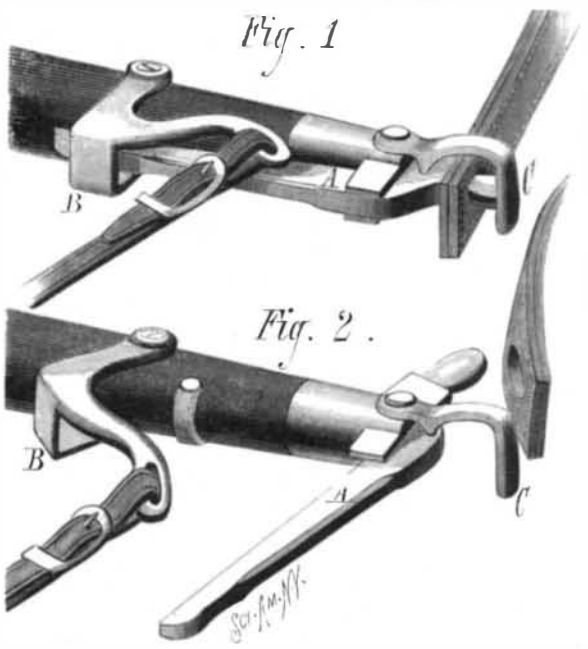
NEW SAFETY WHIFFLETREE.

The engraving shows a simple and effective device for instantly detaching horses from a vehicle. This invention was recently patented by Mr. B. J. Quattlebaum, and is controlled by Messrs. Brooker & Home, of Ridge Springs, S. C., who are general agents for the inventor in the United States. The invention will be comprehended by a glance at the engravings, in which Fig. 1 shows one end of a whiffletree with the trace attached, and Fig. 2 shows the device as it appears when letting the trace go.

The whiffletree is of ordinary construction and attached to the pole or shafts in the usual way. The end of the whiffletree is provided with a clip in which is pivoted the lever,



QUATTLEBAUM'S SAFETY WHIFFLETREE.

A, with its shorter arm projecting beyond the end of the whiffletree to receive the end of the trace, while the longer arm rests against the rear side of the whiffletree and is retained by a locking lever, B, pivoted to the whiffletree, and having its longer arm projecting in a direction parallel with the lever, A. To this arm is attached one end of a forked strap, the other end of which is connected with a similar lever on the opposite end of the whiffletree. This strap is within easy reach of the driver, and when pulled moves both levers, B, simultaneously allowing the levers, A, to escape, and permitting the traces to slip off, as indicated in Fig. 2. This operation is so simple and easy that a child can readily work the device even when the horses are pulling to their full extent. A spring guard, C, attached to the end of the whiffletree, serves to prevent the accidental unfastening of the traces. When the trace is to be put on or removed from the rounded end of the lever, A, the guard, C, is sprung out of the way. This device is simple and inexpensive, and there appears no reason why it may not outlast the whiffletrees. It is a useful and much-needed invention, and should find a ready application wherever horses are used.

IMPROVED HYDRAULIC RAM.

