What Happens When Artificial Intelligence Invents: Is the Invention Patentable?

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■ *In a decision published on April 27, 2020, the United States Patent and Trademark Office determined that only a human can be considered an inventor. So, who owns the patent when artificial intelligence makes the invention? What are the practical and logistical complications inherent in artificial intelligence-created inventions? With technology advancing faster than the legal system, what can we expect moving forward?*

For centuries, people have developed technology into groundbreaking innovations. Patents not only protect these inventions, but they also provide a unique incentive for people to innovate. Abraham Lincoln, the only U.S. president to become an inventor and obtain a patent, called the patent laws one of the three greatest achievements of discovery, along with writing and printing and the discovery of America.[1]

Under U.S. patent law, patents are owned by the inventor, unless assigned to another person, or entity (commonly the inventor's employer). The owner of a patent possesses key
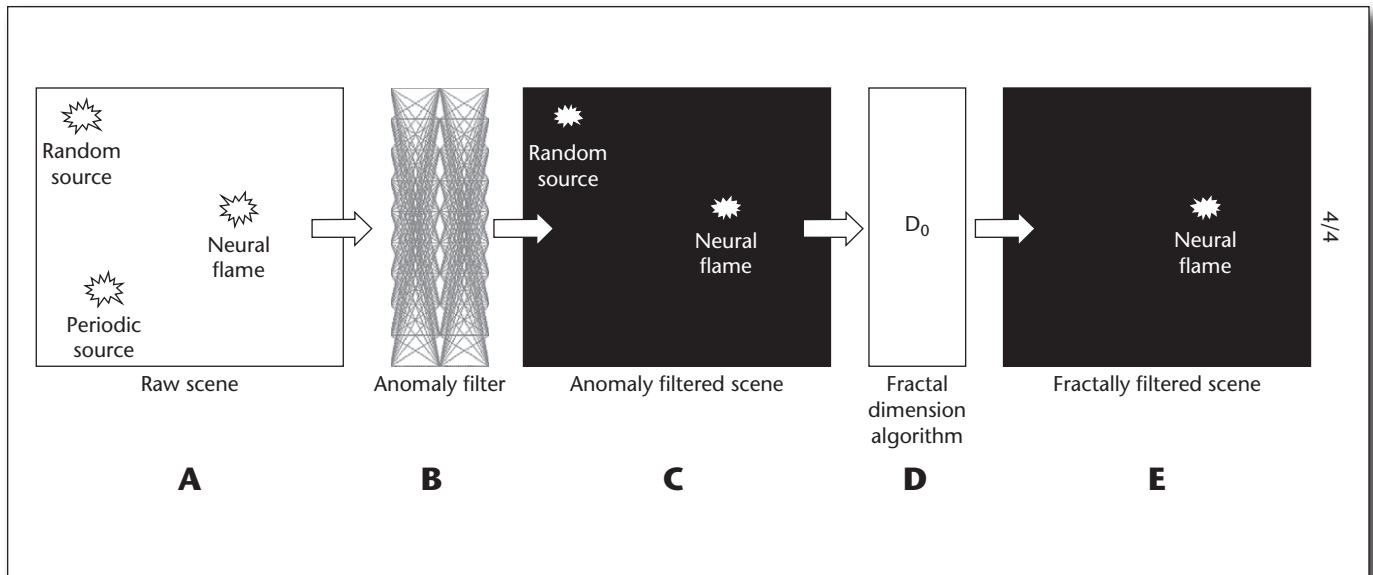
Figure 1. Devices and Methods for Attracting Enhanced Attention.

The image is taken from figure 4 in the U.S. Patent Application No. 16/524,350, European Patent Application EP 3 563 896 A (register.epo.org; European Patent Organization 2019).

rights associated with the patent, including the ability to exclude others from making the invention, which is a legal monopoly that allows the patent holder to license the patent and collect royalties or sue for patent infringement for damages and possibly an injunction. But what happens when artificial intelligence (AI) makes the invention? Who is the inventor, and can AI claim to be an inventor and obtain a patent?

The DABUS Decision: AI Cannot Obtain a Patent

In a decision published on April 27, 2020, the United States Patent and Trademark Office (USPTO)[2] answered this question in the negative, concluding that only a human can be considered an inventor. The decision arose out of a U.S. patent application for an emergency beacon or neural flame that emits light with a fractal pulse frequency based on specific rhythm at which the brain's stream of consciousness occurs. Emitting light at this frequency makes it more likely to attract a person's attention (figure 1).

