ceed best which brought to bear the greatest amount of vituperation against its rival If such a state of matters were allowed, where would it end? There must be a limit beyond which a person cannot go without paying the penalty of his indiscretion The conclusion of the Judge a summing up is so important that we reproduce it here Speaking of the attempt to injure an insurance company not being an ordinary common slander, he said that such a course might ruin a vast number of innocent subscribers, who depend upon it as a help to themselves in ill health, or to their widows and families in case of their death. There might be less to blame if the statements were made recklessly and with anger, but they seem to have been utterred deliberately and with the express purpose of doing injury to the company. Therefore, I must give the plaintiffs not nominal but substantial damages—very substantial damages. I think £1,000 would be extreme; but I venture to say that if a Jury were to give £1,000 in respect of the three libels, I, as Judge, would not reduce it by a penny, as it should go forth to the world that this libel has not the slightest warrant

If this action does nothing more, it will we think, make the agents of life assurance offices more careful in the future as to the statements they make about other offices than their own. We trust that, as it has been the first, it will also be the last action of its kind. There is plenty of room in this portion of the wide world for the agents of the different offices to follow their business in an honourable and legitimate way, without endeavouring to procure proposals by misrepresentation and slander. The occupation of a life assurance agent is an honourable calling, success in which can be reached by energy and perseverance without stooping to any disreputable tactics While each agent strives his best for the office he represents, it is quite possible for the competition to be carried on in a fair and proper spirit, each and all acting for the greater extension of one of the most beneficent schemes of thrift which has blessed the world

We are glad to observe that at the trial there was no suggestion made, nor evidence off red, that the society employing Mr. Barker was cognizant of or approved his reprehensible method of pushing his business as a canvasser. As we have already said, the lesson is a salutary influence for good —*Investigator*

LIFE INSURANCE IN THE UNITED STATES.

The preliminary bulletin issued by the census bureau covering the returns made by the 59 life insurance companies doing business in the United States, for the year ending December 31, 1879, is one of the most important as well as the most satisfying documents ever given upon the subject.

It appears, among other things, that in the 59 companies now doing business, the liabilities to policy holders in 1879 were $365,663,883, with an "American 4½ per cent." reserve after deducting reinsurance of $354,989,935 and assets of $442,269,187, or $76,600,303 in excess of liabilities. The assets are made up over one-third, $184,753,109, of loans on real estate, one-fourth, $115,302,677 of stocks and bonds, and one-seventh, $63,820,691, in real estate, put in at its cost value. The depreciation on assets, including these and other items, is placed at $3-483,266 on a total of $426,492,340, less than 1 per cent., and this depreciation must be much less now than when these returns were made 18 months ago. The total disbursements were $76,089,138, of which half, $33,609,712, was in policy payments, less re-insurance, and the income was $83,388,857, $57,615,102 received from premiums, etc, and $25,-322,092 interest, profits, etc. The companies closed the year with $6,807,701 claims outstanding, of which $1,200,223 were resisted; about 3 per cent. of the total amount paid to policy holders. Aggregated as an entirety, the insurance companies in the country met in 1879 about one-tenth of their total liabilities, and of this fraction they resisted payment of 3 per cent. The companies also paid out $9,906,333 for surrendered insurance to the amount of $62,214,851 and 35,793 lapsed policies representing an insurance of $70,791,189. On the other hand, cash premiums to policy holders were $12,229,887. Agents absorbed $3,871,524 of the disbursements, a tenth as much as was paid on policies; officers, $2,193,755, and travelling expenses cost half as much more. In all, expenses foot $13,176,000. The life insurance business has, also, its peculiar phases, and is subject to fluctuations the same as any other business. An analysis of the figures shows, in the matter of policies written and terminated and extended through the previous 10 years, that while in 1870 171,290 policies were written representing $317,955,773 in insurance, the number gradually shrunk to 98,405 in 1878, covering $172,844,233 in amount, and in 1879 had risen to but 122,864, representing $187,049,113. Less change took place in the policies terminated, which remained from 106,050 to 120,000 a year.

