

The Arc of Emerging Technology

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Introduction

Outside our current venue at this 2015 SXSW conference, artists, musicians, movie producers, interactive media mavens and all manner of creative folk are bursting the seams of every entertainment establishment Austin has to offer. Amid all of this festivity, a select group of lawyers has holed up in a conference room, in furtherance of their continuing legal educations. Given the venue, and the creativity that abounds, it is understandable that many of the lawyers gathered in this CLE seminar room represent the emerging technology and entertainment industries in some form or fashion. As such, most know well their way around copyright, trademark, and licensing issues.

Your author is a software patent attorney. Putting a healthy love of music and the arts aside, perhaps we have one other thing in common:

Article I, Section 8, clause 8.

As most copyright, trademark, licensing and entertainment lawyers know, this Constitutional clause grants to Congress “the power to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.” From this single Constitutional sentence sprout two vast and complex bodies of law: copyright law and patent law. Although having sprouted from the same seed, these two bodies of law could not be more different.

As entertainment lawyers, you likely can do your jobs without ever having to look a patent straight on. Perhaps you are of the mind that patent law’s technological minutia is incomprehensible, that patent lawyers are boring, or that the whole U.S. patent system is obscenely out of control. You may be right. I may be crazy. But why not take a brief walk on the wild side and have a go at the other branch that has sprouted from your Article I, Section 8, clause 8. Don’t fear the reaper.

History

To truly understand what patents are about we need to wind back the clock and visit England at a time when only the Lords and Nobles were allowed to hunt deer, boar, hares and rabbits. In those days the common people lived on bread, pottage (a type of stew), and maybe a few dairy products if they were lucky. Poaching game was punishable by death, or by having one’s hands cut off. While the upper class had acquired a taste for exotic spices, such as pepper, cinnamon, cloves, nutmeg, ginger, and the like, common people could afford none of these spices imported from foreign lands. Salt was important to all, both as a flavoring agent and as a preservative.

Enter John of Shiedame. John had been traveling far from his native England and during his travels he learned a process for manufacturing salt that was completely unknown at home. When John returned home in 1440 he knew that his newly learned skill was potentially quite valuable, except for the practical problem that once others saw him making salt, they would soon learn the secret, just as he had. So John approached the King and convinced him that it would be to their mutual benefit if the King would grant John the exclusive right to practice the

technique—in exchange, of course, for a “royalty” payment to the King. Thus the first English patent on a process was born.

The Shiedame patent on salt making must have proven quite lucrative, for subsequent kings and queens took to granting similar patents in prodigious numbers—in exchange for their royalty, of course. By the time of Sir Walter Raleigh, roughly 150 years later, the proliferation of patents was out of control. There were patents on currants, salt, iron, powder, cards, calf-skins, fells, poledavy canvas, ox shin-bones, train oil, list of cloth, potashes, anise-seeds, vinegar, sea coals, steel, aqua vitae, brushes, pots, bottles, salt peter, lead, oil, calamine stone, oil of blubber, glasses, paper, starch, tin, sulphur, new drapery, dried pilchards, transportation of iron ordnance, of beer, of horn, of leather, importation of Spanish wool, of Irish yam. Indeed, Sir Walter Raleigh, himself, had managed to persuade the Queen to grant him the patent to export woolen broadcloths (worth £3,500 a year) and the further patent giving him the right to charge every tavern in the country a £1 a year license fee.

Anti-monopoly sentiment grows

The granting of patents was undoubtedly good business for the English Crown. But by the late 1500's many began to see how pernicious was this royal prerogative, especially when it began to impact the cost of day-to-day necessities, not to mention the occasional pint of ale.

Public protest, in those days, was not easy or safe. Public protest could get a subject exiled or beheaded. It was considered a grave lack of respect for anyone to question the royal prerogative. Nevertheless, the House of Commons grew increasingly bold and began openly contesting these monopolies of the royal prerogative. The protests lasted more than fifty years.

The first protest by the House of Commons was mounted in 1571. The Queen sternly responded, directing the House to “meddle with no matters of state but such as should be propounded to them.” The House of Commons was persistent, and in 1597 it proposed a bill intended to deal with the abusive monopolies; a bill “touching sundry enormities growing by patents or privilege and monopolies.” The Queen responded, this time more softly, that she “hoped that her dutiful and loving subjects would not take away her prerogative, which is the chiefest flower of her garden and the principal and head pearl of her crown and diadem.” She promised to discontinue the abusive monopolies and the House of Commons backed down.

The Queen broke her promise. In 1601, the House of Commons responded with another bill designed to deal with the abusive monopolies, described as “an exposition of the common law touching those kinds of patents commonly called monopolies.” The debate was fiery. The Queen had many friends in Parliament.

Francis Bacon, whom some believe to be William Shakespeare, spoke out against the bill. Whether Bacon influenced many votes is debatable. Bacon was not a man to be trusted. Francis Bacon, son of Elizabeth I's first Lord Keeper of the Great Seal, had been trying to get appointed by the Queen as Attorney General since 1593. Robert, Earl of Essex (a friend of Francis Bacon) recommended him, but the Queen did not consider Bacon fit for the job. In 1601, Essex was tried for treason. Francis Bacon, his old friend, prosecuted him on behalf of the Crown.

Sir Walter Raleigh also spoke out against the bill, defending the validity of the royal prerogative and the monopolies the Queen had granted (including, of course, his own). His credibility was also, therefore, rather lacking.

Appreciating the gravity of the situation, this time the Queen personally addressed Parliament. In her address she apologetically begged, “that my grants should be grievous to my people, and oppressions to be privileged under colour of our patents, our kingly dignity shall not

suffer it, yea, when I heard it, I could give no rest to my thoughts till I had reformed it.” The bill was withdrawn, but this time the Queen had been backed into a corner.

The Queen revoked the most offensive monopolies. More importantly, she allowed the common-law courts to try the remaining monopolies, to test whether they were valid or void. This opened the floodgates for what might now be called patent litigation. Indeed, as we shall next explore, the first monopoly suit was over a deck of playing cards.

A Deck of Playing Cards - The first case against monopolies

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The first monopoly suit to be tried in the common-law courts was Edward Darcy's patent on playing cards, tried in 1602. So famous was this first suit, it was called “The Case of Monopolies.” The case was argued on behalf of the patentee by law officers of the Queen. Her officers argued that playing cards were not a necessity, but merely a vanity and that the Queen had the power “to suppress entirely or tolerate vain amusements;” hence the patent was valid. The defense saw it differently, drawing the line between valid and invalid monopolies as follows.

When any man by his own charge and industry, or by his own wit and invention, doth bring any new trade into the realm, or any engine tending to the furtherance of a trade that never was used before; and that for the good of the realm; — in such cases the King may grant to him a monopoly-patent for some reasonable time, until the subjects may learn the same, in consideration of the good that he doth bring by his invention to the commonwealth, otherwise not.

According to the line drawn by the defense, there is still room for monopoly-patents, provided the subject matter is new, that it was the patentee's efforts that brought it into the realm, and that the monopoly is reasonably limited in time. Note that the defense also sees the patent monopoly in contractual terms. The patent-monopoly is granted *in consideration* for the good that he does by bringing his invention to the commonwealth. The case was argued on three separate occasions and was not decided until after Queen Elizabeth I's death in 1603. The court ruled for the defense, finding the playing card monopoly was invalid as “against common law on four grounds.” First, the court found, the monopoly causes unemployment:

All trades, mechanical as well as others, which prevent idleness (the bane of the commonwealth), and exercise men and youth in labor, for the maintenance of themselves and their families, and for the increase of their substance, to serve the queen when occasion shall require, are profitable for the commonwealth; and therefore the grant to the plaintiff, to have the sole making of them, is against the common law....

Second, the monopoly raises prices and lowers quality:

[T]here are three inseparable incidents to every monopoly against the commonwealth: that the price of the same commodity will be raised, for he who has the sole selling of any commodity may and will make the price as he pleases; that after the monopoly granted the commodity is not so good and merchantable as it was before, for the patentee, having the sole trade, regards only his private benefit and not the commonwealth; and that it tends to the impoverishment of divers artificers, and others, who before by the labor of their hands in their art or trade,

had maintained themselves and their families, who now will of necessity be restrained to live in idleness and beggary.

Third, the Queen was deceived:

The queen was deceived in her grant; for the queen, as by the preamble appears, intended it to be for the weal public, whereas it will be employed for the private gain of the patentee, and for the prejudice of the weal public.

Fourth, the act of playing cards is not patentable subject matter:

This grant is *primaie impressionis*, [‘case of first impression’] for no such was ever seen to pass by letters patent under the great seal before these days; and therefore it is a dangerous innovation as well without any precedent or example as authority of law or reason. And as to what has been said that to play cards is a vanity, this is true if it is abused; but the making of them is neither a vanity nor a pleasure, but labor and pains. And it is true that none can make a park, chase or warren, without the king's license; for that is *quodam nodo* [‘requires a certain grant’] to appropriate those which are *ferae naturae et jullius in bonis* [‘wild animals or those in the possession of another’], and to restrain them of their natural liberty, which he cannot do without the king's license; but for hawking, hunting, etc., which are matters of pastime, pleasure and recreation, there needs no license, but every man may, in his own land, use them at his pleasure, without any restraint to be made, unless by parliament.

The fourth point of the court is worth consideration. The court distinguishes between the cards themselves and the act of playing cards. The court categorizes the act of playing cards, along with hawking and hunting, as a natural liberty that needs no license. In other words, the act of playing cards is not subject matter to which the patent-monopoly can extend. Recall that the Queen's officers argued the Queen had the power to suppress the act of playing cards, hence she had the power to grant a monopoly on the making, importing, and selling of the cards themselves. The defense countered, arguing that the Queen had no right to take as much as a penny from a subject without an act of Parliament. Therefore, she could not take any moderate recreation from her subjects without similar authority. The argument went something like this:

Queen: The practice of playing cards is unimportant; I could outlaw it. Since I could outlaw the practice, I can grant a monopoly on the cards.

Defense: Playing cards is a recreation. It is no different from hunting, and you cannot restrain that. If you had the right to grant a monopoly on the cards, then you are in effect restraining the playing of cards, which you cannot do. Therefore the monopoly on cards is invalid.

At the heart of the argument lies the notion that some things are a “natural liberty.” Some things are beyond the sovereign's power to grant monopolies; some things, like hunting and playing cards, are not patentable subject matter. This is an important notion, for it is still being argued today. Those who oppose software patents on the basis that software is not patentable subject matter, in effect argue that software is like hunting and playing cards.

The decision in the Case of Monopolies did not have much impact on the actions of Queen Elizabeth I's successor, King James I. When James I ascended the throne in 1603, he gave lip service to opposing monopolies and issued a proclamation condemning existing monopolies. He ordered all monopolies suspended, pending an investigation. He assigned the investigation to a Privy Council, including none other than Sir Francis Bacon. Recall that, during Queen Elizabeth's reign, Bacon had argued in favor of monopolies — no doubt trying to gain the

Queen's favor, as Sir Walter Raleigh had done. Now, Sir Francis Bacon found himself in charge of reviewing the existing monopolies. It was his job to determine which monopolies were valid and which were invalid. Bacon did not reduce the number of monopolies at all, but rather increased the number in scores. Petitions of grievance were presented in 1606 and again in 1610.

In 1610, the King issued a proclamation, known as the Book of Bounty, in which the King condemned monopolies and promised that he would only grant patents for "projects of new invention so that they be not contrary to the law, nor mischievous to the State, by raising prices of commodities at home, or hurt of trade, or generally inconvenient." The King's promises were not fulfilled.

Things got quite divisive, even within the King's court. In 1616, the King removed his Lord Keeper of the Great Seal from office for refusing to apply the seal to some patents the King had granted. In his place, the King appointed Sir Francis Bacon. Now, Bacon was in charge of enforcing the Book of Bounty.

Perhaps Bacon had a vision of what a well-run patent system could provide, for he wrote in his *Treatise on Interpreting Nature*:

Now among all the benefits that could be conferred upon mankind, I discovered none so great as the discovery of new arts for the bettering of human life. For I saw that among the rude people of early times, inventors and discoverers were reckoned as gods. It was seen that the works of founders of States, lawgivers, tyrant-destroyers, and heroes cover but narrow spaces, and endure but for a time; while the work of the inventor, though of less pomp, is felt everywhere, and lasts forever.

Notwithstanding these noble words, the King issued numerous "illegal" patents, often to his personal friends, while Bacon was in charge of applying the Great Seal. Whether Bacon was corrupt, or because his enemies made it appear so, a new Parliament was assembled in the House of Commons in 1621. Many of the monopolies were invalidated, and Bacon was impeached for taking bribes. With Bacon branded a crook and with public protest mounting, both Houses of Parliament acted in 1623, passing the Statute of Monopolies. The Statute of Monopolies was approved in final form on May 25, 1624 and assented to by King James; it became the first patent statute. This statute remained on the books as the patent statute of Great Britain until well into the nineteenth century.

Statute of Monopolies

The Statute of Monopolies of 1624 began by sweeping away all existing monopolies, with certain exceptions. Among the exceptions were patents for new inventions granted for not more than twenty-one years and certain patents on warlike manufactures and materials. What makes the Statute of Monopolies historically important is the sixth section, which authorizes patents for new inventions:

[A]ny declaration [outlawing monopolies] before mentioned shall not extend to any letters patents and grants of privileges for the term of fourteen years or under, hereafter to be made of the sole working or making of any manner of new manufactures within this realm, to the true and first inventor and inventors of such manufactures, which others at the time of making such letters patents and grants shall not use, so as also they be not contrary to the law nor mischievous to the state, by raising prices of commodities at home, or hurt of trade, or generally inconvenient, the said fourteen years to be accounted from the date of the first letters patents or grants of such privilege hereafter to be made,

but that the same shall be of such force as they should be if this act had never been made and of none other.

The Statute of Monopolies codified the common law. The concepts expressed in the Statute are essentially those expressed by the defense in the playing card case, *The Case of Monopolies*. The Statute did not fundamentally change the way patents were granted. Inventors still had to petition the Crown; there was no statutory right to a patent — that was left entirely to the king's grace.

The First US Patent Statute

The United States government began operation under the Constitution on March 4, 1789. The Constitution gave Congress the power to promote science and the useful arts. At first, Congress took this literally. Patent and copyright petitions were handled by Congress itself, on an ad hoc basis; each time a person petitioned for a patent or copyright, an individual bill was introduced in Congress. Most of the petitions were for patents. It did not take long before Congress realized it would be inundated with petitions for patents, unless something was done to delegate the responsibility.

On June 23, 1789, Benjamin Huntington of Connecticut introduced a bill designed to take the burden of reviewing patent petitions off of Congress, providing new institutions for both patents and copyrights. Congress could not act on the bill that session. However, when the second session of the First Congress convened in January 1790, President George Washington set the tone in his address to the joint session, delivered in New York on January 8, 1790:

The advancement of agriculture, commerce, and manufactures, by all proper means, will not, I trust, need recommendation, but I cannot forbear intimating to you the expediency of giving effectual encouragement, as well to the introduction of new and useful inventions from abroad, as to the exertions of skill and genius in producing them at home, and of facilitating the intercourse between the distant parts by a due attention to post office and post roads. Nor am I less persuaded that there is nothing which can better deserve your patronage than the promotion of science and literature.

