There are many applications of fluor spar, some of which we purpose to give in this article.

ALUM FROM FELDSPAR.

The manufacture of alum and other compounds of potash from feldspar has long been regarded as a desirable thing; this result can be obtained for alum by fusing the feldspar with fluor spar and treating the mass with sulphuric acid. In this way the silica is expelled in combination with the fluorine as hydro-fluosilicic acid, and the sulphuric acid unites with the alumina and potash of the feldspar to produce alum, while the lime of the fluor spar being insoluble can be collected on filters or removed by decantation, in the form of gypsum. O[illegible]ash salts can be produced from the alum.

HYDRO-FLUOSILICIC ACID.

Gay-Lussac observed many years ago, that when fluor spar and silica were fused together, some of the fluorine combines with the silicon in the form of fluoride of silicon, and escapes with the gaseous products of combustion. Many attempts were made to save this gas, but without success, until Tessie du Motay constructed a furnace by which, it is claimed, that 68 per cent of the fluoride is economized. Plans of the furnace were shown at the Paris Exhibition of 1867, together with a large suite of salts prepared by means of the hydro-fluosilicic acid. Among these salts we recall pure caustic potash, carbonate of potash, silico fluoride of potassium, silico fluoride of sodium, silico fluoride of barium, and caustic soda. As many of our ores contain fluor spar, and as, in the process of smelting, the fluorine is expelled, it is well worth while to save the incidental product of fluoride of silicon by conducting it into water and converting it into hydro-fluosilicic acid. This latter acid has many applications in the arts, and if we could obtain it cheaply and in abundance, it would prove of great value. It has been recommended for the decomposition of bones and guanos; for the manufacture of artificial stones; for fixing colors in paintings with soluble glass; for the preparation of pure tartaric acid, by removing the potash from tartars; to remove lime and potash from the juice of beet-root; and in some of the operations in the manufacture of pins.

HYDROFLUORIC ACID.

For etching on glass, fluoric acid has long been employed, and for this purpose it can be readily prepared by pouring sulphuric acid upon pulverized fluor spar. The operation must be conducted at a gentle heat, in a leaden or platinum retort. When required pure, the latter metal is indispensable. It is, also, sometimes customary to pass the gas through ammonia or potash to produce the fluorides of ammonium or potassium, also to be used for etching glass or for the resolution of minerals.

It is proper to state in this connection, that great precautions must be observed in handling hydrofluoric acid. The preparation of the gas is attended with great danger, as it attacks violently the organs of respiration. A drop of the acid on the skin produces fearful ulcers, and on the tongue, instant death. In a concentrated state it must be preserved in platinum bottles, and in a dilute form, can be kept in gutta-percha bottles.

FLUOR SPAR AS A FLUX.

It has been observed that lime alone occasions a loss of 5 or 6 per cent of iron, in blast furnaces, and that a small addition of fluor spar remedies this evil, as it keeps the slag more uniformly liquid, so that the iron is not caught in it, but falls rapidly through it, and the slag can, by blowing out the furnace, be more easily removed than when other flux is used. The fluor spar also prevents the formation of graphite and removes phosphorus. The proper proportion is about 50 lbs. to 100 lbs. pig iron, or 40 lbs. to 100 lbs. spiegel iron. A larger quantity might prove injurious to the walls of the furnace. In small crucible operations, fluor spar can be recommended as a valuable flux, and in blow-pipe analysis it has a similar application. [See page 229, Vol. XIX., letter of S. D. Poole, Lynn, Mass.]

PREPARATION OF ALUMINUM AND MAGNESIUM.

