splendid and expanding markets are entirely lost to the manufacturers and merchants of the old country.

"The competition is not confined, as formerly, to those articles for the production of which the Americans enjoy natural advantages, such as wood work, but extend to leather goods, tinware, machinery, every description of implement and edge tool, carriage axles, force pumps, spades, shovels, axes, forks, files, locks, scales, tacks, rivets, pulleys, sewing machines, stove grates, guns, pistols, and other products too numerous to mention. In all these branches of manufacture the Americans are rapidly increasing their Australian business, whilst the English makers are losing ground. Australian commerce, as a whole, is certainly expanding, yet the returns of many well known English firms who supply the markets of Sydney and Melbourne are not now one tenth of what they were a few years ago. If we ask for an explanation of this extraordinary falling off, from those who are in a position to answer us, we are told that it is due to the successful competition of the Americans, who beat our manufacturers sometimes in price, always in quality, and not unfrequently in both. English manufacturers are slow to adopt new patterns or to accommodate themselves to the wants of their customers, but their American competitors spare themselves no pains or expense in this way. They are constantly on the look-out for novelty and improvement, and by good trade organization and close intercommunication they are always kept well posted up in what is being done by their rivals in other parts of the world. Their illustrated pattern books, which are distributed with lavish hand among their customers, are marvels of engraving and typography, and no amount of canvassing or advertising is spared to bring the merits of their productions before the world. Above all, the Americans take care that their goods shall correspond to sample, and be turned out in a finished and workmanlike manner, unlike those of many English makers, who never trouble themselves to inspect the work they send away."

Are Ants Civilized?

The October number of the *Quarterly Journal of Science* contains an article on "Our Six-footed Rivals," the ants, which may well cause us to believe that we are not the only rational and civilized beings on this globe.

Let us suppose that we were suddenly informed, on good authority, that there existed a race of beings who lived in domed habitations, aggregated together so as to form vast and populous cities, that they exercised jurisdiction over the adjoining territory, laid out regular roads, executed tunnels underneath the beds of river, stationed guards at the entrance of their towns, carefully removed any offensive matter, maintained a rural police, organized extensive hunting expeditions, at times even waged war upon neighboring communities, took prisoners and reduced them to a state of slavery; that they not merely stored up provisions with due care, but that they kept cattle and even cultivated the soil and gathered in the harvest. We should unquestionably regard these creatures as human beings who had made no small progress in civilization, and should ascribe their actions to reason.

Among the *hymenoptera* the lead is undoubtedly taken by the ants, which, like man, have a brain much more highly developed than that of the neighboring inferior groups. Perhaps the most elevated of the formicidæ family is the agricultural ant of western Texas. This species is, save man, the only creature which does not depend for its sustenance on the products of the chase or the spontaneous fruits of the earth. A colony of these ants will clear a tract of ground, some four feet in width, around their city, and remove all plants, stone, and rubbish. A species of minute grain, resembling rice, is sown therein and the field is carefully tended, kept free from weeds, and guarded against marauding insects. When mature, the crop is reaped and the seeds dried and carried into the nest. If this is done near a larger city the latter regard it as an intrusion, and a fierce warfare results, which ends in the total destruction of one or the other side. The queens are treated with great attention and installed in royal apartments.

The ant government is communistic. In a formicary there is no trace of private property; the territory, the buildings, the stores, the booty, exist equally for the benefit of all. The family among them scarcely exists. Rarely is the union of the male and female extended beyond the actual intercourse, all provision for the future young devolving upon the latter alone, the former being speedily killed, as he is no longer of any use. The females are the larger, stronger, and more long lived. The workers and fighters are sexless; to them belongs the real government of the ant-hill, and they provide for its enlargement, well being, and defence.

