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Development in Aircraft Technologies and Patent Law: An Analysis

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ABSTRACT

Intellectual Property rights and the law surrounding the same is one of the most crucial within the whole framework. Protection of such rights is a crucial task that the state must undertake to ensure that individual creativity is encouraged and preserved. This paper will mainly be focused on the use of such Patent Law in India as well as around the world within the aviation industry, one which has seen and continues to see huge amounts of development throughout the course of time. With the increasing complexity of aviation technologies, the industry and its ecosystem, innovation in them have become more sophisticated over time. Patent owners began licensing out their inventions to generate new cash streams in order to survive in this competitive climate. Instead of acting as independent inventors with a single patent seeking commercial exploitation, aviation majors now act as integrators. Now one product is a combination of multiple patents. From a single patent to this vast network of patents, the aviation business is only becoming more complex, and the current technology only promises to advance in leaps and bounds in the future. Such an important sector of the industry, really needs to be studied with respect to patent law. The researcher aims to find some development and innovations in the aviation industry which are of significant importance to the legal framework on patent law, the issues which exist with the legal framework on patents and ascertain whether the legal framework on patent law with respect to aviation industry is satisfactory.

Keywords: Intellectual Property Rights, Patent Law, Patent, Aviation Industry, Technology, Inventions, Aircraft, Aviation Technologies

I. INTRODUCTION

Intellectual property is the creative work of the human intellect.³ The right to intellectual property is an intangible right to a creation of person's mind. An intellectual property is at times described as 'knowledge goods.'⁴

Intellectual Property rights and the law surrounding the same is one of the most crucial within

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³ V.K. Ahuja, Law Relating to Intellectual Property Rights 3 (Lexis Nexis, 3rd edn., 2020).

⁴ Bayer Corporation v. Union of India, 2014 (60) PTC 277 (Bom)

the whole framework. Protection of such rights is a crucial task that the state must undertake to ensure that individual creativity is encouraged and preserved, and India as a country does have a strong framework present to guarantee the same. Intellectual Property can be said to be “the property, which has been created by exercise of an intellectual faculty and is the result of an individual’s intellectual activities.” Thus, intellectual property refers to the “creation of mind such as inventions, designs for industrial articles, literary, artistic work, symbols which are ultimately used in commerce.” When a work is commercially used, intellectual property rights allow the creators or owners to profit from it. These rights are statutory rights governed in accordance with the provisions of corresponding legislations. Intellectual property rights encourage human endeavour and creativity, which are the main drivers of human progress. In India, the intellectual property is classified into seven broad categories which have their corresponding legal framework: -

- Trade Marks,
- Industrial Design,
- Copyright,
- Patent,
- Lay out designs of integrated circuits,
- Protection of undisclosed information/Trade Secret according to TRIPs agreements and
- Geographical Indications.

This paper will mainly be focused on the use of such Patent Law in India as well as around the world within the aviation industry, one which has seen and continues to see huge amounts of development throughout the course of time. Throughout the chapters of history, we have witnessed many legendary recreations of this desire and enthusiasm for flying. Flying techniques and methods have been mentioned in numerous legendary literature on various occasions. In Indian mythology, Ravana’s flying chariot ‘Pushpaka’ and ‘mechanical bird’ have been recorded in the Rig Veda (verses 1.164.47-48). Other legends, such as in Greek mythology, include the winged divine stallion “Pegasus” and “Icarus,” who flew free on wings made of feathers and wax. These concepts, along with a slew of others, have been instrumental in kindling the ambition for successful and long-distance flight. With the increasing complexity of aviation technologies, the industry and its ecosystem, innovation in them have become more sophisticated over time. These technologies are very specialised in nature and, if not all, then

most of them, cannot be simply replicated. Airplane manufacturers set the specifications and standards for these parts, working closely with suppliers of such technology who, in most cases, sign enter into long-term exclusive contracts with the manufacturers. Patent owners began licensing out their inventions to generate new cash streams in order to survive in this competitive climate. Instead of acting as independent inventors with a single patent seeking commercial exploitation, aviation majors now act as integrators. Such innovation is first translated into a patent application, which is then turned into a grant with a set of claims, which are then put through the manufacturing process before being integrated into an aircraft platform. From a single patent to this vast network of patents, the aviation business is only becoming more complex, and the current technology only promises to advance in leaps and bounds in the future. Such an important sector of the industry, really needs to be studied with respect to patent law.

(A) Review of Literature

Flying High: Patents in the Aerospace Industry⁵ - *Article on Lexology by Chadha & Chadha Intellectual Property Law Firm*

This article traces the constant developments and innovations in the aviation industry while focusing on the aspect of patent law. The aircraft industry is highly competitive and involves a lot of research, new design ideas, technological innovation, as well as affordable manufacturing methods. This in turn, makes the use of patent law even more significant in this industry.