Metallic aluminum has been made by fusing the double chloride of aluminum and sodium with a proper proportion of metallic sodium, but the actual operation is attended with some practical difficulties, which are said to be removed by the addition of fluor spar. The mixture usually taken is composed of 100 parts double chloride of aluminum and sodium, 50 parts fluor spar, and 20 parts sodium. These substances are intimately mixed and introduced upon the hearth of a furnace previously heated to redness. The doors of the furnace are closed while a strong heat is brought to bear, and by occasional stirring the metallic aluminum will flow down to the front of the inclined hearth. By permitting the more fluid portion of the flux to run away, some fluoride of aluminum can be saved as an incidental product. Magnesium can be prepared in a similar manner by fusing 600 parts chloride of magnesium, 480 parts fluor spar, and 230 parts sodium, in a suitable crucible. The sodium must be freed from naphtha and cut into small pieces so as to be intimately mixed with the chloride and fluor spar, it is then projected into a crucible previously heated to redness, and the cover held down during the first stormy reaction by an iron weight. The magnesium will be found scattered through the slag in small bright pellets, from which it can be separated by crushing and washing.

HYDRAULIC CEMENT.

It is not an easy thing to graduate the heat in the preparation of hydraulic cement so as to prevent the formation of hard slag. By mixing fluor spar with the limestone, a greater range of heat is found to be admissible, and a second burning can be obviated and the properties of the cement are said to be improved.

An excellent cement can also be made by fusing feldspar, lime, and fluor spar together, and separating the potash by dissolving in water. This has the additional merit of securing a most valuable incidental product in the potash.

ANTOZONITE.

A variety of fluor spar has been discovered in Germany, which, on the application of heat, gives off an odor that forcibly recalls chlorine, and, twenty years ago, was supposed to contain that gas. Schoenbein considers the odor to be due to a modified form of oxygen which he calls antozone, and he names this variety of the fluor spar antozonite. A French chemist, also, takes the ground that fluor spar contains oxygen. If either of these theories could be proved by experiment, other and important uses would be opened up to this mineral.

SEPARATING GOLD AND SILVER.

The Stevens flux, for treating mineral ores, is essentially fluor spar, obtained in the treatment of cryolite for soda, and there is, consequently, nothing particularly new about it. According to experiments conducted by Dr. Chandler, of the School of Mines, Columbia College, the amount of fluor spar required in the working of gold quartz is very large, often one hundred per cent, so that the economy of the process must depend upon the cost of the fluor spar at the mines. It is doubtful if fluor spar can be economically employed on a large scale in treating gold quartz. In the working of titaniferous iron ores it now has considerable employment, and may add to the value of that class of ores.

The above are some of the uses to which fluor spar can be applied, from which it will be apparent that it is a valuable mineral, worthy of the attention of metallurgists and manufacturers everywhere.

THE INCREASED USE OF COLD-ROLLED SHAFTING.

The use of cold-rolled shafting is, so far as we can learn, steadily increasing, and its application to purposes where exactitude of diameter, superior strength and rigidity, as well as the highest perfection of finish is required, has now become very extensive.

For our own part we have certainly never seen anything in the way of shafting, superior in point of elegance of finish to this product of cold-rolling.

This beautiful finish, however, is not gained at a sacrifice of strength as might be supposed by those unacquainted with the process, as the following table of results obtained in experiments performed by Major William Wade, of the United States Department, will show.

We may also state that similar tests were made by John P. Whipple, Chief Engineer, U. S. N., and William Fairbairn, Esq., Manchester, England, with like results.

The table is a summary of the average results obtained from numerous experiments made with bar iron, rolled while hot, in the usual manner, compared with the results obtained from the same kinds of iron, rolled and polished while cold, by Lauth's patent process, as manufactured by Jones & Laughlins, of Pittsburgh, Pa., whose advertisement will be found in another column.

