THE NEW YORK CABLE RAILWAY.

(*Continued from first page.*)

in a few inches of each other. One of these sections now operates the line along 10th Avenue, and the other will in the near future operate cables passing through 125th Street, from river to river. On the main shaft are four loosely mounted pinions, two at each section. Each pinion drives a train of gearing carrying a pair of drums, and as they are precisely alike in construction, a description of one will answer for all. Meshing with the pinion is a gear on a shaft, so mounted that it carries one of the driving drums upon its outer end. The second driving drum is carried by a shaft having a large gear wheel, similar to the one on the first shaft. Between and meshing with these gears is a smaller one. Around each pair of drums a cable is wound.

An important variation from the construction usually found in machinery of this kind is here introduced. Generally the bearings of the drum shaft are placed one at each side of the drum. The advantage of placing both bearings at the same side of the drum, as in this case, is apparent. When the tension car, owing to the stretching of the rope, has reached the upper or farther end of the pit, the surplus length of rope can be easily taken up by winding it once more around the driving drums, thereby saving the time, trouble, and expense of splicing. The outer ends of each pair of drum shafts are connected by a strut, adjustable in length by a key, and which serves to take the strain created by the cable passing around the drums, and relieves the bearings.

Each pinion on the line shaft is provided with a friction clutch operated by a handle lever, the bearing points of which are so arranged that there is no strain brought upon the shaft, to throw it either way in the direction of its axis, when the clutch is closed. The clutch consists of two sets of steel plates, one set secured to the pinion and the other to a sleeve sliding longitudinally upon, but revolving with, the shaft. The plates of one set alternate between those of the other, so that when pressed together by the lever, operating through a compound toggle, the friction between them is sufficient to revolve the pinion with the shaft.

The incoming portion of the cable passes around the drums, then around a sheave on a car running on tracks laid on the edges of the pit, shown in Fig. 1, and then to a sheave located so as to guide the rope into the trench along the middle of the street, as shown in Fig. 2. The slack in the cable is taken up by weights on a differential lever at the upper or rear end of the tension pit. The two cables operated by the same section run through the trench upon independent pulleys at a distance of about 3 inches apart. The grip is formed with clutching jaws at each side of the lower end, so that either cable may be grasped to propel the car. By means of the double grip, the cable in use is bound to drop into the grooves of its own pulleys as the car passes on. A cross section of the trench is shown in Fig. 2.

The care of the ropes in the cable system is a very important item, and experience has proved that they should be examined at least once in twenty-four hours, to discover, if possible, any breaks which might otherwise cause the rope to "strand." For this purpose the pair of small vertical engines shown in the center of each section are provided to move the idle rope slowly. It is also very convenient often in repairing a rope to move it a very little, without starting the main engines. Steam is supplied by four return tubular boilers of 150 horse power each, located in the rear of the engine room. The operating machinery was built by Messrs. Poole & Hunt, of Baltimore, Md. Its smooth and almost noiseless working shows the accuracy and skill displayed in executing the designs, while the great size of many of the parts shows the facilities at their command, and conveys some idea of the extent of their works. The duplicate system for cable railways is the invention of Mr. D. J. Miller, of this city.

