

The most interesting features of this tank are the Port Jackson or horned sharks, the group comprising old and young, male and female and eggs. They are types of a very ancient race, and thrive well under all conditions. The eggs are peculiar corkscrewlike objects of horn, which in the winter are washed up by every storm. Adjoining this tank is one containing bass and perch of various kinds, and next to this a larger tank with mussels and crayfish--the local lobster. A smaller tank is given over to a giant of the tribe whose shell was thrown off but a few days ago. From here extends a series of tanks whose occupants would delight the eye of an Eastern naturalist. Here is the king of the sculpins, so called, the great dink and marbled bullhead; then a compartment carpeted with *Serpulae* of hues of the rainbow, their spiral breathing organs twisting and winding, disappearing and reappearing like magic. With them is the graceful *Virgulia*, dredged from the deep sea, dozens of interesting *Terebratulæ*, with pink shells and pseudo-skeleton within.

Then comes a tank of young "Garabaldi," illustrating the difference between old and young fishes in color. The adults are pure deep red, the young golden red, with blue splashes and dots so iridescent as to give rise to a popular local name, the "electric fish," many fishermen believing that they have seen sparks and flashes from them. Here is a series of the Southern California sheephead *T. pulcher*, from the adult males confined in separate tanks to prevent them from fighting, to the young. The old fish is a striking object, its blunt head pure black, its lower jaw pure white, a deep red band in the central portion, and the tail black. The very young one is a pale pink with black spots on its dorsal and anal fins--a brilliant little creature. The next stage it is all pink, the eye spots having disappeared; then in a larger fish some are fiery red, some white; still larger the stripes or bands are fairly outlined. Following are tanks of large black echini, the big California red crab, the giant spider crab of this coast, holothurians with plant-like breathing organs, all decorated with the delicate kelps and weeds peculiar to this region. In a large tank is massed a school of angel fishes, and in a still larger one a mola or sun fish lazily fans itself, while several dogfishes from the deep sea and a yellow-tail nearly four feet long eye it suspiciously.

In the jelly fish tank a *Rhizostoma* stretches away like a comet, and various delicate forms are seen, such as the *torepods*, a long chain of *salpæ*, *physophora*--the latter one of the most beautiful objects seen here; its rapid movements and lovely coloring assuring it much attention. Floating on the surface of several of the tanks are *velellas* with glossy sails and deep blue tentacles. The mollusks are extremely interesting. Perhaps the most showy, seen from time to time, and at short intervals, are *pterotrachia* and *carinaria*, attaining large size, *pteropods* of several species, which cling to the weeds and are remarkable mimics, as *doris*, *tethys*, and *aplysia*, the latter feeding from the hand, taking the rich green *ulva* with avidity.

Several species of *haliotis* cling to the glass or rocks, and a *trochus* shell, covered with a deep orange sponge, moves slowly, while the *marbled-bulla*, or bubble shell, leaves a curious silken web as its great foot glides along. A rare spined *murex*, *boatshells*, *aviculæ*, *oysters*, *mussels*, *mytilus*, and others are seen feeding upon weed or kelp. A small tank contains a group of *ascidians* from deep water bottoms, forms with rough surfaces in strange contrast to the elegant *salpæ*. Among the *corallines* are *retepora* and others, and the living *polyps* of *dendrophyllia* in sulphur yellow tints are fastened to various shells and the large tubes of worms. In the starfish tank is the large form, thirteen or fourteen inches across, common here, a deep red starfish. *Asterias* and several snake stars, *ophidium* and others; the last named being difficult to keep alive.

Among the interesting experiments here have been efforts to keep the deep sea "rock cod," and the yellow-tail, *Seriola dorsalis*. The latter is a very active fish and rarely survives longer than a week. They are so common that they can be frequently replaced.

It has generally been considered well nigh impossible to photograph the fishes in an aquarium, but some fairly successful plates have been made here by Mr. N. Swenson, of the mottled moray, the chimera, the sheephead and others. True, they are not so perfect as could be desired, but are excellent when it is remembered that it is a difficult matter to induce fish to pose. The morays opened and shut their mouths, the sheephead moved its fins, but the chimera was photographed without any trouble. The chief difficulty was in keeping out the reflections, which appeared as white spots.

This is the first aquarium and attempt at a zoological station in Southern California, and the first time the marine fauna has been seen alive. The exhibit has been visited last summer by many students and teachers of natural history, and the institution will be come a valuable adjunct to the school system of Southern California.

