PANJAB UNIVERSITY LAW REVIEW
ISSN: 0971-5541, Volume 63, Part 1, pp. 1-13

ARTIFICIAL INTELLIGENCE AND PATENT LAW: ANALYZING PATENTABILITY OF AI-GENERATED WORKS

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ABSTRACT

Industry 4.0 era has changed the dimension of the manufacturing sector with the integration of AI technologies into its domain. This has created an opportunity for the development of the Intellectual Property domain to adopt AI technology for the development of the nation economically. This research work analyses the existing patent regime and explores the idea of granting AI the inventorship for AI-generated inventions. Based on the analysis, this study identifies the different AI technologies including Artificial Neural Networks (ANN), Convolutional Neural Networks (CNN), and Fuzzy logic technology that can be used in the patent domain for creating an AI-generated invention. This study outlines the existing legal implications relating to the inventorship of AI-generated inventions in the U.S. and India and this research suggests a shift from the traditional view of the courts relating to recognising AI as an inventor of a patent. A model has been proposed relating to the assignability of patents and provides the categories of persons to whom such invention may be assigned by the patent office. Based on the analysis future framework has been recommended.

KEYWORDS: *Artificial Intelligence (AI), Artificial Neural Networks (ANN), AI-Generated Invention, Inventorship, Patent*

1. INTRODUCTION

In this era, the invention using AI is the future of innovation and the development of technology. The Sustainable Development Goals (SDGs) provide the goals for securing the resources and development of the ecosystem for the present and future generations, which also includes the principle of distribution of resources equally to the people and the principle of intra-generational equity. The patent regime becoming global due to the interaction between people across borders. The Intellectual Property domain has promoted sustainable industrialisation and innovation in this domain as contemplated in Goal 9 of the SDGs.

AI is considered to be an emerging technology in different sectors which includes banking, transportation, and healthcare.[1] AI technology is considered the modern technique of handling data and interpreting the data that is enabled in the machine. Also, it can function like a human brain and respond to the situations for which it is trained. The patent domain focuses on innovation and development using technology, and this domain encourages the use of AI for technological innovation. The AI-generated invention and AI being recognised as the inventor of the invention is another paradigm for the Intellectual Property Rights (IPR) domain.

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1 Abadi, H. H. N., & Pecht, M. (2020). Artificial intelligence trends based on the patents granted by the United States patent and trademark office. *IEEE Access*, *8*, 81633-81643.

The traditional interpretation of US courts regarding the inventorship of AI-generated invention is in the public domain, where the courts have refused to recognise AI as the inventor of the AI-generated invention and have recognises that a human or a natural person shall be considered as the inventor of the invention. This article tries to break this traditional approach towards AI-generated inventions and provide AI with the sole ownership of the patent, where there has been no human external influence in such invention. It is also recognised that AI technology can function without human interference and produce inventions for the technological development of the nation.

1.1 OBJECTIVES OF THE STUDY

- The study identifies the different AI technologies that can be used in the patent domain for creating an AI-generated invention.
- The study analyses the existing legal framework in the U.S. and India regarding inventorship to AI-generated inventions.
- A model has been proposed relating to the assignability of patents and provides the categories of persons to whom such invention may be assigned by the patent office.
- Based on the analysis future recommendations have been provided.

Section 2 of the research deals with the Enabling technologies in patents, and Section 3 deals with the Legal implications of inventorship in the Patent regime. Section 4 covers AI as the inventor of the AI-generated invention. Section 5 concludes the paper discussion and lastly, Section 6 provides suggestions.

2. RESEARCH METHODOLOGY

The research methodology is doctrinal in nature with analytical research plan using qualitative methods to provide a structured approach for evaluating the impact of artificial intelligence and patent law: analyzing patentability of ai-generated works.

