ery. We think the operations of this company show clearly that safety from boiler explosions can be obtained by careful inspection at frequent intervals, and careful management at all times, neither plan by itself constituting a sure preventive. Not the least among the results of the company's work is the clear demonstration of the fact that the hydraulic test alone will not reveal all the defects of a boiler; and, as we have frequently pointed out, when it is made with cold water it sometimes produces defects which did not formerly exist.

[For the Scientific American.]

OCCUPATION AND THE DEATH RATE IN ENGLAND.

A comparative study of the death rate in seventy-three of the principal employments in England and Wales has lately been made in the British Registrar-General's office, based on the mortality returns of three years. The results show, among other matters of interest, the mortality among all the males aged fifteen years and upwards, in each of the specified employments, and also the relative mortality in each, the mean death rate of the whole being taken as one hundred.

For example, in the three years under examination, the deaths among grocers amounted to three thousand one hundred and sixty. Had their death rate been equal to the mean death rate for all the employments during those years, as many as four thousand one hundred and seventy-three grocers would have died. The relative death rate of that class, therefore, in comparison with the whole, was only seventy-six.

But the grocers were surpassed in healthfulness by the members of two learned professions, the lawyers and the clergymen. The barristers head the list, with a death rate of only sixty-three; the clergy of the Established Church follow, with a death rate of seventy-one, while the independent Protestant denominations stand at seventy-five.

It is scarcely probable that the immunity of the barristers is altogether due to the lightness or wholesomeness of their work. That counts for much, but we must not forget to allow for the fact that in England a large number of independent gentlemen adopt that calling, not to make a living out of it by hard work, indeed not to work at all in it; but simply for the nominal professional rank it gives. If the working barristers only were counted, it is doubtful whether the class would stand so high in the sanitary list. Perhaps the refuge which the Established Church affords for many men of culture and leisurely regular life may similarly help to account for its lower death rate as compared with that of other Protestant clergy.

Next after the barristers and the Protestant clergy come the grocers, already mentioned, followed by men of the combined occupation of grocer and shopkeeper, with a death rate of seventy-seven. After these we find gamekeepers, with a death rate of eighty; farmers, one of eighty-five; civil engineers, eighty-six; booksellers and publishers, eighty-seven; wheelwrights, eighty-eight; silk manufacturers, eighty-nine; carpenters and joiners, and common laborers, stand together in the list, at ninety-one; bankers at ninety-two; domestic servants, ninety-three; sawyers at ninety-five; musical instrument makers, paper manufacturers, and brass workers, at ninety-six; blacksmiths and gunsmiths at ninety-seven; tanners and curriers, shoemakers, and workers in iron and steel, ninety-eight; and bakers at ninety-nine, completing the group of occupations in which the death rate is below the mean.

Machinists and woolen workers die at the mean rate for all, one hundred. Then follow half a hundred employments, more and more destructive to life. Manufacturers in iron, copper, tin, and lead, with bakers and confectioners—probably what would be classed as fancy bakers here—exceed the mean mortality by one. The schoolmaster's calling, and the solicitor's, rank next in unhealthiness, their death rate being one hundred and two. Millers and Roman Catholic priests stand next, with a death rate three above the mean, and thirty-two above that of the clergy of the church of England: a notable circumstance, to say the least.

Why should the mortality among the Roman Catholic priesthood exceed so largely—nearly fifty per cent—that of the English clergy? Are celibacy and asceticism the unsanitary conditions? Or shall we attribute their higher death rate to a more arduous and exposed life among the sick and squalid poor?

After the priests come watchmakers, one hundred and four; tobacconists, one hundred and five; physicians and shipbuilders, one hundred and six; messengers and porters, coach makers and rope makers, one hundred and seven; drapers, one hundred and eight; tailors, one hundred and and nine; and workers in cotton, flax, and silk, the same. Chemists, druggists, and commercial travelers exceed the mean death rate by ten; clerks, insurance men, and butchers, by eleven; carvers and gilders, by twelve; farriers, by thirteen; miners, printers, and manufacturers of cotton and flax, by fifteen. It will be noticed that weavers and workers in silk are much the most healthy of all who have to do with textile fabrics, their death rate being eleven below the mean. Those that handle wool exhibit an average vitality, compared with all grades of working men. With the addition of cotton and flax to the fiber used the death rate rises to one hundred and nine; while those who handle flax and cotton without silk or wool die at the rate of one hundred and fifteen. Which is the more destructive to life in its working, cotton or flax, the statistics do not show.

