Registration of patents for inventions and utility models by students of higher educational institutions

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Abstract. This article reviews detailed order of registration of patents for inventions and utility models. General issues of patenting are considered and specific recommendations on the preparation of patent application documents are given. The registration of patent is illustrated by the example of a laboratory setup for the demonstration of electrostatic fields, which was modernized by students of BMSTU in the Student Laboratory of Physics (SELP).

1. Introduction
In the Student Experimental Laboratory of Physics (SELP) located in BMSTU, there is a patent sector, which helps students in identifying patentable technical solutions and in the subsequent registration of patents on them. In most cases, it is not ideas of development that are patented, but functioning devices that are already implemented.

Practice shows that many students already have an inventive mindset from an academic bench; they independently implement interesting technical projects, but are not aware of the possibility and necessity of their patenting.

There is a misconception that patenting is a very complex and time-consuming process that only eminent scientists or large companies can go through. And although a number of regulatory documents reflect the requirements for application documents, all of them can be reduced to a list of simple rules, which will be discussed in this article.

2. General Patenting Issues
A patent is a legal document that certifies authorship and the right to own an invention, utility model or industrial design [1].

The patent is limited in time: it is issued for a certain period; and it is limited in space: patent is valid only in the territory of the country where it was issued. The patent protects its owner from competitors and confirms that only the owner has the right to dispose of the invention (utility model, industrial design) for commercial and other purposes.

Patent owners must control their own rights. Any conflicts in this area are resolved either by agreement or through the courts.

The patent owner has the right to manufacture, use and sale of the object in the territory of the patent. He can also transfer his rights or their part to any other person by entering into a relevant
agreement with him. But in the countries where the object is registered, it can be used without the permission of its owner.

Inventions, utility models and industrial designs are subject to patenting. The legal protection is handled by Rospatent. It also provides protection of rights to computer programs, databases and topologies of integrated circuits, for which certificates of state registration are issued.

Table 1 shows comparative characteristics of the invention, utility model and industrial design.

| Object of legal protection | Invention | Utility model | Industrial design |
|---------------------------|-----------|---------------|------------------|
| Solutions related to devices, methods, substances, strains of microorganisms, cultures of plants’ and animals’ cells | Technical devices solutions | Product appearance solutions |
| Requirements | Novelty, industrial applicability and inventive step | Novelty and industrial applicability | Novelty and originality |
| Patent term | 20 years, renewable for 5 years | 10 years, can not be extended from 2014 | 5 years, repeatedly renewable for 5 years |
| The term of obtaining a patent | From 18 months | 6-9 months | 12-15 months |

The table shows that only technical solutions related to the concept of a device can be attributed to a utility model. The concept of invention is broader, includes products that go beyond the concept of "device", as well as solutions related to methods. Requirements for inventions according to the novelty condition are stricter and there is an additional requirement - “inventive step”, which implies that the solution is not obvious to a person skilled in the technical field. It is possible to obtain a patent for a utility model several times faster than for an invention. But the term of the patent will be only 10 years without the possibility of renewal.

It is possible to patent as an industrial design only those solutions that are related to the product design, which significantly distinguishes it from the invention and utility model.

Thus, obtaining a patent for a utility model is much easier than for an invention. As an example of a utility model developed and patented in Korea, you can bring a lighter, which was combined to an opener for beer bottle caps (see Figure 1). The development has a clearly low level of inventiveness, but it has novelty and industrial applicability, as well as it can bring earnings to the owner.
Patent information has a special value for professionals. Information about new solutions appears in patents 3-4 years earlier than in scientific and technical journals and 5-10 years ahead of publications in monographs and textbooks. Therefore, it is necessary to systematically study the patent literature to have information about the latest advances in technology.

The owner of a patent for an industrial property object may be the author himself or the author’s employer. The right to receive a patent for an object created by service belongs to the employer. The employee must inform the employer about the creation of the industrial property object, after this, the employer decides within four months: to file a patent application, to transfer the right to file the application to another person, to keep the invention as a trade secret, or to waive all rights to the invention. In the latter case, the right to obtain a patent passes to the author.

In addition, the author receives a number of benefits from patent registration:

1) If the employer uses the right to a service invention, then he pays the author a reward:
   • Remuneration for the creation of an industrial property object, which is 20% of the average salary of an author-employee for a utility model and industrial design, and 30% for an invention.
   • Remuneration for the use of the object by the employer in the amount of the average salary of the author-employee, which is paid for every 12 calendar months in which the object was used.
   • Remuneration for the transfer of the object under the contract to another person, which is 10-15% of the amount of the contractual remuneration.

