Correspondence.

Plowing by Wind Power.

Rufus Porter, whom the early readers of THE SCIENTIFIC AMERICAN will remember for his quaint writings and the extraordinary results he always anticipated from his wonderful inventions, still lives, and at the age of 92 years he sends us in his own clear handwriting from New Haven, Conn., the following communication:

"The Planet wind wheel has four square sails, one of which is always square before the wind, while two others are filled obliquely on an angle of forty-five degrees with the direction of the wind, the motion being horizontal; so that the action of the wind upon the two oblique sails is equal to that on the one before the wind. The average size of the sails is twenty feet square, so that if the force of wind is equal to one pound per square foot, its force upon the sails will be 800 lb. Such a breeze travels 15 miles an hour 22 or feet per second. A breeze that travels 26 miles an hour exerts a force of 4 pounds per square foot, which would be 3,200 lb. upon the wind wheel sails. If the sails move half as fast as the wind, the force of the wind upon the sails will be only one-fourth, or 1 lb. per foot, and the sails will move only 20 feet per second. The force of 800 lb. moving 20 feet per second, or 1,200 feet per minute, works 30 horse power, equal to the common labor of 60 horses. This wind wheel may be erected upon the center of a triangular or narrow-shaped frame, 35 feet long by 30 feet wide, mounted upon three wheels, each being 5 feet in diameter, with rims 15 inches wide, the front being mounted in a circular horizontal ring or annular platform, with a tiller extending rearward, whereby the machine is steered. The other two wheels are mounted upon the two ends of a 30-foot axle. The main central shaft of the wind wheel is connected to an equalizer, from which two shafts extend to the two driving wheels, applying equal force to each, whether running in a straight line or in curves. The center post is 25 feet high, and the sails receive the wind from all directions equally; but when required to stop, the sails are all pointed to the wind by a lever, so the wind has no power on them. This machine will travel with a gang of ten plows 4 miles an hour, thus plowing four acres an hour with the attendance of only one man. It will run against the wind, but not quite so fast as before the wind; and will ascend hills wherever horses can work. It will harrow, sow, reap and mow, thrash grain, shell and grind corn, carry loads, irrigate lands at the rate of 100 acres a day, or will travel 10 miles an hour in any direction, with 20 passengers. But all these things require a good breeze. The cost of the machines of medium size will be $250, not including plows, mowers, reapers, etc.

"A larger machine will furnish 100 horse power. Small wind wheels, with sails only 4 feet square, may be made for $10 each. They are useful for raising water, washing, etc.

"The medium size will work with a very light breeze, in which they will do good service in various kinds of work. In cases in which a steady, uniform motion is required, they may be regulated by a small and cheap wooden brake-governor. The gang plows to be used are rotaries, which require less power than the common mould-board. One machine will answer for several farms."

Accompanying the above communication, we find a printed circular without date, but bearing the signature of Mr. Porter, which reads as follows:

"I have recently perfected three wonderful inventions, the first of which may be put forward to general use for fifty dollars, and in three months will produce a net income of a hundred dollars a day.

"The next will within six months produce an income of a thousand dollars a day. The third will cost two thousand dollars, and within two years will produce the immense income of twenty thousand dollars a day. These inventions have all been proved by successful operation, and have been examined and commended by many scientific men, whose certificates I now have, and no man can show a reason why they should not accomplish all that is represented; and any man who duly examines the explanation of the utility of the inventions, and the mode of managing the business, cannot fail to be convinced that a great income must accrue, and that immediately."

To the Editor of the Scientific American:

Having occasionally brazed band saws for one of our large brush factories in the village, my attention was called the other day, while visiting the factory, to a new method of joining broken saws—simply lengthening the lap a little, and soft soldering instead of brazing. The saw I examined had three mends in it--all done so; and I was told that in no case had the soldering given way. To Mr. Brooks is due all credit for the above discovery; and I send this to you for publication, if you think it will be a benefit to others, with Mr. Brooks' consent. He cautions, where soft soldier is used, not hanging the saw from nails by or where the joint is made.

Very respectfully,

LANSINBURGER.

Lansingburg, N. Y.

[Band saws are frequently joined by ordinary soldering. A scarf joint is made, and the laps brightened by a file and moistened with a saturated solution of muriatic acid and zinc. Then ordinary solder and powdered resin are applied with a soldering iron.]—ED.

Locomotive Traction.

