

IS THE DEVELOPMENT OF TECHNOLOGY HELPED OR HINDERED BY PATENT LAW — CAN ANTRITRUST LAWS PROVIDE THE SOLUTION?

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I. INTRODUCTION

Technologies do not suddenly exist as complete entities; both the timing of their appearance and the forms that they take are socially influenced, such that it is meaningful to speak of technology in abeyance. This can operate on at least three analytically distinct levels. First, there is abeyance which occurs when a technology is potentially available, but is not realized in a practical form because of its irrelevance in the existing social structure. For example, the ability of steam to act as a form of power was known in ancient Greece, but given the existence of the slave economy, that is, cheap labour power, it was not perceived to be of importance. Electric telegraphy was suggested in the 1750s and was actually demonstrated in the early nineteenth century, but aroused little interest until the development of the railways spawned the need for improved telegraphy.¹ Secondly, there is the situation of the non-development of a technological option in favour of another. That is, a technology may develop in a number of different forms, and specific forms may be developed rather than others. Those that are not developed are, in effect, in abeyance. In particular, if technology B owes a great deal to discovery A, it is important to inquire into why this link occurred. It is not sufficient to show that B required A. It must be shown also that A led to B and could not have led to technologies C, D, or E. Unless this can be done, one must ask why it was B that was developed. The third level of technology in abeyance occurs when a developed technology is not made available; it is, in

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1 R. Williams, *Television: Technology and Cultural Form* (1974).

effect, suppressed. Suppression is not a matter of all or nothing; it may be qualified suppression in the sense that restrictions may be applied that constrain and limit the use of technology rather than completely block its availability. Also suppression may occur through the uninterested, though not disinterested, stance of the logical user of the technology. It is not only the producer of the technology who may suppress. It is this third form of technology in abeyance — suppression — that is of concern here.

Suppression is an aspect of the history of technological development that by its very nature begs for embellishment of the facts, where apocryphal stories can be rampant and hard evidence difficult to come by. Nonetheless, it is possible to document the existence of specific practices which, if lacking somewhat the glamour of folklore, can form the basis of an understanding of the practices that organisations can and do indulge in in an effort to control aspects of their technological environment. Patent and anti-trust in particular, provides a rich field of information on organisational practices which would otherwise be unlikely to receive such detailed exposure. Case material from these areas of law provides the major source of data for this paper. The intention is not to discuss fine points of law, nor primarily to differentiate the legal from the illegal, but to provide insights into practices that are intimately connected with attempts to control aspects of the technological environment.

II. PATENTS AND ANTI-TRUST

Patent laws are intended to provide a legal monopoly as a means to encouraging invention. Anti-trust laws are intended to prevent unreasonable restraint of trade. Thus there is an inherent conflict within the legal framework of commercial activity resolvable only through an assessment of what constitutes “reasonableness”.

The core of anti-trust law in the United States, is to be found in three statutes, the Sherman Act of 1890 and the Clayton and Federal Trade Commission Acts of 1914.² The appropriate sections of the Sherman Act are:

Section 1 Every contract, combination in the form of trust or otherwise, or conspiracy in restraint of trade or commerce among the several States or with foreign nations, is hereby declared to be illegal ...

Section 2 Every person who shall monopolize or attempt to monopolize, or combine or conspire with any other person or persons to monopolise any part of the trade or commerce among the several States, or with foreign nations shall be deemed guilty of a misdemeanor.

The Clayton Act declares the following practices to be illegal where and when their effect is to substantially reduce competition:

- (a) price discrimination
- (b) exclusive dealing and tying contracts
- (c) acquisition of competing companies
- (d) interlocking directorates

2 A.D. Neale & D.G. Goyder, *The Antitrust Laws of the United States of America* (1980).

The Federal Trade Commission Act includes the provision that:

Unfair methods of competition in commerce and unfair or deceptive acts or practices in commerce are hereby declared illegal.

Whilst anti-trust law seeks to promote competition it does not directly seek to increase utilisation of technology. This may be a side-effect but there is no legal basis requiring that either patents or trade secrets be applied. "Every patent is a grant of monopoly power by the state."³ That is, provided "reasonable" commercial practices are followed suppression of technology is perfectly legal.⁴

If non-use of a patent is deemed to be based on reasonable commercial grounds such as lack of available capital for its development, or fixed investment in existing technology or lack of a viable market, then anti-trust provisions do not apply.

There are in fact very few cases in which the non-use of patents has been the central issue and no modern cases in which the Supreme Court has squarely faced the question of whether non-use may be a ground for denying equitable relief of a patentee.⁵

As early as 1906 the tactic of suppression of technology by large corporations in the United States was being noted and criticised as an abuse of the spirit of patent laws. In 1912 the US House Committee on Patents, argued that "the practice of buying up and suppressing patents is widely indulged".⁶ They sought to introduce changes in the patent laws to prevent

[T]he evils arising from the vendor of a potential article fixing the price at which the article must be resold to the public ..., evils arising from the vendor of potential articles prohibiting their use except in connection with other unpatented articles purchased from them ..., evils arising from owners of patents suppressing [my emphasis] the same or prohibiting their use in order to prevent competition with other patented or unpatented articles sold by such owners of patents.⁷

The Committee suggested that patents be voided if not developed within two years, however, critics pointed out that this would be playing into the hands of large companies even more, in that inventors who could not develop their ideas in two years would have their ideas expropriated at the end of that period, by these companies. The House voted for no changes in this regard and legal attempts to prevent suppression have always ended in the upholding of the right of the patent holder to deal with the patent — being his private property — as with any other asset he possesses.⁸ In the *Paper Bag* case⁹ it was argued that the Court should refuse to protect a patented invention which had not been put to use.¹⁰ The Court, however argued that:

3 *Id.*, 288.

4 See Neale & Goyder, note 2 *supra*; E. W. Kintner, *An Antitrust Primer* (2nd ed. 1973); R. I. Miller, *Legal Aspects of Technology Utilisation* (1974).

