the paper and frame mask until the canvas effect is clearly seen on the print. Last, the central mask is substituted for the frame mask, and a third printing gives the frame. The oil painting effect is the result of the contrast between the small details of the canvas and the seemingly broad technique of the picture over it.

How Hydraulic Power is Exported.

The government of Denmark proposes to carry out with the aid of its engineers the following plan: Upon the southern shore of the Sund is found the old city of Helsingborg, not far from which the Lagu rushes down from an elevated plateau over a stretch of about 30 kilometers. A fall of 100 meters is situated not more than 2 kilometers from the mouth of the Lagu. It is at this point and for the purpose of using this important natural motive force, that it has been decided to establish a hydro-electric plant, transmitting its current to Helsingborg (first relay). The submarine cables traversing the Sund permit the distribution of the electric energy produced in Sweden over the territory of Denmark. The Island of Seland, in which is found the Danish capital, will be the first to benefit by this installation, which will be very easily carried out; for between Helsingborg (Sweden) and Helsingör (Denmark) the arm of the sea is very narrow, not more than 5 kilometers wide; due to this circumstance the work necessary for the establishment of the submarine cables does not present any insurmountable difficulties.—La Nature.

Chinese Wild Silk.

M. Francis Marre, writing in Cosmos, gives some interesting particulars concerning the wild silk industry of China. A certain quantity of this silk, known under the name "water eel," is annually imported into France to be worked up in the factories of Lyons and Avignon, but the greater part of it finds its way to America, where it is made into a stuff called "radjah." Of late years, however, a considerable amount has been employed in the manufacture of balloons, a purpose for which it is peculiarly fitted by its strength and toughness.

The silk is obtained from a very common Chinese variety of the oak silkworm (*Antherea pernyi*). The larva feeds on the leaves of the *Cudrania triloba*, a dwarf oak which grows plentifully on the hills of Ho-Nan, Süchwan, and Kweichou. A warm, moist climate prevails almost all the year round in this mountainous district.

The cocoons of the oak silkworm are treated quite differently from those of the domestic silkworm which is fed on mulberry leaves. They are hung in long festoons sheltered from the sun, generally in buffalo sheds, in order that they may be kept at a constant warm temperature. They remain thus until the Feast of Spring (at the end of January or the beginning of February), when they are removed and hung up in a large room, of which all the doors and windows are carefully stopped. A hole is made in the middle of the roof to allow the escape of the smoke from a stove which is placed in the middle of the room. The stove is kept steadily burning for twenty days; at the end of this period the moths emerge from the cocoons and pairing immediately begins; the males and females are then separated, the latter being placed in palm-leaf baskets, where they lay their eggs. This operation takes about five days. Each female lays on an average some sixty eggs, which are about ten times the size of a mulberry silkworm's egg. After another interval of from fifteen to twenty days, spent in the room which has been closed and heated as before, the worms are hatched and are then taken in the baskets to the places where their food grows. The baskets are set down under the dwarf oaks, the flexible young twigs of which are arranged by the natives so as to make it easy for the worms to climb up to the leaves.

The worm feeds for two months, and then begins to make its cocoon, an operation which takes a week. The cocoons are collected toward the close of May, i. e., from three and a half to four months after the removal from the warm chamber.

The silk is wound and spun in two ways. In the first, which is used to produce a coarse material, the thread is spun from twenty cocoons. Silk of this kind is manufactured almost entirely at Süchwan. In the second the thread is spun from eight cocoons, and silk of this kind, which is made for the most part at Kweichou, is in greater demand for export purposes.

A pound of cocoons produces, as a rule, 240 grammes of fine silk. The average price varies from year to year. In 1907 it was 15 francs the kilogramme; in 1908, 22.6 francs.

Denatured alcohol costs more than gasoline and the quantity of denatured alcohol consumed by an alcohol engine as ordinarily constructed and operated is in general relatively greater than the quantity of gasoline consumed by a gasoline engine of the same type. It seems reasonable to expect a greater general improvement in alcohol engines than in gasoline engines.

