

# Pirate Battles in Outer Space: Preventing Patent Infringement on the 8th Sea

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## I. INTRODUCTION

The news of the Challenger space shuttle explosion in 1986 shocked the nation.<sup>1</sup> The catastrophe occurred just seventy-three seconds into the launch due to a faulty o-ring in the solid fuel rocket that led to a chain of failures ending with the mixing and ignition of liquid oxygen and liquid hydrogen fuel.<sup>2</sup> The event was nationally televised, and millions of Americans helplessly watched

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1. Nick Greene, *Remembering Challenger, January 28, 1986*, ABOUT EDUC., <http://space.about.com/cs/challenger/a/challenger.htm> (last updated Jan. 27, 2016).

2. PRESIDENTIAL COMM'N ON THE SPACE SHUTTLE CHALLENGER ACCIDENT, REPORT OF THE PRESIDENTIAL COMMISSION ON THE SPACE SHUTTLE CHALLENGER ACCIDENT 19–21 (1986); Greene, *supra* note 1.

the disaster as it unfolded.<sup>3</sup> In the aftermath of the explosion, the Senate Committee on Commerce, Science, and Transportation ordered the Congressional Budget Office to perform a special study to determine the United States' future involvement in outer space.<sup>4</sup>

Twenty-six years prior to the Challenger incident, when the United States Shuttle Program was first created, the United States' policy was that space travel would be conducted almost exclusively in the public sector through the National Aeronautics and Space Administration ("NASA").<sup>5</sup> It was not until Congress enacted the Commercial Space Launch Act in 1984 that the private sector was allowed to launch spacecraft into outer space for the first time.<sup>6</sup> In 1990, the Launch Services Purchase Act was passed into law, requiring NASA to outsource the launches of its primary payloads to commercial launch providers.<sup>7</sup> By 2010, NASA extended its commercial launch preference to any "space goods, services, or activities," meaning that almost every launch beyond this point was to be contracted to the private sector.<sup>8</sup>

In the absence of a government space launch program, the commercial launch industry is a rapidly growing technological field valued at over \$100 billion per year.<sup>9</sup> As with all technological advances, companies want to ensure that their future invest-

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3. Greene, *supra* note 1.

4. See Rudolph G. Penner, *Preface* to CONG. BUDGET OFFICE, SETTING SPACE TRANSPORTATION POLICY FOR THE 1990S (1986), [https://www.cbo.gov/sites/default/files/99th-congress-1985-1986/reports/doc24c-entire\\_0.pdf](https://www.cbo.gov/sites/default/files/99th-congress-1985-1986/reports/doc24c-entire_0.pdf).

5. See Nat'l Aeronautics and Space Act of 1958, Pub. L. No. 85-568, 72 Stat. 426 (1958); Timothy A. Brooks, *Regulating International Trade in Launch Services*, 6 BERKLEY TECH. L.J. 59, 60-61 (2001).

6. See Commercial Space Launch Act, Pub. L. No. 98-575, 98 Stat. 3055 (1984) (enabling the private sector to launch commercial launch vehicles into outer space).

7. Launch Services Purchase Program, 42 U.S.C. § 2465d (1990) (repealed 1998).

8. See OFFICE OF THE PRESIDENT, NATIONAL SPACE POLICY OF THE UNITED STATES OF AMERICA 10-12 (2010), [https://www.whitehouse.gov/sites/default/files/national\\_space\\_policy\\_6-28-10.pdf](https://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf).

9. GLENNON J. HARRISON, CONG. RESEARCH SERV., R42492, THE COMMERCIAL SPACE INDUSTRY AND LAUNCH MARKET 1 (2012), [http://www.law.umaryland.edu/marshall/crsreports/crsdocuments/R42492\\_04202012.pdf](http://www.law.umaryland.edu/marshall/crsreports/crsdocuments/R42492_04202012.pdf).

ments are protected. Traditionally, inventors have used patents as a tool to obtain an exclusive right granted by a national government to exclude others from making, using, or selling an invention for a limited period of time.<sup>10</sup> “Because patents are granted by national governments, they are inherently territorial and may only be enforced within the jurisdiction of the granting government.”<sup>11</sup> This means that while the holder of a United States patent would enjoy legal protection for her invention within the United States’ territories, the inventor would also need to file for a patent in every other country in which she wishes to receive protection.<sup>12</sup> This jurisdictional issue presents many problems for protecting inventions that have wide, international markets. But what about inventions that have *extraterrestrial* markets? After all, no one has jurisdiction over outer space.<sup>13</sup>

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10. Matthew J. Kleiman, *Patent Rights and Flags of Convenience in Outer Space*, AIR & SPACE LAW, 2011, at 4; see 35 U.S.C. § 271(a) (2013) (“Except as otherwise provided in this title, whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent.”).

11. Kleiman, *supra* note 10, at 4; see JON O. NELSON, INTERNATIONAL PATENT TREATIES 1 (2007); Christopher Miles, Comment, *Assessing the Need for an International Patent Regime for Inventions in Outer Space*, 11 TUL. J. TECH. & INTELL. PROP. 59, 59–60 (2008).

12. Kurt G. Hammerle & Theodore U. Ro, *The Extra-Territorial Reach of U.S. Patent Law on Space-Related Activities: Does the “International Shoe” Fit as We Reach for the Stars?*, 34 J. SPACE L. 241, 247 (2008) [hereinafter *Extra-Territorial Reach*]; Kleiman, *supra* note 10, at 4 (“For this reason, an inventor must file a separate patent application in each country where it wishes to obtain exclusive rights to an invention.”); Theodore U. Ro et al., *Patent Infringement in Outer Space in Light of 35 U.S.C. § 105: Following the White Rabbit Down the Rabbit Loophole*, 17 B.U. J. SCI. & TECH. L. 202, 206–07 (2011) [hereinafter *Patent Infringement in Outer Space*].

13. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, art. II, Oct. 10, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 8843 [hereinafter *Outer Space Treaty*] (“Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”); Kleiman, *supra* note 10, at 5 (“Once an object is in space, however, it transcends the boundaries and protections of any single terrestrial market or patent jurisdiction.”).

“For years, inventors have been filing and obtaining patents for technologies that have either exclusive applicability in outer space or dual-use applicability both on Earth and in outer space.”<sup>14</sup> But these inventions are only protected on Earth.<sup>15</sup> In the beginning of commercial space flight, the technology and cost of entry for joining the commercial space launch industry was a barrier, which kept the number of companies in the field relatively small.<sup>16</sup> As the industry grows, however, and more companies enter the market, “traditional terrestrial legal issues associated with intellectual property (‘IP’) law will find increasing applicability to such commercial outer space activities.”<sup>17</sup>

To address this issue, Congress enacted the Patents in Space Act in 1998, giving the United States extraterritorial jurisdiction over “[a]ny invention made, used, or sold in outer space on a space object or component thereof under the jurisdiction or control of the United States” subject to exceptions for compliance with international treaties.<sup>18</sup> As discussed later in this Note, Congress unintentionally created a loophole by adding these exceptions, allowing infringers in the United States to use, control, and derive benefits from technology in outer space that treads on a United

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14. *Patent Infringement in Outer Space*, *supra* note 12, at 205; *see also USPTO Patent Full-Text and Image Database*, U.S. PATENT & TRADEMARK OFF., <http://patft.uspto.gov/netahtml/PTO/search-bool.html> (last visited Mar. 3, 2016) (finding over 5,600 patents in a quick search that reference to the term “outer space”); *USPTO Application Patent Full-Text and Image Database*, U.S. PATENT & TRADEMARK OFF., <http://appft.uspto.gov/netahtml/PTO/search-bool.html> (last visited Mar. 3, 2016) (finding over 4,400 patent applications in a quick search that reference the term “outer space”).