Although Stephen Thaler filed the application, he did not list himself as the inventor. Instead, Thaler listed the artificial intelligence program DABUS, short for "device for the autonomous bootstrapping of unified sentience," as the inventor. DABUS is what is known as a *creativity machine,* a particular type of AI that generates ideas through a system of neural networks. To do this, general knowledge of a particular field is fed into the machine that then uses a series of neural networks designed to mimic patterns of human thought to generate a novel idea.

Thaler also listed DABUS[3] as the inventor for a food and beverage container with a fractal design with pits and bulges that enables multiple containers to be coupled together.

Thaler built the DABUS system, but did not create the emergency beacon or food container inventions generated by DABUS (see figure 2). As he had not come up with the concepts created by DABUS, Thaler felt he could not honestly list himself as the inventor. Instead, Thaler asserted that DABUS should be considered the inventor, because the system came up with the invention.

The USPTO rejected that argument firmly establishing, for now at least, that only a human can be considered an inventor for purposes of U.S. patent law. In reaching this decision, the USPTO cited, among other things, 35 U.S. C. 100(f), which defines an *inventor* to mean "the individual . . . who invented or discovered the subject matter of the invention" as well as 35 U.S. C. 101 and 115 including the language *whoever, individual* as well as *himself* and *herself.* The USPTO reasoned that such terms suggested a natural person, and that "interpreting 'inventor' broadly to encompass machines would contradict the plain reading of the patent statues that refer to persons and individuals."[2]

Implications for the Future of AI Inventors

Although AI is not yet eligible to be an inventor under U.S. patent law, the DABUS decision far from settles the debate as to how AI-created inventions should be addressed in the future. If an
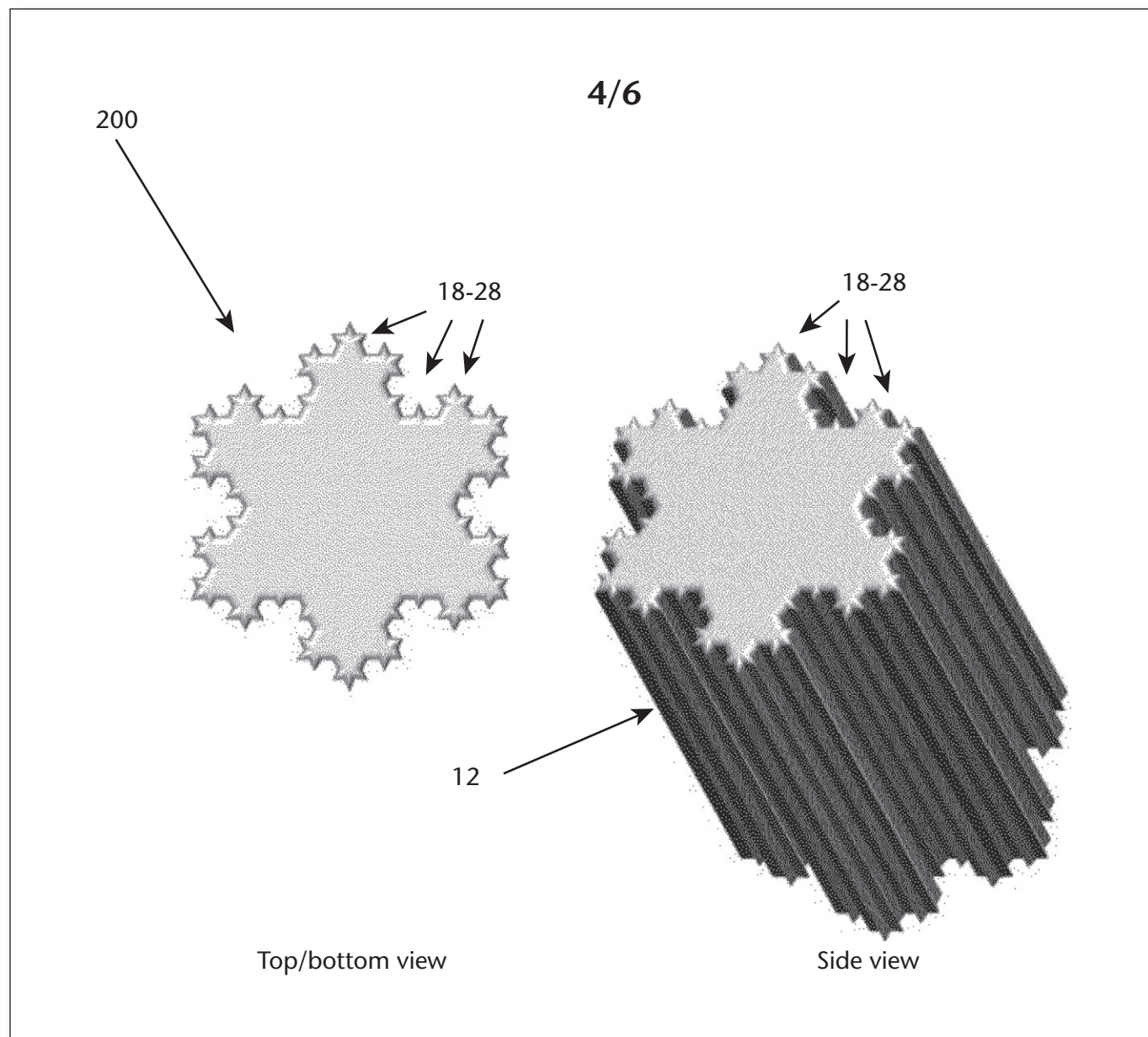
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Top/bottom view   Side view

