gheny Mountains, and extending a very short distance into Ohio, New York, and West Virginia, and it is also stated to have been found in a very limited extent in Illinois and Kansas.

The most important economic locality is that in the immediate vicinity of Pittsburg, which supplies that city with the fuel for the vast iron and glass works and for numerous private dwellings. There are 6 natural gas companies in that city, managing 107 wells, and supplying the gas through over 500 miles of pipe, of which 232 miles are situated in the city proper. The total area of pipe leading into Pittsburg is given as 1,346,608 square inches, and the total capacity of the lines is estimated at over 250,000,000 cubic feet of gas per day. The largest company is the Philadelphia natural gas company, which supplies over 400 manufactories and over 7,000 dwellings with the entire amount of fuel consumed. The composition of natural gas varies greatly, both in specimens from different wells and in those from the same well at different times. In general terms, it can be described as a mixture of hydrogen, nitrogen, and marsh-gas, with occasionally higher carbon compounds. It burns with a nearly colorless flame, and gives off no odor or deleterious matter.

In speaking of the use of natural gas for domestic purposes, Mr. Ashburner pointed out the great advantages which a gaseous fuel has over a solid one like coal, and stated his belief that the greatest of the advantages of the discovery of natural gas was that it had proven the great economy and practical utility of such fuel. A thousand cubic feet of gas was calculated to equal in heating capacity 55 pounds of coal. He stated that the use of natural gas for domestic purposes would not have been possible without the inventions of Mr. Westinghouse of Pittsburg, two of whose inventions the lecturer illustrated. One of these inventions was intended to prevent leakage from gas-pipes, and to locate leaks accurately when they occurred. The leaking gas is conveyed to the nearest lamp-post and there consumed. Another invention was a most ingenious pressure regulator, which not only regulates the pressure at which the gas is supplied to the burners, regardless of the pressure in the mains, but, in the event of the pressure in the mains dropping to zero, automatically shuts off all gas from the house; nor is it possible to turn the gas on again, without violence to the regulator, until every source of escape of gas larger than a pin-hole leak has first been corrected. A model of the regulator was exhibited. The lecture was illustrated by drawings and maps and by a small working model of a well-boring apparatus.

In answer to inquiries, the lecturer stated that the source of natural gas was certainly capable of exhaustion, but that he did not think there was any imminent danger of such a calamity. The sources of supply would certainly last many years; and he believed, that, before they would give out, a method of producing an artificial gas would be invented which would perfectly supplant the present natural gas. The cost of natural gas could not be compared with our coal-gas, for the reason that the natural gas was not sold by meter. The consumer makes a yearly contract with the company to supply him with light or fuel, or both, at certain rates. A house containing twelve rooms costs, to heat and light, from $70 to $90 a year. The use of the gas is most satisfactory; for, by means of an automatic regulator, every room of a house may be kept at a temperature not varying two degrees, regardless of the condition of the outside temperature or the pressure on the mains. Defects and troubles were met with from lack of understanding how to properly regulate the supply or the combustion.

In reply to the question as to whether he thought it wise for the city of Philadelphia to lease the gas-works for a term of years, Mr. Ashburner replied, that, as a business-man, he would say that any scheme for supplying the ordinary form of coal-gas was, at the present time, extremely uncertain as a business venture. He believed that a very short time would demonstrate that there was a method of generating a fuel gas which would totally supplant all present modes of heating, and that electricity had already solved the problem of illumination. We were in a transition stage with regard to both heating and light, and for these reasons, and from this standpoint, he would regard any movement as undesirable at this time.

PURITY OF ICE.