15. *See Outer Space Treaty*, *supra* note 13, art. II; Kleiman, *supra* note 10, at 5 (“Once an object is in space, however, it transcends the boundaries and protections of any single terrestrial market or patent jurisdiction.”).

16. *See Kleiman*, *supra* note 10, at 5.

17. *Patent Infringement in Outer Space*, *supra* note 12, at 205; *see also* Barbara Luxenberg, *Protecting Intellectual Property in Space*, in PROCEEDINGS OF THE TWENTY-SEVENTH COLLOQUIUM OF THE LAW OF OUTER SPACE, 172 (1984), <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1005&context=spacelawdocs>; Kunihiko Tatsuzawa, *The Regulation of Commercial Space Activities by the Non-Governmental Entities in Space Law*, SPACE FUTURE (1988), [http://www.spacefuture.com/archive/the\\_regulation\\_of\\_commercial\\_space\\_activities\\_by\\_the\\_non\\_governmental\\_entities\\_in\\_space\\_law.shtml](http://www.spacefuture.com/archive/the_regulation_of_commercial_space_activities_by_the_non_governmental_entities_in_space_law.shtml).

18. 35 U.S.C. § 105 (2013); *see Patent Infringement in Outer Space*, *supra* note 12, at 208–09.

States patent without liability by registering their space vehicle in another country. This Note will suggest that a treaty should be made between the United States and the most technologically-advanced countries banning benefits derived from any technology used in outer space that would otherwise infringe on patents currently in force in the United States or any other participating countries.

## II. THE JURISDICTION OF PATENT LAW

Before one can begin to understand patent law in outer space, one must have a basic understanding of United States patent law and its jurisdiction. For an inventor to obtain legal protection for an invention, the inventor must file a patent application in each country in which the inventor is interested in receiving jurisdictional protection.<sup>19</sup> A patent is a trade with a government. By filing a patent in a country, the inventor is given an exclusive property right by that country's government to exclude all other people in that country from making, using, or selling the invention for a limited period of time.<sup>20</sup> In exchange, the inventor must publicly disclose the invention with enough specificity so that a person skilled in the relevant field could make and use it.<sup>21</sup> The invention must

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19. *Patent Infringement in Outer Space*, *supra* note 12, at 207; *Extra-Territorial Reach*, *supra* note 12, at 247; Kleiman, *supra* note 10, at 4 (“For this reason, an inventor must file a separate patent application in each country where it wishes to obtain exclusive rights to an invention.”).

20. 35 U.S.C. § 271(a) (“Except as otherwise provided in this title, whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States, or imports into the United States any patented invention during the term of the patent therefor, infringes the patent.”); Kleiman, *supra* note 10, at 4; *see also* 35 U.S.C. § 261 (“[P]atents shall have the attributes of personal property.”).

21. 35 U.S.C. § 112(a) (“The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.”).

be new, useful, and nonobvious to receive a patent.<sup>22</sup> In most cases, a patent cannot be obtained for any invention that has already been disclosed to the public, with the exception of some countries—like the United States—that allow for a one-year grace period under certain disclosure situations.<sup>23</sup> Because patents are issued by governments, and are therefore inherently territorial, it follows that no country has patent jurisdiction over outer space.<sup>24</sup>

#### A. Decca Ltd. v. United States

Although patent jurisdiction is territorial, this does not limit patent infringement liability to acts that physically occur on United States soil. For example, United States courts have interpreted the definition of “use” of an infringing system or apparatus in a manner that allows certain extraterritorial acts to trigger infringement under United States jurisdiction.<sup>25</sup> In its 1976 opinion in *Decca Ltd. v. United States*,<sup>26</sup> the Court of Claims was faced with determining whether the United States had jurisdiction over a claim about a worldwide navigational system called Omega.<sup>27</sup> Omega utilized three transmitting stations—two located in the United States and one located in Norway—to send signals to receivers on ships and aircraft.<sup>28</sup> By noting the time differences between the three signals, the receiver could calculate its distance from each transmitter and determine its location.<sup>29</sup> In its opinion, the Court

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22. See *id.* §§ 101–03. “Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor . . .” *Id.* § 101.

23. *Id.* § 102(a)(1)–(b)(1); Kleiman, *supra* note 10, at 4.

24. Outer Space Treaty, *supra* note 13, at art. II (“Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”); NELSON, *supra* note 11, at 1; Kleiman, *supra* note 10, at 4–5 (“Once an object is in space, however, it transcends the boundaries and protections of any single terrestrial market or patent jurisdiction.”); see Miles, *supra* note 11, at 59–60.

25. See generally 35 U.S.C. § 271(a) (“Except as otherwise provided in this title, whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent.”).

26. 544 F.2d 1070 (Ct. Cl. 1976) (per curiam).

27. *Id.* at 1074.

28. *Id.*

29. *Id.*

of Claims held that the important factors in determining whether the patented system was “used” within the United States were “(1) whether ‘control of a system’ occurs on [United States] territory, (2) whether the system is ‘owned’ by a [United States] entity, and (3) whether there is ‘beneficial use’ in the [United States].”<sup>30</sup> The court held that the infringing technology utilized on United States registered ships was used within the United States because use occurred wherever the signals were received and used.<sup>31</sup>

B. *NTP, Inc. v. Research in Motion, Ltd.*

For almost thirty years, the *Decca* factors were the test for determining whether the United States had extraterritorial patent jurisdiction. But in 2005, the United States Court of Appeals for the Federal Circuit modified the test in its *NTP, Inc. v. Research in Motion, Ltd.* opinion.<sup>32</sup> This case centered around technology that allowed users to receive their emails on Blackberry devices through a wireless communication network.<sup>33</sup> When a user sends an email from her mobile device via the “push” technology at issue in this case, the email is sent to a relay where it is pushed to the end recipient without the necessity of a user-initiated connection to the mail server.<sup>34</sup> The issue in this case was that Research in Motion’s relay was physically located in Canada but was being used in the United States.<sup>35</sup> Research in Motion claimed “that the entire accused system and method must be contained or conducted within the territorial bounds of the United States” for 35 U.S.C. section 271 infringement to apply.<sup>36</sup> The court was again charged with determining whether allegedly infringing activity occurred “within the United States” as required in section 271(a) of the Patent Act.<sup>37</sup> More specifically, the court considered “whether the using, offering to sell, or selling of a patented invention is an infringement

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30. *Patent Infringement in Outer Space*, *supra* note 12, at 210 (citing *Decca Ltd.*, 554 F.2d at 1083) (emphasis added).

31. *Decca Ltd.*, 544 F.2d at 1081, 1098.

32. 418 F.3d 1282 (Fed. Cir. 2005).

33. *Id.* at 1289–90.

34. *Id.*

35. *See id.* at 1313–15.

36. *Id.* at 1314.

