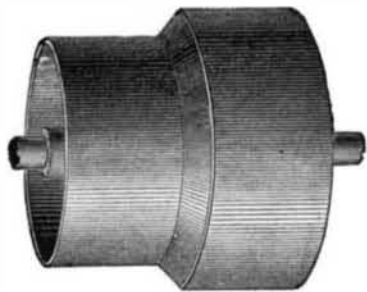


**STREIT'S NEW BEVEL FLANGE LOOSE PULLEYS.**

The chief difficulty encountered in the use of tight and loose pulleys, is that of keeping the loose pulley properly lubricated when the machine is, at rest, and, consequently, while the loose pulley is revolving upon its shaft. The combined influences of the pressure of the belt, produced by its tension, and the centrifugal force from the revolution of the pulley, tend to force out and throw off the lubricating substance, leaving the shaft and bearing of the pulley exposed to all the effects of friction, which is increased in a ratio corresponding to an increased velocity of the pulley. By a departure from the usual line of invention, it is now claimed that these objectionable features have been overcome in a remarkable degree by the use of a loose pulley having a smaller radius than its accompanying tight pulley, the belt being conveyed from the loose pulley to the tight pulley by means of an incline, which is shown in the accompanying illustration.

The principle involved in this device consists in relieving the loose pulley from the effects of the tension of the belt. The belt, when upon the tight pulley, has a tension requisite for driving the machine, but when moved to the loose pulley, the lesser diameter of which reduces the distance between the outer peripheries of the driving pulley and loose pulley, practically lengthening the belt and reducing the friction on the bearing of the loose pulley to that resulting from the belt alone.



These pulleys, we are informed, were subjected to a thoroughly practical test at the recent Centennial Exposition at Philadelphia, where the results obtained were such as to insure the success of the device, which has since been demonstrated in evidence received of their continuing to grow in favor with those having them in use.

A patent for this improvement—"The combination of a tight pulley, a loose pulley of lesser diameter, and a means, in the nature of an incline, for guiding the belt upward from the smaller to the larger pulley"—was granted to J. A. Fay & Co., September 25, 1877; and they are placed upon all counter-shafts constructed by the above-named firm, and from whom any further desired information can be obtained by addressing J. A. Fay & Co., Cincinnati, O.

**How to Kill Entomological Specimens.**

A correspondent says the method of killing entomological specimens, by putting them in a glass cylinder closed at one end, and then inserting a wad of tow saturated with ether on closing the other end of the cylinder, is very good, but when putting the insect, especially butterflies, in the tube, it flutters its wings, and so loosens some of the colors. A better way is to put a small drop of chloroform on the insect's head as soon as it is caught, and the effect is that it instantaneously dies. Not even a relaxation of the muscles being perceptible.

**JOHNSON'S IMPROVED BOILER PLATE SHEARS.**

The improved boiler plate shearing machine herewith illustrated is claimed to be solidly constructed, not liable to become out of order, and to be capable of being expeditiously changed to give any desired bevel upon different thicknesses of plate. A is the stationary blade attached by bolts passing through lugs formed upon the side edges of the bed plate. It is held against outward pressure by a wedge, B, driven between its outer edge and a flange formed on that of the bed plate. The movable plate, C, is bolted to a holder, D, which works in a guide socket, E, which is pivoted to the standard at F. Lugs having curved slots are formed upon said guide socket, and through these slots pass bolts, so that by adjusting the latter the sockets may be placed to give any desired bevel to the cut. To the upper corners of the holder are pivoted bars, which in turn are pivoted to another pair of bars, and these last to the end of the standard. At the point of meeting of the pairs of bars is pivoted a connecting bar, G, which passes back through the standard and is connected to the short arm of the bell crank lever, H, which is pivoted to the standard, as shown. To the long arm of this lever is adjustably connected a connecting rod, which communicates with the operating lever, I. At J is a guide, which can be adjusted by the hand nut shown, and which serves to keep the plate parallel with the blade while being cut.