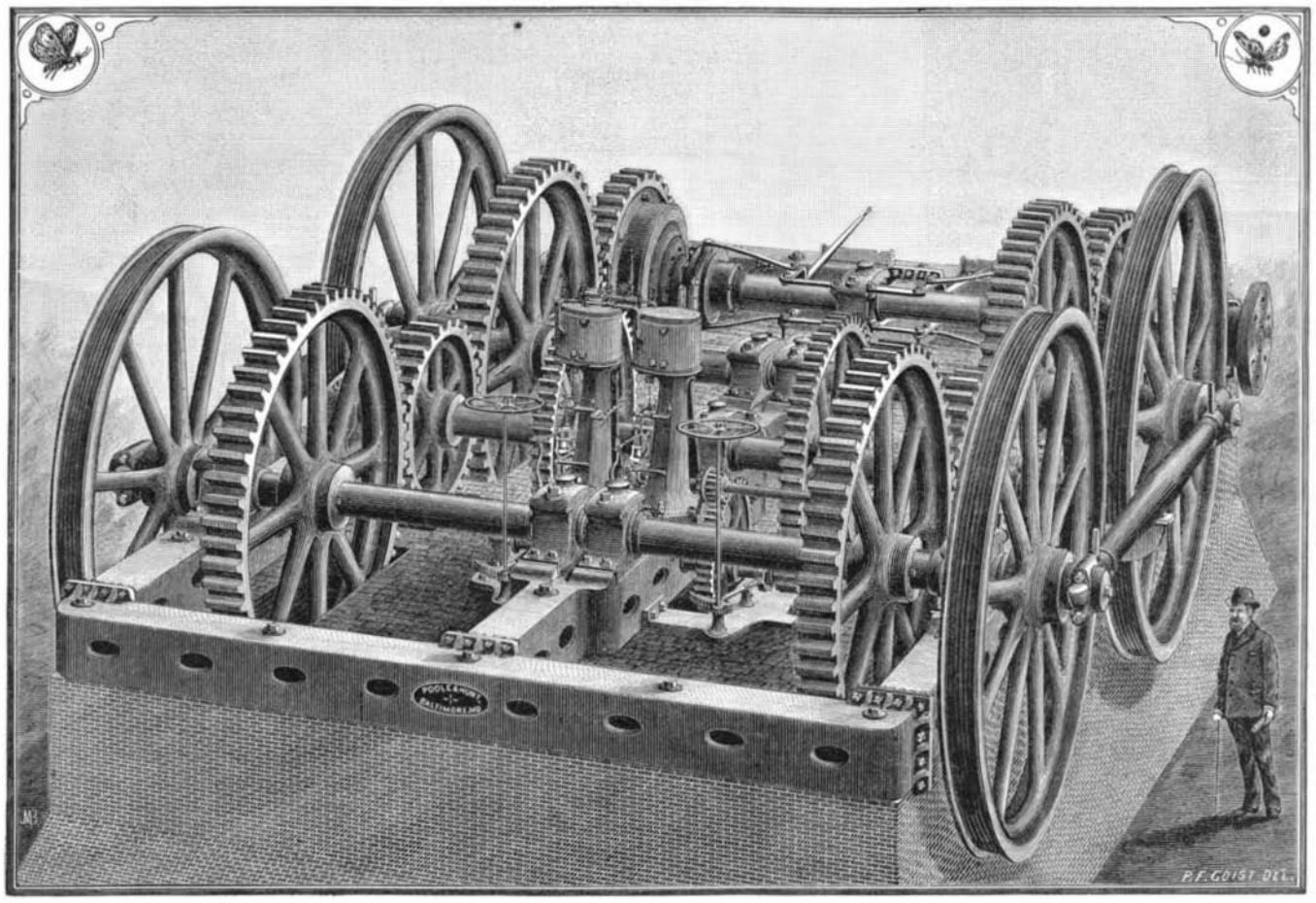
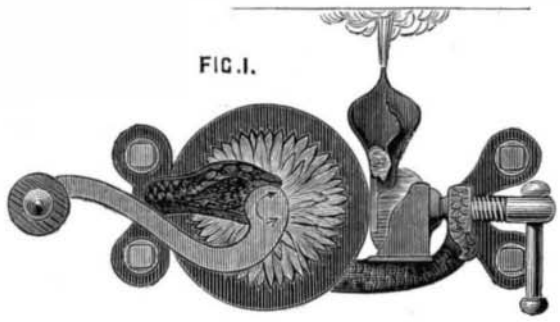


