the Livadia, a Liverpool steamer, which was laden with 150 tons of sulphure de carbone, and with other cargo, at Marseilles, and had to be abandoned by her crew off Cape Cette on May 11 last. The inspector appointed by the board thought the casualty due to the leakage of one of the drums in which the sulphure was stored, to the formation of vapor, and to its being drawn up the drain pipes through the scuppers, so that it came into contact with a light in the forecastle.

### PHOTOGRAPHIC NOTES.

*Silver Intensifier for Gelatine Negatives.*—A modified formula, originally devised by Mr. J. B. B. Wellington, is recommended by a Mr. Richmond, as follows, in the *Photo. News:*

A

| | |
|---|---|
| Silver nitrate | 100 grs. |
| Water | 7 oz. |

B

| | |
|---|---|
| Ammonium sulphocyanide | 240 grs. |
| Water | 7 oz. |

C

| | |
|---|---|
| Hyposulphite of soda | 240 grs. |
| Water | 7 oz. |

For use, take one drachm of the three solutions in the order named, mix, and apply to the plate.

*Uniform Standard for Lens Mounts.*—A very worthy effort is being made among the leading opticians in England to establish a uniform system of screw threads and of lens mounts, so that the lens of one maker will fit in a lens flange of another make. When such uniformity is decided upon, it will be comparatively easy to use different manufacturers' lenses and different kinds of lenses in one screw flange, instead of requiring a separate lens board for each lens.

*A Good Mountant.* — The following mountant is strongly recommended by Mr. W. Willis for delicate prints: Weigh out two ounces of the best arrowroot, mix it into a thick paste with two ounces of hot water, and then add 18 ounces of boiling water, stirring briskly. Soak half an ounce of gelatine in water until it is thoroughly soft and swollen. Stir this swollen gelatine into the hot arrowroot, with which it will quickly incorporate itself. Add ten or twelve drops of pure carbolic acid. This forms a stiff jelly when cold, and it should be used cold, being brushed on to the back of the prints or applied to them with a sponge. —*Photo. News.*

### Slag Cement.

In a recent article on slag cements, *Le Genie Civil* states these cements are made by finely grinding blast furnace slag, and mixing it with a suitable proportion of fat lime. The grinding has to be very fine, because as the cement is made by a simple mixture it is necessary that the surface on which the two constituents, the lime and the slag, react on each other should be as large as possible, if proper chemical combination is to ensue. As manufactured in France, the cement leaves only 20 per cent on a sieve containing upward of 25,000 meshes per square inch, and only 8 to 10 per cent on a sieve with 4,500 meshes per square inch. The density of slag cements is much less than that of Portland, weighing, bulk for bulk, but from 0·8 to 0·88 time as much. In general, this cement also sets somewhat more slowly than Portland, but when hardened has, in many cases, a greater strength, particularly at early dates after setting. In some experiments still unfinished the following results were attained with a slag cement from the Department of Isere:

| Age | 1 week. | 1 month. | 3 months. |
|---|---|---|---|
| Breaking load, lb. per square inch. | 473·5 | 568·8 | 678·3 |

These figures are higher than any attained in tests made on Portland cements for the new Croton aqueduct. Experiments have also been made with slag cement mortar mixed with, and allowed to harden in, sea water, and gave the following results; the mortar consisted of six parts by weight of cement to ten of sand:

| Age. | Breaking weight, lb. per square inch. | | | | |
|---|---|---|---|---|---|
| 8 days.... | 252 0 | 319·9 | 275·1 | 273·0 | 285·8 |
| 28 " .... | 375·4 | 327·0 | 327·0 | 248·4 | 341·2 |

The main objection to slag cement seems to be that if it is allowed to harden in dry air, its strength is very materially reduced, and it is then liable to crack. In the town of Villefranche-sur-Saone (Rhone) it has been largely used for paving footpaths, some 4,800 square yards having been laid there with the most satisfactory results.