5 Note 2 *supra*, 324.

6 US House Committee on Patents, (1912) "Revision of Patent Laws", *House Reports* 5, 62nd Congress, 2nd Session, 4 December 1911 — 26 August 1912, Report No. 1161.

7 *Ibid.*

8 U.S. Congressional Record, 1912, No.18: 6021-6022.

9 *Continental Paper Bag v. Eastern Paper Bag Co.* 210 US 405 (1908).

10 G. E. Frost, "Legal Incidents of Non-Use of Patented Inventions Reconsidered" (1946) 14 *Geo Wash L Rev* 273-311, 435-459.

[t]he inventor is one who has discovered something of value. It is his absolute property. He may withhold a knowledge of it from the public ... it is the privilege of any owner of property to use or not use it without question of motive.¹¹

However, anti-trust legislation is by no means a toothless tiger with regard to patents because few cases are of the simple non-use type. Indeed, it is because of the “tenacity” of anti-trust legislation that it is possible to gain an insight into many of the practices that organisations indulge in with regard to the suppression of technology. These form the core of the following sections.

III. PATENT CONSOLIDATION

A major strategy for attempting to control the development of technology is through the practice of patent consolidation. This requires gaining control of key patents through research and development and/or buying up of such patents, which sometimes involve the purchase of the companies holding them.

In the period from 1916 to 1935 the engineering department of Western Electric Company and Bell Telephone Laboratories — both subsidiaries of American Telephone and Telegraph Company (AT&T) spent US\$250,000,000 on research and development. Central to their strategy was the intention,

... to garner all the patents which the Telephone Company can obtain by development and purchase to corner them if possible so that it can control the subject whatever it is.¹²

The centrality of patents in maintaining the telephone monopoly had existed as company policy since the beginning of the Bell System in 1875.

More than just providing a monopoly, patent consolidation can provide the basis for delaying the introduction of new technology. AT&T held back the combined handset and dial system for twenty years because of the sunk investment in the existing technology and the associated emphasis on cost-saving through standardisation.¹³ Some had been market tested and had met with an enthusiastic response but were quickly recalled. AT&T's chief engineer, in a letter (1907) to an associated company commented:

There are grave reasons which it is not practical to state in this letter why we should avoid taking the slightest step which might precipitate a general demand for these instruments.¹⁴

An associated strategy revolves around dampening enthusiasm for a new technology whilst at the same time actively working to secure a central — if not the dominant — position in the new market. During the time of the development of the automatic telephone AT&T's chief engineer even presented a paper to the American Institute of Electrical Engineers exposing “the fundamental fallacy of automatic telephony”.¹⁵ Once again, the general introduction of the new technology was delayed twenty years.

11 P. E. Areeda, *Antitrust Analysis: Problems, Texts and Cases* (1981) 576.

12 N.R. Danielian, *A.T.&T.* (1939) 93.

13 *Id.*, 102-103.

14 *Id.*, 102.

15 W. Kaempffert, “Invention by Wholesale” (1923) 52 *Forum* 2118.

When AT&T became the first company to organise a co-ordinated research effort aimed at producing a quality system of radio (“wireless telephony”) transmission and reception, they entered radio research as a defensive measure, because of the claims being made about the potential of radio which, if true, could have had a serious impact on that investment in wire communications. “When it was realised that the *status quo* was threatened by new inventions in a field of science then still in its infancy, it was decided to control it in order to protect existing investments”.¹⁶

Again, they publicised the limitations of radio, in an attempt to suppress any inconvenient enthusiasm for the new technology.

[T]he company was fearful that its own success [would] lead the public [to] believe that wires were about to be supplemented by radio, whereby they might sell their telephone stock! So credit was given to no-one, save a blanket commendation of its own workers and the company began to preach the limitations of radio — the words spread all over creation, were no secret, were subject to interference, only a limited number of stations could operate in a common medium ...¹⁷

Their own interest in radio nonetheless expanded and through securing the patents on a few specific inventions: Michael Lupin’s loading coils, the Cooper-Hewitt mercury-arc repeater and Lee De Forest’s three element vacuum tube, securing for themselves a central position in the development of both radio and telephone.

General Electric (GE) came to control the production of incandescent lighting through a strategy of buying companies and patents. The more they held key patents the more they became the only market for further related patents.¹⁸ Then when fluorescent lighting was developed its introduction was suppressed because of the implications for the incandescent market. As well as the “initial restraint” in promoting their sales being based on a desire not to threaten the potential sales of incandescent lights it was also the result of pressure from electric utility companies who believed that the increased efficiency of fluorescent lighting would mean a reduced demand for electricity and hence a threat to their profitability.

A conference was held among representatives of the large-lamp producers and the utilities and understandings were worked out whereby future promotion was to be based upon what was considered to be ‘sound illuminating engineering principles’. The lamp producers met the demands of the utilities, and on May 1, 1939, General Electric issued a statement of policy which included the sentence: ‘The fluorescent Mazda lamp should not be presented as a light source which will reduce lighting costs’. Westinghouse concurred by stating in part: ‘We will oppose the use of fluorescent lamps to reduce wattages’.¹⁹

The technology was effectively suppressed because its introduction was not in the interests of either the manufacturer — who wished to achieve higher

16 Note 12 *supra*, 107.

17 L. Espenschied, AT&T engineer quoted in L. S. Reich, “Research, Patents and the Struggle to Control Radio: A Study of Big Business and the Uses of Industrial Research” (1977) 51 *Business History Review* 208, 214.

18 F.L. Vaughan, *The United States Patent System: Legal and Economic Conflicts in American Patent History* (1956) 75-76.

