issuing, publishing or selling of such articles at the suit of any one complaining.

Another amendment to the copyright law pertains to section 4,966, and was enacted January 6, 1897. It prohibits the unauthorized public performing of copyrighted musical or dramatic compositions, under penalty of not less than one hundred dollars for the first and fifty dollars for each subsequent offense, or such performance may be judged a misdemeanor if it be willful and for profit. An injunction granted by any circuit court in restraint of such performance is also made operative in any other circuit in the United States. This law was enacted to protect playwrights and theatrical managers, and prevent traveling companies from pirating their plays. Heretofore these companies could evade process by traveling from one judicial district to another, and the financial irresponsibility of many of them made a judgment against them of little or no value. It is said, however, that the law goes further than was intended in respect to musical compositions, as composers and publishers generally like to have their music played, in order that a demand may thus be created and more copies of their music sold.

GEMS OF QUARTZ ORIGIN.

Mr. George F. Kunz, in the New York Sun, writes the following: Rock crystal is the purest form of quartz, transparent, colorless, and exhibits most perfectly the properties of the mineral. It is widely distributed, but is brought chiefly from Brazil, Madagascar, Japan, and North Carolina. It is wrought, especially by the Japanese, into polished crystal balls and other articles of elegant ornament. The Romans made much use of it to incise their intaglios, and it has been worked into vases and caskets from the time of Nero to the present, but especially during the fifteenth and sixeenth centuries. Remarkable crystal objects are to be seen in the Louvre, the Green Vaults of Dresden, the Schatzkammer at Vienna, and at Madrid.

Spheres of rock crystal were used as show stones and for divination from the thirteenth to the eighteenth centuries. The engraving and cutting of some of these was so elaborate as to cost years of work and thousands of dollars. Spheres have been cut up to eight inches in diameter, and valued at from $1,000 to $20,000. Nearly the latter price was paid by the late Gov. Ames for the magnificent crystal ball bequeathed to the Boston Fine Arts Museum. This ball measures 185 mm., or 7¼ inches. It was found in 1876. The crystal from which it was cut was 18 inches high, 14½ inches wide, and 12 inches thick. It was found on the Ortake-muko-Yuma, province of Kohi, Japan, originally the property of Naito Arimori, and purchased from Naito Tuskuba for 18,000 yen—about $18,000. It was cut by an old workman, who had devoted his entire life to cutting rock crystal balls. This one was started in June, 1891, and finished in December, 1894. The ball weighs nineteen pounds. The famous Dresden ball measures 6¾ inches and weighs 16½ pounds, but is quite imperfect. A five inch ball cut from material found in Ashe County, North Carolina, and another nearly six inches in diameter, from the summit of Mount Antero, Colorado, are now in the Field Columbian Museum in Chicago. Though not entirely perfect, they are quite equal to the balls of the eighteenth century.

At Hot Springs, Ark., clear, rolled pebbles found on the banks of the Ouachita are often sold. These are more highly prized than the quartz crystals, as the fancy prevails that they cut clearer gems. The scarcity of these, and the demand for them, has led to their artificial production, by putting the crystals into a box which is kept revolving for a few days by water power. Any expert, however, can discern the difference, since the artificial ones have a little whiter surface.

Many places in Colorado furnish fine specimens, and along the New Jersey coast and Long Branch, Atlantic City, Cape May, and other places, transparent pebbles are found in the sand and are sought after by the visitors, who often have them cut as souvenirs. At such places the local lapidaries have been known to substitute for pebbles from the beach foreign-cut quartz, cairngorm, topaz, crocidolite, Ceylon moonstone, and even glass, obtaining twice the value of the foreign gem for the supposed cutting. Sometimes even the stones found by the visitors are exchanged for cut ones from Bohemia, Oldenburg, and the Jura. Cutting is done abroad on so large a scale and by labor so poorly paid that the cut stones can be delivered in this country at one-tenth of the price of cutting here, because the rock crystal itself has but little value.

