

interest that when the company's shop was moved from New Rochelle to New York the whole of the plant was transported on the lorry shown at the exhibition. On the same stand was a light voiturette driven by a 4-horse power, gasoline, air-cooled motor, with a water-cooled head.

Some of the makers this year showed an excellent arrangement of the front end of the body, in which the seating capacity can be doubled by a simple operation. One of these is the model No. 1, Prescott steam automobile, of which we present two illustrations, one showing the front end of the body, corresponding to the dashboard of a horse-drawn vehicle, closed, and the other open. The casing is hinged, one-half of it containing the back rest and the other half forming the foot rest. When these are thrown back and down a cushioned seat is drawn forward, thus providing a thoroughly comfortable extra accommodation for two persons. This machine has been built in response to the demand for a heavier construction than is afforded by the ordinary steam runabout or Stanhope type. The wheel base has been extended and measures 5 feet. The water tank has a capacity of 32 gallons and the fuel tank of 12 gallons. The boiler measures 16 by 13 inches, and is provided with a superheater and a 16-inch two-piece burner. A feature in the design of the $7\frac{1}{4}$ horse power engines is that the bearings are all plain and of exceptional width. The running pressure of the boiler is 200 pounds to the square inch. This machine, whether with the front let down or closed, presents a very neat, attractive and well-balanced appearance. Its weight with the tanks filled is 1,050 pounds.

Another automobile of the let-down type that attracted much attention was the locomobile touring Model B. This has a seating capacity for four passengers, a 73-inch wheel base, a capacity for 21 gallons in the fuel tank, 49 gallons in the water tank, while the boiler and engine are of large capacity, the diameter of the boiler being 20 inches. The latter is of the upright fire-tube type, and is composed largely of copper. The running pressure is about 180 pounds. Some changes which will be appreciated have been made in the burner, the top plate being constructed in one piece, while an excellent shut-valve permits the fire to be turned off without the operator having to get out of the carriage. In this year's type the differential gear has changed from bevel gears to spur gears, and the device is completely inclosed and runs in grease, the spur gears being keyed instead of pinned to the axle. The locomobile also used a double-acting brake which arrests the backward as well as the forward motion of the carriage.

Particular interest attaches to the Pierce motorette knockabout, a shapely little car which has the distinction of being the smallest vehicle that took part in the endurance run from New York to Buffalo. Two of these little fellows were entered, and although they are only provided with a $2\frac{3}{4}$ -horse power De Dion motor, they climbed all the hills without assistance. This is not only the smallest-powered, but also considerably the lightest machine that took part in the run, since its weight is but a little over 500 pounds when in ordinary running order. Sufficient gasoline is carried for a run of over 100 miles, and from 30 to 35 miles can be run on one gallon of gasoline, the distance, of course, being dependent upon the condition of the roads and weather. The motorette is capable of a speed of 20 miles, while from 10 to 14 miles an hour can be maintained over ordinary roads.

In our last issue we showed an autocar complete, ready for service, and we now present a view of the same car with enough of the framework removed to show the running and driving gear. The running frame is of one-inch tubing, and stoutly trussed. The lower frame is of hickory and the body frame of oak. The tank of cooling water will be noticed behind the seat, while six gallons of gasoline are carried beneath the forward hood. The double-cylinder gasoline motor is seen below the seat, and the illustrations show well the compact arrangement of the driving mechanism.

The steam-driven Surrey exhibited by the Lane Motor Vehicle Company, weight 1,325 pounds, is a machine of substantial build and pleasing appearance. It has 34-inch wheels, 3-inch tires and an 8-foot wheel base. There is fuel capacity for from 40 to 50 miles over ordinary roads, and the air pressure is pumped direct by the engine. Devices are provided for the absolute protection against a dangerously high water level, while a low-water alarm is also supplied. As the exhaust is direct to the water tank there is a saving of a considerable percentage of the water, and a return of heat to the boiler.

