heavy steering knuckles. The rear or driving axle, with the compensating gear near its center, runs on roller bearings in a casing made of heavy steel tubing, and having two heavy oval flanges that screw together securely and form the gear casing. This construction relieves the driving axle and compensating gear of all strains except the driving of the carriage. The rear wheels are keyed fast to the axle. Both front and rear wheels are given additional strength by steel trusses. The steering lever is attached to the body, which is supported at the front by a double elliptic spring that absorbs all vibration from irregularities of the road without affecting the rigidity of the steering mechanism. The power is transmitted direct from the motor shaft to the rear axle by a chain, tested to 4,000 pounds working strength, which effectively disposes of all chain troubles. The transmission gear is protected by a steel case which is oil-tight, thus permitting the gears to run continually in an oil bath. It has three changes—two forward and one reverse. It is very simple and effective, and for ordinary running all the gearing is locked fast to the motor shaft, there being no gears used except in starting, climbing very steep grades, or in running backward. This avoids friction and noise and the general wear and tear usually found in most transmission gears. The compensating gear and rear sprocket are incased and completely protected from sand and mud. The motor is started easily from the seat by means of a non-detachable crank at the right hand of the driver. A turn of the crank will put the motor in action. The speed of the motor is increased by means of a foot lever acting upon a gate-valve opening which admits more explosive mixture to the igniting chamber, and is further increased by advancing the spark controlled by the lever for change of lead. One lever controls all changes of gear, moving forward to get the two speeds ahead, and backward for the reverse, making a simple as well as effective control.

A very effective band brake operated by the foot is applied by a clutch band to a flange attached to the driving sprocket. It is powerful enough to slide the driving wheels. There is also an emergency brake acting directly on the rear axle and shutting off the power, so that the machine can be stopped on an instant's warning

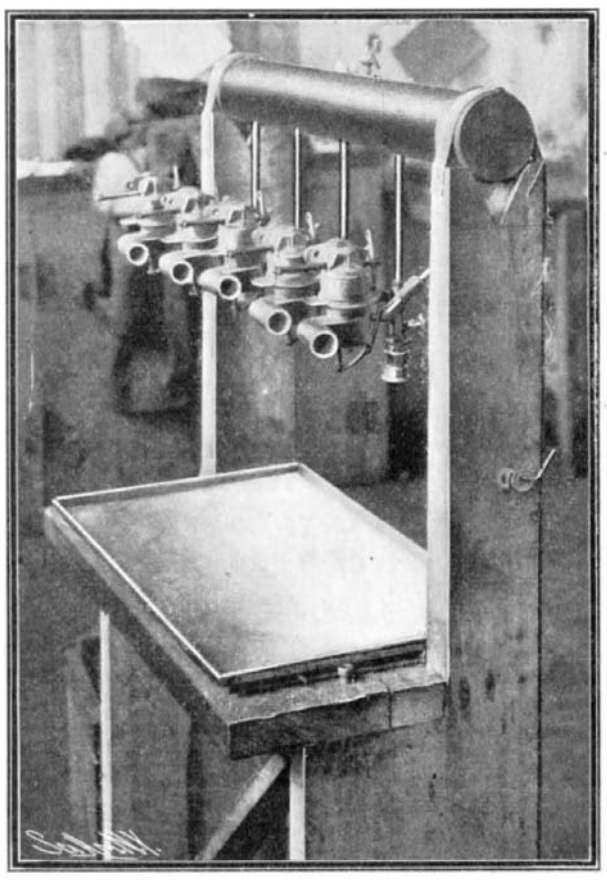
The range of speed is from three to twenty-five miles an hour, and the net running weight is 870 pounds. When the ease of running and the comfort of traveling in this machine are considered, it is little wonder that they are made in such large quantities as a recent visit to these factories would indicate. The running gear is well adapted to support the covered body of a delivery wagon. We have already illustrated this type of vehicle.

Progress of the United States in Its National Industries.

