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Contents:

(Illustrated articles are marked with an asterisk.)

HEAT POWER---ITS VALUE AND WASTE.

Our mechanics are becoming convinced that a broad field for improvement is opened to them in providing against the enormous waste of force caused by the insufficient means by which we generate motive power from heat. To this end the attempts of our inventors are directed in the various forms of steam generators, which so frequently become the subjects of patents. Heat is the best reservoir of power yet known to the mechanical or the scientific world. But the larger proportion of the heat evolved in the combustion of fuel is lost or wasted, whether that combustion is employed in generating steam for boilers or warming the atmosphere of rooms. In our best steam generators the percentage of heat force rendered available as a motive power, compared with the amount of fuel consumed, and the amount of latent heat force known to reside in the fuel, is ridiculously small. We seem to be, in regard to the utilization of the products of combustion under our steam boilers, but a trifling degree removed from the attempts of the last generation to heat their dwellings. From the old-fashioned fireplace, with its heap of wood burning at the base of a capacious chimney, which exacted the larger part of the heat, to the elegant heat-saving stoves, furnaces, and ranges, supplied with every appliance to extract the largest possible amount of heat in its passage from the fire to the outer atmosphere, is a large remove. In this direction a great deal has been done, and our dwellings are warmed and our dinners cooked with a tithe of the fuel which was required twenty-five or thirty years ago.

It may be doubted if so much progress has been made in this direction by our mechanical engineers. To be sure, there are instances where a steam generator of an improved style has shown marked advantages over those of the old make in the saving of fuel. But there is still room for much greater improvement in this direction.

The next great radical invention must be, it seems to us, something which shall enable us to use the means which nature has placed within our reach for the production of power, without letting eighty or ninety per cent of it slip through our fingers in the using. One obstacle to this is the attachment to old styles of boilers, which in the days of our fathers seldom exploded, simply because the internal pressure was but little above that of the atmosphere externally. To confine heat, or to rapidly generate heat in a reservoir, at a degree which shall render it the most effectual for the production of power, requires, not only a strong vessel (boiler), but knowledge of its powers and skill in its management. If these are wanting it is useless for inventors to exert themselves in contriving more efficient steam generators only to be blamed for the results of the carelessness of ignorant or underpaid employés who pay with their lives for the cupidity of employers. We need a steam generator which shall yield in available power at least the larger percentage of the heat employed for its production, and we believe this is within the bounds of mechanical skill and the limits of scientific knowledge.

ARE MODERN MECHANICS INFERIOR?

Not only in the social and the political world, but in the mechanical world, there are to be found many croakers, who are forever disparaging the present and praising the past—who are forever regretting the "good old times," and belittling the progress of the present. If they are directed to the progress made in the mechanic arts by the present generation, they will, at once, point to the vast improvements made in tools and labor saving machinery as the reason for that progress, without considering that these very improvements refute their statements, and render untenable their position. The saving of manual labor, the economy of time, and the perfection of results, are the objects aimed at by our present generation of mechanics, and they deserve as much credit for their attempts and successes in this direction as those who went before them do for their surprising patience and skill in manipulation. Taking the steam engine as an example of improvement, it is useless to deny that a first class machine of the present day is not a very superior machine to the best constructed under Watt's personal supervision. The principle may be the same, the motive power and its means of generation similar, but the results are widely different. The steam engine has become an economical machine, not merely a motor which could be used advantageously only where other power could not be made available, but one that stands in the front rank for economy, facility of handling, and regularity of speed under the most rigorous tests. The improvements to which this result is due are evidences of the inventive genius, patient investigation, and constructive skill of our modern mechanics.

The machines most used in iron manufactures are also illustrations of the fidelity of our present race of mechanics to their business. All of them, without exception, and almost every hand and bench tool, have been improved so as not only to facilitate the progress of work, but to add greatly to its accuracy. The turning lathe of only twenty-five years ago would be regarded now as a relic of comparative mechanical ignorance. The "shears," or frame of timber, with the ways of cast iron, mortised in, and planed or filed by hand; the hand chaser for screw cutting, followed by the hand-worked slide rest; these contrast strangely with the elegant engine lathes which turn a shaft, bore a pulley, or cut a thread, involving changes, which, however, may be made in a moment. The upright drill for boring holes through the hubs of heavy pulleys and gears, requiring only to be seated and trued on the revolving bed and chucked as nicely as though swung in a lathe, had no counterpart in the wearisome hand labor of hand boring, equaled in its monotousness and weariness by the convict's treadmill. The planer, obeying the will of the operator, who merely directs the work, is not much like the wearisome chipping and filing of the hard working mechanic of thirty years ago.