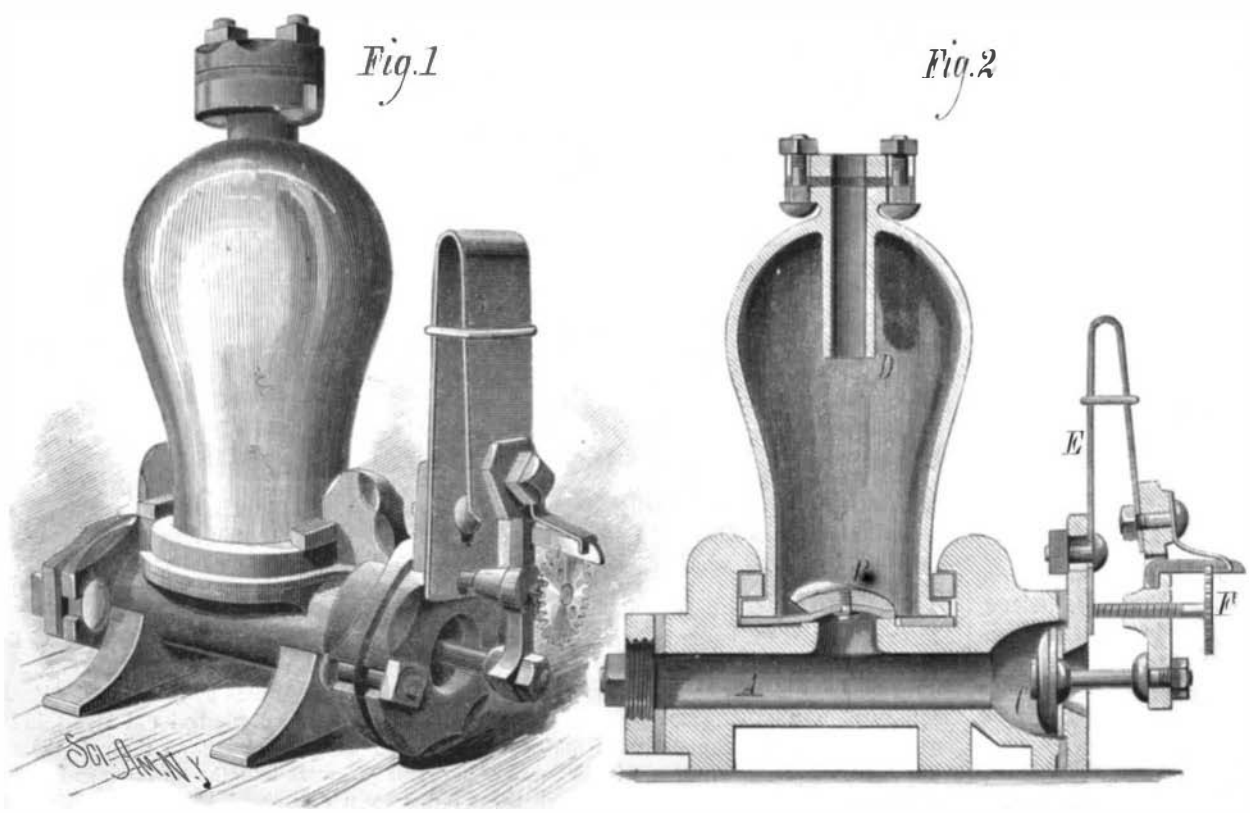
The hydraulic ram is one of the simplest and most desirable devices for raising water where a fall of a foot or more is available, providing its construction be such as to insure continuous and uniform action under equable conditions. A ram which seems to embody every essential feature without being unduly complicated is represented by the annexed engraving, in which Fig. 1 is a perspective view showing the exterior, and Fig. 2 is a vertical section showing the interior construction.

The base of the ram has a horizontal passage, A, with a discharge valve, B, at the top, and an overflow valve, C, at the end. Covering the discharge valve there is an air chamber, held in place by keys or wedges, and furnished with a discharge pipe at the top, which projects a short distance downward and serves the double purpose of a discharge for water and an escape for the surplus of air in the chamber. One of the greatest troubles with all rams, aside from this one, is the gradual increase of water in the air chamber until the chamber is filled and the ram stops. The ram shown in the engraving airs itself, and drives off with the water any surplus air when the quantity is more than sufficient to fill the space above the lower end of the tube, D.

The discharge valve, B, is attached to a flap formed on a disk of leather which also forms the packing of the lower end of the air chamber. The valve is concaved to receive the head of the rivet or bolt which secures it to the leather, and the leather touches the valve seat a short distance from the edge of the valve opening. By means of this construction the valve is always kept free from ridges, and whether or not it always strikes exactly in the same place it is always tight.

The overflow valve, C, is hung upon a casting attached to the lower end of the spring, E, and its stroke is regulated by the screw, F, which bears against the body of the ram. The screw, F, carries a toothed head which may be secured in any desired position by a stop or pawl. This construction admits of regulating the overflow valve to the $\frac{1}{448}$ part of an inch, and effectually prevents it from jarring out of adjustment. The valve can be regulated to make from 30 to 300 strokes per minute, and the ram may be adjusted so delicately as to raise water 10 feet on a 9 inch fall, or it may raise water 200 feet with less than 4 feet fall. For irrigating lands, supplying dairies, farms, barnyards, dwellings, factories, engines, railroad stations, villages, etc., this ram is invaluable, as its extreme simplicity enables it to be set up or repaired by any one likely to use it.