Patented through the Scientific American Patent Agency, May 15, 1877. For further

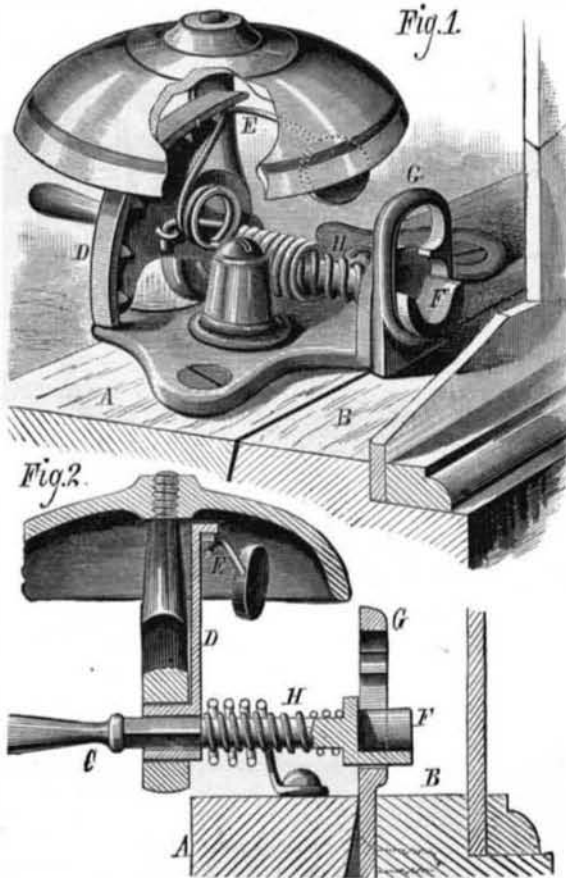
information address the inventors, Messrs. J. W. & R. Johnson, Ferrysburg, Ottawa county, Mich.

**IMPROVED BURGLAR ALARM WINDOW FASTENING.**

The annexed engraving represents an improved fastener and burglar alarm particularly applicable to securing windows, shutters, and other similar devices, which is so constructed that in case of any one attempting to raise or lower the lower or upper sash without first releasing a bolt, a bell is sounded and an alarm given. Fig. 1 is a perspective and Fig. 2, a sectional view.

A represents the top bar of the lower sash, and B, the bottom bar of an upper sash, of a window.

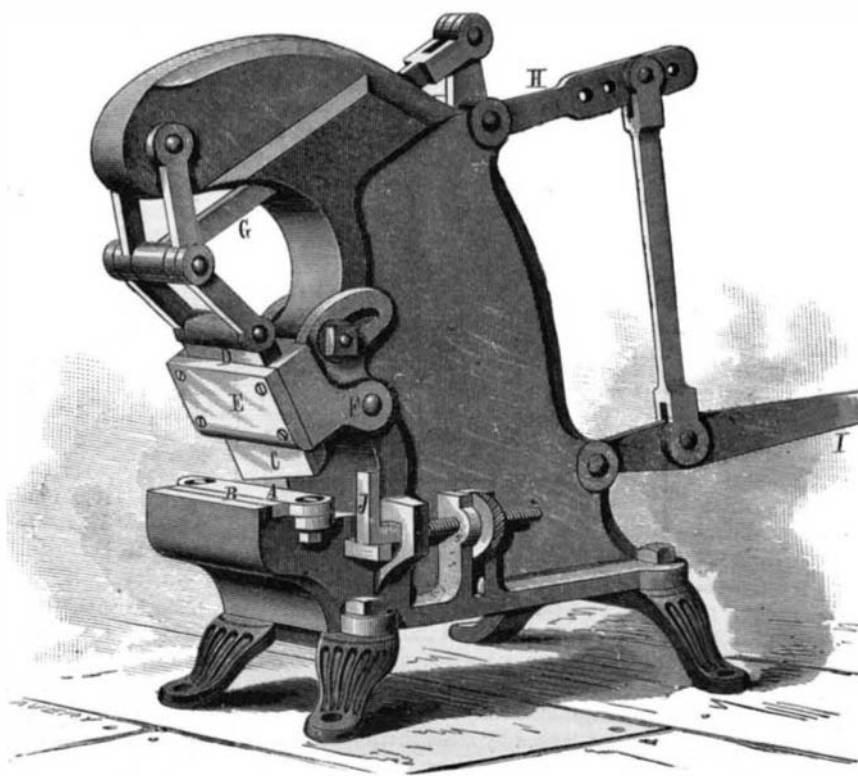
To the bar, A, is affixed the main framing of the device by means of screws. On the frame is a standard, which supports the bell shown.



C represents a bolt, which is supported in bearings in such manner that it is capable of a to-and-fro as well as a revolving motion. Upon the bolt, C, is mounted a semicircular disk, D, which is provided with a circumferential rim, and a series of serrations or projections, adapted to engage with and operate the arm of the gong hammer, said arm being formed on the end of a spring coil, which is mounted on a standard, forming part of the main framing, C.