3. ENABLING TECHNOLOGIES IN THE PATENT DOMAIN

The term Artificial Intelligence (AI) includes any technology that can function like a human mind. This includes technologies like machine learning, deep learning, data mining, and fuzzy logic. In this mechanism, the machines are trained in such a way as to learn, adapt, and function through experiences. These machines function when a large amount of data is enabled into it and are tasked to function through the enabled data. AI engages in activities that require human intelligence. The common AI technologies include machine learning, which can be further classified into Artificial Neural Networks (ANN) and Convolutional Neural Networks (CNN). These neural networks are trained to mimic the activities of a human brain and to learn through experiences. The neural networks have high data handling capability to perform complex activities and produce efficient results. These neural networks can also be

introduced into the patent system to create inventions that are novel and have industrial applications.

Fuzzy logic technology is considered to be the advanced form of traditional or classical logical systems. It creates a model aimed at producing reason-based or rational results, which is considered to be an inherent ability of the human mind.[2] It uses a decision-making algorithm, instead of producing binary results in the form of true or false.[3] The fuzzy system also adapts itself in a particular given situation to avoid disruption in the process even in the absence of rules or the directions of the expert.[4] This model can be used to solve complex problems to derive a rational result. The patent regime advocates technological advancement for the benefit of society and this requirement can be satisfied with the use of fuzzy logic technology in the patent regime to create inventions that might be path-breaking for the society.

4. LEGAL IMPLICATIONS OF INVENTORSHIP UNDER THE PATENT REGIME

A patent is a form of IP, which grants the holder the exclusive right over the invention. There are certain requirements for the grant of a patent, which include:

1. Patentable subject matter- This requirement classifies the categories of works which can be considered as an invention. The courts consider that laws of nature, physical phenomena, and abstract ideas are not patentable. The U.S. Supreme Court observed that "the Congress had the intention to include anything under the sun that is made by man."[5]
2. Utility- The second requirement is to determine whether such an invention has a useful purpose and the invention must have a practical use.
3. Novelty- The invention must not be known or used by others and it must be a new product or process.
4. Non-obviousness- The subject matter sought to be patented should not be obvious to a person having ordinary skill in the art.

Position in US

The America Invents Act defines the subject matter of patent as "any new or useful process, the machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefore, subject to the

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2 Zadeh, L. A. (1988). Fuzzy logic. *Computer*, *21*(4), 83-93.

3 Bird, J. S. (2003). Cognitive Neuroscience as a Model for Neural Software Patent Examination. *AIPLA QJ*, *31*, 273.

4 Kosko, B., & Isaka, S. (1993). Fuzzy logic. *Scientific American*, *269*(1), 76-81.

5 Diamond v. Chakrabarty 447 U.S. 303 (1980)

conditions and requirements of this title."[6] The U.S. patent law specifically does not define the term 'inventor.' The USTO's Manual of Patent Examining Procedure provides that, "the threshold question in determining inventorship is who conceived the invention, and unless a person contributes to the conception of the invention, he is not an inventor."[7] Patent law specifically states that individuals should be considered as inventors. This implies that corporations cannot be considered inventors. An individual who conceives an invention is an inventor and generally it is a natural person.[8]

The term "conception" has been interpreted by the courts. In Townsend v. Smith,[9] the court defined "conception" as the "complete performance of the mental part of the inventive act and the formation in the mind of the invention of a definite and permanent idea of the complete and operative invention as it is thereafter to be applied in practice." In Hybritech Inc. v. Monoclonal Antibodies Inc.,[10] the court observed that conception is "formation in the mind of the inventor of a definite and permanent idea of the complete and operative invention, as it is hereafter to be applied in practice." In Hiatt v. Ziegler,[11] the court observed that "conception is achieved when the invention is made sufficiently clear to enable one skill in the art to reduce it to practice without the exercise of extensive experimentation or the exercise of inventive skill."

The U.S Code on Patents specifically defines joint inventorship, and states that "an invention may have joint inventors, each of whom may have independently contributed to the conception of at least one component, feature, or restriction of the invention."[12] These definitions indicate that since an inventive act requires an inventive mind, such an inventor is a natural person. So, an inventor cannot be a corporation or another business entity, or an organisation. In Beech Aircraft Corp. v. EDO Corp.,[13] the Federal Circuit held that "only natural persons may be inventors." A person who works in the direction of another by fabricating a prototype is not an inventor. In 1952, Congress stated that the subject matter of the patent was "anything under the sun that is made by man." This statement shows the intention of the legislators towards considering the ambit of the Patents Act and only considering human beings as the authors of the work.