Global Aerospace Patents: Technology, Innovation and Competitive Strategy⁶ - *Paper by Aerospace Technology Institute*

“To support the aim of securing the full economic potential of the civil aerospace sector, ATI undertook an extensive and detailed review of international aerospace patents. Patents contain a wealth of technology data that is relatively standardised across industry, making them a strong candidate for meaningful analysis. Patents are associated with innovation and value, however, their potential for insight is far wider. This investigation of global aerospace patents aims to understand their economic value and subsequently use the data to assess international capabilities and developments that might be of strategic importance. Across national and corporate entities technology themes are analysed in the context of varying policy, culture and

⁵ Tewari Avaneer - Chadha & Chadha Intellectual Property Law Firm, ‘Flying high: patents in the aerospace industry’ (Lexology, 7 January 2021), <https://www.lexology.com/library/detail.aspx?g=d8985bb5-7668-448b-bce3-debd89521f16> (last visited on 217 December 2022).

⁶ Aerospace Technology Institute, ‘Global Aerospace Patents: Technology, Innovation and Competitive Strategy’ (April 2019) available at: https://www.ati.org.uk/wp-content/uploads/2021/08/insight_11-global-aerospace-patents-1.pdf (last visited on 17 December 2022).

incentive. Policy, culture, commercial strategies and incentives can significantly influence patent statistics and these all play an important role in this study.”

Innovation in Aviation - Paper by Patentwire

This paper goes into detail on the topic of patent law and its use in the aviation industry since the Wright Brother’s first flight till the present times. With the help of various surveys, statistics and graphs it details how India and its aviation sector, be it commercial and military, has fared against the world.

Law Relating to Intellectual Property - Book by B.L. Wadhera

This book is another authority on the subject of Intellectual Property in India. It contains various case laws and contemporary developments in various spheres of intellectual property rights from India and abroad and discusses the area of Designs as an intellectual property in a detailed manner.

Law Relating to Intellectual Property Rights⁷ - Book by V.K. Ahuja

This book by Ahuja is one of the leading sources on Intellectual Property Rights in India. The same deals with all the aspects of Intellectual Property Rights in a detailed manner while showing us how the Courts have developed the concept and application of the various principles of Intellectual Property Rights while tracing its development as a whole.

The Role of Patents in The History of Aviation - Article in WIPO Magazine

This article tries to briefly cover the evolution and development of the aviation sector as well as the use of patent law with it. “The history of how a heavier-than-air machine took flight is replete with tales of fearless inventors, daredevils and dream chasers. It is also full of stories of meticulous and repetitive experimentation, advanced calculus and reliance on hard science. Government, too, played a decisive role in the airplane’s development, in particular during the two World Wars.”⁸

(B) Statement of Problem

With the increasing complexity of aviation technologies, the industry and its ecosystem, innovation in this sector has become more sophisticated over time. These technologies are very specialised and cannot be simply replicated. From a single patent to this vast network of patents, the aviation business is only becoming more complex. Such an important sector of the industry, which has major consequences on the global economy, should be studied with respect to patent

⁷ V.K. Ahuja, Law Relating to Intellectual Property Rights (Lexis Nexis, 3rd edn., 2020)

⁸ Hamdan-Livramento Intan, “The role of patents in the history of aviation” WIPO Magazine (2018).

law. Since there is a lack of such information on this topic in the public domain, this paper aims to cover the same in an easy to understand manner.

(C) Research objectives

1. To explain and analyse the current legal framework on intellectual property rights in India.
2. To explain and analyse how Patent Law as a whole is used in the aviation industry throughout the world.
3. To showcase certain development and innovations in the aviation industry which are of significant importance to the legal framework on patent law.
4. To showcase whether the legal framework on patent law with respect to aviation industry is satisfactory.

(D) Research Questions

1. What is the current legal framework on intellectual property rights and how did it evolve to its current form in India?
2. How is the subject of Patent Law as a whole used in the aviation industry throughout the world?
3. What are some development and innovations in the aviation industry which are of significant importance to the legal framework on patent law?
4. Is the legal framework on patent law with respect to aviation industry satisfactory?

(E) Research Methodology

For the purpose of writing this paper, the researcher has only made use of secondary and descriptive sources, including case laws and restricted literature on the concept of patent law and the aviation industry, the legislature relevant to the same and various research papers and blogs by reputed authors, in order to facilitate analysis for this paper. The doctrinal method of research has been adopted. Electronic sources have been used to place reliance on books, cases, commentaries by reputed authors.

II. GENERAL OVERVIEW OF THE PATENT LAW IN INDIA

This section of the paper will briefly go on to discuss the legal framework of patents in India. On April 20, 1972, the Patents Act 1970 and the Patents Rules 1972 came into force, replacing the erstwhile Indian Patents and Designs Act 1911. The Patent Act was largely based on the recommendations of the Ayyangari Committee Report by Justice N. Rajagopala Ayyangari.

One of those recommendations was to grant process patents only to inventions related to chemicals, medicines and foodstuffs.

Later, India ratified a number of international agreements in an effort to strengthen its legal system for patents and bring it into compliance with global norms. A key step in achieving this objective was adopting the Trade Related Intellectual Property Rights (TRIPS) framework.