Figure 2. Food Container.

The image is taken from figure 6 in the U.S. Patent Application No. 16/524,532, European Patent Application EP 3 564 144 A1 (register. epo.org; European Patent Organization 2020).

invention is completely conceived and created by AI, would the invention simply not be eligible for patent protection? If the answer is yes, then the resultant invention may not be patent-eligible and would become part of the public domain after the patent application was filed and published. This could create perverse incentives, reducing companies' willingness to invest in AI technologies that could inhibit important, even lifesaving, developments. Alternatively, companies that invest in AI technologies may decide to keep the inventions secret and attempt to protect them as trade secrets, undermining a central purpose of patents to encourage the exchange of novel ideas for a temporary grant of a monopoly.

At the same time, allowing AI to be eligible for patent inventorship poses its own host of issues. The increasing presence and accessibility of AI systems could result in a flood of patent applications. Between 2013 and 2016, for example, patent applications for deep learning increased by 175 percent. Similarly, applications for robotics and control methods grew on average of 55 percent per year, while applications for AI planning/scheduling grew by 37 percent.[4]

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By contrast, the average annual growth rate for patents across all areas of technology was 10 percent during the same period of time.[5] Allowing AI to be listed as an inventor could result in an even more drastic increase in the number of AI patent applications, completely overwhelming the USPTO.

A Need for Legislation?

Beyond the potential spike in applications, allowing AI to serve as an inventor poses several logistical problems. How could an AI inventor enter into licenses for the patent or possess standing to file a patent infringement suit? And, if such a lawsuit were filed, how would the AI inventor participate in discovery?

As a result, despite the recent DABUS decisions, many questions remain regarding the implications of AI on the concept of inventorship. With technology advancing faster than the legal system, we can expect continuing uncertainty in the area of AI-created inventions and likely a need for legislation to clarify the field, perhaps allowing a company or a person to claim that invention if they created and directed the AI system.

Notes

1. The Collected Works of Abraham Lincoln, Vol. 3, p. 361, Second Lecture on Discoveries and Inventions, February 11, 1859, available at http://name.umdl.umich.edu/lincoln3.

2. Decision on Petition In Re Application of Application No. 16/524,350 (United States Patent and Trademark Office, April 27, 2020), available at www.uspto.gov/sites/default/files/documents/16524350_22apr2020.pdf.

3. U.S. Patent Application No. 16/524,532, European Patent Application EP 3 564 144 A1 (register epo.org; European Patent Organization).

4. World Intellectual Property Organization (2019), WIPO Technology Trends 2019: Artificial Intelligence, Geneva: World Intellectual Property Organization, available at www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf.

5. World Intellectual Property Organization (2019), WIPO Technology Trends 2019: Artificial Intelligence, Geneva: World Intellectual Property Organization, available at www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf.

References

European Patent Organization 2019. Application EP 3 563 896 A1, Devices and Methods for Attracting Enhanced Attention, Figure 4. Munich, Germany: European Patent Office.

European Patent Organization 2020. European Patent Application EP 3 564 144 A1, Food Container, Figure 6. Munich, Germany: European Patent Office.

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