

**ELECTRICAL
DISTRIBUTION OF HEAT,
LIGHT AND POWER**

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Electrical Distribution of Heat, Light and Power by Harold P. Brown

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HAROLD P. BROWN

**ELECTRICAL
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ELECTRICAL DISTRIBUTION

OF

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HEAT, LIGHT AND POWER.

BY

ing
HAROLD P. BROWN, ELECTRICAL ENGINEER,
45 & 47 WALL STREET, NEW YORK.

WITH PARTIAL LIST OF DEATHS FROM ELECTRICAL
LIGHTING APPARATUS,

AND ADDRESS BY

JOHN MURRAY MITCHELL, COUNSELOR AT LAW,

ON

Legislative Control of Dangerous Electrical Currents.

NEW YORK:

PRESS OF J. W. PRATT & SON, 73 TO 79 FULTON STREET.

1889.

PREFACE.

Believing that the subject of electrical distribution and its attendant dangers is of interest to a wider circle of readers than is represented by the membership of the Medico-Legal International Congress, the writer republishes his address, with a list of deaths from electric lighting apparatus and the able paper of Mr. John Murray Mitchell. To prevent any hasty and ill-advised legislation on the matter, it is necessary that it should receive careful consideration from scientific, legal and business standpoints. Though the writer would favor making the law suggested by Mr. Mitchell apply solely to the high-tension alternating current on the ground that the continuous current can be made safe, it will perhaps serve as a basis for discussion which could not otherwise be obtained.

The slaughter of innocent men by dangerous electrical systems will sooner or later be checked by the passage of laws prohibiting or regulating deadly pressures. High pressure is in many localities necessary for economical distribution of electrical service, and the law should not, in the writer's opinion, set any limit except that imposed by the capacity of the current under such pressure to produce death in a human being by leakage to the ground from its conductor.

A MEDICO-LEGAL VIEW

—OF—

ELECTRICAL DISTRIBUTION.

*Address by HAROLD P. BROWN, Electrical Engineer, before
the International Medico-Legal Congress, at Steinway Hall,
June 4th, 1889.*

The marvelous advance made during the past ten years in the adaptation of electricity to the needs of modern life is but a mere suggestion of what the next decade will bring us. Millions of dollars have already been invested in electric lighting alone, and our cities are gridironed with copper wires, but a mere fraction of the demand for light has as yet been filled. Our engineers are beginning to realize that, great as is the field for lighting, the field for motive power in factories and dwellings is tenfold greater. And beyond this lies an unexplored territory—heating, cooking and refrigerating by electricity, whose extent is beyond computation. To get an idea of the growth possible to an electrical industry in this country one needs only to recall that the telephone, which was invented in 1876, had, at the close of the year 1888, 411,511 instruments in use, with 243,764 miles of wire. During the same period electric lighting has assumed practical commercial shape, and it is estimated that over one million horse power is now in daily use for this purpose. Looking at the network of wires now used for intercommunication alone, and multiplying their number by one thousand and their cross-section by one hundred, which is a low estimate of the requirements of the future for all uses, we can realize what a tremendous problem

is involved in the distribution of this amount of metal. Electricity will do all the hauling and street car work in the cities of the future, while the horse with his omnipresent manure and the rough footing he requires for heavy loads, will be relegated to pleasure driving and farm service. The streets will then be smoothly paved and clean, and the noise and rattle of to-day forever silenced. The air will no longer be polluted with smoke, for one immense station provided with triple or quadruple expansion engines and furnaces in which combustion is complete, will supply heat, light, power and motion. The consequent addition to human health, comfort, and length of life by the banishment of dirt and noise will be enormous. Electrical disinfection and sewage purification are already in use, and since we can command immense volumes of electricity, it is not improbable that a better understanding of the laws of meteorology will enable us to at least partially control the weather and thus avoid the evil effects of severe changes and extreme temperatures. But to offset these advantages, earth and air are filled with wires, many of which may be charged with swift and invisible death which may overtake the most cautious in a myriad of unseen ways. If, then, the near future is to see a thousand electrical horse power distributed where now we have but one, it is clearly the physician's duty to point out the dangerous currents, and it remains for the lawyer to secure wise legislative action preventing the adoption of systems or apparatus which needlessly jeopardize human life or health. What work could be more appropriate than this for an International Congress of the Medico-Legal fraternity? The list of deaths from electric lighting, which forms an appendix to this paper, numbers, though incomplete, over 91 in the past few years; yet it must be borne in mind that not one street in a hundred or one building in a thousand is as yet lighted by electricity, and more than half the house lighting now done is the work of the continuous current used at a pressure that cannot possibly prove fatal. The subject evidently deserves your serious attention, since this list proves that I am no mere alarmist. There are also many maimed and crippled men who are the

victims of the false economy which uses dangerous systems of electrical distribution in order to make an apparent saving in first cost of equipment. As an example of the injury which is liable to be inflicted upon any person in a city having a high-tension alternating current station, Mr. W. J. Bell, of St. Paul, has been invited to be present to-day. This unfortunate young man has had his nervous system severely if not permanently wrecked by touching, while holding a district messenger service wire, a pole step-iron which happened to be in contact with a Westinghouse wire some distance away, by means of a guy to a pole on the opposite side of the street. This was on a dry day and the insulation of the wire was apparently uninjured. It is interesting to note that, although terribly injured, Mr. Bell was unconscious of any sensation of pain. Dangerous electrical systems are being rapidly installed in all parts of the country, and, in the interests of human life and health, prompt action is imperatively demanded. It will not do to rely upon the presumption that the electric light or power people *must* sufficiently guard public welfare in order to protect their own business. Nor will it do to rely upon their own statements, for if you listen to the stories told by the worst offenders in this line, you will hear that their system is "perfectly safe," and that the dead man's "carelessness" caused each fatality. This was the same cry that was raised by the oil refiners when it was first proposed to require a high fire test by law. Nor should we accept as an infallible guide the so-called "professional scientist" who nowadays seems to believe that his opinion must necessarily coincide with the wishes of the corporation which retains him. No matter if scientific accuracy must be sacrificed, for science gives its rewards only in return for work accomplished and not for written opinions designed to assist stock-jobbing. When the water gas question was under discussion some years ago, one of this fraternity gave his written opinion to a New York gas syndicate that a small percentage of carbonic oxide in illuminating gas was necessarily fatal. Shortly after, he was "acquired" by a water gas system and testified without hesitation that thirty-two per cent. of carbonic oxide need not be