This improved form of hydraulic ram is the invention of Mr. H. F. Morrow, of Chester, Pa., who has a patent for it and an application pending.



MORROW'S HYDRAULIC RAM.

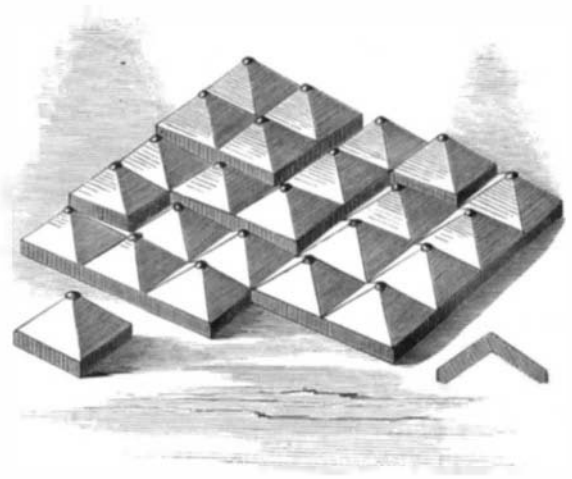
Mode of Purifying Oils.

Oils in their natural state are always more or less impure, and some of them so viscous as to be quite inapplicable to the lubrication of machinery, or to illuminating purposes, without previous purification. The impurities consist, for the most part, of albuminous, mucous, gelatinous, and coloring matters. A great part of the mucilaginous matters, and all bodies merely in a state of suspension, are deposited by repose for a short time; but, in order completely to clarify the oil, it is necessary to employ other means. The method most generally adopted is that suggested by Thenard. Sulphuric acid, for example, in the proportion of 1 to 2 per cent of the oil, acts as a purifying agent, precipitating the mucilage and parenchymatous matters: first, by its powerful dehydrating action, it removes the water by which the substances were held in solution in the oil, and afterward chars the mucous matters themselves, thus rendering them insoluble, or otherwise effecting their destruction. The oil itself is, to a small extent, used upon. It becomes green or dark brown, and after some time yields a deposit of the same color, becoming itself bright and clear.

Thenard's purifying process, as improved by Cogan, is conducted as follows: The oil is heated to 212° Fah. by steam in a copper pan. When sufficiently hot, from 1 to 2 per cent of sulphuric acid is gradually poured in, with constant and violent agitation. As the action of the acid depends more or less upon the amount of contact between the two liquids as well as upon the degree of heat, Cogan's improvement consists in blowing steam through the mixture. In five or ten minutes the action will be complete, and after twenty-four hours' repose, the oil will be almost entirely freed from acid, and the black feculent dregs will subside, leaving the supernatant oil quite clear and greatly improved in color. For one hundred gallons, ten pounds of sulphuric acid are required, diluted with an equal bulk of water. After standing for twelve hours, the black watery acid liquor is withdrawn, by opening a stop cock at the bottom of the pan. The clear and limpid oil is then drawn off by opening a tap in the side, and what remains below this tap is turbid, and this, being let out into a reservoir, is either clarified by subsidence, or mixed with the next portion of raw oil.

NOVEL FIRE KINDLER.

The engraving shows a recently patented fire kindler which dispenses with matches, and is always ready and reliable. The kindler is moulded from inflammable material in the form of hollow pyramids, a number of which are produced in a sheet, as indicated in the illustration. The apices of the pyramids are tipped with a striking surface of material something like that applied to the ends of safety matches, which can be ignited only by striking it against a prepared surface. This admits of packing and shipping the kindlers with perfect safety. The peculiar form of the sheet admits of forming a very close package, and it facilitates breaking off one or more of the pyramids as may be required. The material of the kindler is easily ignited, and burns for a long time, giving off no unpleasant odors. It is



IMPROVED FIRE KINDLER.

cheaply made, and answers perfectly the purpose for which it is intended.

