

Tame Trout.

BY CHARLES F. HOLDER.

Among the interesting localities of the Pacific coast the Bay of Monterey is pre-eminent. I believe Dr. Jordan states that here are found more distinct varieties of fishes than in any one locality on the coast.

Certainly this is not confined to fishes, as a few days ago when angling for salmon in their sea run in the bay, I saw a strange assortment of invertebrates, among them the physalia or Portuguese man-of-war, so common in the tropics.

In a recent article I described some tame sea-lions at Santa Catalina. At Santa Cruz, in the St. George Hotel, one of the proprietors is much interested in fish culture, and in the office of the hotel he has a small tank containing perhaps fifty trout ranging in size from five to eight inches in length, some possibly longer. They are rainbows, brook trout, and steel-heads, and are absolutely tame. I first noticed that when I went near the tank they crowded to the front and lined up, facing me, eager for something, and I found this to be due to the fact that at this time the owner fed them. He was kind enough to extend this prerogative to me, and handing me some chopped meat, red and inviting, asked me to hold it over the tank.

I have seen the rainbow rise to the lure in its native wilds; seen it leap for the fly; but this was the first time I ever saw one leap at myself. No sooner did my fingers appear over the water than half a dozen fishes surged up, and one big fellow almost cleared the water and seized the meat, while the others fought to take it from my hand. It was a strange and extraordinary spectacle. I had often in wading down a trout stream for this same game, approached a pool or riffle with the greatest care, maneuvering to make the right approach to get the wind behind me so that I could make the longest cast and have my fly literally appear to drop out of a clear sky or come down stream naturally to the fish heading up; but here were the same fishes fighting to nip my fingers, and absolutely as tame as cats. I say cats, as these trout rubbed their sides against my hand, and seemed pleased at the attention I was giving them.

Even more interesting was the exhibition given by the owner. He would indicate certain fishes that were a certain age and say that they were not so tame as others, though I could see but little difference. All were marvelously tame; indeed, the owner had raised them from "fry," and had always handled them. As he placed his hands in the water they crowded about, and appeared to enjoy being lifted up, and the spectacle—to me, at least—of a big trout lying complacently in his hand out of water and perfectly at ease and comfortable, was remarkable. I tried the same experiment with a wild trout later, and the performance did not appeal to the trout.

At Brookdale, about five miles above Santa Cruz in the mountains, the county has established a large trout hatchery from which the streams of the neighborhood are stocked. Here one may see trout of all sizes and ages, an attractive spectacle. It was interesting to note how quickly they felt or heard a noise. I happened to be standing by a large tank of big rainbows when the little narrow-gauge train came down the mountain. I could hear it a mile or two distant, and the trout noticed it at once, and their fright increased until the train reached the hatchery, when they displayed every evidence of alarm and fear.