### Electrical Notes.

One of the regular items of expense in operating an arc station is that of lamp trimming. As a general rule, and perhaps universally, the carbon trimmers are paid at the rate of about $2 per day, and each man has so many lamps assigned to his care. The general manager of a large plant in the Southwest informs us, however, that he has tried the performance of trimming duty on a piece work basis. At first they paid their trimmers 2½ cents per lamp, so that the men made as much as $75 to $90 per month, although the circuits are very long. Since the middle of May they have reduced the rate to 2 cents per lamp, the men still making as much as $65 per month. Each man, it will be seen, looks after more than 100 lamps per day.

A disadvantage of this method is that the men are hardly likely to take time to give the lamps the care they require, the trimmer being more anxious as to the number of the lamps than as to their efficient burning. On the other hand, the men, since they get so much for each lamp on their "beat," are anxious to secure new customers, and will readily go out of their way to secure additional business for the station.

Cheap and dishonest competition has cut much of the interior wiring business into pieces, so that reputable contractors often do not care to bid on work. In ordinary work for bells, annunciators, alarms, etc., where conscience is not kept on the alert even by fear of the inspector, the work is frequently disgraceful. If it were plumbing, the architect knows that he would have to deal with a board of health, or with a nervous buyer whose sense of smell had been abnormally developed by the reading of sensational hygienic literature. But wiring—the lowest bid will win the day. This is not as it should be, and until architects are themselves able to judge of the quality of the work and of the goods used in the installation, they should call in a trustworthy expert or engineer, whose modest fee for examination will be recouped many times over in the solid satisfaction enjoyed by the occupants of the property.

While at the outset arc lamps were employed to a considerable extent for interior illumination, their use is at the present time confined almost exclusively to outdoor illumination, except in cases where large interior spaces are to be lighted, and where the height of the ceiling permits of the even distribution of the light. It has often been remarked, however, that an arc lamp of small candle power ought to find a large field for application for interior illumination, and it is indeed strange that efforts in the past have not been made or have not been successful, if made, to produce a lamp of this nature. We believe that some attempts, with fair success, have been made abroad, but up to the present this field seems to have been entirely neglected in this country. We are glad to note, therefore, the appearance of a lamp designed for such a purpose. With a good mechanism and good carbons, so as to insure a steady light equivalent to 150 or 200 candle power illumination, there is no reason why such a lamp should not come into extensive use, especially on the score of economy.

Now that electric welding, pure and simple, has attained a firm foothold in the arts, we see springing up around it, and as a direct result of it, a variety of most valuable and interesting processes worked out by Prof. Thomson and his associates. Among these we describe in this issue a process for case-hardening, devised by Prof. Thomson, in which the high heat produced by the current is employed to effect the deposition of carbon from a hydrocarbon gas surrounding the piece to be treated. This process will be recognized at once as analogous to that employed for the flashing of incandescent lamps in order to obtain uniformity in the filament. In the present instance, however, the body upon which it is deposited combines with the carbon to form a steel coating. Mr. Lemp's process of electric swaging seems also destined to a wide application, not only on account of the nicety with which the operation can be performed, but equally on the score of its economy. It is safe to say that we have by no means reached the end in this work, which indeed seems without limit.

As a method of protection from abnormal currents, fusible cut-outs have found wide application, probably as much on account of their simplicity as for any other reason. When applied to the protection of delicate instruments, however, the difficulties encountered in drawing down a fusible metal, on account of its lack of tenacity, and also from its extreme fragility, limit its use. To avoid this, Mr. Stephen D. Field has applied the mercury cut-out in an ingenious manner, by which not only is uniformity and strength obtained, but the cut-out is saved from destruction, and, upon the cessation of the abnormal current, immediately assumes its former guarding functions. The cut-out shows itself to be quite satisfactory in its operation under severe conditions.

In the system of electrically increasing traction as developed and practiced by Mr. Ries, a low tension quantity current is made to flow through a local circuit of almost negligible resistance, of which circuit the driving wheels and that portion of the track rails immediately below and between them form the principal part. This current produces a slight local heating or incipient welding effect at the points of contact between the wheels and rails, which is practically instantaneous in its action, and brings about a decided increase in the coefficient of friction between the opposing metallic surfaces.

