

Nature's Fireworks at Sea.

The steamship *Pathan* arrived here recently from Japanese ports with the first cargo (938 tons) of summer tea. Capt. Roy reports having witnessed several remarkable meteoric showers on the Atlantic. The shooting stars were of unusual size and brilliancy. Nearly all of them looked as large as Jupiter appears to be, and at least a dozen left in the sky bright flashes that lasted from ten to twelve seconds. Some few were so luminous that they lit up the ship like electric lights. The rain of stars seemed to come from the vicinity of the Great Bear. Its course appeared to be from north to south and south-east.

On Aug. 1, just after leaving Gibraltar, the *Pathan* ran into an electric storm, preceded by heavy squalls. The tip of every yard arm and mast was adorned with globes of electric fire. They jumped from point to point, ran up and down the rigging, slid along the stays, ascended and descended the halliards, playing such a game of tag as Capt. Roy had never before seen in his long experience in southern seas.

THE BREEDING HABITS OF THE SKATE.

BY WM. P. SEAL.

An interesting observation has recently been made in the aquaria of the United States Fish Commission, at Washington, on the common or "barndoor" skate (*Raja laevis*), which, though not complete, shows a very long period of gestation and incubation.

On November 1 last a single skate of this species was received among a lot of fish brought from the Wood's Holl station by the commission's steamer *Fish Hawk*, on her return to Washington. The skates do not usually live well in aquaria (in small tanks at least), but this one being not very large—about fifteen inches from tip to tip—appeared to be well satisfied with the conditions, and ate with avidity, catching small fish, or taking them from the hand of the attendant. On January 16 it laid an egg, and within a few days laid six more. It was thought at the time that as there was no male present, and it had been in the aquarium two months and a half, there was small probability of the eggs being fertilized. It was with considerable astonishment, therefore, that on May 12 the attendant, Robert Tunbers, a very observing man, found that they were undergoing development, and that by holding them up to the light the young skates could be plainly seen moving about. The accompanying sketch by Mr. H. E. Baldwin, a draughtsman of the commission, gives a very satisfactory view of the young skate at this period.

To make the drawing it was necessary to open an egg, and this was done by cutting it open on three sides, leaving one side to act as a hinge. The shell was filled with a thin but somewhat viscid fluid, in which the little skate moved freely about while the drawing was being made. When the picture was finished the egg was closed up and replaced in the aquarium. More than two weeks after this the little fish thus rudely disturbed, in the interests of science, was found to be still alive and apparently not at all the worse for it. It seems impossible that the salt water should not have found its way into the egg through the opening, and yet, on the other hand, the pressure may have sealed it up very tightly. At this point the egg disappeared, and a very interesting observation was brought to a close.

The hatching of the remaining eggs was awaited with the greatest interest. Another misfortune awaited, however, for before the absence of any of them was noticed they had all mysteriously disappeared like the first one.

This was a very great disappointment, of course, and a solution of the mystery was sought, but no trace of them was ever found. It was surmised, however, that as they had been transferred to an aquarium which had no cover over it, they were pulled out by the rats infesting the place and carried off into their holes to be eaten. As the eggs, owing to the air forced into the water, sometimes became so covered with the globules as to become buoyant and float to the surface, this seems to be a reasonable conclusion, especially as the rats are known to capture fish, snails, etc., from the tanks when opportunity offers.