	Iron rolled while		Ratio of increase by cold rolling.	Average rate per cent of increase.
	Hot.	Cold.		
TRANSVERSE—Bars supported at both ends, load applied in the middle, distance between the supports 50 inches.				
Weight, which gives a permanent set of one tenth of an inch, viz.: 1½ in. square bars.	3,100	10,700	3,451	162½
Round bars, 2 in. dia.	5,200	11,100	2,134	
Round bars, 2¼ "	6,800	15,600	2,294	
TORSION—Weight which gives a permanent set of one deg., applied at 25 in. from center of bars.				
Round bars, 1¾ in. diameter, and nine in. between the clamps	750	1,725	2,300	130
COMPRESSION—Weight which gives a depression, and a permanent set of one hundredth of an inch, to columns 1½ inch long and ⅝ in. in diameter	13,000	34,000	2,615	161½
Weight which bends, and gives a permanent set, to columns 8 in. long and ⅞ in. diameter; viz.: Puddled iron	21,000	31,000	1,476	64
Charcoal bloom iron.	20,500	37,000	1,801	
TENSION—Weight per square inch, which caused rods ⅞ in. dia. to stretch and take a permanent set, viz.: Puddled iron	37,250	[illegible]	[illegible]	95
Charcoal bloom iron.	42,439	[illegible]	[illegible]	
Weight, per square in., at which the same rods broke, viz.: Puddled iron	55,760	83,156	1,491	73
Charcoal bloom iron...	50,927	99,293	1,950	
HARDNESS—Weight required to produce equal indentations	5,000	7,500	1,500	50

NOTE.—Indentations made by equal weights, in the center, and near the edges of the fresh cut ends of the bars, were equal; showing that the iron was as hard in the center of the bars as elsewhere.

SCIENTIFIC INTELLIGENCE.

SEPARATION OF ANIMAL AND VEGETABLE FIBER.

M. Shervord has invented an ingenious method for the separation of animal fiber from vegetable. The process does not alter the structure or color of the animal fiber, and permits the use of cotton and linen fiber separated from it for numerous purposes. It is sufficient to suspend the goods in an atmosphere of nitrogen or carbonic acid, and to cause the vapors of perfectly dry sulphuric, phosphoric, or hydrochloric acid to enter the room. These fumes disintegrate the vegetable fiber and leave intact the animal—the two fibers can thus be separated and appropriated to their respective uses.

CLEANING ENGRAVINGS.

It very often happens that fine steel engravings get stained with moisture on the wall, or specked with mildew, and it becomes an important question how to bleach them. One of the best methods is to moisten them carefully and suspend them in a large vessel partially filled with ozone. The ozone bleaches them perfectly without attacking the fiber of the paper.

For the evolution of ozone the simplest way would be to clean pieces of phosphorus and place them, half covered with water, in the bottom of the jar in which the pictures are suspended. On a large scale, a Ruhmkorff coil and constant discharge of electricity would be preferable. It is somewhat surprising that this method of cleaning fibers has not been more generally applied.

INFLUENCE OF FORESTS UPON RAIN.

The London *Athenæum* contains another example of the influence of forests upon the quantity of rain. In several districts of Australia there is a perfect rage for cutting down timber, and where this devastation has been carried out, the quantity of water that falls in a year has greatly diminished; from 37 inches in 1863 it has decreased to 17 inches in 1868. In 1869, from January to July, comprising two of the wet months, there only fell 11 inches of rain.

In Victoria the want of water is becoming a serious question, and the Government has been compelled to appoint an inspector of forests intrusted with the duty of preserving the trees already existing, and to establish nurseries for young sprouts wherever admissible. By a judicious planting and preservation of forests it is anticipated that a decided improvement can be effected in the climate of the country.

The residents of New England, who permit the mountains to be stripped of their trees for the production of charcoal, would do well to consider at what a cost to the water power of the States, to the fertility of the farms, to the climate of the country, and to the health of the community, all this momentary gain is attained. While other governments are planting trees at great expense, they are cutting them down to obtain a few chaldrons of charcoal.

MORIN'S EXPERIMENTS UPON THE PUNCHING OF METALS.

General Morin, one of the ablest of French engineers, and who has given to the world one of the best treatises on mechanics extant, has been extending his investigations to the determination of the power expended in the punching of metals and plastic substances.

The results of a large number of experiments are given by him in a paper read before a recent session of the Academy of Sciences, Paris, which demonstrate that the same elements of resistance enter into the operation of punching as in that of shearing. In short, a punch and die may be considered as a shears with circular blades. The coefficient of pressure in punching, per any given area of section, will be exactly that for shearing the same area of section, without reference to the thickness of the material.