Models exhibited show an increase in traction due to the current of over 200 per cent. Preliminary tests of the invention, as applied to steam locomotives in regular service, have been very successful.

The traction-increasing current is generated by a small alternating current dynamo, driven by a rotary engine supplied with steam from the locomotive boiler. The engine and dynamo are mounted upon a common base secured to the boiler in the position formerly occupied by the sand box. One or both pairs of driving wheels are electrically insulated from the body of the locomotive and from each other by the use of special insulation surrounding the driving box and side rod brasses. The insulation so far employed has proved itself fully capable of withstanding the exceptionally severe strain to which it is subjected, and tests made after several months of continuous service have led to its permanent adoption for this class of work.

Experiments already made upon a large scale have shown that by this method it is possible to increase the tractive adhesion of locomotives fully 25 per cent, thus enabling them, with a saving of fuel, to haul a largely increased load, to mount heavier grades, and to descend the same under perfect control and without the skidding of wheels. Besides this, it will enable railroads to haul, with their present engines, much longer trains than they can now do, thus not only increasing the carrying capacity of the road, but saving largely the wear and tear upon tracks and bridges that the use of heavier engines for this purpose would entail. It will likewise enable both passenger and freight locomotives to make better speed and to maintain schedule time notwithstanding ordinary unfavorable conditions of the track due to the weather.—*Electrical Engineer.*

### Alexander Parkes.

Mr. Alexander Parkes, one of the most prolific inventors that has ever been produced by this or any other country, died on June 29, at his residence, Penrhyn Villa, Rosendale Road, West Dulwich. Born at Birmingham in the year 1813, Mr. Parkes was apprenticed in the year 1827 to the firm of Messrs. Samuel Messenger & Co., as a modeler and designer, but having practically the run of the factory, his education as a practical metallurgist may be said to have commenced at the same time. In 1840 he was engaged by Messrs. Elkington to superintend the casting department of the electro-plating works they were then on the point of organizing, and while with them, in 1841, he took out his first patent, which in the course of his long life has been followed by what, considering their quality, must be considered as an enormous number of others. The best known of these are the Parkes process for desilverizing lead by means of zinc, and the invention of "parkesine," which has, however, been since renamed celluloid or xylonite. Another important patent was one for the construction of weldless tubing by "drawing" flat plates in a press. This process has been largely adopted, though we believe the inventor's name is known comparatively to few. Of his numerous patents, which must be quite forty in number, a very large proportion have proved valuable, though as Mr. Parkes was but poorly up in the modern art of self-advertisement, as practiced more particularly by American inventors, his name has been but little known to the general public. His most recent inventions, the last of which was patented at the end of 1887, relate to the separation of gold from its gangue, by fusing the quartz by suitable fluxes, and this process has been put into operation at the Champion silver mines, New Zealand. Mr. Parkes' death, though occurring at a ripe old age, is a distinct loss to the metallurgic world.—*Engineering.*

### Pumice Stone.

A mine of pumice stone exists on the Teneriffe Peak, of which the working was only started in 1888. The stone is found in that part of the peak called the "Canadas," at about 2,000 feet above sea level, which has an area of some 6,000 hectares, out of the middle of which rises the highest part of the peak. The Russian consul at St. Croix bought this property of the Spanish government in consideration of an annual payment for the pumice stone working. The Russian consul has associated himself with a Belgian, and they, under the firm styled Aguilar & Valcke, commenced operations in 1888, but it was only last year exportation was really started. At the Paris exhibition, the consul-general states that this stone obtained a silver medal, and in view of the requirements of England, France, and America, he believes it will develop a trade of great importance before many years. So far, the Lipari Islands have practically furnished the world's supply of this product, exporting about 100,000 tons per annum. The Teneriffe stone being recognized as of excellent quality, and its extraction being a much more simple matter than in the Lipari Islands, it follows that the price is much less.

SIX years ago there were scarcely a hundred electric motors in operation in the United States for any purpose; to-day there are not less than 15,000 motors in use, applied to not less than two hundred different industries, and an industrial revolution is taking place equaling, if not surpassing, in importance that attending the introduction of the steam engine, and marvelous in the rapidity of its growth.—*Sprague.*