

Correspondence.

The Largest Leather Belt.

To the Editor of the Scientific American:

In your journal of August 19 last, you refer to a leather belt 48 inches wide, which you assume is the largest belt made; this is not so, as we manufactured last year a belt 75 inches wide and 156½ feet long. The belt is now at work transmitting *six hundred* indicated horse power, and gives every satisfaction.

SAMPSON & Co.

Manchester, England.

[It is proper to say that in our paragraph above referred to, the Jewell belt, 48 inches, was mentioned as being probably the largest ever made from a single width of hide. The 75-inch belt of Messrs. Sampson was supplied to the order of the Société Anonyme de Loth (Woolen Mills), near Brussels, a double belt, 75 inches wide and 153½ feet long, to transmit 650 horse power indicated. It is made on their patent system, without cross joints. The power is obtained from a Corliss engine, 800 horse power. From the flywheel, which is 28 feet diameter by 6 feet 9 inches wide, the force is transmitted direct to the weaving shed, which contains 1,000 looms, and spinning mill adjoining. The belt runs perfectly straight, and gives entire satisfaction. The mills are the largest of the kind in Belgium, giving employment to over 3,000 workpeople.]

Ants on the Wing.

To the Editor of the Scientific American:

Owing to the important additions which have recently been made to our knowledge of the habits and ways of ants, the subject has become one of general interest. The following notes may be worth recording:

On the 8th of October, Burlington Bay, in Lake Champlain, was visited by an immense horde of flying ants. The scene of their arrival, or of their *shipwreck*, to speak more properly, was the sandy beach which stretches a mile or more from Rock Point to Burlington city. Along this line the sands were teeming with formic life. It is likely that in an attempt to cross the lake they were caught up by the wind, which was blowing from the south, and thus driven ashore. Many, doubtless, were blown into the water and took passage on the waves, which they seemed to survive, although with some difficulty. Every wave tossed up several individuals, who, half drowned, struggled slowly from the wet sand to the drier driftwood above, and began observations on their surroundings. A large stump, embedded in the sand and stretching its prongs several feet into the air, was covered to nearly half an inch in depth with these swarthy voyagers. This mass of life exhibited restless activity, individuals crowding past their fellows, trampling their neighbors under foot, or pushing them down from their lookout. Those who fell seemed to suffer no inconvenience, but, using their wings in the descent, caught on a convenient place below and began to climb up again.

The activity of these little creatures is worthy of notice. The bee, in the course of her honey-gathering pursuits, frequently comes to rest, but in the case of this ant motion seems to be natural. It moves about continuously, frequently changing its direction, but rarely stopping. This was partly due to their inability to fly. Indeed, their flying apparatus was in many cases sadly out of order, some having lost both pair of wings and others being only partially provided.

For several days these unfortunate ants wandered about the sands of the shore, collecting on the driftwood, or huddling in hollow places to avoid the wind. Some advanced inland, as if for the purpose of exploring the country, in which they were strangers. The number of these small animals could not readily be estimated, but must have been of great size. It was a noticeable fact that the males were greatly in excess of the other sex.

The sexes of ants are not always distinguished with ease. The males, however, may be identified by the number of joints in the antennæ, which is thirteen, and by the wings, which they are supposed to retain throughout life. The females, on the other hand, have twelve-jointed antennæ, an ovipositor or sting, and wings which they lose shortly after maturity. The neuters are noticed to want the last two mentioned characteristics of the female.

It is a well known fact that the male and female ants leave the nest when fully grown, and take to flight. After this the males die, and the females, rendered helpless by the loss of their wings, are cared for by the neuters, who seek a suitable place for a nest, and assume the domestic duties and the care of the offspring. If the appearance of this horde of ants had been earlier, it might thus be accounted for.

F. H. HERRICK.

Rock Point, Burlington, Vt., Oct. 13, 1882.

How the Telephone Business is Growing.