19 A.A. Bright, *The Electric Lamp Industry* (1949) 404.

sales of existing lights (incandescent) before releasing the new product — or the utilities who, in the short run at least (*i.e.*, until demand for electricity increased) stood to lose financially. When the fluorescent lights were released onto the market in a big way by Westinghouse and GE, this was because a smaller competitor — Sylvania — began to do so successfully and hence suppression no longer was in the manufacturer's interests.

Consolidation of patents may also allow a suppression of the quality of a product. Vaughan provides documentary evidence that GE consciously downgraded the quality of torch globes to increase sales. He cites a 1932 memorandum from the files of GE which reads,

Two or three years ago we proposed a reduction in the life of flashlight lamps from the old basis on which one lamp was supposed to outlast 3 batteries, to a point where the life of the lamp and life of the battery under service conditions would be approximately equal. Some time ago the battery manufacturers went part way with us on this and accepted lamps of 2 battery lives instead of 3. This has worked out very satisfactorily. We have been continuing our studies and efforts to bring about the use of one-battery-life lamps ... If this were done we estimate that it would result in increasing the flashlight business approximately 60%. We can see no logical reason either from our standpoint or that of the battery manufacturer why such a change should not be made at this time.²⁰

A recent case where the purchase of a company became associated with accusations of suppression involved the development of an electronic pain-killing device. In 1971 three men founded a business called Stimulation Technology Incorporated (Stimtech) to produce the device. In 1974 Johnson & Johnson purchased the company. The founders were paid US \$1.3 million, promised up to US \$7 million in future profits and were made Johnson & Johnson executives. The company said that the device would be marketed world-wide, given the Johnson & Johnson label and that substantial research and development funding would be provided. However, within six months the company "imposed a number of restrictive and suppressive requirements".²¹ These included a prohibition on expansion of market, refusal to accept large purchase orders, refusal to allow development of an improved device, prohibition of use of the Johnson & Johnson name and limitations on advertising. Amongst the restrictions was also the banning of the product from display at Johnson & Johnson's annual meeting at which it was normal practice to display all the company's products. The founders offered to buy Stimtech back but Johnson & Johnson refused. In 1979 the former charged the company with fraud, breach of contract and suppressing the use of the device because of the competition that it could constitute to their drugs business.

The lower court decision in favour of the inventors was largely overturned in the Court of Appeal. Whilst the suppression of the stimulator was not disputed, the Court of Appeal found that an anti-trust case did not exist because

²⁰ Note 18 *supra*, 236-237.

²¹ *McDonald et al v. Johnson & Johnson* 722 F 2d (1984) 1370, 1380.

former shareholders lacked standing to bring anti-trust action whereby selling their stock they had voluntarily withdrawn from the market and where any harm sustained by them was directly related to the purchase agreement and only indirectly related to suppression of the stimulators.²²

A new trial was ordered on the fraud charges and the lower courts US \$5.7 million judgment on the breach of contract count was affirmed.

IV. PATENT BLITZKRIEG

A technique for control that is closely related to patent consolidation involves the taking out of a large number of patents with the specific intention of blocking the path of would-be competitors. The president of Hartford-Empire — during the course of an anti-trust case — described the purposes of taking out patents as follows:

to cover the actual machines which we are putting out and prevent duplication of them.
to block the development of machines which might be constructed by others for the same purpose as our machines, using alternative means.
to secure patents on possible improvement of competing machines so as to 'fence in' those and prevent them reaching an improved stage.²³

The effect of this blocking strategy is that "[i]f an outsider seeks a patent in this domain, he must find out in some instances about hundreds of patents on kindred ideas and avoid them".²⁴

This practice, sometimes called 'patent blitzkrieg', could effectively suppress competition through the use of infringement suits (or at least the threat of them). "[A] large and possibly growing hoard blanketing his field would confront any new producer with the substantial possibility of patent infringement litigation".²⁵ Also, banks are extremely unlikely to lend money for the development of a technology where infringement suits are threatened. This blitzkrieg is facilitated by the use of "umbrella patents" (patents that are so broad as to prevent the development of similar products), "accordian patents" (patents that begin with the single invention, but which expand to include products and processes used in association with it) and "bottleneck patents" (patents which control the use of inventions without which the industry cannot operate).²⁶

American Bell Telephone Company in the 1890s utilised patent infringement suits as a central strategy for the harassment of their competitors. This purpose is clearly stated in their 1892 annual report:

... the policy of bringing suit for infringement on apparatus patents is an excellent one because it keeps the concerns which attempt opposition in a nervous and excited condition since they never know where the next attack may be made, and since it keeps them all the time changing their machines and causes them ultimately, in order that they may not be sued, to adopt inefficient forms of apparatus.²⁷

²² *Id.*, 1370

²³ *United States v. Hartford-Empire Co.* F Supp 541, 618 (N.D. Ohio 1942) as quoted in Vaughan, note 18 *supra*, 240.

²⁴ Note 18 *supra*, 262.

²⁵ P. E. Areeda & Donald F. Turner, *Antitrust Law*, Vol III (1978) 704.

²⁶ B. J. Stern, "Science and War Production" (1943) 7 *Science & Soc* 97, 100-101.

²⁷ Quoted in Danielian, note 12 *supra*, 98.

