CHAPTER 1

Patents, Copyrights, and Trademarks—A Look Back

Patents, trademarks, and copyrights have an extensive history dating as far back as 5,000 years ago when the Neolithic man marked cave walls to show that he owned the cave. These marks are the predecessor to today's trademarks. Inventors, authors, and others who develop ideas and inventions that have potential commercial value petitioned lawmakers over time to enact regulations that classified their ideas and inventions as assets. Those regulations are known as patents, trademarks, and copyrights.

The differences among patents, copyrights, and trademarks can be confusing. A *patent* grants an inventor sole rights to a new idea, new method, or new process. A *copyright* grants authors, musicians, and artists the exclusive rights to publish and sell literary, musical, or artistic works. Copyrights cover artistic, dramatic, musical, literary, and other scholarly works—both published and unpublished. A *trademark* is a word, phrase, slogan, design, or symbol that is used to identify merchandise and is used to distinguish merchandise from competing products. Trademarks indicate the source of a product (i.e., brand names).

A trademark was the first way a tradesman identified his goods and services. Greeks, Romans, Egyptians, and the Chinese used these markings to identify the maker of a product so that a buyer would know the workmanship of the goods or services that he or she was buying.

One of the first trademark laws was *The Bakers Marking Law* passed in England in 1266 under the reign of King Henry III. The Bakers Marking Law required bread makers to mark their work with either pinpricks or stamps. Nearly a century later in 1363, silversmiths were required to mark their products as well. Soon after, bottle makers and porcelain manufacturers were also obligated to mark their products.

Nearly four centuries after The Bankers Marking Law was enacted, one of the first cases of a trademark infringement appeared before the courts in England. A *trademark infringement* is an action of another that violates the trademark of a trademark holder. In the 1618 case, a company that made a lower-quality cloth tried to pass their product off as their higher-quality competitor's in the marketplace through the use of their markings.

The History of Inventions

An *invention* has three distinct characteristics. These are

1. **Problem.** Every invention (including patents) has to solve a specific problem.
2. **Solution.** An invention must solve a specific problem using an idea that those skilled in the art have not yet considered, which is subjective and the basis for many legal challenges to an invention.
3. **Novelty.** The solution to the specific problem must be novel.

The first patents were granted during the Renaissance period in Italy. Venice granted ten-year patents on silk making devices as far back as the 1200s.

Britain has the oldest formal patent system. During the fifteenth century, the government granted patents to specific persons or groups. The earliest known English patent was given to Flemish-born John of Utynam in 1449 for a method of making stained glass that had not previously been used in England. To receive a patent was to receive a favor from the ruling monarch. In exchange for Utynam's patent, he was to teach craftsmen in England his method. The practice of teaching others and passing on information continues today as part of the patent process (see Chapter 4, "Invention Teams").

A patent in the fifteenth century was different than a patent today. The word "patent" originally came from the Latin "litterae patentes," meaning open letter. Patents during the Middle Ages were literally letters stamped with the king's seal of approval. They were left open so that anyone could come and read them and see or challenge their validity. This was the state of Utynam's patent. The state of being of a simple, literal letter has changed drastically since that time, but the meaning also has changed.

During the fifteenth century, receiving a patent also meant that the person received royal consent for a monopoly on that product. (A monopoly is when a group has exclusive control over certain manufactured goods or services.) This was a problem because merchants were granted patents for common products that were already in existence such as soap, glass, iron, and paper.

An Example of an Early Patent

Let's take a look at an example of a patent granted in 1915, a life-saving device invented by Michael Kispeter,[1] to see how patents were conceived and documented during that time.

[1] Refer to http://colitz.com/site/1143835/1143835.htm.

LIFE-SAVING APPARATUS; MICHAEL KISPÉTER

Patented June 22, 1915

To all whom it may concern:

Be it known that I, Michael Kispéter, a subject of the King of Hungary, residing at New York, in the county of New York and State of New York, have invented new and useful improvements in Life-Saving Apparatus, of which the following is a specification.

This invention relates to life saving apparatus and its object is to provide means whereby the life of a person dropping from an aeroplane or airship either over land or over water may be saved.

I attain my object by means of an outfit consisting of a life jacket, lined with airtight inflatable cushions, a spring helmet removably attached to the jacket and a parachute fastened to the body over the jacket, adapted to be opened and shut at the will of the wearer thereof.

In the accompanying drawings: Figure 1 is a partly sectional, partly elevational view of my device in operation, showing a person fitted out therewith. Fig. 2 is a side elevation of a part of the device. Fig. 3 is a plan of part of my device, partly broken away. Fig. 4 is a section taken on the line a-a of Fig. 3. Fig. 5 is a section taken on the line c-c of Fig. 4, on an increased scale. Fig. 6 is a detail sectional view. Fig. 7 is a sectional view of another detail.

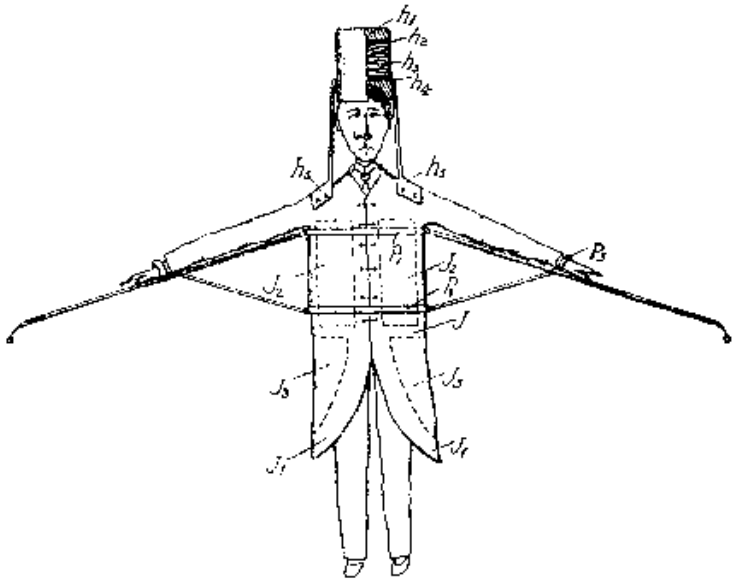


Fig. 2.

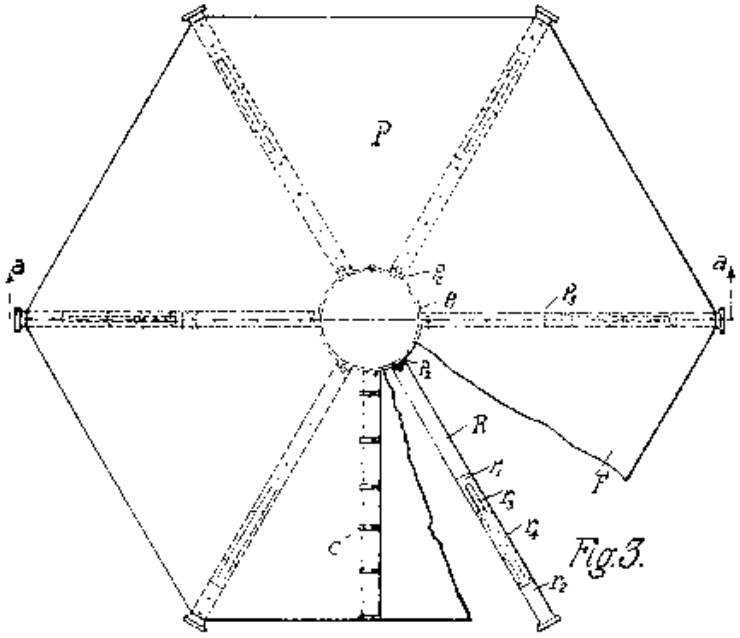


Fig. 3.

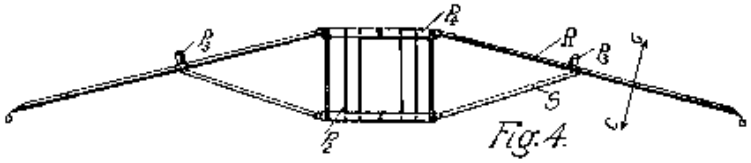


Fig. 4.

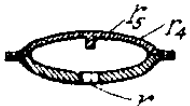


Fig. 5.

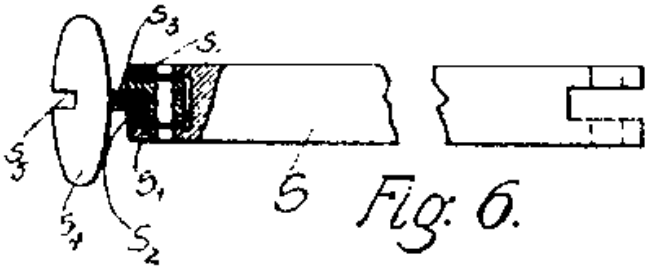


Fig. 6.

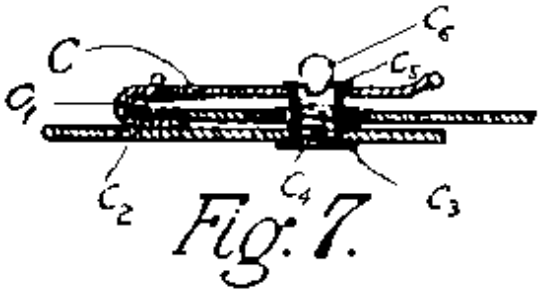


Fig. 7.

The same reference characters refer to the same part throughout the several views. Fascinating . . . you may do this already, but it would be interesting to understand how the expectations of patent documentation have changed over the years.

Drawing *J* is a jacket substantially of the shape of an ordinary coat, having two side tails j1, the front and rear part being cut away below the waist. This jacket is lined at the inside with air-cushions j2 made of rubber, two at the front and two at the back of the body portion and one on each side tail, j3. The jacket *J* is buttoned at the front from neck to waist and if the wearer thereof falls into water, the two coats will, on account of the buoyancy of the air cushions, float on the surface of the water, coacting with the air cushions in the body part of the jacket to keep the wearer afloat.

Over the jacket *J* is strapped a parachute *P* consisting of two parallel cylindrical hoops p1, each of two parts hinged together at the back and having means for closing or opening it at the front. The two hoops p1 are connected with each other by six vertical bars p2 placed equidistantly around their periphery. Hinged to the top end of each bar p2 are ribs R and hinged to the lower end of each bar p2 are stays S. On top of the ribs R is conveniently fastened at a substantially circular cover *F* of some suitable fabric, with a circular opening at its center around the hoops p1. The cover *F* is slit at the front, the edges overlapping each other and held together by clasps C.

The ribs R are halfround metal bars, having a concave portion from r1 to r2 slotted as at r3 and covered by a convex lid r4 removably secured thereto and forming an elliptical channel therewith. The lid r4 has all along its inside a vertical projection or guide rail r5.

The stays S are flat bars of light metal, forked at their outer ends and carrying between the prongs s1 of the fork pivotally mounted swiveling blocks s2, provided with a screw hole each at its outer surface adapted to take up therein the threaded stem of a screw s3, having a head s4 with a groove s5 diagonally to the length of the stays S. The screw s3 is inserted into the slot r2 in the concave portion of the ribs R, when the lid r4 is removed there from and screwed into the swiveling block s2 so that the groove s5 is parallel with the length of the rib R. Then the lid r4

is fastened on, the guardrail r5 engaging the groove s5, which is adapted freely to slide thereon. Straps p3 are provided on top of the two of the ribs diametrically opposite, for slipping the hand into and thereby open or shut the parachute.

The clasping device of the cover of the parachute consists of a metal clasp C of the form shown in Fig. 7 suitably fastened on the fabric at a convenient distance from one edge of same, having a hinge c1 and a spring c2 tending to keep it open. A small metal cup c3 is passed through the fabric near the same edge thereof to which the clasp is fastened. Attached to the bottom of the cup c3 is one end of the helical spring c4 and to the other end of it is fastened a resilient plate c5, integral with a pushbutton c6. The two ends of the resilient metal plate c5 overlie the upper edges of the cup and the edges of the circular aperture in the clasp C, fitting over the cup, thus preventing it to open. The other edge of the fabric is provided with eyelets fitting over the cup c3 and the two edges are clasped together as shown in Fig. 7. If the button c4 is pressed down by a finger, the metal plate c5 will be forced into the cup c3, thereby releasing the clasp C which will then automatically be opened by the action of the spring c2. When clasped together again, the spiral spring c4 will push the metal plate c5 and button c6 out again of the cup c3.

H is a cylindrical metal helmet having a solid rubber lining h1 inside the top and a metal plate h2 under the rubber. To the metal plate h2 is fastened a helical spring h3, resting on another metal plate underneath it, h4, which projects through horizontal slots in the cylindrical body of the metal helmet on both sides and is continued in two bars running down vertically to the shoulders of the wearer and there shaped like epaulets as shown at h5, removably attached to the shoulder portions of the jacket J. At the back the material of the helmet is prolonged to the back of the jacket J, where it is removably fastened to, as seen at h6. The helmet is supported on the shoulders of the wearer by means of the bars h5 just above the head of the person and not resting thereon.

It will be readily understood from this description of my invention that a person falling from the air, equipped with my life saving apparatus, will first open the parachute by means of raising slightly the hands slipped in the straps over the ribs, the rest being done by pressure of the air against the lower surface of the fabric covering the parachute. Should the person fall into water, the air cushions will keep him or her afloat and should the respective person fall on land and the parachute not assure a descent smooth enough to prevent a violent impact with same, the impact will considerably be reduced also by the air cushions. Should the person fall head foremost the sides of the helmet will break on contact with the soil and the resilient means contained in the helmet will mitigate the concussion.