The measure of force, necessary to effect the various punchings easily gives the value of the resistance to shearing, in case of the ordinary metals. This resistance (per square meter) is determined to be, for

	Kil.
Lead	1,820,000
Block tin	2,090,000
Alloy of lead and tin	3,390,000
Zinc	9,060,000
Copper	18,930,000
Iron	37,570,000

It is difficult to give these figures in exact denominations of English measures and weights. A square meter is 1·196 square yards, nearly; and a kilogramme is, approximately, 2·205 lbs. avoirdupois.

THE GREAT UNION DEPOT ON FOURTH AVENUE, NEW YORK.

The contract for this enormous structure has been finally awarded to the Architectural Iron Works at the foot of Fourteenth street, New York. The depot is intended to accommodate the trains of the Harlem, Hudson River, and New York Central Railroads. For the latter a branch road will be built to connect with the Harlem, the trains being switched off in the neighborhood of Spuyten Duyvil. The car house will have accommodations for twelve single trains, while, if it be necessary, double or even treble that number can be accommodated.

Photographs of the plans and drawings were sent to Europe for bids, but it was found that American founderymen could more than compete with any bids received abroad.

The foundation of this immense structure, to be the largest of the kind on this continent, is well under way—in fact, nearly completed. The contract calls for the completion of the entire structure within eight months from its date. If not completed within the time specified, the contractor is to forfeit and have deducted from the contract price $500 a day for every day over; and if completed within the time specified, the contracter is to receive, in addition to the contract price, the sum of $200 for each day the work is so completed and accepted by the engineer.

The weight of iron to be used will be over 8,000,000 pounds. It will require 100,000 square feet of glass in the roof alone, and 90,000 square feet of galvanized corrugated iron to cover the roof. The roof over the car-house will extend over an area limited south and west by the office buildings, east by the Fourth avenue, and north by a line 30 feet 6 inches south of Forty-fifth street. The entire length of the roof will be 652 feet, and it will be 199 feet 2 inches in width between the walls, and supported by 32 arched trusses, placed 20 feet four inches apart. These great arches will be set upon the foundation, whose upper face is 2 feet below the surface of the ground, rising to an elevation of 94 feet from the springing line to the extrados of the arch.

The car-house is to be lighted through three skylights extending over the entire length of the roof—one on the center, double pitched, and two single ones on each side of the center. The rewill be seven courses of ventilators running the entire length of the roof, faced up with stationary sheet iron slats.

On the south end, the segmental portion of the arch above the brick wall will be faced with cast iron trimmings and plate glass.

The north end will be closed with a beautiful cast iron front highly ornamented. The east side, along the Fourth avenue, will be finished with cast iron pilasters acting as casings set in front of each truss. These pilasters are to have bases and caps, supporting a main cornice along the front, and crowned by a cast iron balustrade; a line of balconies will run along the west side and across the south end, connecting with the offices in the second story. The trusses are placed in heavy cast iron shoes, sixty-four in number. To permit free expansion and contraction of the trusses, without interference with the side walls crossed by them, there will be placed cast iron boxes or casings perforated by a series of cores, and fitted together by means of bars and angles in such a manner as to insulate entirely the mason work from the trusses.

The rafters will consist of five-inch deck beams, secured to the top chord by double angle iron studs, 3½ by 3½ inches, and stiffened by diagonal braces of same size, riveted together and fastened on the chord by means of bent lap plates one half inch thich, and riveted to the former.

The doors and windows will have cast iron trimmings, all ornamented, the windows to be glazed with rough half inch glass. The whole of the north front will be of cast iron, the width to be 203 feet 10 inches, and raised 112 feet 6 inches in extreme hight. The windows and doors of the first story will have rolling shutters.

The ends of the structure will be occupied for offices on the first floor, while the ground floor will be set apart for ticket offices, passengers' rooms, baggage lockers, restaurants, newsstands, etc.