"The Progress of the United States in its Material Industries" is the title of a statistical statement presented by the Department of Commerce and Labor through the annual report of the Chief of the Bureau of Statistics. The table pictures conditions in the great industries and material interests of the United States in 1903, where such figures are available, and compares those conditions with those of earlier years, running back, where possible, to the year 1800.

Area, population, wealth, public debt and the interest thereon, gold and silver production, money in circulation, savings-bank deposits and depositors, value of money of the country, value of farm products, imports and exports of principal articles and total of imports and exports, railways in operation, number of post offices, receipts of the Post Office Department, and many other subjects indicating in various ways the financial, industrial, and commercial condition of the country are included in the tables, which give opportunity to compare present conditions with those of earlier years. In area, for example, the total in 1903 is 3,025,600 square miles, against 2,980,959 square miles in 1850, and 827,844 square miles in 1800. These figures do not include Alaska or the islands belonging to the United States.

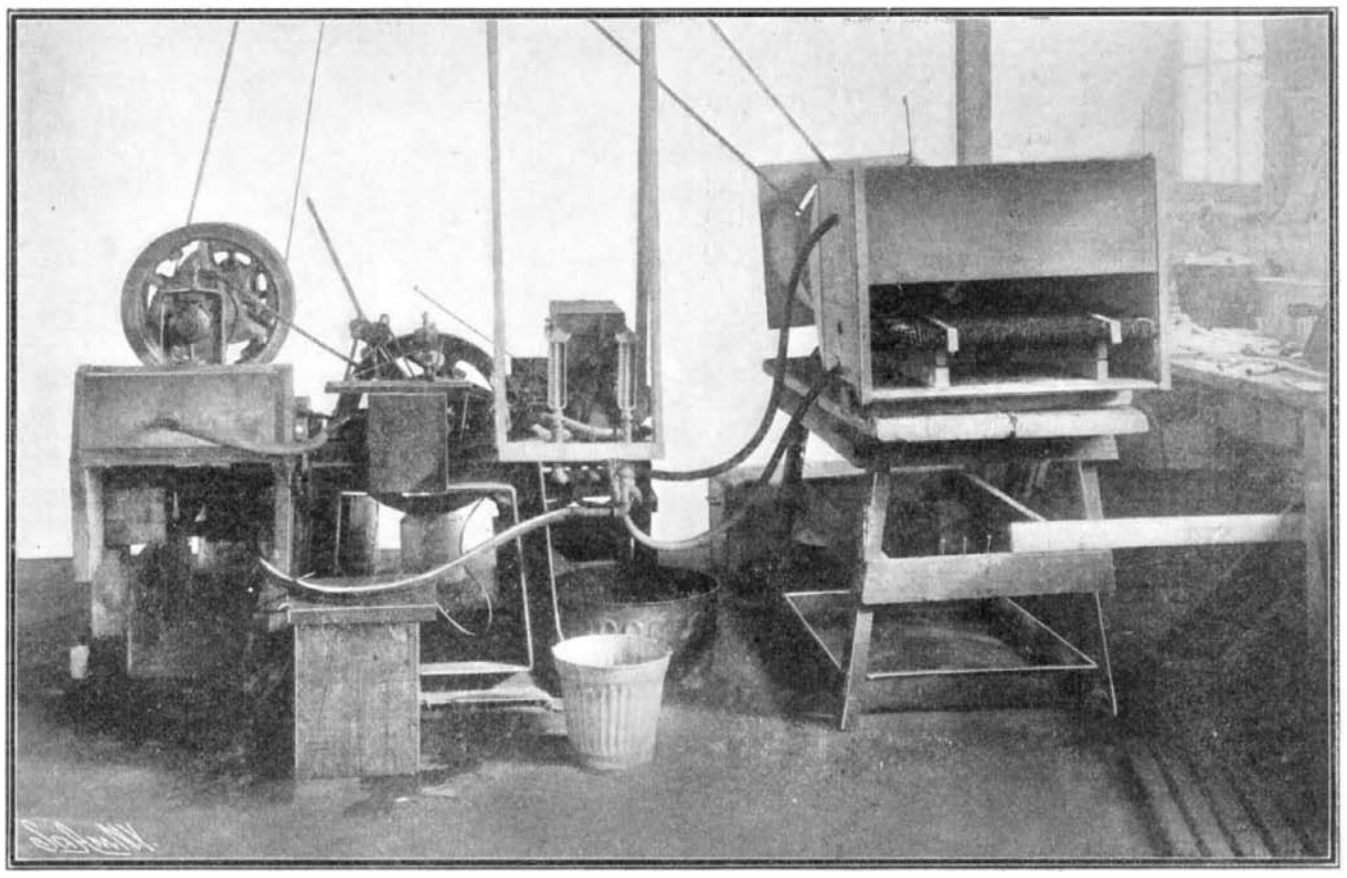
The population in 1903 is stated at 80,372,000, against 23,191,876 in 1850 and 5,308,483 in 1800. The wealth of the country is stated at 94 billions of dollars in



