JIG-FILE FOR FINISHING DIES.

The accompanying sketch was made by our artist during a recent visit to the works of the American Waltham watch factory. It represents one of the thousand-and-one handy and ingenious machines with which the factory is crowded. Everyone who has handled a file at the bench knows how difficult it is to file a surface that shall be perfectly plane or exactly normal to some other surface. No hand is so steady or eye so true but inequalities or variation will occur. In the jig-file herewith shown the operator is finishing up some of the fine dies which are used in the factory. The file is carried in a vertically sliding head, operated by a crank and connecting rod below. It projects above a plane cast iron table, upon which the die is

JIG-FILE FOR FINISHING DIES.

firmly held down, and at the same time brought up with suitable pressure against the file. The machine is driven by belt and pulley and requires no manipulation after it is once started, the workman being able to direct his whole attention to bringing the die to the required shape. The table is capable of being set and clamped at any desired angle according as the edges of the die are to be square or at an angle with its face.

A LARGE OCTOPUS.

BY PROF. C. F. HOLDER.

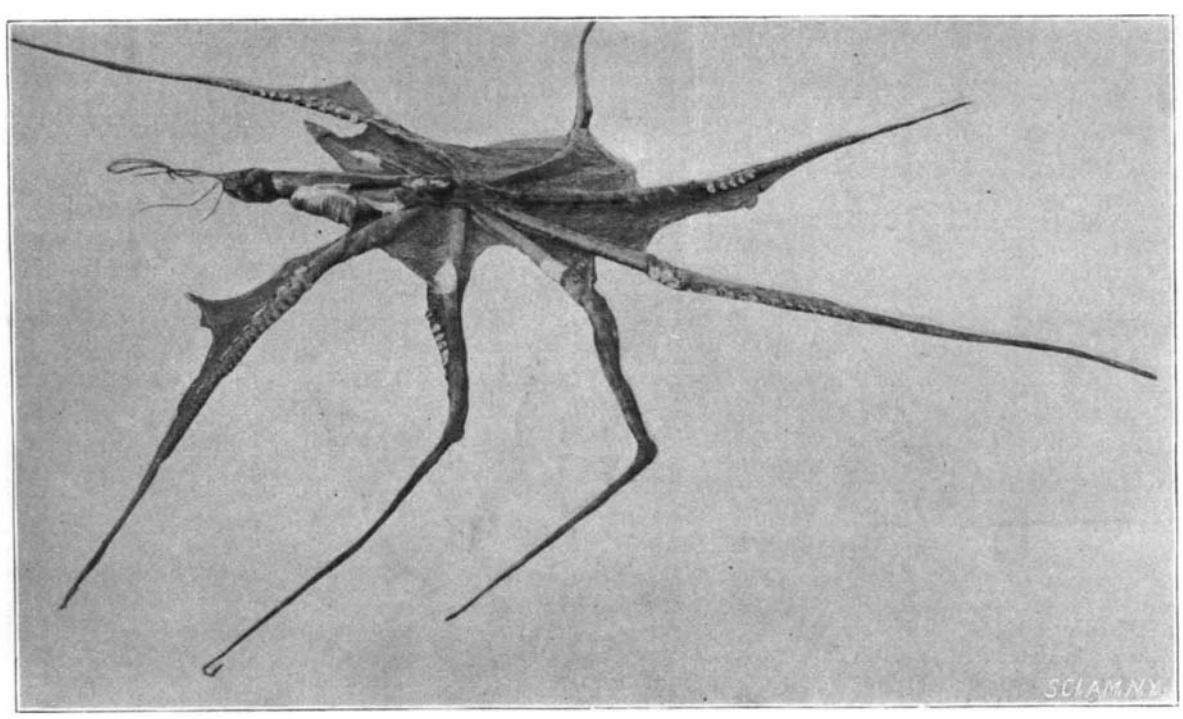
One of the most disagreeable animals of the sea to handle or contemplate is the octopus. The tangle of arms, the snakelike movements, the strange flashes of color, the green glittering eyes, are all features that arouse a strong feeling of aversion on the part of the observer. I have had under observation several octopi at the Santa Catalina Aquarium and it has been interesting to note the characteristic features of the various individuals. In a small tank were confined three individuals having a radial spread of perhaps 18 inches. One affected a light yellow hue and was timid, sulking behind a rock. Another, of a dark reddish cast, was continually flourishing its tentacles, rising and falling on the side of the glass until an observer nicknamed it the "skirt dancer." A third was almost black, and was a vindictive fellow, ready at any time to make an attack. When I introduced my hand into the tank, this octopus would as quick as a flash send out one long attenuated tentacle and coil about it, then if an advance was made it would suddenly release its hold upon the rock and quickly encompass my hand with its eight arms, pressing the round serrated disks into the flesh while a tremulous motion would be felt.