1. Patentability: Applying for a Patent

It is to be noted that not every innovation can be simply patented, a patent is awarded to the patent owner only if their innovation in question meets the criterion laid down for patentability under the current legal framework. Hereinbelow, some of these criterion have been listed: -

- Inventive step or non-obviousness
- Industrial Application
- Novelty

The list of exclusions that do not qualify as "inventions" and are therefore not patentable is covered in Sections 3 and 4 of the Patents Act.⁹

2. Procedure for Grant of Patent

"Persons entitled to apply for patents: - (1) Subject to the arrangements contained in section 134, an application for a patent for an invention might be made by any of the accompanying persons, in other words, —

(a) By any individual professing to be the valid and first creator of the invention;

(b) By any individual being the assignee of the individual professing to be the valid and first innovator in regard of the privilege to make such an application;

(c) By the legitimate agent of any deceased individual who is preceding his demise and is qualified to make such an application.

(2) An application under sub-section (1) might be made by any of the persons alluded to in that either alone or mutually with some other individual. ”¹⁰

Once it is determined that the application meets all parameters for patentability, the applicant is granted a patent. The patent is sealed by the Patent Office and periodically announced in the journal.

⁹ The Patents Act, 1970, (Act 39 of 1970), s. 3,4.

¹⁰The Patents Act, 1970, (Act 39 of 1970), s. 6.

According to Section 25 of the Act, “the opposition to grant of patents which can be said to be of two types: -

- Pre Grant (before the patent is granted) and
- Post Grant (after 1 year of grant of the patent).

Such opposition can be filed by anyone interested in the field of the invention in form 7 with the prescribed fee within 12 months from the date of publication of the patent.”¹¹

3. Rights of Patentee

According to Section 48 of the Act, “rights conferring upon the patentee after the grant of the Patent.

- Exclusion of the third party to use, sell, or import the patented product without the patentee’s consent.
- Exclusion of the third party from using, selling or importing the patented product (if the subject matter is the process) without the patentee’s consent.”¹²

4. Infringement and Remedies with respect to Patent

A violation of the rights held by a patent holder may be termed as ‘infringement of patent’. “Whenever a person exercises the rights of the patent holder without the patent owner’s consent, they cause infringement.”

5. Kinds of Patent Infringement: -

- Direct Infringement – Without the patentee's approval, directly selling, marketing, or using any product that is remarkably similar to the patented product for commercial purposes is direct infringement.
- Indirect Infringement- Any instance of fraudulent and accidental patent infringement constitutes an indirect infringement.
- Contributory Infringement- Contributory infringement occurs when a person intentionally violates a patent holder's rights.

Following are the acts that have been excluded from the scope of such infringement-

- “Government use: As per Section 100 of the Act a patented invention can be used by the Central government for its own use and as per Section 47, the patented invention can

¹¹ The Patents Act, 1970, (Act 39 of 1970), s. 25.

¹² The Patents Act, 1970, (Act 39 of 1970), s. 48.

be imported by the government.¹³

- Exemption on experiments and research: the use of a patented invention for experiments and teaching purposes does not come under infringement.¹⁴
- Patented inventions on drugs and medicines can be imported by the government.¹⁵
- Any patented invention on foreign vessel/ aircraft/ vehicle comes to India is not an infringement.”¹⁶

6. Filing suits for infringement

Section 104 of the Patent Act of 1970 deals with the filing of a lawsuit by the patentee against any infringement of their patent. “The patentee can file a suit in a district court or directly in the high court. Suit for patent infringement can be filed after the grant of patent yet the patentee can also claim for damages committed between the publication of patent application to the grant of the patent.”¹⁷

After receiving a patent, the onus of proof rests with the patentee; however, if the invention is still in progress, the onus of proof shifts to the opposing party.

7. Remedies for patent infringement

Section 108 of the Act deals with reliefs or remedies available to the patent holder against any infringement.

8. Injunction

The most typical type of remedy granted in patent infringement cases is an injunction. “Injunction is an order of the court restricting a person from beginning or continuing a course of action (infringing in this case) which threatens or invades the legal rights of a person.”

9. Damages and account of profit

If the suit is decided in favour of the Plaintiff, the court can award either damages or direct the Defendant to render an account of profits but not both.

10. Exceptions and Limitations of Patent in India

“Article 30 of TRIPS (Trade-Related Aspects of Intellectual Property Rights) allows for limited exceptions to the exclusive rights conferred by a patent.”

¹³The Patents Act, 1970, (Act 39 of 1970), s. 47, 100.

¹⁴The Patents Act, 1970, (Act 39 of 1970), s. 47.

¹⁵*Ibid.*

¹⁶The Patents Act, 1970, (Act 39 of 1970), s. 49

¹⁷The Patents Act, 1970, (Act 39 of 1970), s. 104.

- **Exception on Non-Commercial use**

“The Government has the power to grant a license, known as Compulsory License (CL), to a third party to use the patented invention (when the patentee is not using the invention for profit) so as to restrict the rights of the patentee for the purpose of preventing the abuse/ misuse of the rights by the property holder and to prevent the negative effect of such action on the public.

