tell. In his business arrangements, he often took a more distant role, keeping his place in the laboratory. When he was pushed out of General Electric, in fact, the laboratories he created vanished with him until General Electric reinstituted them ten years later. His laboratory in West Orange remained his, organized around the multiplicity of his interests.

Numerous commentators have noticed how Edison seemed to love not only inventing but also the social atmosphere of the laboratory. He slept there, took his meals there, and stayed all night, hanging out with his boys. The lab was his home, and everywhere he moved he established a lab. His most trusted business colleagues later on were those he first got to know in the laboratory. The communication system developed in the laboratory seemed to be the most interactive, most intimate, most humanly satisfying and bond-building locale in his life.

In the interactivity of the lab we see the most intimate of the languages of light, the language of its birth. This was surrounded by the other more public languages that supported, protected, promoted, and maintained it. These other languages were thoroughly embedded in public communication systems with evolving histories, which the light and Edison had to take place in, fit into, translate themselves into. But here in the laboratory is an improvisational language, spare, creative, and spontaneous, brought into being moment by moment by people trying to work out the thing itself, using the communicative resources at hand but representing only what they needed to make the light work—then make it work better. When the light got beyond the laboratory, it became other things, to be talked about in other ways. It no longer needed people hovering over its flickering beginnings figuring out how to make it robust and steady.

Patents as Speech Acts and Legal Objects

In the modern capitalist world, an emergent technology is a potentially valuable property. Indeed, part of the theory of capitalism is that the desire for economic reward will foster the invention of products and production methods. As modern capitalism developed in Britain and America, special economic incentives were put into law to encourage invention and the public dissemination of inventions.[1] These incentives were in the form of "letters patent," which granted monopoly control of and advantage from the invention for a limited period. Thus a legal mechanism was created to turn ideas into property. During the period of patent protection, one could profit from the exclusive sale of a product, prohibit others from using ideas for their own profit, and sell or rent ideas to others. This new class of property, known as "intellectual property," inevitably required governmental mechanisms for certifying particular ideas as property and for protecting that property from theft.

To take advantage of monopoly in the form in which it existed in the late-nineteenth-century United States, Edison had to protect his ideas even as they were being born. The United States had developed a system of patent examination based on the novelty of a conception rather than on its proven viability, usefulness, or market value. The examination process, carried out in government offices in Washington, was based largely on submitted paper representations of an idea (picture and text), abstracted out of the particular object or product that was the realization of the idea. Neither a working prototype nor a completed product nor evidence of economic value was a part of the process of establishing that an idea was ownable and was owned by a particular person. Viability and economic value were only projected consequences—hopes that drove invention and the desire for ownership. Ownership had to come first, and the earlier the better, so that one could solicit capital and so that one could market products incorporating the invention without fear of information's getting into

hands of competitors. This system of early, prospective patenting presented puzzles for inventors and their partners as to exactly what they wanted to protect and in what form, for they did not know how the product and the market would shape up by the time a saleable product had been developed.

Edison's Patents

Thus, even as ideas for incandescent lighting were being developed on paper and in prototype in Edison's laboratory, the incandescent lamp and the system of electricity had to gain presence in another symbolic system that circulated in hallways distant from Menlo Park. The entire research and development enterprise needed legal protection so that Edison and his sponsors would gain the maximum benefit from any industrial results.

On September 13, 1878, five days after visiting William Wallace, Edison drafted his first patent caveat. In the patent system of the time, a caveat was a first notice of intent to claim an invention. Edison's caveat was in the form of a series of drawings illustrating regulating devices aimed at diverting current from an incandescent filament before it burned out. This idea, as we have seen, initiated Edison's first serious line of investigation and his public claims of having conquered the problem of incandescent lighting. By October 14, with the help of lawyers, agents, and illustrators, he had worked this idea into a formal patent application. This application was approved on April 22, 1879, and patent 214,636 was granted. The same day, a follow-up application filed on November 18, 1878, was also approved, and patent 214,637 was granted. Two other applications concerning temperature regulation of the filament, filed on December 9, 1878, resulted in the granting of patent 218,866 (on August 26, 1879) and patent 219,628 (on September 16, 1879). Three additional patents for regulating features were applied for on February 1, February 10, and April 21, 1879, and on May 4, 1880, patents 227,227, 227,228, and 227,229 were granted. During this period Edison also started work on other aspects of the system of lighting, including filaments, generators, and "subdivision of current."[2] In ten years Edison was granted at least 245 patents concerning electric light and power—109 for lights, filaments, and their manufacture, 39 for generators, 60 for regulators and meters, and 37 for the system and conductors.[3] Indeed, the whole technology was surrounded by a hodge-podge of protections that made it difficult for any competitors to enter into the terrain, even though it may never have been precisely clear what was covered and what was not.

To see how this thicket of patents was built out of nascent ideas, let us examine the relationship of the four early patents for thermal regulation of the filament through current regulation.

The earliest patent (214,636) is for the general principle of thermal regulation. It is not tied to any particular method, although the application illustrates an example. "Various devices for carrying my improvements into practice may be employed," Edison explained, "and I have tested a large number. I however have shown in the drawings my improvement in a convenient form, and contemplate obtaining separate patents hereafter for other and various details of construction, and I state my present invention to relate, broadly, to the combination, with an electric light produced by incandescence, of an automatic thermal regulator for the electric current."[4] The claim at the end of the patent is limited to the general idea of a regulator and a thermostatically operated shunt.

The ensuing applications identify particular mechanisms of regulation. That for patent 214,637 specifies an air or fluid expansion chamber to break the circuit, that for patent 218,866 uses a series of expansive conductive levers and springs to break the circuit as temperatures rise, and that for patent 219,628 claims the specific mechanism illustrated in the original general patent (a form of shunt that is mechanically closed when the temperature of the incandescent lamp rises). The patents of the following year also protect regulation by an improved conducting lever and spring mechanism (227,227), by combination with a generator regulator to control incoming current (227,228), and by another air expansion device obtained by surrounding a vacuum bulb with another sealed air-filled bulb (227,229). That is, Edison first patented a general approach and all the promising lines of specific development, then proceeded to investigate each of the latter. None of these mechanisms worked and none were used in the eventually marketed technology; none were even in use by the time any of the patents were granted. They were all abandoned in the time it took to process the applications, and thus all the approvals were in a sense moot. However, other features of light were being developed by the Edison team at the same time, and many of these were incorporated in various designs (some of which were patented separately—such as safety conductors,[5] which we would now see as forerunners of wire safety fuses). Other usable features appeared as parts of multiple claims in conjunction with regulating devices—for example, the use of a sealed glass vacuum

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY.

