

SYNERGISM AND NONOBVIOUSNESS: THE RHETORICAL RUBIK'S CUBE OF PATENTABILITY

A combination device is an assembly of two or more previously known mechanical elements designed to operate as one complete apparatus.¹ The Patent Act of 1952 permits the patentability of such devices which are useful,² novel,³ and nonobvious.⁴ This latter condition of nonobviousness requires the entire subject matter of the apparatus sought to be patented, in light of the prior art, to be unapparent at the time the discovery was made to a person possessing ordinary skill in the pertinent art.⁵ In recent years, however, a controversy has arisen among the federal courts of appeals regarding the necessity of an additional criterion for the patentability of combination devices: synergism.⁶ Depending upon the definition endorsed by the particular court, such devices are variously considered synergistic when the individual elements "result in [a combined] effect greater than the sum of the several effects taken

¹ See, e.g., *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 274 (1976); *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 59 (1969); *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 150-57 (1950).

² Patent Act of 1952, ch. 950, 66 Stat. 797 (1952) (codified at 35 U.S.C. § 101 (1976)). For the full text and a discussion of the utility requirement of section 101 of the Patent Act of 1952, see *infra* note 74.

³ Patent Act of 1952, ch. 950, 66 Stat. 797 (1952) (codified at 35 U.S.C. § 102 (1976)). For the full text and a discussion of the novelty requirement of section 102 of the Patent Act of 1952, see *infra* note 74.

⁴ Patent Act of 1952, ch. 950, 66 Stat. 798 (1952) (codified at 35 U.S.C. § 103 (1976)). For the full text and a discussion of the nonobviousness requirement of section 103 of the Patent Act of 1952, see *infra* notes 74-81 and accompanying text.

⁵ *Id.*

⁶ See *infra* notes 131-73 and accompanying text. The term "synergism" derives from the Greek, *syn*, "together" and *ergos*, "work", i.e., to work together or cooperate. The AMERICAN HERITAGE DICTIONARY 1305 (1966) defines synergism as "[t]he action of two or more substances . . . to achieve an effect of which each is individually incapable." WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 2320 (1976) defines synergism as the "cooperative action of discreet agencies . . . such that the total effect is greater than the sum of the two effects taken independently." Congress, in the Federal Courts Improvement Act of 1982, created the United States Court of Appeals for the Federal Circuit as part of a comprehensive program designed to improve the quality of the Federal Court system. The purpose of the new court, which consists of the predecessor Court of Customs and Patent Appeals and the Court of Claims, is to resolve some of the innumerable structural, administrative, and procedural problems that have impaired the ability of the Federal Courts to deal efficiently and expeditiously with the vast range of controversies confronting the federal courts of appeals. The new court has been granted exclusive appellate jurisdiction of patent cases, thereby removing them and the issue of synergism from the existing circuit courts. For the full text of the Federal Courts Improvement Act, see Federal Courts Improvement Act, Pub. L. No. 97-164, 96 Stat. 25-58 (1982).

For a discussion of the legislative history of the Federal Courts Improvement Act, see generally H.R. 312, 97th Cong., 1st Sess. 16 (1981); S. REP. NO. 275, 97th Cong., 1st Sess. 1 (1981).

For a discussion of proposals advocating the establishment of a new federal circuit court prior to the enactment of the Federal Courts Improvement Act, see generally Meader, *A Proposal For a New Federal Intermediate Appellate Court*, 60 J. PAT. OFF. SOC'Y 665 (1978); Miller, *Future of the CCPA*, 60 J. PAT. OFF. SOC'Y 676 (1978).

separately,"⁷ perform "a new and different function"⁸ or produce "unusual or surprising consequences."⁹ Those circuits which adhere to the synergism doctrine interpret recent Supreme Court decisions¹⁰ as requiring, for patentability, that combination devices exhibit synergistic qualities, either as a prerequisite to finding statutory nonobviousness or as an independent standard of patentability.¹¹ In contrast, those circuits which reject the synergism doctrine hold that the utility, novelty, and nonobviousness standards of the Patent Act of 1952 comprise the sole criteria of patentability for combination devices.¹²

⁷ *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 282 (1976); *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 152 (1950); *Sarkisian v. Winn-Proof Corp.*, 688 F.2d 647, 649-52 (9th Cir. 1982); *Huron Mach. Prods., Inc. v. A. & E. Warbern, Inc.*, 615 F.2d 222, 224-25 (5th Cir. 1980); *John Zinc Co. v. National Airoil Burner Co.*, 613 F.2d 547, 551 (5th Cir. 1980); *Smith v. ACME Gen. Corp.*, 614 F.2d 1086, 1093 (6th Cir. 1980); *Reinke Mfg. Co. v. Sidney Mfg. Corp.*, 594 F.2d 644, 648 (8th Cir. 1979); *International Tel. & Tel. Corp. v. Raychem Corp.*, 538 F.2d 453, 457 (1st Cir. 1976).

⁸ *Sakraida v. Ag Pro, Inc.*, 425 U.S. at 282; *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 60 (1969); *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. at 152; *Huron Mach. Prods., Inc. v. A. & E. Warbern, Inc.*, 615 F.2d at 225; *John Zinc Co. v. National Airoil Burner Co.*, 613 F.2d at 551; *Reed Tool Co. v. Dresser Indus., Inc.*, 672 F.2d 523, 527 (5th Cir. 1980); *Smith v. ACME Gen. Corp.*, 614 F.2d at 1093; *Deere & Co. v. Hesston Corp.*, 593 F.2d 956, 963 (10th Cir. 1979); *Reinke Mfg. Co. v. Sidney Mfg. Corp.*, 594 F.2d at 648.

⁹ *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. at 152; *NDM Corp. v. Hayes Prods., Inc.*, 641 F.2d 1274, 1280 (9th Cir. 1981); *John Zinc Co. v. National Airoil Burner Co.*, 613 F.2d at 551 (5th Cir. 1980); *M-C Indus., Inc. v. Precision Dynamics Corp.*, 634 F.2d 1211, 1213 (9th Cir. 1980); *Smith v. ACME Gen. Corp.*, 614 F.2d at 1093; *International Tel. & Tel. Corp. v. Raychem Corp.*, 538 F.2d 453, 457 (1st Cir. 1976). For other definitions of synergism espoused by the courts, see *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d 963, 970 n.20 (7th Cir. 1979).

¹⁰ *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 282 (1976); *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 60-61 (1969); *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 152-53 (1950).

¹¹ *Sarkisian v. Winn-Proof Corp.*, 688 F.2d 647, 649-52 (9th Cir. 1982); *Huron Mach. Prods., Inc. v. A. & E. Warbern, Inc.*, 615 F.2d 222, 224 (5th Cir. 1980); *John Zinc Co. v. National Airoil Burner Co.*, 613 F.2d 547, 551 (5th Cir. 1980); *Reed Tool Co. v. Dresser Indus., Inc.*, 672 F.2d 523, 527 (5th Cir. 1980); *Robintech, Inc. v. Chemidus Wavin Ltd.*, 628 F.2d 142, 144-45 (D.C. Cir. 1980); *Smith v. ACME Gen. Corp.*, 614 F.2d 1086, 1093 (6th Cir. 1980); *Whitley v. Road Corp.*, 624 F.2d 698, 699-700 (5th Cir. 1980); *Deere & Co. v. Hesston Corp.*, 593 F.2d 956, 963 (10th Cir. 1979); *Reinke Mfg. Co. v. Sidney Mfg. Corp.*, 594 F.2d 644, 648 (8th Cir. 1979); *International Tel. & Tel. Corp. v. Raychem Corp.*, 538 F.2d 453, 457 (1st Cir. 1976); *Rosen v. Lawson-Hemphill, Inc.*, 549 F.2d 205, 209 (1st Cir. 1976).

¹² *Rengo Co. v. Molins Mach. Co.*, 657 F.2d 535, 546 (3d Cir. 1981); *Champion Spark Plug Co. v. Gyromat Corp.*, 603 F.2d 361, 372 (2d Cir. 1979); *Plastic Container Corp. v. Continental Plastics of Ok., Inc.*, 607 F.2d 885, 904-05 (10th Cir. 1979); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d 963, 967-72 (7th Cir. 1979). For a discussion of the circuit court decisions rejecting the synergism doctrine, see generally Crossan, *Synergism Rejected*, 56 CHI-KENT L. REV. 339 (1980) [hereinafter cited as Crossan, *Synergism Rejected*]; Note, *Patent Law*, 27 VILL. L. REV. 777 (1981-82) [hereinafter cited as Note, *Patent Law*]; Note, *Requirements for Patentability*, *Republic Indus., Inc. v. Schlage Lock Co.*, 48 GEO. WASH. L. REV. 110 (1979) [hereinafter cited as Note, *Requirements for Patentability*, *Republic Indus.*]; Note, *Synergism and Nonobviousness: The Tenth Circuit Enters the Fray*, 58 DEN. L.J. 465 (1981) [hereinafter cited as Note, *Synergism and Nonobviousness*]; Note, *Synergism Fails to Add Up: Republic Indus., Inc. v. Schlage Lock Co.*, 41 U. PITT. L. REV. 761 (1980) [hereinafter cited as Note, *Synergism Fails to Add Up*]; Note, *Synergism*:

This note will examine the concepts of synergism and nonobviousness as interpreted by the United States Supreme Court and the various circuit courts of appeals. To appreciate fully the context and significance of these interpretations, a discussion of the historical development of patentability and the theoretical framework for synergism is presented first. Then a review of the various positions advocated by the circuit courts of appeals concerning the role of the synergism doctrine in determining patentability will be conducted. It will be submitted that synergism, defined solely in terms of a "result greater than the sum of the several parts taken separately" or a "new and different function," is a condition precedent for finding statutory nonobviousness. An absence of synergism successfully demonstrates that the patent claim is obvious under section 103, hence unpatentable. On the other hand, although the presence of synergism does not mandate a finding that the device is nonobvious, nonobviousness can exist only in a synergistic device. The very selection and arrangement of elements which produced the desired result could have been apparent, at the time the discovery was made, to a person skilled in the pertinent art. Properly applied, therefore, synergism, although not an *ipso facto* determinant of patentability under the statutory nonobviousness standard, may be a useful consideration for scrutinizing combination devices under section 103.

I. THE SYNERGISM DOCTRINE: HISTORICAL DEVELOPMENT AND THEORETICAL FRAMEWORK

A. Introduction: *The Early Patent Acts*

The American patent system derives its power from a specific constitutional grant.¹³ Article I, section 8, clause 8 of the Constitution empowers Congress "[t]o 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."¹⁴ Since its inception, the patent system has sought to encourage inventive activity and to promote the disclosure and development of knowledge beneficial to society.¹⁵ This end is achieved through the utiliza-

One Year Later, 59 DEN. L.J. 359 (1982) [hereinafter cited as Note, *Synergism: One Year Later*].

Other circuits have left the issue undetermined. Although the Tenth Circuit in *Plastic Container Corp. v. Continental Plastics of Ok., Inc.*, 607 F.2d 885, 904-05 (10th Cir. 1979) rejected the synergism doctrine, in a later case the court explicitly decided to "leave . . . resolution [of the synergism issue] for a later day." *Norfin, Inc. v. IBM*, 625 F.2d 357, 365-66 (10th Cir. 1980).

¹³ For a discussion of the historical development of the Patent Clause of the United States Constitution, Article I, section 8, clause 8, see generally Irons & Sears, *The Constitutional Standard of Invention — The Touchstone for Patent Reform*, 1973 UTAH L. REV. 653 (Winter) [hereinafter cited as Irons & Sears, *The Constitutional Standard of Invention*]; Lutz, *Patents and Science, A Clarification of the Patent Clause of the United States Constitution*, 18 GEO. WASH. L. REV. 50 (1949); Outline of the History of the United States Patent Office, *The Constitutional Provision*, 18 J. PAT. OFF. SOC'Y 55 (1936) (Centennial Issue No. 7). See also Rich, *Principles of Patentability*, 28 GEO. WASH. L. REV. 393, 394-97 (Jan. 1960) [hereinafter cited as Rich, *Principles of Patentability*].

¹⁴ U.S. CONST. art. I, § 8, cl. 8.

¹⁵ 35 U.S.C. § 112 prescribes the manner in which the invention shall be described so

tion of a profit motive.¹⁶ Accordingly, under the constitutional aegis, the inventor is offered an exclusive proprietary monopoly over the discovery for a specified period of time, currently limited to seventeen years.¹⁷ This constitutional provision, however, does not authorize Congress to provide indiscriminately for an award of exclusive rights in every "discovery." The Constitution authorizes the promulgation of a patent system only for the limited purpose of promoting the progress of science and useful arts.¹⁸ Accordingly, Congress is constitutionally restrained from granting patents that effectively remove existing knowledge from the public domain or exhibit no innovation.¹⁹ Within that restraint, however, Congress may liberally impose conditions for patentability.

as to enable others to reproduce it accurately:

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 of carrying out his invention.

Patent Act of 1952, ch. 950, § 1, 66 Stat. 798 (1952) (codified at 35 U.S.C. § 154 (1976)). See also Kitch, *Graham v. John Deere Co.: New Standards for Patents*, 1966 SUP. CT. REV. 293, 341 (1966); Rich, *Principles of Patentability*, *supra* note 13, at 400-02; Note, *The Standard of Patentability — Judicial Interpretation of Section 103 of the Patent Act*, 63 COLUM. L. REV. 306 (1963) [hereinafter cited as Note, *Judicial Interpretation*].

¹⁶ *Atlantic Works v. Brady*, 107 U.S. (17 Otto.) 192, 200 (1882). See also Rich, *Principles of Patentability*, *supra* note 13, at 400-02.

¹⁷ Patent Act of 1952, ch. 950, § 1, 66 Stat. 804 (1952) (codified at 35 U.S.C. § 154 (1976)). 35 U.S.C. § 154 prescribes the conditions of every patent:

Every patent shall contain . . . a grant to the patentee . . . for a term of seventeen years, of the right to exclude others from making, using, or selling the invention. . . .

Id.

The utilization of an exclusive patent monopoly may have the detrimental effect of encouraging the inventor's desire to restrict the supply of and raise prices on the patented discovery. Consequently, the policy of the American patent system embodies a balancing between the short-range competitive interests realized by society from the immediate, unrestricted access to disclosed innovations and the long-range interests of the intangible public loss inherent in the grant of a monopoly. Note, *Patentability of Mechanical Combinations: A Definition of Synergism*, 57 TEX. L. REV. 1043, 1057 (1979) [hereinafter cited as Note, *A Definition of Synergism*]; Note, *Synergism and Nonobviousness*, *supra* note 12, at 466-67; Note *Synergism Fails to Add Up*, *supra* note 12, at 762-63.

¹⁸ U.S. CONST. art. I, § 8, cl. 8.

¹⁹ An adversity toward monopolies existed in the United States at the time the Constitution was drafted. This adversity resulted from the English practice of granting monopolies to individuals well known to the Crown for items which were within the public domain. Thus, the framers of the Constitution intended to limit the ability of the government to grant patents on discoveries which remove existing knowledge from the public domain.

As the Supreme Court in *Graham v. John Deere Co.*, 383 U.S. 1 (1966) observed: This qualified authority . . . was written against the backdrop of the practices . . . of the Crown in granting monopolies to court favorites in goods or businesses which had long before been enjoyed by the public. *Id.* at 5. See also Mintz, *The Standard of Patentability in the United States — Another Point of View*, 1977 DET. C.L. REV. 755, 765 [hereinafter cited as Mintz, *The Standard of Patentability*]; Sears, *Combination Patents and 35 U.S.C. § 103*, 1977 DET. C.L. REV. 83, 88-89; Note, *Patentability of Mechanical Combinations: A Definition of Synergism*, *supra* note 17, at 1044; MEINHARDT, *INVENTIONS, PATENTS AND MONOPOLY* 30-35 (London, 1946). See generally H. FOX, *MONOPOLIES AND PATENTS* (1947).

