vice is an improvement on a previously patented article, that fact be also declared: the object being to enable any one reading the patent, even if unskilled in patent matters, to perceive not only what is claimed but the exact condition of the art on which the invention is based. The section of the Patent Laws relating to specifications (§ 4888) requires that the description of the invention "shall be in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the same," and that the invention or discovery claimed shall be particularly pointed out. There is nothing in the law requiring any specific statement as to the prior condition of the art or science, nor the embodiment of information which will post people unskilled in the subject matter, but on the contrary the tenor of the statute plainly presupposes knowledge which may be considered as at least that of an intelligent mechanic or student in the particular art or science affected by the invention. Such an amendment of the law (for such it amounts to) by the Commissioner, besides not being clearly warrantable, is objectionable because it complicates the formalities incident to the application for a patent, and makes the preparation of the same more difficult and laborious. This is diametrically opposite to the proper tendency of innovations, which should have as a cardinal object the simplification of every branch of our patent system, so that eventually the obtaining of a patent may be attended with as little ceremony and work as that of a copyright now is. It should be remembered that the majority of inventions are made by men whose pecuniary resources are too often inversely as their genius, and to whom the conception is mainly suggested by the practical needs which they see within their own immediate horizon. These inventors have neither the means, time, nor opportunities to study up the state of a great art or science; many have not the attainments requisite to make such an investigation; and therefore, to require them to do so would be burdensome to a degree hardly to be appreciated by those not familiar with the sacrifices these men now make to obtain a patent. Again, there is a large corps of skilled examiners in the Patent Office paid out of the inventors' money to do this very specific duty, and provided with all the facilities for doing it. To remove the labor from them and put it on the shoulders of the inventor would simply be to make the latter pay for work and still do it himself.

General Spear's administration of the Patent Office has been notably successful and satisfactory to inventors, and we are the more inclined to look to him for beneficial reforms and improvements. While his object in issuing the circular above referred to is laudable, we think that for the reasons stated the measure is ill-advised.

PATENT OFFICE EMPLOYEES TO BE DISGRACED.

Representative Douglas has brought a bill into the House which makes it unlawful for any past employee of the Patent Office to act as patent agent or attorney within two years after his connection with the office shall have ceased, and imposes penalties on any present employee of the United States who shall knowingly recognize a person so practicing. The idea is to correct certain abuses alleged to exist and to prevent impositions through knowledge acquired in Government service. The above measure is conspicuous for nothing but an endeavor to induce Congress to interfere where it has neither the authority nor reason for so doing. Why does not Mr. Douglas go the whole length and provide that all Patent Office employees shall after their service is expired be regarded as criminals and kept under police scrutiny for two years?

THE MAIL OF THE METROPOLIS.

Enough letters, circulars, and postal cards annually pass through the post office in this city to extend, if placed end to end, from one side of the Atlantic to the other; or, in round numbers, they aggregate over 240,000,000 per year. To this must be added over 100,000,000 newspapers which in the same period are dispatched, and then a roughly approximated idea of the enormous mass of mail matter which is handled in the lower floors of the new Post Office building will be obtained. It is curious to remark that the aggregate of letters is more than half of the total number dispatched in all France, and over four times as many as are forwarded in Russia, while a notion of how extensively news and information is disseminated in this country may be obtained by comparing the above total of newspapers transmitted from New York alone with that representing the aggregate number sent in all Germany (2,300,000), or even with the same in all Great Britain, which is only about fifty per cent. in excess.

To explain with any detail the elaborate yet very simple system perfected by Postmaster James, and under which the mail of the metropolis is handled, would require far more space than is here at our disposal, but there are some interesting features which are worth notice. At the outset the public is made to distribute its own mail by dropping its missives into boxes marked with names of States and large cities, and from these receptacles the letters are constantly being gathered and transmitted to the cancellers, who affix the post mark and obliterate the postage stamp. It is well known that this is done by the use of the hand stamp, and that, simple as the problem seems to be, no one has yet devised a mechanical system of cancellation which has been deemed worthy of adoption. Machines have been tested in the New York Post Office, but have been discarded, and the prevailing opinion among the experts there is that until the public can be made to produce letters uniform in size and thickness, and always with the stamp in a certain position, no purely mechanical contrivance is likely to succeed, or even advantageously compete with hand work. The skill of the cancelling clerks is such that they can now mark on the average 100 letters per minute, and a machine to be of value would of course have to do much better than this.