IMPROVEMENT IN ELECTRIC LIGHTS.

Specification forming part of Letters Patent No. **214,636**, dated April 22, 1879; application filed October 14, 1878.

CASE 156.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the State of New Jersey, have invented an Improvement in Electric Lights, of which the following is a specification.

Electric lights have been produced by a coil or strip of platina or other metal that requires a high temperature to melt, the electric current rendering the same incandescent. In all such lights there is danger of the metal melting and destroying the apparatus, and breaking the continuity of the circuit.

My improvement is made for regulating the electric current passing through such incandescent conductor automatically, and preventing its temperature rising to the melting-point, thus producing a reliable electric light by rendering conducting substances incandescent by passing an electric current through them.

In my apparatus the heat evolved or developed is made to regulate the electric current, so that the heat cannot become too intense, because the current is lessened by the effect of the heat when certain temperatures are reached, thereby preventing injury to the incandescent substance, by keeping the heat at all times below the melting-point of the incandescent substance.

Various devices for carrying my improvement into practice may be employed, and I have tested a large number. I however have shown in the drawings my improvement in a convenient form, and contemplate obtaining separate patents hereafter for other and various details of construction, and I state my present invention to relate, broadly, to the combination, with an electric light produced by incandescence, of an automatic thermal regulator for the electric current.

Figure 1 represents the electric-light apparatus in the form in which the thermal regulator acts by the heating effect of the current itself, and Fig. 2 illustrates the same invention when the radiated heat from the incandescent conductor operates the thermal regu-
r.

e incandescent metal is to be platinum, ium, iridium, titanium, or any other suitable conductor having a high fusing-poin and the same is used in the form of a wire thin plate or leaf.

I have shown the platinum wire *a* as a doubl spiral, the two ends terminating upon th posts *b c*, to which the conductors *d e* are co nected. The double spiral *a* is free to expan or contract by the heat, as both ends are b low the spiral.

A circuit-closing lever, *f*, is introduced i the electric circuit, the points of contact bein at *i*, and there is a platinum or similar wire, *k* connected from the lever *f* to the head-piec or other support *l*.

The current from a magneto-electric ma chine, a battery, or any other source of elec tric energy, is connected to the binding-post *n o*, and when contact at *i* is broken the cur rent passes from *o* through lever *f*, wire *k*, sup port *l*, wire *e*, post *c*, platina coil *a*, post *b*, an wire *d*, or metallic connection, to binding screw *n*. In this instance the wire *k*, bein small, is acted upon by the electric current an heated, and by its expansion the lever *f* is a lowed to close upon *i* and short-circuit th current.

The contact-point *i* is movable, and it is ad justed so that the shunt will not be closed un til the temperature of the apparatus arrives a the desired height, and, by diverting a portion or the whole of the current, the temperature o the incandescent conductor is maintained in such a manner that there will be no risk of the apparatus being injured by excessive heat o the conductor fused.

If the wire *k* is small, so as to be heated by the electricity itself, it may be placed in any convenient position relatively to the light; but if such wire is heated by radiation from the electric light, then it should be adjacent to the incandescent material.

In all instances, the expansion or contraction of a suitable material under changes o temperature forms a thermostatic current regulator that operates automatically, to prevent injury to the apparatus and to the body heated by the current.

In Fig. 2 the current does not pass through the wire *k*, and the short-circuiting lever i

operated by the radiated heat expanding the wire *k*. This in practice does not operate as rapidly as the device shown in Fig. 1.

The electric light may be surrounded by a glass tube or any other suitable device, such as two concentric glass tubes with the intervening space filled with alum-water or other bad conductor of heat, the object being to retain the heat of the incandescent metal and prevent loss by radiation, thus requiring less current to supply the loss by radiation.

I am aware that the electric current has been used to produce heat, and that such heat has been employed to vary the relative position of the light-giving electrodes and the length of the intervening arc. In my light there is no electric arc.

I claim as my invention—

1. In combination with an electric light having a continuous incandescent conductor, a thermostatic circuit-regulator, substantially as set forth.

2. In combination with an electric light, a thermostatically-operated shunt, substantially as set forth.

Signed by me this 5th day of October, A. D. 1878.

THOMAS A. EDISON.

Witnesses:
ALFRID SWANSON,
STOCKTON L. GRIFFIN.

Text of Edison's first incandescent light patent (214,636). See page 81 for figures.

container in conjunction with patent 227,229 (a patent that includes five different claims relating to improvements in bulb design).

Edison's patent applications sought an ever-expanding set of protections around any line of development he considered promising, until the technology stabilized around an adequately protected, technologically efficient product on the market. After 1882, once a successful product reached the market the rate of patents directly connected to lamp design diminished to only a few per year until Edison Electric Light was absorbed by General Edison at the end of the decade. In the mid 1880s, the greatest emphasis was on generators and electrical distribution systems.

During the period of development of the technology, it was not clear what improvements would turn out to be truly useful. What would be considered the crucial breakthrough in retrospect was even less clear. Indeed, when everything was settled in court, in 1888, after the technology had been marketed for a number of years, only a later patent (223,898, filed November 4, 1879, and granted January 27, 1880) was considered crucial, and only one claim out of the four granted in that patent was deemed consequential (use of a high-resistance filament). The high-resistance filament did not represent Edison's main line of work, and it remained only a minor research strategy for some time; nonetheless, it turned out to be the peg on which the courts secured Edison's ownership of the incandescent light in the form that it turned out to take.

Given the peculiar nature of the patent system (which offered the lure of ownership, but which could not determine what was worth owning or what would be the crucial conceptual element of the marketed technology),

Edison and his colleagues had to represent the light in a bramble of overlapping claims, some irrelevant, some never realized, and some not even realizable. All these claims were necessarily premature, so as to create a thicket of representations that would be sure to surround the valuable product that might emerge.