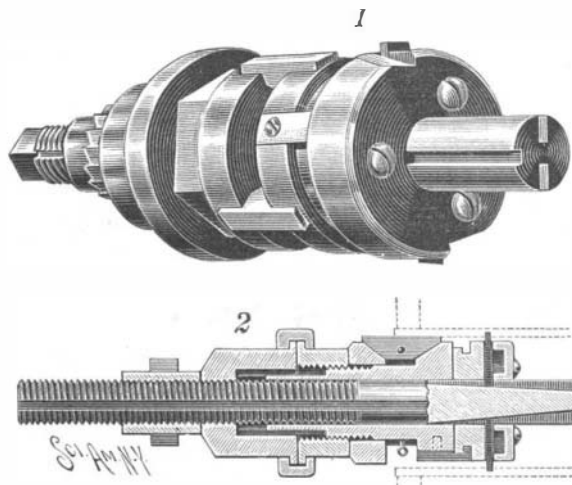
AN IMPROVEMENT IN FLUE-CUTTERS.

The flue-cutter which we illustrate in perspective and section was invented by Mr. Philip J. Kruger, of Greenville, Ill., to fill a want for a device by means of which a flue could be cut at the inner side of the sheet without forming a bur, thus leaving the flue in perfect condition to have a piece welded on the end, so that it could be used again.

The cutter comprises a central screw-shaft provided with inclined channels to receive the ribs of the cutter-carrying head. Owing to this arrangement the cutter-head is free to rotate with the shaft; and the shaft has longitudinal movement through the head. Cutters carried by the head are adapted to be moved outward by a longitudinal movement of the shaft and inward by a spring. The shaft is mounted to rotate in a sleeve on which clamping-blocks are supported by a spring-ring. On the sleeve a ring is mounted for forcing the blocks outward, which ring is in turn forced longitudinally by a nut engaging a feed nut on the shaft. The abutting portions of both units are engaged by a locking collar. A second sleeve removably engaging the shaft but rotating therewith has ratchet-teeth on its outer side, which may be engaged by a suitable tool to turn the shaft. This second sleeve brings the torsional strain upon the shaft nearer the cutters than in most similar devices.

In operation the cutter is placed sufficiently within the flue, as shown by dotted lines in Fig. 2. By rotating the sleeve-nut, the sleeve-ring is forced forward, causing the clamping-blocks so firmly to bind against the interior of the flue that the slightest movement of the sleeve and connected parts is impossible. Then by rotating the central shaft, to move it inwardly, the inclined walls of the channels will gradually force the cutters outward as they are carried around with the head.

The inventor has subjected his cutter to severe tests



KRUGER'S FLUE-CUTTER.

and has found that flues can be cut with a gratifying dispatch and facility.

Water-Plants as Land-Winners.

In *The Naturalist* for August, Mr. Albert Henry Pawson makes a brief contribution to the study of the influence of water-plants on the land surface. "There are several ways in which these plants tend to diminish the water-space and to increase the dry land. By their own decay they form vast masses of vegetable soil in shallow waters and on water margins; by occupying running streams they moderate the flow of the current and give it time to deposit its silt; by their creeping rhizomes and spreading roots they fix the bed of a stream and prevent its being scoured and deepened by floods, and again in times of flood they serve as a sieve or strainer, arresting all floating and much suspended solid matter." This is indeed a familiar theme, but the author discusses it with freshness and with appreciation of its dramatic interest. "Inch by inch, as the result of this accumulation and decay, the land creeps in upon the mere; more and more solid grows the edge; the aqueous plants retreat from the now shallow margin, the terrestrial plants advance, finding firmer footing; the sedges and reeds crowd on their floating neighbors which need space, and cannot endure the shade; these, too, press forward, and the open water grows less and less; it is invested on every side, and it is plain that its complete subjugation is now only a matter of time." It would be of interest to procure some actual measurements of the amount and rate of land-winning, and to study in minute detail the elimination which proceeds as the mere is closed up.

A BLUE grotto like that of the island of Capri has been discovered on the shore of the promontory of Skinari on the Ionian island Zante. The entrance is from the sea, and is larger than in the Capri grotto, but the interior is smaller. Fishing boats can make their way in when the water is calm.

Correspondence.

A Suggestion to High Speed Railroad Engineers. To the Editor of the SCIENTIFIC AMERICAN.

Railroad engineers who travel at a high rate of speed are painfully aware of the peculiar and trying effect upon the nerves of the eyes, caused by objects on the side of the tracks which in effect flash by them, and distract the gaze, which should be fully concentrated straight ahead.