An illustration of the rapid growth of the telephone business generally is found in the increase which has taken place in Lowell, Mass. In the fall of 1877 the exchange was started with sixty subscribers. October 1, 1880, it had 600 subscribers, and at the present time, says the *Boston Globe*, there are about 900 subscribers connected with the exchange, showing an increase of 150 subscribers a year. The company is now putting in about twenty new instruments a month in Lowell alone, and the ratio of increase to

the population is about the same throughout the territory covered by the consolidated exchanges. Lowell has one telephone to every sixty-two of its population, a very large proportion. In Portland, Me., there are 700 telephones, and the ratio is one to every fifty of population, the largest ratio in the world in any city of the same size. Considering, however, that there are in Lowell 20,000 mill-operatives, the large number of telephones in use in that city is even more remarkable. One would naturally suppose that the increased use of the telephone, particularly for long-distance talking, would seriously affect the business of the telegraph companies. Oddly enough, this appears not to have been the case. In Lowell, for instance, to-day the telephone company receives and sends as many messages as the Western Union Telegraph Company, and yet the telegraph Company is doing half as large a business again as it was two years ago. The distance from Lowell to Portland is 115 miles, and, unless the atmospheric influences are exceptionally unfavorable, conversation can be readily carried on between these two points. The consolidated New England companies have a standing order with Washburn & Moen, of Worcester, for 300 miles of wire a month. They also have standing orders for 400 signal bells a month from Post & Co., of Cincinnati, Charles Williams, of Boston, the Western Electric Company, of New York, Gilliland & Co., of Indianapolis, and Davis & Watts, of Baltimore. The insulated copper wire, which is used for inside work, comes from the Ansonia Brass and Copper Company and Eugene Phillips, of Providence.

A novel experiment is now in progress with a view to overcoming the difficulties attendant upon long-distance talking. Between Boston and Worcester a line is being constructed of No. 4 gauge wire, which reduces the telephone distance between the two cities about one-half. This line will cost \$10,000, whereas an ordinary line of No. 9 wire would cost only about \$4,000. If the experiment is a success, the line will be extended to Springfield, and similar lines will be built from Boston to Portland, Plymouth, N. H., and other distant points, enabling subscribers there to talk with Boston as readily as subscribers in Lowell, Salem, Lawrence, and other neighboring places. The ordinary telephone line, running straight across the country, costs from \$100 to \$150 per mile. The big wire is now completed between Boston and Hopkinton, a distance of twenty miles. Communication over the line on this twenty-mile stretch is as distinct as in the city.

The number of operators required to answer the calls of subscribers is, in Lowell, fifteen to 900, or one to every sixty. The operators are paid from \$18 to \$30 a month, according to their ability, experience, and the service required of them. They are mostly ladies, between eighteen and twenty-four years of age. The superintendents of exchanges receive salaries varying from \$50 to \$100 a month. These are the average salaries paid for the work throughout the country.

The Employment of Tobacco.

It is probable that no physiologist would contend that tobacco in any form is essential to the well-being of the body. Thousands of healthy men and the vast majority of women never touch it; yet it is certain that its use is becoming daily more frequent, and that when once introduced into a country it is almost hopeless to eradicate the taste for it. It is clearly not necessary for the exercise of the highest intellectual powers. Dante and Chaucer, Michael Angelo and Raphael achieved their triumphs without its aid; and no encomium of its virtues will be found in the wise sayings of Sancho Panza or in the pages of Shakespeare; nor have we any record that Milton composed under its influence, unless, indeed, a habit of smoking in bed led to his not very clearly explained connubial disturbances, and to his tart treatise on divorce. Be this as it may, the eagerness with which it is sought after by its devotees, who allow neither manners, nor the presence of ladies, nor the comfort of others to interfere with their enjoyment, the distress that is occasioned by a temporary failure of the pernicious weed; the difficulty with which the habit of smoking once acquired is broken—indicate clearly enough that it supplies some want in the economy or exercises some influence on the system which cannot be replaced by other means. To many men a poison, to others tobacco is the very staff of life, and to be without it is the extremity of misery. Enforced abstinence from it is to many a convict the severest part of his sentence, and the cunning and deception, as well as bribery, employed to effect its introduction into prisons are well known. An amusing address has lately been delivered by M. Bouley to the Société contre l'Abus de Tabac, on the economical and hygienic aspects of the use of this narcotic. The total value of the tobacco smoked in France amounts, he tells us, to no less than 352,538,000 francs, nearly eighteen millions sterling, which immense sum represents the increase in the taste for tobacco since the year 1830, when this singular habit took its origin from the leisure of the Corps de Garde after the restoration of the National Guard suppressed by Charles X. M. Bouley points out how smoking has effected an intellectual separation between men and women, conversation being no longer maintained after dinner as in his earlier years. The men are anxious to smoke, and the ladies retire early, to the great detriment, in his opinion, of the mental faculties of both sexes. He is reminded by the present condition of things of Voltaire, who, when consoled with by Piron on the ill-success of one of his comedies, ventured to say, "Well, at