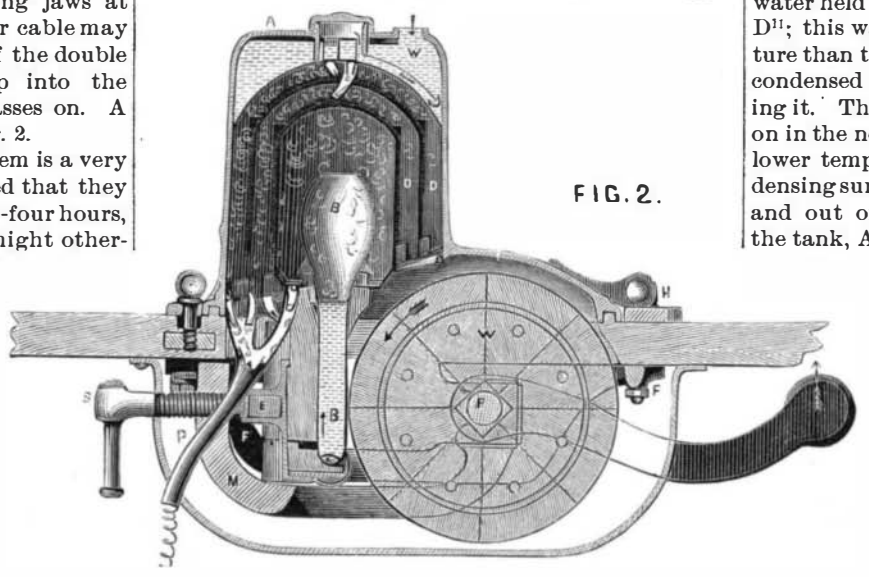
Fig. 3.—NEW YORK CITY CABLE RAILWAY.—ENLARGED VIEW OF ONE SECTION.

MAKING STEAM BY FRICTION.

The friction still illustrated by the accompanying engravings has been devised, says the *Engineer*, by Mr. Lional Pearse, of Coalbourn brook, near Stourbridge, for the production in an open boat, or in any boat at sea, of small quantities of fresh water from sea water without any heat supply except that of muscular energy. The still and the small machine for illustrating the frictional generation of heat are very ingenious applications of well known phenomena and of the experiments of Count Rumford. Mr. Pearse has succeeded in solving a problem which has occupied many minds; and although no vessel expects to be wrecked, there is little doubt every well-appointed passenger ship will carry several of these little machines for their boats.

Fig. 2 shows a friction still fixed to and let through the seat or after thwart of a ship's boat; above that seat is the condensing or domed part, and below is the malleable iron framing. The machine may, of course, be fixed to any, or the most convenient, place in a boat. Our engraving is about one-fourth full size. The framing may be said to consist of two parts, one fixed and the other movable; the fixed frame, F, being bolted through the seat, fixes the part above the seat to that below. The metal supporting the boiler must be understood to be part of this fixed frame, though the section does not clearly show it. The movable frame, M, is capable of a sliding motion in three bearings, one above the pressure screw, S, and another to each side of friction wheel, W. It is single where shown in section, and branches off to each side of the wheel to form bearings for the spindle, P. This frame brings the friction wheel, W, in contact with the boiler, B, at B^1 with any desired pressure, regulated by the pressure screw, S. The inequalities which may occur in the periphery of the friction wheel are compensated for in the elasticity of the packing at E. Either side of the spindle may be fitted with a handle, and the same still can be worked effectively within the range of power from that of a lad of fourteen years of age to 4 man power. The boiler, B, is held in a hard wood block to prevent heat being readily conducted to the metal frame supporting it. The upper part of the machine is hinged at H, and may be thrown open, leaving boiler and friction wheel exposed; the inner domes, D^1 D^{11}, also hinge open or take out for any attention that may be required.





MAKING STEAM BY FRICTION.