Bookbinding is a degree more unhealthy than printing, the death rate of this class of workers being one hundred and sixteen. In glass manufacturers and fishmongers it rises to one hundred and nineteen; and in printers and plumbers to one hundred and twenty. Quite a number of callings show a death rate of one hundred and twenty one; namely, railway employees, dock laborers, tool makers, file makers, and saw makers. For the diverse causes of high mortality in their occupations, it is not needful to enquire. In hatters, coppersmiths, and needle makers, the rate rises to one hundred and twenty-three; and in manufacturing chemists, and dye and color manufactories, to one hundred and twenty-four. In hair dressers the mortality is more than double what it is in the legal profession, that is, one hundred and twenty-seven. Bargemen die at the rate of one hundred and twenty-nine, or twenty-nine above the standard death rate. The employments of carmen, dray men, horse-keepers, and grooms are still more fatal, the death rate being one hundred and thirty-one. In the next group, embracing potters, innkeepers, licensed victuallers, the mortality is thirty-eight above the standard; while in cabmen and coachmen (not domestic), the death rate rises to its highest, one hundred and forty-three, or twice that of the English clergy.

These figures show with practical accuracy the comparative mortality of the men engaged in these various employments. To considerable extent also, they represent the comparative healthfulness of the several callings; but the reader will readily see that many outside conditions conspire to affect the death rate in each. An easy and healthful calling may show a high death rate, simply because it is easy and comparatively favorable to life, and consequently attracts to itself the feeble and disabled. For example, the statistics of the Medical Department of the Provost Marshal General's Bureau, during our late war, shows that proportionally more watchmen were rejected for physical unfitness than men of any other employment. Yet the watchman's work is easy and not specially unhealthful: so easy, in fact, that the worn-out and crippled and diseased naturally gravitate to it.

That cabmen should show excessive mortality is rather to be expected. Their working hours are long and irregular; and they are exposed to all weathers under unfavorable conditions. It is not so apparent why the unexposed innkeepers and victuallers should die almost as rapidly. The clever author of "Diseases of Modern Life" charges their high death rate to drink. No doubt excessive indulgence does cut short the lives of very many. But we are inclined to think that the selective action of the business has much to answer for. A large proportion of the English innkeepers are men whose working days are past: men who have earned a little money as butlers, stable keepers, small traders, and the like, and find the inn, or "saloon," as we would call it, a sort of hospital for the physical incapacity.

Again, the mortality of hair dressers is relatively high, thirty per cent higher than that of blacksmiths. It can hardly be that their business is in itself so much more killing, notwithstanding the hot and ill ventilated rooms they usually occupy. It is another case, we think, of natural selection. Out of a hundred boys fated to be blacksmiths and barbers, there is little doubt that the majority of the sturdy ones will gravitate to the blacksmith shop, the majority of the undersized and feeble ones to the barber's.

In another article we propose to examine the relative healthfulness of the different employments of men in this country. The results are in many respects curiously unlike those derived from the English statistics. R.

The Meeting of the American Association for the Advancement of Science.

The annual meeting of this association convened at Buffalo, N, Y., on August 23. There is a remarkably large attendance, not only of American scientists, but of scientific men from Europe, who are on a visit over here to the Centennial. The proceedings were formally opened in the Common Council Chamber of the City Hall by a speech by the retiring president, Professor G. S. Hilgard. This was followed by a brief address by the new president, Professor William B. Rogers, after which a formal welcome was extended to the Association by the Mayor of Buffalo and influential citizens. These proceedings, together with the work of electing a standing committee and the reading of a few papers, which will be referred to in the abstracts which we shall publish next week, occupied the attention of the scientists for the first day. On the ensuing morning Professor Huxley arrived, and, after receiving an enthusiastic welcome, addressed the assembly substantially as follows. After gracefully returning thanks for the reception accorded him, he stated that he had no scientific matter to communicate, and in that respect was unprepared, but that, to satisfy a curiosity which he had noticed to be especially developed among us, he would state briefly his impressions of the country.

PROFESSOR HUXLEY'S ADDRESS.

"Since my arrival," he continued, "I have learned a great many things, more, I think, than ever before in an equal space of time in my life. In England, we have always taken a lively interest in America; but I think no Englishman who has not had the good fortune to visit America has any real conception of the activity of the population, the enormous distances which separate the great centers; and least of all do Englishmen understand how identical is the great basis of character on both sides of the Atlantic. An Englishman with whom I have been talking since my arrival says: "I cannot find that I am abroad." The great features of your country are all such as I am familiar with in parts of England and Scotland. Your beautiful Hudson reminds me of a Scotch lake. The marks of glaciation in your hills remind me of those in Scottish highlands.