This First Congress was inspired, and it immediately took up Huntington's bill, which had been tabled at the close of the previous session. Believing the copyright law would be easier to draft than the patent law, Congress decided that separate copyright and patent bills should be drafted. Congress knew that there was likely to be little debate over literary property and how it should be protected. Inventive property was another matter; hence separate copyright and patent bills were drafted. It is interesting that the two bodies of law, copyright law and patent law, remain separate today. It is also significant that over two hundred years after the First Congress, computer software is the first technology to be protected by both bodies of law.

The first patent bill was introduced on February 16, 1790, debated, and quickly passed by both House and Senate. President Washington signed the act into law on April 10, 1790. Interestingly, Congress first tackled what it perceived the more difficult task; it passed the patent act before it passed the copyright act. The copyright act was enacted on May 31, 1790.

In the first patent act, known as the Patent Act of 1790, Congress created a patent agency in the Department of State, headed by a board comprising the Secretary of State, the Secretary of the Department of War, and the Attorney General. This board, whose members administered the patent system along with their other public duties, was known by its own designation as "Commissioners for the Promotion of Useful Arts." Any two of the board members could issue a patent, for a period not exceeding fourteen years, to any petitioner that "hath ... invented or discovered any useful art, manufacture, ... or device, or any improvement therein not before known or used," if the board found that "the invention or discovery [was] sufficiently useful and

important....” To apply for a patent under this act, the applicant had to submit a written specification, a drawing, and, if possible, a model. The application fee varied between four and five dollars.

The first board consisted of Thomas Jefferson, Secretary of State; Henry Knox, Secretary of War; and Edmund Randolph, Attorney General. Jefferson, in particular, took the job of patent commissioner quite seriously. He personally examined all applications. As the United States' first patent examiner, Jefferson was extremely tight-fisted, issuing only fifty-seven patents during the three years in which the Patent Act of 1790 was in force.

The Thomas Jefferson Influence

Thomas Jefferson was a deep thinker, and he held very strong views concerning invention, patents, and monopolies. An inventor himself, Jefferson had every reason to favor patents. While Jefferson was in France shortly after the Constitutional Convention, he worked out the mathematics for a new moldboard plow, which was a far superior plow to those he had watched the French farmers using in the fields. While Jefferson was vice president, he disclosed his moldboard to farmers and it quickly replaced existing plow technology on two continents. His invention was so significant that in 1806 the Agricultural Society of Paris awarded Jefferson's moldboard plow a gold medal. Jefferson never thought of patenting his moldboard plow, for he opposed the monopoly of any useful idea. Justice Clark, writing for the Supreme Court in *Graham v. John Deere Co.*, wrote that “Jefferson, like other Americans, had an instinctive aversion to monopolies. It was a monopoly on tea that sparked the Revolution and Jefferson certainly did not favor an equivalent form of monopoly under the new government.”

Jefferson wanted a bill of rights, as a guarantee that the Constitutional government could not lapse into despotism. Jefferson did not want all thirteen colonies to adopt the Constitution until a bill of rights was in place. James Madison was initially opposed to a federal bill of rights and saw danger in tacking on additional provisions that might prevent ratification of the Constitution. The two corresponded at length on this subject.

Writing from France in July 1788, Jefferson urged Madison that there should be a bill of rights provision restricting monopolies. Jefferson countered the argument that a limited monopoly might incite ingenuity, with the argument that “the benefit even of limited monopolies is too doubtful to be opposed to that of their general suppression.” Later, in another letter to Madison (August 1789) after drafting the Bill of Rights, Jefferson stated that he would have been pleased by an express provision in this form:

Art. 9. Monopolies may be allowed to persons for their own productions in literature & their own inventions in the arts, for a term not exceeding — years but for no longer term & no other purpose.

Later he wrote:

Certainly an inventor ought to be allowed a right to the benefit of his invention for some certain time.

{[omitted]}

Nobody wishes more than I do that ingenuity should receive a liberal encouragement.

Ultimately Jefferson and Madison reached an understanding, for the Constitution was ratified and Madison, almost single-handedly, carried through the First Congress the first ten amendments (the Bill of Rights) to the Constitution.

Jefferson, First Patent Examiner

As a patent examiner there was none tougher than Thomas Jefferson. Only fifty-seven patents were issued during Jefferson's watch as America's first patent examiner. Jefferson

made it a point to personally examine each application, ever vigilant lest an onerous monopoly should be granted. Being patent examiner for the entire country was hard, time-consuming work. It troubled Jefferson that he could not find the time required to examine each patent application as fully and carefully as he thought necessary.

Thus, Jefferson drafted a bill and introduced it in Congress on February 7, 1791, which reflected the sentiment that if you cannot do a proper job of examining, then do not do it all. The bill was not passed, although many provisions of it are found in the bill introduced on December 10, 1792, passed on February 4, 1793, and signed into law on February 21, 1793, which is known as the Patent Act of 1793.

The Patent Act of 1793 significantly changed the requirements for obtaining a patent. The 1793 Act removed the requirement of the 1790 Act that the invention be deemed "sufficiently useful and important," and the 1793 Act eliminated examination of the application, making the grant of a patent a purely clerical matter. In short, the 1793 Act relieved Jefferson and the other two board members of the responsibility of reviewing each application. The 1793 Act simply shifted this responsibility to the courts.

With the passage of the 1793 Act, Jefferson would appear to have softened his views regarding the evils of monopolies. This is not the case. Federico reports:

One object, expressed by Jefferson, in eliminating the examination system, was to give the courts an opportunity to develop a system of jurisprudence with respect to patentability, but after a number of years experience with a registration system, Jefferson became convinced that preliminary examination of applications and a refusal of a patent when the patent was not warranted, would better safeguard the public.

Jefferson also expressed his views, by letter, in a famous patent infringement suit brought on an invention for which he had granted a patent under the 1790 Act. It may be that Jefferson was the first expert witness in a patent trial.

Jefferson, First Patent Expert Witness

The suit involved Oliver Evans's patent (U.S. Patent Number three), granted December 18, 1790, on the use of a bucket conveyor and Archimedean screw for conveying grain. The device, called a hopper boy, was used in a flour mill. Jefferson had a flour mill and employed Oliver Evans's hopper boy, paying Evans's agent \$89.90 for the use of the invention. Peterson reports, "He paid willingly, as a tribute to a man whose talents were so useful to mankind, but at the same time denied he was under legal obligation to pay."

Oliver Evans took full advantage of the patent laws available to him. Not only did he seek and obtain a United States Letters Patent for his hopper boy, he also held a wide assortment of pre-1790 Act patents that had been granted to him by the State of Maryland

In 1813 Evans brought suit for patent infringement in Baltimore. Isaac McPherson, of that city, wrote to Jefferson, asking for his expert opinion of the case. Jefferson's reply, a letter to McPherson dated August 13, 1813, rebukes Evans's position that his patent covers all forms of elevators and screws used in manufacturing flour. Jefferson finds the hopper boy itself to be original to Evans, but shows that elevators and screws date back to ancient Egypt and to Archimedes. Moreover, Jefferson's letter is a remarkable essay on Jefferson's philosophy on the nature and purpose of the patent monopoly.

If nature has made any one thing less susceptible than all others of exclusive property, it is the action of the thinking power called an idea, which an individual may exclusively possess as long as he keeps it to himself; but the moment it is divulged, it forces itself into the possession of every one, and the receiver cannot dispossess himself of it. Its peculiar character, too, is that no one possesses the less, because every other possesses the whole of it. He who receives an idea from me, receives instruction

himself without lessening mine; as he who lights his taper at mine, receives light without darkening me. That ideas should freely spread from one to another over the globe, for the moral and mutual instruction of man, and improvement of his condition, seems to have been peculiarly and benevolently designed by nature, when she made them, like fire, expansible over all space, without lessening their density in any point, and like the air in which we breathe, move, and have our physical being, incapable of confinement or exclusive appropriation. Inventions then cannot, in nature, be a subject of property. Society may give an exclusive right to the profits arising from them, as an encouragement to men to pursue ideas which may produce utility, but this may or may not be done, according to the will and convenience of the society, without claim or complaint from any body.

This language is quoted by the United States Supreme Court in the seminal patent law decision in *Graham v. John Deere Co.*, when that Court examines the conditions for patentability.

The modern day patent

The modern day patent is a property right, akin to real estate but where the property is incorporeal. It is also a contract with the government: disclose your invention as the *quid pro quo* for being granted a limited monopoly. With this limited monopoly the patent owner gains the right to use the federal court system to prevent others from using the invention. At a fundamental level the concept is essentially the same as the deal John of Shiedame struck with the Crown in 1440.

Example patent

Reproduced on the following page is the front cover of an example patent to John Hile et al, entitled, "In Transit Detection of Computer Virus with Safeguard." A lot can be learned by studying the first page of a patent. For instance, you can see that John Hile had two co-inventors, Matthew Gray and Donald Wakelin. You can see that their application was filed on September 29, 1992 and issued on June 7, 1994, and that their application was a continuation of an earlier filed application dating back to April 19, 1990. Reading between the lines here, you can see that the patent was pending essentially from April 1990 until June 1994—about four years, which is fairly typical.

You can see that at the time the patent was issued, the patent rights had been assigned to Hilgraeve Corporation, of Monroe Michigan. Because patents are personal property they can be assigned, as was the case here. The Patent Office does not reprint the patent document each time it is assigned. Thus you need to check the on-line records to learn who is the current owner. If you check the on-line records in this case you will find that the Hile patent is now owned by Symantec Corporation.

The patent also shows a list of "References Cited," which are all the documents considered by the patent examiner to establish what was the state of the art at the time the invention was made. You can also see who the patent examiner(s) were and what attorney or firm represented the applicants. The patent also contains a bunch of cryptic codes, designated Int. Cl., U.S. Cl., and Field of Search. These are the codes used by the Patent Office to categorize the patent, based on the technology being claimed. You can think of these codes as being roughly equivalent to the Dewey Decimal System used by some librarians to classify books.

Also featured on the first page of the patent is an abstract, and a sample drawing from the patent. This abstract and sample drawing, is printed here to convey the gist of what the patent is



US005319776A

United States Patent [19]

[11] Patent Number: **5,319,776**

Hile et al.

[45] Date of Patent: **Jun. 7, 1994**

[54] **IN TRANSIT DETECTION OF COMPUTER VIRUS WITH SAFEGUARD**

5,144,660 9/1992 Rose 380/4

[75] Inventors: **John K. Hile; Matthew H. Gray**, both of Monroe; **Donald L. Wakelin**, Tecumseh, all of Mich.

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Wiseman, Simon, "Preventing Viruses in Computer Systems", Elsevier Science Publishers Ltd., Computer & Security, Aug. 1989, pp. 427-432.

README file from the IBM Virus Scanning Program, Version 1.1, VIRSCAN.DOC from Version 1.2, IBM Virus Scanning Program's Version 1.2.

Simultaneous Search for Multiple Strings, Winter edition 1988 of the C Gazette, pp. 25-34, John Rex.

[73] Assignee: **Hilgraeve Corporation**, Monroe, Mich.

Primary Examiner—Charles E. Atkinson

Assistant Examiner—Ly V. Hua

Attorney, Agent, or Firm—Harness, Dickey & Pierce

[21] Appl. No.: **954,784**

[22] Filed: **Sep. 29, 1992**

Related U.S. Application Data

[63] Continuation of Ser. No. 511,218, Apr. 19, 1990, abandoned.

[51] Int. Cl.⁵ **H04L 9/00**

[52] U.S. Cl. **395/575; 380/4; 371/67.1**

[58] Field of Search **364/200; 380/4, 25, 380/24; 371/67.1; 395/575**

[57] ABSTRACT

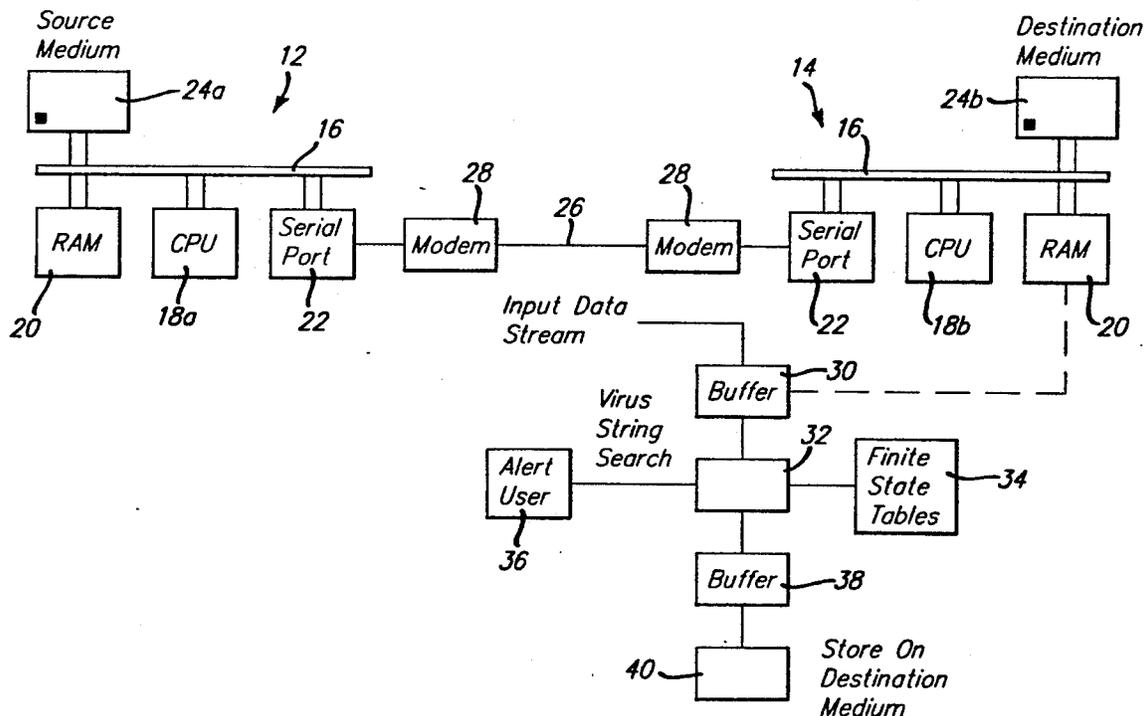
Data is tested in transit between a source medium and a destination medium, such as between two computer communicating over a telecommunications link or network. Each character of the incoming data stream is tested using a finite state machine which is capable of testing against multiple search strings representing the signatures of multiple known computer viruses. When a virus is detected the incoming data is prevented from remaining on the destination storage medium. Both hardware and software implementations are envisioned.