When the patented invention is not commercialised in India or the invention is not available to the public at reasonable prices or the invention is not manufactured in requisite amount, then the government grant such license.”¹⁸

- **Exception on Experimental / Scientific Research**

Section 47(3) of the Act with the exception on “experimental and scientific use of Patented invention, the grant of a patent is subject to the condition that any product or process, in respect of which the patent is granted, may be made or used by any person for the purpose merely of experiment or research including the imparting of instructions to the students. This form of exception grants third parties to carry out experiments and scientific processes for teaching students without infringing the rights of the patent holder.”

- **Exception on Regulatory use or Private use**

Section 107A of the Indian Patent (Amendment) Act, 2005 is also referred to as the Bolar provision and deals with the exception of “regulatory and private use, this exemption allows the manufacturers of generic drugs to undertake steps reasonably related to the development and submission of information required for obtaining marketing approval anywhere in the world in respect of a patented product without the consent of the patentee.”¹⁹

Because of this provision, generic manufacturers are able to sell and create their products before the term of patent expires. Several nations use the Bolar Provision, which has been recognised as complying with the TRIPS agreement, to advance science and technology.

- **Exception on Foreign Vessels, Aircraft or Land Vehicles**

“Section 49 of the Act deals with the said exception, when the foreign vessels, aircraft, or land vehicles accidentally or temporarily comes to India, the patent rights are not infringed when the patented invention is used exclusively for the needs of foreign vessels, aircraft, or land vehicles

¹⁸ TRIPS: Agreement on Trade-Related Aspects of Intellectual Property Rights, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C (adopted April 1994, entered into force 1 January 1995) 1869 U.N.T.S. 299 (TRIPS) art 30.

¹⁹ The Patents Act, 1970, (Act 39 of 1970), s. 107A.

and other accessories.”²⁰

11. Reciprocal Agreements and Treaties

India is also a signatory to the following international IP agreements: -

- **Paris Convention**

Under this agreement, “any person from a signatory state can apply for a patent or trade mark in any other signatory state, and will be given the same enforcement rights and status as a national of that country would be.”

- **Berne Convention**

Under this agreement, “each member state recognises the copyright of authors from other member states in the same way as the copyright of its own nationals.”

- **Madrid Protocol**

Under this agreement, “a person can file a single trade mark application at their national office that will provide protection in multiple countries.”

- **Patent Cooperation Treaty**

“This is a central system for obtaining a ‘bundle’ of national patent applications in different jurisdictions through a single application. India is not a signatory to the Hague Agreement, which allows the protection of designs in multiple countries through a single filing.”

III. AVIATION INDUSTRY AND PATENT LAW

In 1903, the Wright brothers applied for their first patent in the United States for an aileron deflection mechanism and rudder structural design. In 1906, the US Patent Office granted Wright Brothers a patent for the same. Mr. Octave Chaunte was an American civil engineer and aviation pioneer who helped to foster the collaborative spirit of aviation communities by publishing his book ‘Progress in Flight Mechanics’ in 1894. Mr. Chaunte is frequently referred to as the ‘Father of Aviation’. He was critical of this decision of the Wright Brothers’ because they had refused to share their knowledge with the aviation community, from which they had gained so much in the first place.

Meanwhile, a German citizen, Mr. Hugo Junkers, had filed a patent application with the German Patent Office for his current understanding of aerodynamics and more stable aeroplane construction. His contributions to aviation influenced the development of future plane designs.

²⁰ The Patents Act, 1970, (Act 39 of 1970), s. 49.

During this time, the number of patent applications filed around the world increased at a rapid rate. A patent was given to the Wright Brothers in 1906, claiming rights to a system of flight control. This patent took the form of a patent troll when it was utilised to file suits for infringement against all innovators working on flight controls. This eventually hampered the rate of aeroplane development in the United States, as seen by the fact that the US used European-designed planes in World War I.

The Manufacturers Aircraft Association (MAA) was founded in 1917 by the US government in response to their realisation of the scope of IP rights. Its mission was to encourage its members to cross-license their inventions through a patent pool to support the country's wartime requirements. In many major countries, similar organisations were formed to aggregate all aircraft patents from various inventors. This, however, did not pan out as planned. Mr. Junkers, like the Wright Brothers, was unwilling to share his inventions with other aircraft manufacturers in Germany. The government, on the other hand, forced Mr. Junkers to share and contribute his inventions with aircraft manufacturers. During World Wars I and II, the government made significant investments to speed up the design and manufacture of warplanes, which gave the aviation industry a boost. The German government further forced inventors such as Junkers, Dornier, and others to collaborate in the pursuit of the finest warplane design. The National Advisory Community of Aeronautics (NACA) was founded in 1915 in the United States to accelerate aviation progress.