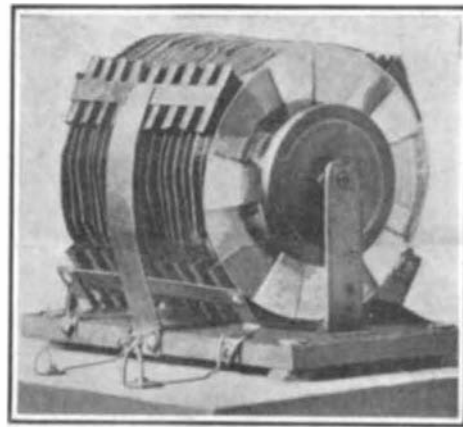
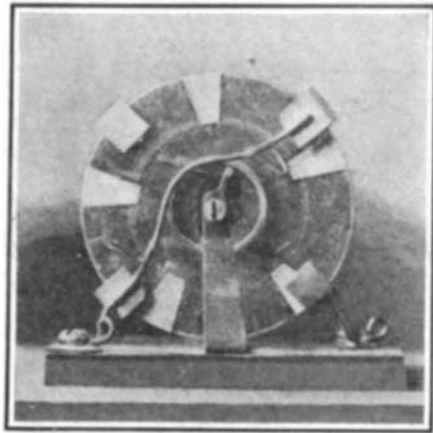
Geometrical observations have shown that the density of the earth's crust is variable, but they have not given any positive indications of the depths to which these observed variations extend. All calculations of the depths of subterranean variations in density and of the mountain compensation have, therefore, to be based on arbitrary assumptions of depth. The fact that the plumb-line seems generally to respond readily to the results given by the pendulum perhaps justifies the inference that the observed variations in the density of the earth's crust are not deep-seated. If an abnormal amount of matter exists in the crust near the surface, it will exercise direct effects upon plumb-lines and pendulums in the vicinity, but if it lies at a great depth its effects, especially on plumb-lines, will be less perceptible. Col. Burrard has taken several instances of abnormal pendulum results from the table, and has found in each case direct response from the plumb-lines at neighboring stations. This conformity could hardly ensue if the variations in density extended to greater depths than thirty or forty miles. Our results do not justify us in asserting that no deep-seated variations in density exist, but they do justify the belief that the variations in density which have been discovered are apparently superficial.

A MOTOR THAT RUNS BY LIGHTNING.

BY C. FRANCIS JENKINS.

When a glass rod is rubbed with a silk cloth, it acquires the property of attracting light objects. It is electrically charged with a charge of high tension and small quantity. A stick of sealing wax acquires like properties, but on proper investigation it will be noted that the charges are dissimilar. If a pith ball be suspended between the glass rod and the rod of sealing wax it will oscillate, contacting with the rods in turn, taking first a positive charge from the one and exchanging it for a negative charge from the other. The pith ball, after taking up a positive charge, for example, swings away from the rod because it is repelled by the like charge of that rod, and at the same time it is attracted by the unlike charge on the other rod. So the oscillations continue until the charges on the two rods are again in natural equilibrium.

The machine illustrated herewith is based on this phenomenon, and in its simplest form consists of a thin glass or mica disk supported on pivotal points and well balanced. This disk has five armature sections of tinfoil overlapping the edges of the disk at five equidistant points. Enveloping the disk also at equidistant points are four metal field poles, each field pole electrically connected with the field pole diametrically opposite. Each pole has a thin brush mounted thereon, which contacts with the armature sections as they pass thereunder. As there are five armature sections and but four field poles, some one of these brushes is always in contact with an armature section. If, now, one pair of opposite field poles be positively charged and the other pair be negatively charged, some one of the armature sections receives a charge of like sign with the field pole enveloping it. The armature section is, therefore, immediately repelled, and moves away from the field pole and toward the next field pole, to which it is attracted for like reason. As it passes under the

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brush of the latter field pole the charge is given up for one of unlike sign, and the armature section is in turn repelled by this field pole. Similar phenomena are taking place at each of the other field poles, and continuous rotation at high velocity is maintained.

To increase the torque, a battery of armature plates were mounted on a single shaft, and all the like armature sections in a row (parallel to the shaft) were connected together. Thus a larger capacity in each of the five armature sections was secured. The field poles were likewise connected together. But one set of brushes were required. These brushes were arranged to contact with the armature sections only just after each had passed the median line of each field pole. Therefore the motor always turned in the same direction. Any suitable source of high-tension current sufficed for power, as, for example, an induction machine. A charged glass rod held to one and a charged sealing-wax rod held to the other of the field posts was sufficient to cause considerable rotation of a single-disk motor.

In experiments in wireless telephony a pole supporting wires fifteen feet above the roof of a two-story frame house was used. It was noticed that on the occasion of storms there would be sparking at the gap in a plug cut-out block on the instrument table. It was found that on connecting the motor between the points, that is, so that one field pole was in metallic communication with the earth and the other with the aerial, the motor would run, beginning some little time before the rain began to fall. It was also noticed that the motor did not always behave similarly; sometimes it would revolve rapidly, while upon the occasion of other storms the torque would be weak.