At the first attack of this kind the sensation was one of horror. The hideous creature flattened out, assimilating the color of the flesh to a marked degree and evidently endeavoring to smother the hand with its folds, as the tentacles were distended to their utmost limit. To hold the hand firm under such circumstances required some effort, and I confess when it was first attempted, with a Florida specimen, I beat a rapid and decided retreat; but in the latter case I waited to see if the animal's object was to bite, knowing that the bill of so small a specimen could not make a serious wound. But the octopus merely pressed its mouth on the back of my hand, apparently trying to intimidate the supposed enemy. While fastened to the hand, it still held to the rock, and it was with difficulty released. When I remained quiet, the animal began to creep along like a huge spider, but at the first movement of my fingers it pounced upon my hand again, enveloping it in the eightsnakelike arms. I finally twisted out of its grasp and seized it firmly by the body, when its rage became intense. Flushes of color passed over it in rapid succession; now red, black, yellow, and when at the height of its anger it was mottled and splashed with black—a frightful creature. It made a desperate effort to escape, but when released ejected a cloud of ink, darting off rapidly under its cover.

This octopus resented any intrusion and advanced to the attack at once. When a strange octopus was placed in the tank, although much larger, it came out of its corner without hesitation, eyed the newcomer a moment, then in some incomprehensible way literally hurled itself at the enemy, and in a second the two were rolling over and over in a contest that was amazing to witness. The sixteen tentacles wound about each other with the rapidity of light, and both animals ejected the inky fluid from their siphons. They resembled a ball of snakes rolling along and striking at each other more than anything else. A close examination of the writhing mass showed that the object apparently was to smother the opponent. Finally, the newcomer beat a retreat; it was badly wounded, and succumbed a few hours later.

The octopus is a favorite subject with popular writers on natural history, and many accounts have been written of its ferocity, which are almost invariably denied by naturalists; yet I am inclined to think that in some instances certain individuals are more or less pugnacious. I have handled scores of them from the Gulf of Mexico and California, and observed only one instance—the one cited—where the animal deliberately rushed to the attack, though I know of two others. One was observed by Mr. Ralph Arnold, a geologist, of Pasadena. He was wading among the pools at low tide at Point San Pedro when suddenly he heard a cry and turning saw some children in a pool, wading, and moving toward them a large octopus, its long arms raised above the water. Whether the animal would have attempted to attack them is a question, as it was interrupted in a more or less violent manner. A resident of Washington told me that once when visiting the shore he was advised by the fisherman with him to avoid the pools, and when it became necessary to cross them to pass over as quickly as possible, as large octopi frequented them. He considered this the exaggeration of a fisherman, and paid but little attention to it; but once in crossing a pool, stepping from stone to stone, suddenly a long livid arm shot out of the water and reached insinuatingly for his legs, the entire animal moving rapidly toward him. He, however, reached the rocks safely and bombarded the animal with stones. He estimated its size at twenty-five feet across, judging the tentacles to have been twelve feet in length. Again, it cannot be determined from this whether the animal would have seized him; though the observer was confident that it would, and that it was large enough to have held him under water had he been pulled in.