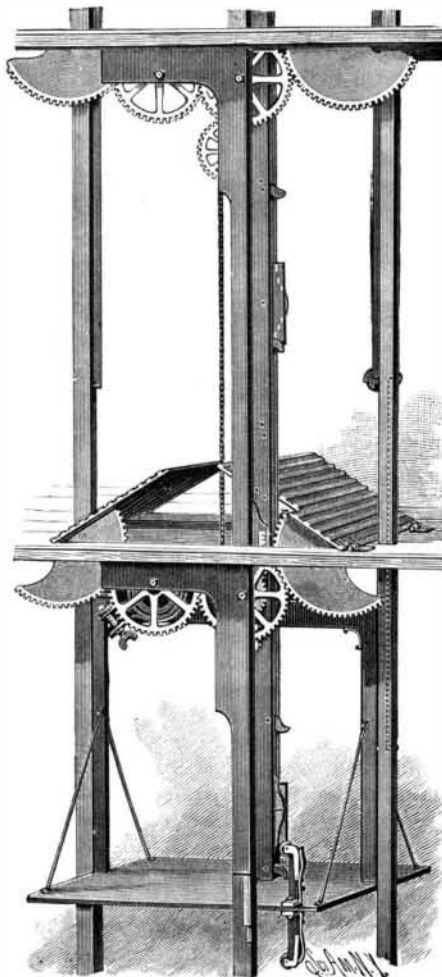
On the 16th of June, when the eggs were last noticed by the writer, the hatching was apparently still some time off. It is possible that the period covered from the laying of the eggs to their disappearance may not represent a normal development, but there may have been a retardation from some cause. It appears that but little is known of the habits of the skates.

Vinal Edwards, an observing collector of the United States Fish Commission at Wood's Holl, Mass., has found skates' eggs in great numbers on sand bars, at low tide, all standing upright, with one end buried in the sand. Those who visit the sea shores are familiar

with the empty shells, which are quite common among the sea weeds and drift.

IMPROVEMENTS IN ELEVATORS.

The accompanying illustration represents various novel features of construction relative to elevator doors and means for operating them, a brake and safety devices, and other attachments, applicable to both freight and passenger elevators, and forming the subject of several patents in the United States and foreign countries, Mr. William N. Anderson, of San Rafael, Cal.,



ANDERSON'S IMPROVED ELEVATOR.

being the inventor. The doors of the shaft openings are automatically opened and closed, so that there will be no draught in the well shaft, by the movement of the elevator car, which is raised by a cable attached to the top of the car frame and connected with a winding drum in the usual way. The car floor and top carries mechanism for operating the doors, which have on their under sides transverse strips aligning with the side posts, to form when the doors are open a continuous guide for the car. A cord affixed to the inner edge of each door extends over a suitable pulley, and carries at its outer end a weight or counterbalance, that the doors may be easily operated. Each door also has at one end a depending segmental rack meshing with one of two pinions depending in hangers from a floor joist across each entrance to the elevator well, the other pinion engaging toothed racks fixed to the top of the elevator car frame. The floor joist also has vertical slots in its inner side aligning with the racks on the top of the car frame, and with racks attached to the bottom of the frame, and engaging one of the sets of pinions, these slots being normally held closed by a spring-pressed plate, to prevent any draught through such opening, one of the doors also having an overlapping flange, that the elevator shaft may be at all times closed tightly, to prevent any upward draught of air.

of the operator, the brake shoes are arranged to engage the sides of the posts or guide ways of the elevator shaft. Each of the shoes consists of a block of rubber or other suitable elastic material, inclosed except on its face by a metallic casing, while the back of the casing is acted upon by eccentrics on a shaft on the under side of the carriage, a gear wheel on this shaft meshing with a segmental gear wheel on a weighted lever normally held by a catch in an inoperative position. A governor on the elevator carriage has a belt connection with a spring-pressed friction wheel traveling on one of the guide posts of the shaft, and the stem of the governor presses upon a pivoted lever connected with the catch holding the weighted lever adapted to operate the brake shoe, any too rapid descent of the elevator car causing the governor to release the catch and thus apply the brakes. A cord from the brake-operating lever also extends to the inside of the car, whereby the brakes may be readily operated by the occupant.