Testing Carbureters.

1900, and presumably 100 billions would not be an unreasonable estimate for 1903, while for 1850 the wealth of the country stood at 7 billion dollars, no estimate being given for any year earlier than 1850. The per capita wealth is set down at $1,235 in 1900 and $307 in 1850, having thus more than quadrupled meantime. The interest-bearing debt in 1903 is 914 million dollars, against 1,724 millions in 1880 and 2,046 millions in 1870. The per capita indebtedness of the country in 1903 is $11.51, against $60.46 in 1870, and the interest per capita, 32 cents in 1903, against $3.08 in 1870.

Gold and gold certificates in circulation in 1903 for the first time exceeded one billion dollars, or, to be exact, 1,031 millions, against 810 millions in 1900, 232 millions in 1880, and 25 millions in 1870. The total money in circulation in 1903 is 2,367 million dollars, against 1,429 millions in 1890, 973 millions in 1880, 675 millions in 1870, and 435 millions in 1860. The per capita money in circulation in 1903 is $30.21, against $26.94 in 1900, $19.41 in 1880, and $13.85 in 1860. Deposits in savings banks in 1903 are 2,935 million dollars, against 1,524 millions in 1890, 550 millions in 1870, and 149 millions in 1860. The value of manufactures for the census year 1900 is given at 13 billions of dollars, against 5 1-3 billions in 1880, and less than 2 billions in 1860. Railways in operation in 1902 are 203,132 miles, against 166,703 miles in 1890, 93,262 miles in 1880, 52,922 miles in 1870, 30,626 miles in 1860, and 9,021 miles in 1850.



Testing the Efficiency of Radiating Coils.

DEEP-SEA SUNFISH.

BY PROF. CHARLES F. HOLDER.

So remarkable are many of the large fishes recently discovered that it would be difficult to indicate any individual more singular in shape than another; yet in the entire group the sunfish (*Mola*) stands out as perhaps the most curious and impossible among the forms which attain a large size. It is a shapeless creature and seemingly cut off abruptly behind the fins, and apparently a grotesque head, the ears represented by fins.

The sunfish, or head-fish, belongs to the family *Molidæ*. It is fairly common in the vicinity of Santa Catalina Island, off Los Angeles County, California; that is, I recall no locality on the American coast where the sunfish can be so often observed and examined near at hand. In general appearance the fish is oblong and deep; very thin or compressed; cut off (truncate) behind, so there appears to be no tail, a mere rim of movable flesh taking its place, which has a very limited use in the slow locomotion of this extraordinary fish. The skin is hard and coarse, rough, scaleless, and covered with flat spines; the entire skin in the individuals examined by me was covered with a thick coating of slime, which appears to be a world in itself for numerous parasites which prey upon the fish.