37. *See id.* at 1311; *Patent Infringement in Outer Space*, *supra* note 12, at 210–11.

under section 271(a) if a component or step of the patented invention is located or performed abroad.”<sup>38</sup> The Federal Circuit determined that when deciding the situs of the “use” of a system, a court should look to (1) the place where the system is *controlled* and (2) the place where the system obtains its *beneficial use*.<sup>39</sup> By combining the control and beneficial use factors from the *Decca* test and omitting the ownership element, the court created the new “the place at which the system as a whole is put into service” test.<sup>40</sup> Therefore, even if some of the necessary components of a protected system are not physically located in the United States, an infringement claim may still have extraterritorial reach under the *NTP* test as long as the user exercises a minimal amount of control over, and receives beneficial use from, the product within the United States.<sup>41</sup>

### III. MARITIME LAW

With a foundational knowledge of the jurisdictional reach of United States patent law, one can move on to the second building block used in creating existing outer space law: jurisdiction under maritime law. As discussed above, outer space law is a tricky body of law because no single country has jurisdiction over outer space. Instead, most of the laws governing space are embodied in a collection of treaties, much like maritime law, signed by the major outer space exploring countries. In fact, many of the treaties governing outer space are modeled after maritime law because of the vast similarities and difficulties in governing an area over which no country has control. Due to the youth of outer space exploration, the collection of treaties governing it is relatively small and still developing. To better understand the intent of the treaties on outer space aimed at solving the problems arising in the field, it is important to first have a brief understanding of maritime law.

Maritime law is defined in the United Nations Convention on the Law of the Sea (“UNCLOS”) as “all issues relating to the

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38. *NTP, Inc.*, 418 F.3d at 1315; *Patent Infringement in Outer Space*, *supra* note 12, at 211.

39. *NTP, Inc.*, 418 F.3d at 1317.

40. *Id.*; *Patent Infringement in Outer Space*, *supra* note 12, at 211.

41. *Patent Infringement in Outer Space*, *supra* note 12, at 211.



law of the sea.”<sup>42</sup> All ships sailing in international waters must register in a country or “flag state.”<sup>43</sup> By registering a ship in a flag state, that country’s laws receive extraterritorial jurisdiction to follow the ship wherever it travels, turning the ship into what is known as a “floating island.”<sup>44</sup>

A very important issue arises out of this floating island concept: ships do not have to register in the country in which their owners live or are incorporated.<sup>45</sup> In fact, most of the time they are not.<sup>46</sup> As with any law where jurisdiction is left to the involved parties to decide, forum shopping runs rampant.<sup>47</sup> Many ship owners abuse the flag state registration principle by registering their ships in the countries with the least regulation so they can sidestep many of the laws that would otherwise impose additional taxes, costs, and liability.<sup>48</sup> Over the years, this concept of maritime fo-

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42. United Nations Convention on the Law of the Sea pmb., Dec. 10, 1982, 1833 U.N.T.S. 397.

43. Convention on the High Seas art. 6(1), Apr. 29, 1958, 13 U.S.T. 2312, 450 U.N.T.S. 11 (“Ships shall sail under the flag of one State only and, save in exceptional cases expressly provided for in international treaties or in these articles, shall be subject to its exclusive jurisdiction on the high seas.”); Kleiman, *supra* note 10, at 5 (“Similar to the Outer Space Treaty, under maritime law, a ship operates under the law of its country, or ‘flag,’ of registration.”).

44. *Patent Infringement in Outer Space*, *supra* note 12, at 208; Glenn H. Reynolds, *Legislative Comment: The Patents in Space Act*, 3 HARV. J.L. & TECH. 13, 19 (1990).

45. See United Nations Convention on the Law of the Sea, *supra* note 42, art. 91.

46. See United Nations Conference on Trade and Development, *Review of Maritime Transport*, 44 tbl.2.5, U.N. Doc. UNCTAD/RMT/2014, (Nov. 20, 2014) [hereinafter U.N. Trade & Dev.] (estimating that Panama, Liberia, and the Marshall Islands—the three countries with the largest registered fleets based on deadweight tonnage—have national ownership of only 0.17%, 0.01%, and 0.30% of their registered vessels, respectively).

47. See B.J. Haec, Note & Comment, *Yamaha Motor Corp. v. Calhoun: An Examination of Jurisdiction, Choice-of-Laws, and Federal Interests in Maritime Law*, 72 WASH. L. REV. 181, 208 (1997).

48. Kleiman, *supra* note 10, at 4 (“This system of national jurisdiction could enable companies to circumvent patents on space technologies by registering their spacecraft in countries where these patents are not on file, just as the owners of merchant ships often register their vessels under ‘flags of conven-

rum shopping has become known as “flags of convenience.”<sup>49</sup> “Due to lax regulations, minimal oversight, and poor record keeping in these countries, flags of convenience are often criticized for creating a permissive environment for criminal activities, poor working conditions, and environmental damage.”<sup>50</sup> The flags of convenience issue has become a widespread, global problem with over fifty percent of the world’s deadweight tonnage (“DWT”) being carried by ships registered in Panama, Liberia, the Marshall Islands, and Hong Kong.<sup>51</sup> Furthermore, over seventy-five percent of all DWT is carried by the top ten flags of convenience States.<sup>52</sup>

While the laws of the flag states govern ships while they are traveling at sea, traveling at sea is not the end goal for most ships; most of them are transporting cargo from one country to another.<sup>53</sup> At each port, a ship is subject to the jurisdiction of the country where it is currently located.<sup>54</sup> While a ship registered in a state other than the United States could make, use, or sell a device that infringed on a United States patent while at sea, United States laws prevent incoming ships from participating in these activities once they reach United States territory.<sup>55</sup> One such law—of importance to this Note—prevents the importation of patented devic-

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ience,’ such as Panama and Liberia, to avoid burdensome taxes and regulations in their home countries.”).

49. *Id.* at 5 (“The term ‘flag of convenience’ refers to the practice of registering a ship in a country different from that of the ship’s owners for the purpose of reducing operating costs and avoiding burdensome regulations.”).

50. *Id.*; *see, e.g.*, The Common Maritime Policy, EUR. PARL. DOC. ch. 2 (1996), [http://www.europarl.europa.eu/workingpapers/tran/w14/2\\_en.htm](http://www.europarl.europa.eu/workingpapers/tran/w14/2_en.htm); Rex S. Toh & Sock-Yong Phang, *Quasi-Flag of Convenience Shipping: The Wave of the Future*, TRANSP. J., Winter 1993, at 31; *Flags of Convenience: Avoiding the Rules by Flying a Convenient Flag*, INT’L TRANSP. WORKERS’ FED’N, <http://www.itfglobal.org/en/transport-sectors/seafarers/in-focus/flags-of-convenience-campaign/> (last visited Mar. 3, 2016).

51. *See* U.N. Trade & Dev., *supra* note 46, at 44 tbl.2.5.

52. *See id.* (listing the top ten flags of registration states by the most deadweight tonnage shipped: (1) Panama, (2) Liberia, (3) Marshall Islands, (4) Hong Kong, (5) Singapore, (6) Greece, (7) Bahamas, (8) China, (9) Malta, and (10) Cyprus).

53. Kleiman, *supra* note 10, at 5.

54. *Id.*

55. *Id.*

es.<sup>56</sup> When a foreign ship arrives at one of the 360 designated ports in the United States, the United States Customs Department checks the ship's cargo to ensure that none of its contents contain any such items.<sup>57</sup> If it does, the ship is not allowed to unload its contents on United States soil.<sup>58</sup>

#### IV. OUTER SPACE LAW

Like maritime law, outer space law is a type of international law that is almost completely governed by treaties.<sup>59</sup> But because the treaties were “largely developed during the Cold War” and focused mostly on governing “the behavior of the major space powers” instead of regulating private space activities, it is debatable whether this body of international law has any application to

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56. 35 U.S.C. § 271(a) (2013) (“Except as otherwise provided in this title, whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent.”).