As originally codified, the Patent Act of 1790 required that a patent be issued only if the innovation was "sufficiently useful and important."²⁰ The Patent Act of 1793 modified the "sufficiently useful and important" requirement by excising both the reference to "importance" and the modifier "sufficiently." Rather than being "sufficiently useful and important," a discovery, under the Patent Act of 1793, need only be "useful."²¹ This utility requirement was satisfied if the device actually worked to accomplish a beneficial result or if it was an improvement over earlier devices.²² In addition to utility, the new act required that the discovery demonstrate "novelty" in order to merit a patent.²³ This requirement of novelty was intended to preclude from patentability any device which existed in written form or was known or used by others prior to the time the patent was sought.²⁴ The Patent Act of 1790, as modified by the Act of 1793, thereby prescribed utility and novelty as the first statutory criteria of patentability.²⁵ These early historical prescriptions for patentability proved a ready touchstone for judicial inquiry for almost a century and a half. Although the Patent Act was revised and amended approximately fifty times during the years between 1790 and 1950, utility and novelty remained the only statutory requirements for patentability.²⁶ Nonetheless, the

²⁰ Patent Act of April 10, 1790, ch. 7, § 1, 1 Stat. 109, 110 (1790) (repealed in 1793) provides in relevant part:

That upon the petition of any person or persons . . . that he, she, or they, hath or have invented or discovered any useful art, manufacture, engine, machine, or device, or any improvement therein not before known or used, and praying that a patent may be granted therefor, it shall and may be lawful to and for said Secretary of State, the Secretary for the department of war, and the Attorney General, or any two of them, if they shall deem the invention or discovery *sufficiently useful and important*, to cause letters patent to be made out in the name of the United States. . . . [emphasis added].

Id.

²¹ Patent Act of February 21, 1793, ch. 11, § 1, 1 Stat. 318-20 (1793) (codified at 35 U.S.C. §§ 101-02 (1976)) provides in relevant part:

That when any person or persons, being a citizen of the United States, shall allege that he or they have invented any *new and useful* art, machine, manufacture, or composition of matter, or any *new and useful* improvement on any art, manufacture or composition of matter, not known or used before the application, and shall present a petition to the Secretary of State, signifying a desire to obtaining an exclusive property in the same, and praying that a patent may be granted therefore, it shall and may be lawful for the said Secretary of State, to cause letters patent to be made out in the name of the United States. . . . [emphasis added].

Id.

²² See Rich, *Principles of Patentability*, *supra* note 13, at 402-05. Note, *The Utility Requirement in the Patent Law*, 53 GEO. L. J. 154, 156-59 (1964).

²³ See *supra* note 21 for the novelty provision of the Patent Act of 1793.

²⁴ Evans v. Eaton, 16 U.S. (3 Wheat.) 454, 513-18 (1818). See also Note, *Novelty and Reduction to Practice: Patent Confusion*, 75 YALE L.J. 1194 (1966).

²⁵ See Rich, *Principles of Patentability*, *supra* note 13, at 402-05. See also *Graham v. John Deere Co.*, 383 U.S. 1 (1966) in which the Supreme Court stated that "the 'new and useful' tests which have always existed in the statutory scheme . . . need no clarification." *Id.* at 10.

²⁶ *Graham v. John Deere Co.*, 383 U.S. at 10. The requirement that a patentable discovery be "sufficiently useful and important" was excised from the Patent Act of Feb. 21, 1793, ch. 11, 1 Stat. 318-20 (1793), but was reinstated in the Patent Act of July 4, 1836, ch. 357,

standards of utility and novelty would remain neither unaltered nor the sole criteria of patentability indefinitely. To the contrary, Congress intended the articulation and interpretation of the standards of patentability to be shaped by judicial analysis and pronouncement.²⁷

B. *The Hotchkiss Standard of Invention*

In accordance with its paramount role in articulating and applying the standards of patentability, the judiciary added to the statutory requirements a third criterion: "invention."²⁸ In 1851, this first judicial formulation, extending beyond the statutory utility and novelty requirements, was set forth by the United States Supreme Court in *Hotchkiss v. Greenwood*.²⁹ In *Hotchkiss*, the Court rejected the validity of a patent granted for an improved doorknob.³⁰ The inventors in *Hotchkiss* substituted clay or porcelain for the traditional metal or wood and utilized an opening in the doorknob shaped like an inverted cone for the insertion of the shank.³¹ Although the Court found the replacement of materials to be new, it concluded that the materials, clay and porcelain, were known previously in the art, as was the method used to fasten the knobs to the shank.³² Accordingly, the *Hotchkiss* Court observed that "unless more ingenuity and skill . . . [are evident in the device] . . . than [are] possessed by an ordinary mechanic acquainted with the business, there [is] an absence of that degree of skill and ingenuity which constitute [the] essential elements of every invention. In other words, the improvement is the work of the skillful mechanic, not that of an inventor."³³ In essence, the *Hotchkiss* invention standard required an assessment of the level of skill necessary to discover a useful

5 Stat. 117, and remained a requirement of patentability until the Patent Act of 1952, ch. 950, § 1, 66 Stat. 792-814 (1952) (codified at 35 U.S.C. §§ 1-293 (1970)). This requirement, although unused, was deleted as unnecessary in light of the new requirements. See Federico, "Commentary on the New Patent Act [of 1952]" in 35 U.S.C.A. 1, 2-5 (West 1954) [hereinafter cited as Federico, *Commentary*]; Rich, *Principles of Patentability*, *supra* note 13, at 398.

²⁷ Thomas Jefferson, a member of the Patent Board, noted that patent investigations occupied "more time of the members of the board than they could spare from higher duties. . . ." The task of developing predictable standards of patentability, therefore, was given to the judiciary "to be matured into a system, under which everyone might know when his actions were safe and lawful." Letter from Thomas Jefferson to Isaac McPherson (Aug. 13, 1813), reprinted in 13 THE WRITINGS OF THOMAS JEFFERSON 335 (A. Lipscomb ed. 1904), VI WRITINGS OF THOMAS JEFFERSON 181, 182 (H. Washington ed. 1864), quoted in *Graham v. John Deere Co.*, 383 U.S. 1, 10 (1966). According to the Supreme Court in *Graham*, Congress implicitly agreed with the suggestion of Thomas Jefferson and the other members of the patent board that the judiciary should develop the additional conditions of patentability. The Court noted that, although the Patent Act was amended, revised or codified approximately fifty times between 1790 and 1950, Congress avoided statutory requirements other than bare utility and novelty. *Graham v. John Deere Co.*, 383 U.S. at 10.

²⁸ *Hotchkiss v. Greenwood*, 52 U.S. (11 How.) 248 (1851). See generally Irons and Sears, *The Constitutional Standard of Invention*, *supra* note 13.

²⁹ *Hotchkiss v. Greenwood*, 52 U.S. (11 How.) 248 (1851).

³⁰ *Id.* at 262, 265-67.

³¹ *Id.*

³² *Id.* at 264-65.

³³ *Id.* at 266.

and new device. As a practical indication of patentability, therefore, the invention standard required a comparison between the subject matter sought to be patented and the level of expertise existing before the creation of the device.³⁴ This judicially sanctioned test reflected the implicit constitutional limitation of and public policy against issuing patents on discoveries which withdrew existing knowledge from public access.³⁵ Thus, when the contribution to the public knowledge from the discovery was insubstantial or would have developed without the incentive of the patent system, no monopoly should have been granted under the *Hotchkiss* standard.³⁶

Hotchkiss, therefore, became the seminal case enunciating the third prerequisite for patentability: invention.³⁷ For the next one hundred years, elaboration of the *Hotchkiss* invention requirement remained with the judiciary as the patent statute continued to embrace only the standards of utility and novelty.³⁸ Although ostensibly simplistic in its theoretical formulation, the invention requirement of *Hotchkiss* proved difficult to formulate and even more troublesome to apply in the vast array of cases in which the invention standard arose.³⁹ Even the Supreme Court admitted that it could provide no exact definition of "invention" to aid in the determination of patentability.⁴⁰ Without such a definition, the *Hotchkiss* standard of invention proved problematic.⁴¹ As a result of

³⁴ See *Graham v. John Deere Co.*, 383 U.S. 1, 12 (1966).

³⁵ See Irons and Sears, *The Constitutional Standard of Invention*, *supra* note 13, at 653-54. Rich, *The Vague Concept of "Invention" as Replaced by Section 103 of the 1952 Patent Act*, 46 J. PAT. OFF. SOC'Y 855, 859 (1964) [hereinafter cited as Rich, *The Vague Concept*].

³⁶ Note, *Synergism and Nonobviousness*, *supra* note 12, at 468 n.25; Note, *Sakraida v. Ag Pro, Inc.: Combination Patents Now Require Synergistic Effects*, 15 HOUS. L. REV. 157, 159 (1977) [hereinafter cited as Note, *Combination Patents Require Synergistic Effects*]. See also Rich, *The Vague Concept*, *supra* note 35, at 859.

³⁷ See Kitch, *New Standards for Patents*, in *THE SUPREME COURT AND PATENTS AND MONOPOLIES*, 161, 183-87 (P. Kurland ed. 1975).

³⁸ *Graham v. John Deere Co.*, 383 U.S. 1, 10 (1965). See *supra* note 26.

³⁹ *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 151 (1950). For a discussion of the problems inherent in the "invention" requirement, see generally Deller, *The Problem of Invention in the Law of Patents*, 28 J. PAT. OFF. SOC'Y 797 (1946) [hereinafter cited as Deller, *The Problem of Invention*]; Mintz & O'Rourke, *After Black Rock: New Tests of Patentability — The Old Tests of Invention*, 39 GEO. WASH. L. REV. 123, 123-32 (1970) [hereinafter cited as Mintz and O'Rourke, *New Tests of Patentability*]; Note — *Requirements for Patentability, Sakraida v. Ag Pro, Inc.*, 45 GEO. WASH. L. REV. 546, 549-50 (1977) [hereinafter cited as Note, *Requirement for Patentability, Sakraida*].

⁴⁰ The Supreme Court in *McClain v. Ortmyer*, 141 U.S. 419 (1891) stated:

To say that the act of invention . . . involves an operation of the intellect, is a product of intuition, or of something akin to genius, as distinguished from mere mechanical skill, draws one somewhat nearer to an appreciation of the true distinction, but it does not adequately express the idea. The truth is *the word cannot be defined* in such manner as to afford any substantial aid in determining whether a particular device involves an exercise of the inventive faculty or not. In a given case we may be able to say that there is present invention of a very high order. In another we can see that there is lacking that impalpable something which distinguishes invention from simple mechanical skill.

Id. at 426-27 [emphasis added].

⁴¹ Mr. Justice Woodbury, in a dissenting opinion of *Hotchkiss*, 52 U.S. (11 How.) 249 (1851), accurately foresaw the difficulties arising out of the application of the majority's

judicial uncertainty concerning the application of the *Hotchkiss* standard, judicial interpretation of the term "invention" became more stringent and difficult to conceptualize as a realistic indication of patentability. This difficulty surrounding the judicial application of the *Hotchkiss* invention standard, however, did not become acute until the beginning of the twentieth century.⁴² During this era, many courts, struggling to articulate an equitable interpretation of the invention standard, developed "rules of invention" in an attempt to delineate certain objective characteristics of inventiveness.⁴³ These rules, however, were only alternative definitions of "invention," rather than objective guidelines for assessing the creative process.⁴⁴ As subjectivity in the deter-

"mechanic of ordinary skill" standard. Mr. Justice Woodbury stated that: the test . . . sanctioned here . . . has not the countenance of precedent, either English or American; and, at the same time, it seems open to great looseness or uncertainty in practice. *Id.* at 270 (Woodbury, J., dissenting).

The *Hotchkiss* invention standard ultimately proved to be subjective and thus inherently elusive, resulting in an inconsistent and unpredictable body of case law for nearly a century and a half. See, e.g., *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 151 (1950); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d 963, 967 (7th Cir. 1979). See also Edell, *The Supreme Court and Section 103*, 5, AM. PAT. L.A.Q.J. 99, 99-100 (1977) [hereinafter cited as Edell, *The Supreme Court*]; Rich, *Principles of Patentability*, *supra* 13, at 404; Note, *Requirements for Patentability*, Sakraida, *supra* note 39, at 549 n.29.

As one commentator notes:

In the final analysis, all that it amounted to was that if the court thought the invention, though new and useful, was not patentable, then it did not involve "invention" and vice versa. The requirement for "invention" was the plaything of the judges who, as they became initiated into its mysteries, delighted to devise and expound their own ideas of what it meant; some very lovely prose resulting.

Rich, *Principles of Patentability*, *supra* note 13, at 404.

⁴² For a discussion of nineteenth century approaches to determining patentability, see Dession, *The Trial of Economic and Technological Issues of Fact: I*, 58 YALE L.J. 1019, 1242 (1949); Mintz, *The Standard of Patentability*, *supra* note 19, at 768-96; Mintz & O'Rourke, *New Tests of Patentability*, *supra* note 39, at 126-27; Note, *Subtests of "Nonobviousness": A Nontechnical Approach to Patent Validity*, 112 U. PA. L. REV. 1169 (1964) [hereinafter cited as Note, *Subtests of "Nonobviousness."*].

The rapid expansion of technology and industrialization during the twentieth century caused the judicial interpretation of the invention standard to become increasingly stringent and difficult to conceptualize. This increased stringency and confusion resulted from the difficulty of applying the simplistic *Hotchkiss* "mechanic of ordinary skill" standard to the intricate products of twentieth century technology. Furthermore, the Industrial Revolution brought an awareness as well as an apprehension of the possible abuses and harmful anticompetitive effects of patent monopolies. As a result, courts applied the invention standard in a more stringent manner to avoid the liberal grant of patents. Mintz, *The Standard of Patentability*, *supra* note 19, at 771-77, 774 n.83; Mintz & O'Rourke, *New Tests of Patentability*, *supra* note 39, at 126-28; Note, *Subtests of "Nonobviousness"* at 1169-70.

⁴³ See Cooch, *The Standards of Invention in the Courts*, in DYNAMICS OF THE PATENT SYSTEM 34, 56 (W. Ball ed. 1960); Deller, *The Problem of Invention*, *supra* note 39, at 801-06; Edell, *The Supreme Court*, *supra* note 41, at 99-100; Mintz, *The Standard of Patentability*, *supra* note 19, at 774-75; Mintz & O'Rourke, *New Tests of Patentability*, *supra* note 39, at 126-27; Note, *Requirements for Patentability*, Sakraida, *supra* note 39, at 549 nn.29-30.

⁴⁴ Consequently, the *Hotchkiss* invention standard became variously, and vaguely, described as: the "creative work of the inventive faculty," *Hollister v. Benedict and Burnham Mfg. Co.*, 113 U.S. 59, 73 (1885); the "exercise of the creative faculty," *Turner v. Goldstein*, 154 F.2d 338, 341 (10th Cir. 1946), *Hammond Buckle Co. v. Goodyear Rubber Co.*, 58 F. 411,

mination of patentability became more prevalent, the judiciary correspondingly failed to consider comparisons between the prior art and the subject matter sought to be patented, a necessary consideration under the *Hotchkiss* standard.⁴⁵ The inconsistent results reached by the courts, employing dissimilar standards to similar devices, evidenced the difficulty of applying the *Hotchkiss* standard.

It was during this period of increasingly stringent and subjective determinations of patentability that the judicial underpinnings of what is currently known as the synergism doctrine⁴⁶ first appeared.⁴⁷ On several occasions the Supreme Court noted that a device consisting of previously known elements would not be patentable "unless some new and useful result, an increase of efficiency, or a decided savings in the operation, is clearly attained."⁴⁸ This interpretation of the invention standard focused on the results achieved by the conjunction of previously known elements rather than just the utility and novelty of the act of combining. In due course, this standard was extended further to include an examination of the individual elements of a combination device.⁴⁹ The judiciary began to employ the terms "combination" and "aggregation" in an attempt to delineate certain characteristics of a patentable "invention."⁵⁰ The Supreme Court established that an accumulation of previously known elements would be patentable only if it produced a new and useful

413 (2d Cir. 1893); the "exercise of the inventive faculty," *Potts v. Creager*, 155 U.S. 597, 608 (1895); the "presence of patentable novelty," *United Chromium, Inc. v. International Silver Co.*, 53 F.2d 390, 393 (D. Conn. 1931); the presence of "inventive skill," *Ansonia Brass & Copper Co. v. Electrical Supply Co.*, 144 U.S. 11, 18 (1892). See also, e.g., *Cuno Corp. v. Automatic Devices Corp.*, 314 U.S. 84, 91 (1941) ("flash of creative genius"); *Mantle Lamp Co. v. Aluminum Prods. Co.*, 301 U.S. 544, 546 (1937) ("inventive genius"); *Concrete Appliances Co. v. Gomery*, 269 U.S. 177, 185 (1925) ("inventive genius"); *Potts v. Creager*, 155 U.S. 597, 607 (1895) ("intuitive genius"); *Smith v. Whitman Saddle Co.*, 148 U.S. 674, 681 (1892) ("genius or invention"). See also *Deller, The Problem of Invention*, *supra* note 39, at 802, for a list of ten affirmative and fourteen negative rules of invention; *Mintz and O'Rourke, New Tests of Patentability*, *supra* note 39, at 124-32.