To the Editor of the Scientific American:

In a late number of the *American Journal of Railway Appliances*, I notice a criticism of an answer you made to an inquiry concerning the tractive force of locomotives. The query was: "If there is any difference, which would start and draw the heavier load—a locomotive with seven foot drivers or one with three foot drivers, both to be of the same heft, and engines supposed to be strong enough to slip the drivers?" To this you answer, "Theoretically, no difference." To this the editor of the paper referred to says: "We think that it is hardly necessary for us to say that the first answer is wrong all the way through, as neither by theory nor in practice does the greater driving power belong to the engine having the least leverage in its power, etc." It seems to me that it is hardly necessary for the paper referred to to say anything on the subject, as what it does say shows plainly that it does not comprehend the question as asked. Your answer was right, as a few figures will show. Neglecting fractions to simplify the matter, I will suppose the engine having 36 inch drivers to have cylinders 16x24 and using 100 pounds effective steam pressure per square inch. The ordinary formula for the tractive force where D is the diameter of the cylinder in inches, S the stroke in inches, P the effective steam pressure in pounds per square inch, and W the diameter of the drivers in inches, is: Traction $=\frac{D^2 \times S \times P}{W}$; apply this to the case supposed, and we have $\frac{16^2 \times 24'' \times 100 \text{ lb.}}{36''} = 17{,}066$ lb. tractive force. If it be assumed that to prevent the drivers slipping we require four times the tractive force in weight on them, we have $17{,}066 \times 4 = 68{,}264$ pounds, or a trifle over 34 tons, as the weight necessary to place on the drivers. The query now compares an engine having 7 foot drivers with the same weight on them and *powerful* enough to slip or nearly slip the drivers.

It is evident that the engine with 7 foot drivers must have proportionally larger cylinders to be powerful enough (as the query supposes) to accomplish this. Taking the area of a 16 inch cylinder as 201 square inches, and we have 36 is to 201 as 84 is to 469, the area of cylinder necessary to slip the 7 foot drivers with the same weight on them. The diameter of a cylinder whose area is 469 square inches is a little over 24·4 inches, and applying the same formulæ as before for the tractive force, we have $\frac{24{\cdot}4^2 \times 24 \times 100}{84} = 17{,}059$ lb. as the tractive force, or practically the same as the engine with 36 inch drivers, which proves your answer to be correct. It will at once be evident however, that while the tractive force of the two engines is the same, the horse power of the latter engine is much larger, and the steam generating power must be proportionately larger also, as, if we suppose each engine to be making 100 revolutions per minute, the 36 inch driver will cover 941·66 feet per minute. If the engine is exerting a force of 17,060 pounds, we have:

$$\frac{941{\cdot}66 \times 17{,}060}{33{,}000} = 486{\cdot}8$$

as the horse power, neglecting the friction of the engine. The 7 foot driver engine making 100 revolutions per minute advances 2,200 feet per minute, when if as supposed the engine is exerting the same force, we have:

$$\frac{2{,}200 \times 17{,}060}{33{,}000} = 1137{\cdot}3 \text{ H. P.}$$

If we assume each engine to be using 40 pounds of water per horse power per hour, we have 19,472 pounds for the 36 inch driver engine and 45,492 pounds for the 84 inch driver.

As to the second question, "Which would draw more—a locomotive with six drivers or one with four drivers, both to have the same amount of weight on the drivers?" you answer, "The engine with six drivers," and the *Am. Jour. of R. R. Appliances* says, "Tests show both ways." As the question puts no limits on the weight of the engine, the only correct answer under the circumstances is yours, as it is easy to suppose a weight of engine on four drivers which would destroy the rail, but which if distributed over six drivers would allow of a practical use of the engine. The friction of the six wheel engine on curves would naturally be supposed to be greater, but a test showed it to be less. The friction of an eight wheel or four driver engine pushed around a given curve at ten miles per hour was 1,963 pounds, while that of a mogul or six driver engine under the same circumstances was but 1,750 pounds.

While not connected with this subject, I want to make a few observations on Dr. Grimshaw's proposed engine to make 900 miles in 18 hours. The design of the engine is practically the same as the design patented quite recently by M. N. Forney, save the framing of the engine. Any man who has ever run a passenger engine will at once perceive the utter futility of accomplishing with any engine what the Doctor sets forth. If the road were perfectly level and straight and clear of all trains, it is a question to which even under these circumstances a practical man would say no. But as all roads have grades, curves, trains to meet and pass, coal to take as well as water, and as a stop must be made for coal and a slowing up to take water by the scoop up plan, together with the fact that owing to grades, curves, passing trains, etc., at least one-quarter of their time, a distance of over 30 miles in an hour cannot be accomplished.