So we might go on citing cases innumerable to show that the mechanics of the present day are not a whit behind their predecessors in their attachment to their business and their anxiety to produce good work.

There are some virtues, however, possessed by our predecessors, we might do well to imitate. They worked in consonance with the maxim that "what was worth doing at all was worth doing well," one which, judging by some of the half finished jobs which sometimes vex the eye of the mechanic, we would do well to imitate. Another is that tenacity of purpose and patience of performance which after weeks of monotonous mechanical labor found its reward in a consciousness of a job well done. Still another is that determination to become a master of the business, by repeated and continued trials toward perfection in the use of tools, which left the mechanic master of the field.

Such a man was the late Ebenezer Winship, whose death we noticed in the closing number of the last volume. To him young mechanics resorted for instruction, especially in difficulties. His mechanical knowledge was not so much the result of his fifty years experience, as his frequent and perhaps compulsory requirement of meeting mechanical difficulties with what many present mechanics would deem insufficient means. He was a man for emergencies, and really it is in emergencies that the value and character of the true mechanic shine most brightly. These virtues, added to our superior facilities, ought to make our mechanics the equals of any who have preceded them, and examples to those who may come after.

THE "ANGOLA" ACCIDENT.

From a correspondent who signs himself "F. D. A., an employé of the Lake Shore Road," we have received a communication in which he states that it was a part of his business to make an examination into the cause of the late deplorable accident, and that contrary to our statement on page 25, No. 2, current volume, there was no broken flange on any of the wheels, but that a bent axle was the cause of the accident. He says that the engineer did not know the condition of the train, but obeyed the signals of the conductor in a proper manner. He thinks also that any safety brake, worthy the name, should be one which could be operated under the whole train at once, either by the engineer, conductor, or brakeman, as circumstances might determine, and concludes with the statement that the Lake Shore road employs as experienced and faithful inspectors as any road in the country.

To all of which we yield a hearty assent. But we did not state that a broken wheel was the cause of the accident, only that this was one of the causes assigned by others. When the article to which our correspondent refers was written the verdict of the coroner's jury that the accident was caused by a bent axle had not been rendered; that fact was published on page 41 of the succeeding issue of the SCIENTIFIC AMERICAN. We are not aware that any brake has yet been invented to act simultaneously on all the cars in a train and be operated by a person at any point on the train. We have cast no reflections on the management of the Lake Shore road; having traveled on it many times we have a high opinion of its condition and management.

Death of an Inventor.

Mr. Samuel Nicolson, inventor of the "Nicolson pavement," an improved steering apparatus for vessels, and several other inventions, died at the United States Hotel, Boston, on the 6th inst., after a brief illness, at the age of seventy-six years. He was a native of Plymouth, Mass. He held the office of superintendant of the Milldam Corporation, and secretary of the Water Power Company, for several years; was a useful member of the Boston Common Council of 1852-3, and was truly a thorough gentleman of the old school. The pavement named after its illustrious deceased inventor is becoming so popular in our cities that his name is likely to be known to posterity, as his memory will be respected by the present generation.

REPORT OF COMMISSIONER WELLS.

The second annual report of Hon. D. A. Wells, the Special Commissioner of the Revenue, contains facts and makes some recommendations which will be found worthy of note. Mr. Wells strongly urges a reduction in the expenditures for the army and navy and in other departments of the public service, and recommends that no money be appropriated for the further purchase of foreign territory. He says:

