

for ten minutes, is cooled, and the flask is filled to the brim with it. The tube is inserted in the cork, so as barely to reach through it. The cork is now inserted in the flask, when water will rise a short way in the tube. It should stand only an inch or two above the cork. If it stands too high, the cork should be removed and replaced, less water being introduced into the flask. Absolutely no air must be inclosed. On heating the flask, the water will very slowly rise in the tube as the heat expands it.

The minor point of boiling the water should be attended to, as the effect is much better, and the demonstration is a true one, when no bubbles are discernible.

The same flask and tube may be used to show the expansion of gases. It is emptied, and inverted with the end of the tube under water. On heating the flask with a lamp, the air expands, and escapes in bubbles from the end of the tube. On removing the source of heat the water rises into the tube, and perhaps into the flask, owing to the contraction of the air as it cools.

THE RHINOCEROS IN THE PARK.

Bohu came to the Park only a short while ago, and is of that kind of rhinoceros which has two horns. Those of Asia have only one horn, and their skin lies in thick folds and segments, in shape like that of the armadillo. Nor are they by any means so rare as the one we have in the Park. As will be seen by the picture given of Bohu, drawn by our own artist, the upper lip of this strange beast is much larger than the under one. It is prehensile, that is to say, it can be made to curl about a branch or a wisp of straw, like the end of an elephant's trunk and with quite as much ease. Bohu is in the lion house, and at one end of it. The hippopotamus is at the other. This gives those who like to study animal life a fine chance to compare two rare forms, often mistaken, the one for the other. The last named, as will be seen by a visit to the Park, looks like a great hog in more ways than one. He has a blunt snout, short, thick legs, knows no such thing as grace when he moves, and to wallow is his chief delight. The rhinoceros, on the other hand, though in some ways like the hippopotamus, differs in these respects. It is more comely, or, rather, it is less hideous; its legs are long, its snout sharp, it does not need water to lie in, can stand for a long time, and walks with a free motion.

Bohu is still housed in the circus wagon which has wheeled her from town to town, over highways and country roads, for more than a year, and its keeper told the writer that when, during her pilgrimage, she caught sight of a fine wooded slope with verdant foliage and velvety grasses, she was sure to "make a break" to get out; for the rhinoceros takes the same pleasure in roaming over a wooded hill that the hippopotamus does in wallowing in muddy, sedgy river bottoms. Unlike the river hog, however, the rhinoceros is at times fierce, and visitors to the "show" of which Bohu formed a part had to be warned not to come too near, and it was not thought safe to let any other than her keeper enter her cage.

She belongs to the family *Rhinoceros bicornis*, has, as the name indicates, two horns on the snout, one almost straight, the other curved, and a narrow, compressed, deep symphysis, or union, of the lower jaw. She came from the north of Africa, from Abyssinia, and is said to resemble the specimen which has lived in the gardens of the London Zoological Society for nearly twenty years.

In their native wilds the rhinoceri, like bison, sleep during the heat of the day, feeding at night and in the early morning on leaves and the succulent branches of the trees and on certain kinds of bushes. Their sight is bad, and it is thought by naturalists that this comes, at least in part, from their nocturnal habits. They make up for this defect by a very keen scent, and are otherwise aided in escaping danger by feathered friends, called "rhinoceros birds," by which they are usually accompanied while roaming. These birds, at the slightest alarm, run about their heads, flap their wings, and screech a warning into their ears.

When frightened, they go off at a sharp trot, and, if danger really menaces, break into a gallop, but are easily overtaken by a good horse. The broad-nosed, or Asian, variety invariably run in a straight line, and it is said that all the hunter has to do to bring one down is to ride ahead, take a position to one side of the course followed, and let fly at short range as the beast goes by. The prehensile lipped, or African, variety, however, will change his course when he sees the hunter close at hand, and is not, therefore, so easily brought down.

A strange habit of this kind of rhinoceros is the guiding of the calf when in flight by pressing the horns against its flanks, as if goading it on and steering it at the same time. The meat of the rhinoceros is said by hunters to be very good during the spring and summer, the rump being particularly juicy and palatable. The remains of the rhinoceri were found in the earliest deposits of this continent, and an authority has found reason for the belief that it made its first appearance here. He says:

"In the Eocene formation of the Rocky Mountains are found many modifications of the primitive perissodactyle (odd-toed) type, from which the rhinoceros may have originated, and various existing and distinct species and groups in a family, Rhinocerotidæ, which is a division of the perissodactyle section of the great order of *Ungulata*, or hoofed mammals, of which section the only other surviving members are the tapirs and horses."

SCIENCE IN TOYS.

IV.

The ascensional power of heated air is exhibited by the draught of every chimney. It is shown by the fire balloon and by the upward tendency of every flame. It is the prime factor in the propelling power of one of the ancient motors—the windmill; wind being only air rushing forward to take the place of air which is rising because it is rarefied by heat.

The power derived directly from an ascending column of heated air has never been utilized except as a motor for running mechanical toys, and to some extent for operating small mechanical signs.

