refer to those sources.

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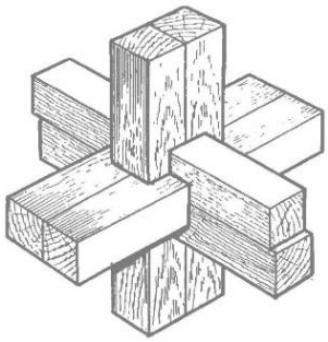

Figure 8. Three mutually perpendicular planes on a sphere.

9-figure.

In a historical story called "Moni" [1], we read the following lines: "Mehrshah [5] teases Moni [6] that he will show you one miracle to prove your prophethood." Next to Moni, he handed Mehrshah a bowl-like container (picture 8) with something heavy in it, not much bigger than a khurjun, and told him to open it. Mehrshoh looks carefully, does not melt, rotates the container (kashkul) for a long time in different situations, moves the parts that make up the cover in different directions. But his efforts go in vain. Mehshah admits that he cannot open the container, returns it to Moni and says, "Open it yourself."

Moni took a stick lying on the table, stuck its end into the place where the three lines of the cover meet, and then he licked the stick on his name. A small triangular notch appears in the center of the cover. Moni slightly enlarges this hole with the help of a sin-chalogi (Fig. 8). The hinges of the lid will be free from the holes in the container. The lid is detached from the container.

Glass windows of different colors, cut into circles of the same size, were cast inside the vessel. Moni took two, then three of those windows, placed them on top of each other, and ordered Mehr Shah to look at them each time. In this way, he shows how changes occur in the human psyche under the influence of colors. At the end, when you ask him to look at three colored mirrors by placing them on top of each other, they appear white. Mehrshah was amazed by this miracle and knelt before Moni and recognized him as a prophet.

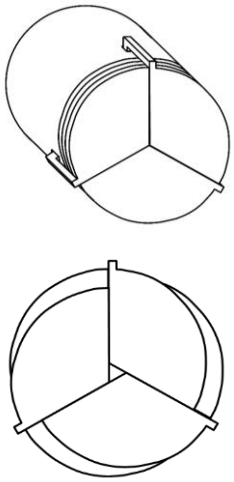

Figure 8. Mony's kashkuli.

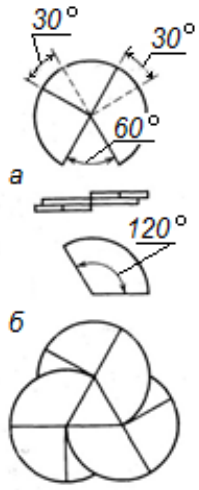

Figure 9. Penrose lock.

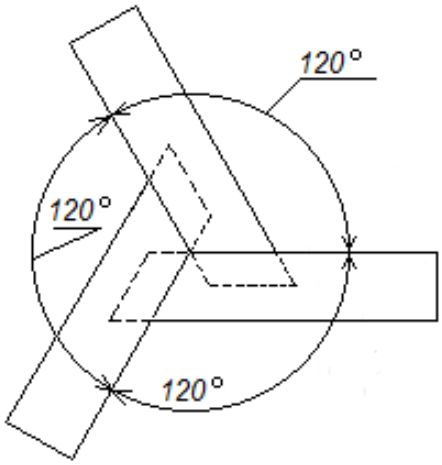

Figure 10. Three winged hair.

This story is related to our topic - the structure of the lid of the container with round windows, which is difficult to open. The author of the story recommends readers interested in the structure of that lock to refer to the works of the famous English biologist Lionel Penrose (the father of the famous physicist and mathematician of the 20th century, Roger Penrose).

We found information about the structure of the Penrose lock from one of the famous scientific journals [2]. Through that scientific article, we got information about the drawing of the details of the lock that acts as a lid and how these details fit together (Figure 9). A geometrical analysis of the Penrose lock structure, which cannot be closed or opened without three hands, confirmed that it is similar in many places to the simpler "Three-wing lock" structure (Fig. 10).

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