To understand why Edison chose this strategy of representation within the legal system, what he had to do to create these representations, what these representations looked like, and how they functioned, we have to look in greater detail at the nature, history, and development of the patent system and at the organizational and textual forms that became incorporated in the patenting process.

Transforming Ideas into Intellectual Property

To create profit from an idea, the idea has to be transformed into an ownable piece of property assigned to an individual. The procedure for this transformation must identify an idea as an invention, establish the limits of the idea (that is, identify the size of the property), establish the period of ownership, and designate an owner (perhaps the inventor or an assignee).

This transformation process consists entirely of words and symbols. It is carried out in the legal sphere of papers circulated among officials, primarily located in the national capital, where an official record of these ideas is created, maintained, and evaluated in relation to specific criteria and instances of disagreement or contention. Secondary agents of this process are courts located in the various judicial districts of the country. Applicants or appellants to the procedure, also distributed throughout the land, are aided by their various agents and lawyers. But all must pass through what Latour (1987, chapter 6) calls "the center of calculation," which keeps the record of owned ideas.

The individual seeking ownership of an idea must define the idea in specific symbolic form, through words and pictures, and then apply for this representation to be granted status as an invention according to the criteria of the granting body. If the application is granted, the text within which the idea is represented becomes the official form of the idea, and all issues concerning the use of the idea must be referred back to that text for as long as the idea remains private property (that is, for the duration of the patent). Moreover, all questions concerning the meaning of the text must be referred through designated interpreters of that text in the patent office and in the courts.

The patented invention is itself not a specific produced object (although at times models were required to accompany an application—but these did not need to be working models, nor did they enter into the actual adjudication; they were used only for display (Dood 1983)). Thus, the granting of a patent does not require a produceable, workable material object, let alone a currently marketed, currently produced object or technology. The invention is legally not a physical entity. It is a symbolic representation—a text representing an idea. There is only a tenuous relationship between any object someone may ultimately produce and the ideas represented in a patent application; similarly, there is only a potential relationship between any product produced by a competitor and the same patent. In both cases, disputes are referred to the usual site for relating legal documents to specific concrete instances: the courts.

Because a patented idea is not the same as a produced technology and the very act of trying to produce a product risks dissemination of the idea, one may wish to seek patent protection before trying to make a workable prototype. Moreover, since the process of realizing ideas as marketable working products is likely to create substantial differences between original conceptions and final material results, one would want to obtain the widest possible patent protection for the broadest array of ideas, in order to make sure that whatever is produced is protected and that whatever competitors might wish to produce is proscribed.

The intention to get a patent is a creation of the historical development of a system. One cannot desire monetary wealth before the institution of money, because the desire is unimaginable, and one cannot desire a patent before patents have ever been granted. Moreover, once the patent system has developed, it can become the channel for the realization of other desires, such as the desire to create a large corporation or the desire to create a successful telephone system.

The History of Anglo-American Patent Laws

The patent genre, patent intentions, and the social system of patent grant developed together.[6] In Renaissance England, the letter patent was simply a designation of monopoly privilege granted by the crown for any benefit or favor to the state embodied in the monarch. For example, a king might grant a patent for the importation of salt, or the colonization and exploitation of a newly discovered or conquered piece of the Americas. Thus, the earliest patents were realized textually through the traditional forms of petition to the crown and royal grant.

Such crown privileges were, of course, open to abuse arising from the conflation of the royal pleasure and the good of the citizens. In England in 1624, out of repugnance against widespread royal abuses, all forms of state-granted monopoly were outlawed except for the single temporary monopoly granted to the inventor of a new good, under the belief that invention would advance the economic well-being of the country (Federico 1929a). A temporary monopoly was thought to encourage both invention and the sharing of knowledge to be exploited by all after the short monopoly period expired. Moreover, since invention created new value, a monopoly was not sequestering a previously open part of the economy; it was only granting temporary privilege for a value that would not have existed without the invention.[7]

Once the idea of privilege dependent on specific value to the state emerged, it became necessary to create a mechanism whereby individuals might request this privilege and present their claim to it for evaluation. In England this led to a registration procedure followed by litigation in the courts when the patent was contested. This system remained in effect until 1852, when England's first comprehensive patent law was passed. In the Anglo-American colonies, patents and other monopolies were granted on an individual basis by courts and local legislatures (Federico 1929b; Bugbee 1967). The framers of the U.S. constitution were concerned to regularize and limit this practice, so they made patents and copyrights a federal responsibility under article 1, section 8, granting Congress the power "to promote the progress of useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."

The first patent bill was signed by President Washington in April 1790, placing responsibility for approving patents on three cabinet members: the Secretary of State, the Secretary of War, and the Attorney General. They were charged with determining whether the "invention or discovery" was "sufficiently useful and important." The application was to include a specification, a drawing, and (if possible) a model. (See Dood 1983.) However, the form of the application was not further determined by the law (Federico 1936).

Because of an 1836 fire in the patent office, we only have a limited number of reconstructed files of the earliest patents. The earliest application that is currently in the patent records dates from 1790 and consists of a petitionary letter from William Pollard to Secretaries Jefferson and Howe and Attorney General Randolph requesting a patent for a spinning machine (Pollard 1790). The letter details Pollard's difficulties in obtaining a model of Arkwright's spinning machines and his failure to create a working model of it until he developed certain improvements, for which he now seeks patent monopoly. Pollard provides many financial details of the spinning industry in Britain to establish the value of the machine. The details of the machine and its operation appear to be present only in a drawing that is no longer in the patent record. Thus, in this earliest extant application the rhetorical emphasis was on the deserving character of the petitioner and the great economic value to befall the United States; the specific technical improvement was purely secondary and unargued. That is, the presentation followed the legally designated criteria of usefulness and importance rather than novelty.

The certificate for a patent granted to Francis Bailey on January 29, 1791 (*Restored U.S. Patents,* volume 1, reel 1, frame 18) bears the seal of the United States and is signed by the president and the attorney general. It looks much like a traditional diploma. The specifics of the invention are mentioned only in a single sentence, which also identifies Bailey as the inventor and attests that "the said Invention appears to be useful and important." The rest of the document includes a reference to the law, the date of issuance, testimony of the act of approval and signing, and certification. The meeting of criteria and the granting of the privilege are foremost.