Further information may be obtained by addressing Mr. Wm. Rausch, 1828 Wood street, Philadelphia, Pa.

Proposed Crematory in Brooklyn.

The advocates of cremation, as an economical and sanitary mode of disposing of the dead, appear to be increasing in number and confidence. It is now proposed to establish a crematory in Brooklyn, a gentleman having tendered a plat of land there for the purpose. Steps have been taken to organize a society for the construction and operation of the crematory, with an associated society for collecting, collating, and publishing information in relation to cremation and its advantages. It is expected that the expense of cremation may ultimately be reduced as low as five dollars.

Compressed Air Locomotive.

A preliminary trial to test the practicability of employing compressed air instead of steam as the motive power for an underground railway lately took place on the Metropolitan line, London. The engine employed was one of Beaumont's compressed air locomotives, and was originally made for a tramway. It was not large enough to draw a complete train, the wheels being only thirty inches in diameter. The inventor, Colonel Beaumont, R.E., was present, together with Mr. Tomlinson, chief engineer of the line; Colonel Frank Bolton; Major Ardagh, of the War Office, and several other gentlemen. A start was made from the Chapel street works of the railway company, near the Edgware road station. The engine ran to Baker street, where it was shunted on to the St. John's Wood line to pick up a carriage, which most of the party entered in order to continue the journey. The engine then ran from Baker street to Moorgate street. On the return journey, after a halt at King's Cross, the engine ran without a stop to Edgware road, the distance between the two stations—which is for the greater part an ascent of 1 in 100—being performed in eight minutes, or less than the average time taken by the ordinary trains The total distance run, including the shunting, was about eleven miles, and the weight moved, including the engine itself, was about 20 tons.

The engine commenced with an initial pressure of 1000 lb. on the square inch, and when the run was finished the gauge showed a remaining pressure of 300 lb. in the cylinders. The engine was perfectly under control throughout the trial, and was started and stopped with the greatest ease. Further experimental trials will be made on the Metropolitan line, but for the present the result is considered highly satisfactory.

Hudson's Bay as a Possible Outlet for the Northwest.

During the past summer the engineers of the Nelson River Railway Company have surveyed a railway route between Norway House at the outlet of Lake Winnipeg and Fort Churchill on the Hudson's Bay. The distance between these places is about three hundred and fifty miles. The surveyed route first follows the course of the Nelson River for a distance of nearly one hundred miles over a level country. The next part of the road is over a broken rocky country, where the Nelson River has a descent of nearly seven hundred feet to the lower plateau, where the country again becomes level, and continues so to Hudson's Bay. Upon entering this rocky range the surveyed route leaves the Nelson River, taking a more northerly course toward the valley of the Churchill River, which is reached at its entrance on the lower plateau, and continues to follow the course of the river to its outlet in Hudson's Bay. The estimated cost for building the road-bed is ten thousand dollars a mile on the plateau and seventeen thousand dollars a mile through the rocky portion of the route, or an average of twelve thousand dollars per mile along the whole route.

It is claimed that by this route it will be possible to transport grain from the Saskatchewan Valley to Liverpool for less than it will cost to carry it to Montreal by the proposed railway north of Lake Superior.

Professor Bell, of the Canadian Geological Survey, who sailed from Fort York, Hudson's Bay, and passed through Hudson's Straits in the latter part of last September, says that sailing vessels have sometimes considerable difficulty and delay in getting through, but steamships can make the voyage at any time between the first of May and November, as the straits are nearly one hundred miles wide in the narrowest part, and the channel is not obstructed by ice.

A Gigantic Electrical Battery.