57. *U.S. Public Port Facts*, AM. ASS'N PORT AUTHORITIES, <http://www.aapa-ports.org/Industry/content.cfm?ItemNumber=1032> (last visited Mar. 4, 2016); 19 U.S.C. § 1337(a)(1)(B) (2013).

(a) Unlawful activities; covered industries; definitions

(1) Subject to paragraph (2), the following are unlawful, and when found by the Commission to exist shall be dealt with, in addition to any other provision of law, as provided in this section:

...

(B) The importation into the United States, the sale for importation, or the sale within the United States after importation by the owner, importer, or consignee, of articles that—

(i) infringe a valid and enforceable United States patent or a valid and enforceable United States copyright registered under title 17, United States Code; or

(ii) are made, produced, processed, or mined under, or by means of, a process covered by the claims of a valid and enforceable United States patent.

*Id.*

58. 35 U.S.C. § 271(a); 19 U.S.C. § 1337(a)(1)(B); *U.S. Public Port Facts*, *supra* note 57.

59. Miles, *supra* note 11, at 59–60.

private enterprises at all.<sup>60</sup> “Consequently, none of the major international space treaties specifically addresses [sic] how national patent laws may apply to activities in outer space.”<sup>61</sup>

#### A. *The Outer Space Treaty*

The Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (“Outer Space Treaty”) was the first international, outer space treaty.<sup>62</sup> It was ratified in 1966 by the United States, the Soviet Union, and the United Kingdom but has since been signed by 128 countries.<sup>63</sup> The treaty discusses property rights with respect to outer space activities.<sup>64</sup> The Outer Space Treaty, and all other later treaties concerning outer space, has a shared concept of “non-appropriation,” prohibiting nations from claiming any territory or resources in outer space or on celestial bodies.<sup>65</sup> The Outer Space Treaty also states that a space object launched into outer space must be registered in a country and that country “shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body.”<sup>66</sup> By creating a framework of jurisdiction based on regis-

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60. Kleiman, *supra* note 10, at 4; Miles, *supra* note 11, at 59–60; see Rosanna Sattler, *Transporting a Legal System for Property Rights: From the Earth to the Stars*, 6 CHI. J. INT’L L. 23 (2005).

61. Kleiman, *supra* note 10, at 4.

62. See Outer Space Treaty, *supra* note 13.

63. *Id.* at 7; Comm. on the Peaceful Uses of Outer Space, Legal Subcomm. on Its Fifty-Third Session, *Status of International Agreements Relating to Activities in Outer Space as at 1 January 2014*, U.N. Doc. A/AC.105/C.2/2014/CRP.7 (Mar. 20, 2014); Miles, *supra* note 11, at 61.

64. See, e.g., Outer Space Treaty, *supra* note 13, at art. II.

65. *Id.* at art. I (“The exploration and use of outer space . . . shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development . . . .”); see also Steven Freeland, *Up, Up, and . . . Back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space*, 6 CHI. J. INT’L L. 1, 11–12 (2005); Leo B. Malagar & Marlo Apalisok Magdoza-Malagar, *International Law of Outer Space and the Protection of Intellectual Property Rights*, 17 B.U. INT’L L.J. 311, 345 (1999); Miles, *supra* note 11, at 64, 70 (“One of the core principles enshrined in the OST is that the exploration and exploitation of outer space should be done for all nations, regardless of their level of development.”).

66. Outer Space Treaty, *supra* note 13, at art. VIII; see also FRANCIS LYALL & PAUL B. LARSEN, *SPACE LAW: A TREATISE* 41 (2009) (“Of [the major

tration states, the Outer Space Treaty adopted a system analogous to the “floating island” principle in maritime law.<sup>67</sup> “Thus, the treaty permits countries to extend their laws—including their patent laws—” extraterritorially to their registered space objects.<sup>68</sup>

### B. *The Registration Convention*

In 1975, the Convention on the Registration of Objects Launched into Outer Space (“Registration Convention”) was created, describing how space objects were to be registered.<sup>69</sup> The Registration Convention implemented the Outer Space Treaty’s registration requirements, stating that the “launching State” is responsible for registering a space object.<sup>70</sup> This, in effect, turned the Outer Space Treaty’s “the appropriate state party to the Treaty” into the “launching state.”<sup>71</sup> Even more importantly, the Registration Convention further defines the “launch state” as either (1) “[a] State which launches or procures the launching of a space object” or (2) “[a] State from whose territory or facility a space object is launched.”<sup>72</sup> In other words, a “launch State” can be: (1) a state that launches a space object, (2) the state that procures the launching of a space object, (3) a state that has a space object launched from its territory, or (4) a state that has a space object launched from its facility. Like maritime law, the owner of a space object

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space treaties] the Outer Space Treaty of 1967 (OST) is generally accepted as foundational, containing in part at least principles of a generality that have passed into customary law.”); *Patent Infringement in Outer Space*, *supra* note 12, at 208.

67. *Patent Infringement in Outer Space*, *supra* note 12, at 208; *see also* Reynolds, *supra* note 44, at 18–19 (“Though we may speak of aircraft, ships, or embassies as being ‘U.S. soil’ in a legal sense, this characterization was aptly described by the U.S. Supreme Court as ‘a figure of speech—a metaphor’ and not an accurate statement of their legal status.”).

68. Kleiman, *supra* note 10, at 4; *see* LYALL & LARSEN, *supra* note 66, at 124–27; *see Extra-Territorial Reach*, *supra* note 12, at 275.

69. Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, T.I.A.S. No. 8480.

70. Registration of Objects Launched into Outer Space, *supra* note 69, at art. II(1); *Patent Infringement in Outer Space*, *supra* note 12, at 208.

71. Miles, *supra* note 11, at 63.

72. Registration of Objects Launched into Outer Space, *supra* note 69, at art. I(a)(i)–(ii); *Patent Infringement in Outer Space*, *supra* note 12, at 208; Miles, *supra* note 11, at 63.

that meets these registration standards in more than one country is free to engage in “flags of convenience” type forum shopping by selecting under which country to register.

At the time the United States signed the Registration Convention, “U.S. patent law . . . [did] not provide protection for inventions made, used, or sold in outer space because the existing law [was] territorial in application.”<sup>73</sup> According to the definitions under the Patent Act, “[t]he terms ‘United States’ and ‘this country’ mean the United States of America, its territories and possessions,” limiting patent law jurisdictionally.<sup>74</sup> Courts have held in the past that United States laws typically do not have extraterritorial reach without Congress explicitly saying so.<sup>75</sup> More specifically, courts have held that United States patent law does not have extraterritorial effect and only applies to activities that take place within the United States’ territorial limits.<sup>76</sup>

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73. Reynolds, *supra* note 44, at 14.

74. 35 U.S.C. § 100(c) (2013); Reynolds, *supra* note 44, at 14.