"With the substantial adoption on the part of Congress of an economical policy as above indicated, the ordinary expenses of the government might, it is believed, be immediately reduced to one hundred and forty millions per annum, which amount would even then be an excess of over 100 per cent on the ordinary expenditures of the fiscal year 1861. With a saving of from fifty to sixty millions per annum thus effected, a reduction of taxation to an extent sufficient to afford an immediate relief and stimulus to the industrial interests of the country, becomes at once practicable; and this even on the assumption that no increase of the Internal Revenue is likely to accrue from any improvement in the method of assessing and collecting taxes, or from the progress of the country in wealth and population. Thus, for example, a reduction in the annual expenditures of the War Department from $83,841,555, as in 1867, to sixty millions of dollars would allow a reduction of over 26 per cent on all the taxes now levied on manufactured products, exclusive of liquors, tobacco, and a few other articles generally classed under the head of luxuries, and still leave to the credit of this department for its increased necessities, growing out of a change in the circumstances of the country, a sum 260 per cent in advance of what was required in 1861. In like manner a reduction in the expenditures of the Navy Department from thirty-one millions, the requirements of the last fiscal year, to fifteen millions, would supplement all the present revenue derived from the following articles, and allow the taxes on the same to be entirely dispensed with:—All fabrics and manufactures of cotton; all manufactures of wool, including carpets and hosiery; or, all manufactures of iron and steel, including machinery, steam engines, &c.; together with hats, leather, and all manufactures of leather including boot and shoes, saddlery, harness and trunks; with paper of all kinds. Or, to put the case differently, if a reduction could be effected, of thirty millions in the expenditures of the War Department, of fifteen millions in those of the Navy Department, of fifteens millions in those of the Civil Service, with a discontinuance of any further appropriations for what may be called extraordinary expenditures, it would permit the removal, substantially, of nearly all of what are understood to be industrial taxes, and also offset the amount derived during the last fiscal year from the tax upon raw cotton.

In regard to the industrial condition of the country the Commissioner remarks that "immigration continues to flow with uninterrupted volume, at the rate of over 300,000 per annum; making a positive yearly addition to the wealth and producing capacity of the country of not less than one hundred and fifty millions of dollars: A continued increase in the invention of machinery, and the perfecting of processes for improving and cheapening products; as is more especially made evident by the returns of the Patent Office—the whole number of patents issued for the eleven months ending Dec. 3, 1867, being 10,907, as compared with 9,100 issued during the corresponding period of 1866, 6,220 for the entire year 1865, and 4,637 for the year 1864. This very remarkable increase must not, however, be accepted in its fullest apparent extent, as illustrative of substantial progress. It is so, undoubtedly, in great part; but, on the other hand, the real value of many patented improvements, as additions to the substantial wealth of the country, may well be doubted: An increase in the capital invested, and in the number and capacity of establishments for manufacturing purposes. In order to obtain some certain information on this subject, the Commissioner, at the commencement of the last calender year, instituted measures for collecting and recording such data relative to every department of industrial progress as were available. The results thus obtained would require a volume for their publication; and, although somewhat imperfect and miscellaneous in their character, they establish, nevertheless, beyond a doubt and in a most curious and interesting manner, the fact that great and substantial progress in manufacturing industry has been achieved in nearly every section of the country.

"In the manufacture of cotton, the amount of machinery at present in the country, and which is substantially engaged in the work of production, is from 15 to 20 per cent more than existed at the beginning of the war; while the export trade in coarse cottons, formerly (before the war), large, but afterward almost entirely lost, is now recovering with gratifying rapidity. In the department of woolen industry, notwithstanding the recent unusual depression of this interest, the erection of new mills has continued, with a reported general improvement in the character of the products.

"In the department of iron industry, the number of blast furnaces for the manufacture of pig iron, in operation during the past year, has been in excess of that of any former period while an unusually large number of new furnaces are now in process of construction.

"During the same period the rolling mills of the country were generally in continuous operation: new establishments of this character, and new and extensive works for the manufacture of Bessemer steel have also been erected; while a marked increase in the American product of ordinary steel is reported.

"The Commissioner would also, in this connection, call attention to the fact that, notwithstanding the almost continued reported depression of the iron interest in the United States, the average annual increase in the domestic product of pig iron is remarkably uniform, and greatly in excess of the ratio of the increase of population; the annual ratio of increase of pig iron, from 1850 to 1866, having been in excess of eight per centum, while that of population from 1850 to 1860, was about 3½ per cent; or, stated differently, the increase in the production of pig iron, from 1810 to 1866, was 2371 per cent, while that of the population was 410 per cent. The annual ratio of increase in the product of pig iron in the United States since 1855 has also been greater than in Great Britain.

