Correspondence.

Ingrowing Toe Nails.

To the Editor of the Scientific American:

About ten years ago I cured ingrowing nails on both of my big toes in the following manner, which can be done by any one who has the least amount of ingenuity and patience. First thoroughly clean the parts, and then pack in front of the nail cotton or lint as hard as may be borne. This will remain with comfort for three or four days, then remove and in front of the pellet will be found a hardened mass of flesh; scrape this away and repack, continuing the operation until the corner of the nail has grown out and is beyond the soft tissues of the toe. Of course easy-fitting shoes or boots should be worn during the treatment and ever after.

JOHN G. HARPER, D.D.S.

The Sudbury, Ontario, Nickel Belt.

To the Editor of the Scientific American:

The Sudbury Nickel Belt, as it is called, was discovered about six years ago, during the construction of the Canadian Pacific Railway through the district. But for two or three years afterward very little development work was done, as it was supposed at first that the ore deposits were copper. The range so far as explored is over fifty miles long, and from three to ten miles wide, running from Lake Wahnapilae to the Spanish River, in a northeast and southwest course. The mineral occurs in great beds that sometimes rise into tremendous hills and ridges above the surface, and covered with gosan or decomposed ore. The range culminates into literal mountains of mineral in the townships of Denison, Graham, and Drury, along the Algoma or Soo branch of the railway. Gold, silver, copper, and platinum have also been found in various places on the range, and even cassiterite or tin ore. The copper and nickel are nearly always found together, and generally in about the same proportion in the ore, but in the famous vermilion mine in the township of Denison the whole five different minerals specified above occur.

There are already five mines being worked on an extensive scale, and a great many other locations being opened up. Three smelters or blast furnaces are in constant operation, reducing the ore into matte. Six tons of ore on an average make one ton of matte, which carries from twenty to thirty per cent of nickel and an equal amount of copper. It is shipped in this state, mostly to Swansea, Wales. The ore is first roasted in large heaps in the open air, to burn the sulphur out of it.

A great number of capitalists have been here this season examining the nickel mines and deposits of the range, and from present appearances this is going to become one of the chief mining centers of the world before long.

R. J. SWANSON.

Nickel City, Ont.

Physical Development of Children.

Dr. Axel Key, of Stockholm, read a very interesting paper before the recent Medical Congress, Berlin, on the development of puberty and its relation to morbid phenomena among school children. In Denmark and Sweden it has been the custom for many years to weigh and measure the school children every year. Out of 15,000 boys and 3,000 girls the results were as follows: "In the seventh or eighth year of life boys grow considerably in height and in weight, after which a delay sets in which reaches its maximum in the tenth year and lasts till the fourteenth year, when a considerable acceleration of growth suddenly sets in. This acceleration lasts till the end of the seventeenth year. Its maximum is in the fifteenth year. The acceleration is at first in height and later on in weight, gaining its maximum in the latter in the sixteenth year. At the end of the nineteenth year bodily development of youth seems to end. In girls the course of development is quite different. The decrease in growth after the eighth year is not so great as in boys and yields in the twelfth year to a rapid increase in height. The acceleration in the increase in weight comes later, but outstrips it in the fourteenth year. In the seventeenth or eighteenth year the increase is but slight. The increase in weight, however, sinks to zero almost in the twentieth year, when the growth in women may be regarded as ended." A remarkable thing, as pointed out by Dr. Key, is that boys grow faster than girls in weight and height till the eleventh year, then more slowly till the sixteenth, and then faster again. With slight variation these relations obtain all over Sweden and Denmark. In Italy and the United States of America the period of puberty in girls ends at least a year earlier. "In the spring and summer the child grows more in height, while in the autumn and winter it increases more in weight." "How is it now with the health of school children during the development of puberty? It was found that 40 per cent of the 15,000 boys in the high schools in Sweden were ill; that 14 per cent suffer from habitual headache, 13 per cent from chlorosis." "We ought," he concluded, "to adapt our demands on the youthful organism to its strength and power of resistance during the various phases of development, to promote the health and vigorous bodily development of youth better than we do now. I therefore indorse, from the bottom of my heart, the words which Johnn Petter Frank, the father of school hygiene, uttered a hundred years ago: 'Spare their fiber still, spare the forces of their minds, do not waste the energies of the future man in the child.'"