The aviation industry ecosystem had undergone a significant transformation by the end of World War II. Even now, the governments have a significant impact on this ecology. During these years, the entire commercial aircraft sector saw significant consolidation, with two primary competitors, Boeing and Airbus, emerging as world aviation's dominating players. The number of patent filings in the aviation business has increased in the last decade or two, but it still does not match the number of patents submitted during the industry's early start-up years. To earn enough returns on their investments, aircraft manufacturers began to rely on other means. With the increasing complexity of aviation technologies, the industry and its ecosystem, innovation in them have become more sophisticated over time. These technologies are very specialised in nature and, if not all, then most of them, cannot be simply replicated. Airplane manufacturers set the specifications and standards for these parts, working closely with suppliers of such technology who, in most cases, sign enter into long-term exclusive contracts with the manufacturers. Patent owners began licensing out their inventions to generate new cash streams in order to survive in this competitive climate. Instead of acting as independent inventors with a single patent seeking commercial exploitation, aviation majors now act as integrators. Such innovation is first

translated into a patent application, which is then turned into a grant with a set of claims, which are then put through the manufacturing process before being integrated into an aircraft platform. From a single patent to this vast network of patents, the aviation business is only becoming more complex, and the current technology only promises to advance in leaps and bounds in the future. The aviation sector, like any other competitive industry, must constantly innovate in order to keep up with client demands. Aviation necessitates a great deal of study, innovative design concepts, technological innovation, and cost-effective manufacturing methods. The quickest and most practical means of transportation is air travel. The aviation industry is, nevertheless, still ripe for innovation and monetization even after many decades have passed since its beginning due to the abundance of new technology that could enhance and benefit it. For instance, a host of innovations are being developed to make flying safer and more environmentally friendly.

1. Patent Troll in Aviation

In 1917, the Wright Company and the Curtiss Company, the two primary aircraft patent holders, virtually halted the development and manufacturing of new planes, which were urgently needed when the United States entered World War I. A committee chaired by Franklin Roosevelt, then Assistant Secretary of the Navy, urged the industry to form a cross-licensing group (a patent pool) and the Manufacturer's Aircraft Association was created.

2. Golden Period of Aircraft Innovations

Many consider the 1930s to be the most inventive time in aviation history. During this time, 139 distinct aircraft models were developed. Air-cooled engines replaced water-cooled engines, resulting in lighter planes that could be built larger and quicker. The cockpit instrumentation also improved with better altimeters, airspeed indicators, rate of climb indicators, compasses, and an artificial horizon. The start of World War II also aided in the development of such breakthroughs from contemporary passenger aeroplanes to ultimate fighter planes.

It was Boeing who created the Boeing 247, frequently referred to as the first modern passenger airliner. When it first appeared in 1933, United Air Lines immediately bought 60 of them. The 247 was based on a military- built low-wing, twin-engine bomber with retractable landing gear that had a speed of 155 miles per hour with seating for 10. In order to make flying more comfortable for passengers, it had a soundproofed interior with soft seats and a hot water heater. Eventually, Boeing installed variable-pitch propellers on the 247, which shortened take-off times, increased climb rates, and ultimately increased cruising speeds.

3. The Jet Engine

In the 18th century, Sir Isaac Newton was the first to postulate that a rearward-channelled explosion could move a machine forward at a high rate of speed. However, until Frank Whittle, a British pilot, created the first jet engine in 1930, no one had found a practical application for the idea. Whittle's invention was not tested for several years due to considerable scepticism about the commercial viability of a jet powered engine at the time. During the war, Whittle refined his jet engine, and in 1942, he shipped a prototype to General Electric in the United States. The Bell P59, America's first jet plane, was manufactured the following year.

4. Radar

Radar was another technological breakthrough that had a significant impact on the war's result (and later on commercial aviation). British scientists had been working on a system that would notify them to approaching enemy aircraft even before the war. By 1940, Britain possessed a line of radar transceivers down its east coast that could identify German aircraft as soon as they took off from the Continent. Sir Robert Alexander Watson-Watt patented radar (British patent) in April 1935.

5. Major Segments

The aviation industry manufactures a wide variety of components such as-

Airframe: Airframe is the mechanical structure of an aircraft. It combines aerodynamics, composites and light materials, on-board systems, and new frame designs for aircrafts.

Fuselage: Fuselage includes that portion of the aircraft that usually contains the crew and payload, either passenger, cargo, or weapons. Most fuselages are long, cylindrical tubes or sometimes rectangular box shapes. The fuselage is joined to by all of the other significant parts of the aircraft.

Wing: The wing is the most crucial component of an aircraft because it generates the lift necessary for flight. The wing is made up of two halves, left and right, when viewed from behind. These halves are connected to each other by means of the fuselage.

Air Engine: Engine is the key component of an aircraft. Aircraft uses several kinds of engines, but they can all be classified in two major categories viz. propeller driven piston engines and a form of jet engine.

Aircraft controller: Aircraft controller comprises of horizontal and vertical stabilizer, elevator, rudder, aileron, flap, cabin and cockpit.

Propulsion & Fuel: Propulsion & Fuel includes aircraft fuel technologies, Electric motors, fuel

storage and supply system, jet/turbofan engines, piston, international combustion engine and turboprop engines.

Air traffic system: Air traffic system includes new electronic and operational data, signalling management, navigation technology, radar, surveillance, data recorders, defence system and performance systems.

Airport development: Airport development includes technology for aircraft route development, aircraft runway development, airport infrastructure development, aircraft parking and passenger's security and management tools.