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6 Perez, T. V. (2023). Native American Intellectual Property Protection: Altering Federal IP Law and the Indian Arts and Crafts Act to Aid Tribal Economic Development. *American Indian Law Journal*, *11*(2), 6.

7 Section 2109 of Manual of Patent Examination Procedure

8 Cummings, P., Balazer, A., & Worrel, C. (2023). Who is an Inventor?.

9 Townsend v. Smith 36 F.2d 292, 295, 4 USPQ 269, 271 (CCPA 1930).

10 *Hybritech Inc. v. Monoclonal Antibodies Inc.*, 802 F. 2d 1367, 1376, 231 USPQ 81, 87 (Fed. Cir. 1986).

11 *Hiatt v. Ziegler*, 179 USPQ 757, 763 (Bd. Pat. Inter. 1973).

12 35 U.S.C. § 116(a)

13 Beech Aircraft Corp. v. EDO Corp. 990 F.2d 1237, 1248 (Fed. Cir. 1993)

Ownership of the invention flows from inventorship. The right to seek patent protection is included under ownership, and the inventor files the patent application. The owner has the right to assignability of the rights. When joint-inventors are employees of the same company, they assign their rights through an agreement and the company is regarded as the owner of the invention. When two companies collaborate on a patent, they become joint proprietors of the invention. Each company has an undivided interest in the patent and can exercise its rights independently of the other company. In HIP Inc. v. Hormel Foods Corp.[14], the District Court held that joint inventorship can be granted based on the contribution to the invention.

Position in India

The patent application is filed by the inventor of the invention and it is important to decide the question relating to inventorship. Generally, an inventor is defined as a person who has significantly contributed to the conception of the invention. The term conception includes the idea creation, the approach made for the definiteness of invention, and the aspect of practical utility.

There can be certain criteria to consider who cannot be considered as the inventor, including:

1. If a person has contributed by giving suggestions only;
2. If a person has acted on the instructions of the inventor;
3. If a person's contribution is limited to consultation to perform experiments;

In India, Section 6 of the Indian Patents Act defines the persons entitled to apply for patents. The person applying for a patent must be the “true and first inventor” of the invention.[15] Section 2 (1) (y) defines “true and first inventor” as “someone that does not include either the first importer of an invention into India or a person to whom an invention is first communicated from outside India.” But the Act specifically does not define the term “inventor” or “inventorship”, and it is open for subjective interpretation.

It is necessary to determine the question of inventorship in cases where there are multiple contributors to the invention and in cases of employer-employee relationships. In V.B. Mohammed Ibrahim v. Alfred Schafrnek,[16] the court held that “since the plaintiff has not contributed any part of his ingenuity or sill or technical knowledge towards the invention and only for the act of financial contribution for running the experiments, the plaintiff could not be considered as the inventor.” Also, the court observed that “neither a corporation

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[14] *Hip, Inc. v. Hormel Foods Corp.*, Civil Action No. 18-615-CFC (D. Del. May. 16, 2019)

[15] Section 6 (1) (a) of Indian Patents Act, 19700

[16] AIR1960 KANT 173

nor a financial partner can be the sole inventor and only the natural person who contributes their skill and knowledge to the innovation can legally claim the inventorship."[17]

The issue relating to the determination of inventorship when multiple contributors are involved is a challenge for the courts. In National Institute of Virology v. Mrs. Vandana S. Bhide,[18] the Controller of Patents determined the question relating to "who is the inventor", and stated that certain factors need to be considered while determining the inventorship, it includes:

1. The person must have made an intellectual contribution to achieving the final results of the resulted invention.
2. If a person has not contributed to the development of an invention, he shall not be entitled to be considered as an inventor.
3. In case the inventor takes the help of another person for the purpose of conducting experiments, or constructing apparatus without any intellectual contribution, such person is not to be considered as the inventor.