Ants are sometimes very stupid in regard to small things, but in many instances they display remarkable sagacity. Mr. Belt, in his "Naturalist in Nicaragua," tells of a column of ants who were crossing a watercourse by a small branch not thicker than a goose quill. They widened this natural bridge to three times its width by a number of ants clinging to it and to each other on each side, over which the column passed four deep, thus effecting a great saving of time. Again, the *eciton legionis*, when attacking the hill of another species, digs mines and passes the pellets of earth from ant to ant until placed at a sufficient distance outside to prevent it rolling back into the hole. Their errors and stupidity are not more conspicuous, however, than among the human beings.

These tiny creatures have a language by which they can impart to each other information of a very definite character, and not merely general signals, such as those of alarm. It has been found that ants fetched by a messenger seem, when they arrive at the spot, to have some knowledge of the task which is awaiting them. Their principal organs of speech are doubtless the antennæ; with these, when seeking to communicate intelligence, they touch each other in a variety of ways. There is a possibility that they may have a language of odors, for the various scents given off by them are easily perceptible. Under the influence of anger it becomes very intense. In battles how, save by scent, can they distinguish friend from foe? After a lapse of several months a former companion will be received kindly into the nest, but a stranger is killed.

More wonderful than their intelligence is their organization. If separate they would be helpless, and probably soon become extinct. Mr. Belt observed a marching column of *ecitons* in the primeval forests of Nicaragua. A dense body of ants, four yards wide, moved rapidly in one direction, examining every cranny and fallen leaf. At intervals larger and lighter colored individuals would often stop and run a little backward, apparently giving orders. On the flanks and in advance of the main body, smaller columns would push out, which pursued the cockroaches, grasshoppers, and spiders in the neighborhood. A grasshopper seeking to escape would often leap into the midst of the ants. After a few ineffectual jumps, with ants clinging to its body, it would soon be torn to pieces. Spiders and bugs which climbed to the tops of trees were followe dand shared a like fate. In Nicaragua the vegetarian ants eat up trees and carry off the leaves, to use as a manure, in which grows a minute species of fungus, on which they feed. They evince a mutual sympathy and helpfulness, which to an equal extent can be traced in man alone. Mr. Belt placed a little stone on one to secure it. The next ant that approached ran back in an agitated manner and communicated the intelligence to others. They rushed to the rescue: some bit at the stone, and tried to move it, others seized the prisoners by the legs and pulled. They persevered until they got the captive free.

In Australia they have been known to bury their dead with some degree of formality. The Texan ant removes any offensive matter placed near its city and carries it away. Ants who refuse to work are put to death. Prisoners are brought in by a fellow citizen, handed over in a very rough manner to the guards, who carry off the offenders into the underground passages.

The slave-making propensity and the reliance upon slaves occur in several species, but not to the same degree. The *polyergus rufescens* is absolutely dependent on its slaves, and would rather die than work. *Formica sanguinea*, on the other hand, has much fewer slaves, being itself capable of working as well as fighting. No less variation may be traced in the habits of the cattle-keeping ants. Of the honey-secreting *aphides* and *cocci* that serve them as milch kine, some have large herds, whilst others have none at all, and if they encounter an *aphis* straightway kill and eat it. These *aphides* are extremely destructive to fruits and trees, as they live by sucking the sap. The ants watch them with wonderful care, and defend them from all enemies.

Instances of sagacity and design might be easily multiplied. Careful observation has shown that the ants are evoluting as fast as their short terms of life will permit them. They are becoming more wise and more civilized yearly. Each century marks an advance. Who knows but that perhaps in the dim future they may assert rights which human beings shall be bound to respect?

Mushroom Ketchup.

Place agarics of as large a size as you can procure (not worm eaten), layer by layer in a deep pan, sprinkling each layer as it is put in with a little salt; the next day stir them up several times so as to mash and extract their juice. On the third day strain off the liquor, measure, and boil for ten minutes, and then to every pint bottle of the liquor add ½ oz. of black pepper, ¼ oz. of bruised ginger root, a blade of mace, a clove or two, and a teaspoonful of mustard seed; boil again for half an hour, put in two or three bay leaves, and set aside until quite cold; pass through a strainer and bottle, cork well, and dip the ends in resin. A very little Chili vinegar is an improvement, and some add a glass of port wine or a glass of strong ale to every bottle. Care should be taken that the spice is not added so abundantly as to overpower the true flavor of the mushrooms.