75. *See, e.g.*, *Cunard S.S. Co. v. Mellon*, 262 U.S. 100, 121–23 (1923) (holding that the 18th Amendment’s prohibition of liquor sales in “the United States and all territory subject to the jurisdiction thereof” did not apply extraterritorially to U.S. registered ships outside of U.S. territorial waters); *Lam Mow v. Nagle*, 24 F.2d 316, 318 (9th Cir. 1928) (holding that a baby born to Chinese parents on a U.S. registered ship in international waters was not a U.S. citizen); *Air Line Stewards and Stewardesses Association v. Nw. Airlines, Inc.*, 267 F.2d 170, 178 (8th Cir. 1959) (holding that U.S. labor laws do not apply to a U.S. registered aircraft outside of U.S. territory); *United States v. 12536 Gross Tons of Whale Oil*, 29 F. Supp. 262, 267 (E.D. Va. 1939) (holding that a U.S. registered ship was not a “point” in the U.S. with regards to the Merchant Marine Act of 1920).

76. *See, e.g.*, *Deepsouth Packing Co. v. Laitram Corp.*, 406 U.S. 518, 531 (1972); *Ocean Sci. & Eng’g, Inc. v. United States*, 595 F.2d 572, 574 (Ct. Cl. 1979) (dictum) (“Of course, the constitutional power of Congress to make our patent laws applicable to processes carried out on U.S. flag ships and planes at sea is not challenged; the question is whether Congress has done so in view of the Supreme Court’s doctrine of strict construction. Perhaps the patent bar will note the possible loophole in the coverage of the U.S. patent laws and will invite the attention of Congress to it. Meanwhile, it is well to adjudicate cases on other grounds when possible, as we do this case.”); *Decca Ltd. v. United States*, 544 F.2d 1070, 1074 (Ct. Cl. 1976) (per curiam) (“In view of the foregoing, we think a decision founded on the fiction that for purposes of the Patent Laws, United States ships and planes wherever found, are United States territory, would be founded on water.”).

### C. *The International Space Station*

The United States has adopted one treaty that discusses intellectual property in outer space. In 1998, Japan, Russia, and the United States signed the Agreement Among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America Concerning Cooperation on the Civil International Space Station (“Agreement Concerning the ISS”), which stated,

[F]or purposes of intellectual property law, an activity occurring in or on a Space Station flight element shall be deemed to have occurred only in the territory of the [country] of that element’s registry, except that for [European Space Agency]-registered elements any European Partner State may deem the activity to have occurred within its territory.<sup>77</sup>

The Agreement Concerning the ISS gave Japan, Russia, and the United States exclusive patent jurisdiction over their respective space modules.<sup>78</sup> This marked the first time that the major space powers instituted an international patent jurisdiction based upon the “floating island” concept, showing that international outer space law could actually be sustained.<sup>79</sup>

Another important concept that arose out of the Agreement Concerning the ISS is that it confirmed that the Outer Space Treaty’s non-appropriation doctrine did not cover such intangible property rights as intellectual property.<sup>80</sup> By signing the treaty, the major space powers of the world implicitly stated that the non-appropriation doctrine of the Outer Space Treaty and its progeny

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77. Agreement Among the Government of Canada, Governments of the Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America Concerning Cooperation on the Civil International Space Station art. 21, Jan. 29, 1998, 1998 U.S.T. 212 [hereinafter Agreement Concerning the ISS].

78. Kleiman, *supra* note 10, at 5.

79. *See id.* 4–5.

80. Agreement Concerning the ISS, *supra* note 77, at art. 21; Miles, *supra* note 11, at 64–66.

only applied to physical property rights for objects that originated in outer space.<sup>81</sup>

#### *D. Patents in Space Act*

In 1989, when Congress enacted 35 U.S.C. section 105 (i.e., the “Inventions in Outer Space” provision of the Patent Act), it coordinated United States patent laws with the Outer Space Treaty and the Registration Convention and extended the reach of United States patent laws to United States-registered spacecraft.<sup>82</sup> Section 105(a) states that “[a]ny invention made, used or sold in outer space on a space object or component thereof under the jurisdiction or control of the United States shall be considered to be made, used or sold within the United States for the purposes of [United States patent laws],” *subject to a few exceptions*.<sup>83</sup>

The first of these exceptions state that jurisdiction under 35 U.S.C. section 105 will not extend to space objects that are “specifically identified and otherwise provided for by an international agreement to which the United States is a party.”<sup>84</sup> The second exception is where the true problem resides: even if the space object would normally be under United States jurisdiction, United States patent law will not apply if the object is carried on the regis-

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81. If one can own intellectual property created in outer space under the Agreement Concerning the ISS, then this would imply that the Outer Space Treaty’s ban on owning outer space property does not include such intangible property.

82. 35 U.S.C. § 105(a) (2013); *Patent Infringement in Outer Space*, *supra* note 12, at 208–09.

83. 35 U.S.C. § 105(a). The exceptions in the statute referenced in the text reads:

[E]xcept with respect to any space object or component thereof that is specifically identified and otherwise provided for by an international agreement to which the United States is a party, or with respect to any space object or component thereof that is carried on the registry of a foreign state in accordance with the Convention on Registration of Objects Launched into Outer Space.

*Id.*; *Patent Infringement in Outer Space*, *supra* note 12, at 213. It should be noted that only the “control” element of the NTP test still remains in this equation. Therefore, space objects arguably fall into United States jurisdiction less easily than other extraterritorial objects.

84. 35 U.S.C. § 105(a); *Patent Infringement in Outer Space*, *supra* note 12, at 213.



try of a foreign state in accordance with the Registration Convention.<sup>85</sup> Therefore, any invention created on a United States registered spacecraft would be considered invented in the United States and any infringement suits would be under United States jurisdiction, but a country could simply avoid United States jurisdiction altogether by registering the space object in another applicable country.

#### V. ISSUES WITH OUTER SPACE PATENT LAW: THE LOOPHOLE

The second exception in 35 U.S.C. section 105(a) creates a loophole allowing individuals and companies to avoid liability under the prohibition outlined in the first part of the subsection. When a loophole is large enough that anyone who would be a potential infringer can use it, the law itself becomes ineffective, resulting in plaintiffs losing a remedy. Current patent law requires a company to apply for a patent in every country where its space object may potentially be infringed upon.<sup>86</sup> This can be a long, tedious, and expensive process in many cases.<sup>87</sup> Any country in which the company fails to obtain patent protection could become a loophole exploited by competitors through flags of convenience.<sup>88</sup> As discussed above, the Patents in Space Act only gives the United States extraterritorial jurisdiction over space objects that are not registered in another country in accordance with the Registration Convention.<sup>89</sup> Under the Outer Space Treaty and the Registration Convention, a space object can be registered in a country that “launches or procures the launching of” said space object.<sup>90</sup> This language is ambiguous enough to allow a company that is seeking to exploit stolen technology to avoid United States jurisdiction simply by launching its space object from any other coun-

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85. 35 U.S.C. § 105(a); *Patent Infringement in Outer Space*, *supra* note 12, at 213; Miles, *supra* note 11, at 65.

86. *See supra* note 19 and accompanying text.

87. *See* Kleiman, *supra* note 10, at 5.

88. *Id.*

89. *See supra* Section IV.D.