The Stearns Steam Carriage Company have taken a decided step in the direction of the perfect steam carriage by introducing a compound engine with water pump and air pump attached to the crossheads. The radius of action of the steam carriage to-day is limited by the water supply, and any devices that will reduce water consumption will be welcomed. There is no reason why the compound system, even in such a small size as this, in which the cylinders are 2-inches and 3

inches by $3\frac{1}{2}$ inches stroke, should not show its usual economy over the simple engine, and the makers claim a saving of 20 per cent in fuel and water. The engine, which is completely incased, was one of the most attractive pieces of mechanical work in the Show. A feature of great value for touring is that by means of a distributing valve the engine can be turned at once into a simple engine, thus greatly increasing the power of hill-climbing. If the Stearns Company will follow to its logical conclusion the line upon which they are working we shall yet see their carriages fitted with a condenser—a device which would bring the radius of steam carriages up to that of any type of automobile extant.

Among the Stearns carriages there was none of more pleasing appearance than Model B, a trap or dos-a-dos carrying four persons, back to back. It has a let-down back and footboard, by closing which it may be turned into a single-seated vehicle having the trim appearance of a runabout.

A decidedly attractive vehicle was the Knoxmobile, a particularly easy-riding car, whose comfort is due to the introduction of the old side-bar spring with pivot connections at the end of the springs to the axles. The 7-horse power engine is cooled by air, the draft being intensified by a small fan. The exterior of the engine is entirely covered by 3,000 3-16-inch pins. Ten gallons of gasoline giving a capacity of 250 miles are carried. The engine is horizontal, single-cylinder, and three brakes are provided which hold the vehicle in either direction.

The Century Motor Vehicle Company are makers of a steam carriage which is the only one that makes use of a bevel drive. This is incased and is dust-proof, and a set of gears was exhibited which showed an excellent state of preservation after several thousand miles of service.

The new mobile touring carriage, shown for the first time at the Madison Square Garden exhibition, had just returned from a 250-mile run between New York and Washington, in which the 100 miles from New York to Philadelphia was covered in eight and a half hours of night riding. The machine has been built with a special view to strength, and a successful effort has been made to get rid of some of the objectionable features of European machines. It has sufficient power to climb the heaviest grades and sufficient gasoline is carried for a run of from 125 to 225 miles, according to the difficulty of the road. Particular attention has been paid to those features which experience with steam-driven vehicles has shown to require special attention, and during the New York city and Washington run referred to, we are informed that the operations of pumping air and water, oiling, etc., were conducted while the machine was running and without interruption. Water was renewed at intervals of from 25 to 35 miles. A notable change has been made by getting rid of the by-pass and rendering the regulation of water in the boiler purely automatic. Another notable carriage shown was a 12-passenger vehicle, a dozen of which type have been in operation during the past six months in New York city. In spite of its large capacity this wagon weighs but 1,900 pounds. It has been built to do work of an omnibus character, but with greater speed and regularity than usually characterize that class of vehicles.

The Packard machine, exhibited by the Ohio Automobile Company, attracted considerable attention from the fact that out of five entries of these machines in the Buffalo endurance run, four received first-class certificates, and one a second-class certificate. The makers claim that their very handsome models are not in any sense a mere copy of other existing vehicles. Model C, the original machine made by the company, and Model F, were both on exhibition. The first-named is a horizontal single-cylinder, four-cycle engine of 12 horse power. Connection is made with a clutch and gear shaft, by a spring transmission. The jump-spark ignition is used, two sets of dry batteries with a double-throw switch being provided. The gasoline tank holds sufficient fuel for a 150 to 200-mile trip, according to the roads, and the working speed varies from 7 to 22 miles. In Model F the essential features of Model C are retained; there are three direct-gear speeds ahead and one reverse, and both lever and pedal clutch control are fitted.

Limitations of space prevent any further reference to this most successful exhibition, in which the quality of the exhibits, almost without exception, was of such a high standard as to cause the opening year of the century to remain always the real starting point in the history of the thoroughly successful inauguration of the practical automobile in this country.

A Tropical School for Medicine in London.

