HAND-WORKED SLOTTING MACHINE.

We illustrate on page 161 a handy form of hand-worked slotting machine, constructed by the students of the Alexandrowski Technical School, Moscow, the tool being intended for fixing to a bench. As will be seen, a vice is provided for holding the work to be operated upon, and the toolholder is worked to and fro by a hand lever, provision being made for giving a self-acting traverse. The details of the machine will be readily understood from the engraving without further description.

AMERICAN CENTENNIAL EXHIBITION.

The commissionners appointed for holding the above exhibition, in 1876, in Fairmount-park, Philadelphia, have issued their regulations, of which the following are the most important relating to foreign exhibitors:—

Products brought into the United States, at the ports of Boston, New Yorx, Philadelphia, Baltimore, Portland, Maine, Port Huron, New Orleans, or San Francisco, intended for display at the international exhibition, will be allowed to go forward to the exhibition buildings, under proper supervision of custom officers, without examination at such ports of original entry, and at the close of the exhibition will be allowed to go forward to the port from which they are to be exported. No duties will be levied upon such goods, unless entered for consumption in the United States. The general reception of articles at the exhibition buildings will commence on January 1st, 1876, and no articles will be received after March 31st, 1876. Space assigned to foreign commissions and not occupied on the 1st April, 1876, will revert to the director-general.

The ten departments of the classification which will determine the relative location of articles in the exhibition are as follows:—1. Raw materials—mineral, vegetable, and animal. 2. Materials and manufactures used for food, or in the arts, the result of extractive or combining process. 3. Textile and felted fabrics; apparel, costumes, and ornaments for the person. 4. Furniture and manufactures of general use in construction and in dwellings. 5. Tools, implements, machines, and processes. 6. Motors and transportation. 7. Apparatus and methonds for the increase and diffusion of knowledge. 8. Engineering, public works, architecture, &c. 9. Plastic and graphic arts. 10. Objects illustrating efforts for the improvement of the physical, intellectual, and moral condition of man.

Exhibitors will not be charged for space. A limited quantity of steam and water-power will be supplied gratuitously. The quantity of each will be definitely settled at the time of allotment of space. Any power required by the exhibitor in excess of that allowed will be furnished by the Centennial Commission at a fixed price. Exhibitors must provide, at their own cost, all show-cases, shelving, counters, fittings, &c., which they may require; and all counter-shafts, with their pulleys, belting, &c., for the transmission of power from the main shafts in the machinery hall. The Centennial Commission will take precautions for the safe preservation of all objects in the exhibition, but it will in no way be responsible for loss or damage of any kind, or for accidents by fire or otherwise, however originating. Foreign commissions may employ watchmen of their own choice to guard their goods during the hours the exhibition is open to the public.

Each package must be addressed "To the Commission for [*Name of country*] at the International Exhibition of 1876, Philadelphia, United States of America," and should have at least two labels affixed to different, but not opposite sides of each case, and giving the following information:—(1) The country from which it comes; (2) name or firm of the exhibitor; (3) residence of the exhibitor; (4) department to which objects belong; (5) total number of packages sent by that exhibitor; (6) serial number of that particular package. Within each package should be a list of all objects it contains.

If no authorised person is at hand to receive goods on their arrival at the exhibition buildings, they will be removed without delay, and stored at the cost and risk of whomsoever it may concern.

Communications concerning the exhibition should be addressed to "The Director-General, International Exhibition, 1876, Philadelphia, Pennsylvania, U.S.A."

It is hinted that another woollen manufacturing Company is to be started in St. Johns, Quebec.

LIFE IN THE BEEHIVE.

The following is a report of a lecture by Professor Agassiz, from the columns of the *English Mechanic*.

At the close of my last lecture I made some general statements with regard to parthenogenesis, a peculiar mode of reproduction by virgin females first investigated in some families of insects, among which the progeny thus brought forth consists of males and of males only. In the family of Phyllopods, among crustacea, the process obtains also; but the progeny in this case consists on the contrary, of females only. The deportment of these animals at the time of reproduction is so singular, they exhibit faculties so peculiar that they have been the objects of careful observation. Their seemingly intelligent action, known as instinct has been compared with the intellectual powers of the higher animals and even with the mental faculties of man himself.

A knowledge of the facts is, therefore, necessary to a first descrimination between these two faculties, which are considered by some as entirely distinct, while others consider them as modifications of one and the same power. It is often said that the possession of reason places man above the brute creation, to which instinct peculiarly belongs; and yet the facts do not justify such a distinction, as we shall find if we study carefully the lives of some of these creatures. The beehive consists, when in full activity, of one queen, several hundred drones, and many thousand working bees. These constitute a community by which a combined system of labour is carried on, transcending, in many respects, the most complicated actions of man himself. Their structure shows no organ similar to those by which the mental functions are manifested in the higher animals and in man. They have no brain proper, nor does their nervous system correspond in any way to that of the vertebrates. In all vertebrates the solid front mass of the nervous system which we call the brain is prolonged backward into a long cord, known as the spinal marrow, from which many nervous threads arise and branch, spreading through the whole organization. The brain and the spinal cord, in fact the whole central nervous system, are enclosed in a cavity, the skull and rachitic canal, separate from those in which the organs of digestion, respiration, circulation and reproduction are contained —the chest and abdominal cavity. For the articulates, on the contrary, to which all insects, crustacea and worms belong the nervous system is scattered along the length of the body in a succession of swellings connected together by threads. The first of the swellings is situated in the head, above the alimentary canal; the rest are at regular distances along the lower side of the body. Thus it appears that the battery from which all volition starts, by which all the acts of life are performed or regulated, through which all external impressions are communicated and acted upon, are very different in these two types of the animal kingdom. It is, therefore, hardly probable that the life work done by these organs should be the same.

Let us look at some of the acts by which the quality we call instinct is manifested in a community of bees. When such a community becomes too populous for a given hive, the bees "swarm," as it is called; that is, a part of the overcrowded population separates from the rest and goes off to establish a new colony. In such case the emigrants are chosen or form their own band with direct reference, seemingly to the future welfare of the new colony, preserving the numerical proportions characteristic of all prosperous hives. The swarm consists of one queen, some thousands of working bees or undeveloped females, some hundreds of males or drones. This is the normal combination in the bee community, and hives so organised may survive and keep together for many years.

There are reports of beehives a century old. It is, however, probably an exaggeration; for beehives 20 years old are rare, and they do not often survive more than seven, eight, or ten years. When I speak of the life of a beehive, I do not mean to say that the individuals composing it live together for that length of time; indeed, a queen rarely lives beyond three or four years; one of seven years is seldom seen, while the males never survive the summer in which they are born, and the working bees die gradually and are replaced by new ones. But the hive as a community holds together for a much longer period, being constantly renewed by the process of reproduction, and comes at last, like a human settlement, to consist of a variety of individuals born at different times. When a swarm breaks off from an old community to form a