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4,979,210	12/1990	Nagata et al.	380/3
5,020,059	5/1991	Gorin et al.	371/11.3
5,051,886	9/1991	Kawaguchi et al.	364/200
5,144,659	9/1992	Jones	380/4

20 Claims, 5 Drawing Sheets



all about. It is *not* the definitive statement of what patent rights have been granted. To learn what the patent actually covers, you would need to flip to the body of the document and carefully review the numbered claims. The claims (and not the abstract) define the metes and bounds of the patented invention. A patent can have more than one claim. Here is one of the Hile patent claims:

1. In a system for transferring digital data for storage in a computer storage medium, a method of screening the data as it is being transferred and automatically inhibiting the storage of screened data containing at least one predefined sequence, comprising the steps of:

causing a quantity of digital data resident on a source storage medium to be transferred to a computer system having a destination storage medium;

receiving and screening the transferred digital data prior to storage on the destination storage medium to determine if at least one of a plurality of predefined sequences are present in the digital data received; and

in response to said screening step:

(a) automatically causing the screened digital data to be stored on said destination storage medium if none of the plurality of predefined sequences are present, and

(b) automatically inhibiting the screened digital data from being stored on said destination storage medium if at least one predefined sequence is present.

Essentially, a patent is infringed if any one or more of its claims is infringed. To infringe a claim, every element of the claim must be present in the accused device or method. These patent rights do not last forever. Indeed, the patent term is far shorter than the copyright term. Term of patent now measured as 20 years from filing date; but can be shorter if the owner fails to pay renewal fees.

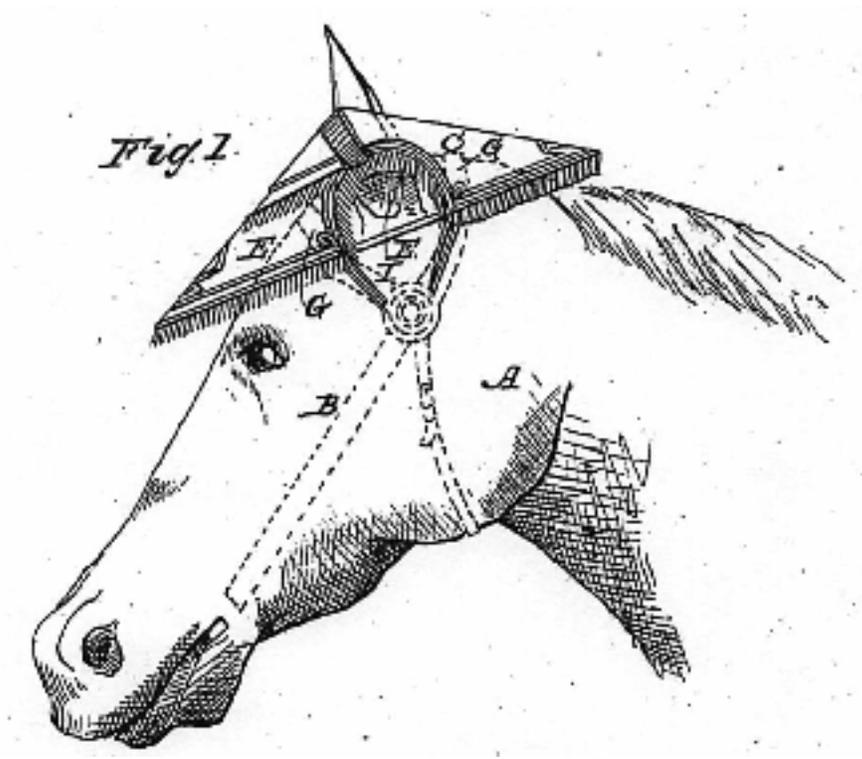
Modern Day Library of Alexandria

Patent office is the modern day Library of Alexandria. It's one of society's official repositories of knowledge. As was explained in connection with the example Hile patent above, patents are classified according to what technical area the invention fall. You can look up the meanings of these codes on the uspto.gov web site. In our example patent the primary U.S. Classification is 726/24. Class 726 relates to "Information security" and subclass 24 relates to "virus detection." Because an invention will sometimes relate to several different technologies, the patent can, and often does, list more than just one classification. In other words, classifications function somewhat like metadata tags.

Until the turn of the millennium the Patent Office comprised several buildings in the Washington D.C. area that were filled with rows-upon-rows of racks-upon-racks of paper patent documents. When you wanted to search through the prior art on a particular subject, you first had to consult an index that told what room and what racks the pertinent patents were located. Then, using a library cart, you hauled the patents of interest back to a desk in the public search room where you could examine each patent one-by-one. It was a good idea to wear old clothes because some of the patents were quite old, with brittle yellowed edges that would literally crumble in your hands and then flake onto your clothing.

Now it is all electronic. Searching the electronic records you can learn not only what has already been patented, but also what is still pending (awaiting a patent). Except in rare circumstances, the pending cases are published 18 months after effective filing date. Electronic data exists for every patent dating back to 1790, although the patents only become full text searchable from 1976 forward.

You can learn all sorts of things about where technology has been by searching out and reading old patents. Go back into the 1800s, for instance, and everyone was inventing ways to deal with horses:



Go back into the early 1950s and you will find all sorts of patents dealing with improvements to military gear. Many of these patents had been held up in the system during the war.

The current patent office database is useful for looking up all sorts of interesting individual patents. But being a database, there is more we can learn from the patent records. We can use this historical record of humanity's progress over the centuries to actually see the arc of technology: where it's been and where it's going. Where the arc of technology has been is no mystery. It's easy to look back in time. The face of each patent gives a glimpse of what was known at the time. Forecasting into the future is far more difficult; it takes sophisticated computer analytic techniques, but it can be done.

Tracing the Arc of Technology

If you were to print out the front cover of patents extracted at random from the historical records of all patents granted in the United States, what could you learn about how our technical lives have evolved? To get a feeling for this, imagine that beginning right after the Civil War the intake clerk at the patent office decides to initiate an award program to the lucky recipient of every 100,000th patent granted. This awards program never actually happened, but we can

imagine it nonetheless. As the chart below shows, the lucky award recipient of patent number 100,000 was the inventor of a sun-bonnet for a horse. If you are a visual person, flip to the back of this article where the patents listed in the above chart can be experienced in all their glory.

Approximately eight years later, patent number 200,000 is granted to the inventor of a carburetor. The pace accelerates a bit after that. In six years, patent number 300,000 is granted for a corn harvester; then five years later patent number 400,000 is granted for a method of making type.

Patent number	Date	Title	Arc of Technology Years
100,000	2-22-1870	Horse sun-bonnet	
200,000	2-5-1878	Carbureter	8
300,000	6-10-1884	Corn harvester	6
400,000	3-19-1889	Method of making type	5
500,000	6-20-1893	Combined flush tank and manhole	4
600,000	3-1-1898	Watch protector	5
700,000	5-13-1902	Work holding device for boring machines	4
800,000	9-19-1905	Demonstrating model (for steam engine)	3
900,000	9-29-1908	Conveyer	3
1,000,000	8-8-1911	Vehicle tire	3
1,500,000	9-10-1920	Submersible vessel for navigation under ice	9
2,000,000	4-30-1935	Vehicle wheel construction	15
2,500,000	12-6-1946	Interlock for quick fastening doors (ship)	12
3,000,000	9-12-1961	Automatic reading system	15
3,500,000	10-31-1966	Self-adaptive echo canceller (telephone)	5
4,000,000	12-28-1976	Recycling asphalt-aggregate	10
4,500,000	2-19-1985	Pad of plastic bags with support	8
5,000,000	3-19-1991	Ethanol production by e-coli and ADH genes	6
5,500,000	3-19-1996	Soft tissue repair system and method	5
6,000,000	12-7-1999	Synchronizing multiple files on two computers	4
6,500,000	12-31-2002	Hand piece for dental syringe	3
7,000,000	2-14-2006	Polysaccharide fibers	3
7,500,000	3-3-2009	Assigning or creating a resource (computer)	3
8,000,000	8-16-2011	Visual prosthesis	2
8,500,000	8-6-2013	Device for locking/unlocking jalousie of container	2

By the time patent number one-million issues (a patent for a vehicle tire), the pace has accelerated to a three year interval. So the awards committee decides to change the rules: awards shall henceforth be made every 500,000th patent. With this new rule in place it takes thirteen years before patent 1,500,000 is granted (for a submarine). Thirteen sounds like a lot of years, but it actually represents an average pace of 2.6 years for each 100,000. The year of the submarine is 1920. Patent 2,000,000 issues some eight years later, for a vehicle wheel construction. Then a couple of world wars disrupt things; it takes 18 years before patent 2,500,000 issues, on a quick fastening door for a ship's hatch.

By the 1950s things are back on a pace similar to that before the wars. Patent number 3,000,000 issues 12 years later; patent number 3,500,000 issues 8 years later. This pace

seems to hold for the next 3,500,000, 4,000,000 and 4,500,000 (about 7-8 years between awards). Then the pace begins to accelerate again. Six years, then five, then four, then three. Today, patent number 8,000,000 issued only two years before patent 7,500,000 and patent 8,500,000 issued only two years after that.

Not only is the pace increasing at an accelerating rate, the diversity of technologies represented by these patent has expanded considerably. Sampling every 100,000 or every 500,000 patents is hardly scientific; yet notice how many of the early patents were related to transportation: horses, carburetors, steam engines, vehicle tires and wheels, submarine ships, and hatches for ships. In more recent years, the technological fields have expanded to include computers, communications, chemistry, biotechnology and medicine.

We can infer from this sampling of historical technology that the arc of technology is expanding, like stars and galaxies in an expanding universe. However, unlike stars and galaxies, that are growing farther and farther apart, patents are actually becoming more and more linked together. This is undoubtedly because information spreads so effortlessly today, thanks to the public internet. With very few exceptions, every patented invention was the result of combining two or more known things to make something new. Evidence of this is everywhere. Combine a handheld radio with a computer and an LCD touchscreen and what do you get? A smartphone.

When you look at the front cover of any patent you can see a list of the prior art patents and documents that represent a sampling by the patent examiner of the state of the art when the subject invention was made. That is not to say that the inventor actually combined those very listed prior art patents and documents when making his or her invention. But the items listed were certainly available to the inventor when his or her invention was made. The essence of every patent on the books is this: The patent examiner, having first studied the listed prior art, considered the claimed invention to be sufficiently novel and non obvious to deserved to be patented.

Forecasting

It is one thing to look at a patent and see what technology came before. Looking backwards in this fashion provides a fascinating view of where the arc of technology has been. But what if we could look forward? What if we could use the patent system to forecast where the arc of technology is heading. It turns out we can, thanks to some pretty sophisticated data analysis.

It is beyond the scope of this paper to delve into details. If interested, see Eusebi, et. al. "Identification and Analysis of Technology Emergence Using Patent Classification," Rand Corporation, 2014. To get a sense of how this is even possible, one must appreciate that patents exist within a painstakingly maintained classification system—a network if you will. Patents are thus "connected" to one another much like friends are connected in a social network. Wheel patents are linked to spokes patents and tire patents are linked to rubber making patents. Many of these links were forged long ago. No one gives these familiar links a second thought. However, some links are only now just emerging. These emerging links are where exciting things happen. When an inventor—for the first time ever—thinks to connect technology A with technology B, that connection may initially go unnoticed. But eventually others discover it and the A-B connection takes off like a rocket. If you are a venture start-up investor and manage to find an emerging A-B connection growing in popularity, bet on it fast, before the market saturates.

For example, there is a new technology within the Patent Office called "quantum dots." These are tiny semiconductor nanocrystals that so small they actually exploit the counterintuitive world of quantum theory where something can exist at two different places at the same time.

Quantum dots were first discovered in 1981, but they are only now starting to find their way into useful applications. For instance, in 2002, one scientist reported using a genetically engineered bacteriophage virus to create a quantum dot biocomposite structure. If a biological process can create a quantum dot, how long before a biological process can *control* a quantum dot? How long after that before the quantum dot becomes a quantum computer, powered and controlled by biological functions within the human body? If you think that this is all just science fiction, know that at the 2015 Consumer Electronics Show some of the reportedly most stunning television picture displays were made with none other than quantum dots. The quantum dot explosion has already begun.

As it turns out, no matter where you choose as your starting point in the patent classification network there are links that will take you (perhaps after a couple of hops) to an emerging technology, like quantum dots. Even if your technical field is buggy whips, there is an emerging technology that—once the connection is made—will completely revolutionize and disrupt the entire buggy whip industry as we know it. The arc of technology exhibits no favoritism. Indeed, the recorded music industry has seen this disruption first hand when digital technology disrupted the well entrenched plasticware industry. Lightning never strikes twice in the same place, or so they say. The same cannot be said for the arc of technology. As the patent records show, the arc of technology *continually* strikes twice in the same place. Will technology disrupt the recorded music industry again? In our lifetimes? The answer is almost certainly, yes.

Emerging Technology Disrupts the Music Industry—Again

Let us first look back to how the recorded music industry was disrupted the last time. When plasticware was the only practical way of mass distribution, the barrier to entry was high. A record company needed expensive Abbey Road recording studios, expensive record pressing plants and expensive merchandise distribution channels to earn dollars from music lovers around the world. Thus recording studios gave us record *albums*, containing extra songs no one really wanted, that were designed to command a high price. This entire scene changed when the music went digital. In the digital domain, musicians could record their own songs without needing a lot of expensive Abbey Road equipment. Because the end product was essentially a computer data file, music distribution became dirt cheap. Anyone with an Internet connection could become a music distributor (not necessarily legally). As a mass market music distribution platform, plasticware was doomed. Music distribution *services* like Pandora and Spotify now dominate what was once the exclusive domain of the record companies.

But are Pandora and Spotify in any safer position than the record companies were? Is there another disruption on the horizon? Given the arc of technology, the answer is almost certainly yes. There are many ways this could happen; here is one:

- Mobile devices get much, much smaller. While we may still carry smartphones in our pockets, advances in nanotechnology and quantum computing will give us network enabled computer devices so small they can be worn as jewelry or even woven into the fabric of our clothing, or worn as body art.
- The Internet will evolve to embrace the already developed IPV-6 standard, creating billions and billions of unique Internet addresses. Each of our tiny computing devices will have its own IP address. This means all those computers worn as jewelry or woven into the fabric of our clothing will be able to get on the Internet. They will also be able to talk to one another even without the Internet:

- Advances in mesh networks will create a *dust cloud* of interrelated nodes talking to each other. While some of these nodes may be connected to the Internet, it is not necessary that they all be so connected. As long as one node in the neighborhood has an Internet connection, the other neighbors can share that connection.
- Unlike the current cloud computing paradigm, which relies on big server farms owned and operated by well endowed service providers, the dust cloud of tiny peer-to-peer computing devices has no central control point. No one entity controls this network.
- Riding on this dust cloud network is a shared database called a block chain (Bitcoins exist using this concept). Using this block chain artists can negotiate for and receive payment for their works, all without either buyer or seller going through a controlled central hub. This provides the mechanism whereby the whole decentralized music distribution scheme can be monetized.
- The resulting music distribution network will operate like Kazaa on steroids. The Kazaa network has been used to illegally distribute copyrighted works, and enormous damages awards have been obtained from individuals caught using it. Use of the dust cloud network would be largely untraceable. The very existence of the dust cloud could encourage a resurgence of Kazaa-like copyright violations, which would be unfortunate.
- The more important and beneficial use of the dust cloud would be to give artists and musicians access to a new channel by which to monetize their works—without the middleman. There would be no need for record labels. In population dense areas, even the cell phone and internet service providers are cut out of the equation. Music would pass from personal node to personal node without ever engaging a WiFi access point or cell phone tower.
- As artists explore the possibilities of offering different services in exchange for micro-payments (via the block chain) customers will have many new ways of enjoying their favorite artists' work. Want to rent Jerry Garcia's guitar riffs from that concert you attended at the Oakland Coliseum in 1992, so that you can play along in your basement? Sold. Want to purchase ringtones that are handpicked each month by Ziggy Marley? Sold.