⁴⁵ *Mintz, The Standard of Patentability*, *supra* note 19, at 772.

⁴⁶ Under this standard, the individual elements of a combination device must "perform a new or different function," produce "unusual or surprising consequences," or result in "[a combined] effect greater than the sum of the several effects taken separately." See *infra* notes 204-32 and accompanying text.

⁴⁷ Note, *Synergism Fails to Add Up*, *supra* note 12, at 766 & n.35.

⁴⁸ *Hicks v. Kelsey*, 85 U.S. (18 Wall.) 670, 673 (1874). See also *Seymour v. Osborne*, 78 U.S. (11 Wall.) 516, 548-49 (1871).

⁴⁹ *Pickering v. McCullough*, 104 U.S. (11 Otto.) 310, 317-18 (1881). See also *Stephenson v. Brooklyn Cross-Town R.R. Co.*, 114 U.S. 149, 157 (1885).

⁵⁰ A "combination" device produces a result due to the combined effect of the individual elements interacting and not simply from the separate action of each. In contrast, an "aggregation" involves the mere union of several elements, independently performing the same function in the same manner as it did when used alone, without interaction. *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 151 (1950); *Lincoln Eng'g Co. v. Stewart-Warner Corp.*, 303 U.S. 545, 549-50 (1938); *Palmer v. Corning*, 156 U.S. 342, 345-46 (1895); *Brinkerhoff v. Aloe*, 146 U.S. 515, 516 (1892); *Thatcher Heating Co. v. Burtis*, 121 U.S. 286, 294 (1887); *Pickering v. McCullough*, 104 U.S. at 317-18; *Reckendorf v. Faber*, 92 U.S. (2 Otto.) 347, 357 (1875); *Hailes v. Van Wormer*, 87 U.S. (20 Wall.) 353, 368 (1873).

result due to the combined effect of the several parts interacting, and not simply from an aggregation of the independently performed functions.⁵¹ This distinction between "combinations" and "aggregations," originally embodied in the rules of invention surrounding the *Hotchkiss* standard, exemplifies the underlying theory of the synergism doctrine.⁵²

C. *Synergism Defined:*

Great Atlantic and Pacific Tea Co. v. Supermarket Equipment Corp.

In 1950, the Supreme Court reaffirmed the trend toward more demanding standards of invention in *Great Atlantic and Pacific Tea Co. v. Supermarket Equipment Corp.*⁵³ In this landmark decision, the Supreme Court affirmed the distinction between "combinations" and mere "aggregations," a distinction which had been recognized in many prior rules of invention.⁵⁴ In addition, the Court urged a more exacting level of "invention" for devices consisting entirely of previously known elements.⁵⁵ Although the Court recognized the *Hotchkiss* invention standard as controlling,⁵⁶ *Great Atlantic* was the first Supreme Court decision to broach, *sub silentio*, the concept of synergism.⁵⁷ The Supreme Court held that for a patent to issue on such devices "[t]he conjunction or concert of known elements must contribute something; only when the whole in some way exceeds the sum of its parts is the accumulation of old devices patentable."⁵⁸

The patent in *Great Atlantic* involved a grocery cashier counter equipped with a rack for manually moving, from the customer to the checking clerk, groceries deposited within it.⁵⁹ According to the Court, each element of the device was known in the prior art.⁶⁰ As to devices consisting of previously known elements, the Court noted that the use of such "words of art" as "combination" and "aggregation" had been recognized previously as determinants of "invention."⁶¹ The Court cautioned, however, that such expressions only serve to confuse because the concept of invention, when applied to a combination of old elements, is inherently elusive.⁶² Nevertheless, the Court, in addressing the standard for determining whether an invention exists, cited with approval the earlier distinction, distilled from many previous decisions,⁶³

⁵¹ See cases cited *supra* note 50.

⁵² See *infra* notes 61-73, 178-232 and accompanying text.

⁵³ 340 U.S. 147 (1950).

⁵⁴ *Id.* at 151-52.

⁵⁵ *Id.* at 154.

⁵⁶ *Id.* at 153.

⁵⁷ *Id.* at 152. Although numerous courts prior to *Great Atlantic* had discussed, in isolation, terminology supporting a definition of synergism, no court had ever outlined all of the contours of the synergism doctrine. See, e.g., cases cited *supra* note 50.

⁵⁸ *Id.*

⁵⁹ *Id.* at 149.

⁶⁰ *Id.*

⁶¹ *Id.* at 151.

⁶² *Id.*

⁶³ *Id.* (citing *Toledo Pressed Steel Co. v. Standard Parts, Inc.*, 307 U.S. 350 (1939)). *Cuno Eng'g Corp. v. Automatic Devices Corp.*, 314 U.S. 84 (1941). The Court in *Great Atlantic*

between "combinations" and "aggregations."⁶⁴ This distinction prohibits the patentability of a mere "aggregation" of previously known elements which, in the aggregate, exhibit no new or different function.⁶⁵ Moreover, the *Great Atlantic* Court urged lower courts to scrutinize patents involving a conjunction of known elements "with a care proportioned to the difficulty and improbability of finding invention in an assembly of old elements."⁶⁶ According to the Court, the validity of a patent for the mere aggregation of previously known elements cannot be sustained when the "effect is to subtract from former resources freely available to skilled artisans."⁶⁷

Under this analysis, the Court rejected the validity of the patent,⁶⁸ noting that the device merely combined previously known elements which performed no additional or different function when used in association with the other elements.⁶⁹ The Supreme Court thus held that for a patent to issue on a combination device, "the conjunction or concert of known elements must contribute something; only when the whole in some way exceeds the sum of its parts is the accumulation of old devices patentable."⁷⁰

The invention standard, as redefined in *Great Atlantic*, was interpreted widely as prescribing a higher standard of patentability for devices consisting of previously known elements.⁷¹ Accordingly, this decision arguably recognizes, albeit *sub silentio*, the synergism doctrine as an appropriate standard for determining the patentability of such devices. The Court's rationale for this stricter scrutiny of combination devices was that a patent can be sustained only when it effectuates its purpose of augmenting the sum of useful knowledge.⁷² Ac-

quoted *Lincoln Eng'g Co. v. Stewart-Warner Corp.*, 303 U.S. 545 (1938) which stated:

The mere aggregation of a number of old parts or elements which, in the aggregation perform or produce no new or different function or operation than that theretofore performed or produced by them, is not [a] patentable invention.

Id. at 549.

⁶⁴ *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. at 151.

⁶⁵ *Lincoln Eng'g Co. v. Stewart-Warner Corp.*, 303 U.S. 545, 549 (1938).

⁶⁶ *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 152 (1950).

⁶⁷ *Id.* According to the Court, the rationale for this scrutiny was that:

the function of a patent is to add to the sum of useful knowledge. Patents cannot be sustained when, on the contrary, their effect is to subtract from former resources freely available to skilled artisans. A patent for a combination which only unites old elements with no change in their respective functions . . . obviously withdraws what already is known into the field of its monopoly and diminishes the resources available to skillful men.

Id.

⁶⁸ *Id.* at 154.

⁶⁹ *Id.* at 152.

⁷⁰ *Id.*

⁷¹ *Id.* J. Douglas, concurring in *Great Atlantic*, criticized the Patent Office and the lower federal courts for applying "a broader, looser conception of patents than the Constitution contemplates" when determining whether an invention was patentable. J. Douglas referred to twenty patents which the Supreme Court has held to be invalid as illustrative of the departures of the patent system from the governing constitutional standards. *Id.* at 156-58 (Douglas, J., concurring).

⁷² *Id.*

according to the *Great Atlantic* Court, a patented discovery which only unites or combines old elements, with no change in their respective functions, would withdraw from the prior art resources theretofore freely available to skilled persons.⁷³ This withdrawal of resources from the public domain is a result not intended by either the Congress or the courts and indeed, would violate the constitutional mandate that new discoveries eventually must become the property of all people.

D. *The Response to the Hotchkiss Era of "Invention":
The Nonobviousness Requirement of Section 103*

The increasingly strict standards of patentability, coupled with the uncertainty and inconsistency resulting from the judiciary's subjective search for "invention," as evidenced in *Great Atlantic*, prompted Congress to clarify the criteria of patentability.⁷⁴ Two years after *Great Atlantic*, Congress attempted to

⁷³ *Id.* at 152-53.

⁷⁴ Patent Act of 1952, ch. 950, § 1, 66 Stat. 792-814 (1952) (codified at 35 U.S.C. §§ 1-293 (1970)).

For a discussion of the legislative intent in enacting the nonobviousness requirement of section 103 of the Patent Act of 1952, see H.R. REP. NO. 1923, 82d Cong., 2d Sess. 6 (1952), reprinted in U.S. CODE CONG. AND AD. NEWS 2394, 2400. See also Beckett, *Judicial Construction of the Patent Act of 1952 — Codification v. Substantive Change*, 7 J. PAT. OFF. SOC'Y 467 (1955); Federico, *Origins of Section 103*, 5 AM. PAT. L.A.Q.J. 87, 95 (1977); Harris, *Some Aspects of the Underlying Legislative Intent of the Patent Act of 1952*, 23 GEO. WASH. L. REV. 659, 671-80 (1955) [hereinafter cited as Harris, *Legislative Intent*]; Mintz & O'Rourke, *New Tests of Patentability*, *supra* note 39, at 135-38; Rich, *Congressional Intent — or, Who Wrote the Patent Act of 1952*, in PATENT PROCUREMENT AND EXPLOITATION 61, 70 (1963) [hereinafter cited as Rich, *CONGRESSIONAL INTENT*]; Rich, *Laying the Ghost of the "Invention" Requirement*, 1 AM. PAT. L.A.Q.J. 26, 32-33 (1972) [hereinafter cited as Rich, *Laying the Ghost*]; Note, *Combination Patents and Synergism, Must 2 + 2 = 5?* 37 WASH. & LEE L. REV. 1206, 1206-11 (1980) [hereinafter cited as Note, *Combination Patents and Synergism*]; Note, *Combination Patents Require Synergistic Effects*, *supra* note 36, at 161-62; Note, *A Definition of Synergism*, *supra* note 17, at 1047-49; Note, *Synergism Fails to Add Up*, *supra* note 12, at 767-68; S. JONES, THE PATENT OFFICE 136 (1971).

In the Patent Act of 1952, Congress redefined the conditions of patentability in three sections. Patent Act of 1952, ch. 950, § 1, 66 Stat. 797-98 (1952) (codified at 35 U.S.C. §§ 101-03 (1976)). Section 101 of the Act, which is a general statement relating to the subject matter for which patents may be obtained, retains the statutory requirements of utility and novelty. 35 U.S.C. § 101 provides:

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, subject to the conditions and requirements of this title.

Id. § 101.

Under this section, a patent may be granted for the discovery of any new and useful process, machine, manufacture, or composition of matter, as well as any new and useful improvement thereof. *Id.* A more detailed explanation of the novelty criterion and other conditions for patentability are contained in section 102. Patent Act of 1952, ch. 950, § 1, 66 Stat. 798 (1952) (codified at 35 U.S.C. § 102 (1976)) provides:

A person shall be entitled to a patent unless —

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior

eliminate the divergent interpretations of the nebulous term "invention" by enacting in section 103 of the Patent Act of 1952, a third, more objective prerequisite to patentability: nonobviousness.⁷⁵ Specifically, section 103 states that a patent will not issue if the entire subject matter sought to be patented, in

to the date of the application for patent in the United States, or

(c) he has abandoned the invention, or

(d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States, or

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent, or

(f) he did not himself invent the subject sought to be patented, or

(g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

Id.

Under this section, the novelty criterion is satisfied generally unless the discovery was known, patented, described in a printed publication, or in actual public use prior to the time the discovery was made. *Id.* § 102.

⁷⁵ Patent Act of 1952, ch. 950, § 1, 66 Stat. 798 (1952) (codified at 35 U.S.C. § 103 (1976)) provides:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Id.

H.R. REP. NO. 1923, 82d Cong., 2d Sess. 7 (1952), S. REP. NO. 1979, 82d Cong., 2d Sess. 6 (1952), reprinted in 1952 U.S. CODE CONG. & AD. NEWS 2394 states:

There is no provision corresponding to the first sentence explicitly stated in the present statutes, but the refusal of patents by the Patent Office, and the holding of patents invalid by the courts, on the ground of lack of invention or lack of patentable novelty has been followed since at least as early as 1850. This paragraph is added with the view that an explicit statement in the statute may have some stabilizing effect, and also to serve as a basis for the addition at a later time of some criteria which may be worked out.

The second sentence states that patentability as to this requirement is not to be negated by the manner in which the invention was made, that is, it is immaterial whether it results from long toil and experimentation or from a flash of creative genius.

Id. at 2401-11.

It is interesting to note that the concept of obviousness was utilized in several Supreme Court decisions prior to 1952. *See, e.g.,* Goodyear Tire and Rubber Co. v. Ray-O-Vac Co., 321 U.S. 275, 279 (1944); Saranac Automatic Mach. Corp. v. Wirebounds Patents Co., 282 U.S. 704, 711 (1931); The Barbed Wire Patent, 143 U.S. 275, 283 (1892); Loom Co. v. Higgins, 105 U.S. 580, 591 (1882); Vinton v. Hamilton, 104 U.S. 485, 489, 491-92 (1882).

light of the prior art, would have been obvious at the time the discovery was made to an ordinarily-skilled artisan.⁷⁶

The structure of section 103 clarified two issues central to determinations of patentability. First, the nonobviousness test of section 103 is not contingent upon whether an innovation is equivalent to one in the prior art.⁷⁷ Rather, the test of section 103 attempts to determine whether the dissimilarities between the discovery at issue and knowledge existing in the prior art would have been obvious to one skilled in the applicable art.⁷⁸ Under section 103 analysis, therefore, the existence of different or identical elements between the current discovery and the prior art does not by itself determine nonobviousness.⁷⁹ Second, nonobviousness is determined in light of the art existing at the time the discovery was made, rather than in hindsight. Third, the nonobviousness test of section 103 was designed to establish an objective test for determining patentability to supplant the subjective scrutiny of claimed innovations that courts had engaged in prior to the enactment of section 103.⁸⁰ Accordingly, nonobviousness, under section 103 is measured by what would have been obvious to a hypothetical person having reasonable skill in the art to which the subject matter pertains, rather than to the ultimate user of that discovery.⁸¹

Although the enactment of section 103 was intended to clarify the standards of patentability by eliminating all divergent interpretations surrounding the concept of "invention," it failed to accomplish its purpose. After the enactment of section 103, a divergence of opinion arose among the circuit courts over the effect of the nonobviousness requirement on the standards of patentability existing prior to 1952. Essentially, the courts differed regarding whether section 103 merely codified the pre-existing standard of patentability or embodied a substantive change in the prior law.⁸² Several circuits viewed the sec-

⁷⁶ Patent Act of 1952, ch. 950, § 1, 66 Stat. 798 (1952) (codified at 35 U.S.C. § 103 (1976)).

⁷⁷ 2 D. CHISOLM, PATENTS § 5.01 (1978). A discovery, in light of the prior art, can be obvious despite the fact that it and a prior discovery are not identical. The courts may find that the claimed innovation was so substantially similar to what was known and already existent in the prior art, that the criterion of non-obviousness is not satisfied. Indeed, the presence of substantial similarity, if the court so finds, typically will negate the patentability of the claimed innovation. Yet even in instances where the devices are substantially similar, it is possible for the test of nonobviousness to be satisfied. In this regard, nonobviousness is distinct from novelty in the sense that a discovery may be obvious even though it is not identically disclosed in the prior art.

⁷⁸ *Dann v. Johnston*, 425 U.S. 219, 228 (1976).

⁷⁹ *Id.*; *Egley v. United States*, 576 F.2d 309, 313-14 (Ct. Cl. 1978).

⁸⁰ See *supra* notes 37-45 and accompanying text.

⁸¹ *Dann v. Johnston*, 425 U.S. 219, 229 (1976). See also *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1965). In essence, rather than an objective test of patentability, section 103 establishes a subjective evaluation based upon the "hypothetical person." In employing this standard, courts should attempt to be more objective by utilizing expert testimony. *Graham v. John Deere Co.*, 383 U.S. at 17; Note, *Subtests of "Nonobviousness," supra* note 42, at 1170-71. See, e.g., *Reinke Mfg. Co. v. Sidney Mfg. Corp.*, 594 F.2d 644, 651 n.9 (8th Cir. 1979).