As the force of attraction and repulsion is in proportion to the capacities of the opposed surfaces, it would seem that a motor of considerable power might be constructed to run by static current taken from the passing clouds, and this is suggested as a line of research of not unpromising results.

Vaccine for Tuberculosis.

Drs. Calmette and Guerin of the Pasteur Institute of Lille have finally discovered a vaccine which will render humanity immune from the dreadful scourge of tuberculosis.

Dr. C. Guerin, with regard to infection from tuberculosis and its remedy, says:

"Many experiments having demonstrated that tuberculosis bacilli destroyed by heat or other agents pass through the walls of the intestines as readily as living bacilli and are found in the mesenteric ganglions and lungs, we experimented with the object of discovering whether young animals, such as calves and kids, that had been made to swallow two doses, the second forty-five days after the first, of from 5 to 25 grammes of dead bacilli or bacilli whose virulence had been modified, could endure with impunity the injection of a meal of 5 centigrammes of fresh tuberculous matter taken from a cow, matter which would be surely infectious under ordinary conditions. We are now convinced that bovine bacilli destroyed by boiling for five minutes or simply heated during the same period will, for five months and even for a longer time to which it is not now possible to fix a limit, vaccinate perfectly against virulent infection through the digestive organs.

"We shall before long make known a detailed account of our experiments as well as others in progress, for which we have used treated bacilli from various sources and bovine bacilli treated by iodine and by hypochlorite of lime. Our belief, founded on experiments, now is that young calves may be vaccinated by a simple intestinal absorption of bacilli subjected to heat, and that this method of vaccination is not dangerous.

"If further careful experiments should justify the application of this method as a preventive against bovine tuberculosis, nothing can be urged against its application in the case of human beings. We think it will be possible to guard children against natural infection by giving to them a few days after birth, and again a few weeks later, a very small quantity of tuberculous bacilli of human and bovine origin subjected to heat and mixed with a little milk. The only precaution absolutely necessary, and one not always easy to apply, would be to guard children thus vaccinated against all tuberculous contamination for a period at least of four months. Special nurseries might be founded for new-born infants of tuberculous parents, where they might be protected against all tuberculous germs until they had acquired immunity through vaccination. We believe that these difficulties would be readily overcome in order to insure such immense advantages as those gained by rendering humanity refractory to tuberculosis contagion."

The World's Paper Consumption.

The Revue Scientifique recently discussed the consumption of paper by the principal nations of the world as reflecting modern progress of civilization because of its extensive use for printing purposes. It places the United States in the front rank as the greatest paper-producing country of the world, with an annual output of 639,734 tons (avoirdupois). Germany follows with an annual production of 393,683 tons, England 246,051, France 196,942, Austria 147,706, and Italy 123,026.

One American corporation is declared to be the greatest paper manufacturing enterprise in the world, possessing 31 factories with 96 continuously running machines, the company using almost as many machines as are operated in Italy and the Netherlands altogether, and its annual production exceeds that of all the paper factories in Austria-Hungary and almost equals that of all the British ones. Its capital amounts to more than \$110,000,000. While America leads in production, Germany has become the largest exporter of this article, with 51,000 tons annually, England following with 49,210, the United States 16,880, and France 13,090. The United States export goes principally to South America, but also to Canada and Australia. Notwithstanding its large production England remains a good buyer, having imported 147,706 tons last year.

Regarding the direct consumption of paper it is an interesting fact that the United States leads with an annual figure of 38.6 pounds per capita, England coming next with 34.3, Germany 29.98, France 20.5, Austria 19, Italy 15.4, Servia showing the lowest European figure, 1.1; India shows only 0.22 and China 1.1 per capita. Nearly half of the paper manufactured in the world is used for printing purposes. Twenty per cent is absorbed in the trades and industries. Almost an equal proportion is applied for official and school purposes. The remaining 10 per cent serves the demand for private use.