

Development of Electric Lights Is Veritable White Magic

Modern Incandescent Lamps Give Eight Times the Light at One-Third the Cost of Those Made by Edison 40 Years Ago

Compiles Book of 3,944 Opinions

Monumental Task Completed by Assistant Attorney General Carl E. Cameron Before Leaving Office.

Before the staff of Attorney General S. C. Ford retired from office January 1, a task requiring many hours of "overtime" and a great amount of patience was completed by Assistant Attorney General Carl E. Cameron, who compiled a digest of every opinion of every attorney general since the state of Montana was created.

The demand for the digest was urgent. While many copies were printed, Mr. Cameron devoted Sundays, holidays and spare time generally in delving through the voluminous files and records of the office, going through ancient and rusty documents which were written when the state government was located in the Lewis and Clark county court house, and in



CARL E. CAMERON.

regulating all of the opinions rendered on every possible subject. They were then re-written in more readable style; the questions and answers taken on each by the attorney general as they were requested from time to time in the course of the growth of Montana.

All of these opinions have been arranged in alphabetical order and volume in one large volume. The volume was compiled at the suggestion of Attorney General S. C. Ford and the quest of many county attorneys who pleaded that the digest will eliminate many requests for opinions, and will give many county officers a guide to questions of administration of state affairs.

There are a total of 3,944 opinions. Graduate of State University. Mr. Cameron was born in Kellogg, N. D., and came to Montana with his parents at the age when he did not pay much attention to geography and the Missoula his home. After being graduated from the Missoula high school he entered the state university in addition to winning two degrees was prominent in nearly every activity of the state university. He was graduated from the law department with the degree of LL. B. While in his junior year in the university he was elected president of the law and when a senior was given the highest honor accorded any student, being elected president of the association of students. He won his track and letter for winning middle distance events every year he was in school and also captained the team during his last year in school. Among his honors he was elected president of the Y. M. C. A. of the university.

Active in Politics. In addition to his other activities Mr. Cameron took an interest in politics early in life and while in the university took an active part in the organization of the first Bull Moose organization of the school in 1912. In 1914 he ran for the legislature on the Bull Moose ticket, and although he lost his ticket, was defeated. After finishing school he went to working when the oil excitement started and for two years was engaged in the detail of corporate law organization of several companies in the oil fields. While in this work Mr. Cameron specialized in the corporate law pertaining to oil production organizations. He returned to Missoula for a short time and was appointed law clerk in Attorney General Ford's office in May, 1919. He later appointed assistant attorney general, succeeding A. A. Gross, and engaged in the general practice of law litigation on behalf of the state in supreme court at Helena and in courts in various places in Montana.



Assembling Thousands of Lamp Sockets Daily



Glass Blower Fashioning Lamp Bulbs

Photos by General Electric Co.



Thomas A. Edison

The Way to Better Light.

No. 1-3000 B.C. Alabaster Oil Lamp. No. 2-300 B.C. Pottery Lamp. No. 3-1400-Venetian Stand Lamp. No. 4-Flemish Oil Lamp. No. 5-1800-Candle. No. 6-1830 Whale Oil Lamp. No. 7-1850-Camphine Lamp. No. 8-1870 Coal Oil Lamp. No. 9-1880-Carbon Filament Lamp. No. 10-1908-Tungsten Filament Lamp. No. 11-1920-White MAZDA LAMP.



WHITE MAGIC! It has overcome darkness with brightness!



MAKING PORCELAIN BASE OF SOCKET IN 2 SECONDS



Dr. Irving Langmuir - Dr. W.D. Coolidge, Who Improved Lamps Through the Might of Science.



Punching Electric Light Sockets into shape.

Some profess to believe that if the millions of gleaming dots now scattered in multi-bulbed clusters upon the earth become sufficiently intense, those snubnosed folk on neighbor Mars will just have to turn their heads and take a squint. We humans are bound to make ourselves known. It is white magic.

The present earth-dweller lives in a nightly gloom that would astonish his dark-groined forefathers. If they could see it, today the man with a home as a wizard in his own house. The twentieth century housewife finds her path brightened by a power so completely a part of her daily life that she no longer wonders at it. Verily, it is white magic.

In the days of primitive man, the mark who was a fire. He got that from Prometheus, who brought it down to earth from the sun, according to authentic accounts. Fire, being primitive man's sole source of light, was naturally guarded with watchful zeal.

The woman of the prehistoric cave family was the fire tender. If she failed to keep the precious flame alive, day and night, she was severely punished. It was a serious matter if the fire went out. The only remedy was to secure a burning brand from a neighboring tribe. If the neighboring tribe was unfriendly, this procedure might result in war—which frequently happened.

The evolution of the simple torch was the first feat of those mighty ages. To separate the central blaze into smaller blazes for local lighting seemed a big idea.