Twenty-seven barrels of gasoline, recently left at a railroad station in the United States, were accidentally fired, supposed to have been by a spark from a locomotive, and a serious explosion and fire took place. Thirty persons, principally firemen, were injured, and much property damaged. Gasoline, benzine, and all that family of destructives, should be carefully secured against fire and cautiously avoided by all not compelled to handle them, and even those handling them should act as if in the presence of imminent danger, which they really are, while so exceptionally benzine, kerosene, and their relatives, have made heavy drafts on insurance funds, and are likely to continue these operations Underwriters are not sufficiently restrictive in respect to that class of fire raisers, as would appear from the fact that, from whatever cause, whether it be downright wilfulness, ignorance of the danger, or competition—a desire to grant favours to secure business—companies go on granting permits to store and use these things, just as if the permits involved little else than the trouble of making the endorsements We hear of many such permits, and desire to caution underwriters against such loose practices No truly conservative underwriter will freely grant such permits, or in any way trifle with, or unduly encourage those very troublesome, hazardous customers, Benzine, Gasoline & Co.

A book recently published in England, entitled, "How to Detect the Adulterations in Food," shows that everything is badly mixed, or say thoroughly well mixed even to the oatmeal, the Scotchman's "staff o' life." One would think that life was short enough, and sufficiently embittered with the ills that flesh is heir to, even at its best, without this wholesale poisoning process being in operation to cut off man before his time. Life companies should take the matter in hand, and if they adopt the principles and plans in vogue with the fire companies, in protecting (?) their interests, they will see to it that the assured do not patronize any shops that deal in adulterated articles. They will also insist upon a complete system of sanitary measures to be enforced in all towns and cities, and do business nowhere else. They should take charge of the streets, yards, etc, and keep them clean, as was expected of the life companies this spring in New York, when the city was in a disgracefully filthy condition, and the citizens all but demanded of the companies to cleanse the city, just because filth induces disease and death, and the companies are interested in the rate of mortality. The reasoning is logical from that standpoint, and is the parallel to that insisted upon by the fire companies, with this difference in favour of the life companies, viz.: death is certain—a certainty that no action of the companies can remove—and secures to them a continuance of business. But continuance of business the fire companies are trying all means possible to limit or destroy, in their endeavours to remove every cause of fire. When the problem is fully worked out the result will be—their own extinction! "You cannot have your cake and eat it."

With a view to the efficiency of the volunteers, the London *Times* suggests marching match a as well as shooting matches.

The *Liberator* (London) says:—"The poverty of the poor clergy would be hard to bear in any case, but what must be the feelings of a poor curate when he hears of such a living as that of Wimbush, Essex, the net income of which is £650 a year, while no duty whatever is required from the holder? It has been a sinecure for more than 400 years, and for the most part has been bought by ladies for family purposes. It is also a donative—*i. e*, the right to present is absolute, and any clergyman, whatever his character, can be presented, in spite of all the bishops in England. This living was lately put up to auction, and, not being sold, the price is reduced from £6,200 to £5,500. It is an investment simply—we cannot say pure and simply.

The five French academies which compose the Institute have awarded the prize of $4,000 given every year for the work or discovery most worthy of honour or most useful to the country that has been produced during the preceding ten years. This prize, founded in 1859, is awarded on the recommendation of each of the five academies in turn; and it has been remarked that the recipient is invariably a member of the body that makes the award. This year it was the turn of the Academie Française, which chose M. Desire Nisard, author of the "Historie de la Litterature Française," which originally appeared in 1844-49. A new and revised edition, however, has been published within the prescribed period of the past ten years. In 1861 the nominee of the Academie Française was Thiers, and in 1871 Guizot.

Many people must have been surprised (says *Life*) at the comparatively small amount which the personal estate of the late Mr. Sothern realised. The will was sworn under £16,000, a small sum truly for a man who has often made his £600 a week on the boards. The chief reason for this was the inordinate extravagance of "Lord Dundreary." When he was making money fast he simply sprinkled it about like water. His house in Harley street, his rooms at the St. Pancras Hotel, his carriage, horses, hunters, at Market Harborough all were simply perfect, and this class of establishment makes a hole in £20,000 a year. It is well for the memory of Sothern that his will has been published for there were many ugly rumours afloat that his children had been left penniless. This, however, is not the case, for when all debts are paid there will be sufficient to give the children £3,000 a piece, if not more.

SCIENTIFIC AND PRACTICAL.

TOTAL ECLIPSES THIS CENTURY

In an interesting article in *Nature* particulars are given of twelve total solar eclipses which will occur during the remainder of the present century

First—1882, May 17 The most accessible portions of the central line will be in upper Egypt and the extremity of the Peninsula of Sinai The central eclipse on the Asiatic coast near Shanghai

Third—1881, May 6 The line of totality faces in the Pacific Ocean Eclipse lasts six minutes

Third—1885, Sept 8 Visible in New Zealand soon after sunrise.