While I have thus shown and described the preferred form of my invention, it is understood that I do not wish to be limited to its mechanical details and may resort to alterations and modifications, which come within the scope of the claims hereunto appended.

What I claim as new and wish to secure by Letters Patent is:

1. A life saving apparatus, for aeronauts, comprising, in combination, a jacket lined with air-tight inflatable cushions, a parachute adapted to be easily opened and closed, removably attached to the body over said jacket, and a helmet supported over the head of the wearer by means of supports attached removably to the shoulder and back portions of said jacket, resilient means in said helmet, substantially as and for the purpose set forth.

> **2.** A life saving helmet, comprising, in combination, a cylindrical body portion closed at the top, said top lined at the inside with resilient material, a helical spring between two metal plates within said cylindrical body, projections of the lower of one of said plates piercing the sides of said cylindrical body, adapted to be fastened to the shoulder portions of a life saving jacket, and to support said helmet just above the head of the wearer, and a prolongation of the material covering said helmet adapted to be removably fastened to the back portion of a life saving jacket, substantially as and for the purpose set forth.
>
> In testimony whereof, I have hereunto fixed my signature in the presence of two witnesses.
>
> **MICHAEL KISPÉTER.**
>
> **Witnesses:**
>
> **ALEXANDER DENES**
>
> **ABADAR HAMBURGER.**

Between the years of 1561 and 1590, Queen Elisabeth I granted about 50 patents on the manufacture and sale of common things (like those mentioned above). During Queen Elisabeth and her successor, King James I's, respective reigns, there were mounting concerns and overall discontent about the state of the patent system. It came to a head in the year 1624 and was resolved by the publication of the *Book of Bounty*, which stated that "monopolies are things contrary to our laws" and "projects of new invention so they were not contrary to the law, nor mischievous to the state by raising prices at home or hurt of trade." The *Statute of Monopolies* was also published in conjunction with *Book of Bounty*. It limited to 14 years the time of power that the state had in giving out monopolies and "manners of new manufacture" (in other words, new inventions).

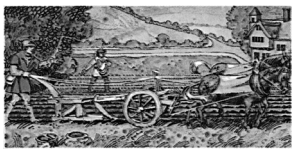
This reform satisfied the people, and there was no alteration to the English patent law for nearly 200 years. During the reign of Queen Anne, a condition was added to the law stating, "The patentee must, by an instrument in writing, describe and ascertain the nature of the invention and the manner in which it is performed." James Puckle created the first invention with the new required specifications in 1718. It was for a machine gun.

Article I, section 8 of the United States Constitution says: "The Congress shall have 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 writing and discoveries." In 1790, two years after the ratification of the U.S. Constitution, the newly formed United States as a nation passed its first patent statute.

A Timeline of Inventions

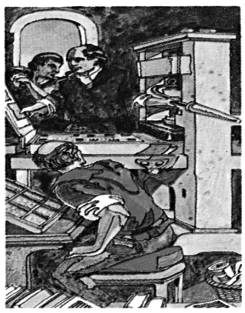
1. **287–212 BC, ARCHIMEDES:** Many of the great minds of history not only invented machines but made important discoveries as well. The Greek, Archimedes, invented the simple, practical water screw for raising irrigation water short distances—and these screws are still in use in parts of the Middle East. However, it was also Archimedes who explained the principles of the lever and made the great discovery that since bodies of equal volume displace equal amounts of water, it is quite simple to find the relative density—and thus purity—of many substances. (One simply compares its weight with the volume of water it displaces.)

2. **400 BC, THE NUT AND BOLT:** The nut and bolt, two of the most important discoveries in the history of engineering, were not invented at the same time. Their origins are lost in antiquity, but it is certain that the bolt or screw came first. The Greek mathematician, Archytas of Tarentum, probably invented it about 400 BC. The first recorded securing with nuts seem to belong to the middle of the fifteenth century when they were used to secure parts of suits of armor. One of these bolted suits can be seen today in the Tower of London. All kinds of complex nuts and bolts are now commonplace, including explosive bolts fitted to the escape hatches of spacecraft.

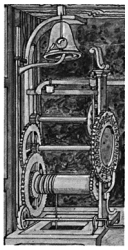


3. **500 BC, THE PLOUGH:** Crude wooden ploughs were used in Egypt and Mesopotamia around 2000 BC, although it is likely they were known of a thousand years earlier. The first iron ploughshares were found in Palestine and in other ancient Mediterranean countries. Both the Romans and Greeks used them, and the Chinese used a wooden plough in about 500 BC. Surprisingly, the plough was not introduced into Europe until the twenty-second century AD. David Ramsey and Thomas Wildgoose patented an English plough machine in 1619. There are many types of modern ploughs, yet some of the ancient designs are still in use.

4. **500 BC, THE WHEEL:** The origin of the wheel is lost in the mists of time. However, it is reasonable to suppose that the first "'wheels" were roughly hewn tree-trunks used as rollers. The unknown builders of Stonehenge probably used this method to drag the huge stone blocks on to Salisbury Plain. Wooden disc wheels on axles were in use in Sumeria between 2000 and 3000 BC. Carved seals and painted clay models found in Mesopotamia, dated about 1600 BC, show spoke wheels. Celtic wainwrights in Europe made spoke wheels in 500 BC.



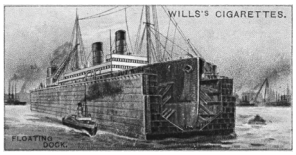
5. **NINTH CENTURY AD, HISTORY OF PRINTING:** The oldest known printed book was produced in China about the middle of the ninth century AD. Early books were called "block" books because they were printed from letters carved of wood, in reverse, which were inked and stamped on cloth and paper. These block books first appeared in Europe about AD 1350, but printing as we know it today really began with the invention of movable type by a German named Johann von Gutenberg, born about AD 1400, whose printed Bibles are now worth a fortune. England's first printer was William Caxton of Kent, who learned the printing trade in Germany and returned to England in 1476.



6. **THIRTEENTH CENTURY, MEASUREMENT OF TIME:** The first time measuring devices were sundials, water clocks (allowing water to escape at a fixed rate), and candle-clocks. In the thirteenth century came the first true mechanical clocks. Because reliable springs did not yet exist, weights were used for power. However, the early regulating mechanism—a *""foliot*,"[2] or weighted arms rotating backwards and forwards—was still inaccurate by modern standards, and even good clocks of this type could lose ten minutes or so each day. Only with the invention of the pendulum and then the balance wheel was real accuracy attained.

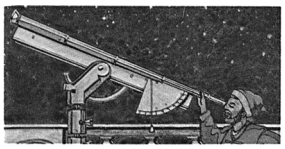
[2] Making for the first mechanical escapement clocks, a foliot mechanism consists of a crossbar with a weight on either end operating in conjunction with the verge, a vertical shaft upon which the foliot sits.

7. 1452–1519, LEONARDO DA VINCI: Leonardo da Vinci has been called the greatest genius who ever lived. He was certainly a most remarkable man with an incredibly inventive and versatile mind. Apart from being a highly talented artist and producing such masterpieces as the Mona Lisa, he had one of the keenest minds in the realms of science and engineering. Drawings and sketches show that he had ideas for submarines, tanks, and other weapons of war, which did not come to fruition until some 400 years after his death. He designed a diving dress, a parachute, and a helicopter and produced superbly accurate anatomical drawings.



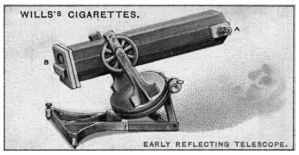
8. 1495, FLOATING DOCK: A Floating Dock is in general appearance something like a huge box without ends or top. The bottom consists of a tank or pontoon; by filling this with water the dock is sunk sufficiently to allow the ship, which requires docking, to be floated in. The water is then pumped out from the bottom by means of powerful machinery, the dock rising until the ship is clear of the water. Some of these docks will raise a ship that weighs up to 36,000 tons.

9. 1590, THE MICROSCOPE: The simplest microscope is merely a powerful single convex lens or magnifying glass. The compound or multi-lens microscope opened up an entire unseen world of microbes to Man. The first to achieve this was a spectacle maker of Middelbug, Holland, by the name of Zacharias Janssen in 1590. Dubbed the "father of micro-scopy," Dutch scientist, Anton van Leeuwenhoek, not only created the first high definition instrument but also studied tiny life forms under it.

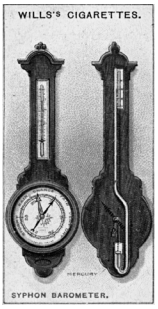


10. 1608, THE TELESCOPE: Although it is quite easy to magnify close objects with a simple lens, bringing distinct objects close baffled many minds—including that of the famous English scientist, Roger Bacon. Eventually, a Dutch spectacle-maker, Hans Lippershey, solved the problem with a practical two-lens telescope. The great Italian scientist, Galileo, quickly recognized the true value of this invention to astronomy and became the first

man to see the craters on the moon and the moons of Jupiter. However, Galileo's telescope aided his then revolutionary theories about the universe to such an extent that eventually his church denounced him as a heretic.

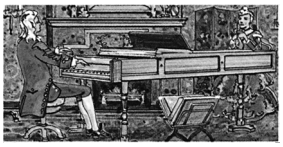


11. 1610, EARLY REFLECTING TELESCOPE: Telescopes were being made in considerable numbers in Holland around 1610 and were much improved by Galileo, Kepler, and other scientists. One telescope of notoriety was Sir Isaac Newton's (1642–1727): It was a reflecting telescope, the image viewed through a compound eyepiece placed at the side. It magnified from 50 to 800 times according to the size of the parabolic mirror. The mounting was of the "Equatorial" type.



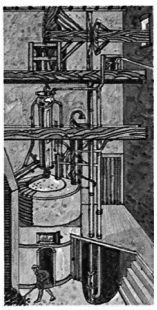
12. 1643, SYPHON BAROMETER: Torricelli first discovered the pressure of the atmosphere in 1643. The barometer is not really a weather glass but an atmospheric pressure measurer, the column of mercury in the tube rising or falling as the pressure of the air on the mercury at the open end of the tube becomes heavy (as in fine weather) or light (as in wet or windy weather).

13. 1706–1790, BENJAMIN FRANKLIN: More than 200 years ago, there was much argument as to the nature of lightning, and Benjamin Franklin, who about the year 1746 had begun to be interested in electricity, devised a simple way to "trap" some lightning. It was already known that certain materials when rubbed together would emit a spark. The question was, however, was lightning the same kind of energy? Franklin flew a kite into a thunderstorm and showed that by bringing his knuckles near to a key at the lower end of the kite string an electrical spark could be produced. It was a dangerous experiment. Some of those who later tried it were electrocuted.

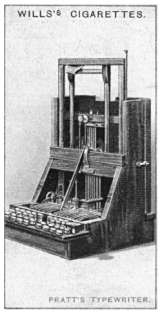


14. 1709, THE PIANO: A whole family of stringed instruments preceded the modern piano, but the two that most closely resembled it were the harpsichord and the clavichord. Both these instruments had keyboards, but they differed in that the harpsichord had strings, which were plucked by quills or pieces of

leather, while the clavichord's strings were struck by brass wedges. Bartolommeo Cristofori, an Italian harpsichord maker, developed a keyboard action, which transmitted the player's true touch on the keys to the felt-covered hammers. Hence, the pianoforte was able to play PIANO (soft), or FORTE (loud) with so perfect an action that every shade of expression could be reproduced.



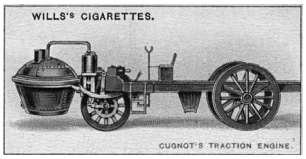
15. **1712, THE STEAM ENGINE:** Although Giambattista della Porta (1538–1615), Denis Papin (1647–1712), Thomas Savery (1650–1715), and other inventors produced suggestions on how steam could be used to work an engine, it is generally accepted that Thomas Newcomen built the first practical steam engine in 1712. His engine was the "atmospheric" type in which the condensation of steam created a partial vacuum in a cylinder so that the pressure of the atmosphere forced the piston down. These engines were used to pump water out of mines, and some were still in use many years after James Watt's pressure steam engine was invented more than 60 years later.



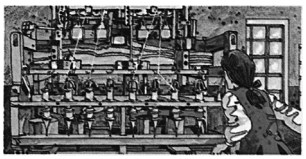
16. **1714, PRATT'S TYPEWRITER:** As early as 1714, Henry Mill invented a machine for impressing letters on paper, but the first machine to really demonstrate the possibility of producing writing by mechanical means faster than by the pen was that patented by John Pratt in 1866. In 1878 a firm of gun manufacturers in America called E. Remington and Sons brought out their Remington typewriter (the design having come from C.L. Sholes, an American journalist), and since then the use of typewriting machines in business houses has become almost universal.

17. **1731, MARINER'S SEXTANT:** After the compass this was the most important invention for navigation. It simply measures the altitude (number of degrees) of the sun above the horizon. Before reliable ships' clocks existed, this was done at midday when the sun was highest in the sky, and by checking from a table of the sun's altitude on each day, the Equator was quickly found. However, longitude East or West was still largely a matter of guesswork until Harrison, some two hundred years ago, produced a remarkably accurate chronometer unaffected by the motion of a ship. Only then did navigation become a science.