Pennsylvania iron, of the best welded quality, will be used for plates, flat or square bars. Round bars and rods for braces to be of Ulster iron: rivets and bolts, of charcoal iron. Sheet iron, best welded and refined Pennsylvania. Cast iron, mixed in the following proportions, viz.: American pig No. 1, and Scotch pig No. 1, 5 per cent of each for shoes, casings, lintels, box, angle, studs, and braces. American pig No. 1, 10 per cent, and Scotch pig No. 1, 15 per cent, for columns and pilasters. American pig, No. 1, 15 per cent, and Scotch pig No. 1, 20 per cent, for hanging cornices, friezes, and flat pannelings. American pig No. 1, 30 per cent, and Scotch pig No 1, 30 per cent, for small moldings and ornamented work. All rolled and welded iron to be subject to a strain of 30,000 pounds per sectional inch.

BILL TO AMEND THE PATENT LAWS NOW PENDING BEFORE CONGRESS.

We have now before us the completed bill pending before Congress to amend the patent laws, to which reference was made in No. 8 of the current volume. It amounts substantially to a codification of our entire present patent system, and we feel bound to confess, that in many respects the bill is a great improvement upon the old law, reflecting credit upon the Committee, of which Hon. T. A. Jenckes is chairman.

The bill came up for discussion in the House on the 15th inst., but went over under the rules, and before the discussion was concluded. The provisions of the bill embrace patents, designs, trade-marks, and copyrights, and are too voluminous to print in our columns.

We regret to notice, however, that the provisions relating to appeals from the Commissioner to the Supreme Court of the District, have been stricken out. We trust that the House will insist upon its restoration.

In explaining the various features of the bill, Mr. Jenckes says:

"In the law with regard to patents, which appears as chapter two of the bill, there are four principal propositions of amendment. One is the requirement of a fee to be paid at the expiration of seven years from the date of the patent, and another at the end of the twelfth year as a condition of keeping the patent alive. Such a provision is found in the patent laws of almost all other countries. The proposition had met the commendation of the Commissioner and of persons doing business at the Office. Its adoption will increase the revenues of the Office, and will weed out those worthless patents which are sometimes taken hold of by speculators near the expiration of their terms for the purpose of harassing the public with igenious reissues. One great annoyance and evil will be removed and positive good obtained in its place.

"Another source of difficulty, and which was becoming a great one, arose from the fact that there is a large number of what are called rejected applications in the Patent Office. During the past year there were over five thousand of final rejections, and the year before nearly as many, and since the constitution of the Office there are perhaps twenty thousand remaining in the Office; most of these rejections have been acquiesced in and the claims abandoned. But some of these have been rejected improperly, and contain descriptions of valuable inventions. In course of time it has been discovered in many cases the rejection was wrong and that the examiner had made a mistake, and the applicant has again made application for his patent, and pressed it, and it has sometimes been allowed and sometimes rejected. If allowed, he would go and try its validity in the courts. If refused, the further difficulty arose on the provision in the existing law for the revision of the decisions of the Commissioner.

"As the law now stands an appeal may be taken to one of the judges of the Supreme Court of the District of Columbia, or remedy be had in a suit in equity in that or any other circuit court. This led to a conflict in the jurisdiction exercised by the Commissioner and that exercised by a single judge in this District court, and exposed behind it a further and greater cause of difficulty. That is, the law as it now stands, contains no provision absolute in itself, clearly and distinctly defining what should constitute the abandonment of an invention to the public. We heard the solicitors at great length on the question, and the conclusion the committee arrived at is expressed in two short provisions of the proposed bill. The substance of them I will state. Each and every party whose application has been refused is allowed two years to renew that application before the Commissioner, but this provision is not allowed to revive any application for an invention which has been, as a matter of fact, abandoned to the public. In other words, it says a mere lapse of time in the prosecution of an application of a patent shall not be conclusive evidence of abandonment; that the right to a patent for a first and original invention is a vested right, and can only be lost by the inventor in not proceeding in accordance with the provisions of law, or in his forfeiting that right in accordance with those provisions; and to those in this condition, not cut off by any positive existing statute of limitation a new statute of limitation is proposed, defining the time within which such new application shall be made. Thus all the rights are preserved and the mode of prosecuting them is pointed out. The field of controversy concerning these old applications, whether abandoned or not, is fully and satisfactorily provided for."