During the three years this law was in operation, about 60 patents were approved,[8] but the burden of evaluating the applications was too much a drain on the time of the cabinet officers. In 1793 the law was revised to become simply a registration system with no evaluative procedures. A typical application consisted of a description of the invented object, cross-referenced to a drawing. Models (not necessarily working) were also to be provided to the patent office. The grant consisted only of official testimony that the papers were filed and the fees paid. The laxness of this law made the obtaining of patents easier, but only 9890 were issued up to 1836 under this law (Vaughan 1956). Since no check was made of prior art and since the putative inventor was not required to make a case for novelty, there were many lawsuits. Two crucial issues appear to have emerged in the litigation: the identity of the actual inventor and what exactly was being claimed as novel in the patent.

By 1830, patent applications typically included a formulaic opening statement identifying the putative inventor and a closing statement summarizing the claim.[9] These features became institutionalized in the laws that followed. At first the claim consisted only of "a listing of the important component parts of the invention" (Hantmann 1991, p. 123), but by

the law of 1870 the claims marked out the boundary of the territory protected by the patent.

A new patent law passed in 1836 established a patent office with examiners.[10] The system established by this law is still in effect in the United States, with some modifications (the most important dating from 1870 and 1952). The form of the patent that was in effect in Edison's time was specified in the 1836 legislation and elaborated in practice. The procedures and criteria for examination (aimed at preventing excessive litigation) were established by both the law and the practices of the newly formed Patent Office in the Department of Commerce: novelty, invention, and utility (Bugbee 1967). These examination procedures and criteria provided a rhetorical target for applications aimed at gaining approval.

The patent reforms of 1836 initiated a period of exponential growth in patents and invention. This growth went hand in hand with the development of large industries dependent on technology and market capitalization. Throughout the remainder of the nineteenth century, the number of patents grew dramatically. In 1837, 426 patents were issued; in 1847, 495; in 1857, 2674; in 1867, 12,277; in 1877, 12,920; in 1887 20,403; and in 1897, 22,067.[11] Edison's first patent (1869) was number 90,646; his last (a posthumous one, granted in 1933) was number 1,908,830.[12]

The Typification of Patent Form

After the Civil War, the journal *Scientific American*, owned and produced by the New York patent agents Munn & Company, fostered the culture of invention by distributing promotional pamphlets that included extensive descriptions of the patent process. The *Scientific American Reference Book* of 1881, published by Munn & Company at the height of the excitement over the Edison light, gives a glimpse of the mood and the procedures surrounding patents at that time.

The 90-page section on patents opens with an upbeat assessment of invention's role in the U.S. economy (attributing to it more than $6 billion in capital investment—more than three-fourths of all capital investment in the U.S.) and of the value of individual patents. "A very large proportion of all patents prove remunerative," and useful inventions "can easily be sold for from ten to fifty thousand dollars" (p. 15). Munn & Company offer services ranging from a simple inquiry (free) through patent searches (for five dollars) and prosecution of rejections or postponements (for "very moderate" fees). The pamphlet recommends subscribing to *Scientific American* and publicizing inventions in it. It contains engravings depicting the patent office and the publisher's offices, apparently to indicate that Munn and Company equaled the mighty and intimidating splendor of the government. It warns the neophyte against cheap sale of patent rights and underhanded brokers. The pamphlet ends, as inspiration for the would-be inventor, with portraits and biographies of famous American inventors.

The main text of the pamphlet consists of advice and information on the patent process. The fees and processes for various government actions and international copyrights are presented, along with an abstract of the current laws and the full text of the latest revision. Also included are standardized forms for submission of various petitions, including the basic patent petition with cover letter and affidavit. Procedures for ensuing actions, such as rejections, appeals, interferences, and infringements, are also offered.

In the sample patent application, the opening announces the invention. The second section establishes the intention or aim of the invention. A technical description of the accompanying diagram and operations of the invention follow. The petition closes with a specification of the exact claims being made, followed by the signatures of the applicant and the witnesses. This highly regularized form is closely consistent with the format used in Edison's patents and in almost all other patents of the period. It is a form largely dictated by the 1874 law, which states in Section 4888 that the application in writing should include "a written description" of the invention and

> the manner and process of making, constructing, compounding, and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the same; and, in case of a machine, he shall explain the principle thereof, and the best mode in which he has contemplated applying that principle, so as to distinguish from other inventions; and he shall distinctly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery. The specification shall be signed by the inventor and attested by two witnesses. (*Scientific American Reference Book*, 1881, p. 75)

A drawing might be attached. Until 1881 a model was required, but afterward was to be supplied only on request.

Consistent with these regulations, the sample patent describes an invention, identifies its inventor, and declares particular aspects of the invention as original (the claim); it further carries an official designation of the

patent-granting body, a patent number, and a date from which the patent right begins.

In the late-nineteenth-century United States, a patent typically opened with one or more technical drawings signed by the inventor and two witnesses. The first page of text was headed "United States Patent Office," with subheadings identifying the inventor and the name of invention, followed by "Specification of Letters Patent xxxxx, dated xxxxx." The text, addressed "to all whom it may concern,"[13] began with a formulaic opening paragraph: "Be it known that I, xxxxxxxx, of xxxxxxxx, have invented a new and improved xxxxxxxxxxxxx; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon." A general elaboration of the invention and its improvements over prior art is followed by a detailed description of the invention and its operation, typically introduced as follows: "To enable those skilled in the art to fully understand and construct my invention, I will proceed to describe it."[14] The description is usually cross-indexed to the illustration by means of reference letters. The patent then concludes with precise claims of novelty, prefaced by some such language as "I claim as new, and desire to secure by Letters Patent. . . ." The signatures of the inventor and two witnesses again appears at the end.

One obvious but unusual feature of this form as it was used in the nineteenth century is that the body of the text is in the first person in the form of a legal petitionary letter, although the patent, as indicated by the heading and opening formula, is presented as already granted. Indeed, the patent adopts the specification directly from the application, and amends it only by adding the designations of official approval by the Patent Office. Today the specification is written in the third person, without the markers of individual petition, but it is still generally the case that the language of the application is used wholesale in the grant.