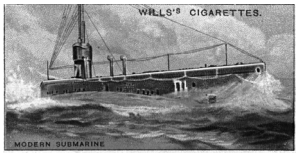
18. 1734, THE FIRE EXTINGUISHER: It is possible that in very early times when humans first became aware of the danger of fire, they kept containers of sand or water near at hand when they kindled cooking fires. However, what might be called a true fire extinguisher did not appear until the eighteenth century when M. Fuchs of Germany invented the idea of glass balls filled with water, which could be thrown on the fire. Then, in 1762, a Dr. Godfrey of London used sal-ammoniac-filled round containers burst by gunpowder. Two Swedes, Von Ahen and Nils Moshein, designed a water-chemical extinguisher in 1792. Some of today's complex extinguishers are computer-controlled.



19. 1763, CUGNOT'S TRACTION ENGINE: The first practical horseless vehicle was the steam "lorry" (or truck) built by Cugnot in 1763. Its success induced the French Government in 1770 to order a steam traction engine for the transportation of artillery, which could carry a load of 4 $^1/_2$ tons at about 2 $^1/_4$ miles per hour on level ground. The traction engine had then become a familiar and almost essential part of the then modern road locomotion.



20. 1768, THE SPINNING MACHINE: Until the invention of the spinning machine, yarn for the making of cloth had for centuries been spun by hand in people's homes. It was a "cottage industry." By the time of the Industrial Revolution, the output was too small to meet the needs of weavers who made cloth. Sir Richard Arkwright's famous "Spinning Frame," which he made at Bolton in Lancashire, was able to spin strong warp yarn or "twist" a better product than the slightly twisted yarn produced by a machine invented by Lewis Paul in 1738. In 1769, Sir Richard Arkwright patented his cotton-spinning frame and established factories at Cromford. He was the first to employ machinery on a large scale for textile manufacturers.

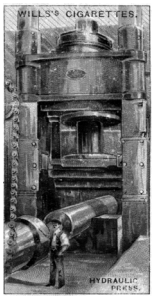


21. 1776, MODERN SUBMARINE: The first submarine to actually go into action was built by David Bushnell in 1776. In 1880–1887, several submarine boats were built; however, these proved to be unstable when submerged. In 1891, the Gustave Zede was built, displacing 266 tons and having a speed of 8 knots when submerged. The modern submarine has a displacement of nearly 1,000 tons and a submerged speed of over 10 knots.

22. 1784, THE LOCK: No one is certain where the first locks were invented, but they are usually attributed to the Chinese. It is known that the ancient Egyptians used locks with movable tumblers. Some early ones were designed to chop off the hand of anyone who fumbled with them without having the right key. The Greeks also had tumbler locks that were opened with a key. A number of Roman locks have been found that had keys to raise levers or lift pins in order to release the bolt. The first modern compound lock was invented by Joseph Bramah of Britain and officially patented in the year 1784.

23. 1785, LIFEBOAT: In 1785, Lionel Lukin, a London coachbuilder, fitted up a Norway yawl with air-boxes at the stem and stern and fixed a best of solid cork along the outside of the gunwale, thus making the first in submersible boat. In 1824, the Royal National Lifeboat Institution was founded, and its fleet later consisted of over 280 boats. The modern lifeboat is virtually unsinkable, is self-righting, and may even have its own radar.

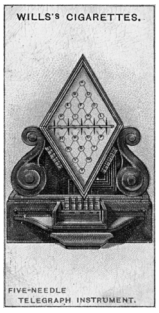
24. 1790, THE SEWING MACHINE: In 1790, Thomas Saint, a cabinet maker who lived in London, invented a machine for sewing leather that produced a chain stitch—a stitch that "locked" itself and prevented running—and so led the way to the modern sewing machine. It incorporated other features of the modern machine such as the vertical needle, the over-hanging arm that carries it, and the feed plate that moves the material along under the needle. Earlier attempts at a stitching machine had been made, such as Englishman Charles Weisenthal's device with its double pointed needle, but none were successful.



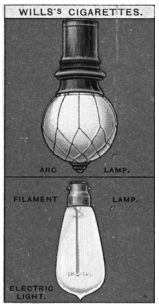
25. 1795, HYDRAULIC PRESS: The credit of the invention of the hydraulic press belongs to Joseph Bramah and Henry Maudslay. Wherever an enormous sustained effort is required for lifting heavy loads, bending steel plates, or compressing metal, the hydraulic press was a potential solution. This huge press was also used for consolidating steel ingots for armor plating. It was 33 feet in height, weighed 1,280 tons, and exerted a pressure of 12,000 tons. Today, hydraulic power is indispensable.

26. 1797, PARACHUTE DESCENT BY GARNERIN: In 1785, Blanchard lowered dogs and other animals from a balloon by means of a parachute, and a few years later he made a descent. It was, however, reserved for M. Garnerin in 1797 to make the first descent that attracted public attention. Ascending in a hydrogen balloon to a height of 2,000 feet, he cut himself adrift and descended in perfect safety. He afterwards made other equally successful descents, both in France and London.

27. 1799, THE ELECTRIC BATTERY: Although scientists had known about the strange power of electricity for centuries, the first man to "'capture" it, so to speak, was an Italian chemist named Alessandro Volta. Volta, from whose name we get the term, "volt," discovered that electricity could be produced by chemical means. He made his first electric cell—a "wet" cell—in 1799 by using a zinc plate for the negative terminal and a copper plate for the positive terminal, immersed in a solution of sulfuric acid. "Dry" cell batteries work on much the same principle today, known as the electrochemical generation of power.



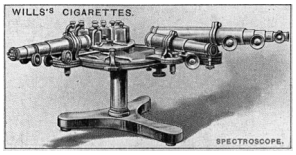
28. 1800, FIVE-NEEDLE TELEGRAPH INSTRUMENT: The discovery by Volta in the year 1800 of current or low-tension electricity resulting from chemical action and the introduction of the electro-magnet in 1824 led to the invention of the magnetic receiving instrument. The first needle telegraph was made between 1825 and 1832. Then in 1838, a line of galvanized iron wire, six miles in length, was laid and proven to be satisfactory for transmission purposes. Messrs, Cooke, and Wheatstone invented this five-needle instrument in 1837.



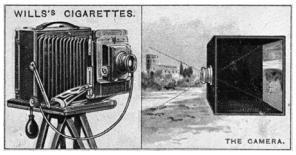
29. 1801, ELECTRIC LIGHT: There are two kinds of electric lamps employed—the arc lamp and the filament lamp. Of the two, the arc lamp was invented first by Sir Humphry Davy in 1801. The filament (incandescent) lamp was developed in 1860.[3] In the arc lamp, two carbon rods are placed with their points almost touching. The electric current sparks across the

[3] While the design of the filament was made in 1860, it was not until 1880 when Thomas Edison teamed with Swan that an operative lighting system was achieved.

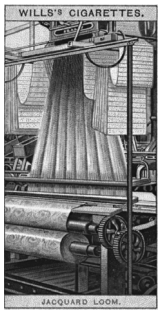
gap, and an arc of glowing vapor is formed, the carbon points becoming white hot and a dazzling light produced. In the filament lamp, the electric current passes through an extremely fine wire, which creates so high a resistance as to become white hot, thus giving out light.



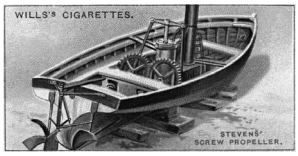
30. 1802, SPECTROSCOPE: When a beam of light passes through a glass prism it is broken up into a band of colors called the "spectrum." Light from different substances will give different kinds of spectra, and the spectroscope is an instrument for studying and analyzing the spectra of luminous bodies. The dark lines in the solar spectrum were first observed by Wollaston in 1802, were mapped out by scientists in 1815, and numbered over 2,000.



31. 1802, THE CAMERA: The principle of photography was acknowledged as early as the sixteenth century. In 1802, Thomas Wedgewood wrote a paper on "An account of a method of copying paintings upon glass and making profiles by the agency of light upon nitrate of silver." In 1824, Daguerre commenced his experiments, and in 1839, Mr. Talbot published a method of producing prints from a negative. Dry plates were introduced in 1874 and, in 1893, Lumiere produced photographs in natural colors.



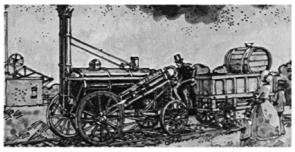
32. 1804, JACQUARD LOOM: The credit of introducing the Jacquard Loom and of making it a commercial success, if not of actually inventing it, belongs to Joseph Jacquard, a native of Lyons. This apparatus is one of the most ingenious and important appliances used in the art of weaving, for by its aid the most complex and intricate patterns can be produced with as much certainty and almost as rapidly as plain cloth.



33. 1804, STEVENS' SCREW PROPELLER: Colonel John Stevens built a vessel propelled by twin screws that navigated the Hudson River and attained a speed of nine miles per hour, but for many years, the idea of screw propulsion was abandoned by engineers in favor of the paddle-wheel. The first large sea-going screw steamer was the ARCHI-MEDES of the 232 tons register. The vessel was built in 1838 and proved to be a complete success.

34. 1815, SAFETY LAMP: Although it was well known that the air of coal mines contained gas, which caused explosions upon coming into contact with naked lights, it was not until 1815 that a practical safety lamp for miners was invented. Sir Humphry Davy found that a tube of wire gauze so cools a flame attempting to pass that it prevents the ignition of inflammable gas on the other side, and this principle is embodied in the "Davy" lamp. Only when battery lamps were introduced were the Davy lamps superceded.

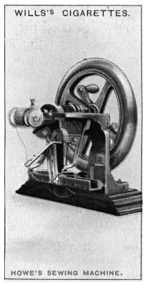
35. 1816, HOBBY HORSE: Amazingly, what may have been the first bicycles appear on bas-reliefs from Babylon and Egypt: two-wheeled machines with no pedals and no means of steering. The Hobby Horse—or Dandy-Horse—the forerunner of the modern bicycle, was introduced by J.N. Niepce, a Frenchman, in 1816 and Karl von Drais, a German nobleman in 1817. With the ability to steer, the rider propelled it by a tiptoe running action. The pedal-driven "velocipede" was invented in France in 1865. In 1888, Dunlop invented the pneumatic tire, and the introduction of the free wheel and two and three speed gears finally gave us the bicycle of today. Simple though it may seem, the bicycle is one of the most efficient machines created by man.



36. 1829, GEORGE STEPHENSON'S "ROCKET": The Stephenson's—George and Robert, his son—were undoubtedly the fathers of the modern efficient steam train, although engineers such as Trevithick had had some success earlier. In 1814, George Stephenson's first locomotive pulled several trucks at four mph. His second engine marked a milestone: It

forced the exhaust steam up the chimney and thus greatly increased the draught for the fire. His engine, "Locomotion No. 1," opened the world's first fare-paying railway for freight and passengers between Stockton and Darlington. Four years later, his "Rocket" easily won the important Rainhill Trials. One of the Rocket's competitors was disqualified, as it's "engine" was a horse on a treadmill.

37. **1829, READING FOR THE BLIND:** Blindness is a condition that can lead to a terrible sense of isolation. Little had been done to help the blind until the nineteenth century, when Louis Braille, a Frenchman, invented the first specially designed reading system for the sightless in 1829. His system of raised dots, read by touch, is still used today, and automated printing processes now produce Braille books. A new method of blind "reading" utilizes a TV camera, which scans every letter and is linked to a small panel of studs. By placing a palm on the panel, the blind person can feel each letter pattern being raised as it is scanned.



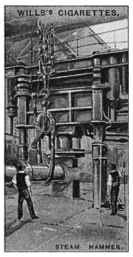
38. **1830, HOWE'S SEWING MACHINE:** In 1830, a successful chain stitch sewing machine was invented and constructed by Thimmonier, who started a factory in which many of these machines were employed. In 1845, Elias Howe constructed the first lockstitch sewing machine, using an eye-pointed needle and an independent shuttle, each of which was threaded. In 1851, Singer patented his first machine and did much to accelerate the commercial introduction of this most useful invention.

39. **1831, THE DYNAMO:** Although it was known that moving a coil of wire across the force field between the poles of a magnet could produce an electrical current, it was not until 1831 that Michael Faraday set about making practical use of the knowledge. Faraday experimented with a copper disc that could be turned between the poles of a horseshoe magnet, with thin pieces of metal connecting both the center and outer edge of the disc to a galvanometer. When the disc was spun an electric current was generated. Faraday had designed the first dynamo—today it is the world's main source of power.

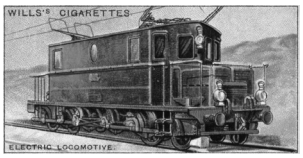
40. 1834, THE REFRIGERATOR: For many centuries, large numbers of country houses had specially built "ice-houses," which were low buildings with thick walls where ice from frozen winter ponds was stored and covered with layers of straw until it was needed in summer for cooling drinks. By the early nineteenth century, methods had been found to make ice artificially with huge, if rather crude, refrigeration plants, and this ice was sold to householders with ice-boxes, helping to keep fresh vegetables crisp in the summer's heat. It was not long before a home refrigerator was on sale—by Jacob Perkin of America.