   If the object was created by the joint creative work of several workers, then the reward is distributed equally between them. These rules act "automatically" (by law), but only if there is no contract between the author and the employer providing for other conditions.

2) Patents give an advantage in competitions for scholarships, grants for projects related to patented developments.

3) The scientific community equates patents with publications in journals from the SAC list. And the patent also serves as confirmation of the scientific novelty of a thesis.

4) Applicant's patents can be a competitive advantage when hiring for high-paying jobs.

    When registering a patent, you can go two ways: either arrange everything yourself, or seek help from a patent attorney. Ultimately, this is determined by the tasks for which the patent is directed. If it is required to register a patent as soon as possible, or the patented object has a large commercial potential and all possible nuances should be taken into account when drafting protective documents, or the object must be patented in other countries, then it may be advisable to use the services of a patent attorney, to pay for his work about 30-40 thousand rubles. In other circumstances, there is no need to pay this much and a patent can be registered independently.

3. Patent Filing Procedure
The procedure for obtaining a patent for a utility model (invention) is as follows [2]:

Figure 1. Patent for a utility model “A lighter with an opener for beer bottle caps”
1) Registering a utility model (invention) involves the preparation of a patent application. It includes:

- description of the invention;
- drawings, figures, tables, test reports and other materials, if they are necessary to understand the essence of the utility model (invention);
- formula of a utility model (invention);
- review;
- application for the patent grant (with signatures and seal of the applicant);

The application is accompanied by a document confirming the payment of the filing fee. Further, the application must be sent to the Federal Institute of Industrial Property (FIIP, Moscow).

2) In FIIP, an examination of applications is carried out, which includes three stages:

- preliminary (formal) examination of the application;
- publication of application materials;
- fundamental examination of the application.

The purpose of a formal examination is to check the compliance of the application documents with the formal requirements for it. At this stage, the availability of the necessary documents in the composition of the application, the correctness of their preparation is checked. This examination is carried out in two months from the date of receipt of the application in the FIIP.

After passing the formal examination, the patent office publishes in the corresponding bulletin (“Inventions” or “Utility models”) the information about the application.

Fundamental examination is carried out after receiving the payment of the fee. You can pay the fee at the application stage and attach supporting documents. The purpose of the fundamental examination is to establish the compliance of the declared object with the criteria for its protectability. As a result of the substantive examination, a decision may be made to issue a patent for an invention or to refuse to issue this patent.

In the process of the examination additional materials may be requested to clarify or explain the application. You have 2 months to answer these requests.

3) After receiving a positive decision, the applicant must pay a fee for registration and issuance of a patent. Only after that a patent is issued (sent by mail to the address indicated in the application).

The process of patent registration will be considered on the example of the modernization of a laboratory installation for the demonstration of electrostatic fields (see Figure 2). Such installations are used in physics laboratories of universities.

![Figure 2. The laboratory installation for the demonstration of electrostatic fields.](image-url)

This installation is a tray filled with tap water. A constant voltage is applied from the power source to the metal electrodes 1 and 2, thereby forming an electrostatic field. A metal probe 3 connected to a voltmeter measures the potential at points in the aquatic environment (the potential is measured relative to electrode 1). At the bottom of the tray there is coordinate paper that helps to get the location of the probe. Laboratory research consists of finding points with equal potential and transferring them to a workbook with the subsequent construction of equipotential and power lines of the electrostatic field.
This installation has the following disadvantages:

1) It is inconvenient to work with water: when moving the probes, ripples appear on the water surface. It is necessary to wait for the damping of oscillations during each measurement; installation requires additional maintenance (it is necessary to fill in and pour out water); there is a risk of overturning the tray with water on electrical appliances located in laboratories.

2) It is difficult to measure the coordinates on the coordinate paper.

So, we chose a graphite coating as a medium of field propagation, this coating is applied to foiled textolite boards with a pattern of electrodes etched on them (see Figures 3, 4).

![Figure 3 - Foiled textolite boards with electrodes etched on them](image1)

![Figure 4 - Graphite conducted boards](image2)

To measure the coordinates of the probe and the potential at the points of the board, a model of the device was proposed, containing a probe connected to a voltmeter and ultrasonic sensors, the data from which are synchronously fed to the processor. A patent for utility model No. 178350 was issued for this device (see Figure 5).

![Figure 5. A device for coordinate and electrical potential measuring](image3)

The following are the requirements for the preparation of each of the application documents, which the authors of this patent adhered to during its registration.