Aircraft Manufacturing: Aircraft Manufacturing includes design, engineering, manufacturing, construction, testing, maintaining, commissioning and servicing of aircraft.

IV. AVIATION INDUSTRY: AN INDIAN PERSPECTIVE

The Indian aviation industry is on the verge of discovering fresh growth opportunities. India aspires to be the third-largest aviation market in the world. In pursuit of this objective, the aviation industry has adopted a number of improvements to aid development, including Foreign Direct Investment (FDI), the launch of low-cost carriers (LCCs), the modernisation of airports with cutting-edge technology, and the establishment of new routes to promote regional connectivity.

The aviation industry contributes INR 330 billion (0.5 percent) to India's GDP each year. This includes INR 147 billion in direct contributions from the aviation sector's production (airlines, airports, and ground services); INR 107 billion in indirect contributions from the aviation sector's supply chain; and INR 77 billion in spending by aviation sector and supply chain employees. Additionally, tourism generates INR 582 billion in 'catalytic' benefits, bringing the total contribution to INR 912 billion, or 1.5 percent of the country's GDP.²¹

In India, the aviation industry employs 1.7 million people. This number includes 276,000 directly supported by the aviation industry, 841,000 jobs indirectly supported by the aviation industry's supplier chain, and 605,000 jobs supported by the spending of aircraft industry and supply chain employees. The aviation sector contributes to public finances by paying around INR 87.5 billion in taxes, which includes employee income tax, social security contributions, and corporate tax levied on earnings. According to estimates, the supply chain for the aviation industry contributes an additional INR 9.8 billion in government revenue, with an additional INR 7.1 billion coming from activities supported by the expenditure of both aviation and supply chain employees. The

²¹ IATA, 'The Importance of Air Transport to India' (4 September 2018) available at: <<https://www.iata.org/en/iata-repository/publications/economic-reports/india--value-of-aviation/>> (last visited on 17 December 2022).

Indian civil aviation industry is among the top ten in the world in terms of market size, with a value of roughly USD 16 billion. However, much more needs to be done in order to attain the goal of becoming the world's third largest aviation market.

Global businesses dominate the Indian aviation industry, particularly in terms of design and the introduction of new technologies. When it comes to global competitiveness, Indian enterprises are teetering, and they must redouble their efforts in the areas of research and development if they are to compete on a level playing field in the global aviation market. Aerodynamics, engine, alternative fuel formulation, air traffic system, and airport development are not covered by Indian players who are primarily concerned in aircraft production.

Indian Efforts on Fighters

The Light Combat Aircraft (LCA) project started in 1983, and it took 14 years to build a light aircraft. The LCA was created as a low-cost, lightweight replacement for India's ageing fleet of MiG-21 fighters, which were renamed Tejas (Sanskrit meaning brightness) in 2003. The prime contractor HAL was given responsibility for the majority of the LCA design and manufacturing work under the authority of India's Aeronautical Development Agency (ADA). HAL is also in charge of coordinating the efforts of a number of government labs, educational institutions, and subcontractors. The Tejas has a delta wing design with a digital fly-by-wire control system, integrated avionics, considerable use of composite materials, and glass cockpit displays. The aircraft's multi-mode radar, laser designator pod, and FLIR system, ring laser gyro inertial navigation system, full electronic warfare suite, and jam-resistant communications systems are among its other advanced features. Tejas only needs a short runway and "rockets off the runway and into the air in less than 500 metres."

V. NEW DEVELOPMENTS IN THE AVIATION INDUSTRY

A patent is a sort of intellectual property (IP) that provides legal protection for new products, techniques, or designs. They give the owner a competitive edge by preventing competitors from using an invention for a limited time. Patents can also serve as a valuable indicator of innovation, as well as a predictor of technological and market developments. Additionally, governments may utilise them as a success gauge for innovation goals or to wield geopolitical power.

Not all patents are created equal. For instance, to protect a competitive manufacturing technology, a collection (family) of patents may be required; a single patent can result in a multi-million-dollar pay-out; and another patent may have no commercial or economic potential at all.

As a result of a patent filed in 1994, Airbus and Aviation Partners Inc. launched a lawsuit in late 2011. The patent described a “swooping” blended winglet, similar to the “Sharklet” featured on the Boeing 737 and Airbus A320. A seven-year court struggle ensued, culminating in a ‘substantial settlement’ to Aviation Partners in spring 2018. On the other hand, some patents are submitted in a systematic manner to artificially raise statistics while having no genuine value. Patent value can be estimated using citations as well as global publications. While trademarks, trade secrets, commercial agreements, and other instruments are used by the aerospace sector to maximise the return on technological breakthroughs, patents are seen as critical for leveraging aerospace IP.

Patents are becoming more vital for developing MSMEs, mid-caps, and large corporations. It becomes more difficult to enhance performance and maintain an edge as technology matures inside a given paradigm. As competition heats up, firms are increasingly relying on patents to protect incremental improvements and keep competitors at bay. According to some experts, the aircraft sector is approaching the technological boundaries of the existing paradigm, adding to the fierce battle for the tiniest of profit margins.