It was a big idea—for those times. It was the germ thought which, trickling through countless generations then to come, was to create the human world that only the white magic could satisfy. It was the "big news" of, say, 5,000 B. C.

Endless years have seen the dull glow in man's home grow brighter as the torch gave way to the first crude lamp, to be followed by the universal candle, and then by a more improved oil-burning lamp. So the year 1879 finally arrived—a year of note in the march of events towards better illumination.

On October 21 of that year, Thomas A. Edison, apostle of light, made the first practical incandescent lamp. A few months later his lamps were on the market.

They had straps of carbonized bamboo for the filament, the substance within the bulb which gives the illumination. The bulbs themselves had tapering glass necks, expanded into a globe at the top.

Lighting Costs Reduced. Forerunners of today's white magic illuminations, these lamps of Edison, consumed 100 watts of electricity and gave a 16 candlepower ray. Modern lamps give about eight times the amount of light for the same energy consumption; and the cost of lighting in 1920 was only 3 per cent of what it was in 1881.

Cheerful news to harassed folk who have been grieving over the high-flying ambitions of the cost of living! Today more than 400,000,000 electric lights shine every 24 hours the world around. The bulbs for these lamps and the multitude of new ones constantly going into action are made at the rate of a million a day. In just one building of just one large electrical manufacturing plant of the United States, nearly 3,000 tons of porcelain clay are mixed daily for the insulated parts of lamps. In another building of this same plant, 175,000 sockets for electric lamps are made every week, a total of nine million a year, in this one building.

That building alone turns out enough sockets to fit 30,000 new lamps every day—many as the entire number of Edison's lamps sold in 1881. This is the more marvelous when the fact is disclosed that each socket has from 20 to 40 parts and must be handled by 200 persons in nearly 240 operations.

Magic Behind White Magic. If the Mazda lamps now used were made at the low efficiency of Edison's first lamps, the coal bill of the United States last year would have been greater by \$500,000,000 to allow the volume of electric light used in this country that year to be produced. That is the largest gas-filled lamp regularly used in the United States.

All this is magic. But there is a greater magic back of it—the magic behind the white magic.

That famous Alice who passed through the looking glass was amazed so the carpenter, in a notable room recited for her entertainment. It was a proposal that "seven maids with seven mops" should try to sweep away the same of the seashore. Nothing short of magic could have done it.

But, then, nothing short of magic could have banished the imps of darkness into the narrowing corners of the earth; it is magic, and nothing else, that has shattered the tyranny of night by the universal army of the elf of light.

But the time was when such a victory seemed impossible. The incandescent electric light could not be made its brightest until men, seemingly by magic workers, although in reality simply patient, hard-thinking investigators, discovered the tungsten way.

Tungsten, the substance of most lamp filaments now, long baffled the scientists because it was so brittle. But an American experimenter, Dr. W. D. Coolidge, while working in the research laboratories of the General Electric company at Schenectady, discovered a method of making tungsten ductile, so it could be drawn into a fine wire.

The finest tungsten wire is only four ten thousandths of an inch in thickness. That is approximately one-sixth the diameter of a human hair.

The tungsten discovery was little less than magic, for it increased the brightness of the electric light many times. But more magic was to follow.

Just a few years later, another scientist at the General Electric laboratories, Dr. Irving Langmuir, discovered that certain inert gases, when filled with certain inert gases, tungsten filaments would give an even brighter light. Two inert gases, argon and nitrogen, are used in these gas-filled lamps, swelling the illumination of the incandescent lamp more than ever.

Equals 2000 Candles. The maximum accomplishment, resulting from these discoveries, is that the largest gas-filled lamp regularly made has an illuminating power equal to two thousand candles, and consumes a thousand watts in giving that amount of light.

Thus it is the research laboratory which by its own magic has made possible the white magic. The General Electric research laboratories, of which Dr. W. D. Whitney is the director and L. A. Hawkins the engineer, have witnessed noble work.

Chemists, physicists, metallurgists and engineers have co-operated in a steady forward drive for scientific knowledge. It would be hard to find the counterpart of these laboratories anywhere in the world.

And the man who was, in silent wonder, is standing over the shoulder of Father Time to see the dazzling white light that floods the world of the sub-station, still further back to the man who is

contributed great deeds. Electric lamps as large as melons and as small as peas have become possible because of the work of these laboratories.

Rise of Electricity Inevitable. The rise of the great electrical industry, of which the diffusion of white magic, the light of the home, is a part, has been inevitable in consequence. The whole intricate electrical system of the nation, from the great central power stations, down to the push button on the wall that lights the tungsten lamp in the fixture, is the great boon of twentieth century progress wherever found.

There is an unbroken chain of apparatus and machinery that links the source of power with the user of power; the source of light with the lighted home; even one of the sources of heat with the snug office or living room.