Conclusion

The patent system, which has existed for hundreds of years, provides a mother lode of data mining opportunities. With a few simple text searching tools you can trace the arc of technology back with great clarity for at least several hundred years. With more sophisticated computer-implemented forecasting tools, and a little ingenuity, you can even see into the future. Because the patent system touches virtually every technological field, patent data mining can yield valuable insights on just about any topic that interests you. We have taken a glimpse of how patent data mining can forecast the next disruption in music distribution. As this is just a forecast, the precise arc of technology may take a somewhat different path. Regardless of the details, forewarned is forearmed. As interactive media and entertainment lawyers, you have some challenges ahead.

About the Author

Gregory Stobbs - Mr. Stobbs has been a principal in the patent firm, Harness Dickey, since 1986 and has practiced in the IP field for over 30 years. He is the author of two leading legal treatises, *Software Patents*, and *Business Method Patents* and editor of a third treatise, *Software Patents Worldwide*, a work comprising country law chapters contributed by personally chosen IP attorneys throughout Europe and Asia. He has handled complex patent litigation, argued before the Court of Appeals for the Federal Circuit, rendered legal opinions and served as expert witness in several patent litigations. He has clients throughout the world and regularly speaks internationally. To complement his travels, he has acquired intermediate level fluency in both spoken and written Japanese. Today Mr. Stobbs specializes primarily in computer software, telecommunications, GPS navigation, computer user interfaces, artificial intelligence and pattern recognition systems ranging from speech recognition to bioinformatics.

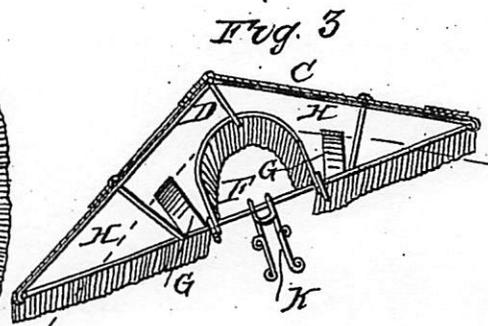
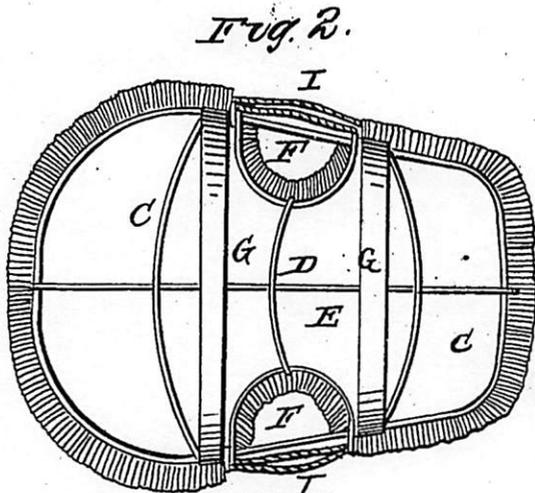
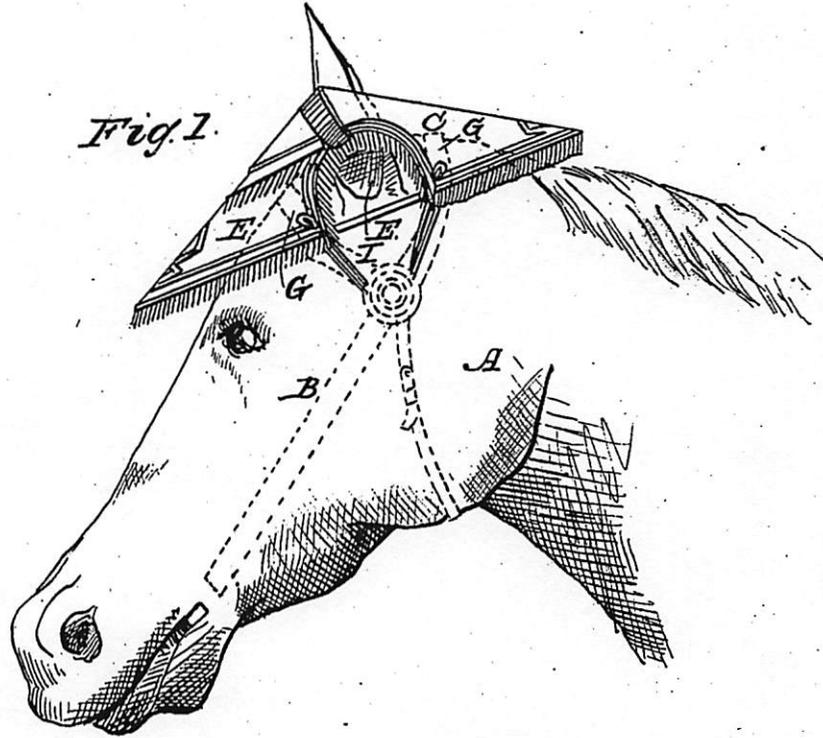
stobbs@hdp.com

248-641-1214

J. ANDERSON.
Horse Sun-Bonnet.

No. 100,000.

Patented Feb. 22, 1870.



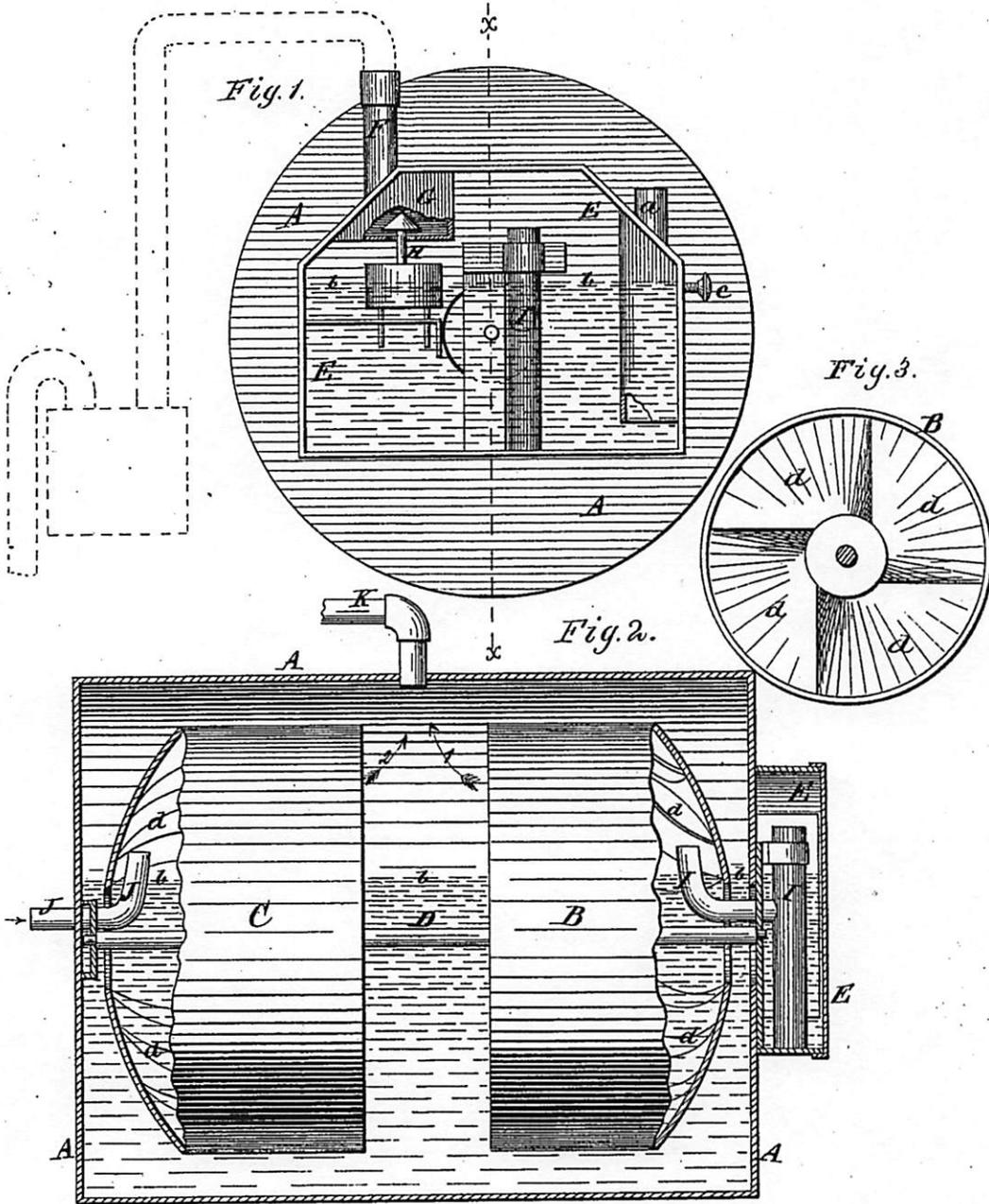
Witnesses
Wm. H. Cummings
Samuel Lewis

Inventor
J. Anderson

M. SHEA & J. McC. HAMILTON.
Carbureter.

No. 200,000.

Patented Feb. 5, 1878.



WITNESSES:

Henry N. Miller
J. H. Scarborough.

INVENTORS

M. Shea.
J. McC. Hamilton.
BY Munroe

ATTORNEYS.

(No Model.)

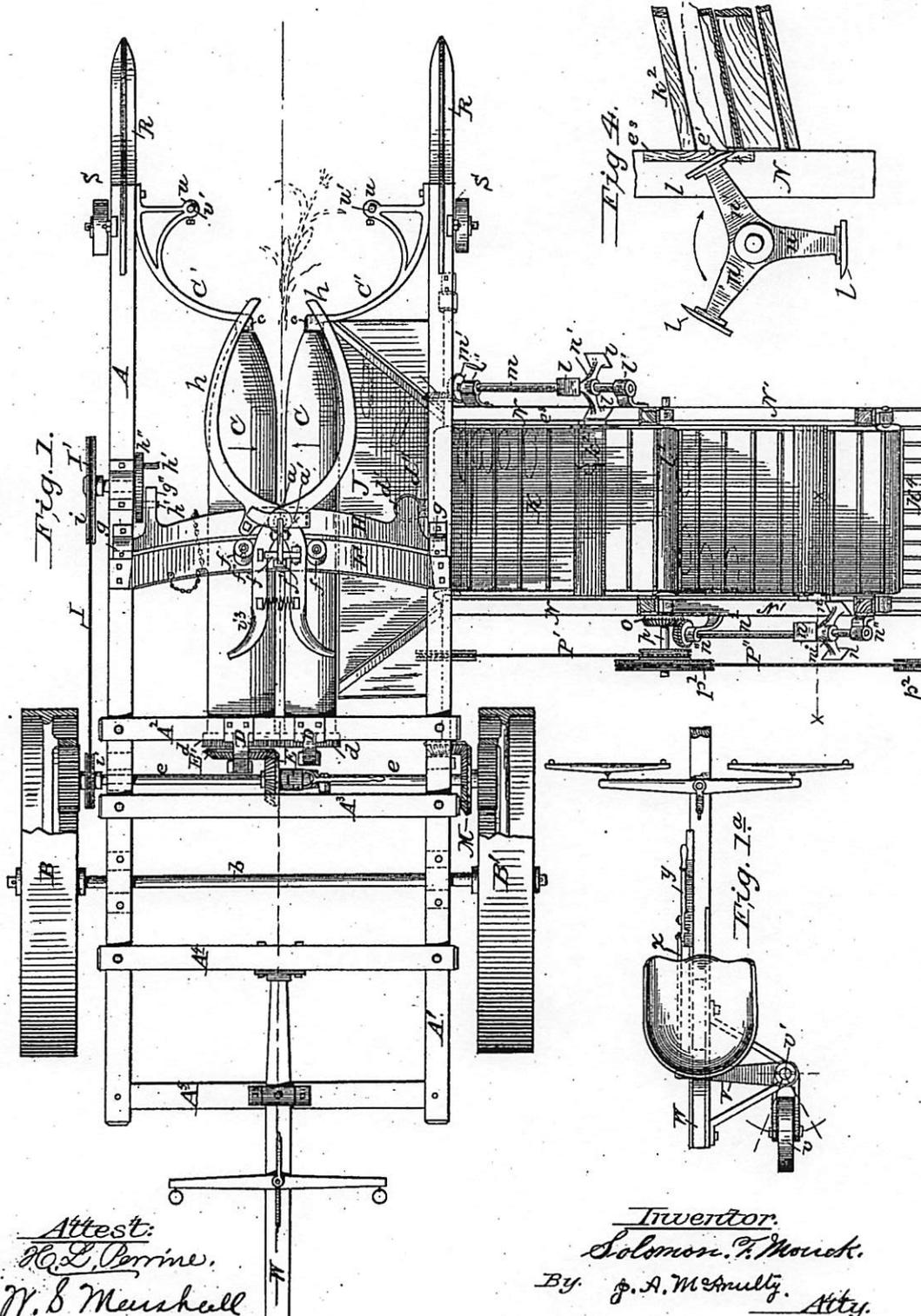
3 Sheets—Sheet 1.

S. F. MOUCK.

CORN HARVESTER.

No. 300,000.

Patented June 10, 1884.