An immense galvanic battery has been constructed for use in the lectures at the Royal Institution, London. It consists of 14,400 cells of chloride of silver and zinc elements. Each cell is composed of a glass tube about the size of a large test tube, stoppered with a paraffin wax stopper, through which the zinc rod and chloride of silver are inserted, a small hole being left to pour in the solution, which consists of a weak solution of chloride of ammonium (sal-ammoniac), the hole being fitted with a small paraffin stopper to make it air-tight. The tubes are mounted in trays, each containing 120 cells; eighteen trays are fitted in each cabinet. The battery, which is in the basement of the building, was begun in June, 1879, and finished in August, 1880. The charging of the battery occupied three persons a fortnight. A lightning flash a mile long could be produced by 243 such batteries, and yet Faraday has proved that the necessary amounts of electricity to produce a powerful flash of lightning would result from the decomposition of a single grain of water.

RUSSIAN BEER FLAGON.

The annexed engraving represents an example of Russian artistic metal-work. It is a massive silver flagon wrought in high relief, in a spirited design embodying an episode in

SILVER RUSSIAN BEER FLAGON.

the life of Peter the Great. With the exception of the waist of the vessel and knob of the cover the flagon is quite plain, but the relief portions are done in a style characteristic of Russian art.

SCALY-FINNED FISHES.

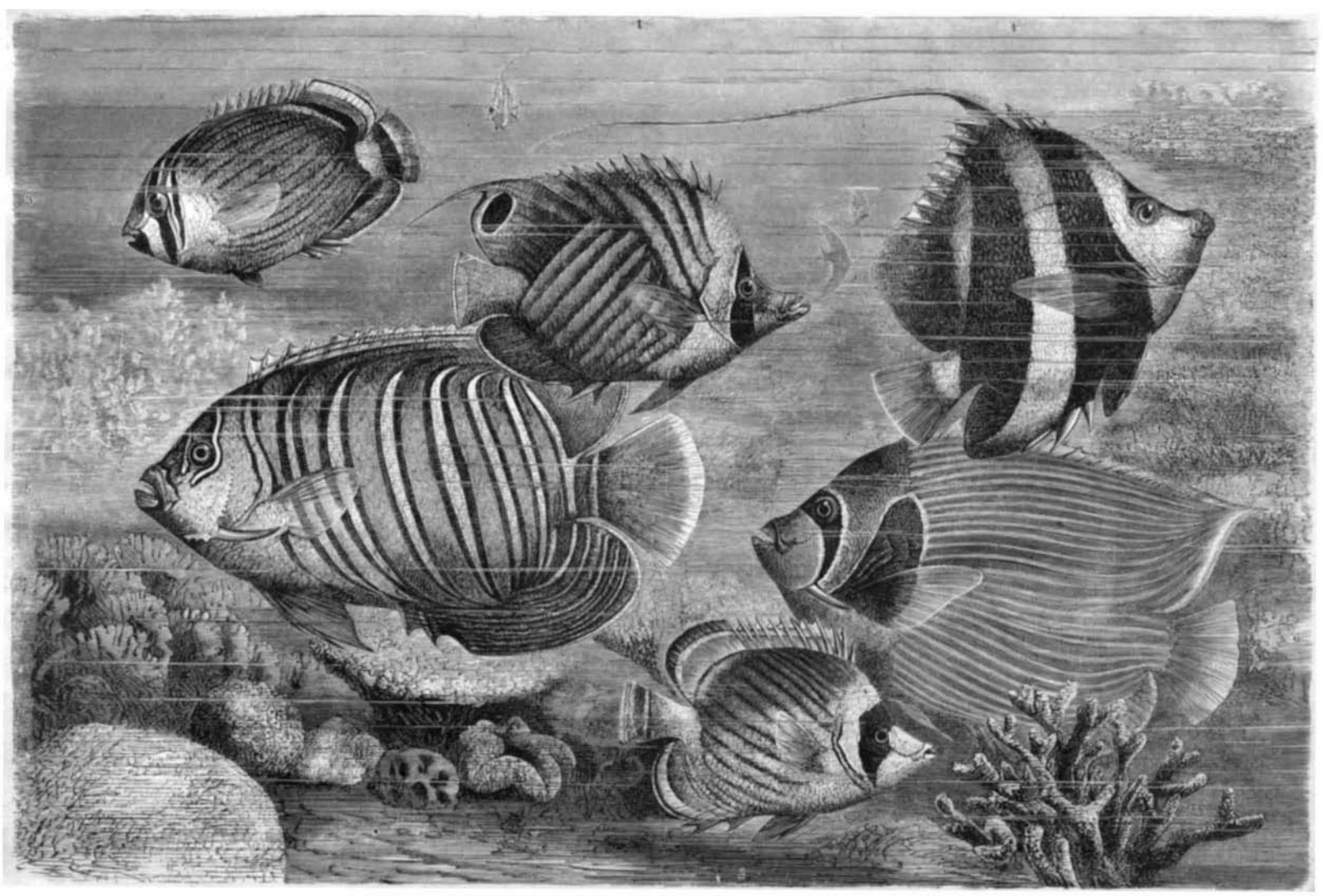
Our engraving represents members of a large family of fishes called by Dr. Günther *Squamipinnes* or scaly-finned fishes, because "the vertical fins are more or less densely covered with small scales;" but the spinous portions are not always scaly. These fishes are mostly carnivorous, and are inhabitants of the tropical seas and rivers. They are remarkable for their peculiar shape and their strange coloring. Their bodies are thin and very deep in proportion to their length, and their mouths are usually small.