The overflow tank, T, is pivoted so as to be easily released from the boiler. The manner in which it is fed and the action are as follows: It will be seen that the upper tank, A, is full of sea water; from this tank the water is made to pass at intervals in the directions indicated by the arrows. It then passes down small pipes shown in the center, and feeds or saturates the flannel with which the two domes are covered. The arrows still indicate the course of the sea water after it has left the coverings, and it will be seen that that from the inner dome, D^{11}, as it is collected by its trough, runs through a pipe into the overflow tank, T, which tank is openly connected with boiler, B, keeping that fed with sea water to the height allowed by overflow tank; the overflow from the middle dome, D^1, is allowed so run away as cooling water, because that from the inner dome is sufficient feed for the boiler, and, being hotter than that from D^1, is preferred. The water enters the boiler at the bottom, as shown by the arrow. The heat result of the friction of the wooden wheel, W, against the steel on the boiler at B^1 causes the sea water to boil in about half a minute. The steam then rising is wrapped in the dome, D^{11}, and, condensing upon its inner surface, drains away into its trough, then from that to outlet pipe, P. The condensed steam or distilled water may be traced throughout the engraving indicated as drops.

The heat given up by the steam condensed upon the inner surface of dome, D^{11}, will be imparted to the sea water held in the saturated flannel covering the dome, D^{11}; this water is freely vaporized at a lower temperature than that required for the boiler, its vapor being condensed upon the inner surface of dome, D^1, inclosing it. The action of vaporizing and condensing goes on in the next compartment, as just described, but at a lower temperature; the product from the three condensing surfaces can be traced as drops all flowing into and out of outlet pipe, P. The feed water, W, in the tank, A, will, when the machine is in full work, reach a temperature that a delicate hand cannot bear by heat imparted to it from the vapor which condenses upon the domed bottom of the tank.

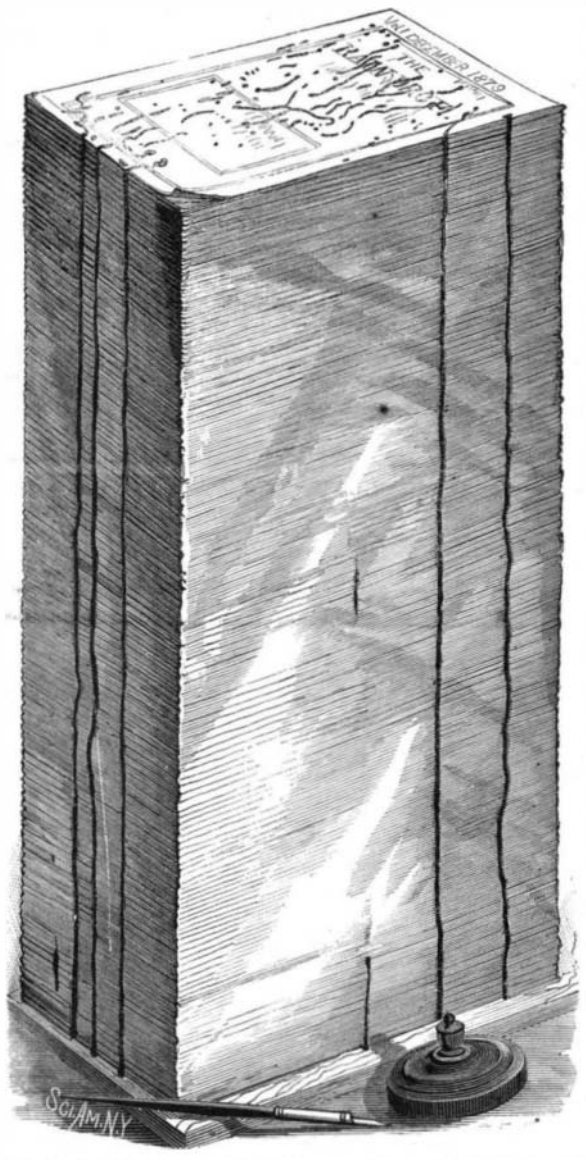
If the machine is worked by the power of a boy of fourteen years, the product from the two flannel-covered domes will be nearly double that of the boiler; if worked by a man, the product from the boiler will be equal that of the two domes, making the profit through the domes upon the man's work much less in proportion to that of the boy's work. Cov-

ered domes may be used with profit to any convenient number, but, on account of size, the inventor prefers to put only three in the friction still. In its present form the still is capable of producing thirty pints of distilled water in twenty-four hours, sufficient, he thinks, for any small boat's crew. Salt will not, we are informed, appear deposited if the machine is used properly, or unless all in the boiler or in the domes is vaporized to dryness.

