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INDIAN PATENT REGIME AND NANOTECHNOLOGY: EXPLORING THE CHALLENGES

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ABSTRACT :-

Among the emerging technologies, nanotechnology is one of the most prominent examples and it raises high expectations in a wide range of areas affecting daily life. Nanotechnology is a science which operates at an extremely small scale, as it uses the size of a so-called nano scale. There are two main ways of applying nanotechnology so far: One is the top-down approach, whereby structures are made smaller and smaller until they reach a nanometric scale. The other approach is the bottom-up approach, by which elements at the nanoscale are chosen and assembled to form some sort of matter or mechanism. This way of manipulating matter at the atomic level obviously bears the potential of enormous developments.

The commercialization of nanotechnology results in extraordinary for the benefit of humankind in a foreseeable future. For example, in the area of health, achievements such as diagnostic tools penetrating (and perhaps remaining in) cells or therapeutic micro-tools directly treating ill cells from the inside can be envisaged. Extremely small electronic components allowing miniaturized and much more powerful electronic devices could be developed. While inventions in the field of nanotechnology would, as a general rule, appear to qualify for patent protection, there are a number of issues that may need further consideration subject to the fulfillment of the relevant conditions of patentability. There is some consensus that patenting NT innovations poses more problems than other technologies, owing to their multi-disciplinary character, cross-sectoral applications, broad claims as well as difficulties in fulfilling the patentability criteria of novelty, non-obviousness and industrial application. The patent if properly granted facilitates more and more innovations in the field to which the invention belongs however the growth retards once the patents are wrongly granted or rejected.

Today the Indian Patent Act has no provision that incidentally touches the field of nanotechnology. There have been no guidelines or regulations framed with respect to regulating this technology even though the TRIPS agreement specifically provides that intellectual protection must be extended to all fields of science so that it encourages more research and innovations. Thus this research paper discusses various issues relating to patenting of Nanotechnology and addresses suggestions to cope up with challenges posed in patenting of Nanotechnology.

Keywords: Nanotechnology, Patent, Industrial Application, Inventive step, prior Art.

INTRODUCTION:-

Nanotechnology is the use of matter on an atomic, molecular, supramolecular scale for industrial purposes. . The study of qualities at the molecular level and the design and production of incredibly small machines or devices are the focus of the engineering discipline known as nanotechnology. Although it has been present for more than 60 years, it has only just started to appear in commercial products.

The 'nano' in 'nanotechnology' comes from the 'nanometer' which is a unit of measurement equal to one-billionth of a meter in size. The most primitive and widespread description of nanotechnology referred to the particular technological goal of precisely manipulating atoms and molecules for fabrication of macro scale products, also now referred to as molecular nanotechnology. The production of "things"—materials and equipment—on the scale of atoms and molecules is the focal point of this area of research and innovation. One billionth of a metre, or ten times the diameter of a hydrogen atom, is a nanometer. An average human hair measures 80,000 nanometers in diameter. The standard laws of physics and chemistry do not hold true at such sizes. For instance, there can be significant differences in a material's properties between the nanoscale and the macro scale, including its colour, strength, conductivity, and reactivity. Carbon

"nanotubes" are six times lighter and one hundred times stronger than steel.

What can be done with nanotechnology?

Nanotechnology is frequently used for industrial, medical, energy production and defense purposes. These include stronger building materials, effective medicine therapy, and higher density hydrogen fuel cells which are environmental friendly also. Being that nano particles and nano devices are highly versatile through modification of their physiochemical properties, they have found uses in nanoscale electronics, cancer treatments, vaccines, hydrogen fuel cells, and nanographene batteries. Nanotubes can help with cancer treatment. They have been shown to be effective tumor killers in those with kidney or breast cancer.Multi-walled nanotubes are injected into a tumor and treated with a special type of laser that generates near-infrared radiation for around half a minute. These nanotubes vibrate in response to the laser, and heat is generated. When the tumor has been heated enough, the tumor cells begin to die. Processes like this one have been able to shrink kidney tumors by fifty percent.

Nanotechnology's ability to observe and control the material world at a nanoscopic level can offer great potential for construction development. Nanotechnology can help improve the strength and durability of construction materials, including cement, steel, wood, and glass.