⁸² This confusion stems largely from the contradictory legislative history leading to the Act's passage. For a discussion of the controversy surrounding section 103 of the Patent Act of 1952, as well as the decisions interpreting this section in light of the legislative history of the Act,

tion merely as a codification of the stricter judicial standards of patentability reflected by later decisions. Accordingly, the opinions of these courts relied upon pre-1952 case law such as *Great Atlantic* to test the presence or absence of "invention."⁸³ Other circuits, however, recognized that the new standards appeared more relaxed than ones previously imposed. These courts interpreted section 103 as a reinstatement of the more lenient standard of invention articulated in *Hotchkiss* — the discovery must evidence more ingenuity or skill than that possessed by an ordinary, skillful mechanic acquainted with the business.⁸⁴

This controversy surrounding the interpretation of section 103 existed until 1966 when the Supreme Court first interpreted the statutory nonobviousness standard in the landmark case of *Graham v. John Deere Co.*⁸⁵ The patent in *Graham* consisted of an assembly of previously known elements designed to absorb shock from plowshares in rocky soil and to prevent damage to the plow.⁸⁶ The Court held the patent invalid because it failed to comply with the nonobviousness requirement of section 103.⁸⁷ After examining the history of the patent system, the case law prior to 1952, and the legislative history of the Patent Act of 1952,⁸⁸ the Court reasoned that the nonobviousness standard of section 103 was intended as an objective statutory expression of the invention standard originally articulated in *Hotchkiss*.⁸⁹ The Court stated that Congress, in section 103, mandated adoption of the "mechanic of ordinary skill" standard with

see Harris, *Legislative Intent*, *supra* note 74, at 661-62; Kayton, *Nonobviousness of the Novel Invention*, 35 U.S.C. § 103, in NONOBVIOUSNESS — THE ULTIMATE CONDITION OF PATENTABILITY 2:101 (1980); Marans, *Some Aspects of the Patent Act of 1952 as Interpreted by Published Decisions*, 36 J. PAT. OFF. SOC'Y 482 (1954); Martin, *The Patent Codification Act*, 36 J. PAT. OFF. SOC'Y 625 (1954); Pearce, *A Review of Important Cases on Patents and Trademarks Reported During 1953*, 36 J. PAT. OFF. SOC'Y 358 (1954); Rich, *Congressional Intent*, *supra* note 74; Note, *Combination Patents Require Synergistic Effects*, *supra* note 36, at 162-63; Note, *Judicial Interpretation*, *supra* note 15, at 313-22; Note, *Synergism and Nonobviousness*, *supra* note 12, at 470; Note, *Synergism Fails to Add Up*, *supra* note 12, at 767-68, 768 nn.43-44; 2 D. CHISOLM, PATENTS § 5.02(4) (1978); P. GOLDSTEIN, COPYRIGHT, PATENT, TRADEMARK AND RELATED STATE DOCTRINES 425 (1973).

⁸³ *Caldwell v. Kirk Mfg. Co.*, 269 F.2d 506, 510 (8th Cir. 1959); *Hawley Prods. Co. v. United States Trunk Co.*, 259 F.2d 69, 72-74 (1st Cir. 1958); *Stabler v. Bright Leaf Indus., Inc.*, 261 F.2d 383, 386 (5th Cir. 1958); *Bobertz v. Gen. Motors Corp.*, 228 F.2d 94, 98-99 (6th Cir. 1955); *Kwikset Locks, Inc. v. Hillgren*, 210 F.2d 483, 487 (9th Cir. 1954); *Vincent v. Suni-Citrus Products Co.*, 215 F.2d 305, 315 (5th Cir. 1954); *Wasserman v. Burgess & Blacher Co.*, 217 F.2d 402, 404 (1st Cir. 1954); *Bobertz v. Gen. Motors Corp.*, 203 F.2d 912, 918 (6th Cir. 1953). See also Note, *Judicial Interpretation*, *supra* note 15, at 317-22.

⁸⁴ See *Brown v. Brock*, 240 F.2d 723, 728 (4th Cir. 1957); *R.M. Palmer Co. v. Luden's, Inc.*, 236 F.2d 496, 499 (3d Cir. 1956); *L-O-F Glass Fibers Co. v. Watson*, 228 F.2d 40, 43 (D.C. Cir. 1955); *Lyon v. Bausch & Lomb Optical Co.*, 224 F.2d 530, 536-37 (2d Cir. 1955). See also Note, *Judicial Interpretation*, *supra* note 15, at 313-17.

The seventh and tenth circuits employed standards inconsistent with either of the above interpretations. See *Mott Corp. v. Sunflower Indus., Inc.*, 314 F.2d 872 (10th Cir. 1963); *Helmes Prods. v. Lake Shore Mfg. Co.*, 227 F.2d 677 (7th Cir. 1955).

⁸⁵ 383 U.S. 1 (1966).

⁸⁶ *Id.* at 19-21.

⁸⁷ *Id.* at 4, 17.

⁸⁸ *Id.* at 3-19.

⁸⁹ *Id.* at 14-17.

Congressional directives to determine the obviousness of the discovery.⁹⁰ The Court based this conclusion on the assumption that the Patent Act of 1952 was not intended by Congress to change the general level of innovation required for patentability. Rather, Congress intended to promote uniformity by codifying the existing case law which construed the invention requirement as one of non-obviousness.⁹¹ As support for these contentions, the Court noted that even the legislative history stated that "[s]ection 103 . . . provides a condition which exists in law and has existed for more than 100 years, but only by reason of decisions of the courts."⁹² In addition, the Court noted that the first sentence of section 103 was "strongly reminiscent" of the language in *Hotchkiss*; both standards emphasize the pertinent art existing at the time the discovery was made and both are implicitly related to advances in the art.⁹³ The only distinction between the two tests, according to the *Graham* Court, was that Congress had substituted the term "nonobviousness" for the more imprecise language of the *Hotchkiss* invention standard.⁹⁴

Calling for strict observance of the statutory requirement of nonobviousness, the *Graham* Court outlined the analysis to be followed in determining patentability of a discovery under section 103.⁹⁵ Although patent validity is a question of law,⁹⁶ the *Graham* Court observed that section 103 analysis lends itself to several factual inquiries.⁹⁷ The Court indicated that the nonobviousness standard requires a factual examination into the scope and content of the prior art, the differences between the state of the prior art and the patent claims at issue, and the level of ordinary skill in the pertinent art.⁹⁸ Only after making these express factual findings of primary consideration, the *Graham* Court indicated, can a court resolve the ultimate question of obviousness under section 103.⁹⁹ In addition, the Court recognized that secondary considerations, such as the commercial success of the device sought to be patented, long-felt but unsolved needs, and the failure of other inventors, may be relevant indicia of obviousness.¹⁰⁰ According to the *Graham* Court, however, these secondary considerations would not support a finding of nonobviousness under section 103 if it is otherwise established that a patent's disclosures were obvious.¹⁰¹

⁹⁰ *Id.* at 14, 17.

⁹¹ *Id.* at 14.

⁹² *Id.*

⁹³ *Id.*

⁹⁴ *Id.* at 14-15.

⁹⁵ *Id.* at 17-19. According to the Court, strict observance of this analysis would result in the uniformity and definiteness which Congress sought in enacting the Patent Act of 1952. *Id.* at 18.

⁹⁶ *Id.* at 17 (citing *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 155 (1950)). See generally, Note, *Nonobviousness in Patent Law: A Question of Law or Fact?*, 18 WM. & MARY L. REV. 612, 621 (1977).

⁹⁷ *Graham v. John Deere Co.*, 383 U.S. at 17.

⁹⁸ *Id.* at 17-18.

⁹⁹ *Id.* at 17.

¹⁰⁰ *Id.* at 17-18. See also Note, *Subtests of "Nonobviousness,"* *supra* note 42, at 1172-77.

¹⁰¹ *Graham v. John Deere Co.*, 383 U.S. at 17. See, e.g., *Tokyo Shibaura Elec. Co. v.*

The Supreme Court decision of *Graham v. John Deere Co.* appeared to have clarified significantly the requisite standards for determining patentability under the section 103 nonobviousness requirement. *Graham's* systematic approach to nonobviousness, however, failed to unify the divergent standards of patentability for combination devices which existed among the lower federal courts.¹⁰² This failure stems in large part from lack of adequate discussion regarding the effect of the nonobviousness requirement on the standards of patentability existing prior to 1952. Although the *Graham* Court emphasized that section 103 did not embody a substantive change in prior law,¹⁰³ it did not address adequately the question of whether section 103 was intended merely as a reinstatement of the more lenient standard of invention articulated in *Hotchkiss*, or as a codification of the more exacting judicial standards espoused in later decisional law. In failing to distinguish between the lenient and strict judicial interpretations of the *Hotchkiss* invention standard, the *Graham* Court paved the way for continued judicial inconsistency. Moreover, although the Supreme Court has applied the tripartite *Graham* analysis uniformly, subsequent Supreme Court decisions have deepened the uncertainty concerning the requisite standards of patentability for combination devices.

E. Departure From Obviousness

In *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*¹⁰⁴ and *Sakraida v. Ag Pro, Inc.*,¹⁰⁵ the Supreme Court again reviewed the criteria of patentability under the nonobviousness standard of section 103.¹⁰⁶ These cases presented an excellent opportunity for the Supreme Court to reaffirm the standards of patentability under section 103 set forth in *Graham*. In an apparent reversion to

Zenith Radio Corp., 548 F.2d 88, 94-95 (3d Cir. 1977).

Consequently, only in a close case in which application of the primary criteria of obviousness under section 103 does not produce a firm conclusion, can these secondary considerations be used to tip the scale in favor of patentability. See *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 61 (1969); *Panduit Corp. v. Burndy Corp.*, 517 F.2d 535, 541 (7th Cir. 1975); *Novo Indus. Corp. v. Standard Screw Co.*, 374 F.2d 824, 828 (7th Cir. 1967).

¹⁰² See Note, *Synergism Fails to Add Up*, *supra* note 12, at 769; Note, *Requirements for Patentability*, *Sakraida*, *supra* note 39, at 552.

¹⁰³ *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). The Court noted that the revision "was not intended . . . to change the general level of patentable invention . . . but rather was intended . . . as a codification of judicial precedents embracing the *Hotchkiss* condition." *Id.* Finally, the *Graham* Court emphasized that the standard employed by the Supreme Court has remained invariable. *Id.* at 19.

¹⁰⁴ 396 U.S. 57 (1969).

¹⁰⁵ 425 U.S. 273 (1976).

¹⁰⁶ As previously noted, *Graham v. John Deere Co.*, 383 U.S. 1 (1966), significantly clarified the requisite standards of patentability under this statutory standard by mandating a three-part primary factual inquiry as well as an assessment of various secondary considerations. Under this primary tripartite inquiry, *Graham* mandated an examination into the scope and content of the prior art, differences between the prior art and the patent claim at issue, and the level of ordinary skill in the pertinent art. In addition, secondary considerations such as commercial success, long felt but unsolved needs, and the failure of others may be indicia of obviousness. *Id.* at 17-18. See also *supra* notes 95-101 and accompanying text.

the more stringent standard embodied in *Great Atlantic*,¹⁰⁷ however, the Supreme Court in *Black Rock* and *Sakraida* appeared to depart from the *Graham* analysis of nonobviousness in favor of an analysis based upon the presence of synergistic qualities.¹⁰⁸ Rather than clarifying the standards of patentability, the Supreme Court's reference to the synergism doctrine in *Black Rock* and *Sakraida* exacerbated the differences of opinion among the circuit courts regarding the proper standard to be applied in determining the patentability for combination devices.

Anderson's-Black Rock, Inc. v. Pavement Salvage Co. involved a patented device which attempted to prevent "cold joints" on blacktop pavement.¹⁰⁹ This device assembled on the same chassis utilized an infra-red radiant heater with the component elements of a standard bituminous paving machine.¹¹⁰ Each of the elements of the apparatus was known in the prior art and therefore unpatentable by itself, although the radiant-heater never before had been used successfully in the process.¹¹¹

Affirming its strict adherence to the guidelines previously developed in *Graham*, the *Black Rock* Court held the patent in question invalid because "the combination was reasonably obvious to one with ordinary skill in the art."¹¹² This purported adherence to *Graham*, however, was not absolute. While claiming affirmance to the *Graham* standard, the Court utilized the more stringent pre-1952 standards of patentability espoused in *Great Atlantic*, where the Court required the presence of a synergistic result for patentability.¹¹³ The *Black Rock* Court, as part of the obviousness determination, considered the manner in which the components of the system function together. Indeed, citing *Great Atlantic* as authority, the *Black Rock* Court noted that "a combination of elements may result in an effect greater than the sum of the several effects taken separately [although n]o such synergistic result is argued here."¹¹⁴ The Supreme Court then focused on the lack of synergism in the apparatus as a partial basis for the conclusion that the device "was not an invention by the obvious-nonobvious standard."¹¹⁵

¹⁰⁷ 340 U.S. 147 (1950). See *supra* notes 61-71 and accompanying text.

¹⁰⁸ *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 61 (1969); *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 282-83 (1976).

¹⁰⁹ *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. at 58. A cold joint occurs when two adjoining strips of pavement are laid at different times. *Id.* at 57. Poor bonding between the strips results because the first strip usually has cooled before the adjoining strip is laid. *Id.* at 58. Water and dirt then enter between the strips causing the pavement to deteriorate. *Id.* at 58-59.

¹¹⁰ *Id.* at 58. The radiant heater was used to soften the exposed edge of the cooled strip of pavement immediately before a new layer was laid alongside, thus producing a more durable bond. *Id.* at 59.

¹¹¹ *Id.*

¹¹² *Id.* at 60.

¹¹³ *Id.* at 60-61. The *Black Rock* Court dismissed the secondary considerations of *Graham*, those of long-felt need and commercial success, with the accurate statement that, absent invention, such considerations would not indicate patentability. *Id.* at 61.

¹¹⁴ *Id.*

¹¹⁵ *Id.*

Although the *Black Rock* Court recognized the necessity for strict adherence to the tripartite *Graham* analysis of section 103, it failed to adhere strictly to it as the proper method for determining nonobviousness. Rather, the *Black Rock* references to synergism represent an apparent reversion to the strict pre-1952 "invention" analysis employed in the *Great Atlantic* case. Rather than clarifying the requisite standards of patentability for combination devices, therefore, the *Black Rock* decision created further confusion among the circuits by utilizing both the tripartite *Graham* analysis of section 103 and the *Great Atlantic* standard.

Seven years after *Black Rock*, in *Sakraida v. Ag Pro, Inc.*,¹¹⁶ the United States Supreme Court employed an analysis similar to that applied in *Black Rock*. The *Sakraida* Court affirmed the necessity of strict adherence to the three-part *Graham* analysis of section 103 while employing the language of synergism. The patent in *Sakraida* involved a water flush system designed to cleanse animal excrement from the floor of dairy barns.¹¹⁷ The apparatus consisted of water storage tanks, a graded floor for the collection of manure, flush troughs, and a method of storing and releasing water abruptly onto the dung-ridden sloped floor of the dairy.¹¹⁸ As in *Black Rock*, all the individual elements of the apparatus were previously known in the business.¹¹⁹ The claimed innovative feature, however, was that the particular manner in which these elements were combined produced a unique rolling action at the front edge of the water due to the frictional differentials.¹²⁰ Despite this alleged unique advancement the Court invalidated the patent on this device.¹²¹

In reaching its decision, the *Sakraida* Court reiterated the *Graham* pronouncement that the section 103 requirement of nonobviousness codified the constitutionally required invention standard articulated in judicial precedents surrounding the *Hotchkiss* decision.¹²² In affirming its fidelity to the tripartite factual inquiry of *Graham* as the proper means to determine nonobviousness under section 103, the *Sakraida* Court considered the scope and content of the prior art, along with the differences between the prior art and the claims at issue.¹²³ The Court, however, failed to examine the level of ordinary skill in the art, one of the primary factors in the *Graham* analysis,¹²⁴ and dismissed evidence of pertinent secondary considerations.¹²⁵ Rather, the Court cited with

¹¹⁶ 425 U.S. 273 (1976).

¹¹⁷ *Id.* at 275.

¹¹⁸ *Id.* at 275-77. Operation of the device washed the manure into drains at the base of the barn. *Id.* at 276.