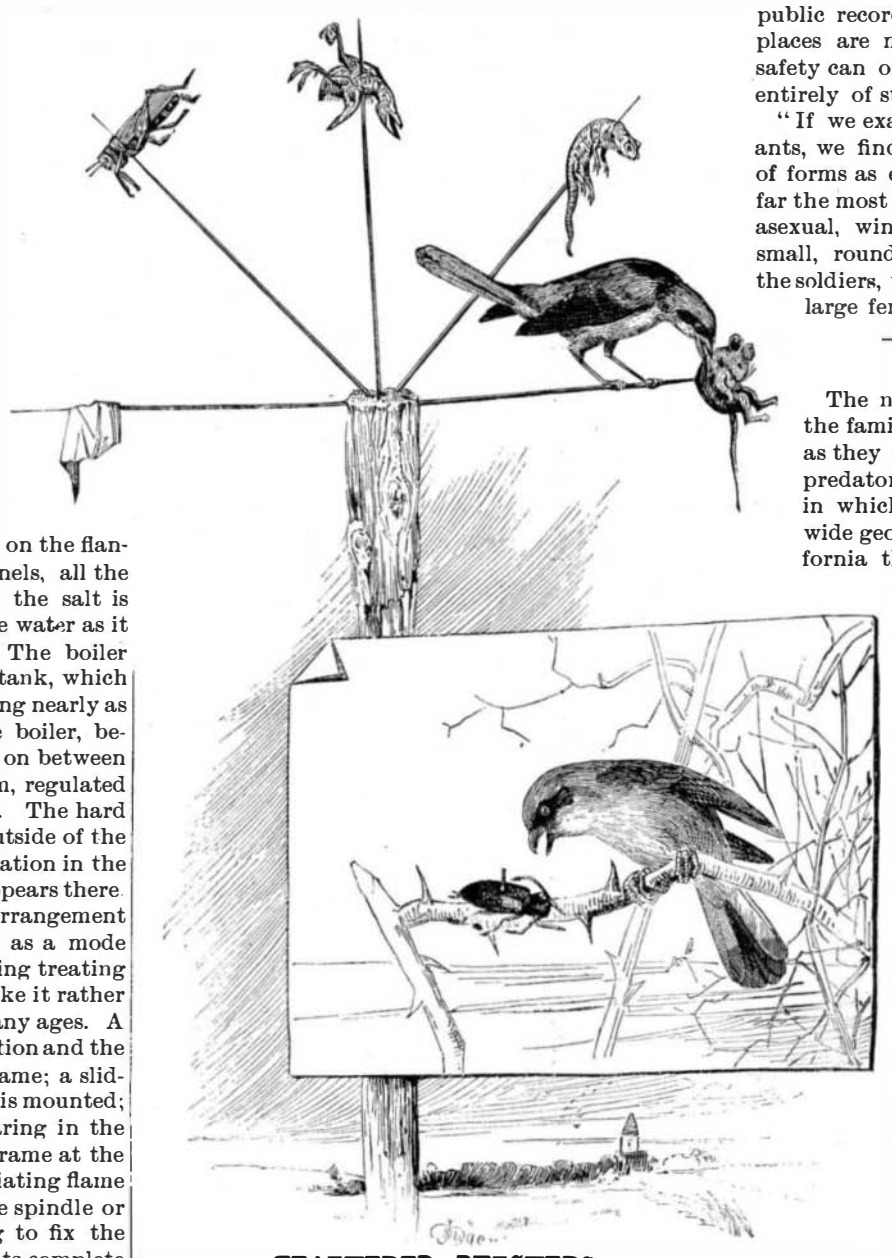
Should this occur—and it must occur many times before sufficient salt is incrusted to causeany serious loss of heat—it can be got at by throwing the top open and releasing the overflow tank. The domes are cleansed by allowing a quantity of water to flow over them when not at work. The inventor explains the non-appearance of salt in the boiler and on the flannels by saying that, in the case of the flannels, all the water fed to them is not vaporized; thus the salt is kept in solution, and is carried off in the water as it runs to waste or to the overflow tank. The boiler does not show any because of the overflow tank, which is always wasting water, and its water being nearly as heavily charged with salt as that of the boiler, because a certain amount of circulation goes on between them; so the salt is kept at an equilibrium, regulated by the salt carried away in the overflow. The hard salt that does appear is only found on the outside of the overflow tank, TT. So long as the evaporation in the boiler is not allowed to empty it, no salt appears there.