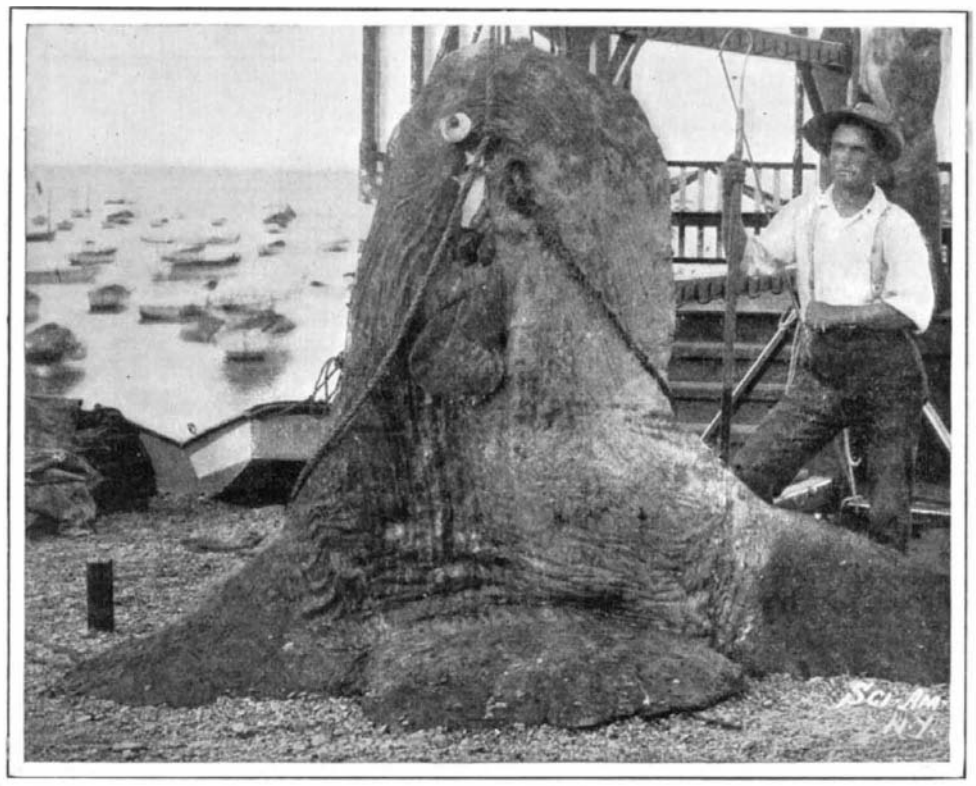
The sunfish is seemingly formed on a reversible plan; that is, the casual observer might conceive it swimming on its back just as well as the reverse, as its dorsal and anal fins are alike, large, long, and conspicuous, the back portion joining more or less with the rim of the "tail." The side or pectoral fins are very small for the size of the fish; the eyes small, but conspicuous; gills small; air bladder absent; color light gray, resembling that of the shark. The mouth of the sunfish is ridiculously small for so large a creature, and is armed with solid white porcelain-like teeth, completely joined in each jaw, forming a powerful beak.

There are three well-known genera of the sunfishes and six species. Comparatively little is known regarding their habits. Their young are strange, spine-clad little creatures bearing at first but slight resemblance to the adult, and when first discovered, were supposed to be different fishes and were so described. The sunfish is one of the few fishes of little or no use to man, though I am of the opinion that the hard skin might be utilized. I once learned that the boys of a certain village in Maine were anxious to secure the muscular envelope of a specimen caught by me to use it as rubber. They cut the hard, elastic substance into round shapes and used them for the interior of home-made baseballs, winding them about with yarn. It was the belief of fishermen and boatmen on the New England coast that the sunfish lived on jelly-fishes, and in many specimens examined by me none contained any solid food or traces of it. The first large sunfish observed by me was off Ogunquit, Maine. It was lying prone upon the water, partially exposed, literally basking in the sun, and I had no difficulty in running alongside and capturing it by inserting a gaff in its mouth, whereupon it began a violent struggle, but in a short time gave up. This fish was about three feet high and was covered with parasites—worms and crustaceans, with a few barnacles of various kinds. A large goose barnacle had found a resting place in its mouth, the long "stem" wav-

ing about just avoiding the teeth of the patient sunfish.

