### Electrical Notes.

It is announced that a company has been formed with a nominal capital of £175,000 for the purpose of operating the Armstrong-Orling system of wireless telegraphy. Factories are to be erected in Buckinghamshire and in France. The step is the outcome of experiments made in Hughenden in the autumn of 1901, when electrical impulses were sent through the ground without wires and without poles. It will be remembered that the SCIENTIFIC AMERICAN described very fully how, during the experiments, a torpedo was moved at will to the right or left by pressing a releasing lever of a small transmitter.

Osmium has the highest melting point of any metal, viz., about 2600 deg. C., and it can, therefore, be used at a higher temperature than carbon in an incandescent lamp, making the efficiency correspondingly higher. The lamp is the invention of Dr. Auer von Welsbach, and the Auer Company, who are making it, will shortly be letting out lamps on hire. Owing to the rarity of osmium, it is found worth while to employ the metal remaining in the filaments after they have burned out. The chief difficulty appears to be the low resistivity of osmium. Owing to this, up to the present lamps of 25, 35 and 50 volts only have been produced, and the smallest candlepower of a 35-volt lamp has so far been 40. The lecturer described experiments made with a 20-volt lamp at different pressures. At 20.5 volts the lamp gave 22 candle power, and required 1.48 watts per candle. At 25 volts the efficiency rose to 0.99 watts per candle and the candle power to 46. At 30 volts the figures were 0.654 watts per candle and 99 candle power; at 35 volts 0.487 watts per candle and 171 candle power; at 40 volts 0.38 watts per candle and 275 candle power; and at 50 volts 0.32 watts per candle and 460 candle power. At this pressure the lamp burned out. A life test was made on another lamp at its normal pressure. This lamp required 1.5 watts per candle at the commencement, dropped gradually to 1.36 and 1.32 watts per candle, and finished at 1.4 watts per candle after 1100 hours. During this time the candle power, which started at 14.8, rose gradually to 16.8 after 250 hours, and then dropped to 15 candle power after 1000 hours' use.

One of the most important substitutions of electric for steam traction in Italy has been carried out by the Mediterranean Railroad Company upon a system of lines starting from Milan. The main branch goes from Milan to Gallarate, 25 miles, and thence start three separate branches which supply the Lago Maggiore region and have their termini at Arona, Laveno and Porte Ceresio, with lengths of 16, 19 and 20 miles. The Milan-Gallarate line passes through a densely populated region and the traffic is constant throughout the year, while the three branches supply the tourist traffic, which is considerable in the summer and autumn. In order to meet the competition of the local tramway lines the company was obliged to change its system. Since the new system was inaugurated last October the passenger traffic has increased 50 per cent. The direct-current system is used for the motors, and the trains have a speed of 50 miles an hour. The energy is supplied by a hydraulic and a steam plant on the Tessin, which generate 3-phase current at 12,000 volts, and this is fed to the line by sub-stations at 650 volts. The third-rail contact system is used. The hydraulic plant, at Tornavento, is under construction. Meanwhile the road is fed from the steam plant. A fall of 25 feet is obtained here by a branch canal, which delivers 140 cubic yards per second, representing 11,000 horse power. The dam upon the Tessin is constructed upon the Poirée movable system, with 179 sections. The canal, which is over 40 feet wide and 12 feet deep, is navigable. The station has eight large turbines, which drive the alternators, and two smaller ones for the exciters. The main turbines generate 1200 horse power and the dynamos 742 kilowatts. The steam plant will be used as a reserve when the hydraulic station is finished; it has eight boilers and three horizontal Corliss engines of 1400 horse power, which drive triphase alternators. The latter give 13,000 volts at 25 reversals. From the station the current is transmitted by two main lines at high tension, and these supply the five sub-stations for the road, where the current is transformed to 420 volts direct current by sets of rotary converters. The third rail, carrying the current, is supported along the road every 12 feet upon earthenware insulators protected by a cast-iron cap which receives the rail flange. The rolling stock consists of 20 motor cars and 20 trailers, of 55 feet length, having two first-class compartments containing 24 passengers, and two third-class containing 39. The cars have a vestibule at each end, in which is also the motorman's cab. The motor cars will hold in all 75 passengers, and the trailers 90; the former have four Thomson-Houston motors per car, which take current from the side rail by four sliding contacts. The express trains make a speed of 55 miles an hour, and the ordinary trains 20. The road started last November with 38 trains per day, but since January 42 trains have been running.