A determined attempt is being made to establish a large Tropical School for Medicine in London, replete with every modern convenience and up-to-date appliances. The exigences of the colonial expansion of commerce in the tropics, especially of those depend-

encies infested with malaria, demand the foundation of such an institution. For this purpose no less than \$500,000 are required. Many wealthy gentlemen, who have great interests in the tropics, are lending their strong financial assistance to the scheme. The Right Hon. Joseph Chamberlain, the British Colonial Secretary, has always evinced a strong interest in the matter, since the development of many of the British African colonies depends upon the successful subjugation of the various malarial maladies indigenous to these climes. The present school is wretchedly inadequate to fulfill the necessary requirements, since it has only six rooms available for the accommodation of students. The large mercantile companies are always demanding competent men, and these cannot be provided owing to deficiency of means. It is desired to erect a large building with more living rooms for students, enlarged laboratories, museum, and a library. Dr. Patrick Manson, the medical adviser to the Colonial Office, opines that in the course of one generation the blood of the Barbadians can be entirely freed from elephantiasis and cognate diseases. Sir Francis Lovell, who is also deeply interested in the scheme, proposes visiting India, Burma, Ceylon, Straits Settlements, China, Japan, New Zealand, Australia, Canada and this country, in order to emphasize the objects of the school and to obtain assistance, since it will be of universal importance and benefit. An expedition is at present being organized to visit Christmas Island, to investigate beri-beri and to study the pathology of other diseases. They will remain on the island for two years.

THE OPOSSUM.

BY A. C. CARSON.

The American opossum, representing the genus *Didelphys*, is one of the most curious animals in the United States. It is the only one carrying its young in a pouch or marsupium, like a kangaroo. It is the only animal which can feign death perfectly in order to escape its enemies, and the expression "playing possum" is a well-known phrase. It is also remarkable in that it hangs by its tail like a monkey. Its hands resemble those of a human being. It is most liberally provided with teeth, and has a snout like that of a hog, eyes like those of a rat, and hisses like a snake.

Mr. Edward Decker, an agriculturist residing near Columbus, Ohio, caught a female opossum last spring, and discovered that his captive had in her pouch an interesting family of twelve little ones. His dog had been investigating a rail-pile, and suddenly raised a tremendous outcry. Mr. Decker found the dog worrying the old opossum and delivered her from the jaws of death, but not until after she had been severely bitten. He dressed her wounds, took good care of her and succeeded in raising to maturity every one of the twelve young ones.

When first discovered, the baby opossums were about two inches long, hairless and sightless.

The dozen grew slowly at first, their progress being retarded by the injured condition of the mother. It was several weeks before the boldest of them, having had his eyes unsealed, timidly poked his white snout through the opening of the pouch and reconnoitered. By and by he ventured to crawl outside and hung by the long fur of the mother. Soon another and another followed the leader on a tour of inspection. After that the twelve came out daily, but were exceedingly timid, scuttling back into the pouch at the slightest noise or the approach of any person.

One of the twelve managed to escape from the old corncrib where they were confined and was gone for ten days. Upon his return he was immediately set upon by his brothers and sisters as a renegade, and had his large, fan-like ears bitten off close to his head.

The method of feeding the mother consisted at first of throwing in a pigeon, and later a fowl from the barnyard. The young opossums used to have fierce fights over their nocturnal meals, and in one of these wrangles one of their number lost her ear, after the style of punishment visited on the renegade. This seemed to be the vulnerable point of attack in a 'possum fight.

When they had attained the size of rats the young bore a remarkable resemblance to these rodents, and when all climbed upon their mother, clinging to her hair, neck and legs, she staggered under the load. No other mother among the animals of North America bears such a burden, and her patience and tranquillity under her manifold cares were admirable. The photographer who succeeded in taking the half dozen fine views of mother and family has given an insight into the domestic arrangements of the opossum family such as the world has never had; for the opossum, although far from uncommon in the United States, seems to be little understood. Owing to the nocturnal habits, comparatively few people have ever seen a female with her young.

The writer obtained from Mr. Decker four of the young opossums when they were about one-fourth grown, and he made a close study of their habits.

The opossum is known to naturalists as being one of the most innocent and harmless of animals. In its wild state, when attacked by man or dog, it immediately falls over as if dead, and no amount of beating or physical torture can make it cease "playing possum." There is only one way in which the animal can be made to resume the semblance of life, and that is by throwing it into water. A cold bath will instantly cause it to cease feigning death and swim for life.