The toy motor shown in the annexed engraving is too familiar to require description. It is generally placed over a lamp chimney or at the side of a stove-pipe, where the rapidly ascending heated air may impinge on the inclined vanes. The air, acting on the vanes according to the well known law of the inclined plane, produces a lateral movement of each vane, and the vanes being restrained at the center of the wheel while free at their outer ends,



HOT AIR MOTOR.

are compelled to move circularly.

The aerial top is the reverse of the toy just described. Instead of being made to revolve by a rising column of air, it is made to rise on a column of air by being revolved.

It is of substantially the same form as the hot air motor, but it is made much heavier, in order that it may acquire sufficient momentum to carry it high up in the air. With the application of a sufficient amount of force, this top will rise to a height of 150 to 200 feet. It can hardly be called a flying machine, as it does not carry its own motive power. In the next illustration, however, is shown a flying machine which in one sense carries its own power, that is, stored power.

It consists of a light frame furnished at one end with a slender rattan bow inclosed in a little bag of tissue paper, which forms a sort of rudder when the fly-fly ascends, and opens like an umbrella when it descends, forming a parachute, which greatly retards the fall. In the crosspiece of the opposite end is journaled a little shaft formed of a wire having on its inner end a loop receiving a number of rubber bands, which are fastened to the opposite end of the frame. To the outer end of the little shaft is secured a piece of cork, in which are inserted two feathers inclined at an angle with the plane of the shaft's rotation, and oppositely arranged with respect to each other.



THE FLY-FLY.

By turning the propeller wheel thus formed, the rubber bands are twisted, and sufficient power is stored in them to turn the propeller wheel in the direction opposite to that required for winding, and thus propel the device through the air.

Another device still more nearly approaching the ideal flying machine is shown in the annexed cut, Fig. 1 being a perspective view of the entire bird and Fig. 2 an enlarged perspective view of the working parts. It is known as Penaud's mechanical bird.

It is a pretty toy, imitating the flight of a bird very well indeed. It soars for a few seconds, and then requires rewinding. Two Y-shaped standards secured to the rod forming the backbone of the apparatus support at their upper ends two wires, upon which are pivoted two wings formed of light silk. The wings are provided with light stays, and are connected at their inner corners with the backbone by threads. In the Y-shaped standards is journaled a

wire crank shaft carrying at its forward end a transverse wire forming a sort of balance, and serving also as a key for winding. The inner end of the crank shaft is provided with a loop to which are attached rubber bands which are also secured to a post near the rear end of the apparatus. Two connecting rods

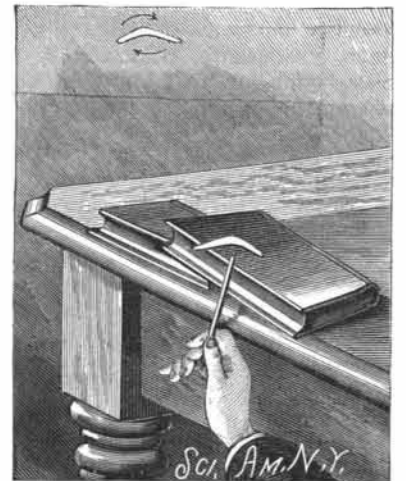
MECHANICAL BIRD.

placed on the crank are pivotally connected with the shorter arms of the levers of the wings. The rear end of the backbone is provided with a rudder.

The rubber bands are twisted by turning the shaft by means of the cross wire. When the shaft is released, it is turned by the rubber bands in a reverse direction, causing the crank to oscillate the wings, which beat the air in a natural manner, and propel the device forward. The principle of the inclined plane is involved here, but the plane, instead of being rotated, as in all the cases mentioned above, is reciprocated.

The toy boomerang, which is, in some respects, similar to the regular article, cannot perform all the feats with which the more pretentious implement is credited; but it can be projected, and made to return over nearly the same path.

The toy boomerang is made of a piece of tough cardboard cut on a parabolic curve as shown in the engraving, one arm of the boomerang being a little longer than the other. When laid on an inclined surface, as shown in the engraving, and snapped by a pencil held firmly in one hand and drawn back



BOOMERANG.

and released by the fingers of the other hand, the boomerang is set in rapid rotation by the blow, and is at the same time projected, the first part of the trajectory being practically in the continuation of the plane in which the boomerang is started; but when the momentum which carries it forward is exhausted, the boomerang still revolves, and maintains its plane of rotation, so that when it begins to fall, instead of describing the same trajectory as ordinary projectiles, it returns along the same path, or perhaps in a different path, toward the point of starting.

The flatness or curvature of the boomerang and the form of its edges, as well as the position in which it is placed for starting, and the speed and manner of starting, all have an effect in determining the outward as well as the return course of the projectile.

G. M. H.

Treatment of Whooping Cough.

The following method of disinfection of sleeping and dwelling apartments and clothes is recommended by M. Mohn in the treatment of whooping cough. It is said to cure the cases immediately. The children are washed and clothed in clean articles of dress, and removed to another part of the town. The bed room and sitting room or nursery are then hermetically sealed; all the bedding, playthings, and other articles that cannot be washed are exposed freely in the room, in which sulphur is burnt in the proportion of twenty-five grammes to the cubic meter of space. The room remains thus charged with sulphurous acid for five hours, and is then freely ventilated. The children return the same day, and may sleep and play in the disinfected rooms.—*Lancet*.