An investigation into the Bell Telephone Co in the 1920s found that they had suppressed 3,400 patents to prevent competition, a strategy which had involved them in acquiring patents covering devices for which they had no need, but to which they wished to deny potential competitors access.²⁸ Later, in its new form — AT&T — the company utilised the same strategy in an effort to control the development of radio. In the case of *United States v. National Lead Company*²⁹ the National Lead and DuPont companies were criticised by Mr Justice Burton for their “proliferation of patents” which made it extremely difficult for any potential competitor.³⁰

An anti-trust case also revealed the practices of Kobe Incorporated, manufacturers of hydraulic pumps who for years had maintained the practice of buying up patents that might affect their business.³¹ In 1947 an inventor named Dempsey developed a competing pump. Kobe claimed that it infringed their patents, began litigation and informed the major industry customers of this move. Subsequently Dempsey’s business virtually dried up and he initiated legal action. As a result of this the Court found that Kobe’s activities were based on the intention to suppress competition. Included in the case had been evidence to the effect that Kobe had not even seen specifications of the new pump yet it had still begun litigation.³²

In another anti-trust case it was found that a company had accumulated more than 2,000 patents and which were found by the Court to go beyond legitimate purposes.³³ However, this finding was possible only because a significant number of the patents had been obtained from other companies. Accumulation of patents based entirely on a company’s own research is not similarly assessed.³⁴

Some companies patent many small improvements to, or variants of, their inventions or those of competitors with no intention to practice them. The intent may be aggressive (*i.e.* to block a competitors likely direction of technical development or to force him into cross licensing or pool arrangements) or it may be defensive (*i.e.* to protect oneself from being “blocked”). A central difficulty for the courts is how to distinguish patents taken out as part of a genuine new research endeavour and those which merely block the path for competitors.³⁵

V. PATENT POOLS

Companies sometimes find themselves in a situation where they require the use of technologies protected by the patents of each other. One response

28 B. J. Stern, “The Frustration of Technology” (1937) 2 *Science & Soc* 19.

29 *United States v. National Lead Co.* 332 US 319 (1947).

30 Note 2 *supra*, 300.

31 *Kobe Inc v. Dempsey Pump Co* 198 F 2d 416 (10 Cir. 1952).

32 Note 2 *supra*, 305-306.

33 *United States v. United Shoe Machinery Corp.* 110 F Supp 295 (D. Mass. 1953).

34 L. A. Sullivan, *Handbook of the Law of Antitrust* (1977) 511.

35 Note 2 *supra*, 325.

to this situation is to form a patent pool whereby the parties to the agreement have access to each other's patented technologies without fear of patent infringement suits.

By 1890 GE and Westinghouse monopolised major sectors of the electrical manufacturing industry. Their position was significantly due to patent control, however, increasingly they were being involved in expensive and time consuming patent suits between themselves.³⁶ An agreement to pool their patents mutually enhanced their ability to undertake controlled technological development. In particular in the radio field, AT&T, Westinghouse, GE Western Electric, Radio Corporation of America and others formed a patent pool because the intensive development and acquisition of patents covering the development of radio had led to "a stalemate created by mutual patent interferences".³⁷

Patent pools can be perfectly legal. An example is provided by the development of cracking processes — which use high pressure and heat to separate the components in crude oil — for gasoline production. Each of four corporations, including Standard Oil (Indiana) held patents on the processes. Because of conflicts over infringements and associated litigation the companies pooled the patents, and the individual companies were allowed to issue licences to other companies (*i.e.*, those outside the pool).³⁸

However, rarely is the pool aimed purely at removing barriers to the development of technology; it is a basis also for attempting to control their common markets by preventing new competition from outside the group. The pooling arrangement

... enables the pool to buy patents at low prices, since holding the basic patents, it can refuse permission for the use by others of any improvements upon the master processes. In short the pool constitutes the only possible buyer of auxiliary inventions. Such an advantageous position permits the purchase and suppression of patents to be practiced.³⁹

The profitability of the sewing machine industry was established (1850s-1870s) largely on the basis of the pooling of patents amongst the four initial manufacturers — Elias Howe, Wheeler and Wilson, Grover and Baker and I.M. Singer — in an effort to "more effectually protect the business against infringers".⁴⁰

During the early years of the motion picture industry ten companies sought to dominate using a patent pool. Competition was virtually eliminated hence those in the industry were compelled to use all or none of the machines and films of the monopoly.⁴¹ Similarly, glass blowing became an automatic process through the application of advances made by a member of glassware

36 D.F. Noble, *America by Design* (1979) 10.

37 Note 12 *supra*, 109.

38 *Standard Oil Co. (Indiana) v. United States* 283 US 163 (1931).

39 R.K. Merton, "Fluctuations in the Rate of Industrial Invention" (1935) 49 *Quart'y J Econ* 454, 465-466.

40 Note 18 *supra*, 41.

41 *United States v. Motion Picture Patents Co.* 225 Fed 800, 811 (E.D. Pa. 1915)

manufacturers who then pooled over 600 patents. This pooling was used to exclude new entrants from the industry and to control supply and prices.⁴²

When the operation of patent pools involves collusion to suppress the development of technology then such activity violates anti-trust law. Precisely this happened in the case of the development of radio. The patent pool was drawn up so that each party would remain in control of its primary fields of activity without threat from the other members and so that collectively they were protected from would-be competitors. The result was "... to give a free hand to particular companies to press or delay, as interest dictated, the development of new industries".⁴³ In 1930 this pool was the subject of an anti-trust suit, however, an agreement by the companies to change from exclusive to non-exclusive licencing led to a dismissal of the suit.

In 1934 three manufacturers of the variable condensers used as tuners in radios formed General Instrument Corporation to which they assigned their patents and from which they received licences. The Corporation's functions were to expand its patent holding, sue for alleged infringements and to grant licenses but only if pool members unanimously agreed. In this case anti-trust action was successfully taken. It was found that the companies had colluded with the intention of dominating the market. The decision of the Court was that the Corporation be dissolved and that the patents be compulsorily licensed at reasonable prices.⁴⁴

The Department of Justice initiated anti-trust action against the Automobile Manufacturers Association — citing in particular the four major US manufacturers — arguing that they had, "conspired to prevent or retard pollution control through a pooling technique that guaranteed that no manufacturer would proceed more rapidly than the slowest member of the inside group".⁴⁵ The decision went against the Association.⁴⁶ The defendants were required to cease the pooling activity and to grant royalty-free licenses for any of the patents in the pools. Miller argues that the weight of authoritative opinion was that the pollution control technology existed but that the industry worked at least as hard at having standards relaxed as at implementing the technology.⁴⁷

In the early 1970s anti-trust action was taken against United Aircraft Corporation alleging that they had colluded with T.R.W. Inc with the intention of suppressing competition in the development of fuel cells (fuel cells utilise a chemical reaction to produce electricity). The resulting decree:

42 *Hartford-Empire v. United States* 323 US 386 (1945).