"The Committee also propose to amend and enlarge the provisions as to relief between interference patents, and to provide relief in cases where a patent has been improperly obtained or improperly reissued, or where the validity of a patent is contested by persons using the things patented.

"There is now no means provided by which a person thus injured or threatened to be injured by a suit can turn around on his prosecutor and test his right to the patent. We propose to give that remedy, so that a single suit can determine the question and avoid the extended litigation and expense now attending controversies upon patents. Heretofore it has sometimes happened that persons have obtained reissues of old patents, and then gone around the country threatening suits against persons; sometimes commencing a suit in a court, and if not liking the temper of the judge, or from some untoward circumstance connected with the trial, abandoning it and commencing another somewhere else, with the hope of obtaining a decision in their favor. And when they have succeeded in obtaining a single decision they will go around again and levy a tax upon all who do not feel able to go to the expense of contesting the validity of the patent.

"That has been a great burden and a great wrong, which has many times been sought to be amended. But the difficulty has been to do it without injuriously affecting rights conferred and established. The committee propose to do it by recommending that where any party has been sued for the infringement of a patent, and he thinks the patent is invalid for any reason or should not be enforced against him for any cause, he may commence a suit against the owners of the patent who have sued him, in order to test the validity of that patent, and the final decision in that case shall be conclusive upon the right of all parties claiming the right to use the thing claimed to be patented.

"I know one case where after a defendant had succeeded in a suit upon a patent, the patentee turned around and brought upwards of a hundred suits all over the United States upon that very patent, subjecting each of the parties sued to as much expense as the one who had defeated him, in the hope of obtaining a reversal of the former decision. That is an evil to be prevented; and we think we have provided a remedy which will reach the case, so that the expense of one suit shall be all that is required to test the validity of any patent or the right of any party under it.

"The committee have recommended also certain provisions which are entirely new concerning trade-marks. These have not heretofore been the subject of any national law. It is a subject embraced within the common law jurisdiction of all the courts of the country, and also within the general equity jurisdiction of all the State courts. This bill does not propose to interfere at all with the local and State jurisdictions. A person, standing upon his common law rights, may still go into the State courts and defend a trade-mark, exactly as he may do now; but if he chooses to register his claim at the Patent Office, pay his fee, and take his certificate of registration, it will protect him throughout the United States, in the same way as a patent for a design or a copy-right is protected.

"Concerning trade-marks, we are at present in an anomalous condition, which perhaps is not understood by the House generally. By certain treaties or conventions with Belgium, France, and Russia, we have agreed to recognize the validity of the trade-marks of those countries upon their being registered in the Patent Office of the United States, and to give them the same effect throughout the United States that they have in the country where they originated; and trade-marks recognized by the law of this country have the same effect throughout those European countries as the trade-marks secured by the citizens or subjects of those countries.

"A *fac similie* of the trade-mark is to be sent to the Patent Office. The kind of business, as well as the kind of goods, to be protected, is to be described briefly and correctly. A fee of $25 is to be paid into the Treasury of the United States. A certificate of such registration, with a *fac simile* of what is filed in the office, is to be delivered, under the seal of the Patent Office, to the person causing such registration. It is to be in effect for thirty years from the date of registration, and if it be copied by a person not having a right to do it, or if it be copied by a person in such a manner that the imitation is calculated to deceive the public, then the party may have his remedy in any court of the United States for the injury done him."

ELECTRIC FORCES.