The Street Railway Convention.

The popularity of the electric motor was well attested at the recent meeting of the American Street Railway Association at Buffalo. In the West, especially, where it has been in continuous use for a considerable period, comparative estimates of economy between horse and electrical traction have, it would appear, demonstrated the superiority of the latter, at least from the shareholders' standpoint. Practical men, used to estimating costs and familiar with both systems of traction, gave their views, recounted their successes, and disappointments while looking for perfect service, and though not able to devise the means of remedying defects, furnished clear and comprehensible descriptions of their needs. From these it would appear that the repair shop for electric motors has taken the place of the horse hospital, which, in horse railway service, makes so formidable an item in the expense account.

How to keep the electric motor out of the repair shop. That appears to be the most important question now agitating the field. The station and overhead trolley wires, with a minimum of expert attention, may be kept in repair, but unseen and often unexplained causes serve to stop the wheels of the motors. Now it is a lame armature, again a burut field magnet, a fused connection, or broken gear. These are everyday occurrences—so the railway men say. Not yet has the mechanic's cunning sufficed to make certain the working of the axle gear and intermediate shaft gear, shaft pinion, and armature pinion. Then there are the boxes or bearings of the axle, intermediate shaft and armature. Trouble here is trouble all over. There is a large and general demand for gear and pinions which won't break, for gear that will be reasonably durable and at the same time noiseless.

One of the speakers at the recent meeting said that cast iron might do for axle gear, which is large and of slow movement, but only steel was fit for intermediate shaft pinions. He was firm in the belief that steel does better than bronze in such employment, lasts longer, besides being less expensive. His experience with electric motors had taught him that to overcome the noise it is necessary either to have the gear covered and running in oil or to have the gear of wood or the pinion of rawhide. The large gear on the axle and intermediate shaft, if made with wooden teeth and used with steel pinions, he had found to run noiselessly and to last longer. Those who gave extra care to making the keys in all gear and pinions tight and self-retaining would, he believed, find themselves amply rewarded. The shaft boxes and bearing, experience had taught him, must be made of some compound metal that will not wear out too fast, for but little wear on the armature bearing will allow the armature to scrape on the pole pieces of the motor.

Continuing, he said: "The electrical parts of the motor in which we are most interested are the armature, field magnets and the controlling switch or rheostat. The armature of an electric motor is its most wonderful and interesting as well as its most expensive and troublesome part. A street car is the most overloaded vehicle known to mankind. It may run a week with a light load, and then suddenly receive enough passengers to load fairly well three or four ordinary cars; the driver may forget to oil either the car or motor, he may reverse the motor accidentally or purposely to avoid an accident; these and many other causes require of an armature more work than it is capable of. Hence a burn-out. On the other hand, the armature itself may be at fault. An armature such as we use to-day consists of a shaft surrounded by a metallic core. Around this core is wound the best insulated wire, each coil terminating at the same end of the armature and being attached there by means of solder or screws to the bars of the commutator. The shaft of the armature will in a few years become worn by its bearings, and it would be well to have bushings or sleeves placed around the shaft at those points, which sleeves can be removed. As there is no wear to the core, and as the commutator can be renewed when worn down, which ought not to occur in less than two or three years, an armature should then have as long a life as one could desire. were it not for the coils of wire. Where these coils cross around the head of the armature they chafe on each other and destroy their insulation. Where they end in the commutator they loosen. By an excessive load or careless driver they burn out. It may be possible to repair the armature by rewinding one coil or by refastening the loose ends, and even when a deep coil is burnt the total rewinding with new wire should not cost but forty or fifty dollars. Could we but prepare for the burn-outs by having the car on some side track near the repair shop, where it would not interfere with our running time or cause a hindering of cars, we would not feel so aggravated; but it happens invariably at the time we need every car most urgently. We can watch our gear and bearings, and when worn they may be replaced at our convenience, or at night, but an armature gives out without warning. It is on this account that those systems advocating but one motor to a car must give us positive assurance of *no burn-outs*, for were it not for the double motor now so generally in use we would see crippled cars being *towed* into the shop, greatly to our discomfiture. In the matter of minor details, such as cables, terminals, trolleys, and gearing, the electric manufacturers have made the greatest improvements during the past eighteen months; but so far as we can obtain information based on actual facts, there has been but little improvement in the armatures. The Edison company has recently announced a new armature, but we have been unable to learn what results it may show."