Fig. 1 of our engravings shows another arrangement by the same inventor for utilizing friction as a mode of heat. As this is not like the still—a thing treating of life and death—he has thought fit to make it rather fantastic, and his design carries us back many ages. A single casting, taking a snake-like configuration and the necessary course, forms the whole of the frame; a sliding box carries the wood in which the boiler is mounted; the spindle of friction wheel has one bearing in the mouth of the creature and another in the frame at the opposite side of the friction wheel; the radiating flame piece or wheel boss is in one piece with the spindle or is fixed thereto, the purpose of it being to fix the wooden wheel; an ordinary handle and bolts complete the machine, the boilers for which may have various sizes or shapes, according to purpose.

The inventor devised it as specially suitable for lectures on physics, for use in magazines where fire is not allowed, or for heating shaving water, where half a minute's vigorous work every morning serves the purpose of providing a little hot water for this purpose, waking the shaver up, and providing him with exercise which is better now than in July.



BOARD AND PAMPHLETS PERFORATED BY THE TERMES FLAVIPES.



FEATHERED BUTCHERS.

THE TERMES FLAVIPES.

We received some time ago, from Mr. Joseph Eichbaum, of Pittsburg, a pamphlet which had been curiously eaten away by a small boring insect. The pile containing the pamphlet stood on a half inch board, and was about three feet high. Both board and pamphlets had been completely penetrated as represented in our engraving. Mr. Eichbaum found a small white worm, to which he was inclined to attribute the injury. After examining the result of its work, however, Professor C. V. Riley, the Government Entomologist, decided that it was due to the activity of that mischievous pest of the libraries, the white ant. He describes it as follows:

"The pamphlet perforated with numerous round, or oval, or oblong holes, or even with long branching slits, admirably illustrates the work of one of the most dangerous insect enemies to libraries and stored paper. This is the notorious white ant (*Termes flavipes*), which has received its popular name from its external resemblance to our commoner ants, as well as from its somewhat similar mode of life, *i. e.*, congregating in large, well organized colonies. Otherwise, the white ants have no relation to the true ants, the former belonging to the order Neuroptera, the latter to the Hymenoptera. The colonies of *Termes flavipes*, the only species of white ant occurring in North America east of the Rocky Mountains, are to be found in the ground under large stones, or within old stumps or roots, but never exposed to the light. As the food of these insects consists of dry vegetable fiber, their work in the field proves beneficial by hastening the decay and crumbling of old logs, etc.; but, unfortunately, these insects also destroy fence posts and fence boards, enter our houses, and stealthily weaken the beams and rafters. But, above all, they prefer to attack rows of old leather bound books or piled up paper, working through covers and pages in the manner illustrated by the pamphlet sent by Mr. Eichbaum. As the white ants never come to the surface, but always work in the interior of woodwork or within books, the mischief done by them is usually not observed until the destruction is complete, and herein lies the great danger from these insects. Thus quite a number of instances are on record where in public or private libraries large rows of valuable books or documents were found to be utterly destroyed by the white ants before their presence was suspected.