I was fortunate in observing a large sunfish in the St. John's River, Florida. I was watching the bar of the river one day when I saw the fish come in and run aground, its long keel striking. In its terror the fish created such a sea that the fishermen went out and captured it, the sunfish proving to be a monster in every sense of the term. On the Pacific Coast I have repeatedly observed sunfishes (*Mola mola*) ranging in size from small individuals weighing from twenty to fifty pounds to huge creatures. A sunfish was taken off Redondo, California, which weighed eight hundred pounds, being over eight feet in length. Another, and perhaps the largest sunfish ever seen, was sighted by an acquaintance of the writer, who approached near enough to put a harpoon into it. The fish slowly sank below the surface, exhausting the rope and taking the bow of the launch down so continuously that the crew were well satisfied when the rope broke. Various estimates were given as to the size of this fish, but all agreed that it must have weighed over a ton. I have frequently observed these fishes near the south end of Santa Catalina, in August, which appears to be a summer meeting and feeding ground for many large fishes. On one occasion in looking over I saw several sunfishes swimming about. They may have weighed forty or more pounds each, and their movements, while slow, were graceful. One was swimming in a circle with a certain dignity, and I could see its peculiar "tail" bend as it turned but a few feet below. The fish had little or no fear of the boat, rising to within a few feet of it—near enough to have allowed the use of the gaff had the crew been so disposed; in fact, nearly all sunfishes caught are taken with gaff hooks which are driven into them from boats, the fishes paying no attention to bait of any kind or dead sardines thrown at them.

The waters of Santa Catalina Island have recently provided, in all probability, the largest sunfish ever taken or perhaps seen. It was literally impossible, even with all the available tackle used in lifting huge tunas and black sea bass, to weigh this fish entire or to lift it entirely from the ground, so that its weight was guessed at a "ton," while conservative estimates placed it at from eighteen to nineteen hundred pounds. The exact weight is not of paramount interest, as the photograph of the fish, herewith shown, proves it to have been a giant of its kind and a capture of great interest. It was 10 feet in length and 10 feet high. While ordinarily the fish is very clumsy, this individual made a fight that will be remembered by the captors, boatmen Farnsworth and Elms, of Avalon. The former discovered the fish while fishing from a launch, and determined to attempt its capture. The fish was swimming about, its huge sharklike fin above the surface; yet the launch was steamed alongside and the boatman thrust a heavy gaff into it. Immediately the fish began a series of elephantine struggles which more than once threatened the boat, and for over an hour the boatman held it, hoping to wear it out Another launch then came to his rescue, and another gaff was hooked into the fish, which now appeared to renew its struggles, hurling the water over the boats and plunging downward with ponderous strength in a manner that would have deterred some fishermen; but these men held to the fish, and after three hours subdued it and with no little difficulty towed it into port, where it was measured, photographed, and a futile attempt made to weigh it.



THE LARGEST SUNFISH EVER CAUGHT.

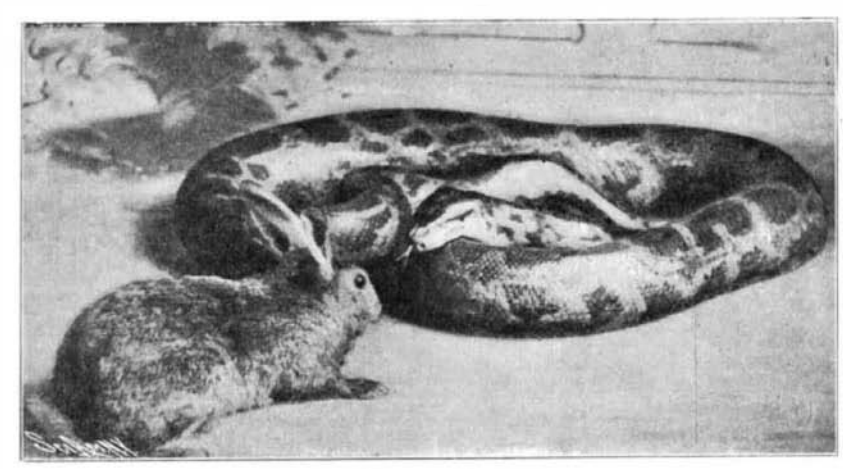
Length, 10 feet; height, 10 feet; estimated weight, 1,800 pounds.