"The increase in the production of anthracite coal (which may be taken as a measure of the production of all American coal), during the year 1866, was about three millions of tuns over the product of 1865, on a gross return for the former year of 12,399,747. This extraordinary increase was referred at the time, in part, to a speculative revival of trade and industry succeeding the termination of the war; and also to the stimulus of very high prices. These stimulants, however, if they were really influential, have clearly not operated in any degree during the past year, and yet the gross product of anthracite coal sent to market has not materially diminished; the deficiency up to the 30th of November, 1867, in the aggregate of coal sent eastward from Pennsylvania, having been only 170,041 tuns, as compared with the movement of the corresponding period of 1866; while the stock on hand at the various markets available for consumption, at the close of the season of 1867, was estimated at less by 250,000 tuns than the stock on hand at the close of the two preceding years. It seems, therefore, certain that the conditions of ability to consume—which conditions are mainly industrial—have not become impaired during the past year; or, in other words, the industry of the country has developed during the past year to such an extent as to render what in 1866 seemed abnormal and uncertain, now legitimate and permanent.

"The record of the export trade in petroleum for the last three years, has also been very similar to that of coal. Thus, for the years 1864 and 1865, the annual report of petroleum, with an advantage of a high premium of gold, averaged about thirty millions of gallons; but during the year 1866, the exports suddenly rose to an aggregate of over sixty-five millions; and this extraordinary increase, which originally might have seemed speculative and temporary, has during the past year been substantially maintained."

On comparing the financial condition of this nation with that of other governments, Mr. Wells gives the gratifying information "that the United States is the only one of the leading nations of the world which is, at present, materially diminishing its debt and reducing its taxes; and the only one, moreover, which offers any substantial evidence of its ability to pay its debt within any definite period, or even anticipates the probability of any such occurrence."

The language of the Report, with the very encouraging facts presented, which are fortified by detailed statements, will serve to inspire renewed confidence in an early return to a solid business prosperity, and incite to the development of enterprises which have been deferred only from the timidity of their projectors. We may have occasion hereafter to advert again to this document.

Finding the Deviation of the Compass.

The *Mechanics' Magazine* describes an invention designed to simplify the process for finding the error on the common steering compass, or, in other terms, the deviation of the magnetic from the true meridian. It has been patented by Major General Shortrede, of Lee, who attains his object by making some additions to the steering compass as usually made, by which it becomes virtually an azimuth compass, without interfering with its ordinary use in steering. One way of effecting this is by attaching at opposite sides to the rim of the cover a semi-circular arc or band of a convenient width, having along its middle a narrow slit, by means of which it may be directed to the sun or other heavenly body; or through which the sun's light shining over the center and on the edge of the card, shows by a bright streak on a dark ground the compass bearing by observation. This being compared with the bearing, determined astronomically, gives a difference, which is the error or deviation of the compass from the true meridian. On a surface projecting from the rim of the bowl, or on the rim of the cover, are graduations, which are read as usual by a zero mark on the other rim. When the sun's light is too faint to give a distinct streak, or in observations of moon, star, or planet, the object may be viewed through the slit, either directly, or as reflected from the glass of the cover beneath the slit. In such cases the observation is made by taking the usual reading of the card at the lubber line, and also the reading on the rim giving the angle between the lubber line and the object. According to their position, the sum or the difference of these readings gives the compass bearing of the object; and this compared with the true azimuth gives the error or deviation from the meridian

As a high wind acting on the continuous arc may cause the compass to have a tremulous motion, in order to avoid or lessen this inconvenience in such cases, the arc is removed and replaced on the side towards the object by a short piece about an inch high, and on the other side by a shorter piece, each piece having in it, as in the arc, a narrow slit. The piece towards the object may be fitted with a reflector, which may be either of the usual sort with a hinge so as to be turned according to the altitude of the object, or it may be a portion (about an octant) of a glass cylinder fixed horizontally, the object reflected in either of these ways may thus be viewed through the slit or hole on the opposite side. There is yet another way of attaining the end in view. Graduate a rim of the bowl or cover of the common binnacle compass, putting a proper zero mark on the other rim, by turning the cover so as to bring a bar of the roof into the shadow of the opposite bar, the zero mark indicates the angle between the object and the ship's head. This with the azimuth of the object and the usual reading of the card suffices, as above shown, to give the true meridian, and the deviation of the compass from it.

Corrosion of Cast Iron.