¹¹⁹ *Id.* at 275-77.

¹²⁰ *Id.* at 277. This cascading sheet of water effectively cleansed the manure from the barn floor and achieved strikingly better results than had previous manual methods requiring hours of additional hand labor. *Id.* at 282.

¹²¹ *Id.* at 282-83.

¹²² *Id.* at 279 (quoting *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966)).

¹²³ *Id.* at 280-83.

¹²⁴ *Id.*

¹²⁵ *Id.* at 282-83.

approval the *Great Atlantic* proposition that "combination patent claims [should be scrutinized] with a care proportioned to the difficulty and improbability of finding invention in an assembly of old elements."¹²⁶ Invoking the rhetoric of synergism articulated in *Black Rock*, the *Sakraida* Court found that the result achieved by the apparatus could not be characterized as synergistic — that is, "resulting in an effect greater than the sum of the several effects taken separately."¹²⁷ Since each of the elements performed no new or different function, the *Sakraida* Court concluded that the patented device lacked the quality of "invention" as defined by *Hotchkiss* and, therefore, would be obvious to anyone skilled in the pertinent art.¹²⁸

Although section 103 and the subsequent *Graham* analysis appeared to establish the proper standards of patentability for combination devices, the Supreme Court in *Black Rock* and *Sakraida* resorted to the *Great Atlantic* standard of patentability, namely the presence of synergism. These references to synergism in *Black Rock* and *Sakraida* have revived the more exacting judicial scrutiny of combination patents, thereby resulting in renewed confusion among the circuits. On the one hand, the Supreme Court advocates strict adherence to section 103 and the tripartite factual inquiries of *Graham* as the proper criteria for patentability of combination devices. On the other hand, the Supreme Court predicates patentability of such devices upon the presence of a synergistic result. The Supreme Court has neglected, however, to explain the relationship among section 103, *Graham*, and the synergism doctrine. This conflict surrounding the proper standard of patentability for combination devices is evidenced by the divergent tests applied by the federal courts of appeals.¹²⁹

II. COURTS ADDRESSING THE SYNERGISM DOCTRINE

Those circuit courts of appeals adhering to the synergism doctrine¹³⁰ view *Great Atlantic*, *Black Rock* and *Sakraida* as requiring combination devices to achieve a synergistic result as a prerequisite for patentability.¹³¹ Under this standard, the individual elements of the combination device must "perform a

¹²⁶ *Id.* at 281.

¹²⁷ *Id.* at 282.

¹²⁸ *Id.* at 282-83. The Court reached this conclusion despite evidence that the elements of the patented device produced more striking results than in previous devices. *Id.* at 282.

¹²⁹ For a comprehensive analysis of the synergism developments in each circuit, see Note, *Synergism: One Year Later*, *supra* note 12, at 361-64; Note, *Synergism and Nonobviousness*, *supra* note 12, at 477-86; Note, *Combination Patents and Synergism*, *supra* note 74, at 1215-18.

¹³⁰ *Sarkisian v. Winn-Proof Corp.*, 688 F.2d 647, 649-52 (9th Cir. 1982); *Huron Mach. Prods., Inc. v. A. & E. Warbern, Inc.*, 615 F.2d 222, 224 (5th Cir. 1980); *John Zinc Co. v. National Airoil Burner Co.*, 613 F.2d 547, 551 (5th Cir. 1980); *Reed Tool Co. v. Dresser Indus., Inc.*, 672 F.2d 523, 527 (5th Cir. 1980); *Robintech, Inc. v. Chemidus Wavin Ltd.*, 628 F.2d 142, 144-45 (D.C. Cir. 1980); *Smith v. ACME Gen. Corp.*, 614 F.2d 1086, 1093 (6th Cir. 1980); *Whitley v. Road Corp.*, 624 F.2d 698, 699-700 (5th Cir. 1980); *Reinke Mfg. Co. v. Sidney Mfg. Corp.*, 594 F.2d 644, 648 (8th Cir. 1979); *International Tel. & Tel. Corp. v. Raychem Corp.*, 538 F.2d 453, 457 (1st Cir. 1976); *Rosen v. Lawson-Hemphill, Inc.*, 549 F.2d 205, 209 (1st Cir. 1976).

¹³¹ *Reed Tool Co. v. Dresser Indus., Inc.*, 672 F.2d 523, 527-28 (5th Cir. 1982).

new or different function,"¹³² produce "unusual or surprising consequences,"¹³³ or "result in [a combined] effect greater than the sum of the several effects taken separately."¹³⁴ Accordingly, these circuit courts scrutinize devices consisting of previously known elements "with a care proportioned to the difficulty and improbability of finding invention in an assembly of old elements."¹³⁵

Those circuit courts of appeals rejecting the synergism doctrine¹³⁶ find that synergism is required neither by statute nor by recent Supreme Court decisions, and that it does not comply with modern patent law principles.¹³⁷ Essentially, these circuit courts indicate that section 103 and the *Graham* standards comprise the only criteria for determining patentability of combination devices.¹³⁸ Rather than analyzing the discovery for indicia of synergism, therefore, these circuit courts examine the scope and content of the prior art, differ-

¹³² *Sakraida v. Ag Pro., Inc.*, 425 U.S. 273, 282 (1976); *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 60 (1969); *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 152 (1950); *Huron Mach. Prods., Inc. v. A. & E. Warbern, Inc.*, 615 F.2d 222, 224 (5th Cir. 1980); *John Zinc Co. v. National Airoil Burner Co.*, 613 F.2d 547, 551 (5th Cir. 1980); *Reed Tool Co. v. Dresser Indus., Inc.*, 672 F.2d at 527; *Smith v. ACME Gen. Corp.*, 614 F.2d 1086, 1093 (6th Cir. 1980); *Deere & Co. v. Hesston Corp.*, 593 F.2d 956, 963 (10th Cir. 1976); *Reinke Mfg. Co. v. Sidney Mfg. Corp.*, 594 F.2d 644, 648 (8th Cir. 1979).

¹³³ *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. at 152; *NDM Corp. v. Hayes Prods., Inc.*, 641 F.2d 1274, 1280 (9th Cir. 1981); *John Zinc Co. v. National Airoil Burner Co.*, 613 F.2d at 551 (5th Cir. 1980); *M-C Indus., Inc. v. Precision Dynamics Corp.*, 634 F.2d 1211, 1213 (9th Cir. 1980); *Smith v. ACME Gen. Corp.*, 614 F.2d at 1093; *International Tel. & Tel. Corp. v. Raychem Corp.*, 538 F.2d 453, 457 (1st Cir. 1976).

¹³⁴ *Sarkisian v. Winn-Proof Corp.*, 688 F.2d 647, 649-52 (9th Cir. 1982); *Huron Mach. Prods., Inc. v. A. & E. Warbern, Inc.*, 615 F.2d 222, 224-25 (5th Cir. 1980); *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 282 (1976); *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. at 152; *John Zinc Co. v. National Airoil Burner Co.*, 613 F.2d at 551; *Smith v. ACME Gen. Corp.*, 614 F.2d at 1093; *Reinke Mfg. Co. v. Sidney Mfg. Corp.*, 594 F.2d 644, 648 (8th Cir. 1979); *International Tel. & Tel. Corp. v. Raychem Corp.*, 538 F.2d 453, 457 (1st Cir. 1976). For other definitions of synergism espoused by the courts, see *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d 963, 970 n.20 (7th Cir. 1979).

¹³⁵ *Reed Tool Co. v. Dresser Indus., Inc.*, 672 F.2d at 527 (citing *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 281 (1976)).

¹³⁶ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d 535, 546 (3d Cir. 1981); *Champion Spark Plug Co. v. Gyromat Corp.*, 603 F.2d 361, 372 (2d Cir. 1979); *Plastic Container Corp. v. Continental Plastics of Ok., Inc.*, 607 F.2d 885, 904-05 (10th Cir. 1979); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d 963, 967-72 (7th Cir. 1979).

For a discussion of those circuit court decisions rejecting the synergism doctrine, see generally Crossan, *Patent Law: Synergism Rejected*, *supra* note 12; Note, *Patent Law*, *supra* note 12; Note, *Requirements for Patentability*, *Republic Indus., Inc.*, *supra* note 12; Note, *Synergism and Nonobviousness*, *supra* note 12; Note, *Synergism Fails to Add Up*, *supra* note 12; Note, *Synergism: One Year Later*, *supra* note 12. Other circuits have left the issue undetermined. Although the Tenth Circuit in *Plastic Container Corp. v. Continental Plastics of Ok., Inc.*, 607 F.2d 885 (10th Cir. 1979) rejected the synergism doctrine, in a later case the court explicitly decided to "leave . . . resolution [of the synergism issue] for a later day." *Norfin, Inc. v. IBM*, 625 F.2d 357, 365-66 (10th Cir. 1980).

¹³⁷ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 546; *Champion Spark Plug Co. v. Gyromat Corp.*, 603 F.2d 361, 372 (2d Cir. 1979); *Plastic Container Corp. v. Continental Plastics*, 607 F.2d at 904-05, 905 n.48 (quoting *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 972.

¹³⁸ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 546; *Champion Spark Plug Co. v. Gyromat Corp.*, 603 F.2d at 372; *Plastic Container Corp. v. Continental Plastics of Ok., Inc.*, 607 F.2d at 904-05; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971-72.

ences between the prior art and the claims at issue, and the level of ordinary skill in the pertinent art.¹³⁹

Those circuit courts of appeals rejecting the synergism doctrine begin their analysis by reviewing the theoretical history of, and doctrines supporting, patentability of combination devices.¹⁴⁰ These circuit courts recognize that the early Patent Act requirements of utility and novelty were supplemented by the *Hotchkiss* standard of invention,¹⁴¹ and that the evolution of this standard became the peculiar province of the judiciary.¹⁴² According to these courts, considerable inconsistency in the interplay and application of these early standards resulted from the constrained judicial development of independent rules of invention.¹⁴³ Congress sought, they observe, in the Patent Act of 1952, to "start fresh semantically" and to "promote uniformity" among the circuits by explicitly defining the concept of patent validity.¹⁴⁴ Accordingly, these circuit courts view the statutory prerequisite of nonobviousness as a codification of the pre-1952 rules of invention under a new rubric: nonobviousness.¹⁴⁵ They then note that the Supreme Court in *Graham* established a procedure¹⁴⁶ for determining patentability under section 103 and thereby contributed to the uniform-

¹³⁹ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 540-45; *Champion Spark Plug Co. v. Gyromat Corp.*, 603 F.2d at 372; *Plastic Container Corp. v. Continental Plastics of Ok., Inc.*, 607 F.2d at 905; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971-72.

¹⁴⁰ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 540-45; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971-72.

¹⁴¹ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 540-41; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 967 & n.9.

¹⁴² *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 541; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 967 & 967 n.10 (quoting *McClain v. Ortmayer*, 141 U.S. 419 (1891); Rich, *Principles of Patentability*, *supra* note 13, at 404). See also *Graham v. John Deere Co.*, 383 U.S. 1, 10 (1966); Act of July 8, 1870, ch. 230, 16 Stat. 198.

¹⁴³ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 541; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 967 n.10 (quoting Rich, *Principles of Patentability*, *supra* note 13, at 404).

¹⁴⁴ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 541-42; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 968 & n.12.

¹⁴⁵ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 542 (citing *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 968); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 968. According to section 103, the courts note, a patent will not issue if the subject matter sought to be patented, in light of the prior art, would have been obvious at the time the invention was made to an individual possessing ordinary skill in the pertinent art. *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 542; *Champion Spark Plug Co. v. Gyromat Corp.*, 603 F.2d 361, 372 (2d Cir. 1979); *Plastic Container Corp. v. Continental Plastics of Ok., Inc.*, 607 F.2d 885, 904-05 (10th Cir. 1979); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 968.

¹⁴⁶ Although the determination of patentability is essentially one of law, section 103 is subject to several basic factual inquiries. *Graham*, they note, sets out a three-fold test for nonobviousness under section 103, demanding an examination of the scope and content of the prior art, the differences between the prior art and the claims at issue, and the level of ordinary skill in the pertinent art. Furthermore, these courts observe, *Graham* permits consideration of other indicia of nonobviousness such as commercial success, long-felt but unsolved needs, and the failure of others. *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 542; *Champion Spark Plug Co. v. Gyromat Corp.*, 603 F.2d at 372; *Plastic Container Corp. v. Continental Plastics*, 607 F.2d at 895, 904 (quoting *Westwood Chem., Inc. v. United States*, 525 F.2d 1367, 1375); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 968 (quoting *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966)).

ity among the circuit courts sought by Congress in enacting the nonobviousness standard.¹⁴⁷ These circuit courts emphasize that in *Graham*, the Court determined the standard of patentability to be based solely upon the nonobvious nature of the patent claim under section 103.¹⁴⁸ For these courts, the *Graham* guidelines do not require that, for a finding of nonobviousness, the result achieved by a combination device must be synergistic.¹⁴⁹ Those circuit courts of appeals rejecting the synergism doctrine recognize that the recent Supreme Court decisions of *Black Rock* and *Sakraida* have employed language similar to that of *Great Atlantic*.¹⁵⁰ They reject, however, any notion that the Supreme Court in *Black Rock* and *Sakraida* departed from the *Graham* interpretation of section 103. Rather than prescribing an additional or different test for patentability, these circuit courts interpret *Black Rock* and *Sakraida* as merely reaffirming the *Graham* assessment of nonobviousness under section 103.¹⁵¹ The Supreme Court's reference to the synergism doctrine in *Black Rock*, they propose, was "merely to note the advent of a phenomenon which may result from a combination patent, without any indication . . . that the phenomenon must be present in every case to satisfy the requirements of section 103."¹⁵² In addition, these courts suggest that, although the *Sakraida* Court employed synergism language, the background of the *Sakraida* decision indicates the Supreme Court did not intend to revitalize the pre-1952 rules of invention;¹⁵³ the Court's reference simply constitutes a repudiation of the lower court's finding that the patented device achieved a synergistic result.¹⁵⁴ Accordingly, those circuit courts rejecting the synergism doctrine note that neither *Black Rock* nor *Sakraida* reinstated the pre-1952 rules of invention or advocated the establishment of an additional requirement for patentability.¹⁵⁵ Instead, these circuit

¹⁴⁷ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 542; *Champion Spark Plug Co. v. Gyromat Corp.*, 603 F.2d at 372; *Plastic Container Corp. v. Continental Plastics*, 607 F.2d at 904 (quoting *Westwood Chem., Inc. v. United States*, 525 F.2d at 1375); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 968.

¹⁴⁸ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 540; *Champion Spark Plug Co. v. Gyromat Corp.*, 603 F.2d at 372; *Plastic Container Corp. v. Continental Plastics of Ok., Inc.*, 607 F.2d at 904-05; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 972.

¹⁴⁹ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 540; *Champion Spark Plug Co. v. Gyromat Corp.*, 603 F.2d at 372; *Plastic Container Corp. v. Continental Plastics of Ok., Inc.*, 607 F.2d at 904-05; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 972.

¹⁵⁰ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 543; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 968-69.

¹⁵¹ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 543; *Champion Spark Plug Co. v. Gyromat Corp.*, 603 F.2d 361, 372 (2d Cir. 1979); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 968-69.

¹⁵² *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 543 (citing *Republic Indus., Inc. v. Schlage Lock Co.*, 433 F. Supp. 666, 669-70 (S.D. Ill. 1977)); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 968-69.

¹⁵³ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 543; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 969 & n.17.

¹⁵⁴ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 543-44; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 969 & n.17.

¹⁵⁵ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 544; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 969.

courts recognize the tripartite *Graham* analysis as the proper criterion for determining patentability of combination devices under the nonobviousness standard of section 103.¹⁵⁶

Several circuit courts of appeals, therefore, are convinced that neither section 103 nor recent Supreme Court decisions advocate adoption of the synergism doctrine. These circuit courts further examine the synergism doctrine, however, to decide if synergism, even though not required by section 103 or the Supreme Court, would facilitate application of modern patent principles.¹⁵⁷ These courts, however, note several arguments which counsel against utilizing the synergism doctrine — applicable solely to combination devices — for determining nonobviousness under section 103.¹⁵⁸

First, these circuit courts observe that section 103 does not distinguish between various types of patents.¹⁵⁹ According to them, Congress intentionally replaced the rules of invention, which predominately related to a narrow range of devices, with the single standard of nonobviousness.¹⁶⁰ Accordingly, they opine that "it would confound the statutory design to impose on one class of patents a harsher test of patentability than the rest."¹⁶¹

Second, they note that even courts adhering to the synergism doctrine have failed to agree on a formulation of synergism readily accessible to uniform application.¹⁶² Depending upon the definition endorsed by the particular court, combination devices are variously considered synergistic when the individual elements "result in [a combined] effect greater than the sum of the several effects taken separately," perform a "new or different function," or produce

¹⁵⁶ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 544; *Champion Spark Plug Co. v. Gyromat Corp.*, 603 F.2d 361, 372 (2d Cir. 1979); *Plastic Container Corp. v. Continental Plastics*, 607 F.2d 885, 895, 904-05 (10th Cir. 1979) (quoting *Westwood Chem., Inc. v. United States*, 525 F.2d 1367, 1375 (Ct. Cl. 1975)); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 97 at 971-72.