According to the testimony given, the rheostat used in one system, and for which so much has been promised, is not infrequently burnt out and often injured by rain leaking through the platform. A principal claim made for this rheostat is that together with resistance coils the cars are started more easily and the motor is less liable to burn out, an excess of current being avoided. As to the first claim, it would seem to be fairly true, but the evidence of practice does not support the second claim. Indeed, it was openly asserted that motors using a rheostat require more current than those which do not use it—from 15 to 20 per cent more. Perhaps this is due quite as much to a difference in the winding in the armature or fields as to the use of a rheostat. As to the advisability of using the rheostat there seems to be some doubt, it being suggested to collect evidence of the actual number of burn-outs. An owner of an extensive plant operated under fairly favorable conditions testified that his fuel cost about $1 per car per diem, and repairs $1.50 per car per diem. "If," said he, "we can save 10 per cent each day on fuel by giving up the rheostat, we do not want to do it at the expense of adding 25 per cent to our repair account—already much too large."

An example of the approximate cost of repairs is thus given; the figures referring to four 30 horse power Sprague cars for the six months ending October 1, 1890, each car making 90 miles a day, the grade being 1,900 feet of 9 to 9¾ per cent, one 300 feet of 5 per cent, one 300 feet of 8 per cent.

MECHANICAL.

3 bronze intermediate pinions, at $14	$42.00
3 steel " " " 9	27.00
8 steel armature " " 7	56.00
4 intermediate gears, at $11	44.00
2 main gears (axle), at $16	32.00
6 axle brasses, at $4.50	27.00
8 shaft bearings, at $4.50	36.00
12 armature bearings at $2.75	32.00
Total	$296.00

ELECTRICAL.

180 carbon brushes, at 10 cents	$18.00
6 trolley wheels, at $1.25	7.50
3 field magnets, at $20	60.00
6 armatures repaired, at $35	210.00
	$295.50
For labor:	
2 motor repair men, at $50 per month	$600.00
Total	$1,191.50

Average per diem per car, $1.62.

There are other minor repairs that would increase this about 20 cents a day.

Fuel, sawdust, and slabs, $1.30.

A statement which went unchallenged, and may, therefore, be taken to be approximately correct, was that the cost of operations of a 10 car road is the same by electricity or horses; that, when the number of the cars is above 10, a road may be more economically operated by electricity. When the number reaches 50 cars and upward, the cable is the most reliable and economic.

An interesting feature of the Buffalo meeting was the favorable testimony elicited for storage battery traction. The facts given by W. J. Carruthers-Wain, president of the Tramways Institute of Great Britain and Ireland, concerning the Birmingham road, will do much to prove that, even at its present stage of imperfection, the storage battery may be run with economy as a motor. The cars he operates are constructed to carry 50 passengers, 24 inside and 26 outside. They are 26 feet long, 6·3 feet broad. Each car with its motor and batteries weighs 9 tons. The average takings of the road are $1,250 a week, as against $750 for horses. The cars will run seventy hours—the road has grade of 1 in 19—from one charging. They cost little comparatively for repairs, and when intelligently handled give little trouble.

"Sundown Doctors."

This is the appellation said to be applied in the city of Washington to a class of practitioners who are clerks in the government offices, and who have taken a medical degree with a view to practicing after the hours of their official work are over.