3.1. Description

Name. When determining the name of the utility model (invention), the following requirements should be met: brevity (the name should contain no more than 8–10 significant words); compliance with one of the headings of the international patent classification (IPC); the characteristic of the object's purpose, the function it performs, or an indication of its belonging to a specific technical field; nouns should be in the singular (with the common exceptions, for example, glasses).
Index of the International Patent Classification (IPC). To select the appropriate IPC index for a technical solution, open the FIIP website and follow the path: FIIP website/ Information resources/ International classifications/ Inventions [3].

Technical field. The section "Technical field" indicates the scope of the utility model (invention). It is necessary that the branch of technology specified in this section corresponds to the IPC index; therefore, when describing it, one should proceed from decoding this index. It is advisable to start the section with the phrase: "The claimed technical solution relates to...". If the object belongs to several branches, one should indicate all branches or only one with the proviso "mainly". Then one can show in which processes or for the production of which products in this technical field a useful model (invention) can be applied.

The level of technology. This section provides information on the closest analogues of development (with reference to the patent in the form indicated above), identifies their shortcomings in comparison with the patented object. Analogues are objects of the same purpose as the object under consideration, similar in technical essence and the achieved result in their use and similar in the totality of features that served or could serve as the basis for the identified technical solution. The search for analogues is carried out on all available information sources of the main and adjacent classification indexes, to which the claimed object belongs. The search for patents is also conveniently carried out on the FIIP website.

Manifestation of the utility model (invention). In this section, one should indicate the problem to be solved by this technical solution, how this problem is solved, and the achieved result. The formulation of the problem solved by the model, as a rule, is formed from the shortcomings of the existing analogues, which are eliminated in the stated model. The technical result is a characteristic of the effect achieved when using the product.

Implementation of the utility model (invention). In this section, one should give all the essential features that characterize the utility model (invention). Attached figures should be listed. One should also show the presence of a causal relationship between the set of essential features and achieved technical result.

3.2. Drawing
Each graphic image, regardless of its type, is numbered with Arabic numerals as a figure (Figure 1, Figure 2, etc.) in a single numbering order. Graphic images (drawings, diagrams, pictures) are made by handwriting or in typewritten manner, with black, indelible, clear lines of uniform thickness along the entire length. The elements shown in the drawing are denoted by Arabic numerals in accordance with the description of the utility model (invention). Drawings are performed without any inscriptions, except for the necessary words, such as "water", "steam", "open", "closed", "A – A" (to designate the section), etc.

3.3. Formula
The formula should be completely based on the description. This document begins with the heading “Utility Model Formula” (“Formula of the Invention”), followed by the full presentation of the formula. The formula has legal value. The formula of the utility model (invention) expresses its essence, if it contains a combination of its essential features, sufficient to achieve the specified technical result. The formula can be single-claim and multi-claim and include, respectively, one or several sections. Each claim is presented as one sentence. A multi-claim formula is used to characterize a utility model (invention) with a refinement of its characteristics as applied to particular cases of implementation or use.

3.4. Abridgement
The abridgement is an abbreviated description. The title of the abridgement is the name of the utility model (invention). The abridgement contains the characteristics of the technical field, the technical
result achieved by the object, the statement of the object essence with an indication of all the essential features.

3.5. Patent application
You can take the application form from the website of Rospatent. A completed application must be signed by the applicant or his representative; the last column on the application form is intended for this. At the same time, the signature of the person acting on behalf of the legal entity must be sealed.

When filing patent application documents, we recommend to use the description of utility model No. 178350 discussed above as an example (it can be found on the FIIP website), taking into account the requirements for documents given in this article.

4. Conclusion
A comparative analysis of statistical data on patent activity of various countries shows that the number of patent applications in Russia is significantly less than in China, the USA or Japan. Patent statistics is the main indicator of innovation potential and one of the key indicators of technological development. The authors of this article consider that specialists of technical professions must be taught the skill of patenting developments when they are students and the patenting of their ideas should be promoted. Otherwise, it is not possible to reverse the current situation with patent activity in Russia. The skill of identifying novelties in their developments, the ability to apply for patents for their legal protection, in the opinion of the authors, are just as important for specialists in technical professions as the fundamental knowledge of physics or mathematics.

Any creative person has a lot of interesting ideas, but only a few of them come to life. This may be caused by uncertainty about the novelty of their ideas, overestimation of the required inventive step, fear to share their ideas with others. The skill of patenting allows you to throw off the bonds of thinking and contributes to the discovery of creative potential.

References
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[2] Application for the grant of a patent for a utility model (rup.to/ru/documentforms/zayavlenie-o-vydache-patenta-na-poleznuyu-model)
[3] Federal Institute of Industrial Property. Site http://www1.fips.ru.