41. 1835, THE REVOLVER: For centuries, man tried to develop a small, fast-firing gun, and Samuel Colt was the first to effectively solve the problem. The story goes that the inventor of the famous Colt revolver ran away to sea at the age of 16. His ship was going to India, and while on the voyage, Colt carved a wooden revolver. Realizing its possibilities, Colt then had a number of metal models made between 1831 and 1835 and worked on his idea until he could construct a patent. The American government ordered a thousand Colt revolvers for the Army when the U.S.–Mexican War broke out in 1846, the age of the revolver had arrived.

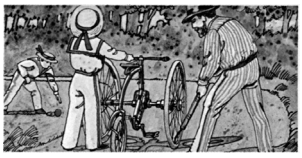
42. 1837, MORSE CODE: Samuel Finley Breese Morse left his home in America to study art in London when he was 24 years of age. He returned to America on board a ship in 1832, and during this voyage, he spent some time discussing electricity and magnetism with other passengers. Suddenly, Morse thought of the idea of what he called "transmitting intelligence by electricity." He sat on the deck of the ship and worked out the details of his idea, but it was five years later before he was able to apply for a patent. Contrary to general belief, the famous "S.O.S." signal does not mean "Save Our Souls" but was adopted because of its unmistakable character in Morse Code.



43. 1838, STEAM HAMMER: James Nasmyth, a Manchester engineer, invented the Steam Hammer in 1838. Robert Wilson, his partner and successor, improved upon his invention in 1853. While these immense machines can give a blow of enormous energy, so delicately are they adjusted and so perfectly controlled, that they can by made to tap the shell of an egg without breaking it, and some of these hammers can deliver a blow equivalent to 4,000 tons.

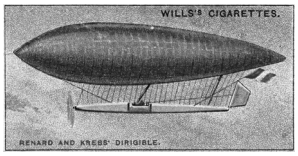


44. 1842, ELECTRIC LOCOMOTIVE: The first attempt to use electric power for railways was in 1842 when an electric locomotive was constructed, weighing five tons, which attained a speed of four miles per hour. The powerful Electric locomotive was used for conveying trains throughout the Simplon Tunnel—connecting Iselle, Italy, to Brig, Switzerland. It could draw a train of 300 tons throughout a tunnel in 18 minutes at an average speed of 42 miles per hour.

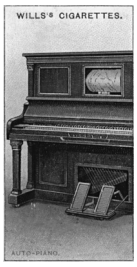


45. 1845, THE PNEUMATIC TIRE: Although R.W. Thomson, a Scotsman, is credited with inventing the pneumatic tire, it was a fellow Scot, John Boyd Dunlop, who first made it a successful commercial proposition in 1890. Thomson's tires consisted of tubes of rubber protected by an outside casing of leather, and many of these were used on early bicycles. Solid rubber tires were widely used before the arrival of the pneumatic tire. The greatly increased comfort of the pneumatic tire was a great stimulus to the sales of bicycles, and, in fact, this kind of tire with its built-in "shock absorber," is much safer than solid tires.

46. 1847–1931, THOMAS ALVA EDISON: Anyone who worries about not doing well at school may feel encouraged by what happened to Thomas Alva Edison, who was perhaps America's most prolific inventor. His teacher considered him stupid—he had only three months' official schooling. His mother knew he was far from stupid and so took him away from school to teach him herself. Young Edison went on to invent not only the forerunner of the gramophone, but even a successful electric filament lamp in 1880. He also invented an early form of a radio tube and a method of telegraphy between moving ships or trains.

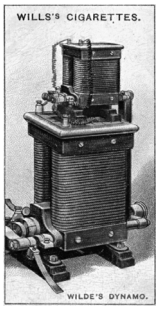


47. 1852, RENARD AND KREBS' DIRIGIBLE: The first airship to be propelled by an engine was built by Giffard in 1852 and attained a speed of about six miles per hour, but the first really successful dirigible was that constructed in 1884 by Captains Renard and Krebs of the French Army. This was of a more scientific design than any of its predecessors and traveled at the rate of 14 miles per hour, overcoming winds of considerable strength.

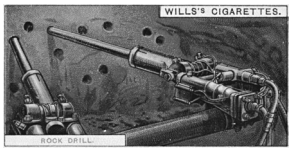


48. 1860, AUTO-PIANO: As early as 1860, a patent was filed in the United States for a keyboard piano-player, and the first pneumatic keyboard was made in France in 1863. With its many ingenious contrivances for bringing out the melody of a piece, regulating the time and expression, and accentuating any notes desired, the modern Piano-player can be made to exactly reproduce the playing of a master, even though the operator himself be entirely ignorant of piano technique.

49. 1860, THE WASHING MACHINE: The laborious washing of clothes by hand is still the only laundering method available in many parts of the world. Many methods have been used, from banging the clothes on flat stones by a river's edge to an old seaman's trick of dragging them behind the ship to force water through them. Modern washing machines evolved from an idea that appeared in the 1860s when the British firm of Thomas Bradford built the first working model, a hand-turned device. It was made of wood and quite primitive, but modern machines still use much the same principles of mechanical agitation, freeing women from backbreaking labor.

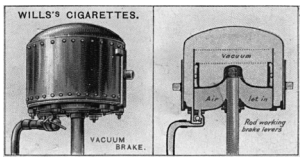


50. 1863, WILDE'S DYNAMO: In 1863, Dr. Wilde invented the first separately excited Dynamo, demonstrating that the feeble current from a small magneto-electric machine could be made to produce currents of great strength from a large dynamo. Wilde's Dynamo weighed 4 $^{1}/_{2}$ tons, and when driven at 1,500 revolutions per minute, the current fused 15 inches of round iron $^{1}/_{4}$ in diameter with an expenditure of about 10 horsepower. This machine was used for electro-plating purposes, depositing 20 ounces of silver per hour.



51. 1865, ROCK DRILL: The Rock Drill differs from most other Rock Drills in that it really bores and does not merely peck its way into the rock. The hollow drill stem, furnished with three or four splayed-out teeth, is driven by means of high-pressure water. The drill is pressed against the face of the rock by a hydraulic ram with a force of 10 tons. To sink a hole 39 inches deep took from 12 to 15 minutes with this method.

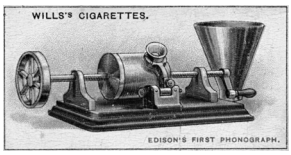
52. 1866, TRAFFIC SIGNALS: The first traffic signals were invented by a man named Hodgson and were of the semaphore type. However, they were actually copied from railway signal-arms. A set of traffic signals was first erected near Westminster Abbey in London in 1868 as an experiment. They had two semaphore arms, one for Stop and one for Go, with red and green gas lamps for night use. The modern type of light signal was not introduced until early in the 20th century, the first ones being in use in New York about 1918. They are now sometimes linked to tubes in the road and to computers so that the signals take into account the traffic requirements for the time of day.



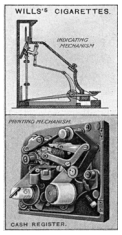
53. 1874, VACUUM BRAKE: By means of the communication cord, a train can be stopped from a compartment. Under each carriage is a cylinder in which a vacuum is created from the engine by an air-ejector. When the cord is pulled, air is let into the cylinder under the piston. This pushes the piston up, and by means of levers immediately puts on the brakes, automatically stopping the entire train.

54. 1874–1937, GUGLIELMO MARCONI: Marconi was interested in anything electrical when he was a young boy. At Bologna, Italy, he watched Professor Righi doing experiments with electromagnetic waves. In 1895, the young Marconi began his own experiments and soon was able to send Morse code messages more than a mile with a tapping device but with no wires connecting transmitter and receiver. In 1897, the Marconi Wireless Telegraph Company was formed, and in 1899, a wireless message was sent across the English Channel. Strangely, even before this, an article in *The Strand Magazine* in London had discussed the possibility of television.

55. 1876, THE TELEPHONE: The first words ever to be spoken over a telephone were, "Mr. Watson, come here. I want you." They were spoken by the inventor himself, Alexander Graham Bell, in a hotel in Boston, Massachusetts, where he had been conducting experiments with the help of Thomas Watson, his assistant. Bell was born in Edinburgh in 1847 and studied at both Edinburgh and London Universities. His father was a teacher and elocutionist, and Bell came to realize that the pressure of sound waves in a thin plate held the key to the electrical transmission of sound. Yet even he was surprised by the high quality of sound reproduction he quickly achieved this way.

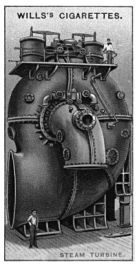


56. 1877, EDISON'S FIRST PHONOGRAPH: In 1877, Edison held the patent for an instrument capable of automatically registering sounds, known as the phonograph. This consisted of a grooved metal cylinder covered with tinfoil on which the sounds were registered and afterwards reproduced by means of a steel needle. A conical mouthpiece was attached to concentrate the reproduced sounds.

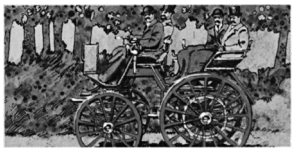


57. 1879, CASH REGISTER: The modern cash register, now to be seen at work in almost every store worldwide, has taken the place of the old-fashioned open till. This marvelous mechanism keeps a record of all transactions, indicating the value of the purchase and printing the figures and nature of business done on a ticket for the customer and also on a roll of paper tape for the proprietor.

58. 1882, ELECTRIC TRAM: The electrically driven car entirely superseded the old-fashioned horse-drawn tram. The first electric tramcar was operated at Leytonstone, Essex, in 1882. The trolley pole at the top of most electric cars during this period had nothing to do with the actual driving of the car but simply conducted the electricity from the overhead wire, through the motorman's switchbox, to the motor beneath the car.

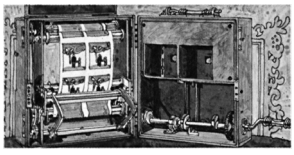


59. 1884, STEAM TURBINE: Invented by Charles Parsons, the steam turbine engines were at first used for driving electric-dynamos at very high speeds and generating electric power. Pressure from steam of boiled water is used to turn a turbine. This mechanical action is converted into an electrical energy through the use of a dynamo.



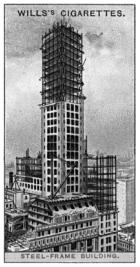
60. 1885, THE MOTOR CAR: Like many great inventions, the motor car was not the result on one man's effort. Nobody can be certain who built the first working petroleum engine road vehicle, but the credit is usually given to two Germans—Carl Benz and Gottlieb Daimler. Benz used a tricycle to which he fitted a $^1/_4$ horsepower engine in 1885; while in 1887, Daimler built the first four-wheeled road vehicle with a more powerful four horsepower petroleum engine. Daimler's invention was the more successful of the two, and his machine incorporated many of the features of the modern car.

61. 1888, PLATE AND ROLL-FILM CAMERA: During the first half-century of photography, pictures were made on plates—originally metal Daguerreotypes, but later glass. The early glass plates, even in such processes as the collodian method, had to be coated with the light-sensitive material just before the photograph was taken—a tremendously complicated task. Obviously, anyone who could invent a simple method of photography could command a huge market for his method, and the honor fell to George Eastman, whose early Kodak roll-fill cameras—at first using a paper roll-film with room for 100 negatives—in 1888 gave photography to us all.



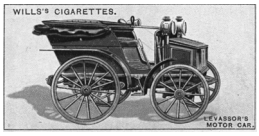
62. 1889, THE MOVIE CAMERA: The origin of motion pictures is obscure, and a number to men were working at more or less the same time on the idea of taking a continuous series of photographs on one length of film. There seems little doubt, however, that an Englishman, William Friese-Green, was the first man to project a film onto a simple screen. He achieved this success in January 1889 after a number of experiments. The American

inventor, Alva Edison, also designed an apparatus called a "*kinetoscope*," a kind of moving-picture viewer. However, Friese-Green's invention had gone even further and featured an attempt at 3-D movies.

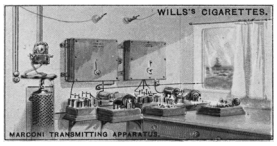


63. 1889, STEEL-FRAME BUILDING: Owing to the high cost of building sites in the large cities of the United States, the method of the steel-frame building has been adopted. The skeleton of the building consists of steel girders, the walls being comparatively thin, and inserted like panels in a door. Brick and stone buildings cannot be taken more than 12 to 14 stories high, owing to the thickness of the walls required, but steel-frame edifices allow people to produce buildings of astounding heights.

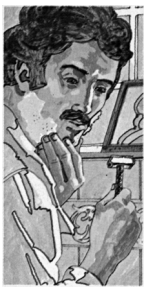
64. 1892, EDISON'S KINETOSCOPE: The cinematograph is really a development of the "zoetrope," or "wheel of life." In 1877, E. Muybridge obtained successive pictures of a running horse by means of a row of cameras, but Edison invented the first practical moving picture apparatus in 1890. In 1892, Edison brought out the kinetoscope, a combination of photography and electricity, by means of which the voice of a phonograph worked synchronously with the action of the figures on the screen.



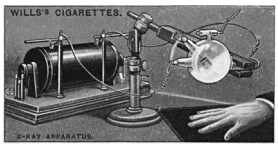
65. 1894, LEVASSOR'S MOTOR CAR: The first important motor car race took place in July 1894, from Paris to Rouen (France), and in 1895 the Automobile Club de France was established. The famous race from Paris to Bordeaux and back, a distance of some 732 miles, originated in 1895 and was won by M. Levassor, who covered the distance in 48 hours and 48 minutes, at an average speed of about 15 miles per hour; the highest speed in the race being about 20 mph.