The bolt, C, at one end is provided with a handle, and at its opposite end with a semicircular locking piece, F, which, when the bolt is thrown, passes into a recess, in a plate, G, carried by the bar, B.

A projection is formed on one side of the recess, the object of which is that, in the event of either of the sashes of a window being attempted to be raised or lowered without the bolt being withdrawn, the projection will immediately come in contact with the semicircular locking piece, and cause the same to make a partial revolution, and in so



JOHNSON'S BOILER PLATE SHEARS.

doing cause the disk, E, to also revolve, thereby operating the arm and ringing the gong each time a serration or projection passes said arm.

The bolt is kept forward in a locking position (when not otherwise held by the handle) by means of a spring, H. Around this spring is also arranged a second spring, adapted to bring the bolt and disk back to their normal position when they have been revolved.

Patented August 21, 1877. For further particulars relative to purchase of patent rights address the inventor, Mr. George Saurbrey, 195 East Livingston avenue, Columbus, Ohio.

**BORDEN'S IMPROVED GAUGE COCK.**

The object of this invention is to provide a gauge cock that will not allow of the escape of hot water or steam if it should be broken off outside of the boiler shell. In the engraving, A is the body of the gauge cock, which is bored longitudinally through its center, and threaded internally to receive the spindle, B, upon which a thread is cut that fits the internal threads of the body, A. The inner end of the body is concaved to receive the convex valve, C, which is attached to the end of the threaded portion of the spindle, B. The outer end of the spindle, B, is provided with a hand wheel, and is surrounded by a stuffing box at the outer end of the body. A passage runs lengthwise through the body, A, the inner end of which terminates at the annular



groove cut in the valve seat, and is closed by the valve, C, and its outer end terminates in a nozzle. The body, A, is threaded externally and screwed into the boiler in the usual way. The internal thread of the body, A, and the thread of the spindle, B, extend from the valve and valve seat outward beyond the boiler shell, so that if the gauge cock should by accident become broken outside of the boiler shell the valve would be undisturbed, and the accidents that usually follow the breaking of gauge cocks entirely avoided. The valve of the cock is opened or closed by turning the screw by means of the hand wheel.

This invention was patented through the Scientific American Patent Agency, June 19, 1877, by Mr. Henry L. Borden, of Elgin, Ill.

**Is There a Resisting Medium in Space?**

Mr. C. B. Warring, of Croton-on-the-Hudson, has written to the *Tribune*, suggesting that the rapid motion of one of the newly discovered moons of Mars may be explained without impugning the nebular hypothesis, by the supposition that there is a resisting medium in space. If at the time this moon was left behind by the shrinking nebula of Mars, its distance from the center of that nebula was comparable with that of our moon from the earth, and it was afterward drawn nearer to the planet because of the check occasioned by a resisting medium, its time of revolution would be shortened as it approached the planet. On the other hand, the revolution of the planet itself would be little affected by the resisting medium; but to whatever degree it was affected, its speed of rotation would be decreased, and hence the difference between the times of the planet's rotation and the satellite's revolution would become greater. Mr. Warring regards the discovery of the swift moving satellite as evidence in favor of the presence of a resisting medium in space. He suggests as problems not less difficult of solution, the questions why the eighth satellite of Saturn is 12° or 14° out of the plane of the other satellites and the rings of the planet; and why our moon is 18½° nearer the ecliptic than the plane of the earth's equator.

**Substitute for Tea and Coffee.**

In an official report by Mr. O'Connor on the general condition and economic progress of Brazil, he states that the cultivation and preparation of sterva-maté, which is largely exported from the province of Paraná to the neighboring countries of Uruguay, Paraguay, and the Argentine Confederation, has not yet become an article of commerce for European markets, and this will be regretted by those who have experienced what a capital substitute it is for either tea or coffee. In its nature more fortifying and alimentary, and far more wholesome, it can be bought at a price so moderate that it would easily be within the means of the poorest inhabitants of Ireland or Scotland; and it is said there can be no doubt that if it were once known it would be extensively used in place of the far more expensive and sometimes adulterated beverages of tea and coffee. A small sum has been appropriated by the Minister of Agriculture, with a view to make this excellent plant

known in Europe, and it is sincerely hoped that the experiment will be productive of beneficial results.—*London Grocer.*

**What They Say About Us in India.**

Campbell, the poet, in his poem on "The Last Man," has written verses which have attractions for most men, more or less. The Bible tells us the history of the first man, and unsatisfied curiosity peers forward, and wants to know the situation and position of the last man.