43 Note 12 *supra*, 132.

44 *United States v. General Instrument Corp.* 115 F Supp 582 (D.N.J. 1953), noted in Vaughan, note 18 *supra*, 52.

45 Miller, note 4 *supra*, 31.

46 *United States v. Automobile Manufacturers Association et al* 307 F Supp 617 (USDC Central Dist. Calif. 1969).

47 Miller, note 4 *supra*, 32.

... enjoined the defendant from entering into confidential agreements concerning fuel cell technology, from using or threatening to use its economic power to prevent others from engaging in fuel cell research and from acquiring a significant interest in any other company involved in fuel cell technology.⁴⁸

Also United were required to grant a royalty-free license to anyone wishing access to their patented technology.⁵⁰ Similarly when General Cable Corporation and three other manufacturers of high tension cable pooled their patents, refused to license other manufacturers and fixed prices and terms of sale, the Court cancelled these agreements and ordered licensing at reasonable royalty rates.

A variant on patent pools is where licensees and patent holders collude to exclude all others. In 1939 two inventors patented a fully automatic concrete block making machine. Besser Manufacturing and Stearns companies obtained licenses from the inventors and obtained agreement from them that the approval of Besser and Stearns was required before any other licenses were granted. No others were licensed, threats of infringement were widely used to harass new entrants, to the extent that many went out of business and sold their patents to Besser. It is illegal for patent holders and exclusive licensees to act together to maintain their dominant position and eliminate competition.⁵¹

Patent pools do not always achieve the objective of market control. Even where this situation is achieved anti-trust actions may occur which destroys the pool. The existence of such action is however merely a possibility; there is no inherent mechanism which makes it a certainty. Also, even where the decision goes against the company there may be reasons other than the existence of a patent pool which allow suppression. In the United Aircraft Corporation case⁵² the effect of the Court's ruling on the diffusion of fuel cell development has been minimal because United's dominance depended also, and perhaps more fundamentally, on industrial know-how encapsulated within United.

VI. QUALIFIED LICENSING

When a patent holder licenses some other organisation or individual to utilise the technology, this licencing need not be unconstrained. Qualifications can cover such factors as the market or field in which it can be employed (the "field-of-use" limitation), the price at which a patented product may be sold, and the quantity of the patented product produced (though not the number of products produced using a patented product). In this section field and price qualifications are illustrated.

48 Miller, note 4 *supra*, 29.

49 *United States v. United Aircraft Corp.* 80 F Supp 52 (USDC Dist Conn. 1973).

50 *United States v. General Cable Corp.* CCH 1948-1949, Trade Cases 62, 300 (SDNY Civil No. 40-76, 1948; as noted in Vaughan, note 18 *supra*, 58-59.

51 *United States v. Besser Manufacturing Co.* 96 F Supp 304 (E D Mich. 1951).

52 Note 49 *supra*.

1. *Licensing by Field*

A patent may have a range of applications in varying fields. Licensing may take place on the basis of authorising the licensee to apply the application in a specific and confined field. A patent holder may grant access for fields that it does not exploit yet not utilise the technology in the field that it does exploit. It is entitled to act in this way. It need not act on the technology in its own field if it so chooses.⁵³

Thus it is possible that the application of a technology be suppressed in specific fields, with the concept of fields being understood to apply to either market (*e.g.*, consumer or industry) or geographic location (*e.g.*, UK or US). The New Jersey Zinc Company used its patents on processes for producing high grade zinc to limit the production of such zinc in the United States and thereby stabilising such production in a number of European countries and benefitting in this way from the consequent inflow of royalties. In fact, "... the unlimited production of high grade zinc by its licensees in Germany helped to build the war machine in that country..."⁵⁴

Sometimes this geographical suppression occurs through the operation of an international patent cartel. The extent of this activity was graphically illustrated during World War II, when it was discovered that the United States war effort was being seriously limited by such cartels involving United States and German companies. Companies such as Dow Chemical Company, Standard Oil, GE, Aluminium Corporation of America and Dupont were all enforcing cartel agreements with German companies. The agreements covered commodities such as magnesium, zinc, rubber, aviation gasoline, electrical equipment, plastics and dyestuffs. A result of this practice was the restricted production in the United States of supplies vital to the war effort causing in some cases severe shortages.⁵⁵

Geographic licensing is intended to allow price discrimination and thus maximise the patent holder's profit, however, it can also be "a mechanism around which a group of actual or potential competitors cartelize by dividing fields and avoiding competition".⁵⁶ The key factor from the legal point of view is whether or not there is intent to suppress competition. A patentee may grant an exclusive license for a given area and not compete there but competing patentees cannot agree not to compete in the same area. An example of an illegal arrangement is provided by the case of the National Lead Company which held one of only three independent and competing patented processes that could be used to produce a greatly improved paint (based on titanium pigments). Over a period of about fifteen years National Lead entered into agreements with the holders of the other two patented processes which specified sales quotas, patent exchanges, market allocations

⁵³ Note 34 *supra*, 559-560.

⁵⁴ Note 18 *supra*, 237.

⁵⁵ Note 26 *supra*.