66. 1895, MARCONI TRANSMITTING APPARATUS: The outstanding figure in the realm of wireless telegraphy is Guglielmo Marconi. He commenced experimenting in 1895, and when only 22 years of age, he sent wireless messages across the Bristol Channel. In 1901, the first wireless telegraph was sent across the Atlantic, and messages can now be sent from 2,000 to 3,000 miles. Almost all large liners, battleships, and cargo boats are now fitted with wireless apparatus, and the distress call of "S.O.S." has been the means of saving numerous lives.



67. 1895, THE SAFETY RAZOR: Razors with crude guards to prevent deep cuts have been tried out for many centuries past, but the man who gave the world a razor that was not only safe, but also had a separate disposable blade, was an American named King Camp Gillette. Gillette is said to have gotten the idea while shaving with one of the dangerous old "cut-throat" razors one day in 1895. His American Safety Razor Company was formed in 1901, and by 1904, it had sold 90,000 razors and 12,400,000 blades. Today, this kind of razor has hardly changed and is still the most popular shaving method in the world.



68. 1895, X-RAY APPARATUS: X-rays were discovered in 1895. Their discovery has given a great impetus to the progress of science and surgery and has had far-reaching effects in saving human and animal life and the alleviation of pain. Initial descriptions said that the bones of the living body could be seen (or photographed) by means of these rays, flesh being almost transparent to them, while bones being almost opaque.

69. 1902, THE VACUUM CLEANER: Dirt not only makes carpets filthy but also sinks into the carpet backing and cuts the fibers. In the past, the only way to get rid of this dirt was to hang the carpet up and give it a hard beating—a tiring and dirty business. It occurred to inventors a long time ago that the best solution was to collect the dirt up and out of the carpet, where it laid flat, via principals of vacuum. The solution—the vacuum cleaner—began life as a much different machine from the trim "Hoover" of today. It was actually a huge piece of equipment that sat outside the house, and hoses were put through windows to collect the dirt via the vacuum.

70. 1906, SANTOS-DUMONT'S AEROPLANE MOTOR: M. Santos-Dumont built a small flying machine fitted with an Antoinette motor, and on August 22, 1906, he made the first flight in Europe to be officially recorded. On October 23, he made a flight of 25 meters, and on November 12, succeeded in flying 200 meters, winning the prize offered for the first flight of 100 meters.

71. 1920, MODERN LIGHTHOUSE LANTERN[4]: In the earliest types of lighthouses, open wood or coal fires were used as lights for the guidance of navigators. In due time, these were replaced by tallow candles, but as their range was extremely limited, attempts were made to intensify their light by means of reflectors. The modern lighthouse is illuminated by huge "hyper radiant" lanterns, lit by means of incandescent petroleum vapor, sometimes exceeding 1,000,000 candle power, and weighing as much as 20 tons.

72. 1923, THE HEARING AID: Humans probably discovered at a very early stage that they could hear distant sounds better by cupping a hand to their ear, which may later have led them to use animal horns as ear trumpets. Specially made metal horns were later used, but no electronic device appeared until the Marconi Company produced the valve-operated otophone in 1923. It was cumbersome and weighed 16 pounds, including its sturdy case. Some modern hearing aids, far more efficient, weigh only one-thousandth of this.

73. 1925, TELEVISION: A number of men contributed to developing a practical method of transmitting pictures by wireless. Dr. L. Weiller, a German, invented a drum of mirrors used to "scan" the scene to be viewed, and an Englishman, A.A. Campbell Swinton, thought of using electronic tubes for transmission and reception. However, it was a Scotsman named John Logie Baird (1888–1946) who began experimenting in 1922, who built the first practical TV system. Baird used a

[4] Although the signaling strength of a lighthouse advanced mostly during the 20th century, lighthouses have been in use as far back as 280 BC.

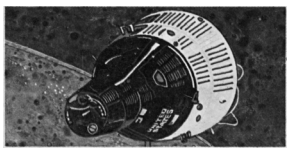
disc scanning system and saw his first TV picture, a Maltese Cross, in 1925. The picture was very blurred—but it was true television. And a few years later Britain had the world's first TV service.

74. 1930, THE JET ENGINE: Jet engines and rocket engines work basically the same way—a high velocity gas stream is emitted, which produces a thrust in the opposite direction. While a rocket carries all its combustible materials with it, a jet engine sucks in air at the front and mixes it with a suitable fuel. The first man to successfully produce an efficient engine of this type was Sir Frank Whittle, whose early turbojet engine powered the famous Gloster E 28/39 jet in 1941. However, the German designer, Heinkel, had already flown a jet plane in 1939—the He178. Whittle's engine, however, was superior in design, and modern jet engines are based on it.

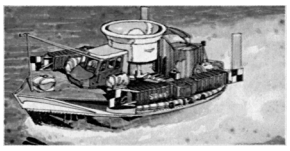
75. 1934, CATS EYES: Percy Shaw, the inventor of those tiny reflectors that are sunk into the center of roads, was born in Yorkshire. He used to run a road repair business, and as a young man he realized how dark and dangerous unlit country roads could be at night. On his way home one night, he noticed reflectors on a poster by the roadside. This gave him the idea for "cats eyes" in the road. His first road reflectors were used in 1934, and the design has barely been altered in 40 years, including the simple, effective, automatic collapse of the reflector system when a wheel runs over it.

76. 1935, RADAR: Radar is one of those inventions that came about largely by accident, but which nature had already created in a slightly different form—in this case, the bat's method of avoiding obstacles in the dark. Sir Robert Watson-Watt, a member of a British scientific team studying radio reflections from the upper atmosphere in 1934, noticed a strange echo on his cathode ray tube. It turned out to be from a distant building. Once it was realized that distant objects could be found, located, and "ranged" by radio waves, the idea was used to track enemy aircraft and then to make air and sea navigation much safer.

77. 1947, THE POLAROID CAMERA: The Polaroid camera does not actually use polarized light. It gets its name from the fact that Edwin H. Land, its inventor, created the company that made Polaroid sunglasses. However, his camera is an achievement photographers had dreamed about for a whole century—instant pictures without the trouble of separate developing and printing. In fact, these processes are carried out not in the Polaroid camera itself, but in its film pack. After exposure, the negative, in contact with the positive, is drawn through rollers, which break a pod of developing chemicals, squeezing them on to the sensitized surfaces. In ten seconds, the print appears—developed and fixed.



78. 1947, THE TRANSISTOR: Three Americans are jointly credited with the invention of the transistor—William Shockley, John Bardeen, and Walter Brattain. Their invention was first demonstrated in 1948 at the Bell Telegraph Laboratories in the United States. Transistors have brought about a revolution in radio and electronics and have almost completely replaced the old radio valve because of their remarkable reliability, toughness and incredibly small size. In fact, without the transistor, the computers used in manned spacecraft would have been so heavy that the rockets might never have been able to get off of the ground.



79. 1954, THE HOVERCRAFT: In 1953, Sir Christopher Cockerell became interested in the problem of 'drag' on ships' hulls as they travel through water. He experimented unsuccessfully with air films under model boats to give a kind of lubricated surface. In 1954, he tried using fixed sidewalls with water-curtains and also hinged end-doors with air pumped into the center. This led him to consider using air-curtains, and one Sunday he made a model out of two empty coffee tins and a small industrial fan-dryer. It worked, so in December 1955, Cockerell applied for his first "hovercraft" patent. The full-size SRN-1 soon showed that the craft could easily travel over land and marshes as well as over water.

80. 1958, HYDROFOIL SHIPS: The idea of building small vessels that used underwater "wings" to lift the hull above the surface of the water, seems to have originated in France around 1850 when a priest named Ramus demonstrated a model hydrofoil. It failed because he had no way of moving it fast enough through the water. An Italian named Enrico Forlanini built the first successful hydroplane in 1905. It was moderately successful because he used a petrol engine for power. Hydrofoils today offer a simple way to achieve high speed with small vessels without excessive "'wash," which can damage riverbanks and wash levees away.

81. PRESENT, A PEEK INTO THE FUTURE: It's an intriguing thought—what inventions would a "Famous Inventions" picture card series published in AD 2075 include? Or one published in AD 2975? Matter transmitters? Faster-than-light spaceship drives? Tele-transporters? Instant health dust? Certainly, some inventions of the future will be as far beyond our present understanding as the transistor would have been even to a keen mind like Faraday's. However, the steps along the way will be marked with the useful, everyday products of inventions—like a shaving cream that dissolves whiskers, perhaps, or a cheap, truly pocket-sized color TV set. One thing is certain: The future holds inventions galore—just waiting to be invented.

In 1899, Charles Duell, head of the U.S. Patents Office, suggested that his office be abolished, stating that "everything that can be discovered, has been discovered." Clearly, Duell's recommendation was premature, but his statement reflects the attitude from much of society during his time in office. Life expectancies were rising thanks to the development of better public health practices. Incomes throughout the U.S. were rising due to the increased production afforded by industries. Electricity was being made available throughout the country as a "utility," further symbolizing the increased quality of life for the newly affluent country. Very soon, the Internet will be delivered as a broadband solution from our utility companies through the power plugs in our walls. We will (no doubt) then somehow be billed according to our "utility" use of the Internet. We can suppose, then, there is more to be invented.

Conversely, says Rick Hamilton (Master Inventor at the IBM Corporation), it might be convincing to debate this thought from 1899. Consider that perhaps certain more established societies did not have intellectual property protection mechanisms. Could they have suffered from this abundance of innovative disincentives?

The History of Copyrights

Copyright law originated in England. Before the year 1710, there was a monopoly on printing presses and therefore heavy censorship. That year, however, Parliament ratified the Statute of Anne to address mounting concern about ownership and censorship. This act gave the authors of works a 14-year term of fixed protection that could be renewed and extended.

American Copyright Law Was First Seen in the Copyright Act of 1790

The following timeline is presented by the Association of Research Libraries, Washington, DC as noted at http://arl.cni.org/info/frn/copy/timeline.html. *The timeline is a work-in-progress and said to be frequently updated. The original author recognizes Stanley Katz, Director, Princeton University Center for Arts and Cultural Policy Studies, for reading and offering valuable advice on this timeline.*

The history of American copyright law[5] originated with the introduction of the printing press to England in the late fifteenth century. As the number of presses grew, authorities sought to control the publication of books by granting printers a near monopoly on publishing in England. The Licensing Act of 1662 confirmed that monopoly and established a register of licensed books to be administered by the Stationers' Company, a group of printers with the authority to censor publications. The 1662 act lapsed in 1695 leading to a relaxation of government censorship, and in 1710 Parliament enacted the Statute of Anne to address the concerns of English booksellers and printers. The 1710 act established the principles of authors' ownership of copyrights and a fixed term of protection of copyrighted works (14 years—and renewable for 14 more if the author were alive upon expiration). The statute prevented a monopoly on the part of the booksellers and created a "public domain" for literature by limiting terms of copyright and by ensuring that once a work was purchased, the copyright owner no longer had control over its use. While the statute did provide for an author's copyright, the benefit was minimal because in order to be paid for a work an author had to assign it to a bookseller or publisher.

Since the Statute of Anne almost three hundred years ago, U.S. law has been revised to broaden the scope of copyright, to change the term of copyright protection, and to address new technologies. For several years, the U.S. has considered and acted on copyright reform. The Canadian government is considering copyright reform as well.

1787: U.S. Constitution

According to Article I, Section 8, Clause 8 of the U.S. Constitution, " . . . the Congress shall have 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."

1790: Copyright Act of 1790

The First Congress implemented the copyright provision of the U.S. Constitution in 1790. *The Copyright Act of 1790, An Act for the Encouragement of Learning by Securing the Copies of Maps, Charts, and Books to the Authors and Proprietors of Such Copies*, was modeled on the

[5] For more information, please refer to http://arl.cni.org/info/frn/copy/timeline.html#Bib.

Statute of Anne (1710). It granted American authors the right to print, reprint, or publish their work for a period of 14 years and to renew for another 14. The law was meant to provide an incentive to authors, artists, and scientists to create original works by providing creators a monopoly. At the same time, the monopoly was limited in order to stimulate creativity and the advancement of "science and the useful arts" through wide public access to works in the "public domain." Major revisions to the act were implemented in 1831, 1870, 1909, and 1976.

1831: Revision of the Copyright Act

The term of protection of copyrighted works was extended to 28 years with the possibility of a 14-year extension. Congress claimed that it extended the term in order to give American authors the same protection as those in Europe. The extension applied both to future works and those current works whose copyright had not expired.

1834: Wheaton v. Peters

The case arose from a dispute between the official reporter of U.S. Supreme Court decisions, Richard Peters, and the previous reporter, Henry Wheaton. Peters began publishing "Condensed Reports" of cases decided during Wheaton's tenure, and Wheaton sued. The case went before the U.S. Supreme Court. Peters argued that Wheaton had failed to properly obtain copyright, while Wheaton argued that authors were entitled to perpetual property rights in their works. Justice McLean delivered the majority decision stating that "since the Statute of Anne, the literary property of an author in his works can only be asserted under the statute . . . That an author, at common law, has a property in his manuscript, and may obtain redress against any one who deprives him of it, or by improperly obtaining a copy endeavors to realize a profit by its publication cannot be doubted; but this is a very different right from that which asserts a perpetual and exclusive property in the future publication of the work, after the author shall have published it to the world." The decision struck a decisive blow against the notion of copyright as a perpetual natural right, and the utilitarian view of copyright embodied in the U.S. Constitution prevailed, i.e., "that patents and copyrights are exclusive rights of limited duration, granted in order to serve the public interest in promoting the creation and dissemination of new works." See the amicus brief submitted to the U.S. Supreme Court by Tyler Ochoa and Mark Rose in the case of *Eldred v. Ashcroft,* May 20, 2002.