Fourth—1886, Aug 29 Totality lasts six minutes and twenty-seven seconds Central line passes across the Atlantic and over South Africa Duration of eclipse when it reaches African coast four minutes and thirty-eight seconds This eclipse is a repetition of that of 1868, Aug 8, and will recur in 1904, Sept. 9, in mid Pacific, and 1922. Sept. 21, visible on east coast of Australia, where the duration will be about three and a half minutes

Fifth—1887, Aug 19. Eclipse begins in 11° 39' east and 51° 38' north It will be most favourably observed in Asiatic Russia, but some fifty miles north of Moscow the total eclipse will continue two minutes and thirty seconds, with the sun at an altitude of 17°. At Berlin the sun will be totally eclipsed immediately after rising On Lake Baikal totality will continue about three minutes and thirty-eight seconds, with the sun near the meridian.

Sixth—1889, Dec. 22. The greater duration of totality in this eclipse falls upon the Eastern Atlantic, but where the central line meets the African coast in Angola (about 10° 6' south) it continues three minutes and 35 seconds, with the sun at an altitude of 56°.

Seventh—1892, April 26. Almost entirely an ocean track on the South Pacific; an impracticable eclipse.

Eight—1893, April 16. Probably the most favourable eclipse occurring before the end of the century On the west coast of South America, rather less than a degree north of Coquimbo, totality will continue three minutes, hence the central line traverses Brazil, passing off the continent near Ciara, and here the sun, near the meridian, will be totally eclipsed four minutes and forty-four seconds. After traversing the Atlantic it enters Africa close to Bathurst, where the total phase is about four minutes; thence through Central Africa to a point west of Khartoum.

Ninth—1894, Sept. 28. Either a sea track or a passage over inaccessible regions, except that the eclipse may ultimately be found total in the Seychelles. The central line begins in the middle of Africa just north of the equator, leaving that continent near the Juba river and ends near Macquarie Island.

Tenth—1896, Aug. 9. The central line enters Norway, near Tana, in Finmark, and in 28° 46' east, and 70° 31' north, the duration of totality is one minute and forty-three seconds. Near the Amoor river totality continues two minutes and thirty-eight seconds. The total eclipse may be observed also in the northern parts of Yesso, Japan. This will be a recurrence of the eclipse of 1806, June 16, observed in this country by Bowditch. Its last recurrence was on July 29, 1878, the central line passing down the Rocky Mountains.

Eleventh—1899, Jan. 22 This eclipse may be well observed in Hindostan; totality will continue about two minutes and six seconds.

Twelfth—1900, May 28. The central line begins in the Pacific in 48° north, traverses the south-east portion of the United States, from Louisiana (not far from New Orleans) to Norfolk, on the Atlantic coast, and at the point where it leaves the American continent totality begins about 8 47 a.m., and continues one minute and forty seconds. Crossing the Atlantic, upon which the greatest duration of totality falls, it enters Portugal, near Oran, where the total phase continues one minute and thirty seconds. The eclipse may be well observed in Portugal and Spain It will be a recurrence of that of May, 1882.

ELECTRIC PHOTOGRAPHY.