⁵⁶ Note 34 *supra* 555.

and prices.⁵⁷ In a similar manner, Singer Manufacturing Company used patent acquisition and cross licensing as a means to exclude Japanese competition from the United States.⁵⁸

2. Price Qualification

Where one company licenses another to make and sell a product the former may legally specify the price at which it is to be sold. This is known as the "GE doctrine" after the ruling in the case of *United States v. General Electric Co.*⁵⁹ The GE Company held patents on key components of electric lights. A condition of the licensing of other companies in this regard was that the price at which the patented parts were to be sold was fixed. Since 1926 this aspect has been continually refined.⁶⁰ It is not legal to price fix with regard to the products of a patented machine.⁶¹ Nor is it legal where a manufacturer used more than one patented invention in making a product. Where patents held by more than one company are needed to make a product cross-licensing is common, however, this does not give one company the right to price fix.⁶² In the *Line Material* case, two companies both held a key patent. Forty percent of the market in electrical circuit cutouts required the use of the two patents. A royalty-free cross-licensing agreement was reached and the prices fixed at which the cutouts were to be sold. The fixed prices became part of the terms on which other manufacturers were licensed to make the product. Whilst such cross-licensing is antithetical to suppression, "[t]he temptation exists, however, for competitors to use such agreements as a shield for illicit conspiracies or attempts to monopolise".⁶³

Masonite, a manufacturer of hardboard and holder of many patents, entered into agreements with a number of competing firms whereby it would become the sole manufacturer. The others, who held competing patents, agreed to become distributors of Masonite's products which were to be sold at commonly fixed prices. The Supreme Court found that the passivity of Masonite's "competitors" with respect to protecting their patents was due to their preference for the price-fixing system, thus the firms were found guilty of conspiracy in restraint of trade.⁶⁴

VII. NON-PATENT BASED SUPPRESSION

Control of patents is not a necessary condition for the suppression of new technology. Some information exists as trade secrets and as such can be

⁵⁷ *National Lead* case, note 29 *supra* as noted in Neal & Goyder, note 2 *supra*, 336-339.

⁵⁸ *United States v. Singer Manufacturing Co.* 374 US 174 (1963).

⁵⁹ 272 US 476 (1926).

⁶⁰ Note 2 *supra*.

⁶¹ *United States v. General Electric Co.* 80 F Supp 989 (SDNY 1948).

⁶² *United States v. Line Material Co.* 333 US 287 (1948).

⁶³ Kintner, note 4 *supra*, 87.

⁶⁴ *United States v. Masonite Corp.* 316 US 265 (1942), noted in Neale & Goyder note 2 *supra*, 296-298.

legally protected if details are obtained by others through unfair means or a breach of confidence. As part of a counter-claim in an anti-trust case, IBM claimed that certain practices of Telex Corporation constituted illegitimate means of obtaining trade practices.⁶⁵ The Telex strategy involved hiring people who could provide information on IBM's detailed financial and marketing data and innovation plans. Also engineers from IBM were hired to provide technical details on proposed IBM products. The Court found that the Telex practices were designed to benefit from the acquisition of data that it knew to be trade secrets. IBM was awarded damages.⁶⁶ Another case arose as a result of four employees of Kewanee Oil leaving to form a competitor Bicron Corporation.⁶⁷ The employees took with them information that Kewanee claimed were trade secrets resulting from sixteen years work and which constituted the basis of their competitive position. A Supreme Court decision found in Kewanee's favour.⁶⁸

The ex-Kewanee employees had tried to argue that the knowledge was not based on trade secrets; that it was in fact industrial know-how, that is, practical knowledge as to how a technology is incorporated into an organisation. Know-how applies to those situations where factors such as engineering skills, production capability and ability to manage the innovation process constitute the central form of protection for the organisation concerned. A monopoly of specific know-how can be the basis of at least as effective a form of suppression of new technology as that which is provided by patents.

Indeed patents *per se*, may be rendered ineffective if the organisations or industries which constitute the sites at which the new technology would be produced or utilised show no interest. Vaughan has argued that:

The sound and reasonable test to determine whether or not real suppression is taking place is to discover if there is a willingness on the part of others to develop the unused inventions and thus advance the technical arts. If others are willing to use the inventions, then the failure to use them by the patent owners is suppression.⁶⁹

However, this does not acknowledge that it may be that the number of possible users of the new technology is extremely limited and that if they decide not to take up the technology "on offer" it is effectively suppressed. This was already being recognised as a problem in the early part of this century, for example in a testimony to the 1912 House Committee on Patents it was stated:

These great organisations are constitutionally unprogressive. They will not take on the big thing. Take the gas companies of this country; they would not touch the electric light. Take the telegraph company — the Western Union Telegraph Company, they would not touch the telephone. Neither the telephone company nor the telegraph company would touch wireless telegraphy.⁷⁰

65 *Telex Corp v. International Business Machines* F 2d 894 (10 Cir. 1975).

66 Note 4 *supra*, 39-42.

67 *Kewanee Oil v. Bicron Corp.* 416 US 470 (1974).

68 Note 4 *supra*, 42-44.

69 Note 18 *supra*, 232.

70 U.S. House Committee on Patents, Oldfield Revision and Codification of the Patent Statutes, Hearings 62nd Congress, 2nd Session No. 18 (1912) quoted in Stern, note 28 *supra*, 18.

Another major example was the disinclination of the steel industry in the United States to respond to available technological advances; to Gray's invention of a structural section that could be rolled together in one piece, Tytus' method of manufacturing steel sheets by a continuous process and Gayley's method of supplying a dry blast furnace, plus delaying the development of stainless steel and alloy steels.⁷¹ In the steel industry, American companies delayed use of new techniques for producing alloy steel which was lighter in weight than the ordinary product, because prices were calculated in tonnage. Even when the United States was at war the introduction of new technology was delayed in an effort to maintain prices and market control.⁷²

The inner tube was offered to all tyre companies in 1914, but not adopted until 1926; washing machines which also rinsed and dried clothes only became available when they did because the Bendix Co, with no established interest in the market, bought the patent after established manufacturers and marketers of washing machines refused the offer to buy the patent.⁷³ Similarly, telegraph companies showed no interest in making use of a superior form of telegraphy.