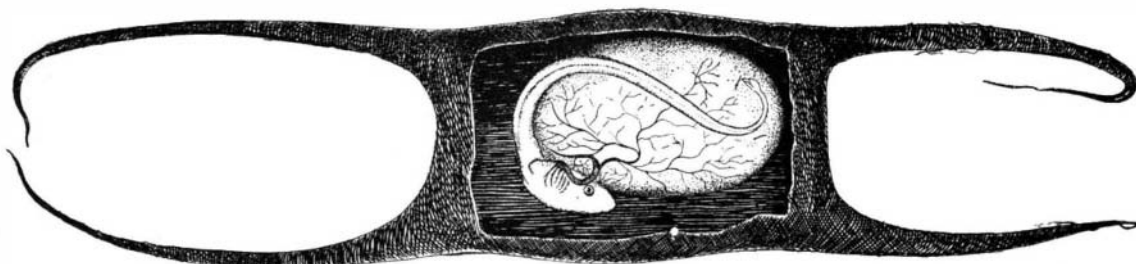
Among the other improvements provided for are the use of corrugated metal doors, the corrugations of one plate intersecting those of the other, the doors when open resting in recesses of the side posts, on one of which is a vertical rod having at its upper end a pivoted catch to engage and hold open the door, the catch being normally pressed by a spring on the rod, and the spring being secured to a latch projecting in the path of a block pressed outward from the cage by a spring. The doors are thus allowed to drop, in accordance with a different construction, in which pinions connected with the segmental gear are engaged by sliding racks secured to sliding bars moving vertically in a raceway secured to one of the side posts of the elevator well. The racks move simultaneously in opposite directions, serving either to open or close the doors according to the direction in which the cage is moving, and each rack-carrying bar having on its back side a projecting block with pins adapted to engage cam-shaped hooks pivoted in the raceway. The hooks are reversed for opposite bars, and are adapted to engage latches on the elevator cage, the latch being pivoted to the free end of bent arms and normally pressed forward by a spring. The latch carries on one side a roller adapted to engage rounded steps on the raceway, the pressure releasing the latches from the blocks so that the cage may move on without straining the mechanism, the steps being located on the raceway at a point opposite the blocks when the doors are in either a wide open or closed position. A gear wheel connected with one of the door racks has a loosely mounted drum within which is a ratchet wheel engaged by a spring-pressed pawl, the drum being encircled by a strap so that pressure can be brought on it to prevent the doors from slamming. A modified form of gearing is provided for use in cases where the elevator well is located against the wall of a building, the mechanism in each case being designed to work with a minimum of friction, while always keeping the elevator shaft closed against draughts.

Log Hauling Devices.

The inclined and horizontal log haul in operation at the Hudson River Pulp and Paper Company's mills, at Palmer's Falls, N. Y., consists of an endless detached chain, running in a recess at the bottom of a trough, having special links with log teeth every five feet and passing over sprocket wheels whose centers are 200 feet apart. The head wheel is 25 feet above the foot wheel. The water end of the chain swings, and can be raised or lowered by means of a small winch to suit the depth of the water. The logs are floated to the haul-up, and as they come around the foot wheel are caught on the teeth of the chain and carried up the incline at the rate of 125 feet a minute. On arriving at the top they are discharged into a horizontal log haul, having head and foot wheels nearly 600 feet apart, the whole being similarly constructed to the inclined haul. The return chain is supported by toothed idlers. A deflecting piece is placed across the horizontal conveyor, by which the logs elevated by the chain are thrown out of the trough and rolled over the side upon long skids.

The outfit has dispensed with the use of eight or ten double teams and as many men, and takes out logs as fast as they come down, preventing the accumulation that resulted under former methods. Some of the logs measure 30 inches in diameter and from 40 to 50 feet in length. The average is about three to the hundred feet. The power required is small, a 25 horse power engine being ample for the work at the pulp mill.

To polish deer horns, scrub them with a brush and sand to take off the dirt and loose fiber, then polish with rouge and rotten stone and a cloth, and varnish with copal varnish.



EGG OF THE SKATE (RAIA LAEVIS) SHOWING EMBRYO.

As the car ascends, the racks fixed to the top of its frame engage one of the pinions in hangers from the floor joist above, this pinion meshing with the other, and that with the segmental rack to raise the doors, which are closed, as the car continues upward, by the racks attached to the bottom of the frame engaging the pinions and actuating the segmental rack. The operation is reversed as the car descends, the doors being left closed in each case.

In the improved brake, which is designed to automatically stop the car when it exceeds a normal rate of speed, while being at all times under the full control