Correspondence.

Ginseng.

To the Editor of the Scientific American:

In the SCIENTIFIC AMERICAN of January 10, 1891, appeared a very interesting article on the "ginseng" root. The article I shall copy for my paper, as several thousand pounds of the root are dug and sold every season in this vicinity, and it will, of course, be of interest. Will you kindly answer the following questions through your valuable paper:

Is the steaming process spoken of in the article for bleaching the root done before or after the root is dry?

Do exporters ship by way of New York and London or San Francisco?

Is the imperial tax spoken of an "import tax," and if so, what is this duty per "picul"?

L. C. SHUSSAR.

Office of the Mancelona *Herald*, Mancelona, Mich., Jan. 13, 1891.

Consul Nicolas Pike, to whom we submitted our correspondent's letter, answers as follows:

In reply to the first question, I would inform you that the steaming of the ginseng root is done immediately after it is dug and washed. This makes it more transparent, and it will bring a higher price in the market.

All ginseng raised in this country is sold direct to brokers, who make it a special business. They sell it to Chinese merchants here, who also make a special business of ginseng and other roots. It is shipped by them to China, by way of San Francisco.

The imperial tax is only on ginseng grown in the Chinese empire. There is no import tax on foreign ginseng.

How Steam Boilers Furnish Water Instead of Steam.

To the Editor of the Scientific American:

The following theory accounting for the fact that water is frequently drawn from steam boilers to the engines feeding from them, and sometimes in sufficient quantities to wreck the latter, I believe is new, and it appears to me plausible. If it is unsound I hope you, or some of your readers, will show wherein is the flaw.

Air or water, in moving from all sides toward a common center at which it escapes, does not move in direct lines, but approaches the center in spiral currents, the velocity of which will be proportional to the speed at which the fluid escapes at the center.

Let the water from a bucket or basin escape through a hole, at or near the center of the bottom, and the water in the vessel will form in a whirling current around a vertical line above the outlet. If the water escapes through a pipe, so that there will be a downward suction, the velocity of the whirling current will be increased. A storm center or area of low barometric pressure is another illustration. Toward such an area all of the air currents influenced by it will move, the same as water in a maelstrom moves toward the center. Now the question is, Will not steam in escaping from a boiler directly upward into dome or steam pipe act in the same manner as water does in escaping from a bucket or basin, as referred to in illustration, or as air does in moving toward a storm center? and in this connection it should be remembered that a storm center is a point where the air is escaping upward, and that it is the escaping air which causes the outside air to move toward, and in so doing around the storm center, just the same as the water escaping from the basin causes the water in the basin to form in a whirling current around the outlet.

It is well known that in the center of a whirling current the fluid, owing to centrifugal force, is rarefied, and the degree of rarefaction depends entirely upon the velocity of the whirling current; for this reason a whirlwind of sufficient velocity passing over water causes a waterspout. Now if the steam escaping from a boiler in the usual manner causes the steam in the boiler and in a small area below the outlet to form in a whirling current, the velocity of which will increase as that of the escaping current increases, what is to prevent a waterspout in the boiler and a wrecked engine as the result whenever the escaping steam reaches a sufficient velocity? And to prevent the escaping steam from attaining such a velocity, is the pipe connecting engine with boiler always of a sufficient area?

WARD STONE.

[This is probably the true theory of the lifting of water in boilers having small steam room, in which the lifting of water has suggested the use of dry pipes and domes.—EDITOR.]

The Belt Problem.

To the Editor of the Scientific American:

Your correspondent Quirk questions the correctness of the reason I gave for the creeping of the belts in his "Belt Problem," and cites as proof some tests he made and illustrated in your issue of Dec. 20, 1890.

Now, I must take exception to those tests, from the fact that no belts work under the conditions shown. In order to get correct results from belt tests, the belts should be placed in actual working conditions. It is well, also, to remember that different conditions very materially affect the results.