90. Registration of Objects Launched into Outer Space, *supra* note 69, at art. I(a)(i).

try where the stolen technology has not received patent protection.<sup>91</sup>

Consider this hypothetical: Acme Space Launch, a private entity incorporated and located in the United States, decides to get into the satellite television business but can not, or does not want to, expend resources on researching and developing the requisite technology to accomplish its goal. Acme instead builds a launch pad and facilities in a small foreign country and proceeds to build a spacecraft and satellite based on the disclosed technology in existing United States patents held by Acme's competitors. Once completed, Acme launches its "space objects" from the foreign country and puts the satellites into orbit. The satellites send transmissions to customers throughout the United States. In this scenario, the United States would not have jurisdiction over an infringement claim against Acme pursuant to 35 U.S.C. section 105(a).<sup>92</sup> Because the second exception to 35 U.S.C. section 105(a) overrides any of the United States jurisdiction granted in the main body of the legislation, a company in the above fact pattern can skirt liability even when the infringing technology is *owned* by Acme (a United States corporation), is *controlled* by Acme or Acme's cus-

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91. Bernhard Schmidt-Tedd & Michael Gerhard, *Registration of Space Objects: Which Are the Advantages for States Resulting from Registration?*, in *SPACE LAW: CURRENT PROBLEMS AND PERSPECTIVES FOR FUTURE REGULATION* 121, 126 (Marietta Benkö & Kai-Uwe Schrogl eds., 2005); Miles, *supra* note 11, at 63.

92. 35 U.S.C. § 105(a) (2013); ORG. FOR ECON. CO-OPERATION & DEV., *SPACE 2030: TACKLING SOCIETY'S CHALLENGES* 177 (2005); Kleiman, *supra* note 10, at 5 ("Because the term 'launching state' is broadly defined, a company could conceivably select an outer space flag of convenience by either incorporating its business in or launching its spacecraft from the desired country."); see LYALL & LARSEN, *supra* note 66, at 94; Michael Gerhard, *National Space Legislation - Perspectives for Regulating Private Space Activities*, in *ESSENTIAL AIR & SPACE LAW 2: CURRENT PROBLEMS AND PERSPECTIVES FOR FUTURE REGULATION* 75, 90 (Marietta Benkö & Kai-Uwe Schrogl eds., 2005) ("There seem to be certain tendencies towards a 'flag of convenience' situation in space law since some States are offering a legal framework that is very advantageous financially to private entities, which encourages them to establish themselves in these States' territory, while these States, are not willing to take full responsibility (and consequential liability) for the activities of such entities."); *International and National Laws* § 7.3.1.1, PERMANENT.COM, <http://www.permanent.com/legal-international-laws.html> (last visited Mar. 5, 2016).

tomers from the United States, or otherwise *benefits* Acme and Acme's consumers located in the United States—all the traditional factors that have been examined in extraterritorial jurisdiction determinations by the United States courts.<sup>93</sup> It should also be noted that a smaller country would welcome the Acme space program because of the tax proceeds, while Acme would benefit from the relatively low number of registered patents in that country. A private company could forum shop to decide which jurisdiction to apply to its space objects by changing where the company “is headquartered, where its production facilities are located, or even where it chooses to register the space object.”<sup>94</sup>

Flags of convenience could have drastic economic effects on the private outer space industry. First, patents are meant to incentivize individuals to create new and innovative technology and to share it with the public.<sup>95</sup> In return, the individual receives a monopoly on that invention for a limited time so that the individual can recover any costs for development and earn a profit for her hard work.<sup>96</sup> The end goal for society is that this technology will be the foundation for further advancements in the same area for the betterment of mankind.<sup>97</sup> If a competitor company can sidestep patent laws by avoiding certain jurisdictions, then the monopoly is diminished, and the incentive to invent new technology is gone.

Second, any competitor companies that are able to sidestep patent laws would not only be able to market the same technology, but they would also be able to offer it to the consumer at a lower cost. Research and development expenses in outer space technology are enormous and must be passed on to the consumer through increased pricing. Companies avoiding liability through flags of convenience would not have these costs like the original inventors and could, therefore, offer their product for much lower prices than

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93. See *NTP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282 (Fed. Cir. 2005); *Decca Ltd. v. United States*, 544 F.2d 1070 (Ct. Cl. 1976) (per curiam).

94. Miles, *supra* note 11, at 63.

95. Kleiman, *supra* note 10, at 4; see *Patent Infringement in Outer Space*, *supra* note 12, at 221.

96. Kleiman, *supra* note 12, at 4; see 35 U.S.C. § 271(a).

97. See generally U.S. CONST. art. 1, § 8, cl. 8 (“To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.”); *Patent Infringement in Outer Space*, *supra* note 12, at 206.

the inventor. This would effectively run the inventor out of business. This competitive advantage would also put “considerable economic pressure on all space companies to register their spacecraft under flags of convenience, resulting in a race to the bottom, that would exacerbate the patent protection problem along with safety, environmental, and other regulatory problems traditionally associated with flags of convenience.”<sup>98</sup>

The problems with an ineffective outer space patent system would affect the private outer space industry at large. If companies can easily avoid liability for patent infringement in the United States, the growth of the outer space program could be stunted due to the lack of incentives for new research that the United States patent program is meant to encourage.<sup>99</sup> Companies may be more likely to protect new technologies as trade secrets instead of sharing them with the public as patent filings, preventing future innovation inspired by the new technology.<sup>100</sup> Companies looking to develop new outer space technology may also “find it more difficult to secure private financing for research and development activities.”<sup>101</sup> Accordingly, a solution to correct the problems associ-

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98. Kleiman, *supra* note 10, at 6; see J. Jonas Anderson, *Hiding Behind Nationality: The Temporary Presence Exception and Patent Infringement Avoidance*, 15 MICH. TELECOMM. TECH. L. REV. 1, 41–42 (2008) (discussing the “temporary presence exception” used by ships to avoid liability for patent infringement).

99. *Patent Infringement in Outer Space*, *supra* note 12, at 221; Kleiman, *supra* note 10, at 4–5 (“Permitting space companies to evade patents using flags of convenience will lessen the value of these patents. . . . Basing the outer space patent system on the application of national patent laws to registered space objects could limit the effectiveness of patent protection for space technologies.”).

100. Kleiman, *supra* note 10, at 4–6; *Patent Infringement in Outer Space*, *supra* note 12, at 221; see also Reynolds, *supra* note 44, at 15–17 (“Many of the most promising [space technologies] can *only* be reduced to practice in outer space, since they rely on microgravity or other unique characteristics of the space environment. Thus, a lack of patent protection would likely forestall research in these fields. . . . By failing to extend patent protection to space innovations made by smaller firms and research centers, we would systematically be depriving ourselves of our most valuable research resources.”); JOE BIDEN, INVENTIONS IN OUTER SPACE, S. DOC. NO. 101-266, at 5 (2d Sess. 1990) (discussing that the addition of Exception 2 to § 105 to conform to the Outer Space Treaty may have resulted in the exact chilling effect that section 105 was meant to avoid).

101. Kleiman, *supra* note 10, at 4.

ated with the outer space “flags of convenience” needs to be implemented to prevent potentially detrimental damage to the outer space industry and innovation.