In its habits this queer animal is a veritable sloth. The two things it likes best to do are to eat and sleep. It eats with great gusto and a carnivorous and omnivorous appetite. So eager were they to snap up a big beetle that one's fingers were in danger of being masticated along with the shelled tidbit. A half-grown frog tied with a string and dropped under their noses precipitated a vicious fight for possession. The contestants for the epicurean morsel growled and snarled like so many dogs, and chewed each others'

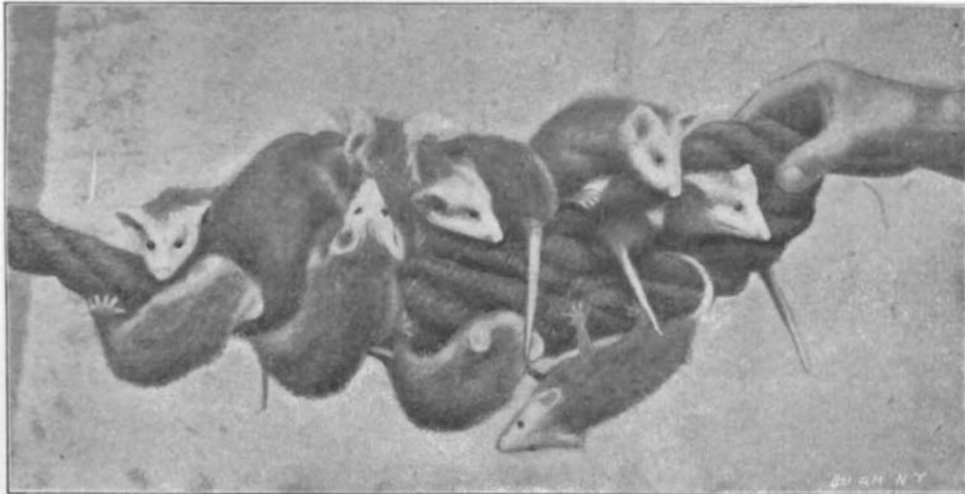
afterward slunk into a corner and crouched low to escape the hands reached forth to touch her. She never manifested any resentment, however, her only desire being to escape notice.

The young animals spent much of their time in combing their long hair and washing their faces and hands. For the latter purpose nature has supplied them plentifully with salivary glands, and in taking a bath Blackie and her companions used copious quantities of saliva. Their pedimanous extremities and their "fifth hand," the tail, were thus kept scrupulously neat, the hands being always clean and rosy. The hair-combing process is both interesting and amusing. Blackie performed this operation principally with her rear foot-hands. With the right one she would begin to comb just back of the ear, and continue until a point above the hips was reached. The work was finished with the front feet. The five fingers of the front extremity are supplied with narrow nails, as are also the four fingers of the hands in