It reaches back from the light bulb, in which the tungsten shines, and the socket with its 20 parts, to the cut-out and the fuse; back of these to the meter, back of the meter millions of criss-crossing wire stretching to the sub-station, still further back to the man who is

feeder cables, and back again to the regulator and the switch-board; until finally it gets back to the source—the great turbine generators in the central stations that create the electrical current which carries the white magic, and other magics as well.

Unseen Magic, Co-Operation. Who will longer doubt that this is the story of a great magic—the magic behind the white magic? But the greater magic is the unseen magic—whose name is co-operation.

The skin-dressed home dweller of primitive times knew as little of this element as he did of electricity. Crouching by his uncertain fire-light, he was doubly in the dark. His roaring fire was his sole defense against night and beasts. His descendants laugh back at him as they wield a power unequalled in routing the imps of blackness. And their power is the outcome of another power as mighty as itself.

Reformed Convict Wins Life Battle

E. H. Morrell, Once in Solitary Confinement, Now Heads Federal Department of Prisons.

After 12 years of effort to ameliorate the condition of thousands of human beings confined behind prison walls, Edward H. Morrell, noted prison sociologist, founder of the Twentieth Century Prison League of America, and friend of the late Jack London, has at last won national recognition.

The Twentieth Century Prison League of America, which was built up by Mr. Morrell after the conquering of a multitude of barriers and discouragements that would have disheartened the average man, has been taken over by the bureau of commercial economics, department of public instructions, Washington, D. C. The league, from now on, will be officially known as the bureau of commercial economics, department of prisons, Edward H. Morrell, director.

Attains Life Objective. The world adores a winner, and Edward Morrell has attained his great life objective after a veritable rough and tumble life, with every handicap and obstacle that human ingenuity could devise. Indifference, scorn, and worst of all prejudice, have had no meaning in concrete fact for Morrell, because the finger of destiny from the bleak hole of a dungeon pointed squarely by the mission and the message, and the world seemed instinctively to understand, and consciously or unconsciously voiced its approval, and as one of the great publicists styled it, "Morrell's life is a life inspired."

As an exceedingly young man, he turned his back on society, and joined a famous band of train robbers in California participating in a series of holdups, which had no parallel except in the careers of the James Boys. He was the principal actor in a jail delivery, which electrified the country by its dare-devil audacity. But like most offenders against the law, Morrell's career was ended by being given a life sentence in a California prison, where he spent sixteen long years, five of them in a dungeon, not a ray of light penetrating his lonely cell. His terrible experience in this bleak hole of punishment inspired Jack London to write his famous book, "The Star Rover." Pardoned by the governor of California, Morrell came forth with a tale of prison abuse that startled the nation. Aided by many of the most prominent citizens of California, he instituted a movement for prison reform, which had its effect in five of the far western states.

Prominent Men Back Morrell. Into being in these states came the Morrell prison system. Under this system prisoners are allowed to work out of doors, without armed guards. Less than two per cent of these men ever violated their pledge not to attempt to escape, and a large majority of them have become useful citizens. Since his pardon from prison, Mr. Morrell has worked arduously for prison reform, and he has the support of some of the most prominent men in the country, including leading statesmen at Washington.

The aim of the bureau of commercial economics, department of prisons, is as follows:

First, to create a nation-wide activity to further the program for federalization of our criminal and punitive system, thereby centralizing all future efforts to establish a highly specialized system of corrective treatment, to the end that our vast prison population will be immeasurably reduced to sane and safe lines of demarcation; second, to promote a nation-wide educational campaign for the correct understanding of twentieth century scientific penology, and the imperative necessity that our penal institutions be no longer a barrier to the ignorance and incomprehension, inseparable from their connection with partisan politics; third, to promote a nation-wide interest in the advocacy of placing the jurisdiction of the prison system under rigid civil service regulations, whereby only those of high and specialized training and fitness may aspire to executive jurisdictional authority over such institutions and the wards of the state.

Employment Bureaus.

Fourth, to establish a chain of bureaus from coast to coast to be known as the discharged prisoners employment agency, for the purpose of taking in hand friendless convicts, as they leave the prison gates. A program, such as this, is necessary to prevent such unfortunates are allowed to drift aimlessly away on the day of their release, without the least effort being made to see them from plunging again into the leprous criminal straits, from whence they were apprehended by the machinery of the law.

The work of the department of prisons is primarily based upon the keystone of the arch of the criminal evil, namely the crime society commits against the man on the expiration of his prison punishment. With gates ajar on convicts, the inmate steps forth into God's sunlight and freedom, pent-up here never to the breaking point, his soul attuned in determination to meet the world fairly, from the square, and fight the battle back to rehabilitation and his lost station and status of a man. What does society offer him by way of the helping hand and temporary sustenance to fight to aid in this unequal struggle?