

rounded by iron fences with an overhang and with walls going down to bedrock, so that there is little danger of their escape. It contains fifty fat, jolly little prairie marmots. There are also ranges for moose, prong-horned antelopes and buffalo. The Buffalo Range is of large area, comprising 20 acres of rolling meadow amply provided with shade trees. The Buffalo House is a rustic hillside barn 80 feet in length, and its flat roof is open to the public and is intended as a convenient look-out over the main range and corrals. An engraving represents the buffalo herd, which has been "rounded up" by an accommodating keeper.

From the Buffalo House we pass to the Bear Dens, passing the Rocking Stone, a colossal cube of pinkish granite, a pressure of fifty pounds exerted on one angle of which causes its apex to swing north and south about two inches, notwithstanding the fact that it weighs thirty tons. The Bear Dens are most interesting, and at present contain grizzly bears, black bears, and polar bears, the latter being great favorites on account of their being showy and active. In one of the cages are the sea lions, which are also showy animals who are constantly "on exhibition," diving, swimming, climbing, and hopping about, and no one within a quarter of a mile of them need inquire where they are, for their loud and cheerful "hook!" "hook!" is heard far and wide.

The Reptile House, which is the second important building, is one of the finest structures ever erected in a zoological garden. It is 146 feet long, and its greatest width is over 100 feet, and it cost about \$45,000. It is constructed of mottled brick combined with granite and Indiana limestone. It has an ornamental cornice of terra cotta modeled by A. P. Proctor. The great central hall is unbroken by a single column, and at one end it opens across the crocodile pool into the green jungly mass of the conservatory. Nearly the whole of the tropical vegetation came from Florida along with the five alligators, the first occupants of the pool. No other zoological garden in the world has such a unique and beautiful feature in a reptile house. In the center are shallow water and salt water tanks for terrapin and marine turtles. The whole of the main hall is devoted to reptiles of the tropical zone, and the large serpents and lizards occupy one side and one end in large cages, while around the other sides are serpents and small reptiles in neat little cages with living plants, as shown in one of our engravings. Reptiles of the temperate zone are kept in a small wing which forms the entrance. The scientific museums of the United States are rich in animal collections of almost every description but reptiles and amphibians, so that the American public now has an opportunity, as nowhere else in the country, to study living reptiles.

There are at present 157 species of live animals represented in the collections, and the number of specimens is 843, 157 being mammals, 175 birds, and 511 reptiles. Up to the opening of the park on November 8, 5 1/4 miles of wire fence were erected, 2,470 feet of wrought iron fence were built, 9,750 feet of walk were constructed, and the installations and collections in the park have cost the society the sum of \$144,227. It will require two more years of active construction to carry out the society's programme and to provide the buildings that have been planned. Among the buildings and installations for animals which are outlined in the society's programme are the Antelope House, the Administration Building, the Monkey House, the Lion House, the Bird House, the Elephant House, the Pheasants' Aviary, the Eagles' and Vultures' Aviary, the Polar Bears' Pool, the Small Mammals' House, etc.

Hon. Levi P. Morton is president of the Zoological Society. Prof. Henry Fairfield Osborn, of Columbia University, is vice-president and chief executive officer, and to him great credit is due for the success that has thus far marked the progress of this undertaking. Mr. Madison Grant is the general secretary of the society, and from its incorporation has labored unceasingly in its behalf.

The director and general curator of the Zoological Park is Mr. W. T. Hornaday, who is well known for his writings on natural history, taxidermy, and his work in the United States National Museum. Mr. Hornaday is assisted by Raymond L. Ditmers, assistant curator in charge of the reptiles, Mr. J. Alden Loring, assistant curator in charge of the mammals, and Mr. Charles W. Beebe, assistant curator in charge of the birds. The park is open to the public on all holidays, Sundays, and week days, with the exception of Mondays and Thursdays in

summer, and it is open these latter days upon the payment of an admission. In summer the gates will be opened at nine o'clock in the morning and in the winter at ten o'clock, and they will be closed a half hour before sunset.

MOTOR-WHEEL FOR VEHICLES.