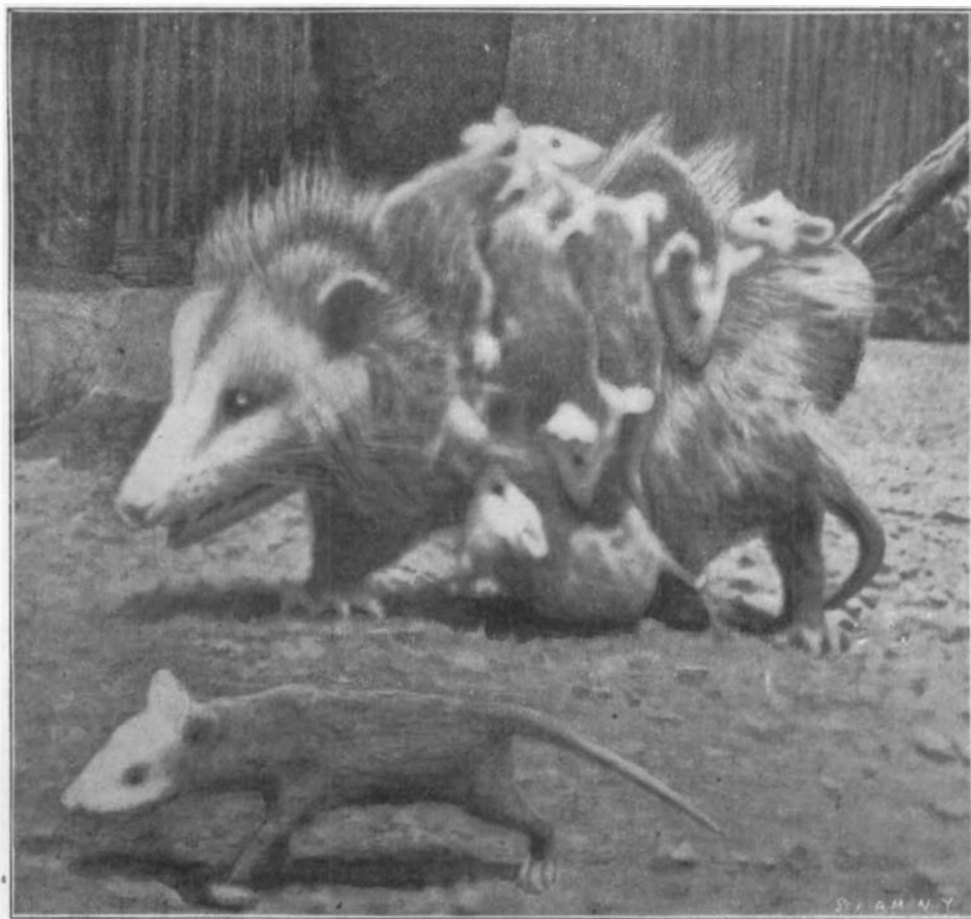
"Antarctic," a small steamer of 390 tons. She carries a crew of twenty-nine all told, under the command of Capt. Larsen, who has had great experience in unfamiliar regions. The expedition is under the famous Swedish explorer, Dr. Otto Nordenskjöld. There are two geologists, a botanist, and a meteorologist on board, besides the scientific members, while fifteen dogs and sleighs for inland exploration are being carried. The "Antarctic" proceeds direct to Buenos Ayres, and thence to the Falkland Islands. After remaining at the latter island for one day, the vessel will steam south to that section of the Antarctic known as the Weddel Quadrant, which will be the special sphere of operations. It will then proceed along the coast of King Oscar Land, and at the first suitable spot land the stores and the houses for the winter party, comprising Dr. Nordenskjöld and five assistants. The ship with the remainder of the expedition will return to the Falkland Islands, where she will remain until the next Antarctic spring. In November or December, 1902, she will fetch the winter party. The principal work will be magnetic and meteorological observations. If opportunity offers, King Oscar Land will be mapped, and sledge journeys made into the interior. The expedition will be absent two years.

The Current Supplement.

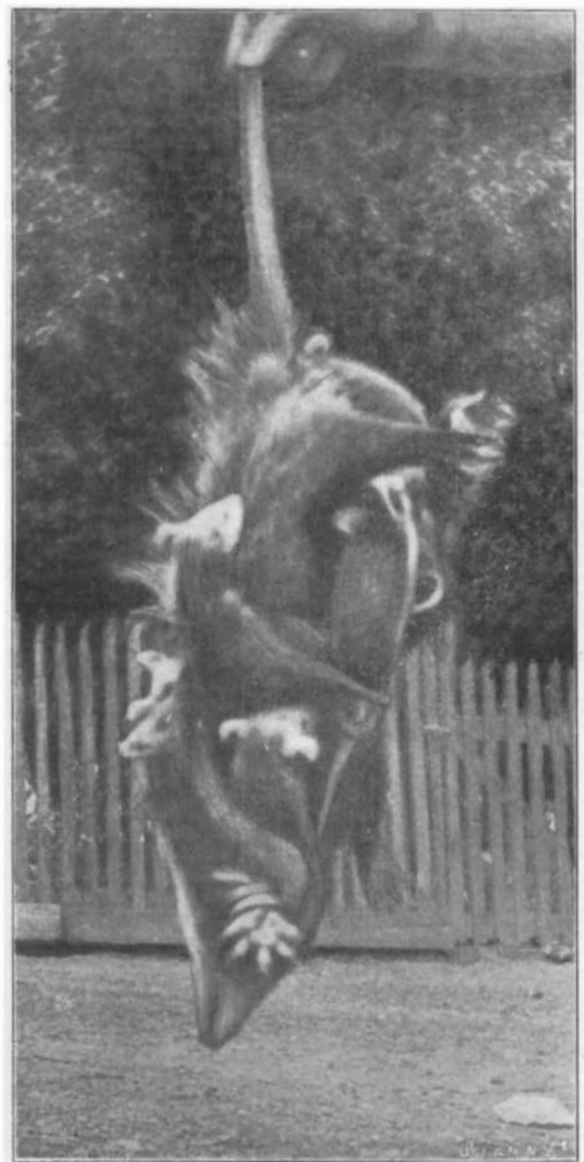
The current SUPPLEMENT, No. 1351, contains many papers of unusual interest. "Count de la Vaulx Balloon 'Mediterranéen'" is by our special Paris correspondent, who visited Toulon for the purpose of in-