The first group of this family have small mouths furnished with several rows of tiny, slender, and bristle-like teeth, which give them their scientific name *Chætodontina*, a term composed of two Greek words, the former signifying hair, and the latter a tooth. The colors of this group are brilliant and generally arranged in stripes or spots. Black and yellow are the prevailing colors, but blue and green are found in some species.

Fig. 1 in our engraving represents a fish which is found in the Indian Ocean and the western part of the Pacific Ocean, and is called by the Arabian fishermen of the Red Sea the flag fish (*Chætodon setifer*), on account of the considerable lengthening of the fourteenth ray of the dorsal fin. Dark bands run in different directions upon the whitish ground of the body. A black band edged with white extends from the neck through the eye to the throat; it is widened on the under-side. Five or six blackish bands run obliquely from the front upward toward the dorsal fin, and from these lines eight or ten bands issue nearly at right angles, take a slight sweep downward, and then converge toward the tail. The region over the eye is also ornamented with four orange-yellow diagonal lines. The back part of the dorsal fin is lemon color, and has a black spot surrounded with an edge of white; above this the fin is a fiery red edged with black. The caudal fin is lemon yellow, ornamented on the back side with a crescent-shaped pale yellow and white-edged girdle, then with a cylindrical dark brown, black-edged girdle. The anal fin is orange color edged with black and seamed with white. The pectoral and abdominal fins are reddish-white. The dorsal fin has thirteen spinous and twenty-five soft rays, the anal fin three spinous and twenty soft rays; the pectoral fin has sixteen, the abdominal fin six, and the caudal fin seventeen rays. The length of the fish is about eight inches.

The coral fish (*Chætodon fasciatus*), Fig. 2, is about six and a half inches long. The main color of the head is white, with a broad black band extending from the crown of the head to the "præ-operculum," or front gill cover. The body is a bright yellow, ornamented with from nine to twelve brownish-black bands running obliquely from the front upward and back, reaching to the yellow fins. The lips are rosy red. The soft dorsal and anal fins have a black border. The caudal fin has near the end a lentiform black diagonal marking and a whitish edge. The dorsal fin has twelve hard and twenty-five soft rays, and the anal fin three hard and nineteen soft rays. This fish inhabits the waters extending from the Red Sea to China.

A third species of this group is the cliff fish (*Chætodon villatus*), Fig. 3. It is about four and a quarter inches long. The ground color of the body is lemon yellow, and has about thirteen longitudinal stripes. The head is ornamented with a broad black curved eye band, with a narrower band behind it running in the same direction. The brow has three or four diagonal lines, which, with the bands and the surroundings of the mouth, are black. The soft part of the yellow dorsal fin has a black edged band and an orange colored border. The anal fin has a bright yellow stripe extending the whole length with an orange colored border, and the black caudal fin has a broad rosy-red border. The dor-



1. FLAG FISH.—2. CORAL FISH.—3. CLIFF FISH.—4. CHARIOTEER.—5. DUKE FISH.—6. EMPEROR FISH.