## VI. PAST SUGGESTED SOLUTIONS

There have been many proposed solutions for solving the outer space “flags of convenience” problem. One such solution is to form an international patent jurisdiction.<sup>102</sup> A uniform and predictable patent law jurisdiction for governing outer space activities would help encourage inventors from around the world to research and share their ideas with each other, spawning new technology and companies in the field.<sup>103</sup> The major problem with this solution is that governments have traditionally resisted conceding their sovereignty to international organizations.<sup>104</sup>

One of the biggest issues with an international patent jurisdiction is the traditional difference in philosophies behind governments awarding patent protection in the first place.<sup>105</sup> Many European countries base their patents upon a “personality” justification while the United States relies on Lockean ideals.<sup>106</sup> Under the personality approach, an invention is seen as an extension of the inventor. In other words, “an idea belongs to its creator because the

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102. See, e.g., LYALL & LARSEN, *supra* note 66, at 127 (“A general and uniform patent protection for inventions made in outer space would give investors confidence in outer space research and encourage such activities.”); Kleiman, *supra* note 10, at 6 (“The ideal solution to the flag-of-convenience problem, at least as it relates to effective patent protection, is to create a new multinational patent jurisdiction for filing and enforcing patents in outer space.”).

103. Kleiman, *supra* note 10, at 6 (“A recently published space law treatise, meanwhile, similarly argued that ‘general and uniform patent protection for inventions made in outer space would give investors confidence in outer space research and encourage such activities.’” (quoting LYALL & LARSEN, *supra* note 66, at 127)).

104. LYALL & LARSEN, *supra* note 66, at 560–61 (“In the early days of space it was never likely that the US and the USSR . . . would consent to the transfer of their authority . . . to the control of an International Space Agency. . . . [I]t seems clear that in the immediate future a global international operational space agency will not be created.”); Kleiman, *supra* note 10, at 6.

105. See Kleiman, *supra* note 10, at 6–7.

106. Justin Hughes, *The Philosophy of Intellectual Property*, 77 GEO. L.J. 287, 303, 330 (1988).

idea is a manifestation of the creator's personality or self."<sup>107</sup> On the other hand, the Lockean approach to patents poses an "instrumental" argument. That is, a person's ideas are her instruments, and therefore, they belong to that person. This argument is best shown through the Constitution's copyright and patent clause, which grants Congress "the power to create intellectual property rights in order 'To promote the Progress of Science and useful Arts.'"<sup>108</sup>

While these differences may seem insignificant, ending with the same result of patent protection, these differences in ideals can create procedural variations in the way patents are awarded in each country. From the time Congress passed the Patent Act of 1790, just one year after the signing of the Constitution, until it enacted the Leahy-Smith America Invents Act in 2011, the United States used a first-to-invent system for determining patent priority.<sup>109</sup> The decision to enact the America Invents Act was motivated in part by the growing push to "promote harmonization of the United States patent system with the patent systems commonly used in nearly all other countries throughout the world."<sup>110</sup> While

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107. *Id.* at 330.

108. *Id.* at 303–04 (quoting U.S. CONST. art. I, § 8, cl. 8); *see also* Alexa L. Ashworth, *Race You to the Patent Office! How the New Patent Reform Act Will Affect Technology Transfer at Universities*, 23 ALB. L.J. SCI. & TECH. 383, 385 (2013).

109. *See* Jerome H. Reichman & Rochelle Cooper Dreyfuss, *Harmonization Without Consensus: Critical Reflections on Drafting a Substantive Patent Law Treaty*, 57 DUKE L.J. 85, 90–91 (2007); Reynolds, *supra* note 44, at 15 ("Unlike the patent laws of most other countries, U.S. patent law generally provides that a patent will issue to the first person to invent the product or process she claims in her patent."); *id.* at 15 n.10 ("In most other countries, the general rule is that the patent goes to whoever is 'first to file,' regardless of who was in fact first to invent."); 157 CONG. REC. E1191 (daily ed. June 23, 2011) (speech of Hon. West).

110. David W. Trilling, *Recent Development: Recognizing a Need for Reform: The Leahy-Smith America Invents Act of 2011*, 2012 U. ILL. J.L. TECH. & POL'Y 239, 246 (2012).

Converting the United States patent system from "first[-]to[-]invent" to a system of "first[-]inventor[-]to[-]file" will improve the United States patent system and promote harmonization of the United States patent system with the patent systems commonly used in nearly all other countries throughout the world with whom the United States conducts trade and thereby

this is a shift toward international alignment of different patent processes, the United States remained one of the only first-to-invent jurisdictions in the world for over 200 years, showing the reluctance of countries to concede their patent procedures.<sup>111</sup> Procedural differences, like the system to determine priority, run deep to the roots of why these governments award patents in the first place and why countries are not likely to agree to forfeit their sovereignty to an international organization with opposing ideals.

Perhaps a more significant reason why an international patent jurisdiction would likely fail is that every country in the world would need to sign the treaty in order for it to be effective. If only the large, spacefaring nations sign the treaty for an outer space patent jurisdiction, a company could build a launch pad in a small developing country and register there, creating a flags of convenience opportunity. This may seem like an expensive measure to avoid patent infringement, but it may be cheaper than incurring the high costs of research and development in the private outer space exploration industry.

Smaller nations have no incentive to sign a treaty to be governed by an international patent organization. Smaller nations typically see enforcement of larger nation's patents as a way to make the larger countries richer while making the smaller countries poorer.<sup>112</sup> With the outer space industry grossing over \$100

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promote greater international uniformity and certainty in the procedures used for securing the exclusive rights of inventors to their discoveries.

*Id.* (quoting H.R. 1249, 112th Cong. § 146(p) (2011)).

111. See Miles, *supra* note 11, at 69.

Perhaps the most contentious is the split between the United States, which follows a first-to-invent patent system, and the majority of other nations, including those who are currently, and are most likely to be space-faring, who follow a first-to-file patent system. Additionally, it has been suggested that substantive harmonization of patent law is not truly feasible nor advisable until developing nations are better equipped to meet their obligations under the existing international agreements.

*Id.* at 69–70.

112. *Patent Infringement in Outer Space*, *supra* note 12, at 230–31 (“Yet the ‘traditional reluctance of terrestrial nations to surrender their sovereignty to international organizations’ makes the implementation of such a system unlikely

billion every year,<sup>113</sup> smaller countries would rather collect the tax money and collateral benefits they could derive from a space program located in their country than sign a treaty that has nothing to offer them in return. Therefore, every country—both big and small—would need to sign the treaty to enforce all other countries' patents in order for an international patent regime to succeed, which seems unlikely.

Another proposed solution has been to provide tax incentives and government contracting preferences to companies that register their space objects in participating countries.<sup>114</sup> The idea behind this approach is to disincentivize private companies from filing for registration in flags of convenience states. The problem with this concept is the same as above: the amount of money that a government can provide in tax incentives cannot rival the immense costs of research and development involved in designing new technology for outer space. For instance, if Acme's research and development costs and licensing costs for patented technology accounted for forty percent of its total expenditures, then the United States government would need to give tax incentives that would match or exceed that amount to disincentivize Acme from exploiting the section 105 loophole by launching from a foreign country. Otherwise, it would still be more lucrative for a company to decline the tax benefits by registering in another country and using existing United States patented technology.

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in the foreseeable future.” (quoting Kleiman, *supra* note 10, at 6)); *see also* Kleiman, *supra* note 10, at 6.

While industrialized nations view robust intellectual property protection as a critical component of a technology-based economy, many developing nations are skeptical of strong intellectual property protections. Developing nations tend to believe that “intellectual property rights raise prices and profits for one country or company at the expense of the well-being of a developing nation” and that weak intellectual property protection is “a means of increasing access to the information and technology needed for economic growth.”