Edison's first patent for lighting (patent 214,636, for the principle of thermal regulation of the incandescent conductor) follows the pattern dictated by law and custom. It begins with a drawing signed by the inventor, the patent attorney, and two witnesses. After the headings, the application is addressed "To all it may concern." The opening paragraph, consisting of one sentence, identifies the inventor and announces that he has "invented an Improvement in Electric Lights." The second paragraph specifies the problem of the metal filament's melting. The third and fourth paragraphs describe in general terms the inventor's solution to the problem (and thus his invention). The fifth paragraph generalizes the method to a variety of other devices that can accomplish the same improvement for which Edison states he is filing separate applications. The next ten paragraphs describe the specific device illustrated in the drawing, so the generalizing fifth paragraph is needed to open the door to other devices to be encompassed by the patented idea. The description concludes with a paragraph specifying that the light does not employ an arc (to distinguish it from the other existing electric light technology). The text ends with a brief summary of the claims, identifying the goal of the application to establish ownership of these specific improvements:

> I claim as my invention—
>
> 1. In combination with an electric light having a continuous incandescent conductor, a thermostatic circuit regulator, substantially as set forth,
>
> 2. In combination with an electric light, a thermostatically-operated shunt, substantially as set forth.

The document is then signed by Edison and his witnesses.

Much of the non-technical text consists of "boilerplate," as is common in such legal documents, the only novelty being in the specifics of the case. In general, the aim is to gain the standard privilege and thus attempt to fulfill all the standard procedures in the safest, most traditional way.

Double Reference

Within this kind of document, as it is defined by law, practice, and Edison's example, there emerged a curious kind of double reference, the first aspect being reference to the specifics of a particular design and the second being reference to the general claims arising from the design. The design is represented by an illustration, and explication of the specifics is the centerpiece of the exposition. The specifics are surrounded by abstractions from the specific forms presented in the diagram to more general events, procedures, or objects that define the property to be owned.

Although the patent diagram and its description are continuous with the kinds of sketches that appeared in the laboratory and were conveyed to the machine shop, the claims that define the domain of ownership are more part of the discursive world of the patent system and the courts. Thus, the patent specification ties a specific configuration into a general idea, which can encompass a variety of instances and can provide a protected arena of ownership.

Edison, in his initial lighting patent, heightens this distinction by stating that he is seeking a patent for a general approach that may be realized in

several different ways. The approach is to be elaborated in future patents, the details of this particular patent being only one convenient form for exposition. Claims in some other patents are more closely tied to specific configurations and designs and therefore become redundant with the accompanying illustration and description, as in claim 2 of patent 218,866 for a particular arrangement of conducting levers to act as a thermal-regulating circuit breaker:

> The circuit-connection t, in combination with the levers or springs n, yoke l, light giving body i, and circuit-connections, substantially as set forth.

The cross-reference letters tie the claim to the specifics of the diagram and their elaboration in the middle paragraphs of the text.

The distinction between the specific description and the abstracted claim developed historically, as we have seen, in the processes of early litigation and later examination. However, to understand in greater depth the relationship between the concrete description and the abstract claim, we need to consider what kind of actions the text itself engages in. That is, we will consider the patent as a kind of *speech act*.[15] This analysis will also indicate the kind of transformation the light must go through as it is transformed from an idea born, represented, and explored in the laboratory into a legal entity of property.

Some Issues in Speech-Act Theory

Before proceeding with an analysis of the conditions a patent application must meet in order to be successful, we must first deal with several related difficulties concerning speech-act theory and its application to long, complex written documents.

The first difficulty is the importance of local circumstances in the identification, interpretation and realization of speech acts. For example, what I take the force of the statement "We have coffee, milk, and juice" to be depends very much on who I am, who I am speaking to, what my relationship is with them, whether I am about to go shopping, whether I have expressed thirst, and whether I am sitting at a dinner table. Simply putting such equivocal cases in the category of indirect speech acts is inadequate for several reasons: first, unless we are total strangers to a situation, we always use our knowledge of local circumstances to confirm or extend or modify our view of the explicit statement; second, most statements are not fully explicit or universally univocal in their illocutionary intent; third, there are many subtle distinctions among acts and the way acts are taken that only emerge out of the interpretation of situation; fourth, there are many kinds of acts that are conceivable only within highly defined circumstances, such as undermining the credibility of a scientific argument by mentioning a piece of apparatus used in producing the result, thereby invoking a disciplinary understanding of the inappropriateness of that apparatus to the experimental problem. Although speech acts may potentially be reduced to a few abstract categories with certain abstract guidelines, they are thereby stripped of the locally significant aspects of their meanings—the aspects that go into constructing the local event as distinctive from others and provide individuals with the subtle tools necessary to successfully respond to and negotiate events as they unfold in local circumstances.

Austin's awareness of the importance of local circumstances in the interpretation and enactment of speech acts, both locutionary and illocutionary, led him to withdraw from absolute formalizations in the closing two lectures of *How to Do Things with Words* (1962), where he qualifies his conclusions as only abstractions and cautions us to examine local circumstances. In lecture 11, in particular, Austin examines a number of examples where local factors are essential for interpretation and winds up making such statements as "Reference depends on knowledge at the time of utterance (p. 144)" and "The truth or falsity of a statement depends not merely on the meanings of words but on what act you were performing in what circumstances " (p. 145).

Searle, in *Speech Acts* (1969) and subsequent works, took on the project of pursuing the formalizations to obtain an abstract calculus of meaning that incorporated reference and illocution in a logically contained interpretive scheme. Local circumstances are included only as conditions that must be met if the completion of a speech act is to be successful. For example, a person conducting a marriage ceremony must be legally qualified to do so, and the event must be carried out in a legally appropriate place and at a legally appropriate time, between individuals legally qualified to marry, if the events are to count as a legal marriage. Here Searle helped identify some features of speech acts as they often emerge in institutionally structured settings. However, this analysis of general rules and conditions for speech acts is accomplished at the expense of suppressing analysis of the particularity of the institutional settings within which individual acts arise and at the expense of obscuring the interpretation of acts in less well defined settings.