Attest:
R. L. Perrine,
W. S. Marshall

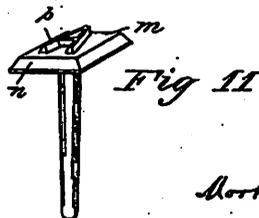
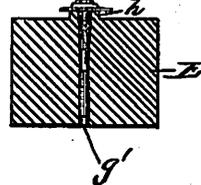
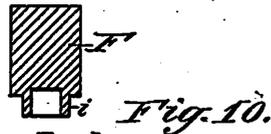
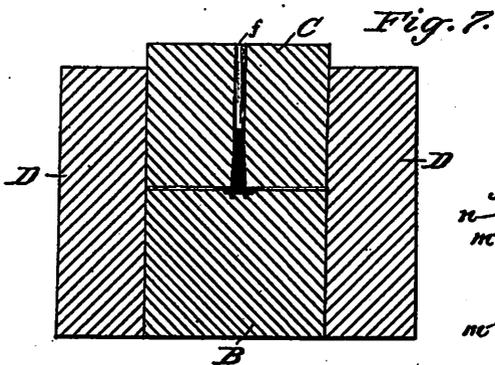
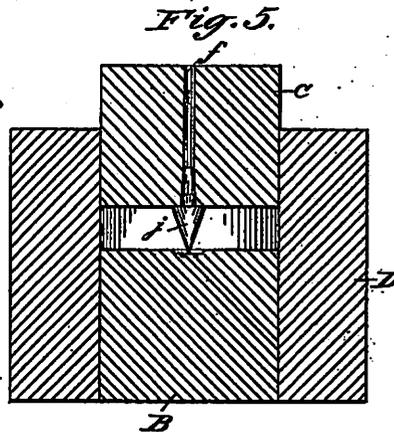
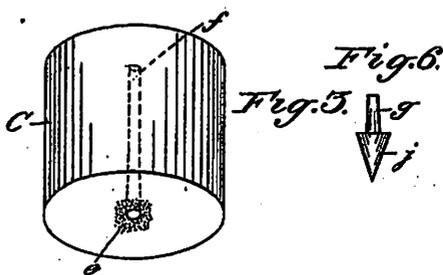
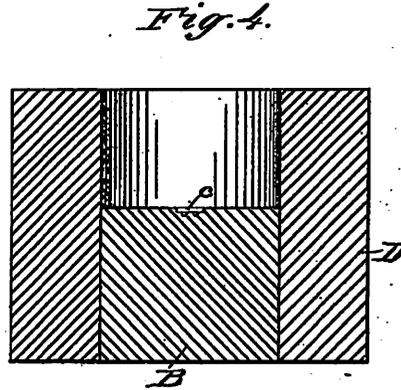
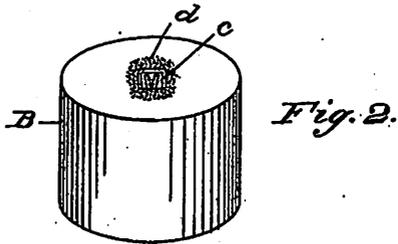
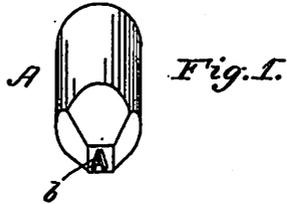
Inventor,
Solomon F. Mouck,
 By *J. A. McNulty,* *Atty.*

(No Model.)

M. G. MERRITT.
METHOD OF MAKING TYPE.

No. 400,000.

Patented Mar. 19, 1889.



Attest:
Andrew W. Steyer,
George B. Milton

Inventor:
Mortimer S. Merritt
By atty. Jacob Felbel.

(No Model.)

B. GREENBERG.
WATCH PROTECTOR.

No. 600,000.

Patented Mar. 1, 1898.

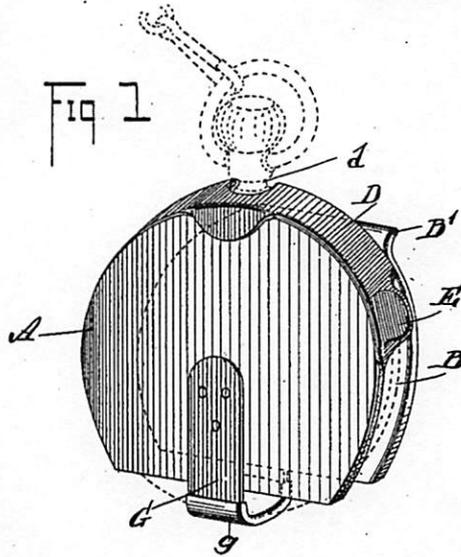


Fig 2

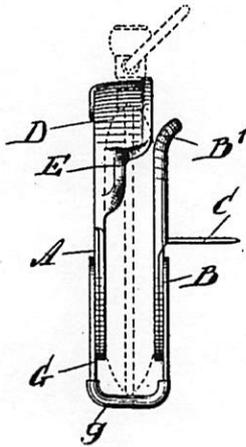
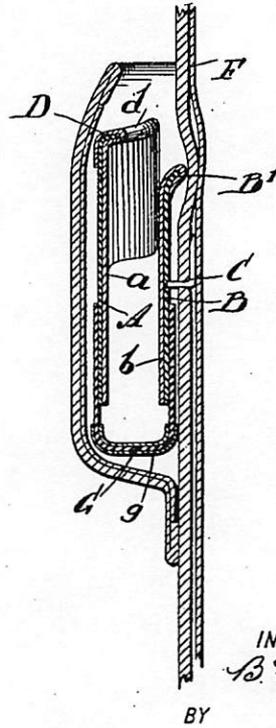


Fig 3



WITNESSES:
Geo. Schum
H. L. Reynolds

INVENTOR
B. Greenberg
BY
Mumford
ATTORNEYS.

McCLINTOCK YOUNG.
WORK HOLDING DEVICE FOR BORING MACHINES.
(Application filed Nov. 26, 1901.)

(No Model.)

4 Sheets—Sheet 1.

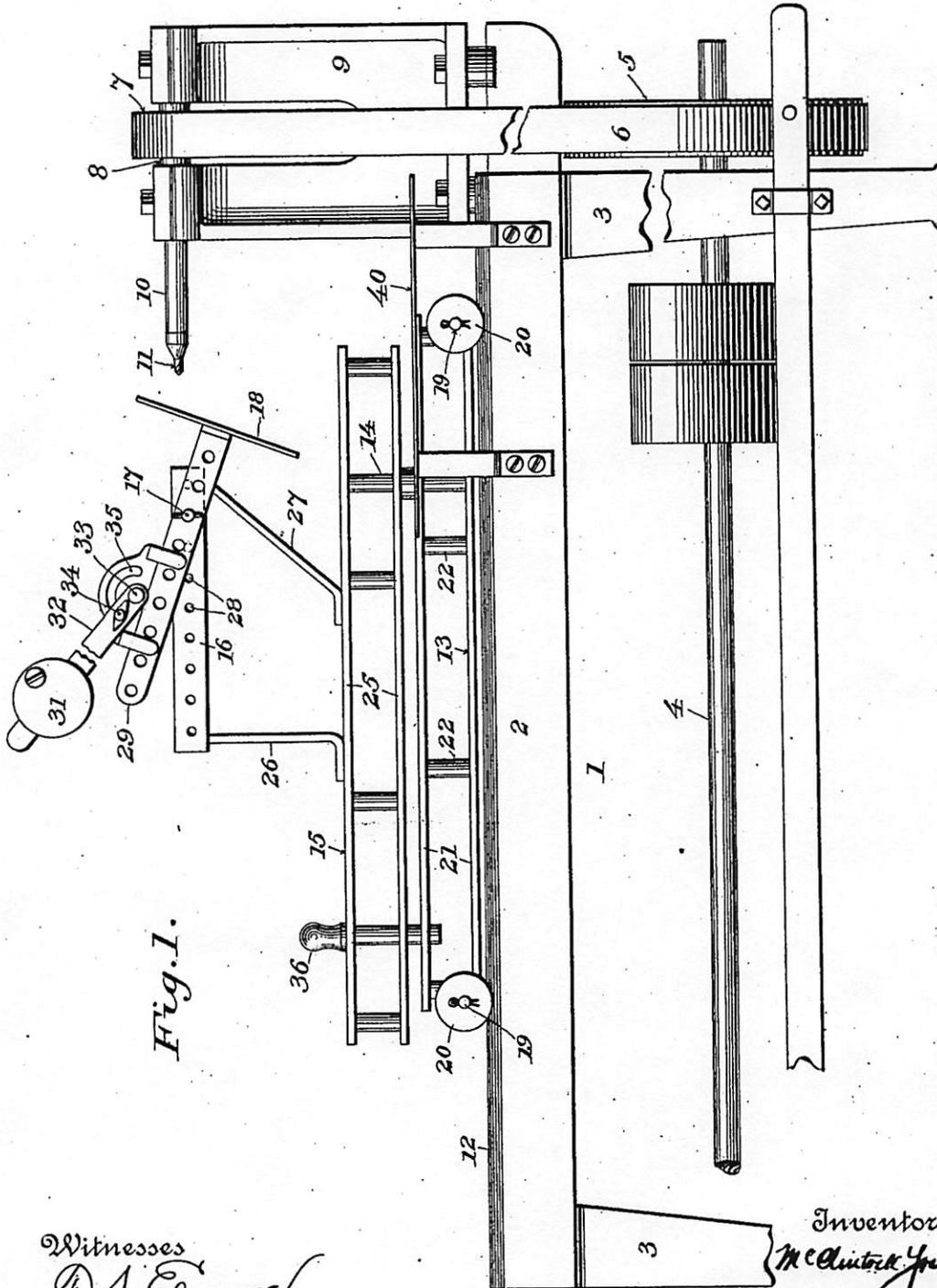


Fig. 1.

Witnesses
D. S. Emore.
Geo. M. Copenhaver

Inventor
McClintock Young
 By *Philip P. Dodge*
 Attorney

C. MELROSE.
DEMONSTRATING MODEL.
APPLICATION FILED OCT. 12, 1904.

Fig. I.

19

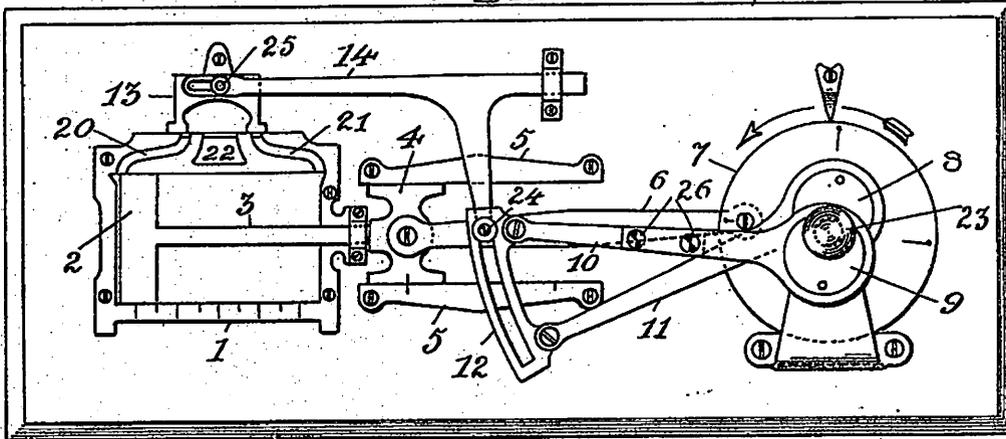
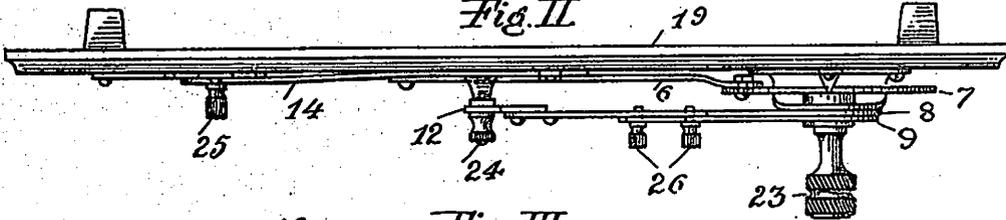


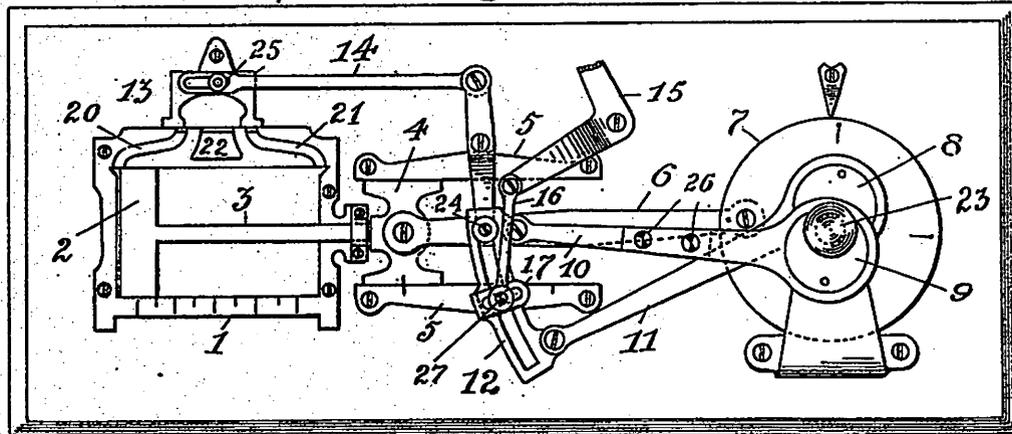
Fig. II.

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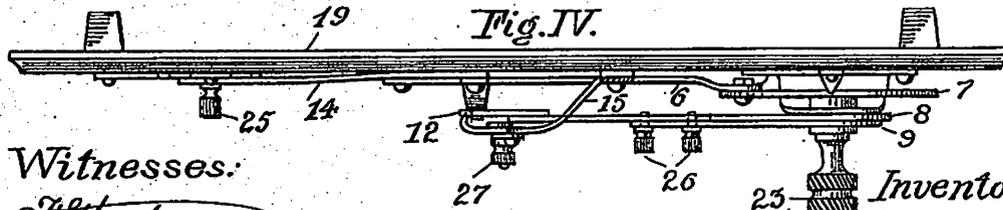
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Fig. III.



19

Fig. IV.



Witnesses:

Elmer Wickes.
Elmer Wickes.

Inventor:

Charles Melrose.
By *J. Richards & Co.*
Attys.

C. D. SEEBERGER.
CONVEYER.

APPLICATION FILED NOV. 24, 1902. RENEWED DEC. 7, 1904.

900,000.

Patented Sept. 29, 1908.