¹⁵⁷ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 544; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 967-72.

¹⁵⁸ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 544; *Plastic Container Corp. v. Continental Plastics*, 607 F.2d 885, 904 n.46, 905 n.48 (10th Cir. 1979) (quoting *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 969-72.

¹⁵⁹ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 544; *Plastic Container Corp. v. Continental Plastics*, 607 F.2d at 905 n.48 (quoting *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971.

¹⁶⁰ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 544 (citing H.R. REP. NO. 1923, 82d Cong., 2d Sess. 7 (1952); S. REP. NO. 1979, 82d Cong., 2d Sess. 6 (1952)); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 968.

¹⁶¹ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 544; *Plastic Container Corp. v. Continental Plastics*, 607 F.2d 885, 905 n.48 (10th Cir. 1979) (quoting *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971.

¹⁶² *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 544. The Rengo Court suggests a comparison among *Reinke Mfg. Co. v. Sidney Mfg. Corp.*, 594 F.2d 644, 648 (8th Cir. 1979) ("new effect"), *Brennan v. Mr. Hanger, Inc.*, 479 F. Supp. 1215, 1225 (S.D.N.Y. 1979) ("a highly desirable new result and not theretofore obvious"), and *Burland v. Trippe Mfg. Co.*, 543 F.2d 588, 592 (7th Cir. 1976) ("at least one element must perform a different function or operation than it did previously"). See generally Note, *A Definition of Synergism*, *supra* note 17.

"unusual or surprising consequences." This difficulty of formulation and application, the courts rejecting synergism state, would exacerbate the inequity of applying such a standard to a particular class of devices.¹⁶³

Third, these circuit courts rejecting the synergism doctrine focus on several inherent analytical defects in the doctrine. The scope of the synergism doctrine, they note, because it applies solely to combination devices, necessarily depends on a proper definition of the term "combination." According to these courts, however, combination devices as a class cannot be described adequately because virtually every mechanical device is composed of previously known elements.¹⁶⁴ These courts note that even if this definitional problem is resolved, synergism rarely can be achieved and, therefore, is merely a figure of speech. They assert that the individual elements of virtually every mechanical device will perform their anticipated functions independently, and will not operate differently in association with other elements.¹⁶⁵ Accordingly, mechanical elements can only contribute to the apparatus their inherent mechanical functions.¹⁶⁶ Therefore, the apparatus will produce a result which equals rather than exceeds the sum of the elemental functions.¹⁶⁷ As a consequence, these circuit courts conclude that the synergism doctrine, as thus construed by recent courts, would prohibit the patentability of virtually all mechanical devices.¹⁶⁸

Finally, those circuit courts rejecting the synergism doctrine address arguments that application of this doctrine is contrary to the fundamental objectives of the patent system. These circuit courts recognize that the selection of the individual elements which produce a desired result may be nonobvious in light of the prior art and therefore patentable under section 103.¹⁶⁹ They point out, however, that the synergism doctrine only considers the performance of the elements after their assembly, without regard to the obviousness of selecting

¹⁶³ Rengo Co. v. Molins Mach. Co., 657 F.2d at 544.

¹⁶⁴ Rengo Co. v. Molins Mach. Co., 657 F.2d at 545; Champion Spark Plug Co. v. Gyromat Corp., 603 F.2d 361, 372 (2d Cir. 1979); Plastic Container Corp. v. Continental Plastics, 607 F.2d 885, 904 n.46 (10th Cir. 1979); Republic Indus., Inc. v. Schlage Lock Co., 592 F.2d 963, 969 (7th Cir. 1979) (quoting Reiner v. I. Leon Co., 285 F.2d 501, 503 (2d Cir. 1960), *cert. denied*, 366 U.S. 929 (1961)).

¹⁶⁵ Rengo Co. v. Molins Mach. Co., 657 F.2d at 545; Republic Indus., Inc. v. Schlage Lock Co., 592 F.2d at 970.

¹⁶⁶ Rengo Co. v. Molins Mach. Co., 657 F.2d at 545; Republic Indus., Inc. v. Schlage Lock Co., 592 F.2d at 970 (citing Application of Menough, 323 F.2d 1011, 1015 (C.C.P.A. 1963)).

¹⁶⁷ Rengo Co. v. Molins Mach. Co., 657 F.2d at 545; Republic Indus., Inc. v. Schlage Lock Co., 592 F.2d at 970 (citing Conner, *Some Highly Personal Reflections on Section 103*, 5 AM. PAT. L.A.Q.J. (1977) ("In the real world, two plus two never equals five."); compare Great Atl. and Pac. Tea Co. v. Supermarket Equip. Co., 340 U.S. 147, 152 (1950) ("Two and two have been added together and they still make only four.")).

¹⁶⁸ Rengo Co. v. Molins Mach. Co., 657 F.2d at 545; Republic Indus., Inc. v. Schlage Lock Co., 592 F.2d at 969 (citing Reeves Instrument Corp. v. Beckman Instruments, Inc., 444 F.2d 263, 270 (9th Cir. 1971), *cert. denied*, 404 U.S. 951 (1971)).

¹⁶⁹ Rengo Co. v. Molins Mach. Co., 657 F.2d at 545; Republic Indus., Inc. v. Schlage Lock Co., 592 F.2d at 971 (quoting B.G. Corp. v. Walter Kidde & Co., 79 F.2d 20, 22 (2d Cir. 1935) (citing Application of Menough, 323 F.2d 1011, 1015 (C.C.P.A. 1963))).

and arranging the particular elements,¹⁷⁰ and presumably thereby unnecessarily restricts patentability under section 103. These circuit courts observe that the synergism test is inconsistent with section 103, which requires the evaluation of patentability to be made in light of the art existing at the time the discovery was made.¹⁷¹

Several circuit courts of appeals reject the synergism doctrine, therefore, because it is mandated neither by statute nor by recent Supreme Court decisions, and because it does not comply with modern patent principles.¹⁷² These circuit courts instead regard the three-part *Graham* analysis as the sole standard for determining the patentability of combination devices under section 103.¹⁷³

III. PATENTABILITY OF COMBINATION DEVICES: PROBLEMS AND SOLUTIONS

A controversy among the circuit courts of appeals has emerged regarding the standard of patentability for combination devices. In essence, the appellate courts are divided on the question of whether a combination device must exhibit synergistic qualities either to comply with the nonobviousness prerequisite to patentability under section 103 or to meet an independent standard of patentability.¹⁷⁴ The inconsistent formulations and applications of the patent standards by the various circuit courts has resulted in an unpredictable body of case law.¹⁷⁵ Consequently, the unreliability of the patent system has thwarted the realization of the ultimate goals of the patent system, namely the fostering of invention,¹⁷⁶ by affecting adversely the inventors' confidence in the reliability

¹⁷⁰ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 545-46; *Plastic Container Corp. v. Continental Plastics*, 607 F.2d 885, 905 n.48 (10th Cir. 1979) (quoting *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971.

¹⁷¹ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 545-46; *Plastic Container Corp. v. Continental Plastics*, 607 F.2d 885, 905 n.48 (10th Cir. 1979) (quoting *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971 (citing Rich, *Principles of Patentability*, *supra* note 13, at 404, 405-06).

¹⁷² *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 546; *Champion Spark Plug Co. v. Gyromat Corp.*, 603 F.2d 361, 372 (2d Cir. 1979); *Plastic Container Corp. v. Continental Plastics*, 607 F.2d at 904-05, 905 n.48 (quoting *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 972.

¹⁷³ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 546; *Champion Spark Plug Co. v. Gyromat Corp.*, 603 F.2d at 372; *Plastic Container Corp. v. Continental Plastics*, 607 F.2d at 904-05; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971-72.

¹⁷⁴ See *supra* notes 129-73 and accompanying text.

¹⁷⁵ This divergence of opinion does not exist solely among the circuits, however. The approach taken by numerous courts is also in conflict with the standards employed by the Patent Office. The Patent Office, which has the primary responsibility for determining patentability, continues to apply the three-part *Graham* test despite the adherence of several circuit courts to the synergism doctrine. See 949 OFFICIAL GAZETTE OF THE U.S. PAT. OFF. NO. 1 TM3 (1976); Note, *Combination Patents and Synergism*, *supra* note 74, at 1207.

¹⁷⁶ *Graham v. John Deere Co.*, 383 U.S. 1, 17-19 (1966). For a discussion of the problems caused by an inconsistent application of the patent laws, see Commission of Revision of the Federal Court Appellate System, 67 F.R.D. 195, 370-71 (1975). See also, Edwards, *That Clumsy Word "Nonobviousness"*, 60 J. PAT. OFF. SOC'Y 3, 6 (1978); Note, *Requirements for Patentability*, *Republic Indus.*, *supra* note 12, at 117. But see Markey, *The Status of the U.S. Patent System — Sans*

of a patent grant. The inconsistent application of the patent standards and the possibility that a patent, upon which reliance has been placed, may be subsequently invalidated, have undermined the patent system through increased litigation, forum shopping, and the concealment of discoveries otherwise patentable.¹⁷⁷ In light of this confusion of standards and its resultant problems, the need for a consistent standard of patentability is evident.

A. *The Evolution of the Synergism Doctrine:
Combination/Aggregation Distinction*

1. Etymological Derivation of "Synergism"

A proper analysis of whether a combination device must exhibit synergistic qualities to merit a patent must begin with a definition and discussion of the concept of synergism. The term "synergism" derives from the Greek, *syn*, "together," and *ergos*, "work," that is, to work together or cooperate.¹⁷⁸ Accordingly, a definition of synergism that reflects its etymology requires that the elements of a mechanical device cooperate or interact with each other.¹⁷⁹ By its etymology, therefore, synergism should distinguish those discoveries which are "combinations" from those which are mere "aggregations." The elements of a "combination" must cooperate integrally, producing a result due to the combined effect of the several parts and not simply from the separate action of each.¹⁸⁰ In contrast, an "aggregation" implies the mere union of two or more unrelated elements, independently performing the same function in the same way as they did when used alone, without interaction or cooperation.¹⁸¹

2. Judicial Application: Combination/Aggregation Distinction as a Condition Precedent of the *Hotchkiss* Invention Standard

A distinction between "combinations" and "aggregations" exists in the case law addressing the standards of patentability, first appearing as the

Myth, Sans Fiction, 59 J. PAT. OFF. SOC'Y 164, 168 (1977).

¹⁷⁷ See cases cited *supra* notes 130, 136.

¹⁷⁸ Republic Indus., Inc. v. Schlage Lock Co., 592 F.2d 963, 970 n.23 (7th Cir. 1979) (citing the Oxford English Dictionary (Clarendon Press) (1919)). See Rich, *Laying the Ghost*, *supra* note 74, at 43-44.

¹⁷⁹ Republic Indus., Inc. v. Schlage Lock Co., 592 F.2d at 970.

¹⁸⁰ *Id.* See also Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp., 340 U.S. 147, 151 (1950); Lincoln Eng'g Co. v. Stewart Warner Corp., 303 U.S. 545, 549-50 (1938); Palmer v. Corning, 156 U.S. 342, 345-46 (1895); Brinkerhoff v. Aloe, 146 U.S. 515, 516 (1892); Thatcher Heating Co. v. Burtis, 121 U.S. 286, 294 (1887); Pickering v. McCullough, 104 U.S. (11 Otto.) 310, 317-18 (1881); Reckendorfer v. Faber, 92 U.S. (2 Otto.) 347, 357 (1875); Hailes v. Van Wormer, 87 U.S. (20 Wall.) 353, 368 (1873).

¹⁸¹ Republic Indus., Inc. v. Schlage Lock Co., 592 F.2d 963, 970 (7th Cir. 1979). See also cases cited *supra* note 50. This dichotomy can best be expressed by the example of a clock radio, although not a mechanical device. If the clock is utilized to activate the radio at a particular time, there is an interaction between the elements, hence a "combination." In contrast, however, where the elements are merely positioned together, yet each operates individually, without interaction, a mere "aggregation" exists.

judiciary struggled to articulate objective rules for finding the presence of an "invention."¹⁸² Under these early rules, the term "combination" was employed to designate a device, consisting of two or more previously known elements, a patentable "invention" because the results it produced were due to the interaction of its component parts.¹⁸³ In contrast, the term "aggregation" referred to a device, again consisting of two or more previously known elements, in which the component parts continued to operate independently of each other, with no unique interaction, and hence lacking the requisite characteristics of "invention."¹⁸⁴

The *Great Atlantic* Court recognized this distinction between "combinations" and "aggregations" by citing a rule of invention which had been condensed from many previous decisions.¹⁸⁵ The Court observed that "[t]he mere aggregation of a number of old parts or elements which, in the aggregation, perform or produce no new or different function than that theretofore performed or produced by them, is not [a] patentable invention."¹⁸⁶ The Court found that the device in question merely "united old elements with no change in their respective functions"¹⁸⁷ and that the elements did not "perform an additional or different function in the combination than they perform out of it."¹⁸⁸ Because the device before the Court in *Great Atlantic* did not evidence these inherent qualities of a "combination," the Court, without explicitly stating so, thereby found the device to be an "aggregation" of old elements, which by definition lacked "inventiveness" and was, under the prevailing judicial standard, unpatentable.¹⁸⁹

Although the *Great Atlantic* Court recognized and utilized this distinction between "combinations" and "aggregations," it noted that such a standard was insufficient as the sole determinant of patentability under the invention standard. According to the *Great Atlantic* Court, use of the term "combination" to signify that a device constitutes a patentable "invention" results in confu-

¹⁸² The *Hotchkiss* standard of invention required all patentable devices to "evidence more ingenuity and skill . . . than that possessed by an ordinary mechanic acquainted with the business." *Hotchkiss v. Greenwood*, 52 U.S. (11 How.) 248, 266 (1851). In an attempt to objectively delineate certain characteristics of a patentable "invention," the judiciary articulated "rules of invention." See *supra* 37-52 and accompanying text. See also Cooch, *The Standards of Invention in the Courts*, in *DYNAMICS OF THE PATENT SYSTEM* 34, 56 (W. Ball ed. 1960); Deller, *The Problem of Invention*, *supra* note 39, at 801-02; Edell, *The Supreme Court*, *supra* note 41, at 99-100; Mintz, *The Standards of Patentability*, *supra* note 19, at 774-75; Mintz & O'Rourke, *New Tests of Patentability*, *supra* note 39, at 126-27; Note, *Requirements of Patentability*, *Sakraida*, *supra* note 39, at 549 nn.29-30.

¹⁸³ See cases cited *supra* note 50.

¹⁸⁴ *Id.*

¹⁸⁵ *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 151 (1950).

¹⁸⁶ *Id.* at 151 (citing *Lincoln Eng'g Co. v. Stewart-Warner Corp.*, 303 U.S. 545, 549 (1937)). In addition, the Court emphasized that "the conjunction or concert of known elements must contribute something; only when the whole in some way exceeds the sum of its parts is the accumulation of old devices a patentable invention." *Id.* at 152.

¹⁸⁷ *Id.*

¹⁸⁸ *Id.* at 153.