### Engineering Notes.

Considerable prominence has lately been given in the press of the world to the fact that not a passenger on the English railroads was killed during the year 1901. It may prove of interest to know that on the Mexican National Narrow Gage Road, from Corpus Christi through Laredo to the city of Mexico, with its branches amounting to more than 1,200 miles of operated road, for more than twenty years no passenger has been killed. This, in the face of the fact that this road climbs more mountains, turns more curves than any road in the United States.

According to Engineering News, a special trolley car for conveying fire engines is in use at Springfield, Mass. The engine is carried on a platform only nine and one-half inches above the top of the rail, mounted on a truck at each end. The front truck is detached and the front end of the platform lowered to the ground when the engine is to be loaded on the car. Platforms over each truck afford space for firemen and equipment. The length of the car over all is 30 feet 10½ inches, and its net weight is 14,000 pounds. The Springfield Fire Department has loaded an engine on one of these cars in two and one-quarter minutes from the time the car was in position to its being ready to start, and has unloaded an engine and attached the horses to it in one and one-quarter minutes.

Most of the roads reaching the recently developed oil fields in the Southwest are actively engaged in making the necessary changes, or have preliminary arrangements under way, whereby oil will be used as locomotive fuel on the equipment operating locally in this territory. There is economy in the use of oil in comparison with coal in this district, where the cost of coal is above and the quality below the average, but just how much is as yet undetermined from reliable information. Conservative estimates, says the Railway Age, place the saving at from 15 to 20 per cent. This reduction is not based on the relative cost of actually producing one horse power by use of coal or oil as fuel, but involves the comparative cost of the handling of both, and it is from this source that the greater proportion of the economy must be looked for, as in some instances the actual cost of the amount of oil used for fuel has exceeded the cost of coal in performing similar service. This may possibly have been due to improper combustion, but it illustrates the fact that care must be taken in the selection of the proper appliances for using oil to effect an economical consumption.

The production of pig iron in the first half of 1902 was 8,808,574 gross tons, against 7,674,613 tons in the same period of 1901 and 8,203,741 tons in the second half of 1901. The production of pig iron in the United States for the first half of 1902 was more than a million tons greater than the production of either Great Britain or Germany during the whole year of 1901, the total production of these countries being 7,761,830 and 7,736,663 gross tons during that period. The production of Bessemer pig iron during the first half of 1902 was 5,105,932 gross tons, against 4,582,187 tons during the same period of 1901. The production of basic pig iron during the first half of 1902 was 1,053,274 gross tons, against 645,105 tons in the same period of 1901. Charcoal pig iron production for the first six months of 1902 was 186-098 gross tons, against 194,231 tons in the same period of 1901. The stocks of pig iron unsold in the hands of manufacturers on June 30, 1902, amounted to 29,861 tons, against 70,647 tons on December 31, 1901, and 372,560 tons on June 30, 1901. The total number of furnaces in blast June 30, 1902, was 286, against 259 at the same period of 1901.

Mr. Charles Rous-Marten recently read a paper before the English Society of Engineers, in which he stated that a large proportion of English locomotives are 20 years old, and that some are even 30 and 40 years old. British locomotives only 20 years old, he remarked, were regarded as comparatively modern. While the longevity of these engines certainly spoke well for the material of which they were built, it could not be denied that they were out of date and unfit for modern railway purposes. The loads of the older engines were limited to five-sixths of that hauled by modern machines; in other words, six engines with six separate trains were required to perform the work of five improved machines on roads already congested. Furthermore, the cost of labor and working expenses were increased. In comparing English with American practice, Mr. Rous-Marten stated that our engines were not expected or even desired to last more than 10 or 15 years at the most, and that they were then displaced by new engines fitted with modern improvements and possessing a large margin of power. Although he deemed the extreme longevity of English locomotives distinctly undesirable, he also questioned the wisdom of using inferior material and workmanship which, it must be confessed, is often characteristic of the American locomotive.