The Pollak-Viraq high-speed telegraph can transmit 100,000 words an hour in legible script. If it were introduced, telegrams would be but little more expensive than posted letters, but the telegraph companies of the world will have none of it.⁷⁴

As well as this, the existence of standardisation of a product or process can constrain the acceptance of a new technology because it may effectively create a monopoly by determining the parameters within which associated equipment may vary, without requiring a complete change of the whole system, a change which may simply be financially beyond the means of potential buyers of the new technology. The suppression that occurs because of standardisation, was recognised early this century with respect to a number of inventions. Kaempffert argued in the 1920s that the Schlick monorail using the principle of the gyroscope, would have been much faster, lighter and simpler than the established system, which had its existing form largely because it developed from steam engines mounted on wheels hauling stage coaches on rails. Once established however, standardised locomotives, tracks and methods of operation effectively constrained the opportunities for the application of an alternative railway technology. Also, because of the standardisation of records a supposedly superior recording system developed by Poulsen, "languished unused ... as welcome as a bombthrower in the court of the late Czar".⁷⁵

Indeed suppression of this sort may occur because to not do so may drastically affect future prospects for innovation. Where there are expectations of improvements in the incumbent technology, of

71 Note 28 *supra*.

72 Note 26 *supra*.

73 Note 18 *supra*, 229.

74 Note 15 *supra*, 2120.

75 *Ibid*.

improvements in the newly available technology or development of a superior technology, the rational response may be to do nothing for the moment.⁷⁶ A current example of precisely this sort of situation is provided by the airline industry and the development of the prop-fan engine, a new breed of jet engine that utilises external propellor-fan blades. Boeing claims that these new engines will be in use by 1992 and that airlines prepared to wait until 1992 to buy replacement aircraft will reap huge benefits.⁷⁷ Airbus however, sees this as a grossly optimistic expectation and one which is intended to deter airlines from buying the new Airbus A320 due in 1987. Boeing is relying on the tendency to resist innovation when further close-by improvements in technology are expected.

VIII. A RECENT DEBATE — THE DEVELOPMENT OF SOLAR ENERGY TECHNOLOGY

One of the components of the aftermath of the “energy crisis” of the early 1970s was the increased interest of many large corporations in the area of solar energy research. IBM, Bell Laboratories, Westinghouse, AT&T, GE, RCA, Texas Instruments, Union Carbide and Grumman Aerospace were amongst those that entered the area of research into the production of photovoltaic cells. Mobil acquired controlling shares in Tyco Laboratories (now Mobil Tyco). Shell established a subsidiary, Solar Energy Systems, and Atlantic Richfield bought Solar Technology International (now Arco Solar). Exxon and Motorola started their own solar energy research companies and Standard Oil of Indiana has an interest in Solarex, one of the largest research companies. General Motors, GE, Grumman Aerospace and Aluminium Company of America all have research interests that focus of solar technologies for heating and cooling.

As the number of such companies involved rose, so did a growing concern that this involvement may not be in the interests of the rapid development of solar energy technologies. As early as 1975, representatives of the small business segment of the solar energy research industry sought to prevent major energy concerns from investing in the industry, arguing that their pre-existing investment in existing technologies would pervert the course of development of solar based technologies.⁷⁸ Some of the more outspoken representatives of small business accused the government of a “sun coverup” due to its policy of directing an increasing proportion of funds to large corporations.

The major concern that underlies the reservations as to the desirability of the involvement of such companies is that a natural conservatism is likely to

⁷⁶ N. Rosenberg, *Inside the Black Box: Technology and Economics* (1982).

⁷⁷ J. Spiers, “The Return of the Propeller, or When the Jet Hits the Fan” *The Australian* 14 June 1985.

⁷⁸ United States Senate Select Committee on Small Business, 1975, *Energy Research and Development and Small Business*, Hearings 94th Congress, 1st Session, Washington at 2299-2310.

exist because they tend to also be companies heavily locked into the existing infrastructure of energy provision. As Fellmeth comments: “[o]il firms cannot quickly phase into solar power without giving up a useful physical plant that may have no other use than oil production”.⁷⁹ Because of this it would be in the interests of large energy companies to locate themselves such that they are able to control the rate of development of solar technologies so that it fits into an overall energy strategy pursued by the companies.

This discussion of the current solar practices is not meant to imply that the oil firms are locked in a cabal to destroy solar power. They do not have to act collectively. And it is possible that individual oil-firm executives would sincerely like to see solar energy developed by their firms. But the kind of massive commitment to product development and marketing needed to shift energy production from one mode of supply to another, is unlikely from an entity whose essential capital plant would suffer from the displacement. Oil firms even acting independently, can be expected to behave with economic rationality and do what is necessary to delay large scale energy-market shifts from existing physical-plant commitments until those physical plants require replacement or the stock of revenue producing fuel is gone. Furthermore, the large-scale entry of oil firms into gas, coal and uranium markets, all with the same high fixed-cost and scarcity features, means that the same incentive will be present to delay large scale solar marketing even further.⁸⁰

Just as the development of radio involved publicising of its limitations by its developer so some of these large energy companies have publicised the limitations of solar based technologies. Mobil,⁸¹ Shell and Exxon⁸² have taken out a series of advertisements in major newspapers to argue the limitations of solar energy technologies whilst at the same time actively increasing their involvement in such research. This has led to considerable suspicion of the motives underlying such activity.⁸³ The patent system has been seen as “implicated” by critics who have interpreted the activities of the companies as, “token commitment to solar development beyond patent acquisition.”⁸⁴

Between 1982 and 1984, Exxon’s subsidiary, Solar Power Corporation, and Martin Marietta Corporation were amongst the withdrawals from the area of photovoltaic research, whilst Atlantic Richfield cut back severely. Such withdrawals have been attributed to the cessation of increases in petroleum prices, improved methods of cheap cell production by the Japanese and a lack of increase in government subsidies.⁸⁵ This action seems to indicate that for some of the corporate solar energy researchers their involvement is not part of a long-term strategy to control the development of the new technology. However, from the point of view of the critics of these companies,

79 R. C. Fellmeth, “Suppression and Other Antitrust Concerns” in J.H. Lawrence & W.H. Lawrence (eds), *Legal Aspects of Solar Technology* (1981) 197.