It has been often stated that cast iron, when exposed to the action of sea water or to atmospheric influences, under certain conditions becomes "rotten," an expression which is intended to indicate a loss of strength or cohesion without a corresponding alteration of volume or size. This phenomenon is entirely different from common oxidation, or rusting, which latter process shows itself by attacking the surface, and gradually reducing the size of the article, which, so far as it remains intact by this external reduction, does not seem to lose its qualities, so that the reduced strength of a rusted bar is simply proportionate to the reduction of its original section. The state of corrosion which would justify the term "rotten" is a reduction of cohesion without any apparent removal of material, and is not easily recognized externally. The nature of this change has for a long time remained unexplained, until some very interesting experiments established its scientific *rationale*. We believe that this scientific discovery is due to Mr. Crace Calvert, F.R.S., of Manchester, who some years back carried out a series of very interesting experiments on this point. Mr. Calvert immersed cast iron cubes, made of Staffordshire cold blast iron, and cast one centimeter in dimension into acidulated water. Each cube was placed by itself in a corked bottle with eighty cubic centimeters of a very diluted acid. Amongst the acids tried were sulphuric, hydro-chloric, and acetic acid; their action upon the iron was very slow, and it required a long time to show any change whatever. After three months of contact Mr. Calvert found that, although the external appearance of the cubes was not changed in any way, some of the cubes, and particularly that in contact with acetic acid, had become so soft externally that a knife blade could penetrate three or four millimeters deep into the cube. The solutions were then removed and replaced by fresh acid of the same kind in each bottle, this removal being continued every month for two years. After this period changes had been effected in almost all the cubes, only the penetration was more or less complete according to the nature of the acid. Acetic acid had acted most energetically of all; next came hydrochloric and sulphuric acid. Phosphoric acid showed no similar action. The result of the action of the acid was a complete change of the nature of the metal, without any alteration of its bulk or of the appearance of its surface. The cubes of gray cast iron, which originally weighed 15.324 grammes each, weighed only about 3¼ grammes at the end of two years, and their specific gravity was reduced from 7.858 to 2.751. The iron had been gradually dissolved or extracted from the mass, and in its place remained a carbon compound of less specific weight, and very small cohesive force, which occupied the same bulk as the original cast iron. The composition of the cast iron and of the carbon compound which remained in its place after two years of contact with acetic acid was found by Mr. Calvert as follows:

	Original Cubes.	Carbonaceous Substance.
Iron	95.413	79.960
Carbon	2.900	11.070
Nitrogen	0.790	2.590
Silicium	0.478	6.070
Phosphorus	0.132	0.059
Sulphur	0.179	0.096
Loss	0.108	0.205

Acids, like hydrochloric, sulphuric, and acetic acid, are to be found in water under a great variety of circumstances. Sea water contains these, or at least the elements from which they can be formed by decomposition of the organic or unorganic matter contained in them; they appear in the air, and are carried by the rain or snow down to the surface, particularly in the vicinity of manufacturing localities. The gradual deterioration of cast iron when exposed to actions of that kind—a change which is all the more dangerous, as it is not immediately apparent to the eye—may therefore be considered as a possibility, and in the presence of acidulated water or sea water may be even called an established fact. It is probable that a coating of the metal or paint, in so far as it is impervious to water, may prevent, or at least lessen this injurious action, but this has not as yet been established by direct experiment. There are many engineering structures relying for their safety upon the strength of cast iron in contact with sea water, and the chances of injury from this action should never be lost sight of during the periodical inspection of such works.—*Engineering.*

Petrified Forests.