The specimen shown in the accompanying illustration was taken near Avalon, Santa Catalina Island. Its arms were over 10 feet in length, giving the animal a radial spread of at least 20 feet. The strength of these large octopi was shown in this instance, it being almost impossible to hold the animal until a large rope had been thrown about it. In Alaska the octopus attains even a larger size, individuals having been reported with a spread from tip to tip of tentacles of 25 or 30 feet. Such an animal is represented in the Yale Museum by a cast, and gives an excellent idea of how the living animal looks. At Santa Catalina Island small specimens are very common, and one has been taken in deep water—500 or 600 feet—having a radial spread of 15 feet, an uncanny monster, which, when it came up, threw its arms over the side of the boat and made a powerful resistance. Indeed, it was almost impossible to bring it in without tearing and cutting the large sucker-lined arms.



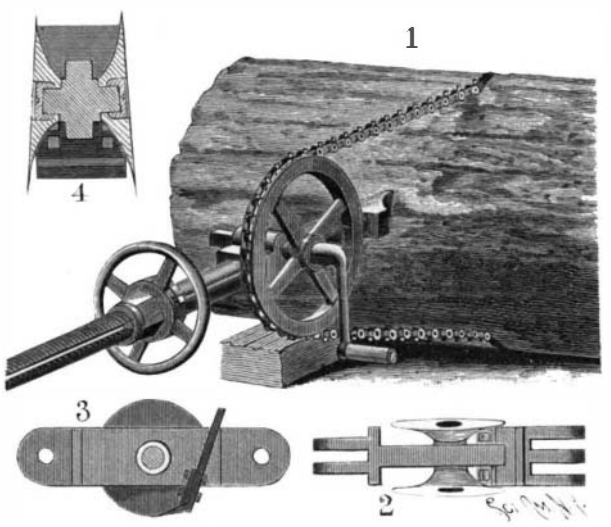
OCTOPUS TAKEN NEAR AVALON, SANTA CATALINA ISLAND, CALIFORNIA.

The octopus is a most interesting creature; its eight sucker-lined arms, like snakes, that creep into every nook, corner, and crevice; its power of changing color, blushing and paling at the slightest alarm, being features that appeal to the fancy and imagination. The octopus has a small mouth with jaws which call to mind those of a parrot and powerful enough to enable them to sever the vertebræ of good-sized fishes which they may capture. Each sucker is a factor, and when it is remembered that there are scores of them, with sharp cutting edges, one can imagine the reserve force and power of the animal. When closely pressed, they resort to the ink bag and force a stream of ink out which permeates the water and in the shadow of which they escape. I have seen a squid hurl its ink a foot or more into the face of a boatman in Florida, who was peering into the water in search of them.

The octopi in confinement, previously referred to, eat fish or crab meat, and upon securing it, spread out their webs, covering as much surface as possible, and when eating, the tentacles are nearly always in motion, "wriggling" being the only term to describe their peculiar motion.

A MECHANICALLY-OPERATED CROSS-CUT SAW.

A novel cross-cut band or chain saw which is designed to saw logs far more rapidly and effectively than an ordinary saw has been patented by Matthew



CLARK'S CHAIN CROSS-CUT SAW.

J. Clark, of Chaparal, Arizona Territory. Of the accompanying illustrations, Fig. 1 is a perspective view of the saw in operation; Fig. 2 is a plan view of a link of the saw; and Fig. 3 is a side elevation of a link, with the one cutter removed. Fig. 4 is a section of a link. The apparatus comprises a bar having at one end a head adapted to engage the log. At the other end the bar is threaded and formed with longitudinal grooves. A box is mounted to slide upon the plain portion of the bar and has arms with opposite flanges extending within the grooves. A two-part nut, operated by a handwheel, is mounted to turn on the threaded end of the bar, between the flanges of the arms. In the box a shaft is journaled carrying a sprocket-wheel around which passes the chain-saw. The links of the chain, as shown in Figs. 2, 3 and 4, are provided at each side with cutting-wheels inclined to each other so that only the edges will engage the wood, thus preventing the clogging of the wheels by the kerf. Chisels are connected with the links and extend between the inner faces of the wheels. The chisels are designed to detach a layer of wood cut by the wheels. In operation, the head of the bar is driven into the log, the chainsaw is passed around the log and sprocket, and the box carrying the sprocket is shifted along the bar by turning the