There is no fact connected with the electric agencies, by which distant communication is secured, more suggestive than the minuteness of the power by which it is sustained. To project a ball at a distant ship with certainty of aim, to blast the sunken rock that impedes navigation, to impel the giant ship that splits the storm with its defiant bow, forces are presented to the eye which bear some natural comparison with the work accomplished. But when a message has to be sent thousands of miles beneath the ever fretting sea, from one continent to another, force seems ignored. We look in vain for any machine hissing with a vigor such as the mind deems necessary to eject the electric current from America to Europe quick as the sunlight comes to the earth. There is even an absence of the usual forces for communication upon the land, where nitric and sulphuric acids, zinc and mercury, are busy in numerous cells brewing the electric fire. The power employed bears more truthful comparison with the action of the brain wherein human thought is evolved. The thought may be one which shall change the destinies of a nation; it may be the sweetest idyl that ever warbled from angelic lips; but both come from within the dome of a brow notable only for its repose.

The battery which operates the Atlantic cable is composed of five cells, although for some time it used only one. Each cell is composed of a glass tumbler, a small disk of sheet copper, and a similar one of zinc, a few pellets of sulphate of copper and moist sawdust filling the tumbler. This is all. It has no smell. A spoonful of water upon the sawdust now and then is all it needs for support. It seems insignificant and powerless, yet does its work efficiently and well. The French cable uses only seven such cells, although twice as long as the other.

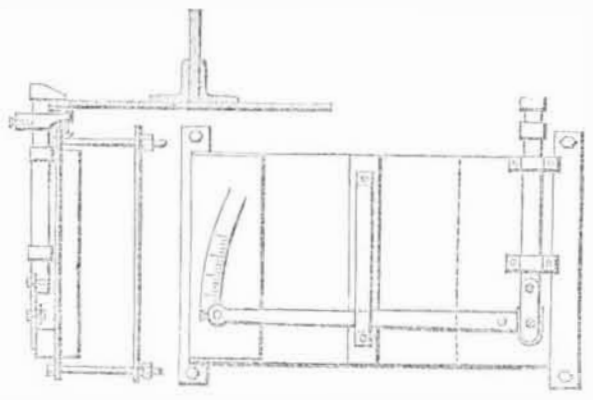
We have before us, as we write, a battery which was used to transmit a message by the Atlantic cable—the minutest, we presume, ever employed. It has a fascination to us inexpressible. It is composed of a simple gun cap soldered to a piece of copper wire, and a narrow strip of zinc. These, with a drop of water from the ocean, were all the forces that were needed to send a message from continent to continent. Here is a sketch of its actual size:

Had the ocean drop been a tear, it would have generated the same current which thus thrilled between two worlds and made them one. Were we disposed to moralize on the salt of this tiny battery and its mysterious agency, we might be excused did we regard it as typifying the power of sorrow which touches the universal heart and makes it throb. It is the alembic of the world's deepest and most omnipotent emotions, and yet may find its rise in the stopping of a single pulse, in the quenching of a single life.

This tiny battery has in it, indeed, a vast moral. We despise the lesser forces of our lives, and measure our influence by an unwise disparagement. From these, however, when true and pure, come the sunlight of the efflorescence of the earth. Let us hold our light high and honored, however small may be its flame. It may reach the radius of another light, and help the dawning of a brighter day—not to ourselves alone, but to thousands who never knew us. A single kind word has ere now planted a seed that has burst its blossoms upon the "infinite meadows of heaven."—*Journal of the Telegraph.*

INSTRUMENT FOR MEASURING THE DEFLECTION OF GIRDERS.

The accompanying engraving represents an instrument which has been used by the Western Railway Company, of France, in testing the bridges of the new Dieppe line *via* Pontoise and Gisors.



Wrought-iron bands together with bolts, serve to secure a plank, carrying the whole apparatus to a rigid structure independent of the girder. A clutch is then screwed on to the flange of the girder. A lever works on a pivot, and the shorter end—one tenth of the longer arm—is attached to a clutch bar. The other end carries a pencil which traces the deflection on a card. By means of the unequal division of the lever it is manifest that a small deflection will produce a comparatively large movement of the pencil. In point of fact, a deflection of 1-10,000th of a meter can be detected with this instrument.

BREAD POWDERS, EXTENSION.—The patent of Professor Horsford for pulverulent phosphoric acid, to be used in making bread, has been extended for seven years from April 22, 1870.