Almost numberless have been the speculations on this topic. The raciest of them which we have seen is that which we give elsewhere from the SCIENTIFIC AMERICAN, and to all of our readers who can enjoy genuine humor, based on good scientific knowledge, we commend the perusal of this very clever skit. *En passant*, we may say that for good sound scientific knowledge, clear cut and luminous engravings, combined with ability and liveliness in general conduct, the SCIENTIFIC AMERICAN has no peer. It is *sui generis*. There are English journals which give more scientific matter, but there is none which has such decided characteristics as those that make this publication peculiarly unique. One is sure to know from it the latest results of science put in the most attractive form, realizing, indeed, Tennyson's line:

"The fairy tales of science and the long results of time."

—*Madras Times.*

**Ventilation of Soil Pipes.**

At a recent meeting of the New York Board of Health it was resolved that soil pipes in tenement houses and vaults, when within twenty feet of any dwelling, should be carefully ventilated by pipes to be laid as the Board directs. After November 1, violations of this resolution will be prosecuted civilly and criminally.

**ARCHER FISHES.**

The chelmons are a species of fish indigenous to the Indian Ocean. They are divided by naturalists into two varieties, distinguished respectively by the short and long nose or snout, and by the disposition of the very beautiful colors which their bodies exhibit. The short-nosed chelmon has a greenish hue over its body; the fins are green with blue reflections. A black spot surrounded by a pearly white circle appears on the dorsal fin, and on the body itself are bands of blue and mother-of-pearl. The long-nosed chelmon, which is represented in Fig. 1, is of a citron yellow color. There is a large black spot beside the forehead, the front of which is azure blue. The eye is of a bright rose tint; and on the anal fin is a circular spot of black bordered with white.

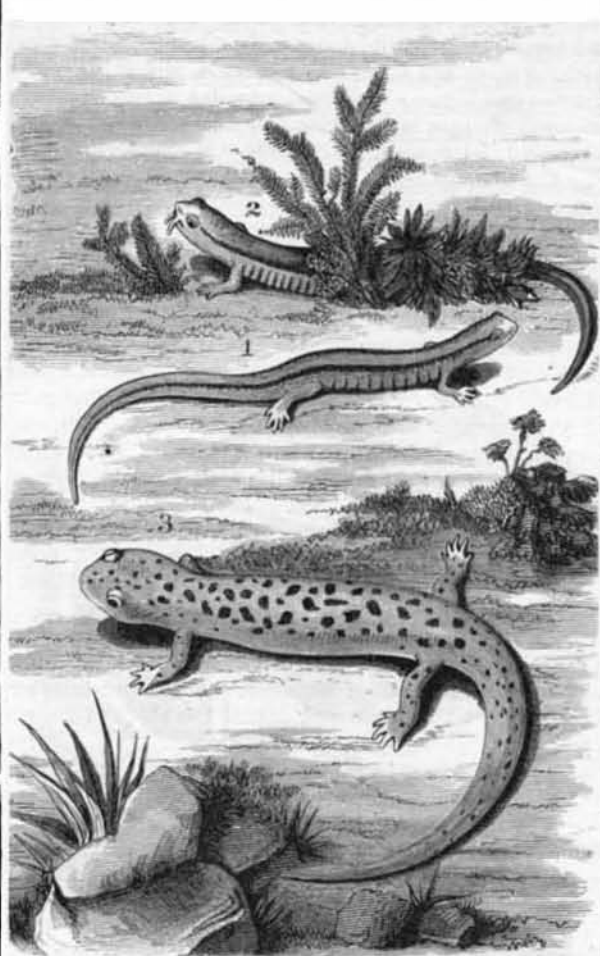
This fish has a singular way of obtaining its food, which has earned for it the name of archer fish or fish pump. It frequents the mouths of rivers, and especially shallow places, in search of the insects which exist on the marine plants, the stalks of which rise a little above the surface of the water. As soon as the fish spies its prey, it approaches cautiously as near as possible, and then, raising its snout above the surface, squirts out a fine stream of water with considerable force and unerring aim. The jet is often projected over a distance of 6 feet. The insect struck is stunned and falls into the water, and there is easily captured by the chelmon.