Asparagus Paper.

According to the *British Mercantile Gazette*, an excellent paper can be made out of the white ends of asparagus, which consist entirely of tough vegetable fibers. The material is adapted to the production of the finer kinds of writing paper.

NEW BOOKS AND PUBLICATIONS.

OUR COMMON INSECTS. By A. S. Packard, Jr. Illustrated. Estes & Lauriat, Publishers, 301 Washington street, Boston.

This is mainly a reprint of a series of popular papers on insects which appeared in the *American Naturalist*, from 1867 to 1871. Mr. Packard has devoted considerable attention to popularize entomological knowledge, and has already published several works similar to this. The descriptions of the various insects treated in the present volume are very full, notably free from technicalities and are abundantly illustrated. The chapter on the ancestry of insects wherein the strong genetic bond uniting the worms crustacea and insects is traced, and the various steps of the evolution of the articulate division of the insect kingdom pointed out, will be read with especial interest by all naturalists, while the insect calendar wherein the times of the appearance of injurious insects are noticed will be of much value to the farmer.

OUTLINES OF MODERN ORGANIC CHEMISTRY. By Professor C. Gilbert Wheeler, of the University of Chicago. A. S. Barnes & Co., New York city and Chicago.

A simple treatise on the science, partially based on Riches *Manuel de Chimie*, and especially adapted to the uses of colleges and schools, where extended study of the subject is not included in the course. It is in harmony with the most recent advances, and is concisely and clearly written.

THE SPORTSMAN'S NOTE BOOK. By Wakeman Holberton, 102 Nassau street, New York.

This a convenient little book bound in soft covers for use by sportsmen. It contains blank pages for a diary, blank scores for rifle matches, game scores, and valuable advice in regard to guns, fishing tackle, camp cookery, receipts for accidental wounds, and a condensed record of game laws and seasons in all the States.

THE TELEPHONE. An account of the Phenomena of Electricity, Magnetism, and Sound, as involved in its action; with directions for making a speaking telephone. Professor A. E. Dolbear, Tuft's College. Lee & Shepard, Boston. Illustrated.

Professor Dolbear has written this small book to meet the public want for a clear and concise explanation of the telephone. He makes plain the phenomena of electricity, magnetism and sound, and the numerous cuts inserted render the mechanical conditions intelligible. As the inventor of the magneto-electric speaking telephone, he describes at length his first instrument and gives directions to make an improved pattern. The book contains a great deal of useful information.

THE COUNTRY is the title of a new weekly journal devoted to the dog, the gun, yachting, fishing, etc., and published by "the Country" Publishing Association, No. 38 Murray street, this city. The first number before us has a capital table of contents. There are practical articles on training dogs, which abound in valuable suggestions: the correspondents columns are well filled with letters evidently prepared by men who know how to write as well as they understand handling gun and rod, and in a word the entire paper is bright, lively, and thoroughly interesting. Its aim is to deal with everything relating to the country, and with outdoor sports of all kinds. It is handsomely gotten up, and is well illustrated. We can bid the new comer a cordial welcome, and can commend it to our readers who are interested in outdoor sports. The subscription price is but 3 dollars a year.

Recent American and Foreign Patents.

Notice to Patentees.

Inventors who are desirous of disposing of their patents would find it greatly to their advantage to have them illustrated in the SCIENTIFIC AMERICAN. We are prepared to get up first-class WOOD ENGRAVINGS of inventions of merit, and publish them in the SCIENTIFIC AMERICAN on very reasonable terms.