80 *Id.*, 206-207.

81 H. Etzkowitz, “Solar Versus Nuclear Energy: Autonomous or Dependent Technology?” (1984) 31 *Social Problems* 417.

82 R. Reece, *The Sun Betrayed* (1979).

83 *Ibid.*

84 Note 79 *supra*, 206.

85 Seppa 1984:381

withdrawal from the market is also bad as it indicates the lack of a serious long term commitment to the new technology. In a sense it is rather difficult for the companies to be seen to do the right thing.

Whilst the effect on the timing of the development of technology is central to the criticisms, the form of technology is also important. A major focus in solar energy research has been the development of the "power tower" system which involves an array of computer controlled concentrating collectors which are used to focus the sun's rays on a container of fluid on top of a tower. Resultant steam is used to drive a generator to produce electricity. The United States government funded a \$123 million, ten megavolt project in California which used 2,000 concentrators and a tower twenty-five stories high. In this form it is a solar technology which is particularly suited to the maintenance of the baseload electricity system exemplified by the electricity utilities and the grid system, that is, it is both centralised and electricity producing. In both these respects, this version of solar energy technology has been criticised for "playing into the hands of the utilities".⁸⁶ Whilst many of the companies are already in the energy industry, a number of others, for example, Boeing, Grumman and Lockheed have emerged from the aerospace industry and therefore not surprisingly many of their ideas bear this imprint. One proposition put forward by such companies has been for the funding of "solar satellites". These would be huge arrays — several acres — of photovoltaic cells which would orbit the Earth; converting solar radiation to microwave energy which would be beamed back to receiving stations on Earth which in turn would rectify the waves into electricity. As yet funding for this proposal has not been forthcoming, but it does indicate how corporations can seek to mould the technology in terms appropriate to their own expertise.

What solar energy technology becomes is not determined *a priori*. The critics of "big solar energy" correctly point out that solar energy technology is being developed in particular directions that are not innate in the technology. At the same time, they tend to fall into a trap themselves with respect to the way they analyse the developments. Underlying most of the objections is a basic ontological assumption that solar energy technology is fundamentally decentralised and that centralisation is therefore a socially constructed misuse of its inherent nature. Hammond and Metz argue for example that: "[s]olar energy is democratic. It falls on everyone".⁸⁷ Similarly Commoner argues that: "An energy system based on solar energy would be highly decentralised".⁸⁸

This assumption is based on a myth. Certainly solar energy *qua* energy is a diffuse form of energy but to equate this with decentralised technology is a

86 A.L. Hammond & W.D. Metz, "Solar Energy Research: Making Solar Energy After the Nuclear Model" (1977) 197 *Science* 241-244; Reece, note 82 *supra*.

87 Note 86 *supra*, 241.

88 B. Commoner, "The Hidden Joker in Carter's Energy Plan", *The Washington Post* 29 May 1977.

mistake. Technology is a social product. It means little to say that solar energy technology should be decentralised if the emphasis in research is actually devoted largely to the development of centralised technologies. It means even less to say or imply that solar energy technologies are inherently decentralised. The solar energy debate enables us to focus on suppression as an issue that involves both time and form.

IX. CONCLUSION

Organisations use a range of legal and illegal strategies in an effort to control aspects of their technological environment. Cases in anti-trust law and patent law are particularly fruitful sources of insight into such practices. Organisations may seek to reduce competitors' options by denying them access to technological developments, control the release of new technology onto markets so that it fits with overall corporate strategy, and/or collude with others so as to control a market. In this paper a number of cases have been used to illustrate this and to identify the range of means whereby suppression in some form can occur. These means include patent consolidation, the patent blitzkrieg, the patent pool, licensing by field, price qualification, trade secrets and suppression through non-innovation. Through such practices organisations are actively involved in the constitution of their environment.

Although not directly pursued in this paper, the phenomenon of suppression reactivates argument that what might be logical at the level of an organisation constitutes irrationality at the societal level:

It seems evident that the opposition of entrenched interests may retard technological advance ... The interests and profits of a given group of industrial leaders do not always coincide with those of the larger society and in such instances, considerations of the 'utility' of the controlling agents dominate over thoughts of social utility.⁸⁹

Associated with this is the view that company researchers spend a lot of their efforts in activities aimed at suppression of competition rather than contributing to technological advances. This may mean that

... science has been compromised to the extent that research funds and researchers have been sacrificed to the essentially unproductive work needed to gain or maintain monopoly position.⁹⁰

A central question would seem to be whether the economic system involves greater incentive to suppress than to develop and apply new technology. Indeed the relationship between development and suppression may be endemic as Elster suggests when he notes that:

... economists from Schumpeter to Arrow have argued that the dynamic optimality of capitalism in developing the productive forces depends in part on its static suboptimality in using them efficiently.⁹¹

⁸⁹ Note 39 *supra*, 466.

⁹⁰ Reich, 1977: 235.

⁹¹ Elster, 1983: 215.

Whether or not the patent system is on balance beneficial is a moot point. The traditional justification for patents is that they provide an incentive to develop new ideas by providing the holder with a legal monopoly. Any suppression that occurs is deemed to be less significant than the positive effect of the existence of the patent system. However the assumption that the removal of patent protection would drastically reduce inventive activity is itself open to question. In a major study commissioned by the National Science Foundation it was found that procurement of such rights was often not of central concern. Respondents from 85% of the companies surveyed could not recall a situation where their development of a product or process had been stopped because of lack of legal protection.⁹² The patent system may be significantly less important than traditionally presumed with regard to its role as a pre-condition for preparedness to undertake inventive activity. At the same time it is implicated in legal and illegal suppression of the results of such activity.

92 Miller note 4 *supra*.