1841: Folsom v. Marsh

In a case brought before the Massachusetts Circuit Court in 1841, the owner and editor of a multivolume collection of George Washington's letters sued Charles Upham for using hundreds of pages of the letters in their entirety in a volume on the life of Washington. Justice William Story found that Upham had infringed the owner's copyright in publishing some 350 pages of Washington's letters in his 866-page book. Upham argued that Washington's letters were not "proper subjects of copyright" because their publication would not harm the deceased author and because

they were not literary in nature. Story disagreed and held that letter writers and their designated heirs, not the persons to whom the letters are addressed, possess copyright in the letters they had written, no matter the content.

Upham also argued that he had "a right to abridge and select, and use the materials . . . for [his] work, which . . . is an original and new work, and that it constitutes, in no just sense, a piracy of the work of the plaintiffs." Again, Story disagreed, saying that Upham's work was "a selection of the entire contents of particular letters, from the whole collection or mass of letters of the work of the plaintiffs . . . [and] that these letters are the most instructive, useful and interesting to be found in that large collection." In explaining the nature of the infringement, Story said, "It is certainly not necessary, to constitute an invasion of copyright, that the whole of a work should be copied, or even a large portion of it, in form or in substance. If so much is taken, that *the value of the original is sensibly diminished,* or *the labors of the original author are substantially to an injurious extent appropriated by another*, that is sufficient, in point of law, to constitute a piracy pro tanto." The court's definition of what constituted a "justifiable use of the original materials" formed the basis of the "fair use" doctrine. Put another way, Story said that "the question of piracy, often depend[s] upon a nice balance of the comparative use made in one of the materials of the other; the nature, extent, and value of the materials thus used; the objects of each work; and the degree to which each writer may be fairly presumed to have resorted to the same common sources of information, or to have exercised the same common diligence in the selection and arrangement of the materials."

1853: Stowe v. Thomas

Harriet Beecher Stowe sued F.W. Thomas, publisher of a German-language periodical, *Die Freie Presse,* in 1853. Thomas translated *Uncle Tom's Cabin* into German and sold it in the United States without the author's permission. Judge Robert Grier of the Third Circuit Court of Appeals explained in the decision that once an author published her or his work "and given his thoughts, sentiments, knowledge or discoveries to the world, he can have no longer an exclusive possession of them." With regard to translations, he continued, "the same conceptions clothed in another language cannot constitute the same composition; nor can it be called a transcript or 'copy' of the same 'book.'" According to Siva Vaidhyanathan,[6] the "antiproperty" rhetoric in the decision encouraged many American authors to take a stand in favor of copyright as property until the copyright law was revised in 1870.

1870: Revision of the Copyright Act

The administration of copyright registrations moved from the individual district courts to the Library of Congress Copyright Office. The term of protection was not extended in this revision.

[6] Siva Vaidhyanathan is currently an assistant professor in the Department of Culture and Communication at New York University. Dr Vaidhyanathan's work is referenced throughout this chapter. For more information on Dr. Vaidhyanathan's works, please reference http://www.nyu.edu/classes/siva/.

1886: Berne Convention

The goals of the Berne Convention provided the basis for mutual recognition of copyright between sovereign nations and promoted the development of international norms in copyright protection. European nations established a mutually satisfactory uniform copyright law to replace the need for separate registration in every country. The treaty has been revised five times since 1886. Of particular note are the revisions in 1908 and 1928. In 1908, the *Berlin Act* set the duration of copyright at life of the author plus 50 years, expanded the scope of the act to include newer technologies, and prohibited formalities as a prerequisite of copyright protection. In 1928, the *Rome Act* first recognized the moral rights of authors and artists, giving them the right to object to modifications or to the destruction of a work in a way that might prejudice or decrease the artists' reputations. The United States became a Berne signatory in 1988.

1891: International Copyright Treaty

Because American copyright law applied only to American publications, European authors were unable to profit from the publication and sale of their works at extremely low prices during the nineteenth century. The so-called "cheap books" movement, spread rapidly by small upstart publishers after the Civil War, threatened the "courtesy principle" of gentlemanly price-fixing adhered to by the large, established publishers such as Henry Holt. By the 1880s cheap books flooded the American market. By 1890, author, publisher, and printer unions joined together to support an international copyright bill.

1909: Revision of the U.S. Copyright Act

A major revision of the U.S. *Copyright Act* was completed in 1909. The bill broadened the scope of categories protected to include all works of authorship and extended the term of protection to 28 years with a possible renewal of 28. Congress addressed the difficulty of balancing the public interest with proprietor's rights:

"The main object to be desired in expanding copyright protection accorded to music has been to give the composer an adequate return for the value of his composition, and it has been a serious and difficult task to combine the protection of the composer with the protection of the public, and to so frame an act that it would accomplish the double purpose of securing to the composer an adequate return for all use made of his composition and at the same time prevent the formation of oppressive monopolies, which might be founded upon the very rights granted to the composer for the purpose of protecting his interests" (H.R. Rep. No. 2222, 60th Cong., 2nd Session, p. 7 [1909]).

1973: Williams and Wilkins Co. v. United States

Williams and Wilkins, publishers of specialized medical journals, sued the National Library of Medicine (NLM) and the National Institutes of Health (NIH), charging that the agencies had infringed copyright by making unauthorized photocopies of articles featured within their publications and distributing them to medical researchers. The U.S. Court of Claims held that finding an

infringement in the case would harm medical research, and since the *Copyright Act* was under revision by Congress, it was better to allow the status quo to continue in the interim. In the decision, Judge Davis stated, "the court holds, based on the type and context of use by NIH and NLM as shown by the record, that there has been no infringement, that the challenged use is 'fair' in view of the combination of all of the factors involved in consideration of 'fair' or 'unfair' use enumerated in the opinion, that the record fails to show a significant detriment to plaintiff but demonstrates injury to medical and scientific research if photocopying of this kind is held unlawful, and that there is a need for congressional treatment of the problems of photocopying."

1976: Revision of the U.S. Copyright Act

The 1976 revision was undertaken for two primary reasons. First, technological developments and their impact on what might be copyrighted, how works might be copied, and what constituted an infringement needed to be addressed. Second, the revision was undertaken in anticipation of Berne Convention adherence by the U.S. It was felt that the statute needed to be amended to bring the U.S. into accord with international copyright law, practices, and policies. The 1976 act preempted all previous copyright law and extended the term of protection to life of the author plus 50 years (works for hire were protected for 75 years). The act covered the following areas: scope and subject matter of works covered, exclusive rights, copyright term, copyright notice and copyright registration, copyright infringement, fair use and defenses and remedies to infringement. With this revision, for the first time the fair use and first sale doctrines were codified, and copyright was extended to unpublished works. In addition, a new section was added, Section 108, that allowed library photocopying without permission for purposes of scholarship, preservation, and interlibrary loan under certain circumstances.

In addition to Section 108, Section 107 is important to libraries because it contains an exception to the exclusive rights of owners to make and distribute copies of their works. It states that "the fair use of a copyrighted work, including such use by reproduction in copies or phonorecords or by any other means specified by that section, for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research, is not an infringement of copyright." To determine whether the use of a work is a fair use, the following four factors are to be considered: purpose and character of the use, nature of the copyrighted work, the amount and substantiality of the portion used in relation to the whole, and the effect of the use on the potential market. See Title 17 of the U.S. Code.

1976: Classroom Guidelines

In addition to legislative reforms, private negotiations between owners and users of copyrighted materials resulted in guidelines for classroom and educational use as well as reserve room use. These guidelines were not part of the statute but were included in the House report accompanying the 1976 act. The 1976 *"Agreement on Guidelines for Classroom Copying in Not-for-Profit Educational Institutions with Respect to Books and Periodicals*" was adopted by 38 educational organizations and the publishing industry. According to the text of the guidelines, the purpose

was "to state the minimum and not the maximum standards of educational fair use under Section 107 of the [*Copyright Act of 1976*]. The parties agree that the conditions determining the extent of permissible copying for educational purposes may change in the future; that certain types of copying permitted under these guidelines may not be permissible in the future; and conversely that in the future other types of copying may be permissible under revised guidelines."

1976: CONTU Process

The National Commission on New Technological Uses of Copyrighted Works (CONTU) was appointed by Congress in 1976 to establish guidelines for the "minimum standards of educational fair use" under the 1976 act. "The CONTU guidelines were developed to assist librarians and copyright proprietors in understanding the amount of photocopying for use in interlibrary loan arrangements permitted under the copyright law." Guidelines were established for copying for interlibrary loan purposes.

1983: Encyclopedia Britannica Educational Corp. v. Crooks

Encyclopedia Britannica sued the Board of Cooperative Educational Services, a consortium of public school districts, for systematically taping educational programs that were broadcast on public television stations and making copies available to member schools. The court found that the actions of the school board would have a detrimental effect on the market of the commercially produced programs and that the use was not a fair use.

1986: Maxtone-Graham v. Burtchaell

Maxtone-Graham wrote a book containing women's stories of unwanted pregnancy and abortion in 1973. She denied Burtchaell's request to use excerpts from her published interviews. He published them anyway. The Second Circuit Court of Appeals found that quoting 4.3% of an author's work was not excessive and that Burtchaell's use of the narratives was a fair use.

1987: Salinger v. Random House

After an initial decision in favor of J.D. Salinger's unauthorized biographer, Ian Hamilton, the Second Circuit Court of Appeals found that quoting or paraphrasing from unpublished materials (Salinger's letters) in an unauthorized biography was not fair use, and the book was never published.

1988: Berne Convention

The United States became a Berne signatory in 1988. The major changes for the U.S. copyright system as a result of Berne were greater protection for proprietors, new copyright relationships with 24 countries, and elimination of the requirement of copyright notice for copyright protection.

1990: Circulation of Computer Software

Congress amended the *Copyright Act* to prohibit commercial lending of computer software. The amendment noted that libraries could lend software, provided the "copy of a computer program which is lent by such library has affixed to the packaging containing the program a warning of copyright." The amendment was a modification of the first sale doctrine.

1991: Basic Books, Inc. v. Kinko's Graphics Corp.

A Federal District Court in New York ruled that Kinko's Graphic Corporation infringed copyrights and did not exercise fair use when it photocopied coursepacks that included book chapters and then sold them to students for class work. The court found that most of the fair use factors worked against Kinko's in this case, especially given Kinko's profit motive in making the copies. Additionally, the court found that the classroom guidelines did not apply to Kinko's. The court did not rule that coursepacks could not constitute fair use in other circumstances.

1991: Feist Publications v. Rural Telephone Service Co., Inc.

The U.S. Supreme Court found that the U.S. Constitution requires that for a work to receive copyright protection, it must reflect creative expression or originality. Thus, the compilation of a telephone directory by Feist was not an infringement even though it was compiled from the information in the Rural Telephone Service White Pages. The information in the white pages was not copyrightable because it comprised "comprehensive collections of facts arranged in conventional formats."

1992: American Geophysical Union v. Texaco

American Geophysical Union v. Texaco resulted from a class-action suit brought by six scientific publishers (on behalf of other publishers registered with the Copyright Clearance Center). In July 1992, a U.S. district judge ruled in the seven-year-old copyright case that a Texaco scientist violated copyright law when he copied complete journal articles without providing the appropriate fee to the publishers. Texaco argued that the copying fell within fair use. The court ruled that the profit motive of the company was a relevant consideration in the analysis of the purpose of the use. They also found against Texaco in considering the amount of the work used and found that the market was affected because Texaco could have paid royalties through the CCC.

In 1994, the Second Circuit Court of Appeals upheld the lower court decision. In April 1995, Texaco petitioned the Supreme Court to review the case. On May 15, 1995, Texaco and a steering committee representing the publishers announced that they had agreed upon terms to settle the case. Texaco, which conceded no wrongdoing in the proposed settlement, paid a seven-figure settlement and retroactive licensing fee to the CCC. In addition, Texaco entered into standard annual license agreements with the CCC over the following five years.

1992: Amendment to Section 304 of Title 17

Congress amended Section 304 of Title 17 making copyright renewal automatic. The amendment dramatically curtailed the entry into the public domain of works protected by copyright before 1978.

1993: Playboy Enterprises Inc. v. Frena

The Florida Northern District Court held that Frena, an electronic bulletin board operator, had violated *Playboy's* copyright when one of its photographs was digitized and placed on the bulletin board system by one subscriber and downloaded by another subscriber. According to the decision, "it does not matter that Defendant Frena may have been unaware of the copyright infringement. Intent to infringe is not needed to find copyright infringement. Intent or knowledge is not an element of infringement, and thus even an innocent infringer is liable for infringement; rather innocence is significant to a trial court when it fixes statutory damages, which is a remedy equitable in nature."

1993: NII Initiative

The Working Group on Intellectual Property Rights was established to explore the application and effectiveness of copyright law and the National Information Infrastructure. The NII was described as "a seamless web of communications networks, computers, databases, and consumer electronics" (Information Infrastructure Task Force, National Telecommunications and Information Administration, *National Information Infrastructure: Agenda for Action,* 1993).

1994: Campbell v. Acuff-Rose Music Inc.