After the letters are stamped they are separated into bundles for States and large cities, and sent to be further distributed on board the railway postal cars on the different routes, or in many cases they are made up into packages for direct delivery to their different destinations. There is one point here that inventors might look to, and that is the way the bundles are done up. It was the late Mr. A. T. Stewart, we believe, who once reproved a clerk for putting an extra and unnecessary turn of string on a bundle. That estimable merchant would doubtless be horror-stricken could he witness the numerous turns of cotton twine which are deemed needful to hold a few letters together. We asked why, and the reply was "custom," and that "the Government issued that kind of string." It seems to us that a simple elastic fastening device might easily be contrived which could be affixed in much less time, and which might be used until worn out. Security is of course the first necessity, and readiness of application the second. Some philanthropic inventor might also devise a system of mnemonics which would facilitate the labor of the assorters in remembering names of individuals, of counties, of post offices, and box numbers. The skill these men attain now is wonderful. Every assorter of city letters is obliged to remember 2,500 names with the corresponding box numbers, and, besides, to keep track of the changes constantly occurring; and he must be able besides to use the knowledge as rapidly as he can glance at the superscriptions of the letters and toss them into the proper receptacles. To show how this faculty can be cultivated, the records of a recent examination exhibit degrees of proficiency represented by from 99·67 to 64·54 per cent.

The clerks also become exceedingly expert in weighing letters by merely holding them in their hands for an instant in distributing them, and on their individual estimate they toss the missive aside as underpaid. It is afterward weighed and delivered in the city with the amount due stamped upon it.

Still another kind of expertness is to be found among the newspaper distributors. Each employé stands before a semicircular tier of pigeon-holes, the openings in which are a little over a foot square. In some tiers there are 170 of these receptacles, yet the distributor in front of them tosses folded newspapers into the proper openings, often fifteen or more feet distant, as rapidly as he can glance at the addresses. Another field for expert talent is in the foreign letter department to decipher addresses, and here the qualifications are simply a knowledge of all modern languages, a genius for deciphering hieroglyphics which seemingly would make light of cuneiform inscriptions and Egyptian papyri, and an intuition of what people mean to write when they don't do it. The gentleman who unites in himself these phenomenal capacities informs us that of all letter writers the Italians are the worst, and he fully verified his statement by exhibiting a collection of missives, the addresses of which contained such words as "uofbrg," which we were told meant "Mulberry," and which to add to their difficulty embodied all the complications of bad caligraphy, pale ink, and blots.

There is room for the exercise of no small skill, especially at guessing, in the searchers' department. Hither comes every irate citizen to know why his letter has not reached its destination, and in the majority of cases he departs with mitigated and somewhat crest-fallen feelings on discovering that he has left out the essential portion of the address, or very possibly written only his correspondent's name and forgotten the address altogether. It is an anomalous fact that people on one hand should insist on the absolute accuracy of their mail service, and yet prove so extraordinarily careless themselves in regard to their correspondence. It is a common sight in this city to see papers and sometimes letters left on top of fire telegraph boxes, and as for defective addressing, no less than 152,266 letters misdirected came to the New York Post Office last year. By way of proving that some at least of this carelessness was not due to ignorance, our attention was called to the fact that over 3,500 of these letters came from banks, where, of all business houses, accuracy is supposed in greatest degree to exist. It is admirable proof of the efficiency of those charged with sending these letters on the right path that out of the above total 147,640 were redirected and forwarded. The amount of labor involved in overhauling all the directories of the country and the geographical and local knowledge requisite was of course very great.

The Post Office is subjected to constant inconvenience by the mailing of so-called "unmailable" matter. No doubt hundreds of people are anathematizing the mails for losing their Christmas gifts, when the articles are probably snugly entombed in the dead letter office, whither they have been sent after a temporary sojourn in the office where dispatched. There is quite a museum in the New York office of this material, and it is a most heterogeneous collection. Here are bottles of hair tonic, packages of flour, dainty fancy work made evidently by fair hands, but ruthlessly consigned to this limbo because not properly prepared, jostling big bundles of shoe blacking. Some damsel is minus her tresses, for a packet of female hair loosely rolled in newspaper occupies a corner. No one tries to forward these things. They go to Washington, and, Christmas gift or not, unsympathizing buyers bid them in at perennial auctions. Another class of individuals try to evade the revenue laws by making the Post Office an accesory, but they always fail. Whenever a bulky letter comes from Europe the owner is requested to appear at the office, when a custom house official politely insists on seeing the packet opened, and, if the contents are dutiable, requires payment before delivery.