The representation of another group of archer fishes, and to which this name is more specifically applied, is depicted in Fig. 2. The body is elongated, the line of the back being nearly straight, while the belly is strongly curved. The color is olive brown, or yellow, marked with large oblong spots or bands. Although the mouth of this fish is of entirely different formation from that of the chelmon, it takes its prey in precisely similar manner. The Chinese keep the fish in tanks in their dwellings, as pets, feeding them by presenting the insect on the end of a straw, from which the fish knocks it off by ejecting his water jet.

**THE RED AND THE TWO-LINED SALAMANDER.**

BY C. FEW SEISS.

You may, perhaps, have seen in some brook or spring, a bright red, lizard-like animal, either lying motionless at the



bottom, or wriggling beneath a stone at your approach, to escape observation. This is the red salamander, Fig. 3, *spelerpes ruber*, Daudin. The whole superior surface of this animal, in life, is vermilion red, thickly spotted with black,

the spots smallest on the head and tail, and disappearing half way down the sides of the body. A few small spots on the under jaw and the legs. Beneath, spotless orange-red. The eyes are prominent, with a golden yellow iris; a dusky spot before and behind the pupil; pupil oval and black. The dark spots on the iris give it a linear appearance. It varies in size; I have seen it from 3½ to 6 inches in length.

Although so bright and pretty during life, a few hours' immersion in alcohol changes its bright vermilion color to a dirty white. It seems nonsensical to label a uniformsoiled white, black-spotted animal, the *s. ruber*. Dr. Holbrook says "it is a land animal, and is found under rocks, fallen and decaying trees, etc." This is not the case with the red salamander in Pennsylvania and New Jersey, for I have never seen it captured out of the water. The finest specimen I ever saw was in a spring of cold water, and as the time was the middle of summer, it is not probable it had gone there only to deposit spawn. It can, however, remain out of water for a long time; specimens in our aquarium often remained upon floating objects for several successive hours. It is quite possible it could live in extremely moist situations for months at a time.

The food of the red salamander consists of insects and small earth-worms. In the aquarium it is showy and interesting, but as it is an air-breathing animal, it should be furnished with the means of quitting the water when it is so desired.

Another animal belonging to the same genus as the preceding, and frequently met with in Pennsylvania, is the two lined salamander, Fig. 1, *spelerpes bilineatus*, Green. It is a terrestrial species, but frequents only moist places, and most generally in close proximity to a stream of water or spring.

Occasionally during the breeding season two barbels or cirri appear upon the upper jaw of the male, between the nostrils and the lip. Green's *salamandra cirrigera* appears to be a male of this species thus adorned (see Fig. 2). The use of these barbels is unknown, but they seem to be simply ornamentations, to show, perhaps, when the possessor pays his addresses to the females, that "the sign of man is now upon his chin!"

The young or larva of this, as with other species, are provided with gills, and breathe water only. When the gills disappear it becomes a perfect salamander, and respiration

is performed with lungs. The young *bilineatus* resembles the adult in color, but the colors are less bright, and the lines less distinct. In mature animals the color is brownish yellow above, with a black line on each side beginning behind the eye, extending along the flanks, and lost near the end of the tail. Beneath, bright yellow. It is a small species, rarely exceeding three inches in length. In activity, it far surpasses the red salamander, and you will learn, as I have, "you must be quick with your hand if you wish to catch a *bilineatus*."

**Pheasants Poisoned by Shot.**

A short time ago the keepers on Sir H Tufton's estate at Ashford, England, noticed a singular mortality among the pheasants. The cause was not immediately discovered, but it was eventually found out that the birds swallowed the splinters from spent bullets lying about on the ground at the range of the local volunteers, which was close at hand. The lead did not produce immediate death, but caused lead poisoning, to which the birds by slow degrees succumbed. Other even more remarkable instances than the above have occurred with pheasants and grouse swallowing shot picked up in the coverts that have been shot, and among the heather, in mistake either for seed or gravel.

Last year a considerable number of pheasants died in one gentleman's preserve alone in Lancashire from this cause, and there is every probability that many of both pheasants and grouse casually found dead from some unknown cause owe their death to picking up pellets in this manner.