Amethyst is a transparent purple variety of quartz, its color being due to oxide of manganese. It is a very beautiful stone, much used by the ancients to engrave on, but certain varieties are now but little valued, because not rare enough to be costly. It is found in Brazil, Ceylon, India, and the Ural Mountains. In the latter region, near Mursinka, are found superb deep purple gems, changing to red by artificial light, some of which have sold for $500 each. For intensity and perfection of color, and, one might say, majestic beauty, these rival almost any other gem. Smaller but equally fine amethysts occur in Delaware County, Pennsylvania, Maine, and North Carolina. Oriental amethyst is a purple variety of sapphire, far more rare and valuable than the ordinary amethyst.

Agates are usually formed by the deposit of silica, with more or less of coloring oxides, in the cavities of igneous rocks. When the rock disintegrates, they fall out as hard nodules, and are then found on the surface, or frequently strewn along shores, beaches, and the beds of streams. These agate pebbles are abundant on the shore of Lake Superior and on the beach at Pescadero, Cal., and are gathered as souvenirs and to some extent cut for local jewelry. Externally they are rough and of little beauty, their veined structure and colors only appearing on breaking them, and still more upon polishing. They are made into seals, rings, pencils, handles for swords, knives and forks, mortars for grinding chemicals, bearings for fine balances, beads, studs, earrings, trinkets, match boxes, and many other objects.

A peculiar feature of all these agates and chalcedonies is their power of absorbing coloring matters under certain conditions, and by this means all manner of highly colored varieties are artificially produced by skillful treatment of the stone. Most of the deep red carnelians and sards are thus prepared by burning from pale or dull colored chalcedony, and all the black agate, which has now quite replaced jet in mourning jewelry, is so prepared. In the banded varieties some of the bands are more absorbent than others, and thus the highly colored black and white onyx and red and white sardonyx are produced, and most of the richly tinted variegated agates used for ornamental work. Picture agates is the name given to quaint markings resembling human forms or like objects. The famous Madonna agate in the Vienna collection has thousands of peasant visitors annually.

Moss agate has been much less used during the past twenty years than formerly, the annual sales not exceeding $1,000. Since the recent use in cheap jewelry of the Chinese natural green and artificially colored red and yellow moss agate the sale of the American has greatly fallen off. At Hartville, Wyo., large masses of moss agate weighing from forty to fifty pounds each were recently found in limestone rock. When cut into translucent slabs they show the magnificent black dendritic or mosslike markings in a most striking manner. Some table tops of this elegant material were exhibited in the Wyoming section of the Mining building at the World's Columbian Exposition. The finest instructive collection of agate known is the wonderful series presented to the Harvard Mineralogical cabinet by Dr. W. S. Bigelow, of Boston. Ruskin wrote upon and presented a fine series of agates to the British Museum.

If chalcedony is boiled in a solution of molasses and water, blood and water, or sugar and water, until it has absorbed a quantity of the solution, and is then again boiled in sulphuric acid, the transparent hydrocarbon is changed to a charcoal-like substance, and black onyx is produced. When white bands alternate with the chalcedony they are impenetrable to the coloring, and appear clearer and brighter. Black onyx has now almost entirely superseded jet.

The yellow variety is made by first putting the stones in a honey solution, then in a solution of chromate of lead for several days. Placed for a few weeks in hydrochloric acid, kept at a moderate heat, a beautiful clear yellow color is given to the streaks that were before a dirty brown. This is also erroneously called golden opal. Stones of a reddish hue are greatly improved in brilliancy of color by first thoroughly drying them for weeks in ovens, then dipping them in sulphuric acid, heating to full red heat, and afterward slowly cooling them. The changes that take place in both these processes are upon the oxide of iron which is the coloring matter.

Modern chemistry has wrought great changes in agate coloring, as in other arts, a secret process having been discovered by which chalcedony of any single color can be made to assume any two or more colors, so that an onyx of any shape or variety of colors can be made. If a sunken center of another color is required, it can be made so that the figure, when cut out, remains in a hollow, forming a cameo intaglio. In this manner the fine cutting of the cameo is protected. A white figure may be made in a black stone, a red figure in a brown stone, or a white one in a red stone. By this process the entire stone is first changed to the color desired for the outer layer, then a cavity is cut in the top and a solution put into it, which alters it to the required color. It is this discovery that has made a formerly valuable onyx worth now only a nominal sum.