The Supreme Court ruled that 2 Live Crew's parody of Roy Orbison's song, "Pretty Woman," was a fair use. The Court found that a commercial use could be a fair use especially when the markets for an original work and a transformative work are different (Vaidhyanathan, 148-49).

1994: Working Group's Green Paper

The Working Group on Intellectual Property Rights sponsored a series of activities to solicit input on copyright issues and the NII. These included public hearings and, in June 1994, a draft NII report was circulated for comment and review (the *Green Paper*). Part of the review process included three hearings (held in Los Angeles, Chicago, and Washington, DC) hosted by the Working Group, where members of the stakeholder community presented reactions to the *Green Paper*.

1994: CONFU

The Working Group on Intellectual Property Rights sponsored the Conference on Fair Use (CONFU). Established in September 1994, CONFU was the venue for a discussion of issues of fair use in the electronic environment. CONFU participants developed guidelines for fair use of educational multimedia and *proposed* guidelines in a number of areas including interlibrary loan,

electronic reserves, digital images, and distance education. According to the final report, issued in 1998, "it was clear that fair use was alive and well in the digital age, and that attempts to draft widely supported guidelines will be complicated by the often competing interests of the copyright owner and user communities."

1995: Religious Technology Center v. Netcom

A federal judge in the Northern District Court of California ruled that Netcom, an Internet Service Provider (ISP), was liable for contributory infringement (as opposed to direct infringement) of copyright because the company did not remove copyrighted materials posted by a subscriber. Justice Whyte found that "mere possession of a digital copy on a [server] that is accessible to some members of the public" may not constitute direct infringement of the exclusive right to publicly distribute and display. The case was significant for its implications for Internet Service Providers' knowledge of and liability for infringers' activities, as well as their use of the fair use doctrine as an affirmative defense against charges of contributory infringement. In 1998, the DMCA limited the liability of "Service Providers" for some forms of infringement. For more information on ISP liability, see the Copyright Crash Course, "Is Your Library an Internet Service Provider Under the DMCA?" <*http://www.utsystem.edu/ogc/intellectualproperty/l-isp.htm*>.

1995: Release of the White Paper

The culmination of the NII Working Group's efforts was release of the *White Paper* in September 1995. The *White Paper* contained recommendations to amend the *Copyright Act of 1976* and presented a lengthy legal analysis of current copyright law. The *White Paper's* legislative amendments and recommendations were introduced in Congress as the *NII Copyright Protection Act of 1995* (S. 1284 and H.R. 2441).

1996: TRIPS Agreement

In December 1994, President Clinton signed the *Uruguay Round Agreements Act (URAA)*, which implemented the *General Agreement on Tariffs and Trade (GATT)* including Trade-Related Aspects of Intellectual Property (TRIPs). Provisions in the URAA amended U.S. copyright law. On January 1, 1996, copyright for works from eligible countries was restored.

1996: Database Protection Legislation

In May 1996, Rep. Carlos Moorhead (Chair, House Judiciary Subcommittee on Courts and Intellectual Property, R-CA) introduced the *Database Investment and Intellectual Property Antipiracy Act of 1996* (H.R. 3531). The legislation was comparable to a European sponsored initiative to protect databases for 15 years from unauthorized extractions of more than an insubstantial part of the database contents. A variety of bills were introduced until 1999. Discussions on this extremely controversial legislation continued throughout 2002, with Congressional staff trying to craft a compromise bill.

1996: Princeton University Press, MacMillan Inc., and St. Martin's Press v. Michigan Document Services, Inc., and James Smith

In November 1996, the Sixth Circuit Court of Appeals decided in an eight to five ruling in favor of publishers who sued Michigan Document Services (MDS). MDS was an off-campus, for-profit photocopy shop whose owner, James Smith, made coursepacks that included substantial portions of copyright protected books and sold them to students. Smith claimed his use of the material was a fair use, and in February 1996, the same court had ruled in his favor. However, in April 1996, the judges of the court voted to rehear the case *en banc,* leading to the November ruling. MDS appealed the case in January 1997; however, the U.S. Supreme Court refused to hear the case.

1996: World Intellectual Property Organization

Delegates from 160 countries considered two treaties on international intellectual property law during a Diplomatic Conference convened in December 1996 in Geneva, Switzerland. The delegates adopted new versions of the proposed treaties resulting in a new approach to copyright issues. The Conference adopted a statement ensuring the two treaties would "permit application of fair use in the digital environment." The treaty language emphasized "the need to maintain a balance between the rights of authors and the larger public interest, particularly education, research, and access to information."

1998: Sonny Bono Copyright Term Extension Act

On October 7, 1998, the House and Senate passed S. 505, the *Copyright Term Extension Act (CTEA)*. The law extended protection from life of the author plus 50 years to life of the author plus 70 years. President Clinton signed the measure into law on October 27, 1998 (P.L. 105-298). The law's provisions applied to works under copyright on the date of its implementation. An exception permits libraries, archives, and non-profit educational institutions to treat copyrighted works in their last 20 years of protection as if they were in the public domain for noncommercial purposes, under certain limited conditions. See the ARL Federal Relations site for updates.

1998: Digital Millenium Copyright Act

President Clinton signed the *Digital Millenium Copyright Act (DMCA)* into law on October 28, 1998 (P.L. 105-304). The law's five titles implemented the WIPO Internet Treaties; established safe harbors for online service providers; permitted temporary copies of programs during computer maintenance; made miscellaneous amendments to the *Copyright Act*, including amendments that facilitated Internet broadcasting; and created *sui generis* protection for boat hull designs. A controversial title establishing database protection was omitted by a House-Senate Conference.

Among the most controversial provisions of the DMCA is Section 1201. According to Jonathan Band of Morrison & Foerster, LLP, Section 1201 "prohibits gaining unauthorized access to a work by circumventing a technological protection measure put in place by the copy-

right owner where such protection measure otherwise effectively controls access to a copyrighted work. This prohibition on unauthorized access takes effect two years after enactment of the DMCA." Over the next two years, the Librarian of Congress conducted a rulemaking proceeding to determine appropriate exceptions to the prohibition. Additional rulemakings will occur every three years.

For more information on the DMCA, please reference:

http://www.arl.org/info/frn/copy/dmca.html

http://www.hrrc.org/html/DMCA-leg-hist.html

1999: Bender v. West Publishing Co.

The U.S. Supreme Court denied *certiorari*, or refused to hear, two cases under appeal by West Publishing Company. By rejecting the request, the Court let stand two decisions by the Second Circuit Court of Appeals in favor of Matthew Bender & Co. and Hyperlaw, Inc.

The Second Circuit Court of Appeals limited the ability of West Publishing Corporation to copyright legal decisions. In two rulings, *Matthew Bender v. West Publishing Co.* and *Matthew Bender Co. and Hyperlaw Inc. v. West Publishing Co. and West Publishing Corporation,* the court determined that the changes that West Publishing made to judicial opinions were not sufficient to warrant additional legal protection of the decisions. The court noted that "all of West's alterations to judicial opinions involve the addition and arrangement of facts, or the rearrangement of data already included in the opinions, and therefore any creativity in these elements of West's case reports lies in West's selection and arrangement of this information. In light of accepted legal conventions and other external constraining factors, West's choices on selection and arrangement can reasonably be viewed as obvious, typical, and lacking even minimal creativity. Therefore, we cannot conclude that the district court clearly erred in finding that those elements that Hyperlaw seeks to copy from West's case reports are not copyrightable, and affirm."

1999: UCITA Passed by NCCUSL

In July 1999, the National Conference of Commissioners on Uniform State Laws (NCCUSL) passed the *Uniform Computer Information Transaction Act* (UCITA, formerly UCC 2B). UCITA is a proposed state law that seeks to create a unified approach to the licensing of software and information.

1999: Digital Theft Deterrence and Copyright Damages Improvement Act of 1999

Congress approved a significant hike in the minimum statutory damages for various types of copyright infringement in the *Digital Theft Deterrence and Copyright Damages Improvement Act of 1999* (H.R. 3456). The law increased the minimum statutory damages for infringements from $500 to $750 and increased the maximum from $20,000 to $30,000. The maximum for willful infringement increased from $100,000 to $150,000.

2000: Virginia Passed UCITA

On March 14, 2000, Governor Jim Gilmore of Virginia signed UCITA into law. Virginia was the first state to approve the legislation. Maryland passed it in April 2000. The highly controversial legislation is under consideration in several state legislatures.

2000: Librarian of Congress Issued Ruling on DMCA

The Anti-Circumvention Provision of the DMCA, Section 1201(a)(1), allows exemptions from the prohibition on circumvention of technological protection measures for "persons who are users of a copyrighted work which is in a particular class of works, if such persons are, or are likely to be . . . adversely affected." Congress directed the Register of Copyrights to review the section and to issue recommendations to the Librarian of Congress on "classes of works" that should be exempt from the ban on circumvention.

Members of the Shared Legal Capability (made up of representatives of the five major library associations: the American Library Association, the American Association of Law Libraries, the Association of Research Libraries, the Medical Library Association, and the Special Libraries Association) had called for a broad exemption from technological protection measures in order to ensure that library users could exercise fair use of protected material. The Assistant Secretary for Commerce, Gregory Rohde, noted that "information crucial to supporting scholarship, research, comment, criticism, new reporting, life-long learning, and other related lawful uses of copyrighted information should never become available only to those with the ability to pay." He called for exemptions "grounded in the principle of fair use" that would allow the public to fully realize their access to lawfully acquired information.

On October 27, 2000, the Librarian of Congress announced the exemption of two narrow classes of works: compilations of lists of Web sites blocked by filtering software applications and literary works, including computer programs and databases, protected by access control mechanisms that fail to permit access because of malfunction, damage, or obsolescence. In issuing the rulemaking, the Librarian of Congress noted several concerns and stated his intent to call upon Congress to reconsider selected aspects of the copyright legislation. In particular, he noted the "potential damage to scholarship" and possible harm to "American creativity" resulting from provisions in the statute.

The full recommendation of the Register of Copyrights and determination of the Librarian of Congress can be found at http://www.loc.gov/copyright/1201/anticirc.html.

2000: Register.com v. Verio

Verio extracted information from the publicly available Register.com WHOIS database for use in telemarketing. In response, Register.com sued Verio and was successful in the New York Southern District Court in December 2000. The judge ordered Verio to stop using customer contact information it had acquired through the WHOIS database for mass marketing purposes. At issue are limits on access to and use of personal information on publicly available online databases.

2001: Greenberg v. National Geographic Society

Two photographers claimed that the inclusion of their photographs in the National Geographic Society's (NGS) CD-ROM version of the NGS magazine violated their copyrights and that the NGS was not exempt under Section 201(c) of the *Copyright Act*. Section 201(c) permits the owner of copyright in a collective work, such as a magazine or encyclopedia, to reproduce and distribute an individual author's freelance contribution "as part of that particular collective work, any revision to that collective work, and any later collective work in the same series."

"The Complete National Geographic," a thirty-disc CD-ROM set, reproduced each monthly issue of the National Geographic magazine from 1888 through 1996. Each NGS magazine included in the CD-ROM is an exact replica of the entire magazine; thus, a user encounters photographs of a freelance author's article in the original context.

2001: New York Times v. Tasini

On June 25, 2001, the U.S. Supreme Court issued its decision in the case of *The New York Times v. Tasini*. In a decisive 7-2 ruling, the Justices upheld an appeals court ruling that the reuse of a freelance author's work on CD-ROMs and in commercial electronic databases without the author's permission constituted copyright infringement. In its ruling, the Court rejected the publishers' argument that a ruling for the authors would have "devastating" consequences, requiring them to delete freelance writers' works in commercial electronic databases. The Supreme Court explicitly noted in its opinion that deletion of the freelance writers' articles was not necessarily the only outcome and that publishers could explore other alternatives. The Justices pointed out that there are "numerous models for distributing copyrighted works and remunerating authors for their distribution" such as the system of blanket performance licenses for musical compositions.

The New York Times now requires permission for electronic republication of works by freelance authors, but this was not standard industry practice until the 1990s. Equally important, implicit in the Court's decision was the recognition that the nation's libraries and archives continue to provide access to the historical record of periodicals and newspapers. In addition, the Court's ruling recognized that certain archival media, such as microfilm and microfiche, do not infringe freelance authors' copyrights. Ultimately, *The New York Times* and other publishers chose to remove the freelance writers' works, as many as 115,000 articles, from Lexis/Nexis and other full-text databases if the writers did not waive their claims for compensation under the decision.

2001: Russian Programmer Arrested for Copyright Circumvention

Among the first challenges to the DMCA was the case of Dmitri Sklyarov, a Russian programmer accused of circumventing copyright protections in Adobe Systems' eBook Reader while working for a Russian software firm, ElcomSoft. Sklyarov was arrested in July 2001. ElcomSoft was charged with one count of conspiracy and four counts of trafficking in technology used to circumvent copyright protections.

On April 2, 2002, Judge Ronald Whyte of the Northern District of California denied a motion to dismiss the prosecution of ElcomSoft. ElcomSoft's attorneys argued that the actions at issue in the case occurred outside of the U.S. and that the law banned tools that consumers could use for legitimate purposes, such as blind people converting e-books to audio files to be read aloud by their computers. Finally, the attorneys argued that computer code is speech and is therefore protected under the first amendment to the U.S. Constitution.