Correspondence.

WHY WATCH SPRINGS BREAK.

To the Editor of the Scientific American:

I have read with considerable interest the discussion in the columns of the Scientific American relating to the breaking of main springs in watches. While the writer has had no direct experience along this line, the opinions given, while varying in detail and embodying many outside influences, seem to me to point to a common source, viz., the quality of material used in making the springs.

The opinion is constantly gaining ground among steel makers and steel users that the alloys and metallic compounds of iron are vastly more sensitive than those of any other metal, and that the composition and treatment of these substances constitute the foundation for their subsequent success or failure. The use to which the steel is to be applied should be known before the steel is made, and its composition as well as the process of its manufacture should be such as to produce the desired results. From practical results already attained, the writer is of the opinion that if these springs were made of a high-class crucible vanadium steel, and then subjected to a proper treatment, the trouble from breakage would be reduced to a minimum.

It would require too much of your valuable space to give reasons for this opinion, but I believe that a practical test of the material would lead to valuable results. Elwood Haynes.

Kokomo, Ind.

HOW DOES SAP RUN IN PINE TREES?

To the Editor of the Scientific American:

In about ninety per cent of all pine trees in this section, the fiber of the sap wood runs in a spiral around the tree contrary to the motion of the hands of a clock, i. e., from left to right in ascending the tree. This fact is easily observable in trees that have died, and from which the bark has fallen. Cyclones in the northern hemisphere revolve contrary to clock-hand motion. Probably the cause is the same in both cases; liquid sap moving like cyclones. It would therefore be interesting to learn whether this fact in regard to pines is universal throughout the northern hemisphere; and in order to determine the fact of identity of cause with the cause of similar direction of revolution of cyclones, it would merely be necessary to establish the fact that the fiber of pines in the southern hemisphere ascends in spirals that accord in direction with the motions of clock hands. Cyclones in the southern hemisphere, as is well known, revolve in the opposite direction from that of cyclones in the northern hemisphere.

Can some of your readers investigate along these lines, and report results? Does a top spinning in a vacuum weigh less than when it is not spinning? In other words, does the rotation of an object lessen its weight? T. C.

Sumter, S. C.

SAFEGUARDING MINES.

To the Editor of the Scientific American:

The recent mine horror in Cherry, Ill., being a sickening repetition of this sample of man's cruel neglect or indifference, emboldens the writer to trouble you with an indication, perhaps, of his ignorance merely, but which seems to him an idea that must have some value. He is not a trained mechanic, but living in a mining district and reading of the many coal mine accidents, he has not been able to forego all speculation on the subject.

It would seem that the energy of the entire body of mining engineers has been given to the problems of preventing mine explosions and other accidents which damage mines and incidentally cost miners their lives. I do not recall any efforts of theirs to devise means to safeguard the lives of the miners who are entrapped every time an accident happens. A year or two ago some miners were imprisoned in a mine, and were saved by accidentally finding an old gas or water pipe, through which they communicated with their friends and through which their friends lowered food and drink to them. This fortunate rescue has suggested that for a comparatively small cost a mine room here and there (so situated with respect to size and number and location of them as would ordinarily give refuge to all workers who were not killed outright by the accident) could be so equipped as to give refuge to as many as might be necessary, and harbor them until the mine passages could be opened. Why could not such rooms be provided with two-inch pipes, such as the ordinary bored well has, or the smaller hole of the diamond drill if the depth or quality of the rock made it necessary? Through these tubes air could be forced down and the foul air forced out, and food and drink passed down to the prisoners. Such rooms could be supplied with fire-proof and air-tight doors, and each door could have a wicket through which a belated and choking straggler could be quickly admitted. If such a plan would work, surely the cost would be nothing comparatively; even to having a pair of two-inch pipes going down to each room, equipped above with a strong pumping engine, by means of which large volumes of air could be constantly forced down. It will be objected that an explosion would destroy such rooms; to which the answer should be, it seems to the writer, "Leave the walls thick enough to withstand the worst of the ordinary explosions."