For instance, it makes quite a difference what size of pulleys are used to get at what your correspondent is driving at, for this reason: We will say a belt is working on a pulley 6 inches diameter, engaging 9 inches of its circumference, and is ¼ inch thick. Then the outer surface of that 9 inches of belt is ¾ inch longer than the inner. But if the pulley is five times as large, engaging 45 inches of its circumference, the expansion of the outer surface of the belt will be just the same—¾ inch. From this it is evident the ¾ inch expansion over 45 inches of belt will not affect its operation near so much as it would over 9 inches. That there is a tendency in leather belts to expand and contract more on the hair than on the flesh side I know, but the effect must decrease as the size of the pulleys increases.

It appears to me, from your correspondent's articles, he is looking for the force which pulled the rivets through his belts in some creeping action of the belts while in contact with the pulleys. I cannot see anything in that, but can in the stretch of belt between the two pulleys, because it is there the outside belt gains on the inside one, and the gain is in the same ratio as circumference is to diameter.

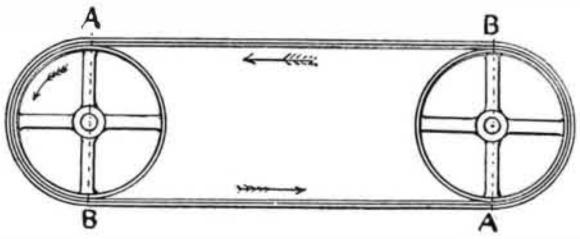
J. A. LOUGH.

Chetopa, Kansas.

THE BELT PROBLEM.

To the Editor of the Scientific American:

I would like to offer a solution to the belt problem, page 213 of SCIENTIFIC AMERICAN, Oct. 4, 1890, and will begin by answering Quirk's last question first. By referring to the drawing, A and A are the points at which



the belts change their course from a straight line to that of a curve, and B and B is where they resume a straight course again. Now it is quite evident that the outside belt will have to travel farther in going from A to B than the inside one will, and has to do it in the same period of time; therefore it has to travel at a higher rate of speed than the inside belt. Although the outside belt travels at a higher rate of speed, it does not gain a particle on the inside one while going from A to B, because it is describing a larger circle and has to go farther; but in going from B to A, where the belts have a straight course, the outside one, having a greater speed, gains on the inside one until they reach the next curve, where they travel together again until another straight course is reached, when the outside one will gain again, and so on.

I think that all belts, whether single or double, have this same tendency to a more or less degree, according to their thickness, as the outside surface of any belt must have to travel farther in going round a pulley than the inside surface does; but in the case of a single belt, or of a double one glued and riveted so that this gaining or creeping cannot take place, the difference traveled by the two surfaces in going round a pulley is met by either a stretching of the outside surface or a compression of the inside surface, or both, which must absorb power. It is certain, however, that Quirk's belts preferred to creep, or his rivets would not have drawn out. The rivets offered a direct resistance to the motion of the belts.

L. H. L.

Contest between a Spider and a Beetle.

To the Editor of the Scientific American:

An article in a recent number of the SCIENTIFIC AMERICAN, describing a "Remarkable Engineering Feat of a Spider," reminds me of a no less remarkable exploit of a tiny spider, which I witnessed, in which the insect's ingenuity in improvising a hoisting tackle gave him the victory.

Potato beetles were very numerous last summer, and were often seen crawling about on fences and buildings. One of these, climbing up on the inside of a wood shed, came in contact with a spider's web stretched across the corner of the building. The watchful spider came out at once and endeavored to entangle him. The propensity of these beetles for "playing 'possum" in time of danger is well known. In this case the insect did not drop to the ground, as they are wont to do when potato vines are disturbed. He held fast to the board with his claws, but drew down his head and antennæ, and remained motionless. The spider, which was a very small one, ran about over the big beetle's oval back, like a cat on a barrel, winding his threads rapidly around his captive until he seemed satisfied, and retired to await results.

The beetle, finding himself left alone, woke up, and tried to move off. Lifting one foot at a time, he succeeded in breaking the cords which bound each one. Then tugging forward with his shoulders, like an ox drawing a heavy load, he had nearly freed himself when the little spider again advanced to the attack, winding his threads with astonishing rapidity.