Agates are thus made to assume the onyx character, which is desired by the lapidary for the production of cameos and intaglios in imitation of the antique sculptured gems. In cameos the figures are in relief and of a different color from the ground. Intaglios are usually all of one color. In Persia inscriptions or devices are written on beads of carnelian and other forms of agate with carbonate of soda and other chemicals; they are then burnt, and the inscription appears white in contrast to the other color. The principal supply of agates for the last hundred years has come from Brazil and other South American countries, where the stone is mostly found by Germans, who leave Oldenburg for that purpose, and who persevere until they find it. Thence it is sent to Germany for cutting, chiefly to Oberstein and Idar. Every fortnight from five to ten tons of the rough material is sold in Idar at public auction, usually in assorted lots of 100 or 200 pounds. The industry yields to the district an annual net profit of half a million dollars, and good agate workmen are among the best paid laborers in Germany, earning from $1.50 to $2 per day.

A NEW DISCOVERY IN PHYSICS.

It has been announced, says the Electrical World, that Dr. P. Zeeman, of the Amsterdam University, while working at Leyden, discovered that the lines of a metallic spectrum are broadened when the source of light is in an intense magnetic field. The experiments of Dr. Zeeman were most rigorously and accurately conducted. Both emission and absorption spectra were examined with a large Rowland grating spectroscope, and the results were marked and certain. The meaning of the fact is clear to those versed in electro-optics, and, indeed, some such broadening had been predicted by several physicists and sought for by others. Dr. Lorentz, of Leyden, from theoretical considerations, ventured the prediction that the light at the edges of the broadened lines would be found to be polarized. This was completely verified by the experiments of Dr. Zeeman. The discovery will probably substantiate the hypothesis that radiation is due to the motion of electric charges, whether free or associated with the vibrating molecules of the luminous body. It has seemed more and more likely, as knowledge of ether physics has advanced, that radiation could not be excited by the motions of the inert molecules of matter, but must of necessity require their electrification. The new facts apparently demonstrate that this is true, and throw another ray of light upon the still obscure subject of the mechanism of radiation. Of course, the principle bearing of the discovery is upon the theory of light. It is a step toward more complete knowledge of the means by which the particles of a body at high temperature disturb the adjacent ether. It contains also the germs of conclusions regarding the nature of radiating and absorbing matter which may go far toward extending our knowledge of molecular and ether physics. There is little doubt that the solutions of the two mysteries—the nature of light and of electricity—are destined to be simultaneously attained. This discovery is probably the most important contribution to science since Roentgen's announcement of his new form of radiation. The fascinating field of speculation opened by each advance toward knowledge of the ultimate nature of electricity and radiation and the mechanism of the ether contains most alluring possibilities of discovery, and every step taken in such an advance is of the utmost importance to nearly every branch of science.

USEFULNESS OF THE SIMPLON TUNNEL.

The Popolo Romano has published, says The Engineer, in one of its interesting special articles on the leading interests of Italy, a summary of the advantages to be derived from the projected tunnel through the Simplon, both to Italy and to travelers to and from Italy and Europe at large. The following table shows the respective distances in kilometers from different parts of Italy to all Western Europe and England:

	Mont Cenis.	St. Gothard.	Simplon.
Milan to Paris	945	904	854
Milan to Boulogne	1239	1128	1108
Milan to Calais	1258	1105	1150
Piacenza to Paris	986	973	923
Piacenza to Boulogne	1269	1188	1155
Piacenza to Calais	1310	1185	1198
Venice to Paris	1208	1156	1103
Genoa to Paris	964	1047	946
Genoa to Calais	1261	1222	1243

But besides the shortening of distances, there is an advantage in the reduction of the height to be climbed, which is by the Mont Cenis route 1293 meters, by the St. Gothard 1155, and by the Simplon only 705. The heaviest gradient on the Simplon is—and that only for 19 kilometers—22 per 1000, while the heaviest on the St. Gothard reaches 26 and on the Mont Cenis 30. When the Neuchatel-Pontarlier line is shortened the real gain in the run from Milan to Paris will be 124 kilometers. There will be a gain also for Italy in the shortening of the distances from Genoa to the great industrial centers of Western Switzerland. The advantages for tourists coming from the West who desire to reach the north of Italy are considerable, to say nothing of the pleasure of a new route which passes through a section of the high Alps not hitherto touched by railway. According to the Times, the shortening of the distance will make the trip cheaper and compel the other lines to reduce their fares.