This means that for every hour in which but 30 miles is made some other hour must show a distance of 70 miles; and most engineers and railroad men would be pleased to see the stretch of track and the engine with its train in which 70 miles for several hours can be covered. Performances which to a theoretical and non-practical railroad man like the Doctor appear easy, is a horse of another color to the man who finds it all he can do to pound out a continuous speed of 35 miles per hour with the best of engines.

GOTHAM.

"Brandy Bread!"

To the Editor of the Scientific American:

Your correspondent N. D., in your paper of to-day, January 12, must brush up his chemistry or he will scarcely prevent our getting "alcohol from bread." He says, "The dough should always be put into the oven before it passes through the first fermentation; the bread in that case will be good, having the sugar in it."

Perhaps so, but we trust N. D. will not invite us to partake if that is the way he bakes things. We showed in an article on "Raising Bread," October 20, that the agent in making the dough light, so that it could be palatable, spongy bread, was an elastic gas—carbonic acid—and that this gas was generated by the process of fermentation. The fermentation caused the carbon, oxygen, and hydrogen which had previously been sugar to split up into two new substances, which had not been there before—alcohol and carbonic acid—so that the sugar had disappeared and the new comers remained.

If N. D. puts his dough into the oven before the sugar has felt the fermentation, he will have a solid mass, almost like a brick; he may eat it if he chooses. But if he lets his dough "rise," his sugar will have gone and he will have alcohol, but he will have wonderfully good bread. If he objects to saving his alcohol, very well, he can let it go as it is in the habit of doing, but it is there all the same.

A.

Movement of the Magnetic Pole.

To the Editor of the Scientific American:

The note on the "Movement of the Magnetic Pole," by J. W. Van Sickle, published in your issue of January 5, 1884, seems to me likely to produce erroneous impressions. In the first place, when he affirms that the magnetic pole was due north in 1657, he does not state from what place it was due north. It is always due north from places on its own meridian, and, therefore, it is necessary to know *on what meridian* it was due north at that time.

Again, your correspondent seems to imply that the magnetic needle always points toward the magnetic pole of the earth. Observations do not show this to be the case. Neither did the last western movement of the needle begin in North America in 1657, but it commenced at Portland, Me., about the year 1765, where up to that time the movement had been to the east. The same westerly movement did not reach New York until very near 1800, and as late as 1870 on the Pacific coast the needle was still moving eastward. It has not yet reached its maximum western declination in New England, but the increase is much slower than it was thirty years ago. From the present indications we may guess that it will begin to turn eastward at Portland, Me., between 1890 and 1900, which would give a period for the swing in one direction of about one hundred and thirty years. But this is only a guess, and it will doubtless be a long time before "A. W.'s" question will be answered.

Allow me to ask who discovered the fact (?) that the magnetic pole has a movement around a circle? This should be pretty well established before we undertake to find out its period.

Respectfully,

E. T. QUIMBY.

Hanover, N. H., January 10, 1884.

Large Wheels.

When 42-inch wheels were first used in this country under passenger cars, there was a good deal of fruitless discussion about their utility as compared with that of smaller wheels. What discussion failed to make clear, however, has been determined by use and the knowledge thereby obtained. Much can now be said in favor of large wheels, showing their superiority to small ones for passenger service, that could not have been said with the same confidence a few years ago. English practice could, of course, be referred to as being conclusive, so far as the style of "carriages" on English roads was concerned. But our cars are altogether different in size, weight, and construction. Probably no road in this country has given 42-inch wheels a more thorough trial than the Boston & Albany, and we are informed that with these wheels such a thing as hot journals is practically unknown on that road, none having been reported for a long time. This is attributed to the fact that the journals revolve slower, their surface speed with the 42-inch wheels at forty miles an hour being no greater than that of journals with 33-inch wheels at thirty-one miles an hour. This is a moderate speed if the journals are well packed, and they ought therefore to run cool. It is also asserted that passengers perceive a difference in the riding of cars having the larger or smaller wheels, and that they prefer those with the large ones. This is significant if not conclusive. But there is still another thing that many observing people have noticed, and that is, that large-wheel trains appear to move at a comparatively moderate speed, when the distance covered shows a speed of forty and forty-five miles an hour.—*Nat. Car Builder.*