Thus, nanotechnology provides the society with the advantages listed below in a variety of areas:

Nano Bio Technologies

One use of this technology is the "stem cells" therapy, which shields people from a variety of illnesses.

One example of this technology is "DNA nanotechnology."

These are just a few more uses of this technology, which includes dental, orthopedic, and drug administration.

Nanomedicine:

The delivery of medications to certain cells

• Methods for diagnosing diseases;

• Antibacterial therapies;

• Methods for treating wounds and Cell repair

Warfare with Nanotechnology

Nanosensors to gauge the scope and type of potential threats during explosions.

Gold nanoclusters based on electronics and sensors.

Nanosuit design.

Nano-nuclear biological and chemical weapons, biomolecular motors, nano-drones, and the development of nanosatellites that use images to locate enemy territory.

History and Development of Nanotechnology

Taniguchi first used the word "Nanotechnology" in 1974. Nanotechnology enables the manufacturing, manipulation, and reduction of materials with high stability, enhanced strength, biocompatibility, cost effectiveness, and precise targeting on a nanoscale range between 1 and 100 nm. The nanomaterial are of very small size and the large surface-to-volume ratio of the nanomaterials leads to a significant change in their physical and chemical properties.

Richard Feynman, a physicist, actually pioneered the notion and concept for this technology. He explained the procedure that can be used to manipulate and control atoms and molecules. Professor "Norio Taniguchi" invented the term "nano technology" after ten years of research on the development of ultra-precise devices. The development of the "Scanning Tunneling Microscope (STM)" and "Atomic Force Microscope (AFM)" equipment has greatly aided in the investigation of nanoscale particles. In contrast to the bulk materials, these nanoparticles have high strength, are lightweight, and have remarkable chemical reactivity. To Monitor the behavior and observe each individual atom and molecule are the main focus of nanotechnology and nanoscience.

Thus the advantages of nanotechnology can be summersied as follow:

The use of nanotechnology can create materials that are unique and are stronger, cheaper, and durable.

Cleaning of pollution utilizes such technology.

The manufacturing cost of using nanotechnology will be very low.

Body sculpturing is a great advantage of nanotechnology.

Nanotechnology leads to the mass production of food and consumables.

The disadvantages of nanotechnology are as follows:

Various Health and safety concerns may arise from the use of this technology as a result human being may suffer serious impairment. Massive production may result into reduced employment in the agricultural and manufacturing industries. Atomic weapons are more accessible, but they also carry the potential for destruction.

Development of Nanotechnology in India

With broader goals and huge Funding from the USA, the government of India announced the Nano Mission programme in 2007 as the first step in promoting nanotechnology research in our country. The Misson proved to be successful. In the last five years, India has published over 23,000 publications in the field of nanoscience. India was in third place in terms of papers published in 2013—behind only China and the United States. In 2013, the Indian Patent Office received 300 patent applications. The amount India spends on nanotechnology research is still just a fraction of the research spending of countries like Japan, USA, France and China.

The commercial, private sector has made a insufficient contribution to nanotechnology research. Academic studies have shown how much of an influence nanotechnology can have on the needs of the Indian market. For instance, a team from IIT Madras has decontaminated water with arsenic using nanotechnology. A different IIT Delhi team has developed a water-based self-cleaning system that can be applied in the textile industry. Although there is so much promise, but still it is matter of concern that the private sector is not making enough investments in nThe commercial sector has made an insufficient contribution to nanotechnology research. Academic studies have shown how much of an influence nanotechnology can have on the needs of the Indian market. For instance, a team from IIT Madras has decontaminated water with arsenic using nanotechnology. A different IIT Delhi team has developed a water-based self-cleaning system that can be applied in the textile industry. Although there is so much promise, it is matter of concern that the private sector is not making enough investments in nanoscience research Projects.

The contribution of the private sector to nanotechnology research has been insignificant. Research from academic institutions has indicated how much impact nanotechnology can have on needs of Indian market. For example, a team from IIT Madras has used nanotechnology for arsenic decontamination of water. Another team from IIT Delhi has come up with a water based self cleaning technology which can be used in textile industry. It is a matter of worry that, in spite of such enormous potential, the private sector is not investing enough in nanoscience research.