The most important factor in making the Boeing ‘BIG BOEING’ was IP protection and administration. One of the most well-known names in the worldwide aviation sector is Boeing. As of January 2014, Boeing had more than 7,000 active US patents and more than 13,500 active patents globally. It had more than 8,500 active patent applications worldwide, including numerous PCT and European Patent (EP) applications that would increase in number when they reached the national/validation stages. Boeing submitted 145 foreign patent applications to the PCT in 2012. On the 787 (Dreamliner) programme alone, Boeing filed over 1,000 patent applications. Patent applications cover avionics, structures, computing, satellites, energy, simulation, and manufacturing, among other fields. Every year, Boeing honours its best innovators for developing new intellectual property.

Airbus filed around 380 patent applications for its new double-decker carrier during the development phase of the A380. Aerodynamics, cabin design, engine integration, flight controls, aircraft systems, manufacturing techniques, and the extensive use of innovative lightweight composite materials all saw significant breakthroughs. Airbus has also applied for patents for the A380’s revolutionary systems. The avionics data communication network (ADCN) was one of them, and it met the growing inter-system communication needs while also improving data integrity and transmission speed. Another important advancement in aviation technology is the Brake-to-Vacate function, which optimises the amount of energy required for braking and reduces runway occupancy time while maintaining a high level of passenger

comfort while landing. These patent applications also cover the Electrical Back-up Hydraulic Actuator (EBHA), which is a part of the new two energy, four channel flight controls architecture for the A380.

VI. NATIONAL AND INSTITUTIONAL AEROSPACE PATENT ACTIVITY

Global:

Globalization and new entrants into the commercial aviation sector, such as China, are having an impact on supply chain dynamics. To stand out and create value in the new and established technology sectors, the global aerospace industry is prioritising patent protection. This increased patent activity reflects the maturation of traditional aircraft technology while also addressing technical trends toward electrification and the advent of new markets.

Patent trends are influenced by different patent laws and policies around the world. Commercial manoeuvring by global original equipment manufacturers (OEMs) and global economics also has a significant impact. There has been a sharp rise in the number of aeronautical patent applications since 2010. Expanding technical innovation and severe competition support the aircraft patent rate. Trade secrets and commercial agreements are still used to protect aeronautical IP, but the data indicates that patents are becoming more common. High R&D expenses and airworthiness rules will not keep competition at bay permanently, with China on the verge of launching its first single-aisle airliner.

US Corporates:

The influence of the US “first to file” amendment on patent activity in US firms may be observed plainly. Boeing’s patent activity grew from 2001 to 2008, owing to major advances in composite technologies, electrification, smart systems, and manufacturing processes made possible by R&D on the 787. Boeing’s patent activity decreased marginally in 2009 before increasing in 2013 in response to a change in US law. The global decline following the high in 2008 could be attributed to the financial crisis.

European Corporates:

Airbus filed the most patents in 2008 as a result of a corporate-wide competitive filing strategy that coincided with important R&D projects. According to GB (UK) first filings, Airbus UK is growing. Manufacturing research and development, as well as design programmes like Wings of Tomorrow, are major drivers. Around two-thirds of the Wing of Tomorrow patent activity, according to Airbus, comes from British inventions. Patent filings in Airbus UK are concentrated in wing, landing gear, and composite technologies, whereas filings in Airbus

France and Germany are more diverse. Airbus' Spanish patent applications are sparse, but they clearly target composite materials and manufacturing.

VII. SHORTCOMINGS

Now while the paper has gone into detail with respect to the entire intellectual property framework on designs in India and has overall provided positive feedback on the same, it cannot be denied that there are a few shortcomings within this framework that still do exist.

In India Intellectual Property Rights can be enforced through courts of appropriate jurisdiction by filing a civil/criminal suit. Our Intellectual Property laws as well as the Competition Act set out procedures for the same. One cannot in the case of patent and design infringements file a criminal case and a disadvantage of a civil suit is that it is highly unlikely for the owner of such Intellectual Property to recover large damages, and punitive damages against an infringer. Such an issue should be resolved by the Indian judiciary and the legislature to ensure that protection of intellectual property rights is preserved.

The legal framework governing all types of Intellectual Property, primarily in response to India's accession to the WTO in 1995, have been amended quite recently. Although the legal framework surrounding Intellectual Property in India is quite thorough and generally on par with other foreign laws of a similar nature, there still do exist significant concerns over enforcement of the same. One of the major reasons of this issue is bureaucratic delay, and the amount of pendency of cases that exist at both civil/criminal courts of the country. This means that cases can go on for several years before their conclusion. At the local level particularly, there is also a lack of transparency. In India there is also the existence of a peculiar scenario wherein a large number of small players infringe upon Intellectual Property rights. This in turn results in a huge difficulty in enforcement of such rights and damages often tend to be quite meagre.

Another issue which exists with the legal framework on patents is patent commercialisation across the industry, which is solely used for value extraction through licensing, monopolising technology and blocking competitors. In reality, certain companies—often known as "patent trolls"—exist solely for the purpose of taking advantage of the legal clout of patents by acquiring inventions in order to sue already-established corporations or demand royalties.