Further, the court differentiated between the inventor and a pair of hired hands. The court held that the authorship in an article can amount to a contribution to writing a paper, but it is not proof of inventorship in the patent application. So, certain factors need to be considered for inventorship, which includes:

1. In case, a person contributes through an idea that later materialises into an invention, then such person shall be the inventor.
2. In case, a person has given a technical contribution, that is not novel, then such a person cannot be considered an inventor, as such technical suggestion may be a routine lab work and a skilled person might be aware of the technical concept.
3. If the technical contribution, is novel then the person may be considered an inventor, because the technical contribution has converted the idea into actual practice and has materialized into an invention.

The legislative intent to grant patent rights to the "inventor" was stated in the Ayyangar Committee Report of 1959. According to the report, even if a person does not have full legal ownership of an invention, they can still be

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[17] Raghuwanshi, R. B. R. a. S. S., & Law, L. (2023, April 15). AI Generated Inventions, ChatGPT, Indian Patent Act, DABUS, United States Patent & Trademark Office, European Patent Office. *Live Law*. https://www.livelaw.in/law-firms/law-firm-articles-/ai-generated-inventions-chatgpt-indian-patent-act-dabus-united-states-patent-trademark-office-european-patent-office- 226394#:~:text=Mohammed%20Ibrahim%20v.,to%20legally%20claim% 20the%20inventorship.

[18] National Institute of Virology vs Mrs. Vandana S. Bhide, Pre-grant Opposition before the Controller of Patents in the matter of Patent Application 581 /BOM/ 1999

considered an 'inventor' if they have moral rights. The idea is to give the inventor financial rewards to which they are legally entitled, even though the agreements restrict their exclusive rights. Presently, AI can neither be granted moral nor legal rights.

5. AI AS THE INVENTOR OF THE INVENTION

The current patent regime system provides that, the invention must be novel, it must have industrial application and it must be a patentable subject matter.[19] These conditions are sine quo non for the registration of the patent. The traditional approach relating to the issue of the ownership of a patent or the inventorship has always been in favour of the 'person who is the inventor.' The term person includes a natural, juristic, legal entity that is capable of being sued or has the capacity to sue.

The question arises whether AI is included under the ambit of a person, as no legal rights of machines have been recognized. Various statutes consider that a human being or a natural person is eligible to be granted a patent in case where the invention is created with the use of AI. Even at present, no case laws or statutes consider the 'computer program' or AI to be the inventor of the invention.

In the case of Thaler v. Vidal,[20] the court affirmed that only a natural person can be an inventor of the invention and such inventorship cannot be granted to AI in cases where the invention is made with the assistance of AI. The contention that AI can also be granted a patent can be justified by taking note of the observation made by the US Supreme Court in the case of Goldstein v. California, where it was observed by the court that terms such as "authors and inventors" should not be interpreted in a narrow literal sense, but in a broad scope to reflect constitutional principles.[21] This observation has opened up different dimensions, where the AI can also be granted inventorship, when such invention is solely made by the AI, without human intervention.

Though it is an accepted view that generally data is enabled into the AI system by human interference, this task does not give the human the sole authority to be considered as the inventor of the patent invention. The primary condition for the principle of inventorship is making a significant contribution toward the invention.[22] AI patents tend to encourage innovation and the creation of inventive machines and are beneficial for technological advancement. It is considered that there must be a permanent idea of the invention, which is

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19 Crowne, D. E. (2008). What is an Invention? A Review of the Literature on Patentable Subject Matter. *Richmond Journal of Law and Technology*, *15*(2).

20 Thaler v. Vidal No. 21-2347 (Fed. Cir.2022)

21 Goldstein v. California, 412 U.S. 546, 561 (1973).

22 Netscape Commc'ns Corp. v. ValueClick, Inc., 684 F. Supp. 2d 699

sufficient for the skilled person to perform or carry out the invention without experimentation.[23]

The issue arises regarding which entity will reap economic benefits from the innovation, where the patent is granted to AI. It is considered that when an AI is granted patent ownership, a dispute relating to the ownership of the patent will arise. The best possible method is where the Patent Office, licenses or assigns the patent that is AI-generated to AI users, which includes persons using AI to create new inventions. This ensures that the innovation remains open in the public domain and the natural person, who has been assigned or licensee reaps economic benefit through the AI-generated invention. This mechanism makes the concept of AI being granted the inventorship a possible event.