YOUNG OPOSSUMS ON A ROPE.



AN OPOSSUM FAMILY.



YOUTHFUL CLIMBERS.

noses and ears in reckless disregard of sensitive feelings and proprietary rights. The chaps whose noses were bitten hissed loudly, after the aspirate fashion of their kind.

The four animals constituted two pairs. Three were gray, while one female was very dark. She was designated as "Blackie" and thrived amazingly, soon becoming larger than any two of the others. She was gentle but extremely sensitive and retiring. One day a collar and chain was put on her and she was taken for an outing in the fields. Blackie became possessed of a frantic desire to part company with her self-constituted guardian, and became furious at the restraint put upon her movements. At first she tried to get away by stealth, sneaking away slowly and softly through the grass, and, when at some distance, would begin to amble at a lively rate. Her disgust at being pulled up with a sudden jerk was pronounced, and she growled like a bear at bay, tearing at the chain with feet and jaws and ruffling her long hair till it stood like quills upon the fretful porcupine. She never got over the memory of that day, and always

the rear, but the thumbs of the latter have no nails. In walking a limb the thumb invariably goes on one side while the four fingers go on the other. The tail, besides being handy in climbing and in suspension, is used while walking a limb, similarly to a rope-walker's balance-pole.

Young opossums may be carried around on the end of a walking-stick and make gentle and interesting pets. They possess none of the viciousness of that most diminutive of the bear species, the raccoon, but on the other hand seem to lack its intelligence. Naturalists characterize them as the most innocent and harmless of animals.

Swedish Antarctic Expedition.

BY OUR LONDON CORRESPONDENT.

The Swedish South Polar Expedition recently sailed from Falmouth, England, for the Southern seas, where it will act in conjunction with the English and German Antarctic expeditions. The King of Sweden and the Swedish Geographical Society are supporting the enterprise. The vessel selected for the work is the

interviewing the Count and obtaining photographs. "Enameling" is the third installment of a most important series. "Improved Boosters" is by Walter M. Hollis. "Sewers of Ancient Rome" is an interesting article. "Prunes and Prune Culture in Western Europe" deals with a curious industry. "A New Method of Judging the Authorship of Handwriting" is by Dr. Persifor Frazer, and is accompanied by a number of most interesting illustrations.

Contents.

(Illustrated articles are marked with an asterisk.)

Antarctic expedition.....	333	Naval station at Puget Sound*	323, 328
Automobiles*.....	330	Notes and queries.....	336
Belleville boiler.....	324	Opossum, the*.....	332
Books, new.....	335	Patents, brief notes concerning.....	329
Bridges, concrete arch*.....	327	Railway, African.....	328
Cable laying in the Philippines*.....	325	Santos-Dumont's plans.....	324
Clock, remarkable.....	328	Sciences, National Academy of.....	325
Eclipse expedition*.....	330	Steam carriage, condensing.....	324
Emden, German port.....	325	Stein's Dr., travels.....	325
Engineering notes.....	329	Supplement, current.....	333
Fuel, low-grade.....	326	Washing, dry.....	327
Inventions, recently patented.....	334		