The second difficulty is the polysemiousness of speech acts. Any speech act may be uttered and interpreted with a variety or a multiplicity

of intentions and frameworks for attributing meaning. Any utterance may serve different functions for different utterers and different auditors, and these multiplicities of functions and meanings may be operating simultaneously. Moreover, the conditions of success for the utterance may become multiple, depending on the functions and meanings attributed to the utterance. In stating at a dinner party that I like vanilla ice cream, I may be placing an order, expressing delight in anticipation, revealing personal character, defending my food against the predatory habits of a dessert-loving child, making small talk, or all of the above simultaneously. The host, my child, my neighbors who served me chocolate last week, and other guests I have just met that evening may interpret the remark in a variety of ways, evaluating its effect and its effectiveness variously according to how they understand the situation and the act. A subtler example: When an intimate friend tells me of a dream, is it a personal revelation, a request for an interpretation, an invitation for commiseration, a step in the co-construction of a communal imagination, a reproach, or an invitation for me to tell my own dreams? The person telling me of the dream may have no single or clear intent and may not inform me as to what kind of response is being invited. Perhaps no particular force is attributable to the telling until the conversation has unfolded, and even then the two parties to the conversation are likely to walk away with rather different perceptions of what has happened.

The nature of a speech act or a series of speech acts is manifold and indeterminate. This indeterminacy, multiplicity, and interpretive complexity may present substantial difficulties in our closest and most spontaneous relations—difficulties we sometimes resolve only by providing some simple, determinate, and benign after-the-fact explanation that excludes some of the more troublesome interpretations triggered by the situational indeterminacy and multiplicity. Although such reductions to primary interpretations of actions and intentions may be fostered in highly institutionalized settings with highly typified actions, that still does not fully exclude multiple secondary intentions and uses packed into or pulled out of the utterances. Thus, formalizations of speech acts can at best characterize a dominant appearance in a multiple act, and can do so only in circumstances where that dominant appearance is well marked and supported in institutionalized circumstances.

The Living Complexity of Located Speech Acts

These two difficulties, which point to the power of the concept of a speech act even as they point to limitations in trying to specify the exact meaning of any particular speech act by means of a generalized understanding of speech acts, illuminate the richness of an activity embodied by utterances within circumstances. Events are alive with new forms of life that grow in the unfolding of both typified and novel utterances. Every utterance exists at the intersection of the typified and the novel as the utterance is perceived by participants coming to terms with each new moment. In Saussurean terms, speech acts exist precisely where *langue* and *parole* meet: at the alive utterance. Any attempt to reduce speech acts to a speech system removes the activity from the act and reduces complex, interpretive, intelligent, motivated human behavior to a static set of signs no longer responsive to human needs and creativity. When speech acts are reduced to a system of *langue*, the typifications—employed as resources by individuals attempting to relate through signs—are taken as the definition and the rules of the utterance. The typified speech acts then become superordinate to the activity, rather than the speech acts' being embedded parts of the overall activity. A less distorting understanding of speech acts requires constant attention to events unfolding in particular circumstances with local definition and interpretation of successful activity. Perceivable regularities in speech acts, whether perceived and acted upon by the participants or by the latecomer analyst, should be seen as historically evolved resources of typified interpretation, in relation to other social regularities and institutions that help identify the nature of each social moment as enacted by the participants.

The task of the analyst of speech activity is simplified and stabilized when the analyst looks to behaviors in highly regularized or institutional settings that help enforce recognizable and socially agreed upon characters to particular moments. Since the institutions and social understandings set the stage and define the game, it is much easier to see what is going on, and we can make plausible connections among various moments or acts if participants see and treat those moments or acts as similar. But we should not confuse a reasonably stable set of linguistic practices evolved within a particular strand of socio-historical circumstances with an absolute understanding of speech acts.

The patent process consists of a highly developed set of typified practices that surpass Searlian rigor in their mandatoriness, but that does not mean that the rigor extends beyond any particular set of typifications. Law, on the face of it, is a rigorous practice. But it is a different rigorous practice in Medieval France and in nineteenth-century America. And twentieth-century plain-language philosophy is, at least some would claim, also a rigorously typified practice, but again a different one. Each, nonetheless,

evolves with novel utterances and novel moves—as do less tightly typified systems with wider ranges of freedom for novelty and multiplicity, such as contemporary literary theory (which nonetheless operates under its own set of recognizable understandings and interventions). Finally, in each of these cases, no matter how rigorous the typifications that guide the enactment any single moment may be, the dynamics of the moment grant new meaning and life to the typifications, and we must look to the dynamics of the moment to understand what is happening.

Genres as Speech Acts

The final difficulty with speech-act theory, particularly for this study, is its application to long, complex written documents. Speech acts as envisioned by Austin and Searle are short utterances carrying out single acts. For the sake of analytic clarity, Searle (1969, p. 22) explicitly excludes from consideration all but the most simple utterances.

Written texts characteristically contain more than one sentence. A text may contain many acts. Moreover, it is not clear whether sentences within extended discourses embody speech acts of specific illocutionary force in the way that isolated sentence utterances do. At best, we can imagine that a highly compulsive, closed text attempts to push a compliant reader down a certain path of reaction through a series of related acts. Nonetheless, what the sum of the various acts of a texts amount to is not clear.

However, if the text is distinctly identifiable as of a single genre, it can gain a unified force, for it is now labeled as of a single kind instantiating a recognizable social action. That is, the text effects a law (a declaration), or makes application (a directive), or contractually binds you (a commissive), or presents a scientific claim (an assertive), or conveys outrage at a governmental action (an expressive).[16] The various smaller speech acts within the larger document contribute to the larger speech act ("macro-act") of the text, and each of the sub-acts must fulfill its part within the macro-act. In fact, the expectations of generic form are such that any missing or weakly instantiated feature of the genre may weaken the text's generic force. Particularly if the genre is responsive to formal regulation, a defect in any of the sub-actions may be reason for the failure of the work of the genre. A patent application without a representation of the object, a declaration of originality, or a specification of claim is not a valid application and will not achieve the purpose of gaining approval. Thus, a defective specification will never appear as an officially approved patent, distributed in reprints by the patent office.