In able hands—for no artistic process can rely wholly or mainly on the improvements and facilities afforded by science, the application of the electric light to photography is of vast importance, and the stride which has already been made in adapting magneto-electricity to such purpose, by Mr. J. E. Myall, at his newly appointed art studio, No 164 New Bond street, can best be estimated by its results These are a combined softness and brilliancy unattainable by any other method hitherto enlisted in the service of photographic portraiture. In truthful definition, roundness, or what is technically called "modelling," and the seizure of a momentary expression, which gives to the best likeness its most magical charm, the pictures taken by Mr. Myall's new process surpass all previous achievements of their kind. To enable the operator successfully to attain such effects of perfectly distributed light and shadow as are apparent in recent works produced by Mr. Myall, a far greater illuminating power than has hitherto been gained was necessary. The machine, which he had mounted on a deep bed of concrete, to insure the utmost steadiness, produces a light of the enormous power of 12,000 candles, or more than double that to which former mechanism could pretend Its prime motor is a 16 horse power gas engine, such as M Jamin recently demonstrated to be of perfect effect in the division of the electric current To balance the resistance of such a volume of electricity as is here brought into play, the most delicately adjusted machinery, at once ingenious and original, is employed and an absolutely pure and steady arc of light is obtained, of a quality most advantageous for chemical radiation. One cable having been used with such brilliant and complete result, two more have been attached to the Gramme machine, so that three separate studios will now be available on the commodious premises on the corner of Grafton street The advantages of an intense and carefully distributed electric light in photography are too obvious to need any elaborate indication Sunlight varies continually, and the time of sitting must therefore depend on the judgment and experience of the operator, who, if he be not a thoroughly skilled artist, will too often depend on mere guesswork. Night or day, in the blaze of midsummer and in November's fogs, the electric light is invariably the same; and the period of exposure is not only reduced to a minimum, but is decided by calculation as certain as it is simple. After all, as we have intimated, the artist's eye and hand are still requisite to pictorial character in a portrait. Facilities such as these which Mr. Myall has scientifically added to his artistic resources would lead an indifferent practitioner further away from his chance of tolerable success. It is when the highest practical operations of physical laws are directed with a just appreciation of their value that they conduce to the real benefit of art —*London Daily Telegraph*.

BRUSH ELECTRIC WORKS.

The Brush Electric Company's Works, occupying six acres of ground on Mason Street, Cleveland, at the crossing of the Cleveland & Pittsburgh Railroad, are the largest electric works in the world The buildings first erected, and which consisted of a main machine shop, 265 by 122 feet with proportionate large boiler room, blacksmith shop, japanning oven, carbon factory, tool, carpenter and tin shops, have since had important additions. The machinery used is of the most perfected description. The engine driving it is 400 horse power In the boiler room are three enormous boilers of Otis steel They were built by the Variety Iron Works and the Cleveland Steam Boiler Works The carbon department proves one of the most interesting to visitors. Here are furnaces in operation for the carbons. Provision is made for thirty-six furnaces, each of a capacity of 10,000 carbons, capable of turning out 75,000 carbons per day The plant for the grinding, mixing, molding, pressing, plating and packing is on a corresponding scale. Three powerful hydraulic presses are in use. Such is the pressure of orders that a new machine shop 410 by 100 feet and an iron foundry 265 by 100 feet is to be added. Some of the material is now on the ground. The buildings are to be of brick and one story in height, thus securing the highest amount of solidity and entire freedom from vibration. With the completion of the buildings they will be capable of affording accommodation for 1,500 men, and of turning out from $8,000,000 to $10,000,000 worth of work per annum On a separate piece of land, facing the works, a laboratory has been erected in which Mr. Brush will pursue his investigations. Mr. George W. Stockly is the business manager of the company and Mr. N. S. Possons the superintendent.

A Roumanian engineer, Trajan Theodoresco by name, has invented a new description of torpedo or submarine boat, whose peculiarity is that it is capable of manœuvring under water at twelve hours on a stretch. It is able to act at depths of from 100 feet in rivers to 700 or 800 feet in the sea. It is able, through the agency of screws to rise or sink noiselessly, and either suddenly or gradually by successive stages, and can move or manœuvre in any direction. The illumination of the vessel is internal, and enables the officers upon her to see for a distance of 130 feet in the water.

The process for working iridium, invented by Mr. John Holland, of Cincinnati, O., is described in the *Scientific American*. After the metal is brought to a high heat and phosphorus added, it is cast into any desired form, and the phosphorus is removed finally by heating the metal again in a chalk bath. Professor Dudley, in a lecture on this metal, gave some interesting particulars. It is like steel in appearance, but is nearly as hard as the ruby. Acids cannot injure it nor can rust consume it. As the negative carbon in the electric arc it was used for sixty hours without any loss in weight or change in form. This metal is so refractory that it cannot be hammered into shape when hot, and it resists the file. When in the way above stated it is moulded into the form, as near as may be, of the article required, it is ground or cut to the finished state by copper disks, revolving at a high velocity, on which emery and water are poured.