4 SHEETS—SHEET 1.

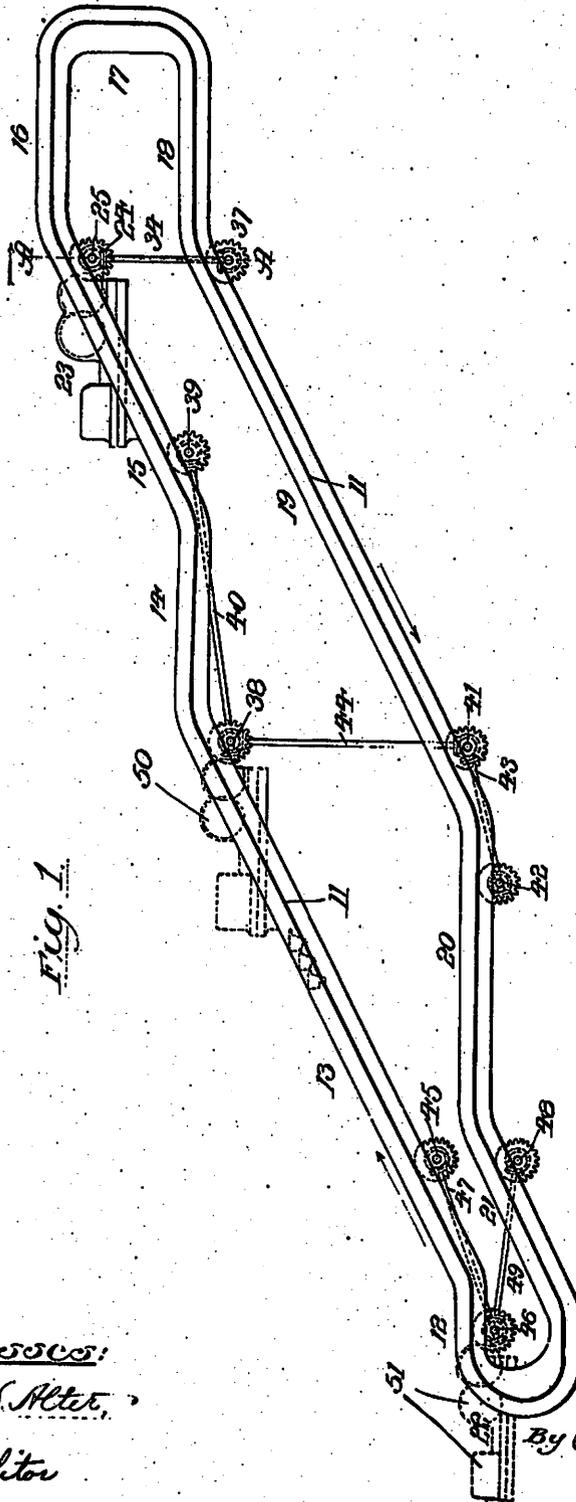


Fig. 1

Witnesses:
Julius S. Alter,
E. Molitor

Inventor:
Charles D. Seeburger
By Coburn, McRoberts & Melton
Attorneys

F. H. HOLTON.
 VEHICLE TIRE.
 APPLICATION FILED APR. 25, 1910.

1,000,000.

Patented Aug. 8, 1911.

Fig. 1.

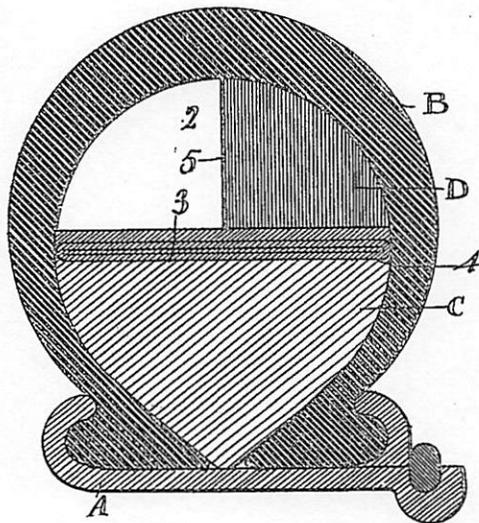


Fig. 2.

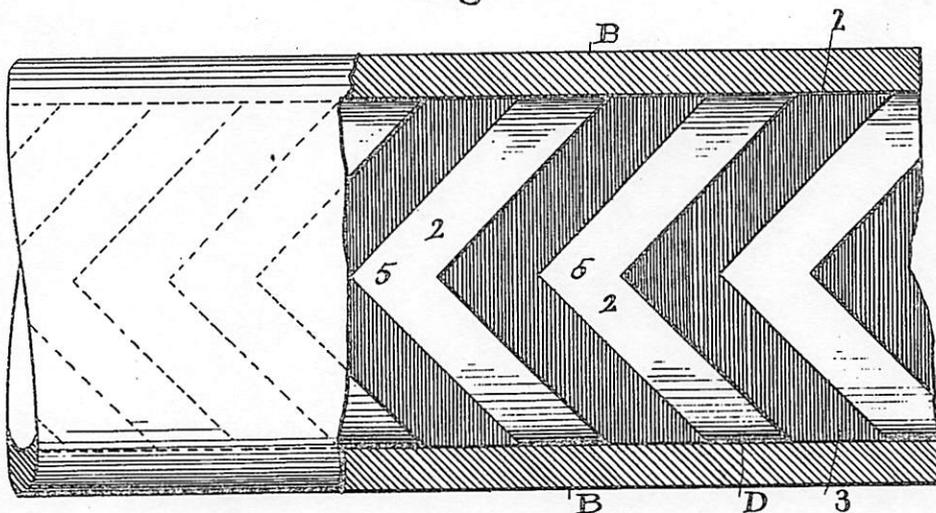
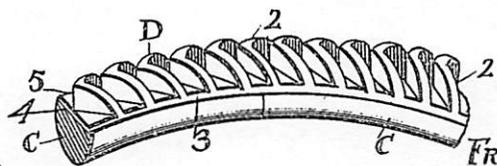


Fig. 3.



ATTEST
E. M. Fisher
J. C. Musson

INVENTOR
 FRANCIS H. HOLTON

BY *Fisher & Musson*
 ATTYS.

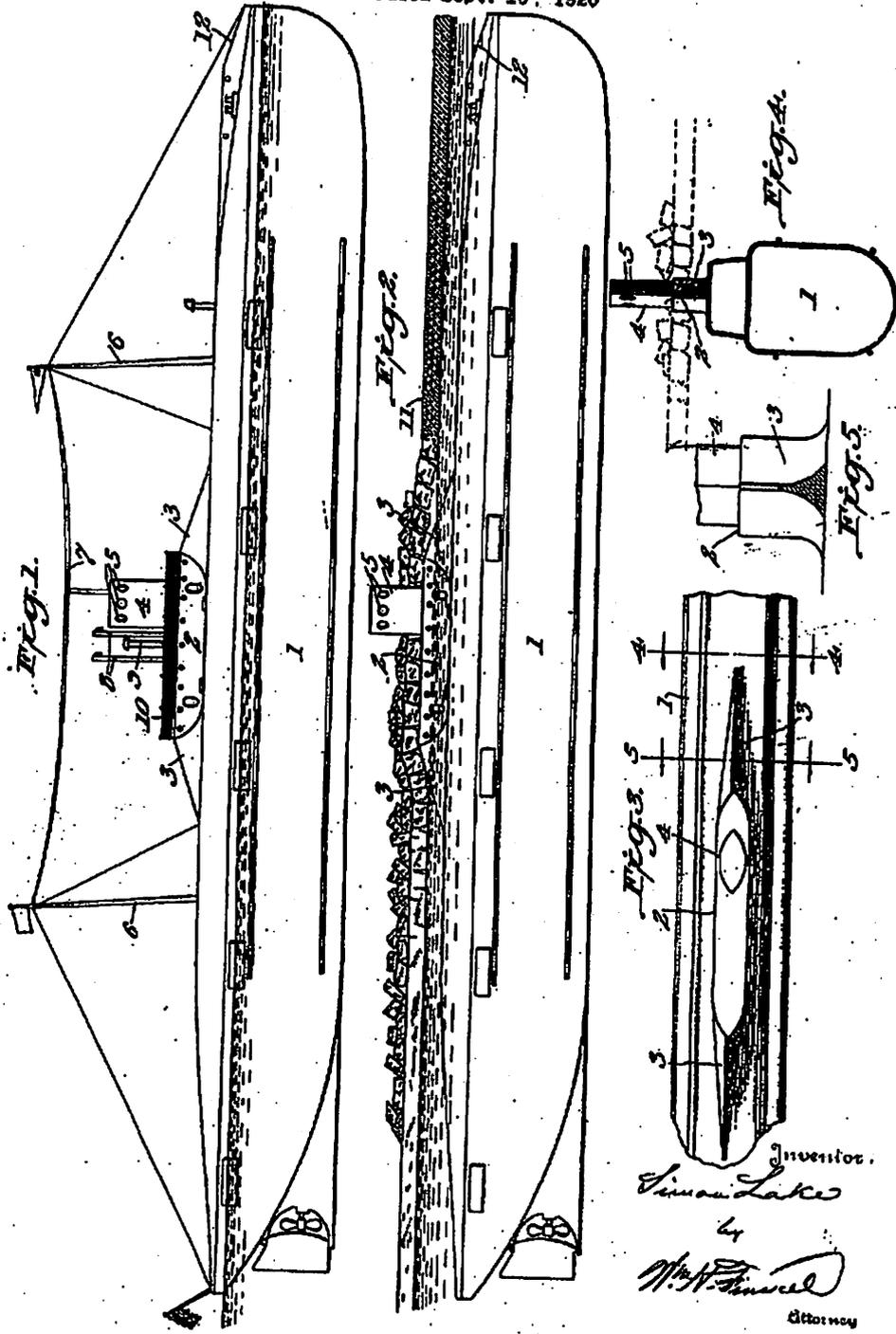
July 1, 1924.

S. LAKE

1,500,000

SUBMERSIBLE VESSEL FOR NAVIGATION UNDER ICE

Filed Sept. 10, 1920



Inventor,
Simon Lake
by
M. H. Simard
Attorney

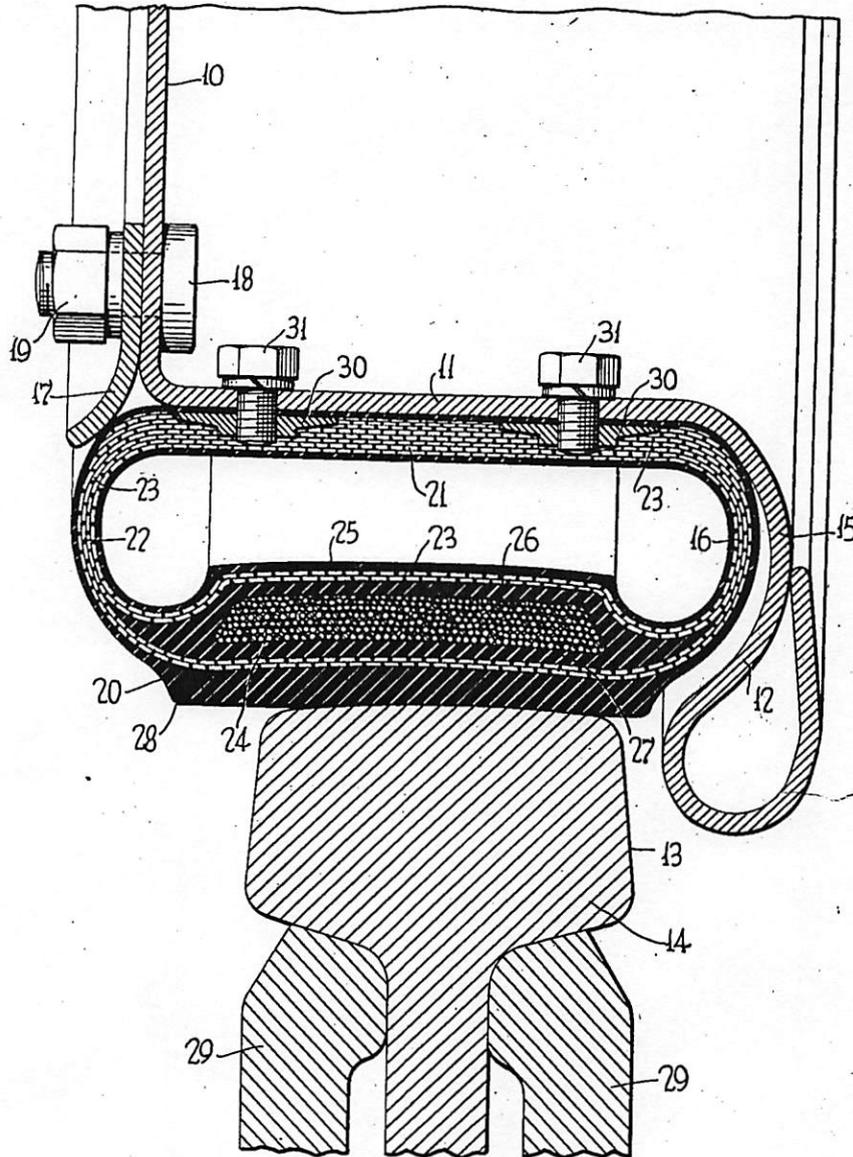
April 30, 1935.

J. LEDWINKA

2,000,000

VEHICLE WHEEL CONSTRUCTION

Original Filed May 12, 1932



INVENTOR
JOSEPH LEDWINKA.
BY *John P. Carbo*
ATTORNEY

March 7, 1950

F. M. LAMBERT

2,500,000

INTERLOCK FOR QUICK FASTENING DOORS

Filed Dec. 6, 1946

3 Sheets-Sheet 1

Fig. 1.

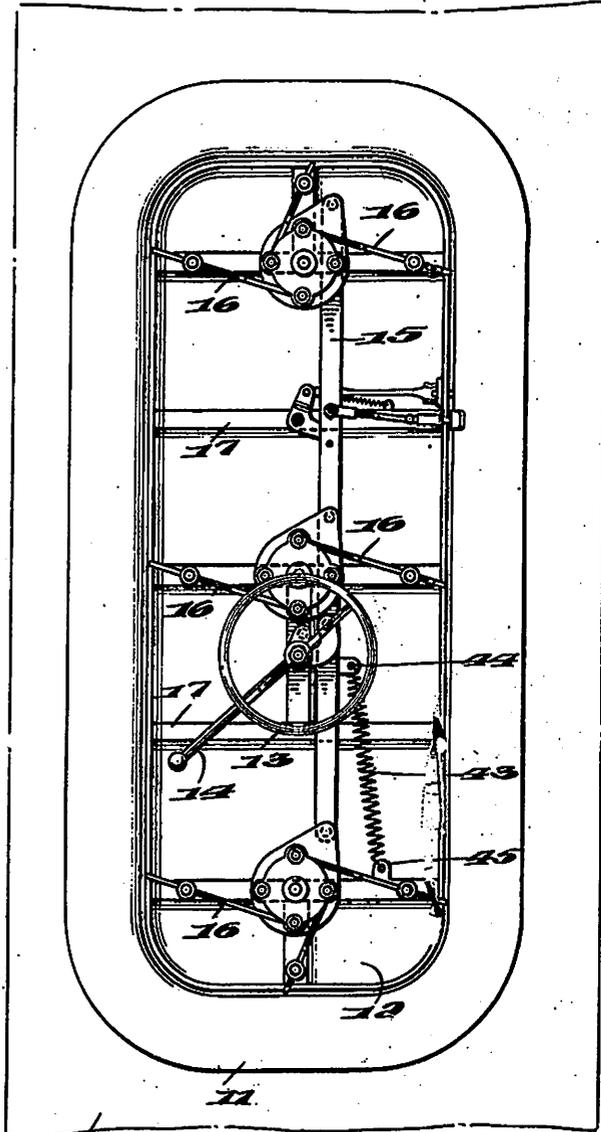


Fig. 6.