"In the Southern States, and especially in tropical countries, the white ants are much more numerous and their inroads into houses more frequent than in the North, so that in some places it is only possible by incessant watchfulness to preserve and protect the public records. Books kept in rather damp and dark places are more exposed to this danger, but perfect safety can only be secured in buildings constructed entirely of stone and iron.

"If we examine the individuals of a colony of white ants, we find among them the same wonderful variety of forms as exhibited in honey bees or true ants. By far the most numerous class are the workers, which are asexual, wingless, yellowish white, the head being small, rounded, and the jaws very minute; then come the soldiers, with immense head and jaws, and then the large females."

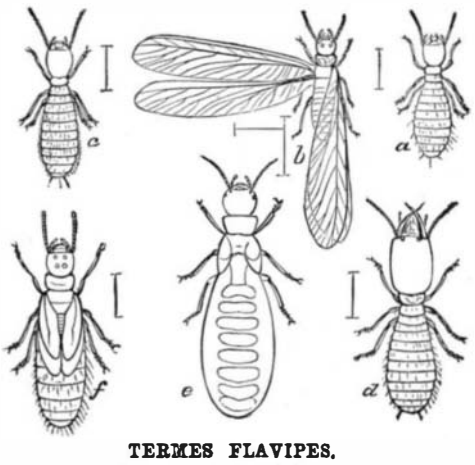
FEATHERED BUTCHERS.

The name butcher bird, that is often given to the family *Laniadæ*, or shrikes, is not misapplied, as they are quite equal to the hawks and other predatory birds in their courage and the cruelty in which they seem to delight. They have a wide geographical distribution. In southern California they are particularly common, and at the time of writing, Dec. 17, in Los Angeles County, they are to be seen upon almost any tree, where they sit motionless, awaiting the approach of their prey, which is of a most varied character.

The shrikes are powerful birds, of attractive mien, presenting an appearance indicative of courage. In many the upper mandible is arched and hooked, forming a powerful weapon with which to tear and lacerate their prey. The adults attain nearly the size of a robin.

It is, however, the habits of the bird that are the most interesting, and the term butcher is applied perhaps from the fact of their impaling their victims. In California they catch a large variety of lizards, including the horned toad, mice, and kangaroo rats, and one has been seen flying laboriously, carrying a blue jay quite as large, if not larger, than itself. As a rule, game thus captured is taken to some favorite spot and impaled or hung up, and then torn apart, so that in a locality frequented by these birds quite a museum is often found, composed of the dried remains of various animals, the dismembered parts, bits of bone, and other material. In southern California the orange tree offers every inducement to these butchers, the thorns with which the branches are armed being used for this singular purpose of laceration. Sitting perfectly immovable on a twig, the bird suddenly espies a horned toad or lizard, and darting down, before the frightened animal can bury itself or seek shelter, it is seized in the powerful beak and borne struggling to the place of execution. At first the victim is often held down with one claw, after the manner practiced by hawks, and so torn and lacerated; but generally a sharp thorn or a pointed twig is selected, and the body forced against it until it is firmly impaled. This having been accomplished successfully, the body is sometimes left, as often the capture is seemingly made in wanton pleasure, for the mere sake of killing; the victim left disemboweled—a grim warning to others.

When the butcher is disposed to devour its game, the thorn is used to help tear it apart, the flesh being



TERMES FLAVIPES.

a, larva; *b*, winged male; *c*, worker; *d*, soldier; *e*, large female; *f*, pupa. (After Riley.)

torn in both directions. So strong is this habit that in confinement the bird still takes advantage of any sharp object. Thus a pointed stick, sharpened for the purpose, being given a caged butcher bird, all its food, consisting of raw meat, was immediately placed upon it, and either left or devoured.

A neighbor of mine arranged a series of spikes in a star form, for the benefit of the birds that carried on their depredations in the vicinity, and found that they eagerly took advantage of the artificial thorns, a variety of animals being arranged upon the spikes. Not only were living creatures impaled, but various