THE state board of health of New York has recently published a report on the purity of ice from Onondaga Lake, the Erie canal at Syracuse, and Cazenovia Lake, being the ice-supply of Syracuse. The local board of health regarded that cut from Onondaga Lake as being detrimental to health. Into this lake discharges the creek of the same name; and into the creek is discharged the sewage of the city of Syracuse, which amounts to five millions of gallons daily. At the time the inspection of this lake was made, there was a margin of from one to four feet wide of black, putrefying organic matter along the shores. The analyses of the ice from this lake showed that it contained probably from ten to twelve per cent

of the sewage impurities dissolved in the same quantity of unfrozen water of the lake. This ice also showed the presence of bacteria in great abundance, retarded somewhat in their growth by the ice, but not destroyed by it. It is perhaps needless to say that this ice was pronounced totally unfit for any purposes where it is liable to come in contact with food or drink. The ice from the Erie canal was also condemned, while there was not sufficient evidence to warrant a condemnation of that from Cazenovia Lake. The report, valuable for what has already been mentioned, is still more so by reason of the numerous references to instances in which impure ice has been the cause of dysentery and other diseases. The earliest of these was that at Rye Beach, N.H., reported by Dr. A. H. Nichols of Boston in 1875, in which there broke out among the guests of a large hotel at that place an epidemic of gastro-enteritis, caused by impure ice from a filthy pond. Another instance of sickness caused by impure ice, referred to in the report, is that of an epidemic of dysentery which occurred in 1879 at Washington, Conn., investigated by Dr. Brown of that place and by Dr. Raymond of Brooklyn. The ice had been gathered from a pond which had been used as a wallowing-ground by the pigs. Other instances are quoted of the injurious effects of impure ice upon the public health, and sufficient evidence given to show, that, in the process of freezing, water does not purify itself. The report, taken as a whole, is a very valuable contribution to this subject, and a complete refutation of the old idea that all ice must of necessity be pure.

COLOR-BLINDNESS AMONG RAILWAY EMPLOYEES.

DR. B. JOY JEFFRIES, at the last meeting of the American ophthalmological society, called attention to the total failure on the part of the Massachusetts authorities to enforce the law passed in that state in 1881, by which railroad companies are prohibited from employing persons who are color-blind, or whose sight is defective, in positions requiring them to distinguish form or color signals, unless such persons have been certified by some competent person employed and paid by the company as not disqualified for such positions by color-blindness or other defective sight. A penalty of a hundred dollars is affixed for each violation of the act. In reference to the enforcement of the law, Dr. Jeffries says that "it is practically as dead a letter as the liquor laws." Numerous cases are cited which have come under the care of the speaker in which the law has been grossly violated. In one case a brakeman who had been on a road three years had been tested as to his vision by the train-despatcher, who had asked him how many knobs there were on an adjacent telegraph-pole, telling him his vision was as good as any one on the road. Another instance of the manner in which the law is violated was that of a gateman who applied to Dr. Jeffries for a certificate for blindness contracted in the army, in order that he might obtain a pension from the government. Although this man was so blind from atrophy of the optic nerve that he groped his way into the doctor's office, yet he was on duty as a gateman at an important railroad-crossing, having a certificate from the examiner of the railroad company "that he is not disqualified by defective sight." The man himself acknowledged that he was completely blind in the sun, and could not see people at his crossing. A number of instances are given where engineers and conductors were employed by railroad companies, although they were completely color-blind. Something of the same negligence seems to exist in the licensing of pilots. One pilot who could not recognize a colored side-light held in the sun six feet before his face was examined by a marine hospital surgeon, and reported as *partially* color-blind. This enabled him to be further examined by the local inspectors, who passed him by their tests, and the man has a full license. In commenting on this case, Dr. Jeffries well asks, "How many more are there?" The matter is one of such grave importance, involving as it does the life and limb of every traveller by land and sea, that the Ophthalmological society could be of no greater benefit to their fellow-beings than in calling the attention of the authorities to these gross violations of the statute, and protesting against their continuance.

COMMISSIONER HADLEY'S SECOND ANNUAL REPORT.

PROFESSOR RICHMOND M. SMITH, writing in the *Political science quarterly* a few months ago, said, in his article examining the various state labor bureaus and their methods, that "the business of collecting statistics successfully is one which requires a great deal of experience, besides knowledge and administrative ability, on the part of the chief," and for the lack of that experience he found the reports of most of the chiefs defective both in method and in results. When Professor Hadley of Yale college was appointed, two years ago, chief of the Connecticut bureau of labor statistics, it was foreseen that statistics collected by one of his ability and experience in handling