In a contract, many acts are fulfilled, but the overall effect is to bind parties to mutual obligations and rights, including all the stipulations agreed to in the contract. The stipulations are meaningless—both in the sense of being non-binding and in the sense of being purposeless and unmotivated and perhaps unintelligible—without the perfection of the overall contractual act. A seduction, a sale, or any other event that ended with a bottom line, a mutual agreement, and focused conjoint action among parties would have the effect of a macro-action and would give the entire proceedings the shape of the single act. Indeed, the minor actions that had gone into it would be hard to understand, hard to attribute intention to, and hard to see as effective acts without being framed by the macro-act.

Many written genres seem to resolve themselves into single acts. A patent application, a tax form, a mail order for a pair of shoes, or a final examination in English Literature 2002, once it has completed its work (to gain the patent grant or the shoes, to satisfy the Internal Revenue Service, to demonstrate competence in the subject), can be filed away purely for the record unless someone wants to call the perfection of the document or consequent actions into question. The text becomes dead and exists only in its consequences. Much of scientific writing is of this character, as articles only have a short shelf life (or citation life) and then live through their consequences or lack thereof unless someone wants to open up the dusty research. Other texts, however, must constantly be reread if they are to have force, for the texts have multiple forces that are created only by the reader's interaction with them. When we read a novel or a book of philosophy, many things are done to us. It is clearly reductionist to characterize these multiple effects under a single macro-act, such as being entertained or being enlightened. We recall a poem or a work of philosophy not just as having a single overall force (as scientific citations sometimes become symbols for single concepts), but as a collection of moments and gestures as well as an overall structure of arguments or feelings or imaginative moves. These texts live not in any sense of unified consequences, but in their multiplicity of effects on readers' minds, arising from the complex of actions realized through the texts. Left in a file or on a dusty library shelf, such texts would not do their work, nor would they do so if we were to reduce them to simple slogans which we were to carry around in our heads. Yet, even though multiplicity of action remains in these texts, attribution of genre helps to limit the domain and focus the character of the multiplicities offered by, or to be read out of, the texts—that is, genre recognition usually limits interpretive flexibility.

Transforming an Idea into a Legal Entity

Any speech act, to be successfully completed, must meet a series of conditions appropriate to that act. (Austin (1962) calls these "felicity conditions.") Accordingly, to succeed, an application for a patent must meet the conditions by which it is judged in the particular institutional conditions of patent examinations. When all these conditions are met and the patent is granted, an inventive idea is transformed into a legal property. The various parts or acts within the text contribute to the success of the overall act by addressing particular conditions.

To obtain a patent, one must have an idea for an object or a process. This object or process must be useful. It must be novel. The applicant must have invented it. All these items must be asserted in the specification. The text of a patent from Edison's time opens with an identification of the inventor and with an assertion of a new and useful invention. A description of the invention, supported by an illustration, follows. Since the applicant does not yet have the patent, he or she must cast the application in the form of a petitionary letter, closing with petitionary language (e.g., "I claim as new and wish to secure by letters patent. . . ."). This petitionary format was further framed by a cover letter, a standard form of which appears in the *Scientific American* pamphlet of 1881:

> To the Commissioner of Patents:
>
> Your Petitioner, a resident of ——,——, prays that letters-patent be granted to him for the invention set forth in the annexed specification.
>
> signed

These petitionary features clearly signify that the applicant intends the document as a request, intends the receiver to understand it as a request, and desires the receiver do what is requested; that the text is communicated to the receiver, who is capable of interpreting the text; that the applicant believes that the person receiving the request (the Commissioner of Patents) is able to grant such a request; that the request is for something that the receiver would not already have done in the normal course of affairs; and that all social and psychological conditions of the sort that Searle (1969, pp. 57–61, 66) spells out for the act of promising must be met if the request is to be granted. The nature of the request, however, is that the receiver (the patent examiner) declare that the sender's representation of an object or process be considered a patent. That is, the petitioner must assert that his or her idea meets the criteria of a patent so that the receiver will then declare the representation to be a patent protecting the idea. Therefore, we must look into the propositions or representations embodied in the patent to see how they meet the examiner's criteria of adequate propositions.

Reference and Predication Acts in the Patent Application

Searle (1969, chapters 4 and 5) points out that every speech act has a propositional content, and that proposition consists of acts of reference and acts of predication. On one level, the act of reference of the application is to the commissioner's declaring a patent, and the predication is that the commissioner will do so. That would be the standard propositional content of a request: reference to a certain state of affairs and a predication that someone will accomplish it. However, the commissioner's declaration is based on an evaluation (to be performed by a patent examiner) of the object or process represented in the specification and of the claims predicated of that object or process. Thus, the key propositions concern the item for which patent status is sought. Because the examination performed by the receiver extends beyond the representation created by the petitioner, we must consider the propositional acts in two stages: as they are represented and as they are received. Further, we must examine what conditions must be met in each instance in order for the patent application to be successful.

The patent refers to the applicant's self, the act of invention, and the object or process that represents the invention. Thus, the patent opens with identification of the applicant, a representation of the act of invention, and details of the object. The largest part of the patent is given over to representation of the object in the form of illustrations, description of the parts of the object in relation to the illustrations, and a description of the object's operation, use, and/or construction. From the point of view of the writer, these representations rely on the writer's believing that they represent him, his actions in inventing, and (most important) the object or process he has conceived. The inventor need not have brought this idea to working perfection, so the reference is to an imagined construction that the inventor is in the process of bringing into physical realization. These representations share information about the idea with the patent examiner for the purposes of evaluation, but they also (after the patent is granted) share that information with others, thus allowing them to use or reproduce the idea once the period of protection is over.

The propositional act, however, consists of predication as well as reference. It is not enough to represent oneself as having invented or conceived

of the object; one must also claim that the object is new, that it is useful, and that it instantiates some particular forms of useful novelty. Thus, a patent of the 1870s typically had near the beginning some language similar to the following, which appears in Edison's patent 214,636:

> Electric lights have been produced by a coil or strip of platina. . . . In all such lights there is a danger of the metal melting and destroying the apparatus, and breaking the continuity of the circuit.
>
> My improvement is made for regulating the electric current passing through such incandescent conductor automatically, and preventing its temperature rising to the melting point, thus producing a reliable electric light by rendering conducting substances incandescent by passing an electric current through them.