Patents can also be utilised to make it challenging for rivals to compete. Smaller companies may struggle to find the resources to file and defend patents, which makes their entry into this industry even more difficult.

VIII. CONCLUSION

To conclude the paper, it can be stated that the concept of patent law has been well incorporated in the aviation industry. The industry is one which has seen and continues to see huge amounts of development throughout the course of time, which makes the use and application of this legal framework even more important.

Historically, aerospace companies have used trade secrets, know-how, and commercial agreements to protect their intellectual property (IP). This has evolved in the previous decade, as the number of aeronautical patents issued worldwide has increased. This transformation is fuelled by national legislation, corporate incentives, new technology, and mature marketplaces. There are also geographic differences. Changes in US IP law in 2009 switched IP ownership from “first to invent” to “first to file,” resulting in a significant rise in patent filing activity. Since 1999, China’s patent quota system has fostered massive amounts of patent applications that appear to be mostly superficial because few of them result in publications. This picture is evolving, and the 2013 reforms to Chinese IP legislation are assisting in the resolution of China’s credibility issues. Western aerospace corporations are ramping up their patent filings in China, recognising the importance of the country’s aviation business as well as the danger posed by a quickly expanding domestic industry. Increased patent activity is also fuelled by technological maturity, new markets, and technological advances. New vertical take-off and landing (VTOL) aircraft ideas and electrification technologies are gaining traction, indicating the potential for disruption. Over the last two decades, the number of composite inventions has increased, possibly explaining some of the changes in the industrial landscape. Patent filings for mature conventional technologies are increasing, indicating that more invention is needed to improve performance and differentiate. In general, technology patent patterns correspond to national aeronautical specialisations and capabilities.

115 years after the invention of aeroplanes, the aviation industry is at the pinnacle of innovation. Currently, every component of the existing sector is being scrutinised from a technology or design standpoint.

Modifications include communications and software solutions that allow passengers to access the internet, as well as the provision of greater seating space on planes, all while adhering to safety rules. In addition to software and technical advancements, airlines are experimenting with structural alterations, such as the location of table trays, the layout of overhead bins, and headsets for virtual reality that are connected to passenger seats. The use of modern technology in aviation is reducing maintenance and safety inspection turnaround times on the ground.

Given the foregoing, it is apparent that the aviation and transportation technology markets will keep growing, resulting in an increase in new ideas and innovations, necessitating the need for strong patent protection.

In the end, researcher would like to state that while the intellectual property framework on patents in India and throughout the aviation industry have some glaring shortcomings, some of them listed in the section above, its importance and its advantages far outweigh the shortcomings and over time the judiciary as well as the legislature will help remove these difficulties within the framework.

IX. REFERENCES AND BIBLIOGRAPHY

BOOKS

- V.K. Ahuja, *Law Relating to Intellectual Property Rights* (Lexis Nexis, 3rd edn., 2020)
- B.L. Wadhera, *Law Relating to Intellectual Property* (Universal Law Publishing, 2016)

ONLINE MATERIAL

- Tewari Avanee - Chadha & Chadha Intellectual Property Law Firm, 'Flying high: patents in the aerospace industry' (Lexology, 7 January 2021) available at: <<https://www.lexology.com/library/detail.aspx?g=d8985bb5-7668-448b-bce3-debd89521f16>> (last visited on 17 December 2022).
- Patentwire, 'Innovation in Aviation' (19 October 2015) available at: <<https://www.patentwire.co.in/wp-content/uploads/2019/05/Innovation-in-Aviation.pdf>> (last visited on 17 December 2022).
- Hamdan-Livramento Intan, 'The role of patents in the history of aviation' (WIPO Magazine December 2018) https://www.wipo.int/wipo_magazine/en/2018/06/article_0007.html (last visited on 17 December 2022).
- Aerospace Technology Institute, 'Global Aerospace Patents: Technology, Innovation and Competitive Strategy' (April 2019) available at: <https://www.ati.org.uk/wp-content/uploads/2021/08/insight_11-global-aerospace-patents-1.pdf> (last visited on 17 December 2022).

STATUTES

- The Patents Act, 1970 (39 of 1970)
- The Patents Rules, 2003

TREATIES

- TRIPS: Agreement on Trade-Related Aspects of Intellectual Property Rights, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C (adopted April 1994, entered into force 1 January 1995) 1869 U.N.T.S. 299 (TRIPS)
- Paris Convention for the Protection of Industrial Property of March 20, 1883, as revised at Brussels on December 14, 1900, at Washington on June 2, 1911, at the Hague on November 6, 1925, at London on June 2, 1934, at Lisbon on October 31, 1958, and at Stockholm on July 14, 1967 (BIRPI), 1968.

- Berne Convention for the Protection of Literary and Artistic Works: Texts. Geneva: World Intellectual Property Organization, 1982.
- Madrid Agreement Concerning the International Registration of Marks (1891) and the Protocol Relating to that Agreement (1989).
- Patent Cooperation Treaty (June 19 1970) 28 U.S.T. 7645, 1160 U.N.T.S. 231.