We shall be pleased to make estimates as to cost of engravings on receipt of photographs, sketches, or copies of patents. After publication, the cuts become the property of the person ordering them, and will be found of value for circulars and for publication in other papers.

NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVED MACHINE FOR CROCHETING THE TOPS OF HOSIERY GOODS.

Joseph M. Merrow, Merrow Station, Conn.—This invention relates to a machine for crocheting or overstitching the top or edge of hosiery or knit goods, and it consists in certain improvements upon that type of machine in which a reciprocating needle carries the yarn or thread through the goods as advanced by a feed, while a hook forms a stitch by looping the thread above and below the work plate. The stitch, consisting of a loop from above the fabric and a loop from below the fabric, of two adjacent stitches having drawn through them a loop from the next stitch in order, is peculiar to this machine, and forms an elastic and ornamental finish for the edge of the work. This stitch is also adapted to joining or overseaming the edges of work, forming a strong seam, which is fully as elastic as the goods in which it is made.

IMPROVED PISTON PACKING.

J. H. Ferdinand Otto, Reedsville, Wis.—This invention relates to improvements in metallic piston packing, by which the packing rings are readily adjusted to the required degree of tightness by a simple mechanism. The inner and outer split packing rings of the piston are guided between the end plates and expanded by three or more interior band springs. These springs are operated upon by sliding nuts that are moved forward or back by means of radial screws, which are operated by a worm gear. The shafts of the intermeshing pinions pass parallel to the piston rod into inner sockets of the face plate, which is attached by screw bolts to the body of the piston. The sliding nut is guided between lugs on the inside faces of piston head and follower. The socket openings of the face plate are closed by short cap screws, which admit, when removed, the engaging of the key with the nicked ends of the pinion shaft, so as to turn the same and sets the springs and rings to the required degree of expansion.

IMPROVED TOOL POST FOR LATHES.

Robert Neasham, Mount Washington (Pittsburgh), Pa.—This relates to tool posts for engine lathes and similar tools, and it consists of a suppor for the tool which is made in two parts, the upper part being screwed into the lower part, and capable of being raised or lowered by turning the said lower part. The tool post passes through the support, and is mortised to receive the tool, which is clamped by a set screw in the usual way.

IMPROVED RAILWAY SWITCH SIGNAL.

George W. Anders, Woodsboro, Md.—The object of this invention is to provide an improved signal to indicate the position of the movable rails of a switch in the night time for the purpose of informing the engineer of an approaching train that the switch is open or closed, as the case may be. The invention consists in attaching to the switch lever a lantern having differently colored glass panes, and provided with a swinging lamp whose position in front of one or another of the colored panes indicates the position of the lever, and thereby the position of the switch rails also. The invention further consists in the particular construction of the lantern and swinging lamp.

IMPROVED COMBINED CRANK AND TREADLE POWER FOR DRIVING SAWS AND OTHER LIGHT MACHINERY.

Henry Shear, Arcola, Ill., assignor to himself and Edward Cornthwait, of same place.—The ends of the shaft, which revolves in bearings attached to the upper rear part of the frame, project at the sides of the frame, and to them are attached the cranks, which are made with an offset, forming a second crank. To the inner and shorter cranks are pivoted the ends of the connecting rods, the lower ends of which are pivoted to the ends of the treadles. The treadles are pivoted at their centers to pins attached to the lower part of the frame. To the driving shaft is attached a pulley, which is made large and heavy to adapt it to serve also as a flywheel, and around which is passed a band. The band also passes around a pulley attached to another shaft, which revolves in bearings attached to the upper part of the frame. In using the machine a man stands upon each treadle with a foot near each end, and grasps the crank with his hands. Then, by the natural motion of turning the crank his weight will be thrown alternately upon the opposite ends of the treadle.

IMPROVED SPARK ARRESTER.

John A. Blair and William C. Bush, Fair Hill, Md.—The object of this invention is to provide an improved spark and cinder catcher for locomotives and other engines which will catch the cinders and conduct them to