¹⁸⁹ *Id.* at 150-53.

sion.¹⁹⁰ Furthermore, the concept of "invention," the Court noted, is inherently elusive when applied to a "combination" of old elements.¹⁹¹

This distinction the Court draws between "combinations" and "inventions" can be explained as follows: while a "combination" must exist for there to be a patentable "invention," the mere fact that a "combination" exists, does not necessarily indicate that a patentable "invention" exists — while all "inventions" must be "combinations," not all "combinations" are "inventions." This incongruity of equating the term "combination," properly defined, to the invention standard results from the different focus of the terms "combination" and "invention." Whereas the term "combination" addresses the existence of physical interaction of individual elements in a device, the term "invention" addresses the degree of skill needed to create the device. Indeed, satisfaction of the invention standard requires something more than the mere interaction of the component elements. The presence of a "combination," defined as two or more elements interacting to produce a desired result, does not mandate a finding that the device evidences "more ingenuity and skill . . . than that possessed by an ordinary mechanic acquainted with the business" under the *Hotchkiss* standard.¹⁹² The desired effect produced through the selection, arrangement and interaction of the component elements quite possibly could have been the "work of a skillful mechanic, not that of an inventor."¹⁹³ Therefore, although the presence of a "combination" is a condition precedent to finding inventiveness, there can be some "combinations" which are not "inventions."¹⁹⁴ In contrast, however, the absence of interaction, as found in an "aggregation," can be employed as the sole determinant of the absence of "invention." This absence of interaction indicates that the device lacks "that degree of skill and ingenuity which constitute essential elements of every invention."¹⁹⁵

Recognizing that the "combination/aggregation" distinction is only a condition precedent to a finding of "invention," the *Great Atlantic* Court attempted to dispel any inappropriate equation of this distinction to the standard of invention. The *Great Atlantic* Court thereby attempted to redefine the standard of patentability for devices consisting of previously known elements by adding a new dimension: unusual and surprising. According to the Court, only such devices producing "unusual and surprising consequences" from the interaction of their elements are patentable.¹⁹⁶ Thus, the Court espoused a

¹⁹⁰ *Id.* at 151.

¹⁹¹ *Id.*

¹⁹² *Hotchkiss v. Greenwood*, 52 U.S. (11 How.) 248, 267 (1851).

¹⁹³ *Id.*

¹⁹⁴ *Id.*

¹⁹⁵ *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 151 (1950).

¹⁹⁶ *Id.* at 152. Thus, the *Great Atlantic* decision contains "combination/aggregation" language as well as reference to the invention standard of patentability. Accordingly, the *Great Atlantic* Court merely engrafted onto the "combination/aggregation" distinction the *Hotchkiss* invention standard.

double-barrelled approach to patentability. Under *Great Atlantic*, a device consisting of several previously known elements may be patentable if, in addition to being a "combination," properly defined, it satisfies the invention requirement, defined in terms of "unusual and surprising consequences." A finding that a device was a "combination" of previously known elements, therefore, was merely a condition precedent to a finding that it was "inventive"; whether a device was a "combination" was not a separate test of patentability, but rather simply a sub-test of the judicially espoused invention standard.¹⁹⁷ Under the *Great Atlantic* standard, however, an "aggregation" definitely is not patentable; an "aggregation" does not require more skill and ingenuity than that possessed by an ordinary mechanic.

This standard of patentability articulated in *Great Atlantic*, requiring devices consisting of previously known elements to be both "combinations" and "unusual and surprising," was not entirely apparent to the various circuit courts of appeals. As a result, the appellate courts continued to employ rules of invention in an attempt to delineate certain objective characteristics of "invention."¹⁹⁸

3. Patent Act of 1952: Nonobviousness as a Codification of the *Hotchkiss* Invention Standard

To help resolve this confusion among the courts, Congress, in the Patent Act of 1952, attempted to eliminate the disparate judicial interpretations of the invention standard by enacting a more objective standard of patentability in section 103: nonobviousness.¹⁹⁹ Section 103 codifies language which has been used in numerous court decisions since the imposition of the *Hotchkiss* invention standard.²⁰⁰ As the Supreme Court noted in *Graham*, the nonobviousness standard of section 103 was intended as an objective statutory expression of judicial decisions embracing the *Hotchkiss* standard.²⁰¹ Accordingly, "nonobviousness" was merely a new rubric for the old invention requirement, defined in terms of "more ingenuity and skill . . . than that possessed by an ordinary mechanic acquainted with the business" under *Hotchkiss* or "unusual or surprising consequences" under *Great Atlantic*.

4. Synergism: Combination/Aggregation Distinction as a Condition Precedent of Nonobviousness

The analysis established in *Great Atlantic*, therefore, requiring devices to be both "combinations" and "inventive," was not eviscerated by the enactment of the apparently uniform nonobviousness requirement of section 103. As a

¹⁹⁷ *Id.* at 152.

¹⁹⁸ See cases cited *supra* notes 83-84.

¹⁹⁹ Patent Act of 1952, ch. 950, § 1, 66 Stat. 798 (1952) (codified at 35 U.S.C. § 103 (1976)). See *supra* note 74.

²⁰⁰ *Graham v. John Deere Co.*, 383 U.S. 1, 3-4, 15, 17 (1966).

²⁰¹ *Id.* See *supra* notes 88-94 and accompanying text.

result, the Supreme Court has continued to require, under the nonobviousness standard of section 103, the interaction of elements in devices consisting of previously known components.²⁰² Although the Supreme Court in *Graham*, *Black Rock* and *Sakraida* has reaffirmed the necessity of strict observance of the tripartite *Graham* analysis of section 103,²⁰³ this observance is not inconsistent with the requirement that such devices be "combinations." An analysis of the various definitions of synergism, as articulated by the Supreme Court, and utilized by the various circuit courts of appeals, will demonstrate that the Court's use of the synergism doctrine, defined in terms of a "new and different function" or a "greater effect" is merely a rhetorical means for distinguishing "combinations" from "aggregations" — that is, for isolating those devices which exhibit the requisite interaction among the component parts. Accordingly, the synergism doctrine, as thus defined is only a judicial application of the "combination/aggregation" distinction couched in the language of synergism, rather than an additional, separate test of patentability. Therefore, just as the existence of a "combination" was a condition precedent to finding "invention" prior to 1952, a finding of synergism is a condition precedent for finding non-obviousness under section 103. In addition, the following analysis will demonstrate that while the requirement that a combination device produce "unusual and surprising results" has been attributed to the synergism doctrine, it more clearly pertains to the nonobviousness prerequisite of section 103.

B. Synergism Defined:

Rhetorical Application of the Combination/Aggregation Distinction

Although many definitions of synergism have been enunciated,²⁰⁴ combination devices are most commonly considered synergistic when the individ-

²⁰² As the Supreme Court noted in the *Sakraida* decision, analysis of the nonobviousness under the tripartite *Graham* inquiry will be affected by the fact that the device is composed of previously known elements. *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 282 (1976). In that decision, although the Court held the manure cleaning device nonobvious under section 103, it also found that the "patent simply arranges old elements with each performing the same function it had been known to perform;" several commentators argue, however, that in light of the context of the opinion, the Court's reference to synergism was in response to the Fifth Circuit Court of Appeals' assertion that synergism was present. See, e.g., Rich, *Laying the Ghost*, *supra* note 74, at 517; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d 963, 970-71 (7th Cir. 1979).

The *Black Rock* Court, in similar fashion, noted that the combination of elements did not result in an "effect greater than the sum of the several effects taken separately." Several commentators state, however, that the Court did not intend to propose any additional condition of patentability or to reaffirm synergism as a prerequisite of finding nonobviousness. In their view, the Supreme Court's reference to synergism is an assertion that devices consisting of more than one element sometimes produce results which either are or seem unattainable by the separate action of the components. *Id.* Without explicitly stating, the *Black Rock* and *Sakraida* Courts found the devices to be an "aggregation" of previously known elements, which by definition, therefore, lacked "inventiveness."

²⁰³ See, e.g., *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 62 (1969); *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 279-80 (1976).

²⁰⁴ See, e.g., *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d 963, 970 nn.21-22 (7th Cir. 1979). See also cases cited *infra* note 207.

ual elements perform "a new or different function,"²⁰⁵ "result in a [combined] effect greater than the sum of the several effects taken separately,"²⁰⁶ or create "unusual or surprising consequences."²⁰⁷

1. At Least One Element Performs a New or Different Function

According to the first definition of synergism, the elements of a combination device produce a synergistic result when "at least one element functions differently in combination than it did previously."²⁰⁸ Those courts which refuse to adhere to the synergism doctrine maintain that the elements of a combination device cannot function differently in the apparatus than they did previously.²⁰⁹ According to these courts, a mechanical element has fixed physical characteristics, and as such, will always perform its anticipated function — whether alone or in association with other elements.²¹⁰ Thus, a mechanical element cannot function differently or in a new manner unless its physical characteristics are changed. Under this line of analysis, virtually all mechanical devices will be precluded from patentability because the individual elements do not perform any new and different function.²¹¹

²⁰⁵ *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 282 (1976); *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 60 (1969); *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 152 (1950); *Huron Mach. Prods., Inc. v. A. & E. Warbern, Inc.*, 615 F.2d 222, 225 (5th Cir. 1980); *John Zinc Co. v. National Airoil Burner Co.*, 613 F.2d 547, 551 (5th Cir. 1980); *Reed Tool Co. v. Dresser Indus., Inc.*, 672 F.2d 523, 527 (5th Cir. 1980); *Smith v. ACME Gen. Corp.*, 614 F.2d 1086, 1093 (6th Cir. 1980); *Deere & Co. v. Hesston Corp.*, 593 F.2d 956, 963 (10th Cir. 1979); *Reinke Mfg. Co. v. Sidney Mfg. Corp.*, 594 F.2d 644, 648 (8th Cir. 1979).

²⁰⁶ *Sakraida v. Ag Pro, Inc.*, 425 U.S. at 282; *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. at 152; *Sarkisian v. Winn-Proof Corp.*, 688 F.2d 647, 649-52 (9th Cir. 1982); *Huron Mach. Prods., Inc. v. A. & E. Warbern, Inc.*, 615 F.2d at 224-25; *John Zinc Co. v. National Airoil Burner Co.*, 613 F.2d at 551; *Smith v. ACME Gen. Corp.*, 614 F.2d at 1093; *Reinke Mfg. Co. v. Sidney Mfg. Corp.*, 594 F.2d at 648; *International Tel. & Tel. Corp. v. Raychem Corp.*, 538 F.2d 453, 457 (1st Cir. 1976).

²⁰⁷ *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. at 152; *NDM Corp. v. Hayes Prods., Inc.*, 641 F.2d 1274, 1280 (9th Cir. 1981); *John Zinc Co. v. National Airoil Burner Co.*, 613 F.2d at 551; *M-C Indus., Inc. v. Precision Dynamics Corp.*, 634 F.2d 1211, 1213 (9th Cir. 1980); *Smith v. ACME Gen. Corp.*, 614 F.2d at 1093; *International Tel. & Tel. Corp. v. Raychem Corp.*, 538 F.2d at 457.

Other definitions of synergism include: *E-T Indus., Inc. v. Whittaker Corp.*, 523 F.2d 636, 641 (7th Cir. 1976) ("the combination must produce a result other than the anticipated sum of the several parts"); *International Tel. & Tel. Corp. v. Raychem Corp.*, 538 F.2d 453 (1976) ("results in an effect greater than the sum of the several effects taken separately"); *Gentleman Mfg., Inc. v. Lawn 'N' Sport*, 517 F.2d 1194, 1199 (7th Cir. 1975) ("the elements take on a surprising quality"); *Panduit Corp. v. Burndy Corp.*, 517 F.2d 535, 539 (7th Cir. 1975) (the elements must, in the aggregate, produce new, unusual or striking results); *Reese v. Elkhart Welding & Boiler Works, Inc.*, 447 F.2d 517, 526 (7th Cir. 1971) ("the results must be unachieved by prior art structures").

²⁰⁸ See cases cited *supra* note 205.

²⁰⁹ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d 535, 545 (3d Cir. 1981); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d 963, 970 (7th Cir. 1979).

²¹⁰ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 545 (quoting *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 970); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 970.

²¹¹ *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 152

Elements of a combination device, however, can produce a new and different function. It is precisely the manner in which the elements interact to achieve a desired result that synergism is present.²¹² The elements in any combination device, rather than performing a single function, perform functions which are both similar to and different from those performed in the prior art.²¹³ By definition, the elements of a combination device will always perform the same function, even though they operate with other different elements in new combinations.²¹⁴ Such elements can also perform a "new and different function" than that performed in the prior art, however, when the function of the elements is described in terms of the role those elements play in producing the particular result brought about by the discovery.²¹⁵ Thus, depending upon the description of the elements' roles in the apparatus, it can perform both "the same function" and a function "new and different" from that in the prior art devices.²¹⁶

This current definition of synergism, requiring the elements of a device to perform a "new and different function," is reminiscent of the "combination/aggregation" distinction of the pre-1952 rules of invention.²¹⁷ This definition necessarily relates to the manner in which the elements interact because there can be no new and different function without an interaction of the elements. Synergism, as thus defined, can only exist in a "combination," not an "aggregation."²¹⁸ A finding that a device exhibits a synergistic effect, however, does not dictate *necessarily* that the device is nonobvious under section 103. The mere presence of a new and different function does not mean necessarily that the association of elements which produced that function was nonobvious.²¹⁹ It may have been apparent to one versed in the art that the new and different function would result. In addition, the elements of all combination devices, both obvious and nonobvious, perform similar as well as new and different functions.²²⁰ An apparatus is obvious when the selection of elements needed to produce its result was obvious. Yet this selection may not prevent the elements from functioning in a new and different, albeit obvious, manner.

(1950); *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 545; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 970. *See also* *Application of Menough*, 323 F.2d 1011, 1015 (C.C.P.A. 1963); *Nikola v. Peterson*, 580 F.2d 898, 912 n.22 (6th Cir. 1978).

²¹² *Sarkisian v. Winn-Proof Corp.*, 697 F.2d 1313, 1319 n.15 (9th Cir. 1983).

²¹³ *Id.*

²¹⁴ *Id.* For example, in a clock radio, a clock will always function as a clock, and a radio will always function as a radio.

²¹⁵ *Id.* In the above example, the clock may be utilized to activate the radio at a particular time. In such case, the clock's function can be described not only in definitional terms, but also with regard to the clock's new function of activating the radio.

²¹⁶ *Id.*

²¹⁷ *See supra* notes 37-52 and accompanying text.

²¹⁸ Where there is no new or different function, the courts have found an "aggregation."

²¹⁹ *Sarkisian v. Winn-Proof Corp.*, 697 F.2d 1313, 1318 n.10, 319 n.15 (9th Cir. 1983).

²²⁰ *See supra* notes 212-16 and accompanying text.

2. A Combined Effect Greater Than the Sum of the Several Effects Taken Separately

According to the second definition of synergism, some courts hold a combination device to be synergistic when the association of elements "results in an effect greater than the sum of the several effects taken separately."²²¹ As the *Great Atlantic* Court observed, "[t]he conjunction or concert of known elements must contribute something; only when the whole in some way exceeds the sum of its parts is the accumulation of old devices patentable."²²² Whereas the previous definition of synergism focuses on the *function* of the individual elements in their interrelationship, the present definition focuses on the *result* achieved by that interrelationship. A combination device cannot produce physically a result exceeding the sum of the individual effects.²²³ As previously noted, a mechanical element may not function differently in association with other elements than it did in the prior art. Therefore, mechanical elements are limited to their physical characteristics.²²⁴ When assembled, elements can only "contribute to the combination the mechanical functions of which they are inherently capable. . . . [T]hus the performance of the combination will always equal the sum of the functions of its components and rarely, if ever, exceed the sum of its parts."²²⁵ Courts following this rationale have rejected synergism as a requirement of patentability for combination devices.²²⁶ This requirement that a combination device must produce a result which is greater than the sum of its parts is only an alluring figure of speech, employed merely to indicate that the desired effect results from the interaction of the individual components. An identical result cannot be reproduced by the independent operation of the individual elements.²²⁷ In this regard, synergism, defined in terms of an "effect greater than the sum of the several effects taken separately," also corresponds to the "combination/aggregation" distinction explored earlier.²²⁸

²²¹ See cases cited *supra* note 206.

²²² *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 152 (1950).

²²³ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d 535, 545 (3d Cir. 1981) (citing *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d 963, 970 (7th Cir. 1979)); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 970.

²²⁴ See *supra* notes 209-11 and accompanying text.

²²⁵ *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d 963, 970 n.21 (7th Cir. 1979). The appearance of synergism defined in terms of a result exceeding the sum of the individual effects arguably is a consequence of insufficient knowledge of the properties of the component parts. This insufficiency of knowledge is relevant to the issue of nonobviousness, although not an independent test for it. Accordingly, the appearance of a result greater than the sum of its parts, the customary test for synergism, is actually subsumed under the nonobviousness standard of section 103 and the *Graham* analysis. *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d 963, 970 n.21 (7th Cir. 1979).

²²⁶ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d 535, 545 (3d Cir. 1981) (citing *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d 963, 970 (7th Cir. 1979)); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 970.