Patenting Nanotechnology- Challenges posed to the Indian Patent Regime

A balance is struck between the applicant's rights and his duty to the community when these rights are recognized by the Indian Patent Act, 1970.A 20-yearof patent term, patent examination on demand, a fast track appeals process, and pre-grant and post-grant opposition, Product and process patents and

rights, protection of biodiversity and traditional knowledge, and publication of applications after 18 months of the date of patent application filing are some of the key features of the above said Act. The current Indian Patent Act accordingly stands to meet practically all the standards imposed by the globalised patent regimes, as encapsulated in the TRIPS mandate and as well as the Patent Co-operation Treaty, 1970. Any brand-new and practical invention is protected by a patent. The requirements that must be met in order for an innovation to receive a patent are the heart of the Patents Act. The invention must be original, have an inventive element, and have some potential for industrial use. The Indian Patent Act's purview includes, among other things, the filing of applications, the formulation of provisional and complete specifications, the resolution of infringement complaints, the granting of mandatory directions, secrecy directions, and the cancellation of patents etc.

Various industries like Electronics, pharmaceuticals, medical devices, food production, and, most significantly, war machineries are just a few of the fields where nanotechnology is crucial. These industries are becoming more popular, which makes them more susceptible to intellectual property theft. This has created a number of difficulties for researchers and patent applicants who are interested in patenting discoveries linked to nanotechnology. The most difficult aspect of trying to patent a specific nanotechnology invention is that the many parts of patent law can be difficult to understand and implement, especially if the invention relates to a new physical feature of matter. Additionally, a single invention may involve multiple stages of innovation, all of which must be adequately described and documented.

i) The Criteria for Nanotechnology Patents is Difficult to Meet

There are three main criteria that must be satisfied when it comes to patenting nanotechnology. These criteria are:

The invention must be unique.

It must not overlap with other patents.

It must have a specific industrial application.

In Nanotechnology, to satisfy all these three criteria is extremely difficult, for various reasons. Since nanotechnology is a multidisciplinary technology with a broad range of applications across a multitude of industries, it is difficult to find a single generic claim for a patent covering the technology and will almost certainly not meet all of the criteria .

According to TRIPS agreement it is mandatory to grant patents to inventions based on any technology. However, it is unfortunate that India falls behind in this regard. The Indian patent regime is not accommodative towards the idea of granting patents to inventions in the field of nanotechnology.

ii) The Claims in the Patent Have a Wide Range of Different Uses and Applications

Threats of infringement arise from the very nature of this Nanotechnology itself. Nanotechnology is used in a wide range of contemporary engineering fields to take use of the unusual properties of matter at the nanoscale level. Even though the patent is held by a company that only works in one of these industries, it has applications in many more areas including semiconductor design, biotechnology, materials science, telecommunications, and textiles. The debate over patentability has long been a point of controversy for emerging technologies. Numerous patent applications are being made for inventions that have previously been protected by patents; the only difference is that these applications are merely for improvements in that technology.

The fact that the claims in the patent accurately describe the invention and show a reasonable

understanding of what it does, what it is used for, and what will happen to the invention if it is not patented is debatably the most significant factor. It does not, however, provide a thorough explanation of how the innovation functions. While drafting a patent application, an inventor will typically take a wide view of the invention and make an effort to illustrate how a number of physical and chemical processes would function if the invention were to be granted a patent. However, a patent examiner will not find a complete grip of the invention in this history of the claims; rather, they will simply see evidence of a number of potential and likely applications for the invention.

The claims must give a thorough and precise description of the invention, but not necessarily how it will be used, for the patent to be considered legitimate. Therefore, the examiner should not be surprised if the process can be successfully executed without the claimed invention if an applicant claims a new method and then argues that the patent office should accept the claims because it appears that the process genuinely works.