Another new application of electricity as a motor has been experimented on at Paris M G. Trouve, a well known electrician, has devised a method of applying the electric current to the propulsion of a boat, and so far the results have been eminently satisfactory. The experiments have been made on the Seine on several occasions with a small boat capable of from two to six persons M T[illegible] electric motor consisted of a S[illegible] which by a simple but ingenious arrangement is made to transmit its [illegible] three-bladed screw at the stern of the boat. The motor itself is fixed on the upper part of the rudder, which it follows in its movements, as does also the screw [illegible] with its accessories, does not weigh more than five kilogrammes M Trouve's apparatus may be adapted to any boat and there seems no reason whatever why it might not be so modified as to be applicable to vessels of much larger dimensions than that experimented on Experiments in navigation by electricity were made on the Neva in 1839 by Jacobi, but the method adopted had so many drawbacks as to be practically useless.

The *Chronique Industrielle* gives an abstract of a paper by a French engineer, M. Mongey of Bray-sur-Seine, wherein the author shows the benefits to be derived from a system proposed by him for distributing cold air through a line of pipes to private consumers. Some such system has been suggested before, but the one under consideration differs from it in the fact that the projector proposes to compress the air to a greater degree (five or six atmospheres) and to *cool* it before sending it through the pipes to the various points of distribution. At these points the opening of a cock, by allowing the air to escape and expand, will distribute throughout cellars, living apartments, or wherever else it may be needed, a pure cold air capable of preventing fermentation or putrefaction of organic matters, and of rendering the atmosphere of stores, manufactories or dwelling houses refreshing during the most sultry days of summer The air thus compressed may also be used, like steam, as a motive power. As for the proposed mode of distribution, that is essentially the same as now employed for supplying steam heat to consumers in Lockport, N.Y.

Bitumen appears in nature as an accidental mineralogical accident, under the most diverse and often most inexplicable conditions. It is found sometimes in the native state, sometimes mixed with clays, sometimes as the cement of conglomerates, sometimes at impregnating limestones. The last combination produces the mineral commonly called asphalt. When the bitumen contained in any of these substances is chemically isolated, it appears always a nearly identical substance, in composition consistency and appearance, except that the empyreumatic odor that characterizes it may become alliaceous in volcanic countries Asphalt is doubtless one of the most considerable and valuable of the forms in which bitumen appears. It is a fine limestone, naturally and closely impregnated with that substance When a specimen is examined under the microscope, each grain of it appears to be immersed in a pellicle of pure bitumen, by which it is cemented to the adjoining particles. It is thus a species of very fine grained bituminous conglomerate. When a lump of this rock is heated to a temperature rising from 176 to 212 degrees, the pellicle of bitumen is melted, the cohesion of the asphalt is destroyed, and it crumbles into dust. If it is taken while it is still hot, or if it is heated again after it has become cool and strongly compressed, the particles will adhere again, and the stone will recover, after cooling, precisely the consistency and appearance it had originally The employment of compressed asphalt for pavements is founded on this property.—*Leon Malo, C.E.*, in *Popular Science Monthly for August*.

At a meeting of the Society of Engineers, held recently in London, in the society's hall, Victoria street, Westminster, Mr. Charles Horsley, president in the chair, a paper was read by Mr A C. Kugert on "The Prevention of Smoke." The author, in choosing the title of "The Prevention of Smoke" instead of "The Consumption of Smoke" gives it as his opinion that smoke once produced by the atmospere and while being carried by the air cannot be consumed, as every particle is surrounded by a thin film of carbonic acid. When however, smoke is condensed as soot, heat will liberate the carbon from the acid, and then the former will burn rapidly. If this theory is found to be correct, carbon cannot destroy the germs of disease floating in the air. For the consumption of smoke many ingenious elaborate inventions are on record, but not yet adopted on account of expense and complicity of mechanism. A simpler apparatus is therefore required To prevent smoke, the cold air must not be allowed to come in contact with the gases arising from green coal, and to this purpose the furnace is, so to speak, divided into two parts. The fire door is removed from the boiler, and a box fixed on the front. On each side of the box rails are placed inside, on which a plate or shutter may rest, which can be pushed forward or backward as required. When pushed forward it passes within the boiler and drops over the fire bars some eighteen inches, thereby cutting off the draught, and prevents the condensation of the gases arising when fresh coal is put on, thus preventing smoke and the cooling of the boiler. A still more simple apparatus can be made with the same results if the opening of the box will admit a higher box. The shutters can be cast together in one piece at an angle of about 130 degrees to hang within the box on two pins or bolts, thus forming a swinging shutter. A rack is attached to the front of the shutter to regulate the movement. The advantages of this apparatus are. The cooling of the boiler is entirely avoided, the gases are consumed so that smoke is prevented, and there is a saving of from 15 to 25 per cent. of heat and coal.