²²⁷ *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 970.

²²⁸ See *supra* notes 37-52 and accompanying text.

3. Unusual and Surprising Consequences

Finally, while the requirement that a combination device produce "unusual and surprising consequences" has been attributed to the synergism doctrine,²²⁹ it more clearly pertains to the nonobviousness prerequisite of section 103. Combination devices, by definition, consist of elements known in the prior art.²³⁰ Thus defined, neither the device nor the elements would meet the test of nonobviousness. The selection of elements, however, producing through their interaction a certain result, may be nonobvious.²³¹ For example, the teachings of the prior art may discourage the selection of certain elements, or the method for combining the elements may be complicated in comparison to the methods employed in the prior art: the elements selected may produce such "new and different functions" that their use would not have been apparent.²³² Accordingly, where the results produced through the interaction of previously known elements are "unusual and surprising," the apparatus has satisfied the nonobviousness requirement of section 103. It is this aspect of the *Great Atlantic* language, mistakenly attributed to the synergism doctrine, which more correctly belongs to the nonobviousness doctrine.

4. Summary

The *Great Atlantic* Court, therefore, offered three definitions of synergism, and therefore patentability. Actually, however, only two definitions corresponded to the etymology of synergism — the presence of a "new and different function," or a "greater effect." These definitions aid in the determination of the "combination/aggregation" distinction, and thereby are merely phrases for distinguishing "combinations" from "aggregations." Section 103, however, requires the presence of an element beyond the mere existence of a "new and different function" or a "greater effect." The "unusual and surprising" language found in *Great Atlantic* and thought to be an alternative definition of synergism is, in actuality, a prototype of section 103 nonobviousness.

C. Judicial Confusion: Description and Prescription

Unfortunately, courts currently have not been conscious of the critical dis-

²²⁹ See cases cited *supra* note 207.

²³⁰ *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 274 (1976); *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 59 (1969); *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 150-51, 152 (1950).

²³¹ *Sarkisian v. Winn-Proof Corp.*, 697 F.2d 1313, 1318 n.10 (9th Cir. 1983); *Rengo Co. v. Molins Mach. Co.*, 657 F.2d 535, 545-46 (3d Cir. 1981) (quoting *B.G. Corp. v. Walter Kidde & Co.*, 79 F.2d 20, 21-22 (2d Cir. 1935)); *Plastic Container Corp. v. Continental Plastics of Ok., Inc.*, 607 F.2d 885, 905 n.48 (10th Cir. 1979) (quoting *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d 963, 971 (7th Cir. 1979)); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971.

²³² *Sarkisian v. Winn-Proof Corp.*, 697 F.2d at 1318 n.10; *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 545-46 (quoting *B.G. Corp. v. Walter Kidde & Co.*, 79 F.2d at 21-22); *Plastic Container Corp. v. Continental Plastics*, 607 F.2d at 905 n.48 (quoting *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971.

tinctions among the terms "combination," "aggregation," "synergism," and "nonobviousness." The gradual erosion of these distinctions has precipitated the confusion among the circuits regarding the proper standards of patentability for devices consisting of previously known elements.

First, the courts have ignored the proper distinction between the terms "combination" and "aggregation." Courts currently employ the term "combination" to signify any device consisting of more than one element, either a real "combination" or an "aggregation."²³³ The elements of a "combination," properly defined, however, must cooperate integrally, producing a result due to the combined effect of the several parts and not simply from the separate action of each.²³⁴ In contrast, an "aggregation" implies the mere union of two or more unrelated elements, independently performing the same function in the same way as they did when used alone, but without interaction or cooperation.²³⁵

Second, courts currently view *Great Atlantic* as offering three definitions of synergism, and therefore patentability. Accordingly, combination devices are variously considered synergistic when the individual elements of the device "result in a [combined] effect greater than the sum of the several parts taken separately,"²³⁶ perform a "new and different function"²³⁷ or produce "unusual and surprising consequences."²³⁸ Actually, only two definitions correspond to the etymology of synergism, as thus examined, namely the presence of a "new and different function," or a "greater effect." The "unusual and surprising" language found in *Great Atlantic* and thought to be an alternative definition of synergism is, in actuality, a prototype of section 103 nonobviousness. Indeed, section 103 may be seen as the statutory counterpart of the "unusual and surprising" facet of earlier definitions of synergism.

Third, courts addressing this issue fail to realize that synergism, properly defined in terms of a "new or different function," or "greater effect," is merely a rhetorical means for distinguishing "combinations" from "aggregations" — that is, for isolating those devices which exhibit the requisite interaction among the component parts from those devices which do not. For the purposes of patent claim analysis, therefore, the terms "synergism" and "combination" are synonymous.

Fourth, a confusion similar to that concerning the terms "combination" and "invention" discussed in the *Great Atlantic* decision exists today regarding the terms "synergism" and "nonobviousness." Just as courts prior to *Great Atlantic* were trying to claim that the existence of a "combination" mandates a finding of invention — rather than being a condition precedent to such a finding as required in *Great Atlantic* — some courts are attempting to assert that the

²³³ See cases cited *supra* notes 130, 136.

²³⁴ See cases cited *supra* note 180.

²³⁵ *Id.*

²³⁶ See cases cited *supra* note 206.

²³⁷ See cases cited *supra* note 205.

²³⁸ See cases cited *supra* note 207.

presence of synergistic qualities alone mandates a finding of nonobviousness.²³⁹ Synergism, although a condition precedent to nonobviousness, does not mandate a finding of patentability under the nonobviousness standard of section 103 and the *Graham* analysis. Synergism, as a condition precedent of nonobviousness, may be useful in determining the validity of a combination device. An absence of synergism, indicating the existence of a mere aggregation, will signify obviousness, hence unpatentability. In this way, the synergism doctrine distinguishes between those devices which may be patentable and those which are not. The presence of synergism, however, indicating the existence of a patentable device, does not necessarily mandate a finding of nonobviousness. The very selection and arrangement of elements which produce a desired result could have been either not "inventive" or "obvious" to a person acquainted with the prior art. Patentability, however, requires more than the obvious selection and arrangement of components.

As a condition precedent for nonobviousness, the synergism doctrine, although not a separate test for patentability independent of section 103, can be seen therefore, as a useful guide for scrutinizing combination devices. In addition to the arguments advanced above, however, there are other reasons why synergism should not be understood as another shibboleth for nonobviousness. Examination of the common definitions of synergism broached in *Great Atlantic* reveals that the doctrine corresponds to the "combination/aggregation" distinction of the pre-1952 rules of invention. Courts which oppose this "combination/aggregation" distinction, however, maintain that the requirements of section 103 of the Patent Act of 1952 apply to all patent claims, regardless of their subject matter.²⁴⁰ They argue that this universality of application is attributed to a Congressional intent to replace the previous rules of invention, many of which were applicable only to a limited range of patents, with a single standard of nonobviousness.²⁴¹ According to these courts, there appears to be no justification for determining the patentability of a combination device by a different standard than any other type of discovery.²⁴² In fact, "it would confound the statutory design to impose on any class of patents a harsher test of patentability than the rest."²⁴³ The Supreme Court, however, in *Great Atlantic* and *Sakraida* has recognized "synergism" to a limited extent as a term symbolizing the more stringent standard for patent claims involving more than one ele-

²³⁹ See cases cited *supra* notes 130, 136.

²⁴⁰ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d 535, 544 (3d Cir. 1981); *Plastic Container Corp. v. Continental Plastics of Ok., Inc.*, 607 F.2d 885, 905 n.48 (10th Cir. 1979); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d 963, 971 (7th Cir. 1979).

²⁴¹ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 544; *Plastic Container Corp. v. Continental Plastics of Ok., Inc.* 607 F.2d at 905 n.48; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971.

²⁴² *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 544; *Plastic Container Corp. v. Continental Plastics of Ok., Inc.*, 607 F.2d at 905 n.48; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 971.

²⁴³ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d 535, 545 (3d Cir. 1981).

ment.²⁴⁴ Where a combination device is involved, special scrutiny into its obviousness may be necessary because of the improbability of finding patentability in a device composed of previously known elements.²⁴⁵ The Supreme Court, in *Great Atlantic* and *Sakraida*, consistently emphasized this basic precept concerning the stricter degree of scrutiny under which combination devices are judged.²⁴⁶

In addition to finding the "combination/aggregation" distinction inconsistent with the language of section 103, opponents of this distinction argue that because synergism relates exclusively to "combinations," as distinguished from "aggregations," the scope of the synergism doctrine derives from the definition of the term "combination."²⁴⁷ Courts which oppose a more exacting scrutiny for combination devices argue that no standard can be articulated for such devices.²⁴⁸ According to this view, most mechanical devices consist of previously known elements interacting in different "combinations."²⁴⁹ The presence or absence of interaction under the synergism doctrine, these courts state, is not useful in determining the nonobviousness of a device clearly suggested by the prior art.²⁵⁰ Proponents of this position, however, fail to recognize that one important purpose of the synergism doctrine is to distinguish "combinations" from "aggregations" and, hence, to distinguish devices which may be nonobvious and therefore patentable from those which are not.²⁵¹ In this regard, synergism, as a condition precedent to a finding of nonobviousness is an important consideration in determining patentability under section 103.

Opponents of the synergism doctrine also argue that synergism conflicts with the language of section 103 and the Supreme Court's repeated insistence that section 103 and the tripartite *Graham* analysis be followed strictly in determining the nonobviousness of a discovery.²⁵² According to these courts, any

²⁴⁴ *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 281 (quoting *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 152 (1950)).

²⁴⁵ *Id.* The rationale for this stricter scrutiny of combination devices is that a patent can only be sustained when it effectuates its purpose of augmenting the sum of useful knowledge. A patented apparatus consisting of previously known elements could possibly withdraw from the prior art resources freely available to skilled persons. This withdrawal of resources is a result not intended by either Congress or the Courts, and indeed, would violate the Constitutional mandate that new discoveries eventually must become the property of all people. *Great Atl. and Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147 (1950).

²⁴⁶ *Id.*

²⁴⁷ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d 535, 545 (3d Cir. 1981); *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d 963, 970 (7th Cir. 1979).

²⁴⁸ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 545; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 970.

²⁴⁹ *Rengo Co. v. Molins Mach. Co.*, 657 F.2d at 545; *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 970; *Nikola v. Peterson*, 580 F.2d 898, 912 n.22 (6th Cir. 1978); *Reeves Instrument Corp. v. Bechman Instruments, Inc.*, 444 F.2d 263, 270 n.4 (9th Cir. 1971); *B.G. Corp. v. Walter Kidde & Co.*, 79 F.2d 20, 21-22 (2d Cir. 1935).

²⁵⁰ *Republic Indus., Inc. v. Schlage Lock Co.*, 592 F.2d at 970.

²⁵¹ The absence of interaction, on the other hand, and therefore the absence of synergism, successfully demonstrates obviousness under the Patent Act of 1952. *Id.* at 970-71.

²⁵² *Rengo Co. v. Molins Mach. Co.*, 657 F.2d 535, 545-46 (3d Cir. 1981); *Plastic Con-*

assessment of the obviousness of a discovery under section 103 and the *Graham* analysis must be made with reference to the level of skill existing in the pertinent art at the time the discovery was made.²⁵³ The synergism test, in contrast, they note, compels courts to focus exclusively on the performance of the elements after they are discovered.²⁵⁴ Furthermore, they conclude, synergism, by referring exclusively to the functioning of the individual elements after they are combined, necessarily assumes that it is always obvious to select and combine known elements to produce a particular result.²⁵⁵

In certain circumstances, however, the selection of the elements and formation of the apparatus may itself be nonobvious under the standards of section 103 and therefore patentable.²⁵⁶ As one recent court observed, elements may be combined in infinitely many variations. The selection of elements, which when combined produce a desired result, "may require a high degree of originality." It is the very selection of these elements which is the innovation.²⁵⁷ Therefore, because the synergism doctrine primarily concerns the performance of the elements after combination and without regard to the obviousness of selecting the component elements of the apparatus, opponents argue that synergism converts a mere difference in the degree of obviousness into a separate standard of patentability which fails to comply with section 103 and the *Graham* mandate. The opponents fail to recognize, however, that synergism is important as an indicia, rather than a synonym of nonobviousness. Synergism only attempts to distinguish nonpatentable "aggregations" from "combinations" which may be patentable under section 103.

CONCLUSION

The present controversy among the circuit courts of appeals concerning patent validity results from the notion that synergism may be an additional criterion of patentability for combination devices. The inconsistent formulations and applications of the patent standards has resulted in an unpredictable body of law which has successfully undermined the primary objective of the patent system as articulated in the Constitution: "to promote the progress of

tainer Corp. v. Continental Plastics of Ok., Inc., 607 F.2d 885, 905 n.48 (10th Cir. 1979); Republic Indus., Inc. v. Schlage Lock Co., 592 F.2d at 971.

²⁵³ Rengo Co. v. Molins Mach. Co., 657 F.2d at 545-46; Plastic Container Corp. v. Continental Plastics of Ok., Inc., 607 F.2d at 905 n.48; Republic Indus., Inc. v. Schlage Lock Co., 592 F.2d at 971.

²⁵⁴ Rengo Co. v. Molins Mach. Co., 657 F.2d at 545-46; Plastic Container Corp. v. Continental Plastics of Ok., Inc., 607 F.2d at 905 n.48; Republic Indus., Inc. v. Schlage Lock Co., 592 F.2d at 971.

²⁵⁵ Rengo Co. v. Molins Mach. Co., 657 F.2d at 545-46; Plastic Container Corp. v. Continental Plastics of Ok., Inc., 607 F.2d at 905 n.48; Republic Indus., Inc. v. Schlage Lock Co., 592 F.2d at 971.

²⁵⁶ Sarkisian v. Winn-Proof, 697 F.2d 1313, 1318 n.10 (9th Cir. 1983); Rengo Co. v. Molins Mach. Co., 657 F.2d at 545-46; Plastic Container Corp. v. Continental Plastics of Ok., Inc., 607 F.2d at 905 n.48; Republic Indus., Inc. v. Schlage Lock Co., 592 F.2d at 971.

²⁵⁷ B.G. Corp. v. Walter Kidde & Co., 79 F.2d 20, 22 (2d Cir. 1935). See also Application of Menough, 323 F.2d 1011, 1015 (C.C.P.A. 1963).

useful arts and discoveries." It is necessary, therefore, to formulate and adopt a consistent standard of patentability for combination devices.

The preceding analysis has demonstrated that the etymological derivation of the term "synergism," as applied to devices consisting of previously known elements, distinguishes those discoveries which are "combinations" from those which are mere "aggregations." This distinction between "combinations" and "aggregations" exists in the pre-1952 case law surrounding the judicial evolution of the *Hotchkiss* invention standard. The *Great Atlantic* Court recognized this distinction, but noted that it was insufficient as the sole determinant of patentability under this standard. According to the *Great Atlantic* Court, a device consisting of previously known elements may be patentable if, in addition to being a "combination" possessing the requisite interaction of the individual elements, the device produced "unusual and surprising consequences" from the interaction of the elements. A finding that a device was a "combination," therefore, was a condition precedent to a finding that it was "inventive."

In the Patent Act of 1952, Congress attempted to eliminate the judicial disparity surrounding the interpretation of the invention standard by enacting a more objective standard: nonobviousness. Nonobviousness, however, is merely a new rubric for the old invention requirement, defined in terms of "more ingenuity and skill than that possessed by an ordinary mechanic" under *Hotchkiss* or "unusual or surprising consequences" under *Great Atlantic*. Accordingly, the Supreme Court has continued to require, under the nonobviousness standard of section 103, the interaction of elements in combination devices. This search for interaction among the elements is couched in the rhetoric of synergism, defined in terms of a "new or different function," or a "greater combined effect."

Synergism, as a condition precedent of nonobviousness, may be useful in determining the validity of a combination device. Properly applied, an absence of synergism, indicating the existence of a mere aggregation, will signify that the device is obvious under section 103, hence unpatentable. Yet, the presence of synergism, although indicating the existence of interaction among the elements does not necessarily mandate a finding that the device is nonobvious under section 103. The very selection and arrangement of elements which produced a desired result could have been apparent, at the time the discovery was made, to a person skilled in the pertinent art. As a condition precedent of nonobviousness, therefore, the synergism doctrine, although it does not bear any *ipso facto* relationship to the nonobviousness, may be seen as a useful guide for scrutinizing combination devices under section 103 and the tripartite *Graham* analysis.

KEVIN J. LAKE