The word 'improvement' and the problem-and-solution format point toward the novelty and usefulness of what will be proposed in the patent. This patent, as has already been noted, closes with more precise claims as to what the useful innovation is: the combination of regulator, shunt, and incandescent light.

From the Speaker's Sincere Statement to the Examiner's Approval

The inventor, in making a patent application, represents himself or herself as having, of a certain date, the idea for a particular kind of device or process, and predicates that he or she believes that this idea is workable and useful, that it is an improvement of a substantial kind and therefore is an invention, and that the novel improvement can be characterized within specific claims. The applicant may always be in bad faith concerning any of these representations and predications; however, in forwarding the application the inventor must present himself or herself as sincere. The patent examiner passes public judgment on the validity of the statements in the application. In approved patent applications, the individual's belief about his or her ideas are transformed by public certification into a form of public knowledge.

The procedures for evaluation, whereby illocutionary force (embodying intent to obtain a patent) is converted to a state of belief on the examiner's part that will legally compel the desired perlocutionary effect (of actual issuance of that patent), are, however, specific and limited. The evaluation procedures attend to only certain aspects of the representations in the application. The inventor's representation of his name and geographical location are accepted on his oath. The date of filing is a matter of record of receipt and of oath. There is no procedure for determining whether the idea is workable, beyond obvious violations of physical laws[17]; the workability is left to future development.

If the idea is not workable, a patent will be of no financial value and will be abandoned, making the patent monopoly moot and insignificant. This is an important point. The patent is a monopoly only of a potential. The reference is only to an idea—a projection of a future product. The patent is of no meaning or value if that potential does not become realized or if it is not realizable. The patent examiner has no way of knowing and no obligation to determine the future prospects of the idea. Similarly, the question of the usefulness of the patent is left unexamined, because that is left to the marketplace. Since the patent monopoly will be moot if no one wishes to use or purchase the patent, there is no reason to examine the usefulness—nor is there any before-the-fact way of determining it.

Since a patent does not deal with actual produced objects, the representation is only of an idea. The idea is embodied in the patent description; there is no further examination of whether an idea is in fact present or whether this is the idea the inventor had. This loophole left open the possibility of submitting defective or incomplete representations of an object in order to stymie one's competitors, because the examiner would have no way of knowing the completeness of the idea. This is also the loophole that allowed a short-lived nineteenth-century practice of inventors' amending their already-issued patents to strengthen their positions against competing claimants on the ground that the inventor had had the correct or full idea but the representation on paper had not been fully clear or accurate. The only usual ground for rejecting a patent on the basis of its description of the idea is lack of clarity or specificity—i.e., that it is not clear what the idea is for which patent protection is sought.

The forms of examination in Patent Office practice are primarily intertextual. A patent's descriptions and claims are compared to the file of existing patents and to other representations of the current state of the art, such as textbooks and encyclopedias. Thus, of all the predications made about the idea, only the novelty of the claim is examined, leaving the examiners agnostic even as to whether this novelty is an improvement (for improvement is equivalent to the usefulness of the novelty). The most sensitive aspect of novelty is how broad the claim can be in relation to the object or process described and in relation to prior claims. In terms of ownership, broadness of claim is precisely the most crucial matter, for it will define the extent of the rights the inventor will own if the patent is issued.

Obtaining a patent monopoly requires that one fulfill the genre of application by meeting, in appropriate textual form (primarily of a representational kind), the success conditions of that speech act of request for a status. That is, the inventor has to represent the idea as patentable. The actual grant of the patent requires the intention of the examiner to fulfill his or her duty by applying appropriate examination procedures to determine the success of these representations of the idea as meeting the criteria of patentability. But only certain aspects of the representation come under systematic scrutiny—and even that is a kind of scrutiny that is contrary to the kind of scrutiny by which the patent is conceived (except, of course, that the inventor and the patent agent and/or attorney try to anticipate the examination procedure by patent searches and clever formulation of claims.) That is, the inventor tries to solve problems and claim turf. The examiner is not concerned about the solution of problems, but instead examines whether the turf is already occupied and tries to limit turf claimed for the specific novelties instantiated in the representation of the idea.

What the inventor and the examiner agree on is that what is sought is patent status with its monopoly privileges. If the patent is approved, they have collaborated in the creation of the patent, and they agree on the kind of thing or the status that has been achieved. They have created new value, a new property to be owned—and that property is a license to attempt to make money from a particular technology. Intentions meet over the status created by the speech act of declaration.

What has happened is that the inventor, in representing an idea he or she has had and in making reference to specific ideas through drawings representing objects in the process of being realized, must transform these objects into successful abstractions of claims that the examiner (and later the courts) will accept as patentable ideas with clear boundaries of ownership warranted by the particulars of the specific case presented in the illustration and the description and consistent with the intertextual examination procedures of the previously owned property (already in the public domain) and the legal rules governing this kind of property and its ownership. If the would-be inventor can successfully make this transformation so as to elicit the cooperation of the examiner, he or she becomes, nominally, an inventor owning an invention.

The status of inventor and the status of invention are technical, narrow legal creations necessitated by the procedures of creating a kind of property (the invention) and assigning benefits to a particular person (the inventor). These designations become legally moot once the period of patent protection is over or once the patent turns out to be valueless. Then the law then no longer cares and the designations evaporate—that is, they have no standing. Although we then popularly associate the status of inventor with the honors of the history of technology or with the orderly story of discrete inventions by discrete inventors, this is not necessarily historically warranted, as historians of technology have been pointing out with regard to the kinds of complex and continuous interactions that go into the emergence of new technologies.[18] Nonetheless, the patent system, for economic reasons only, supports a heroic notion of the history of technology.

Edison's patent, thus, accomplishes a certain kind of work of transformation, turning pieces of the technology that might produce light into pieces of property. Patents, as I have been arguing throughout this chapter, are not the final technology; they are only legal entities that surround the emergent technology as its producers try to bring it to workable use and to establish it as valuable in the marketplace. Patents surround the technology, giving it special status in the legal system and in the financial realms regulated by the laws. Thus we see why the Edison companies had to surround this uncertain new technology with as many claims that would encompass the particulars of whatever technology emerged: they had to have control of enough legal abstractions to maintain legal control of the actual material technology emerging in the marketplace.