2001: State Sovereign Immunity

According to the Eleventh Amendment to the U.S. Constitution, state entities, including universities and libraries, may not be held liable in federal court cases. After a series of U.S. Supreme Court decisions held that the sovereign immunity clause exempts state entities from adherence to federal intellectual property laws, the Texas Northern District Court took up the question of state immunity from copyright infringement litigation in January 1998. The court concluded that a state agency could not be held liable for copyright infringement in federal court. In April 1998, the Fifth Circuit Court of Appeals affirmed the decision, finding that the University of Houston, a state agency, could not be held liable in federal court for copyright infringements.

On November 1, 2001, Patrick Leahy (Chair, Committee on the Judiciary, D-VT) introduced S. 1611, the *"Intellectual Property Protection Restoration Act of 2001*," to address what is seen by many as an inequitable situation under which state entities can use federal law to protect their own intellectual property but may infringe the copyright, patent, and trademark laws that protect others' intellectual property. S. 1611 would make the availability of federal intellectual property protection laws contingent upon the voluntary waiver by states of their own immunity from suit under the sovereign immunity clause of the U.S. Constitution.

2002: Consumer Broadband and Digital Television Promotion Act (S. 2048) Introduced in Senate

On March 21, 2002, Sen. Ernest Hollings (Chair, Committee on Commerce, Science, and Transportation, D-SC) introduced the "*Consumer Broadband and Digital Television Promotion Act*" (S. 2048). The goal as stated in the bill is "to regulate interstate commerce in certain devices by providing for private sector development of technological protection measures to be implemented and enforced by Federal regulations to protect digital content and promote broadband, as well as the transition to digital television, and for other purposes." The bill requires that any device that can record, receive, or store copyrighted digital information comply with copy-protections encoded in digital works such as DVDs, CDs, and electronic books.

2002: ABA Issues UCITA Report

The National Conference of Commissioners on Uniform State Laws (NCCUSL), the body that introduced UCITA in 1999 and continues to promote its adoption by state legislatures, met in early August 2002. The UCITA Standby Committee, responsible for drafting UCITA, proposed 38 amendments. Those amendments were adopted despite a lengthy debate in which delegates

pushed for additional changes. Forty delegates signed a petition to downgrade UCITA from a "uniform law" to a "model law," a move that would remove NCCUSL's obligation to promote the law in state legislatures. Although the effort was unsuccessful, the debate revealed widespread disenchantment with UCITA within NCCUSL.

On January 31, 2002, the ABA Working Group assigned to review UCITA issued its report to the Board of Governors. UCITA seeks to replace the public law of copyright with the private law of contracts. UCITA was passed by state legislatures in Maryland and Virginia in 2000 but has yet to pass in other states due to significant opposition in the public and private sectors.

As part of the ABA review, NCCUSL, the body responsible for drafting UCITA in 1999, scheduled hearings in fall 2001 and invited interested parties to submit amendments. Representatives from ARL, ALA, and AALL drafted two amendments: 1.) To clarify that terms in non-negotiated licenses would not be enforceable if they prohibited activities normally permissible under federal copyright law; and 2.) To broaden the criteria for declaring such contract terms unenforceable.

2002: U.S. Supreme Court Hears Challenge to 1998 Copyright Term Extension Act

On October 9, 2002, four years after Congress passed the *Sonny Bono Copyright Term Extension Act (CTEA)*, the U.S. Supreme Court heard arguments in a challenge to the Act's constitutionality. Lawrence Lessig, noted legal scholar with the Stanford Law School Center for Internet & Society, represented petitioners in *Eric Eldred v. John Ashcroft*. Passed in October 1998, the CTEA retrospectively extended copyright protection of existing works by 20 years, from the life of the author plus 50 years (as mandated in the 1976 *Copyright Act*) to life of the author plus 70 years. The Act prospectively added 20 years of copyright protection to future works. For works made for hire, the term of protection was extended from 75 to 95 years, thus allowing major corporations such as Disney an additional 20 years of control over their works. In February 2001, a federal appeals court found that retroactive term extensions by Congress were permissible under the Copyright Clause and rejected the argument that the CTEA was unconstitutional. The U.S. Supreme Court is expected to announce a decision in spring 2003.

2002: Senate Approves Distance Education Legislation

The *"Technology Education and Copyright Harmonization Act*," or the *"TEACH Act"* (S. 287) became law on November 2, 2002. The legislation, supported by members of the higher education and library communities, implements recommendations made by the Copyright Office in 1999. Among the benefits of the Act for distance education are an expansion of the scope of materials that may be used in distance education; the ability to deliver content to students outside the classroom; the opportunity to retain archival copies of course materials on servers; and the authority to convert some works from analog to digital formats. On the other hand, the *TEACH Act* conditions those benefits on compliance with numerous restrictions and limitations. Among them are the need to adopt and disseminate copyright policies and information resources; implementation of technological restrictions on access and copying; adherence to limits on the quantity

of certain works that may be digitized and included in distance education; and use of copyrighted materials in the context of "mediated instructional activities" akin in some respects to the conduct of a traditional course.

Additional Reading on Copyrights

1. Patterson, Lyman Ray and Stanley W. Lindberg. *The Nature of Copyright: A Law of Users' Rights*. Athens: University of Georgia Press, 1991.
2. Patterson, Lyman Ray. *Copyright in Historical Perspective*. Nashville: Vanderbilt University Press, 1968.
3. Rose, Mark. *Authors and Owners: The Invention of Copyright*. Cambridge, Mass.: Harvard University Press, 1993.
4. Samuels, Edward. *The Illustrated Story of Copyright*. New York: St. Martin's Press, 2000.
5. Vaidhyanathan, Siva. *Copyrights and Copywrongs: The Rise of Intellectual Property and How It Threatens Creativity*. New York: New York University Press, 2001.

Web Resources on Copyrights

1. Association of Research Libraries, Copyright Web site, <http://www.arl.org/info/frn/copy/copytoc.html>; and Federal Relations E-News Copyright Updates, <http://www.arl.org/info/frn/copy/frncopy.html>.
2. American Library Association, Copyright Web Site, <http://www.ala.org/washoff/copyright.html>.
3. Stanford University Libraries, "Copyright & Fair Use," <http://fairuse.stanford.edu/>.
4. U.S. Copyright Office, "Copyright Law of the United States of America," <http://www.copyright.gov/ title17/>.
5. University of Texas System, "Crash Course in Copyright," <http://www.utsystem.edu/ogc/intellectualproperty/cprtindx.htm>.

The History of Trademarks

The topic of trademark legislation has been an important topic in the United States dating as far back as 1791 when Thomas Jefferson advocated trademark laws. Individual states in the United States then began to pass their own laws (i.e., Michigan in 1842 required that all timber be marked with its origin).

Federal legislation concerning trademarks did not come to pass until July of 1870 with the law on registration of trademarks. This law was soon repealed because it conflicted with Constitutional principals. In 1881, a new law was created, and in 1905, the U.S. Patent and Trademark Office was created, whereby all trademark registrations are (to this day) handled.

TRADEMARKS AND SERVICE MARKS

The symbols (R)—® or TM—™ placed near the trademark indicate that registration is either in force or pending, thus stating that unauthorized use of that mark can lead to legal consequences.

These special symbols warn people that a trademark is registered. A service mark, symbols (SM)—SM—SM, is treated in the same manner as a trademark.

The history of trademarks originates in ancient times. It has, however, been very difficult to determine the exact date when the very first trademark appeared. Although, we know that during the period, 5000 BC, people were creating pottery that had indications of the name of the ruling Chinese emperor, their name as the manufacturer, and information regarding the actual place of creation of the pottery.

When you think about trademarks and their history, consider this: hieroglyphs. As the Hellenistic author, a Greek Egyptian Horapollon, discussed in his book, "*Hieroglyphica*," probably in the fifth century AD, yet this book was published only in the fifteenth century. Horapollon,[7] considered hieroglyphs not as elements of Egyptian language, but as ideograms conveying certain notions. Some of the hieroglyphs from Horapollon's book, for example the Phoenix bird, became a commonplace in emblematic science. As Horapollon describes, demotic script is first encountered at the beginning of the 26th dynasty, in about 660 BC. The writing signs demonstrate the connection with the hieratic script, although the exact relationship is still not yet clear. The demotic characters are more cursive (flowing and joined) and thus more similar to one another, with the result that they are more difficult to read than others. Could this have been the dawning of a trademark in its earliest form, asserting ownership?

Symbolizing and emblematizing were very popular in medieval Europe. In the fifteenth century, the military outfit was very bombastic and rich in emblematical elements: innumerable mottos abundantly decorated the hats, jackets, armors, and the horse harnesses.

Officially in England, they started marking gold and silver in 1300, when King Edward I enacted the law that prohibited jewelers to sell their gold and silver creations without a previous stamping at the Goldsmith's Hall (their office in London); those who tried to counterfeit the hallmarks were sentenced to death.

[7] *HORAPOLLON*, of Phaenebythis in the nome of Panopolis in Egypt, Greek grammarian, flourished in the fourth century A.D. during the reign of Theodosius I. According to Suidas, he wrote commentaries on Sophocles, Alcaeus and Homer, and a work on places consecrated to the gods. Photius (cod. 279), who calls him a dramatist as well as a grammarian, ascribes to him a history of the foundation and antiquities of Alexandria (unless this is by an Egyptian of the same name, who lived in the reign of Zeno, 474491). Under the name of Horapollon, two books on Hieroglyphics are extant, which profess to be a translation from an Egyptian original into Greek by a certain Philippus, of whom nothing is known. The inferior Greek of the translation, and the character of the additions in. the second book point to its being of late date. Though a very large proportion of the statements seem absurd and cannot be accounted for by anything known in the latest and most innovative application, there is ample evidence in both the books, in individual cases, that the tradition of the values of the hieroglyphic signs was not yet extinct in the days of their author.

Continuing on this topic, let's explore merchant's marks—these are personal marks that existed since the beginning of the thirteenth century till the end of sixteenth. These marks were widely used by traders and merchants throughout Europe. Merchant's marks can be considered as predecessors of modern trademarks, primarily because they bore names of traders and served as a guaranty that the sold goods were of expected quality. In the fifteenth century, there appeared printer's marks, which were put on books to identify the printer. For example, the famous German printer, Johannes Gutenberg, used the mark representing a double shield, which first appeared in books published in 1462. In the sixteenth century, emblems decorated not only palaces and castles of noblemen, but also inns and taverns, hence were widely used in trade.

The earliest dated printed book known is the "Diamond Sutra," printed in China in 868 CE. It is suspected, however, that book printing may have occurred long before this date. It was in the year 1041 that movable clay type printing was first invented in China. Johannes Gutenberg later invented the printing press with replaceable wooden or metal letters in 1436 (completed by 1440).

The British Parliament adopted the first legislative act concerning trademarks in 1266 under the reign of Henry III, and according to that act, every baker (for example) had to put his or her mark on the breads that were produced.

In Great Britain, the law on registration of trademarks was later enacted on August 13, 1875. This further granted to a trademark holder a monopolistic right for his or her mark and also the right to sue those who infringe upon it. The Department of Registration of Trademarks then opened in London on January 1, 1876. The first registered trademark was the red triangle of the company, "Bass & Co.," which they put on bottles filled with ale.

Although the mark of the "Bass & Co." is still considered to be the oldest registered mark in the world, it was not the first mark among the still existing trademarks. The point here is that the law on registration of trademarks was passed in the U.S. on July 8, 1870, yet marks began registering in the five years prior to 1870.

A pennant with a slogan from the "Averill Chemical Paint Company," which represented an eagle holding in its beak a pot of paint, was the first mark registered in the U.S. However, the Law of 1870 was later repealed as contradicting to the U.S. Constitution; therefore, this first registration was consequently annulled. This new (repealed) law first appeared in 1881.

The trademark of "Pepsi Cola" was registered in 1898, and ever-since, this logo has constantly been changing. The mark has undergone several modifications in the design of typeface. The most notable of these changes occurred in 1905, 1908, and 1940. Then, in 1950, the mark appeared as an image of cap with a logo on it. This cap was then modified several times so that only a circle remained. The final image, the circle, appeared in 1996 transformed into three-dimensional image of a child's ball. Could it be that the developers of this type of symbolism are exploiting our affection for childhood memories and maybe even trying to invoke a subconscious interest?

Heraldry (coat of arms) and heraldic symbols were always in the center of attention—from old ages the displaying of heraldic symbols was seemingly a prerogative of the noble. During times of industrial revolution, there appeared corporate coats of arms, which belonged to guilds of craftsmen.

Among registered trademarks, one can still find many elements of heraldry. Sometimes companies use in their emblems such elements, which are associated with the state emblem. In Russia, for example, there are a lot of trademarks using a stylized double-headed eagle. There is an ambiguous approach to this problem: On the one hand, it is banned to use the state emblem directly; on the other hand, many directors of enterprises are willing to call up associations with state symbols. A possible solution for this dilemma could be a greater degree of stylization of the elements of the coat of arms.

At present special signs warn people that a trademark is registered. The symbols (R)—® or TM—™ placed near the trademark indicate that registration is either in force or pending, thus implying that any unauthorized use of that mark can lead to legal consequences.

In summary, the historical timelines of inventions, patents, copyrights, and trademarks extend far back into ancient history. Since the earliest of times where history can account for the creation or expression of intellectual property, we are able to identify methods of this expression, and protection of these notions of expression.

In the next chapter, we will explore exactly how ideas are formulated, and subsequently, one can begin to look at how to classify these ideas as intellectual property assets.