A procedure can be carried out in a variety of ways, and the applicant is attempting to obtain a patent for the one specific way of it. The claim does not, however, describe how the method is really put into practice, and then the examiner is not required to consider it as legitimate. The examiner is not, however, obligated to accept the claim as valid, because it does not describe how the method is actually implemented.

iii) Industrial Application

An invention must be capable of use in any industry in order to be patentable. One cannot imagine the magnitude of a possible industrial use for nanotechnology because it is still in its infancy and many applications are still in the laboratory stage only. The nature of nanotechnology inventions often shows the way to their industrial applicability, as in the case of nanotubes for making lightweight but strong constructions, nano drug delivery systems, or nanotechnology employed to create high electric conductivity. The issue with nanotechnology in India is that it is an entirely unexplored technology with a lot of potential that has yet to be explored. This area of intense cooperation has been identified by the Indo-US Joint Forum on Science and Technology.

iv) Enablement Issues

The patents act requires an inventor to disclose the best way of manufacturing his invention, to enable a person skilled in the art to do the same, post expiry of the patent. A major problem posed by nanotechnology to the present patent regime, is that the scope of the invention and the field of knowledge itself is far too wide. Expressing and explaining the contents of the invention in full detail is next to impossible. The quintessence of the criterion of 'sufficiency of disclosure' is thus encapsulated: It is essential that the invention is both:

(i) Disclosed in a practicable manner

(ii) Qualified for a reproducible manner.

According to the first criterion, the invention can be changed without putting an excessive burden on the person who is knowledgeable in the art based on the disclosure. Reproducibility means that the outcome of the invention may be obtained repeatedly, not merely by chance or only with a certain level of predictability. It's possible that the patent applicant or patentee will be asked to increase their disclosure and provide more specific instructions for the reworking of their invention if the examining or opposition division has no way of knowing or inferring the practicability of a nanotechnology invention.

Additionally, the fact that the invention produces the claimed results in a repeatable way may pose problems for nanotech inventors. In nanotechnology, analytical methods, tools and metrologies are often not available to the

person skilled in the art. Without these the reproducibility of an invention may be difficult to ascertain. An inventor would thus be obliged to disclose these in the patent in order to make his claims verifiable.

The potential of nanotechnology is enormous. The current patent doctrines must quickly adapt to new technologies given what is at stake and the high expectations placed on the developing industry. Nanotechnology investors face uncertainty about the extent of their patent rights. Patents with broad claims, that lack reference to scale, on traditional products, might allow traditional patent holders to extract royalties from their nanoscale counterparts. Furthermore, bargaining between the traditional and nanoscale manufacturers might break down because of the diverging valuations that the parties place on their assets.

CONCLUSION :

With the potential to function at an atomic and molecular level, nanotechnology is playing a significant role in our lives. Companies which create new discoveries and applications for nanotechnology will require patent protection in order to succeed as a industry. The Indian Patent Regime can successfully meet the challenge posed by nanotechnology with a carefully established patent strategy. Even though there are too many grey areas to count, they shouldn't prevent the patenting of ideas resulting from nanotechnology. Laws are created by, for, and function within society. It would be regrettable if we permitted our legal systems to become obsolete as science and technology advance rapidly. Law is necessary for science to protect.

At present the Indian Patent Act has no provision that even incidentally touches the field of nanotechnology. There have been no guidelines or regulations framed with respect to regulating this technology even though the TRIPS agreement specifically provides that intellectual protection must be extended to all fields of science so that it encourages more research and innovations. The need of the hour is to firstly formulate a plan for increasing the research and development in the field of nanotechnology, secondly to provide for funding and special incentives for research in this field. One of the methods or possible solution to the present problem of patenting Nanotechnology can be addressed by bringing amendments in the Indian Patent Act that may not be exhaustively directed to nanotechnology however they must have some mechanism to recognize the field of nanotechnology and formulate a comprehensive regulatory plan that deals with Nanotechnology providing for research, possible hazards and a framework for regulating the same.

SUGGESTIONS :

Extensive changes ought to be brought, in the Indian Patent Regime, to rise to the occasion, and take on newer technologies with ease. A few of these suggestive measures may be put to use for the same:

i) A team of examiners rather than a single examiner should review patent applications since multiple inspections would help grasp the claims.

ii) Establishing a prior art database analogous to the Traditional Knowledge Database

iii) To facilitate the patenting of nanotechnology, a single, well-organized, and centralized command centre must be formed. This would guarantee consistency in the interpretation of patent claims.

iv) Periodic training for staff members would assist addresses the issue of a lack of knowledge in the area.

v) It would be wise to create extended prior art databases as a way to determine the components of uniqueness and inventive step.

vi) The patent office must be prepared to consider broader claims as the case may express

in order to accommodate nanotechnology which is in its growing stages

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