An AI-generated work cannot be awarded inventorship since AI systems are not natural persons. The boundaries of patentability prohibit the patenting of laws of nature, natural phenomena, and abstract ideas. So, the court has put the burden of proof on inventors to demonstrate the existence of the "inventive concept." In Dr. Koza's case, the patent was granted despite his admission that the whole invention, ‘invention the machine’ was made by the computer or artificial intelligence[24]. This suggests that regardless of the method used to develop the idea, the USPTO only grants patents to natural persons.

The rationale behind the concept of granting the inventorship to the AI is due to the inherent capability of AI to think and respond like a human mind and the greater data handling capability. It has been argued by the critics of the idea of granting patent ownership rights to the AI, that the AI machine does not function without the external support of humans, as it requires a human to seed data into the machine or enable the functioning of the machine.

This argument can be invalidated on the ground that with the advancement of technology and emerging technologies like machine learning which evolves and functions through experiences without additional data being enabled into it.[25] So, a situation might arise where the need for external human interference in the functioning of machines may not be the essential requirement for the functioning of AI machines and AI can function independently. The Artificial Neural Networks (ANN) technology functions like a human mind and it can create novel inventions, which might bring technological innovation to society.

The issue relating to the use of AI-created inventions for future use arises when the inventorship is vested with the AI. To maximize the efficiency of the innovations and to derive economic benefits from the invention, it needs to be

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23 Burroughs Wellcome Co. v. Barr Labs., Inc., 40 F.3d 1223

24 Fok, E. (2021). Challenging the International Trend: The Case for Artificial Intelligence Inventorship in the United States. *Santa Clara J. Int'l L.*, *19*, 51.

25 Pearlman, R. (2017). Recognizing artificial intelligence (AI) as authors and investors under US intellectual property law. *Rich. JL & Tech.*, *24*, i.

disclosed in the public domain, so the invention is used for technological advancement. This research provides a model for deciding to whom the invention is to be assigned from the assignor i.e., the AI. There are certain categories of persons who may and may not be granted the patent.

This process of assignment can be made only for persons interested in maximizing the economic benefits related to the inventions. There are two categories of persons: (i) Active parties and (ii) Disruptive/ Silent parties. The disruptive or silent parties are the persons who are not interested in the monetization of the invention and they try not to disclose it in the public domain. They are persons who block the patents and this decreases the value of the patent. Since a patent involves benefits that are valuable in terms of economic benefits for the further use of the invention.[26] It is also found that entities that are not active participants in the market and have no intent to patriciate in the future, do not raise capital in the field of the invention and the invention turns valueless.[27]

It is suggested that the assignment of a patent should not be made to the software companies as it is considered that the software companies might internalize the AI invention and become the AI user to such inventions and possess the authority to become a potential patentee for any further inventions.[28]

The active parties are the ones who are involved in deriving benefits either through licensing or assignability. They promote their invention in the public domain so that it can be used by industries for further development. It is considered that AI users are the best category to be allotted the patent assignment. AI users are the persons who use AI to create software, so they are more suitable as assignees.

It is argued that if the inventorship vests with the AI, then the invention might not be open to the public and it may hamper the utilization of the invention for public purpose. In this case, it is suggested this model regarding the model of assignability. This model provides the mechanism of assignability of AI-generated inventions. The first step is when the invention is developed by the AI and it comes into the knowledge of the Patent Office, then the Registrar should recognise AI as the owner of the invention. This process of registration of a patent includes the steps relating to filing of provisional/ complete

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[26] Mazzoleni, R., & Nelson, R. R. (1998). Economic theories about the benefits and costs of patents. *Journal of economic issues*, *32*(4), 1031-1052.

[27] Chien, C. V. (2010). From arms race to marketplace: the complex patent ecosystem and its implications for the patent system. *Hastings Lj*, *62*, 297.

[28] Schuster, W. M. (2018). Artificial intelligence and patent ownership. *Wash. & Lee L. Rev.*, *75*, 1945.

specification, publication of the specification, examination by the registrar, Objections relating to the Specification, and finally the grant of the patent.