The process of isomorphism, the formation of what is usually termed a petrifaction, and some few other similar subtle operations of nature, have never been completely fathomed and satisfactorily accounted for by either the practical man or the theorist. There exists in the vicinity of Cairo, although but little known to European visitors, and still less to the Arabs in general, a petrified forest, which presents features of great attraction to the geologist and antiquary. Owing to the intense heat of the sun the expedition to this curious natural feature of the country is best made at night time. Leaving the city by the Gate of Nasr, and traveling in an easterly direction, the tourist reaches the "Tombs of the Caliphs." These sepulchres are small mosques, furnished with a minaret and cupola, and are designed in the purest style of Arabian architecture, a style especially delighting in those multitudinous vagaries of delineation which have given rise to the term arabesque. Unfortunately these unique relics of bygone splendor are left altogether to the ravages of time, and it is lamentable to predict that in a short time they will disappear forever. After passing them a brief interval reveals to notice here and there fragments of petrified wood, the advance guard of the forest, which, however, is still some distance off. Bearing uniformly to the east, and surmounting and descending numerous sand hills, the promised land is gained at last, and a land more desolate and more barren it would be difficult to conceive. The term "petrified forest" may perhaps seem a misnomer when it is stated that there are neither trees nor leaves. The fragments, to all appearance, are stones, only outwardly resembling wood, and in myriads of pieces are scattered, half buried in the sand, like "the ocean witnesses." One of the most remarkable circumstances is that the most accurate search, the most rigid scrutiny, fails to detect the least vestige of arable land, the smallest oasis, which could have afforded an origin to these mutilated relics of timber. Occasionally a trunk is found riven in two, as if split by the heat. The largest of these specimens measures ten feet in length, and has a diameter of twelve inches. One would naturally expect that the species or description of timber to which these petrifactions belonged would be identical with that met with at present in the country. The reverse is the fact. The oak, the beech, the chestnut, and others, are distinctly recognized, but scarcely a single specimen can be discovered of the palm, the sycamore, or the fig-tree. Not only does the specific gravity of the specimens vary, as is always the case with timber, but the original color is well preserved. All the tints are plainly perceptible, from the light Naples yellow to the deep red, brown, or even black. The perforations produced by the passage of insects through the bark are clearly visible, and a gummy secretion has been found in some of the holes made in this manner. It would be idle to attempt at present to offer an explanation of this curious phenomenon, but it is to be hoped that geologists will ultimately solve the problem.—*The Engineer.*

New Anæsthetic, Bichloride of Methylene.

Methylene is a fluid like chloroform in appearance and odor, but differing in its boiling point and its specific gravity. It boils at 88° Fah., and has a specific gravity of 1.34; chloroform boils at 142°, and has a density of 1·49. This substance has chemical relations also with tetrachloride of carbon, the anæsthetic properties of which are known. Chemically speaking, the bichloride of methylene is constructed from the organic radical, methyl, represented by $C\ H^3$, by the withdrawal of one atom of hydrogen, giving methylene $C\ H^2$, and the addition of two of chlorine—thus, $C\ H^2\ Cl^2$. The composition of chloroform is $C\ H\ Cl^3$. It differs from the bichloride of methylene in having one atom of hydrogen less and one atom of chlorine more in its composition. The radical methyl may enter into composition with chlorine, giving rise to the to the chloride of methyl, $C\ H^3\ Cl$, which was discovered in July to have gentle anæsthetic properties by Dr. Richardson. We have, then, a series of compounds,

C H H H Cl, Chloride of methyl,
C H H Cl Cl, Bichloride of methylene,
C H Cl Cl Cl, Chloroform,
C Cl Cl Cl Cl, Tetrachloride of carbon.

All of these compounds are anæsthetic, Dr. Richardson having discovered the anæsthetic properties of the first of these in July last, and of the second in August. That gentleman has experimented on himself and on animals with these new anæsthetics; and two cases of ovariotomy in the practice of Mr. Spencer Wells have apparently proved satisfactorily the anæsthetic power of the bichloride of methylene, which, as it is intermediate in composition, Dr. Richardson regards as also intermediate in strength between chloride of methylene and chloroform. Dr. Richardson has drawn the following conclusions:—

"In its action the bichloride of methylene is more gentle, but as effective as chloroform; it produces less struggling and less vascular excitement. Its narcotic effects are equally prolonged. It acts very uniformly on the nervous centers. It sometimes produces vomiting. When it is carried so far as to kill, it destroys by equally paralysing the heart and the respiration. It interferes less than other anæsthetics with the muscular irritability."

Dr. Richardson expects that it will prove less fatal than chloroform, which causes death, he estimates, once in fifteen hundred cases.—*Chemist and Druggist.*

Antidote for External Poisoning by Cyanide of Potassium.—This substance is extensively used in electroplating and other arts, where its external poisoning effects produce many painful and troublesome ulcers on the hands of the workmen. The foreman of the gilding department of the American Watch Works writes to the Boston *Journal of Chemistry* that experience has taught him the most effectual remedy that can be employed in such cases, which is the proto-sulphate of iron in fine powder, rubbed up with raw linseed oil.

The *Journal of the Telegraph* is the name of a neat little semi-monthly paper, devoted to Electrical Science. Published by James D. Reid, 145 Broadway.