## Correspondence.

### A Substitute for Coal-Burning Apparatus Wanted.

To the Editor of SCIENTIFIC AMERICAN:

Since the coal strike has promised to interfere with the domestic supply of coal for the winter, I have scanned your columns each week for advertisements of hydrocarbon burners, suitable for ranges and the ordinary house-heating steam boiler, but in vain. Do you not think the present a fine opportunity for manufacturers of the above apparatus, in all the branches thereof, to push the sale of such articles? And, doubtless, many who could successfully use oil for fuel would not return to coal. In my house, a frame dwelling in a nearby Jersey town, I have a range connected to a hot-water tank, water-back or boiler, etc., and a cast iron "pot" form of steam boiler supplying eleven radiators. As prudence in trying a new burning agent would dictate, beginning early to investigate the subject, I appeal to you to help me to get in touch with manufacturers of oil burners for ranges and small steam heating plants.

F. T. CAMP,
Asst. to Supts. Construction L. S. S.

New York City, July 31, 1902.

### Gravitation as a Cause of Volcanic Action.

To the Editor of SCIENTIFIC AMERICAN:

In relation to the action of the sun and moon on intensifying volcanic disturbances, it seems quite possible that a volcano on the point of eruption would be more liable to burst forth with the combined action or gravitational pull of the sun and moon acting in conjunction on a part of the earth that stood square before the sun. The action, if any, must be due to the gravitational pull or tidal effect on the liquid interior of the earth.

The electrical disturbances being of a secondary nature, no doubt caused by the heat from the volcano, the planetary influence or their positions are insignificant as compared with the attraction of the sun and moon. With the possible exception of the planet Venus its gravitational pull, although slight, if added to that of the sun and moon while in conjunction might be the means of opening one of nature's safety valves. As for comparison pass a large magnet over the safety valve of a steam boiler that is on the point of blowing off and note the effect.

On referring to the almanac we find the sun and moon May 7 in conjunction almost directly overhead of the island of Martinique, and allowing a few hours tidal lag of the liquid interior we find the greatest effect at about the time Mont Pelée blew up. Similar conditions are again due on the 3d of August. And if the pressure has not been greatly reduced by the last eruption we may look for increased activity at about that date.

A. H. BARBER.

Watertown, N. Y.

### The Telephone as a Surgical Instrument.

According to a London medical journal, several London hospital surgeons are now using the telephone, whenever they have occasion to probe for bullets, or other metallic objects embedded in the body of a person. The receiver of the telephone is placed on the head of the operator, and the patient is placed in the usual manner, in contact with a plate; the general medium employed being a wet sponge or some paper saturated with a saline solution, which is spread over the plate. The latter is connected with a telephone by wire, and the probe after it has been introduced into the body vibrates as soon as the foreign metallic substance comes in contact with it. The probe is also connected with the telephone by a wire, and thus no such blunder is possible as sometimes happens when an ordinary battery is used. When a telephone is used in this way, the plate acts as one pole and the probe as the other. Needles, bullets, grains of shot, and pieces of steel and copper have been easily located by use of this simple method. The only instances when the telephone does not work satisfactorily are when the objects to be located are of the same metal as the probe. French and German surgeons have been following these experiments in London, with the intention of introducing the same method into the hospitals of Berlin and Paris.

### Abandonment of the Oiled Roadbed.

After having oiled their roadbed for three years for the purpose of preventing dust, the Boston & Albany road has decided to abandon the practice. The oil-soaked sand and fine cinders have been removed and in their place broken stone is now used. The reason for the change is to be found in the bitter complaints which have been received by the railway company. A particle of the oil-laden sand sticks to whatever it strikes. Women have protested against the spattering of oily dirt. That oil is certainly a most effective dust-preventer was graphically shown some time ago in the columns of the SCIENTIFIC AMERICAN by the comparative illustrations of oiled and unoiled roadbeds.