HEINRICH DANIEL RUHMKORFF.

In announcing the death of this noted man, who has been so closely identified for years with the progress of electrical science, and whose name is so widely known in connection with one of the most remarkable pieces of apparatus belonging to a philosophical cabinet, it would be out of place in a scientific journal to make no more than a mere passing allusion to his life and labors. Ruhmkorff was, as his name indicates, a German, and was born at Hanover in the year 1801. Beginning the business of life in England, where he remained for some years, he afterward went over to France as a journeyman and became an assistant in the *atelier* of M. Chevalier. Here he seems to have become imbued with a love for that branch of physical science which was destined to make his name famous. Having gained sufficient experience under the friendly guidance of Chevalier, he soon afterward ventured into business on his own account as a maker of philosophical instruments, and bringing to bear on all of his work a reasoning intelligence that had been lacking in his competitors, the merit of his instruments soon attracted the attention of scientists, who became thenceforth his friends and partners.

It was in 1831 that Faraday made the great discovery of electrical induction, and in 1833 our own Dr. Henry, experimenting with coils of insulated wire, discovered the fact that a bright spark is produced in long voltaic circuits when contact is suddenly broken, an occurrence that does not happen when the circuit is short. Faraday investigated this, and the next year demonstrated the fact that the spark was an effect of what he termed the "extra current" induced in the convolutions of the coil by the current traversing the other coils in their close vicinity, and that the induced extra current was in one direction upon contact being made and in the reverse direction upon the circuit being broken, so that when the circuit was alternately made and interrupted, the effect of the extra current was to alternately diminish the principal one by inductive retardation, and to produce a secondary current in the opposite direction. The inductive effects were also found to be greatly increased by the insertion of a core of iron within the coil; or, better still, by a bundle of iron wires, by means of which a stronger induced current could be obtained.

The subject was also investigated by Masson, Brequet, and Fizeau, in France. Having collected the various results obtained by these different investigators and combined them into a practical form, M. Ruhmkorff, after a long series of interesting experiments, produced the first induction coil, now known by his name. This was exhibited in 1851; and, although it produced sparks not much more than an eighth of an inch in length, it caused a profound sensation among scientists and at once gave its inventor a world-wide reputation.

A serious obstacle to the success of the first induction coil was the retardation of the main current by the extra current when the circuit of the coil was closed. This defect was greatly diminished by M. Fizeau, who invented a condenser, by means of which the extra current was stored up, at the moment of breaking the circuit, to be again immediately utilized for increasing the main circuit when again closed. By the application of this and the inventions and suggestions of others, as well as by his own experiments, M. Ruhmkorff gradually brought his coils up to their present state of improvement. While allowing Ruhmkorff all the credit which is justly his due in connection with the development of this apparatus, we should not forget to point out what has been done by our own countrymen. For instance, Professor C. G. Page, of Salem, Mass., published, in 1836, the first account of an induction apparatus consisting of a primary coil with a secondary coil wound upon it of many times its own length. As an acknowledgment of merit, Congress granted him, some years afterward, a patent on his invention. Professor Page was also the originator of the automatic circuit breaker. Ritchie, of Boston, in 1857, by an improved method of winding the fine wire, vastly improved the induction coil, and made it possible to use with success a wire of several hundred thousand feet in length, while the limit in the instrument as constructed by Ruhmkorff was about ten thousand feet only. Ritchie's improvements were quickly adopted by Ruhmkorff, and, it is said, afterward claimed by him as his own invention.

DR. VOHL, of Cologne, has adopted an ingenious method of determining the impurities in the Rhine, which consists in analyzing the boiler incrustations of the river steamers, as well as the concentrated residues remaining in the boilers after passing over a given distance. Arsenious acid and other poisonous substances were found.

MINERAL OIL FUEL.—The neighborhood of the naphtha springs of Bakou has suggested the idea of using mineral oil as fuel for the Russian flotilla in the Caspian. Experiments on the boilers of three vessels have proved so satisfactory that the boilers of four other vessels will be adapted to the new system.