One of the latest and most original developments of the automobile is a motor wheel, which has recently been patented by Mr. J. W. Walters, of 302-306 W. 53d St., New York. The new device stands in a class quite by



Fig. 1.—A DETACHED MOTOR-WHEEL, SHOWING THE MOTOR, FLY-WHEEL, AND STEERING GEAR.

itself, as will be seen from the accompanying engravings, one of which shows the wheel with its motor and steering gear attached to a wagon, and the other the same motor wheel unattached. In a certain sense it may be likened to the steam locomotive; for it is entirely self-contained, and although it cannot run alone, and serves to support a part at least of the load which it draws, yet it bears much the same relation to the wagon, carriage, or other vehicle to which it is fitted as the locomotive does to its train.

The motor wheel consists essentially of a heavy wheel which is journaled in a stout yoke or forks, the head of which turns in a socket. The arrangement is similar to the front wheel and forks of a bicycle except that, instead of being controlled by a handle-

bar, the wheel is steered by a hand wheel, shaft and gear wheels, as shown in the illustrations.

To the right hand fork is attached a two-cylinder gasoline motor, and two gasoline tanks are carried on the other fork. The wheel is driven through a loosely mounted pinion, which meshes into a gear that is bolted to the spokes of the wheel, and a clutch mechanism, the lever for operating which is within easy reach of the driver of the wagon. The two cylinders are carried horizontally, one on each side of the fork, with the crank shaft, upon which is keyed a flywheel between them. The motor wheel is built in various sizes, from one horse power, suitable to a bicycle, up to four horse power for a carriage, or ten or more horse power for a heavy dray or truck. In attaching the motor wheel to any existing vehicle, it is merely necessary to remove the framework of the front wheels and bolt the steering socket to the body of the wagon, as shown in Fig. 2. When the motor-wheel is applied to a light vehicle, it is attached in front, thus transforming the same into a tricycle. In the case of hansom cabs, it is attached at the rear. When it is applied to the heavier vehicles, such as express wagons, coal carts, etc., two idle wheels are attached to the motor-wheel and work in unison with it.

One material advantage claimed for this system is that no reversing mechanism is necessary, the motor always running in the forward direction. If it is desired to back the car, the motor wheel is turned completely around in the steering socket and the motor started. It will be noticed that as the motor wheel is entirely self-contained and has a single point of attachment to the car, none of the twisting strains, due to the irregularity of the road, are thrown upon the motor; moreover, in case of disablement of car or motor, the ease with which a change of motor-wheels from one car to another can be made conduces to facility and rapidity of repairs.

The January Building Edition.

The January number of the Building Edition of the SCIENTIFIC AMERICAN is one of the handsomest numbers of this periodical which we have ever issued. The colored cover shows a colonial residence at Summit, N. J., and the houses in the body of the paper are of all prices and are accompanied by plans and interior views. A special feature of the Building Edition is the publication each month of illustrations of fine buildings or pieces of sculpture at home and abroad. These will appeal to all persons of culture, as the illustrations are reproduced exquisitely, and many purchase the paper on this account. The present number contains an article on Italian gardens accompanied by four beautiful illustrations reproduced on a large scale. The editorials refer to "The Building Code of New York City;" "Exhibition of Handicraft;" "Garden Cities;" "A Move for Better Tenements." We shall be pleased to send an earlier sample number of our Building Edition free to those of our new subscribers who may not be familiar with this beautiful and unique periodical.

The Current Supplement.

The current SUPPLEMENT, No. 1253, is an unusually interesting number. "Long-Span Bridges," by Professor W. H. Burr, of Columbia University, is continued. Like the preceding installments, the paper is elaborately illustrated. "Progress in Mechanic Arts in the Last Three-Quarters of a Century" is by Dr. Coleman Sellers, and is continued in this issue. "Electrical Vehicles and Their Relation to Central Stations" is by H. M. Maxim. "The Scientific Work of the U. S. Department of Agriculture" is a résumé of the report of the year. "A Jib-headed Mainsail Sloop Ice Yacht" is by H. Percy Ashley and is accompanied by working drawings.

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Fig. 2.—THE MOTOR-WHEEL ATTACHED TO A LIGHT WAGON.