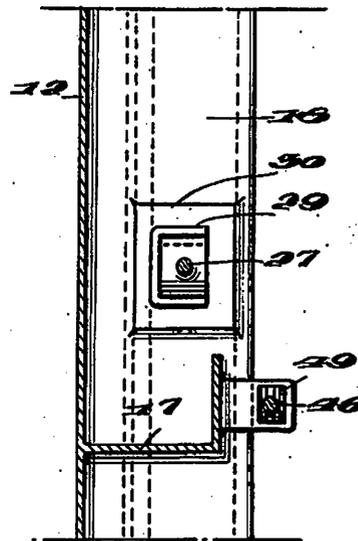
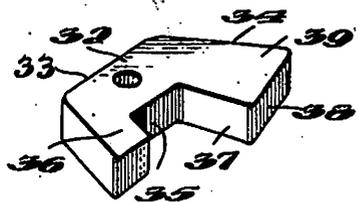


Fig. 7.



Inventor

FRANCIS M. LAMBERT,

334

Robert B Pearson
Attorney

Sept. 12, 1961

K. R. ELDRIDGE
AUTOMATIC READING SYSTEM

3,000,000

Filed May 6, 1955

4 Sheets-Sheet 1

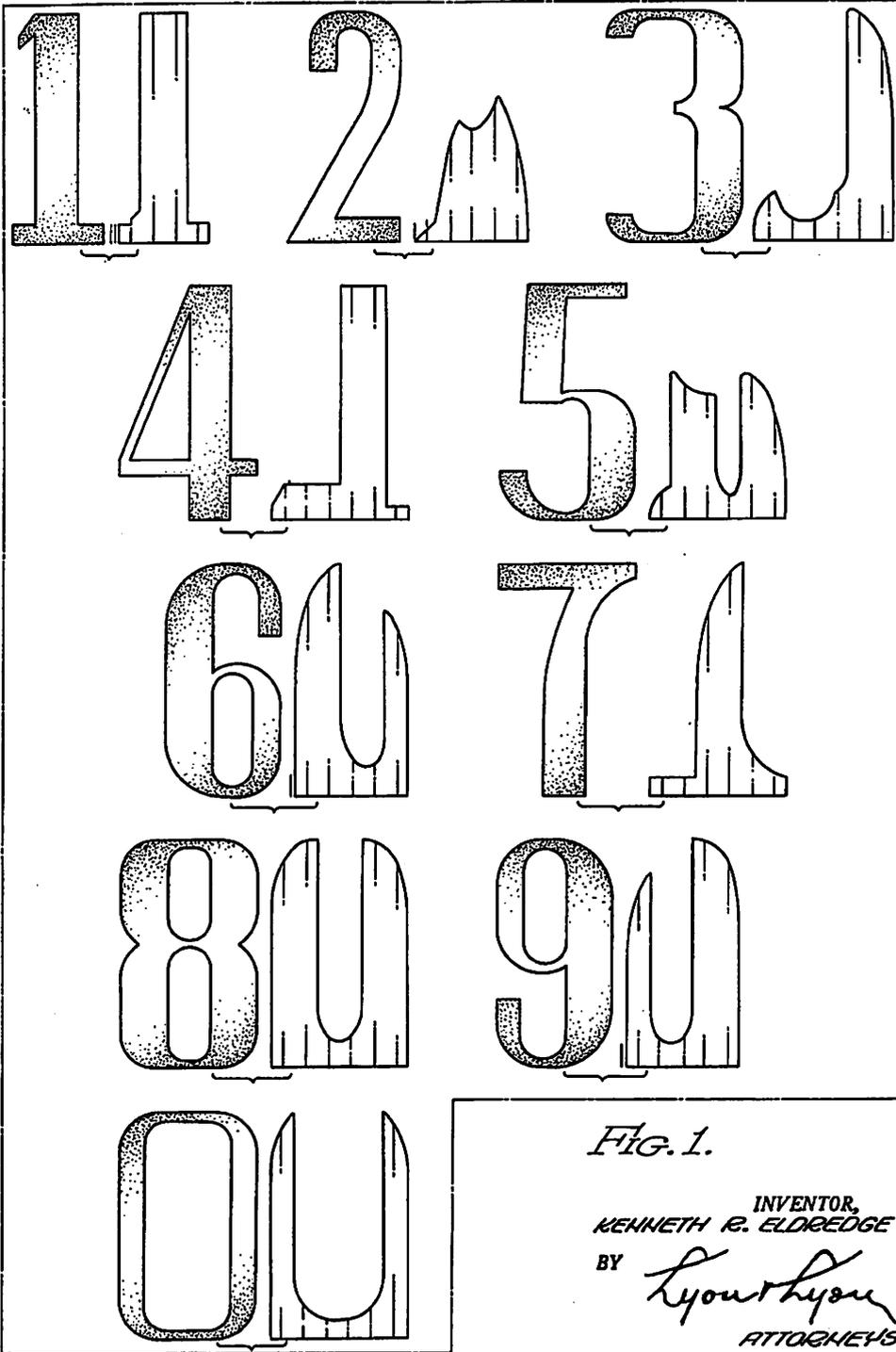


FIG. 1.

INVENTOR,
KENNETH R. ELDRIDGE

BY *Lyon Lyon*
ATTORNEYS

[54] **PROCESS FOR RECYCLING ASPHALT-AGGREGATE COMPOSITIONS**

[76] Inventor: Robert L. Mendenhall, 1770 Industrial Road, Las Vegas, Nev. 89102

[22] Filed: July 15, 1974

[21] Appl. No.: 488,518

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 286,613, Sept. 5, 1972, abandoned, and Ser. No. 360,464, May 15, 1973, Pat. No. 3,845,941.

[52] U.S. Cl. 106/280; 106/281 R; 404/72; 404/79

[51] Int. Cl.² C08J 3/18; C08K 5/01; C08L 95/00; C04B 13/30

[58] Field of Search 106/280, 281, 283, 278, 106/279; 404/72, 73, 79

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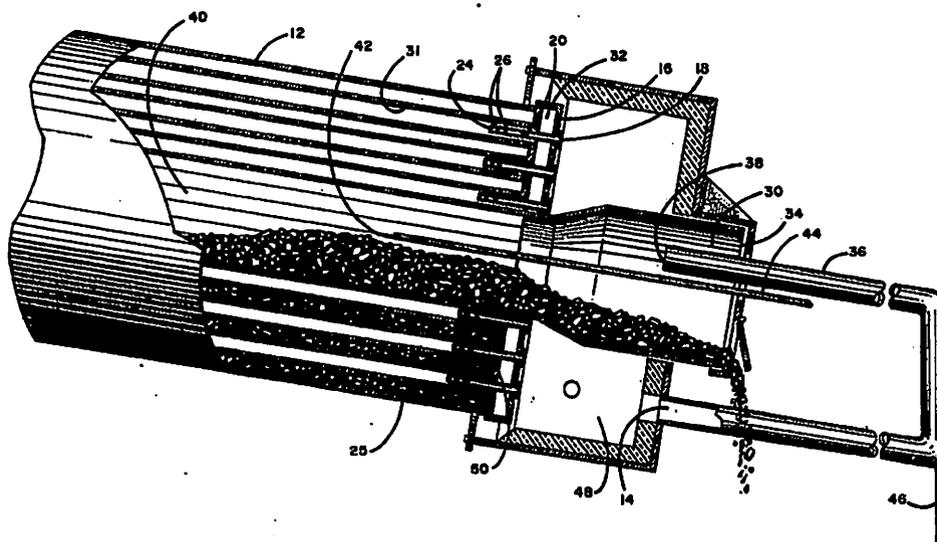
Abraham, *Asphalts and Allied Substances*, 6th Ed., vol. 3, D. van Nostrand Co. Inc., N.Y., TN 853, A35, 1960, c. 3 (p. 190, 2nd full par. relied on).

Primary Examiner—Joan E. Welcome
Attorney, Agent, or Firm—Seiler and Quirk

[57] **ABSTRACT**

In recycled asphalt-aggregate compositions prepared by adding a suitable amount of make-up asphalt to pieces of the used composition and heating the mixture in a rotating cylindrical drum by tumbling the composition over heated pipes as it is gradually directed towards an output end of the drum, the improvement comprising adding an amount of petroleum hydrocarbon to achieve a laid down asphalt penetration of between 25 and 300 dmm at 77° F. A further embodiment of the improved process comprises venting a mixture of hydrocarbon gases and moisture vaporized from the hot composition mixture at the output end of the apparatus, condensing the moisture and removing it and returning the hydrocarbon gases to a combustion chamber for providing heat to the apparatus tubes. Still another improvement comprises an apparatus modification wherein a plurality of relatively short pipes are disposed in the forward ends of the heating tubes through a front plate displaced from the forward end wall of the drum with the open pipe ends exposed to the combustion chamber for providing heat to the interior of the heating tubes.

10 Claims, 1 Drawing Figure



United States Patent [19]

Membrino

[11] Patent Number: 4,500,000

[45] Date of Patent: Feb. 19, 1985

- [54] PAD OF PLASTIC BAGS WITH SUPPORT MEANS
- [76] Inventor: Hercules Membrino, 280 Paoli Pike, Malvern, Pa. 19355
- [21] Appl. No.: 588,567
- [22] Filed: Mar. 12, 1984
- [51] Int. Cl.³ B65D 85/62; B65D 30/00
- [52] U.S. Cl. 206/554; 206/526; 206/806
- [58] Field of Search 206/449, 494, 554, 526, 206/806

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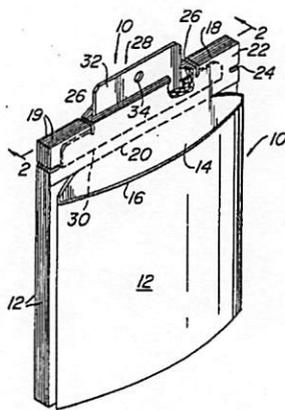
2657395	6/1978	Fed. Rep. of Germany	206/806
1008293	10/1965	United Kingdom	206/554

Primary Examiner—William T. Dixon, Jr.
Assistant Examiner—Brenda J. Ehrhardt
Attorney, Agent, or Firm—Arthur A. Jacobs

[57] **ABSTRACT**

A pad of plastic open-mouthed pockets overlying each other and separably connected by a common base portion, the base portion being formed of selvage portions extending from the open mouth of the pockets and being secured together at the sides thereof and at spaced connections at the free edges thereof, and a support hanger secured to the base portion and having an extension extending beyond the base portion in a position to be secured to a surface, the pockets being individually separable from said base portion to form individual bags.

10 Claims, 4 Drawing Figures



[54] **ETHANOL PRODUCTION BY
ESCHERICHIA COLI STRAINS
CO-EXPRESSING ZYMOMONAS PDC AND
ADH GENES**

[75] Inventors: Lonnie O. Ingram, Gainesville, Fla.;
Tyrrell Conway, Lincoln, Nebr.;
Flavio Alterthum, Gainesville, Fla.

[73] Assignee: University of Florida, Gainesville,
Fla.

[21] Appl. No.: 352,062

[22] Filed: May 15, 1989

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 239,099, Aug. 31,
1988, abandoned.

[51] Int. Cl.³ C12P 7/06; C07H 15/12;
C12N 15/00

[52] U.S. Cl. 435/161; 435/172.3;
435/320.1; 435/252.3; 435/252.33; 435/170;
536/27; 935/19; 935/29; 935/40; 935/60

[58] Field of Search 435/161, 170, 172.3,
435/320, 253, 252.33, 252.3; 536/27; 935/27,
19, 40, 60, 41, 29, 73

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Primary Examiner—Robin L. Teskin

Attorney, Agent, or Firm—Saliwanchik & Saliwanchik

[57]

ABSTRACT

A novel operon and plasmids comprising genes which code for the alcohol dehydrogenase and pyruvate decarboxylase activities of *Zymomonas mobilis* are described. Also disclosed are methods for increasing the growth of microorganisms or eukaryotic cells and methods for reducing the accumulation of undesirable metabolic products in the growth medium of microorganisms or cells.

7 Claims, 4 Drawing Sheets



US00550000A

United States Patent [19] Feagin et al.

[11] Patent Number: **5,500,000**
[45] Date of Patent: **Mar. 19, 1996**

- [54] **SOFT TISSUE REPAIR SYSTEM AND METHOD**
- [75] Inventors: **John Feagin, Durham; Richard Glisson, Bahama, both of N.C.**
- [73] Assignee: **United States Surgical Corporation, Norwalk, Conn.**
- [21] Appl. No.: **86,290**
- [22] Filed: **Jul. 1, 1993**
- [51] Int. Cl.⁶ **A61B 17/04**
- [52] U.S. Cl. **606/232; 606/224; 606/213; 606/220**
- [58] Field of Search **606/232, 60, 72-73, 606/79, 219, 213, 224; 24/453; 411/393**

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Primary Examiner—Gary Jackson

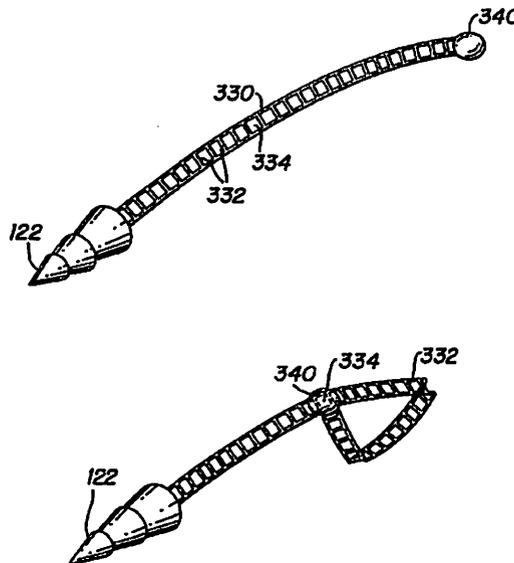
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[57] ABSTRACT

A soft tissue repair system and method are provided. The soft tissue repair system includes a barbed suture anchoring member attached to at least one suture member. A suture retaining member engages the suture member such that the length and tension of the suture may be selectively adjusted before the suture is permanently engaged in the retaining member. In use, the barbed suture anchoring member and suture member are inserted into the soft tissue repair site and across a tear. The suture member extends back through the original entry side of the tear. A retaining member is applied to the suture member followed by tensioning of the suture member to draw the sides of the tear into apposition. Following tensioning, the retaining member is permanently affixed to the suture member to maintain the selected tension and length of the suture member.

6 Claims, 4 Drawing Sheets





US00600000A

United States Patent [19]
Hawkins et al.