*Id.* (quoting THE GLOBAL CHALLENGE OF INTELLECTUAL PROPERTY RIGHTS 11 (Robert C. Bird & Subhash C. Jain, eds., 2008)).

113. HARRISON, *supra* note 9, at 1.

114. Kleiman, *supra* note 10, at 6.



## VII. THE BENEFICIAL USE SOLUTION

Perhaps the best solution to the flags of convenience problem in outer space law is one that already exists in maritime law. On earth, ships transport cargo from one country to another, and when the ship and its cargo reach their destination, they become subject to the laws of that country.<sup>115</sup> A ship entering the United States is subject to inspection by the United States Customs and Border Patrol, and any of its cargo that violates United States law is considered an “unfair act[] involved in importation of articles.”<sup>116</sup> An exclusion order can be obtained through the United States International Trade Commission if it finds that the cargo being imported infringes a United States patent.<sup>117</sup> The cargo is then prohibited from entering onto United States soil.<sup>118</sup> But in space, “there is no ‘destination country’ with its own patent laws;” there are only the laws of the country where the spacecraft is registered.<sup>119</sup>

But many times in the outer space industry, *something* does enter into a destination country. The outer space industry is inher-

115. *Id.* at 5; *see supra* Part III.

116. J. Stephen Simms, Comment, *Scope of Action Against Unfair Import Trade Practices Under Section 337 of the Tariff Act of 1930*, 4 NW. J. INT’L L. & BUS. 234, 235 (1982); *see* 19 U.S.C. § 1337(a)(1)(A) (2013); *supra* Part III.

117. *See* Simms, *supra* note 116, at 235; 19 U.S.C. § 1337(d).

(d) Exclusion of articles from entry

(1) If the Commission determines, as a result of an investigation under this section, that there is a violation of this section, it shall direct that the articles concerned . . . be excluded from entry into the United States . . . . The Commission shall notify the Secretary of the Treasury of its action under this subsection directing such exclusion from entry, and upon receipt of such notice, the Secretary shall, through the proper officers, refuse such entry.

*Id.*

118. 19 U.S.C. § 1337(d).

119. Kleiman, *supra* note 10, at 5; *see* *Hughes Aircraft Co. v. United States*, 29 Fed. Cl. 197, 242 (Fed. Cl. 1993) (holding that there was no infringement when the device for controlling the spacecraft was never actually in the U.S., was controlled from outside the U.S., and launched from outside U.S. territory); *see also* *Extra-Territorial Reach*, *supra* note 12, at 26365 (discussing that the court in *Hughes* would have to have found “direct control” of the satellite in the U.S. to establish U.S. extraterritorial jurisdiction over the claim).

ently technological, and many of the companies in this field transmit data in some form—such as radio, television, GPS, or photos—to their end users. The solution to the flags of convenience problem in outer space is to form a treaty between the largest spacefaring countries to ban any benefits derived from the use of technology that violates the patents of any of the signing countries. Creating such a ban in the most technologically advanced countries of the world would take away the large majority of consumers of the pirated technology. This solution, in effect, brings the beneficial use factor from the *NTP* test into the outer space patent jurisdiction discussion.<sup>120</sup>

In the past, courts have not held the “law of the flag” as absolute.<sup>121</sup> In fact, courts have been willing to ignore the foreign registry of ships for more important public policy considerations.<sup>122</sup> Just as companies outside the United States could build a machine outside of the United States that reads on a United States patent’s claims, the company would not be able to derive any benefit from selling the machine within the United States.<sup>123</sup> Most proposed solutions to the outer space flags of convenience problem involve laws or treaties that are aimed toward the infringing companies themselves.<sup>124</sup> This Note’s solution takes a passive approach by targeting the companies’ potential customers. Because most companies are created for the purpose of, and are therefore incentivized by, making money, drastically limiting their consumer pool would make stealing United States patented technology unprofitable.

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120. See *NTP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282, 1314, 1317–18 (Fed. Cir. 2005) (stating that, for an infringement determination, a court should look to (1) the place where the system is *controlled* and (2) the place where the system obtains its *beneficial use*).

121. Kleiman, *supra* note 10, at 5 n.9.

122. *Id.* (“For instance, the U.S. Supreme Court held in *Spector v. Norwegian Cruise Line Ltd.*, 545 U.S. 119 (2005), that a foreign flag could not shield a cruise ship from the requirements of the Americans with Disabilities Act while the ship was in U.S. waters.”).

123. See generally 35 U.S.C. § 271(a) (2013) (“Except as otherwise provided in this title, whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent.”).

124. See *supra* Part IV.

This ban would work even if the United States were the only country to implement it. Some of the top-grossing outer space fields today include satellite servicing, space communications, and Earth observation data visualization.<sup>125</sup> These three areas of technology generate \$380 billion worldwide, with the United States accounting for over fifty percent of consumption.<sup>126</sup> If the United States were to pass legislation banning any benefits derived from infringing technology within the country, companies who decide to evade the United States' jurisdiction would not be able to sell their product to over half of that product's potential market.<sup>127</sup> Over time, the loss in potential future profit a company could have made selling their product within the United States would outweigh the one-time costs for researching and developing new technology. The economic results of such legislation would be devastating enough to deter companies from using flags of convenience.

A ban on benefits derived, however, would not stop all outer space flags of convenience problems. Industries such as commercial space travel and space taxiing do not necessarily target consumers within the United States. Companies in these industries instead rely on customers coming to them and would not be affected by such a ban. This ban would only stop flags of convenience problems in outer space industries that derive their benefits terrestrially. A solution for fixing this other sector of private outer space activities is outside the scope of this Note and would still need to be devised and implemented along with this beneficial use solution.

### VIII. CONCLUSION

The problems with flags of convenience have existed in maritime law for years, creating conditions ripe for criminal activi-

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125. NAT'L AERONAUTICS AND SPACE ADMIN., PUBLIC-PRIVATE PARTNERSHIPS FOR SPACE CAPABILITY DEVELOPMENT: DRIVING ECONOMIC GROWTH AND NASA'S MISSION 4-7 (2014), [http://www.nasa.gov/sites/default/files/files/NASA\\_Partnership\\_Report\\_LR\\_20140429.pdf](http://www.nasa.gov/sites/default/files/files/NASA_Partnership_Report_LR_20140429.pdf).

126. *Id.* at 6-8.

127. *Id.*

ties, poor working conditions, and environmental damage.<sup>128</sup> The private outer space industry is a rapidly growing field that needs better regulations to ensure that loopholes do not allow companies to avoid liability.<sup>129</sup> By creating a treaty that places a ban on any benefits derived through use of patent infringing-technology, many of the flags of convenience problems in outer space could be eliminated. Because almost every benefit derived from a “space object” is inherently technological, a ban of these benefits in the most technologically advanced countries would greatly disincentivize patent pirating. Attacking the private entities’ customer base would help reduce the incentives for private entities to infringe on patented technology. Even if no other large countries signed the treaty with the United States, there would likely be a substantial enough reduction in the customer base solely from a ban in the United States to disincentivize the infringement worldwide.

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128. *Flags of Inconvenience*, *supra* note 10, at 5; *see, e.g.*, EUROPEAN PARLIAMENT DIRECTORATE-GENERAL FOR RESEARCH, *supra* note 50 ch. 2; Phang, *supra* note 50; INT’L TRANSP. WORKERS’ FED’N, *supra* note 50.

129. Kleiman, *supra* note 10, at 4.