any rate, they didn't hiss it." "No," replied Piron, "how could they, when they were yawning all the time?" In France the state promotes smoking, since each soldier receives, every ten days, 100 grammes of tabac de cantine, on payment of the extremely moderate sum of fifteen centimes. It is given in the belief that it constitutes to some extent a substitute for food, and affords relief to, or at least prevents grumbling at the monotonous character of the diet. As long ago as 1854, Marshal St. Arnaud, when at Varna, wrote to the Intendant of the War Department: "Have you sent tobacco for the troops? It is very important, for tobacco is undoubtedly the best means we possess to prevent attacks of nostalgia and to alleviate the miseries of the bivouac." General Brac, again, in his "Traité des avant Postes," strongly insists that a taste for smoking should be cultivated in the light cavalry, on the ground that it keeps him awake, employs spare moments that would otherwise be employed in thinking, and keeps him near his horse, which he sees has its forage and is not abused. "How comforting it is!" he adds; "in the early morning; it drives away sleep, and renders the rain less cold, thirst less severe." The pipe, again, demands a steel and some tinder, and the implements for the production of the bivouac fire are therefore always at hand. But there is another side to all this. Dr. Blanchet, an army surgeon, writes that "constant association with the soldier, and inquiring into the effects of smoking, have taught him that the illness of many men is to be traced to the abuse of tobacco alone. Ulcers on the lips, in the mouth, on the tongue, in the nose, necrosis of the maxillary bones, are not uncommon results of its use. Others suffer frightfully from gastralgia, gastritis, and enteritis; others from vertigo, mental debility, and even transient attacks of mania." Who is in error here, the general or the surgeon? What have our English surgeons to say to it? In moderation, as Sir B. Brodie said long ago, it probably acts as a calmative to the nervous system, especially when in a condition of excitement and worry, and its abuse only should be deprecated.—*Lancet*.

Tar Roofs.

The London *Builder* says that the German Government has on several occasions pointed out to farmers and others interested in agriculture that too great an expenditure of capital on buildings is a mistake. With a view of illustrating the application of this principle of economy to roofing, the *Cologne Gazette* points out that the system of using tar for roofing purposes is at the same time economical and suitable for agricultural buildings, and what is said may serve as an answer to a recent inquiry in our own pages. The framework of the roof can be of relatively slight construction on account of the nature of the covering it is intended to support, and the perpendicular height of the roof can be one-eighth to one-tenth of the entire depth of the building. The distance of the rafters is arranged according to the width of the covering material, the scale being that from the middle of one rafter to the middle of another. The distance should be 2½ in. less than the width of tar roofing sheets.

Immediately upon the rafters come boards, and upon these (exactly in the center of the separate rafters) are placed strong laths, about 2 in. wide and 1½ in. thick, the upper edges being taken off. The roofing sheets are now placed so as to cover the spaces between the laths, and are nailed. Over the laths are placed strips of paper, 5 in. to 6 in. wide, fastened with nails at intervals of 2½ in.

In order to make the sheets lie smoothly upon the boarding, it is suggested, in case they are too dry, to soften them by immersion in water. It is recommended that the workmen should not wear heavy-nailed boots, and also, that if the rain comes on, the roof should not be walked upon immediately after. When the entire surface of the roof is covered with sheets, the strips of paper (or caps) already named, as well as the joints, are painted over with a hot mixture of coal tar and pulverized lime. Pure dry sand is at once sprinkled over this coating, and particular care must be taken that all the nail-heads are well covered. When the paint is dry the whole surface of the roof is once more coated with the same mixture, and is sanded.

The object of this careful method of overlaying the roof with several coatings of specially prepared solutions is to preserve in the tar those oleaginous and fatty properties which it soon loses if exposed to the air, and the retention of which is an indispensable condition of its resistance to water. Clay and sand do not afford sufficient protection, and they are removed by violent winds.

Reference is made to various systems of coating the tar roof with protective substances, for the purpose indicated. One of the most successful methods consists of a mixture of cow dung and thin white lime, which is spread over the entire surface of the roof. If such a coating is not applied the tar paint must, during the first four years, be annually renewed, which enhances the cost of the roof. If the last-named protective composition is used, and renewed every two years, the coating of tar and lime can be dispensed with. Particular mention is, however, made of a coating of tar mixed with Portland cement, the tar being well heated and used in the proportion of 111 pounds to 200 pounds of cement. The mixture should be kept well stirred during the preparation, and should be applied as soon as made. This particular method has been tried in many cases in Germany, and, according to the journal quoted from, its satisfactory results have caused its adoption upon a scale of progressive importance.