Surely, if such an idea or device would work, as it seems to the writer it must, the two or three hundred dollars that the equipment of each room might cost would seem a small expense to the mine owner if he had imagination enough to place himself in the place of the owner of the mine at Cherry. What would the owner of the Cherry mine give, if it were in his power, to instantly create enough such rooms as would give refuge to the three hundred men below, and be able to tell that frantic rabble of wives and mothers that owing to his foresight, humanity, and money, their men were safely cared for below, and would be fed, and they could communicate with them until the rescuers could release them? Under such conditions there would be no need to sacrifice the lives of those brave fellows who deliberately gave their lives by reason of their very eagerness to help their fellows.

Birmingham, Ala. George L. Brown.

AN EARLY MARINE ENGINE.

To the Editor of the Scientific American:

The following from an old New York American may be of interest, especially at this time of looking up ancient types of steamships:

"In the year 1819, while experimenting for the improvement of the steam engine, my attention was arrested by the great loss of heat under the circumstances in which steam is generally produced, and the idea of my present generator suggested itself to my mind at that time; . . . and in March, 1825, made the first experiment in R. L. Cawdrey's carriage shop, Ithaca, N. Y. . . .

"I used a blacksmith's bellows to supply the fire with air, . . . and concluded that about eight times as much steam was generated as air forced into the fire. . . .

"The engine (which was installed in a Liverpool packet) is called a 'double steam engine,' having two steam cylinders of thirty-five inches diameter, six feet stroke; two blowing cylinders of just half the capacity; which are worked by the engine, and the air is conducted into a boiler whose outer cylindrical case is four feet in diameter and twelve feet high; the furnace, or inner case, is three and a half feet in diameter and nine feet high. The fuel is introduced into it down the chimney, and it is so constructed that not one particle of heat can escape, but must absolutely pass into the water, together with all the gases generated by combustion, and become as strong an agent as the steam itself, passing through the steam cylinders with it."

The inventor, P. Bennet, of Ithaca, seems to have had a great deal of trouble with tar in his cylinder, as we would expect, but claimed to have overcome this difficulty. Walter C. Bilelur.

Holbrook, Mass.

The Current Supplement.

The current Supplement, No. 1770, may be regarded as a North Pole number, for it contains two articles on the Pole. One of them, by Washington Platt, gives a very complete history of Polar exploration, and shows what terrible hardships have been endured in the past in a quest which has no other reward than that of glory. Prof. Messerschmitt, on the other hand, contributes a strictly scientific article on astronomical and geophysical conditions at the North Pole. Although scarcely ten years have elapsed since Marconi made his first really conclusive experiment, wireless telegraphy has already become an art. Some recent developments in this art are reviewed by H. Marchand. W. B. Huff contributes an excellent article on demonstrations with the musical arc. "On Board the 'Parseval'" is the title of an article by Robert Saudek, in which he describes interestingly a trip in the famous German military dirigible. "Engine Power from Solar Heat" is the suggestive title of an article which will be read with much interest. A hop-picking machine which will have a marked effect on the hop industry is described and illustrated. In view of the return of Halley's comet, which has now been found by the telescope, some account of the great astronomer with whose name the comet is associated may prove of interest to the general reader. J. E. Gore contributes such an article. The conclusion of the article on machines that make cordage, begun in the last Supplement, is published. A. E. Shipley tells how zoology is being organized.

Dr. Torp, rector of the University of Copenhagen, has selected Prof. Elis Stromgren, Director of the Astronomical Observatory, as head of the committee to examine Dr. Frederick A. Cook's records. These are expected at Copenhagen about December 7th.