The beetle now seemed to realize that the "'possum" act was not the best thing for that particular emergency, and struggled harder than ever to get away. The spider, also, seemed to understand that something different would have to be done or he would lose his prize, for the threads were snapping as fast as he could wind them. He paused a moment, and I thought he had given up the contest. But I greatly underestimated the resources of the little giant. He was only *thinking!* He saw wherein the beetle had the advantage of him, and devised a scheme to overcome that advantage. The problem was to get his big antagonist off the board into the middle of the web—not an easy matter one would think, considering the relative size of the two insects. But the plan was made and executed with a rapidity that puts to shame our sluggish human thoughts and actions. The beetle was in the edge of the web, about two inches from the corner of the building. Fastening a thread to the beetle's back, the spider ran across the corner and made it fast to the wall on the opposite side of the web, in such a position that it tended to lift the beetle off his feet. Repeating the operation again and again, he soon had a number of threads stretched across the angle, all drawn as tightly as possible.

As this work proceeded, the beetle soon found himself obliged to cease his struggles and use all his strength in holding on. The spider again retiring, "Old Line Back" tried once more to move off, but at the first step he was jerked entirely off his feet by the elasticity of the threads, and left dangling in the air. In this situation he was easily wound up and dispatched by his smart little enemy.

Columbus, Ohio. CHARLES B. PALMER.

Miscellaneous Notes.

At Lynn, Mass., the electric lighting station caught fire, and the wires carrying the current were burnt off. Relieved of the work of producing the current, the 700 horse power engine started off at such a rate of speed that the flywheel broke in fragments, causing much damage to the building. In the settlement of the loss an interesting point was brought out. The company claims that the bursting of the large flywheel was due primarily to the fire, and, therefore, entitles the company to the insurance money. The insurance company, however, assumes that the breaking of the flywheel was due to defect in the machinery. Consequently the company is not responsible for the loss.

In 1778 a great chain was stretched across the Hudson River at West Point to prevent the passage of British vessels. Lossing, in his "Field Book of the Revolution," gives a very interesting account of this work, of which we can quote only the leading facts. The iron of which this chain was constructed was wrought from ore of equal parts from the Sterling and Long mines, in Orange County. The chain was manufactured by Peter Townsend, of Chester, at the Sterling Iron Works, in the same county, which were situated about 25 miles back of West Point. "It is buoyed up," says Dr. Thacher, writing in 1780, "by very large logs, about 16 feet long, pointed at the ends, to lessen their opposition to the force of the current at flood and ebb tides. The logs were placed at short distances from each other, the chain carried over them and made fast to each by staples. There are also a number of anchors dropped at proper distances, with cables made fast to the chain to give it greater stability." The total weight of this chain was 180 tons. Mr. Lossing visited West Point in 1848 and saw a portion of this famous chain, and he tells us that "there are 12 links, two clevises, and a portion of a link remaining. The links, some of which are in the museum at West Point, are made of iron bars, 2½ inches square, and average in length a little over 2 feet and weigh about 100 pounds each."

A new rolling mill in the Krupp Works at Essen, Germany, is probably larger than any other in the world. It will roll plate about 28 inches thick and nearly 12 feet wide. The rolls are of steel. Each pair in their rough state weighed 100,000 pounds.

10,250,000 tons is the grand total of the production of pig iron in the United States for the year 1890, an increase of 1,750,000, or more than 20 per cent over the product of 1889, which was 8,516,079, an increase of 1,247,572 tons over 1888, or 17 per cent. The production in 1890 was more than 40 per cent greater than that in 1888.

The production of steel ingots in the year 1890 was 4,900,000 net tons, and of steel rails 2,200,000 net tons.

The production of copper in the United States in 1890 amounted to 278,610,000 pounds, far exceeding any previous record.

Lead in the United States amounted to 187,000 tons of 2,000 pounds, or a little less than in 1880.

Of spelter 68,000 tons were produced in the United States in 1890, an increase of 15 per cent.

Forty-three vessels were built last year in San Francisco, of which 17 were schooners, 15 propellers, 6 sloops, 3 steamers, 1 barkentine, and 1 ship. The total tonnage was 11,671·47 net, which is largely in excess of the previous year.