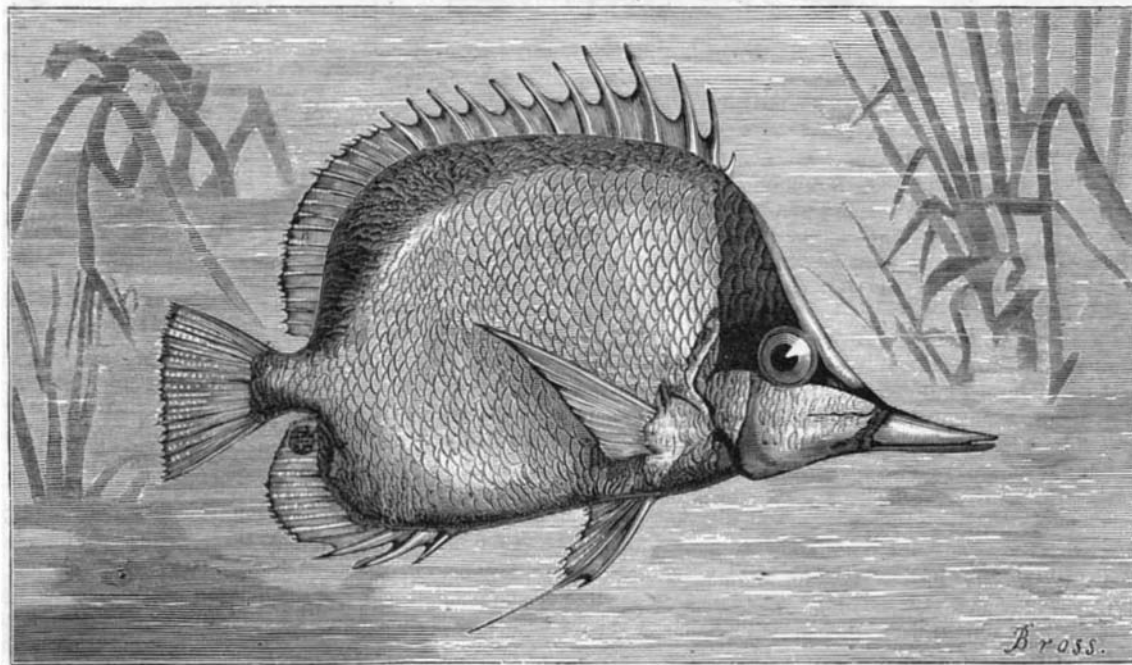


Fig. 1.—THE LONG-NOSED CHELMON.

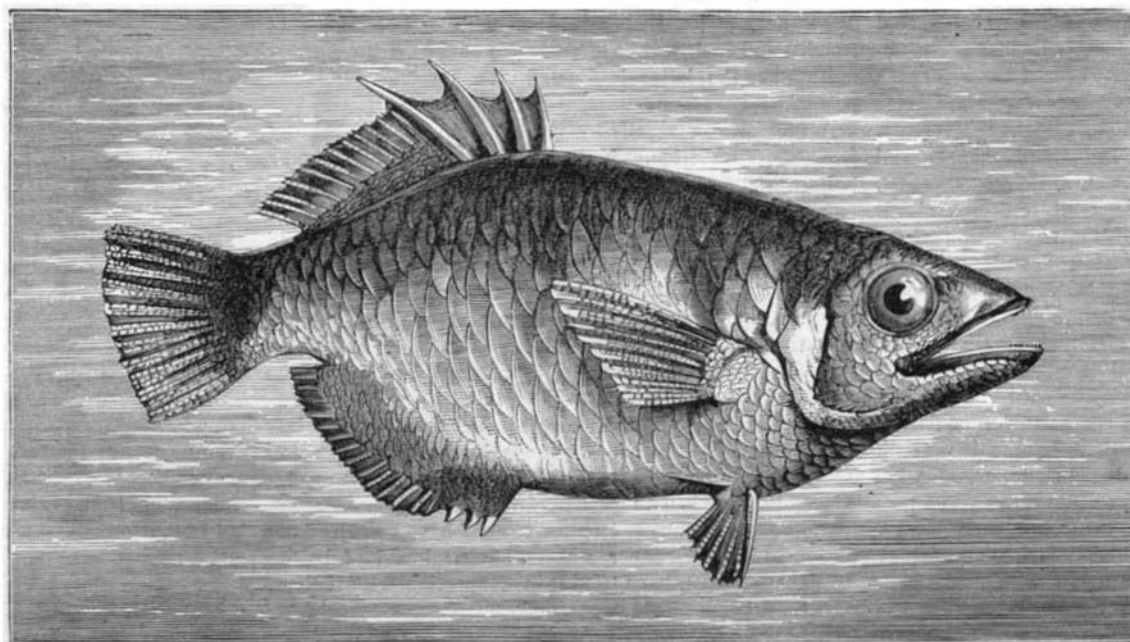


Fig. 2.—THE ARCHER FISH.