[11] Patent Number: 6,000,000
[45] Date of Patent: *Dec. 7, 1999

- [54] EXTENDIBLE METHOD AND APPARATUS FOR SYNCHRONIZING MULTIPLE FILES ON TWO DIFFERENT COMPUTER SYSTEMS
[75] Inventors: Jeffrey C. Hawkins, Redwood City; Michael Albanese, Los Gatos, both of Calif.
[73] Assignee: 3Com Corporation, Santa Clara, Calif.
[*] Notice: This patent is subject to a terminal disclaimer.
[21] Appl. No.: 09/072,274
[22] Filed: May 4, 1998

Related U.S. Application Data

- [63] Continuation of application No. 08/542,055, Oct. 13, 1995, Pat. No. 5,884,323.
[51] Int. Cl. G06F 17/30
[52] U.S. Cl. 707/201
[58] Field of Search 707/201

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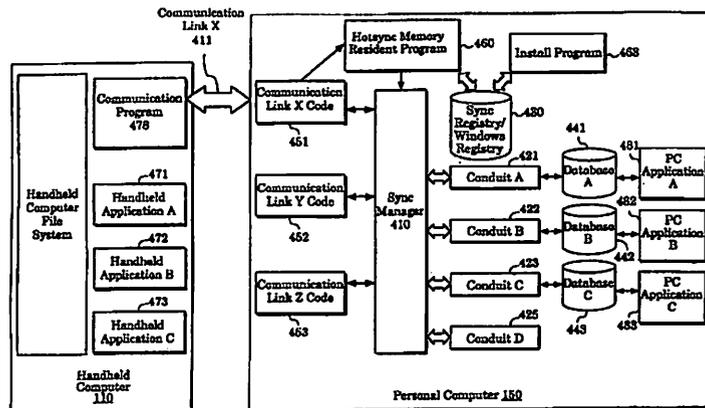
(List continued on next page.)

Primary Examiner—Richard L. Ellis
Attorney, Agent, or Firm—Blakely, Sokoloff, Taylor & Zafman LLP

[57] ABSTRACT

Many users of handheld computer systems maintain databases on the handheld computer systems. To share the information, it is desirable to have a simple method of sharing the information with personal computer systems. An easy to use extendible file synchronization system is introduced for sharing information between a handheld computer system and a personal computer system. The synchronization system is activated by a single button press. The synchronization system proceeds to synchronize data for several different applications that run on the handheld computer system and the personal computer system. If the user gets a new application for the handheld computer system and the personal computer system, then a new library of code is added for synchronizing the databases associate with the new application. The synchronization system automatically recognizes the new library of code and uses it during the next synchronization.

27 Claims, 7 Drawing Sheets





US00650000B1

(12) **United States Patent**
Segal

(10) **Patent No.: US 6,500,000 B1**
(45) **Date of Patent: Dec. 31, 2002**

(54) **HANDPIECE FOR A DENTAL SYRINGE ASSEMBLY**

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(76) **Inventor: Alan Julian Segal, 13 Park Avenue, Hale, Cheshire (GB), WA 15 9DL**

(*) **Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.**

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WO	WO 98/57597	12/1998

(21) **Appl. No.: 09/868,265**

(22) **PCT Filed: Dec. 17, 1999**

(86) **PCT No.: PCT/GB99/04201**

§ 371 (c)(1),
(2), (4) **Date: Jul. 30, 2001**

(87) **PCT Pub. No.: WO00/35370**

PCT Pub. Date: Jun. 22, 2000

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Primary Examiner—Cary E. O'Connor
(74) *Attorney, Agent, or Firm*—Hollander Law Firm, P.L.C.

(30) **Foreign Application Priority Data**

Dec. 17, 1999 (GB) 9827716

(51) **Int. Cl.⁷ A61C 17/02**

(52) **U.S. Cl. 433/80; 433/85**

(58) **Field of Search 433/80, 84, 81, 433/85, 88; 604/244**

(57) **ABSTRACT**

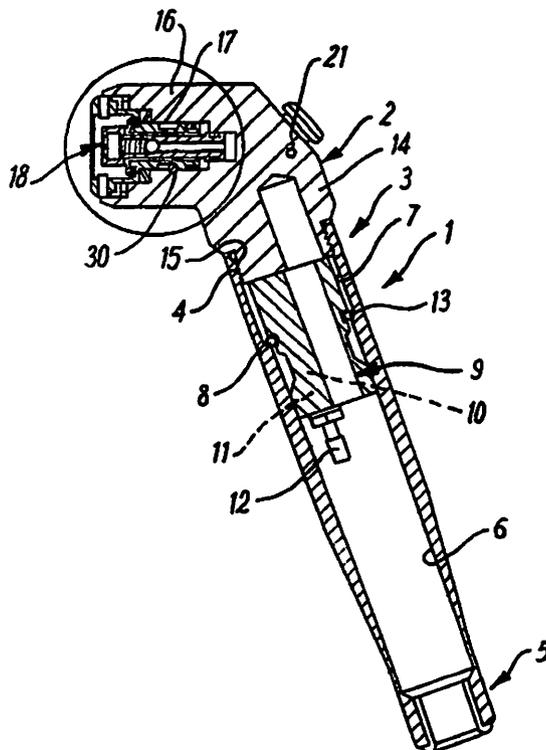
A dental syringe assembly has a handpiece connected to air and water lines and a tip for directing air and water flow into a patient's mouth. The tip has an enlarged cap that is detachably engageable with a sleeve structure of a head member of the handpiece. The sleeve structure may be provided in a connection piece that fits within a socket in the head member so that the connection piece can rotate but is retained against removal. A non-return valve may be provided within the head member to prevent return flow of contaminated water.

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24 Claims, 3 Drawing Sheets





US007000000B1

(12) **United States Patent**
O'Brien

(10) **Patent No.:** **US 7,000,000 B1**
(45) **Date of Patent:** **Feb. 14, 2006**

(54) **POLYSACCHARIDE FIBERS**

(56) **References Cited**

(75) **Inventor:** **John P. O'Brien, Oxford, PA (US)**

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(73) **Assignee:** **E. I. du Pont de Nemours and Company, Wilmington, DE (US)**

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(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(21) **Appl. No.:** **09/857,572**

- WO WO 9606173 2/1996
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(22) **PCT Filed:** **Jan. 19, 2000**

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§ 371 (c)(1),
(2), (4) **Date:** **Jun. 5, 2001**

(87) **PCT Pub. No.:** **WO00/43580**

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PCT Pub. Date: **Jul. 27, 2000**

Related U.S. Application Data

Primary Examiner—James O. Wilson
Assistant Examiner—Everett White

(60) **Provisional application No. 60/117,209, filed on Jan. 25, 1999.**

(57) **ABSTRACT**

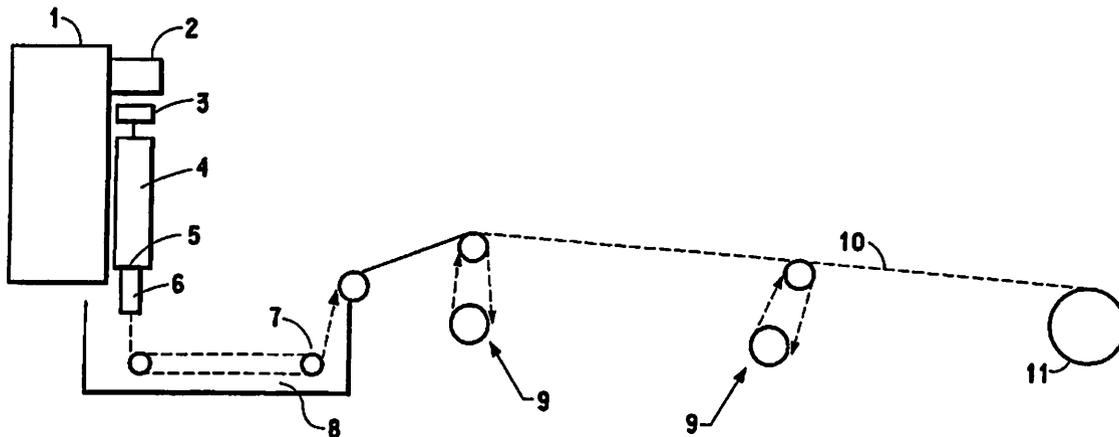
(51) **Int. Cl.**
C07H 1/00 (2006.01)
C07H 3/00 (2006.01)
C08B 37/00 (2006.01)

This invention pertains to novel fibers made of $\alpha(1\rightarrow3)$ polysaccharides, and a process for their production. The fibers of the invention have "cotton-like" properties but can be produced as continuous filaments on a year-round basis. The fibers are useful in textile applications.

(52) **U.S. Cl.** **536/123.12; 536/124**
(58) **Field of Classification Search** **536/123.12, 536/124**

See application file for complete search history.

15 Claims, 1 Drawing Sheet





US00750000B2

(12) **United States Patent**
Groves et al.

(10) **Patent No.:** **US 7,500,000 B2**
(45) **Date of Patent:** **Mar. 3, 2009**

(54) **METHOD AND SYSTEM FOR ASSIGNING OR CREATING A RESOURCE** 6,912,537 B2 * 6/2005 Selkirk et al. 707/100
7,043,738 B2 * 5/2006 Mandal et al. 719/328
7,191,358 B2 * 3/2007 Fujibayashi 714/6

(75) Inventors: **David W. Groves, San Jose, CA (US); Michael L. Lamb, San Jose, CA (US); Raymond M. Swank, San Jose, CA (US); Kevin J. Webster, Tigard, OR (US)**

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(73) Assignee: **International Business Machines Corporation, Armonk, NY (US)** JP 11161431 A 4/1999

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 751 days.

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(21) Appl. No.: **10/739,136** Groves, et al., U.S. Appl. No. 10/739,209, titled "Method and system for assigning a resource", filed Dec. 17, 2003, 24 pages plus 3 drawing sheets.

(22) Filed: **Dec. 17, 2003**

(65) **Prior Publication Data**
US 2005/0138174 A1 Jun. 23, 2005

(Continued)

(51) **Int. Cl.** *Primary Examiner—Dustin Nguyen*
G06F 15/173 (2006.01) (74) *Attorney, Agent, or Firm—David W. Victor; Konrad Raynes & Victor LLP*

(52) **U.S. Cl.** 709/226; 719/328; 707/8; 707/10; 707/100; 718/1; 711/100; 711/114; 711/163 (57) **ABSTRACT**

(58) **Field of Classification Search** 709/223, 709/224; 707/1, 100; 719/328; 714/6; 711/100, 711/163

See application file for complete search history.

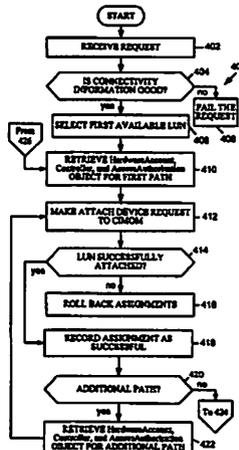
An example of a method for assigning a resource (for example, storage) includes receiving a request for a resource, wherein the request includes a list of paths. This example also includes retrieving a HardwareAccount, Controller, and an AccessAuthorization object for a first path in the list of paths. This example further includes making an attach device request to a CIMOM for a first available resource, using the Controller and the AccessAuthorization object. This example also includes determining if the first available resource was successfully attached, and if so, recording the assignment as successful, and if not, rolling back all assignments for the first available resource that were previously recorded as successful. Another aspect of the invention is a method for creating at least one LUN.

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13 Claims, 6 Drawing Sheets





US008000000B2

(12) **United States Patent**
Greenberg et al.

(10) **Patent No.:** **US 8,000,000 B2**
(45) **Date of Patent:** ***Aug. 16, 2011**

(54) **VISUAL PROSTHESIS**

(75) **Inventors:** **Robert J. Greenberg, Los Angeles, CA (US); Kelly H. McClure, Simi Valley, CA (US); Arup Roy, Valencia, CA (US)**

(73) **Assignee:** **Second Sight Medical Products, Inc., Sylmar, CA (US)**

(*) **Notice:** **Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 206 days.**

This patent is subject to a terminal disclaimer.

(21) **Appl. No.:** **11/874,690**

(22) **Filed:** **Oct. 18, 2007**

(65) **Prior Publication Data**

US 2008/0262568 A1 Oct. 23, 2008

Related U.S. Application Data

(60) **Provisional application No. 60/852,875, filed on Oct. 19, 2006.**

(51) **Int. Cl.**
A61N 1/372 (2006.01)

(52) **U.S. Cl.** **607/60; 607/53**

(58) **Field of Classification Search** **623/6.63; 607/5, 17, 53-57, 62, 60**

See application file for complete search history.

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Primary Examiner — Carl H Layno

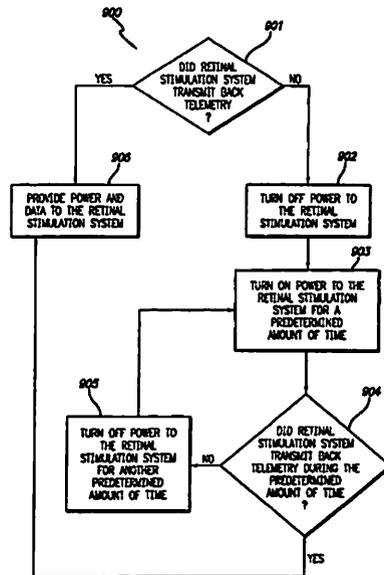
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(57) **ABSTRACT**

A visual prosthesis apparatus and a method for limiting power consumption in a visual prosthesis apparatus. The visual prosthesis apparatus comprises a camera for capturing a video image, a video processing unit associated with the camera, the video processing unit configured to convert the video image to stimulation patterns, and a retinal stimulation system configured to stop stimulating neural tissue in a subject's eye based on the stimulation patterns when an error is detected in a forward telemetry received from the video processing unit.

12 Claims, 16 Drawing Sheets





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(54) **DEVICE FOR LOCKING AND UNLOCKING THE JALOUSIE OF A CONTAINER**

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G07B 15/00 (2006.01)

(52) **U.S. Cl.**
USPC 232/15; 232/1 D; 232/44; 194/350; 109/64

(58) **Field of Classification Search**
USPC 232/1 D, 15, 16, 44, 43.2; 194/350, 194/351; 109/52, 64, 66, 73; 206/807; 220/324, 345.2, 350; 271/162; 221/154; 235/379

See application file for complete search history.

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(57) **ABSTRACT**

The invention relates to a device for locking and unlocking the roller shutter (12, 15) of a container (10) that can be inserted into a rack (11) and removed therefrom. The roller shutter (12, 15) is pulled open by a stationary pin engaging therewith during insertion of the container (10), it is pulled shut by the same engagement of the pin (14) when the container (10) is pulled out of the rack (11). In the closed position, the roller shutter (12, 15) shall be locked reliably and accurately. Two locking pins (21, 22) that can be actuated by cam tracks (35, 36) extending in longitudinal direction of the rack (11) and provided at the rack (11) serve for this purpose. The first locking pin (21) serves to lock the roller shutter (12, 15), the second locking pin (22) keeps the roller shutter (12, 15) in its exactly defined closed position during the locking by the first locking pin (21). As a result thereof, position errors of the roller shutter (12, 15) during locking and unlocking are prevented.

20 Claims, 4 Drawing Sheets