HOW A PYTHON EATS.

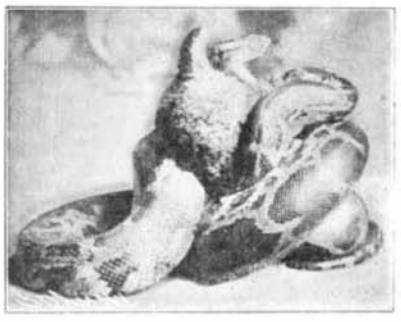
BY DR. V. BURTI.

Photographing animals is a difficult enough task; but the photographing of snakes is one that requires unusual patience on account of the extreme restlessness of most reptiles. Usually the only successful way in which to keep the snake quiet in front of the camera is to feed it. While eating, most animals, whether they be wild or tame, hold the prey firmly in the throat, totally oblivious to everything about them.

It was thus that the remarkable photographs herewith presented were secured. The reptile pictured is a python twenty feet long, forming part of the collection of the Detroit Scenic Park. Needless to say, not a few plates were ruined before suitable pictures were obtained. After placing the python in a warm room, a rabbit was presented to him. The reptile, having eaten nothing for some days, was only too eager for the prey. A few seconds of freedom had elapsed, and the poor rabbit fell into the coils of the snake, which squeezed him to death and then swallowed him whole. In exactly twelve minutes the hind foot of the rabbit disappeared down the python's throat.



Python and Rabbit Face to Face.



In the Toils.

The Rabbit's Head Disappears.

The Last of the Rabbit.

HOW A PYTHON EATS.

Sense of Smell in Snails.

According to the researches of M. Emile Yung, the sense of smell in the snail seems to be located not only in the feeling organs but all over the body, as experiment proves that the snail can perceive odors by means of sensory cells which are placed in different parts of the body, quite apart from the special organs which might be supposed to be his only means of sensation. The idea of sensory cells of this kind distributed over the body of an animal is an interesting one, and is clearly brought out in M. Yung's experiments, which form the subject of a paper read before the Académie des Sciences. He observes the large snail (*Helix pomatia*) which is common in France. It has been generally admitted since the observations of Moquin-Tandon that the snail has a good sense of smell, and the organ is seated in the terminal button at the end of the large feelers. Hence the term of nasal organ which he gives to the latter, and the expressions olfactory ganglia or rhinophoric, etc., which a number of scientists now use for designating these nerves and ganglia.

The writer explored the body of the Helix with a camel's hair brush dipped in a non-corrosive odorant, such as essence of chamomile. He finds that if the olfactory sensibility exists on the large feelers, it is not localized there exclusively. The small feelers, the under part, and the skin of the back, and in fact the entire surface not covered by the shell, is affected by the odor. The numerous experiments which he made show that the snail is still in the stage of *diffusion* of the olfactory sense, and can in fact smell odors at all parts of his skin, as Cuvier already supposed. The feelers are more sensitive to odors than the back, etc., but contrary to the opinion of Moquin-Tandon, a snail which had its four feelers amputated did not change its manner of living and was able to find its food; it also fled from disagreeable or harmful odors. A microscopic examination of the different nerve cells did not show any reason for giving a special sense to one part of the body to the exclusion of the other. The cells differ from each other by their number only. He considers that the cells are capable of receiving different sensations such as shocks, heat, odors, etc. As to the distance at which the snail can smell odors: He places a dozen or more snails (which have been deprived of food) in a circle, and puts different kinds of food in the center. When the snail perceives the odor, he is attracted toward the middle. In most cases the attraction took place at a small distance, an inch or more. Distances higher than this were obtained only by foods giving a very strong odor; the greatest effect was obtained with very ripe melon. No substance attracted farther than 16 inches.

Francis Snyder, who was the designer and patentee of a large number of toys and similar nursery appliances and who was known as the "Children's Friend," died at his home in New York on September 19, 1903. He was born in France and was sixty-eight years of age. He was at one time interested in politics and was closely associated with the late Ex-President Chester A. Arthur.