In the second step, when the patent is granted to the AI, the Registrar shall notify regarding the assignment of the patent to a natural person, so that the invention can be used further by the public in different domains. The suggested model provides the persons who should be eligible for the grant of a patent under the categories of active or silent parties.

At the final stage, the assignment is made by the Patent Office under the terms and conditions which might include monetary transactions between the AI and the human relating to the assignment of the patented invention, as illustrated in Fig. 1. This model created transparency in the process of assignment of the patented invention.

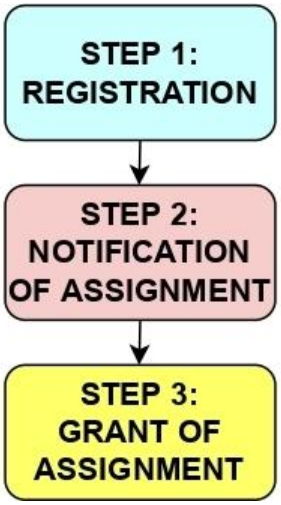

Fig.1: Model for Assignment

6. CONCLUSION

After analysing the correlation between the role of technology and the patent domain, it can be concluded that with the growing technology and research in the field of Intellectual property, where the inventions have an economic value and are useful for technological advancement. The traditional approach regarding the inventorship of the creation needs to be changed, where the courts have considered that in the case of AI-generated invention, the AI cannot be granted the ownership of the patent, and the human or the natural person involved in the process of using AI as a tool shall be considered as the inventor. This article outlines the change in emerging technologies, where such AI has developed a tendency to work independently without human dependence.

The approach to consider AI as an inventor is not to be considered an illusionary approach in Intellectual Property Law. The traditional view of courts

to consider AI as a mere tool needs to be changed and this might help in the development of the patent regime. Since the US patent regime has failed to determine the possibility of granting inventorship to AI, the is the responsibility of the members of the International Conventions like TRIPS Agreement to consider AI under the ambit of artificial person and recognise the rights of machines also. This concept might change the jurisprudence relating to the concept of rights and duties and it requires a liberal approach from the courts for the development of the Intellectual property domain.

This article also provides a model for determining the assignability of patent rights and prescribes the categories of persons who should be recognised as the assignee by the Patent Office. Based on the analysis future suggestions have been provided.

7. CONCLUSION AND SUGGESTIONS

After a detailed analysis relating to the recognition of AI to be granted the inventorship for the invention, this section provides certain suggestions:

- It is suggested that the term 'Artificial Intelligence' should be specifically defined in the domestic law for clear interpretation and determination of the issues in the IP domain. Reliance can be placed on the definition of EU and it can be incorporated in Indian legislation. AI can be defined as *"AI system is a machine-based system designed to operate with carrying levels of autonomy and that may exhibit adaptiveness after deployment and that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments."*
- It is suggested that AI should be considered as a legal person in the IP domain. This would ensure that AI is eligible to be granted rights and duties as an inventor under the Patent domain. AI can be considered as the sole or co-owner of a work or an invention. This would broaden the scope of the term 'person' to include Artificial machines.
- The US patent regime needs to examine the current patent law to broaden the scope of the term 'person' to include artificial machines. Also, the members of the TRIPS agreement need to realize the growth of AI in the IPR domain and adopt the mechanism relating to the recognition of AI technology.
- It is suggested that the assignment of a patent for an AI-generated invention should not be made to the software companies as it is considered that the software companies might internalize the AI invention and are silent parties as they can be the AI user to such inventions and possess the authority to become a potential patentee for any further inventions. So, assignment should be made to the active

parties, who are involved in deriving benefits either through licensing or assignability. They promote their invention in the public domain so that it can be used by industries for further development. It is considered that AI users, who use AI to create software are the best category to be allotted the patent assignment. This research suggests a model for the process of assignability that can be adopted for creating transparency.

- It is suggested that in case of AI-generated intentions, the individual must disclose it to the Registrar. In case the person fails to disclose it, the patent shall be revoked.

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