"I had heard of the degeneration of your stock from the English type. I have not perceived it. Some years ago one of your most distinguished men of letters, equally loved and admired in England and America, expressed an opinion which touched English feeling somewhat keenly—that there was a difference between your women and ours after reaching a certain age. He said our English women were "beefy." That is his word, not mine. Well, I have studied the aspect of the people that I have met here in steamboats and railway carriages, and I meet with just the same faces, the main difference as to the men being in the way of shaving. Though I should be sorry to use the word which Hawthorne did, yet, in respect to stature for fine portly women, I think the average here fully as great as on the other side. Some people talk of the injurious influence of climate. I have seen no trace of the "North American type." You have among you the virtue which is most notable among savages, that of hospitality. You take us to a bountiful dinner and are not quite satisfied unless we take away with us the plates and spoons. Another feature has impressed itself upon me. I have visited some of your great universities and meet men as well known in the old world as in the new. I find certain differences here. The English universities are the product of Government, yours of private, munificence. That among us is almost unknown. The general notion of an Englishman when he gets rich is to found an estate and benefit his family. The general notion of an American when fortunate is to do something for the good of the people and from which benefits shall continue to flow. The latter is the nobler ambition.

"It is popularly said abroad that you have no antiquities in America. If you talk about the trumpery of three or four thousand years of history, it is true. But, in the large sense, as referring to times before man made his momentary appearance, America is the place to study the antiquities of the globe. The reality of the enormous amount of material here has far surpassed my anticipation. I have studied the collection gathered by Professor Marsh, at New Haven. There is none like it in Europe, not only in extent of time covered, but by reason of its bearing on the problem of evolution; whereas before this collection was made, evolution was a matter of speculative reasoning, it is now a matter of fact and history, as much as the monuments of Egypt. In that collection are the facts of succession of forms and the history of their evolution. All that remains to be asked is how, and that is a subordinate question. With such matters as this before my mind, you will excuse me if I cannot find thoughts appropriate to this occasion. I would that I might have offered something more worthy; but I hope that your association may do what the British Association is doing—may sow the seeds of scientific inquiry in your cities and villages, whence shall arise a process of natural selection by which those minds best fitted for the task may be led to help on the work in which we are interested. Again I thank you for your excessive courtesy and, I may almost say, affectionate reception."

The Traveler Ropes of the Brooklyn Bridge.

The joining of the two ends of the first traveler rope, whereby the material for constructing the East River Bridge is to be transported over the river, was recently accomplished. The endless chain is now complete, passing over grooved pulleys on the towers. It is operated by the engine formerly used to elevate stone during the process of erection of the piers. At the time we write, the first section of the second traveling rope is about to be carried over the river. This is made fast to the rope now in position and run over by it. It is lashed to the first rope at regular distances of 50 or 60 feet, as it leaves the Brooklyn anchor pier; and when it is across, these fastenings will have to be cut. This is done by a man sent over in a "buggy," which is a small platform hung upon the traveler rope by deeply grooved wheels. It is surrounded by a railing, inside of which the workman will stand, cutting the lashings as he rides across. The ride down to the center of the traveler rope will be controlled with a hempen rope, and the "buggy" will be hauled up the opposite incline with another. There will be nothing perilous in the process if the workman can keep from dizziness, nor more danger than in a great many other stages of the work.

In order to inspire confidence in the men who are to perform the undertaking, Mr. E. F. Farrington, master mechanic of the bridge, recently crossed from the Brooklyn anchorage to the New York pier, seated on a boatswain's chair, or swing, attached to the moving rope. The trip was rapidly and safely accomplished in the presence of a large and enthusiastic crowd. Mr. Farrington, now the first man who has crossed the bridge, was also the first who traversed the spans at Cincinnati and Niagara.

Recent American and Foreign Patents.

NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVEMENT IN FEEDING PULVERIZED FUEL TO FURNACES.

Allin Cockrell, Lamar, Mo.—This consists of a fan blower combined with a furnace in such manner as to feed it with a constant and regular supply of fuel, and having a conveyer for supplying the fuel to it from a mill in which it is ground, or from a feeding hopper to be supplied with previously pulverized culm, tan bark, sawdust, or the like.

IMPROVED EXPANDING METAL DRILL.

Patrick Duffy, New Bedford, Mass., assignor to himself and James F. Powers, same place.—Two cutters, fixed in the stock to slide forward and backward transversely, are slotted obliquely and reversely to each other. The fastening bolt by which they are secured to the stock is fitted in said slots, and also fitted in a vertical slot in the stock, so that, by shifting the bolt along the slots in one direction, the cutters will be adjusted onward; by shifting the bolt the other way, they will be adjusted inward.