To obviate this, and at the same time relieve the strain on the optic nerves caused by these distracting influences, let the engineer wear a pair of short tubes, say of about three-quarters of an inch in length and painted a dull black on the inside, over the eyes.

These tubes could easily be constructed of some light substance, and made to fit like ordinary spectacles.

Besides the restful effect these tubes produce on the eyes, they at the same time render the vision wonderfully clearer by cutting off all diverging rays of light.

ARTHUR SMEDLEY GREENE.

Port Jefferson, L. I., November 9, 1899.

The Funafuti Expedition.

The Funafuti Boring Expedition has very recently led to the rectification of a common ethnographical error, and the discovery of an interesting fact in zoogeography. In the monograph on the atoll of Funafuti published by the Australian Museum, Sydney, Mr. E. R. Waite referred to a large undetermined fish known to the natives as "Palu," and to traders as "Oil-fish." According to Mr. Louis Becke, a full-grown Palu would weigh up to 150 pounds and be 6 feet long; the average size is about 3 or 4 feet, and weight 40 to 60 pounds. The natives have many superstitions in regard to Palu; every portion of it is edible, even the head and bones when cooked turning into a rich mass of jelly. The flesh of the Palu, if left uncooked, never putrefies; it simply dissolves into a colorless and odorless oil. Perhaps the great regard the natives have for it is due to the fact of its being a rapid and powerful purgative. It is a deep water fish, and is usually caught at a depth of from 120 fathoms down to 200 fathoms; the fishing is only done at night. The Palu fishing hook has been described by Mr. C. Hedley, who points out that this large hook, which is widely distributed in the Central Pacific, and may be seen in most ethnographical collections, has been described by all authors as a "shark-hook." The last expedition to Funafuti has been fortunate enough to obtain a specimen of this fish, and in an appendix Mr. Waite has solved the riddle, and found that this mysterious fish is the well known *Ruvettus pretiosus*, which hitherto was known only from the North Atlantic, and whose recorded range is now enormously increased. The Escolar (Atlantic name) has been taken at depths as great as 300 and 400 fathoms, but can be taken only at night in September and the early part of October. --Nature.

The Current Supplement.

The current SUPPLEMENT, No. 1248, is a most interesting and valuable one. The first article describes "A Unique Departure in Engineering Education." The article illustrates the ceramic school of the Ohio State University, of which Prof. Edward Orton is the director. It is accompanied by illustrations showing the work being actually carried on. "Causes for the Adoption of Water-Tube Boilers in the United States Navy" is by Rear-Admiral George W. Melville, Chief of the Bureau of Steam Engineering, U. S. N., and is an important paper dealing with the advantages and disadvantages of such boilers. "The Modern Armor-Clad" is the first installment of an article illustrating in detail the actual construction of a battleship or armored cruiser. "Designs for the 'Denver' Class of Sheathed Protected Cruisers" is by Rear-Admiral Philip Hichborn, Chief Constructor, U. S. N., and gives in detail his views regarding the class of cruisers with which our readers have already been made familiar. "Krupp Armor-Plate Tests" describes important tests. "Effect of Hydrocyanic Gas upon the Germination of Seeds" is an interesting paper by C. O. Townsend. "A Problem in American Anthropology," by Prof. F. W. Putnam, is concluded. "The Explosive Side of Acetylene" is by F. H. McGahie.

Contents.

(Illustrated articles are marked with an asterisk.)

Acetylene, explosive features	354	Heavens in December	356
of	354	Inventions, index of	364
Africa, future of	353	Inventions recently patented	363
Antidote new	357	Kite, cellular*	370
Automobile news	358	Naval programme	354
Botanical garden*	361	Nicaragua Canal, Congress and	354
Bridge, cables of the new	354	Notes and queries	363
"Columbia" in European waters	354	Patent Office Gazette, largest	357
Cork, compressed	355	Physics in chemistry, experiments in*	360
Crystal Palace repairs to	357	Pictures, new process for reproducing	357
Dawson, death of Sir William	355	Plants, dwarf, habits of	357
Electrical notes	359	Plates, new process for	356
Engineering notes	359	Railroad engineers	343
Error, a gross	354	Science notes	359
Fish, photographing living*	352	Supplement, current	363
Flashlight device*	357	Tidal bore at Moncton*	356
Flue cutters*	363	Torpedo boat speed	358
Fruits, American	355	Tropics, existence in	355
Fulton, monument to	355	Water plants as land winners	363
Funafuti expedition	364		
Gas explosion*	357		