Correspondence.

Bird Soaring.

To the Editor of the Scientific American:

I very much question the conclusions of Mr. Garrett P. Serviss in explanation of the soaring or floating of birds, given in his interesting paper on the subject in the Scientific American of April 30.

I am inclined to think that the following three statements can be substantiated by close observation:

First: The sailing without motion of the wings is usually in circles, and often at times when the air is comparatively still.

Second: At times the bird is constantly falling, but in such gentle spirals as not to be detected by the eye except after long observation.

Third: That often the bird is not falling; and invariably when it is not, the head is lightly raised and the tail depressed, and thus the bird is borne upward, or kept on a level by the pressure of the air current underneath, caused by its rapid flight. And in order to regain its momentum, which it is constantly losing by reason of the resistance of the air underneath, at intervals, and sometimes at very long intervals, the wings are flapped a few times, and then are again in repose.

Such, at least, are my conclusions in observing the flight of the common buzzard, the only bird whose soaring I have had an opportunity of seeing.

Paris, Ill., May 3, 1904. Henry F. Nelson.

Gravity.

To the Editor of the Scientific American:

If the attraction which we call gravity is independent of (not a function of) time and space, then I would submit that the law of the inverse square follows directly.

Consider the attraction of a particle. Call the particle A, and let it be the center of a sphere. Let this sphere have any radius x.

If the attraction of A is independent of time and space, then always the attraction of A on the surface of the sphere is exactly the same whatever the radius x of the sphere.

Now the extent of the surface of the sphere varies *directly* as the square of the radius.

It follows then that the attraction of A on any other particle on the surface of any such sphere must vary *inversely* as the square of the distance.

A rough proof of the above (for the schoolroom) may be given thus: Assume the surface of any such sphere to consist of particles. Now the sum of the attraction of A on such particles is always the same. But the number of such particles varies directly as the square of radius of the sphere. In order then that the attraction of A should be always the same, this attraction of A on any particular particle must vary inversely as the square of the radius, that is the attraction of A on any exterior particle must vary inversely as the square of the distance.

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Double-Deck Cars.

To the Editor of the Scientific American:

In your issue of April 2, 1904, I notice a communication from C. P. Carpenter, of Northfield, Minn., relating to double-deck cars for rapid transit in San Diego. For the benefit of the readers of the Scientific American, and to set Mr. Carpenter right, a little explanation seems necessary.

Double-deck cars were first put on the street-car lines of San Diego in September, 1892, and they were taken off in July, 1903. The cars were 26 feet over all, single trucks, and the seating capacity was 24 on the lower floor and 24 on the upper deck, with one seat each in the front and rear of the car running crosswise. The lower floor and the upper deck seats ran lengthwise; the upper deck seats were built back to back, not crosswise, as Mr. Carpenter's communication to the Scientific American would have it.

There were only two cars on the lines, and they were Nos. 1 and 2 respectively. They have been dismantled, and they will not, as I understand it, be put on the road again.

The double-deck car may, however, be seen across the bay at Coronado. These cars are longer than the ones that were in use in San Diego, being 36 feet over all and seating 40 people on the lower floor and the same number of people on the upper deck, with two seats both in front and rear of the car running crosswise; they had double trucks. These cars certainly are a delight to the eastern tourists, who eagerly climb to the top in order to get a better view of the magnificent surroundings. I am indebted to Mr. Perrin, assistant superintendent of transportation of the San Diego and Coronado lines, who kindly furnished me with the dimensions, seating capacity, etc., of the cars.

San Diego, Cal. John B. Bour.

THE TORPEDO BOAT IN MODERN WARFARE.

If there have been any doubts as to the utility of the torpedo boat under modern conditions of naval warfare, they have been completely dispelled by the activity of the torpedo-boat flotillas of both contestants in the present war. In the first place it is to her torpedo-boat destroyers that Japan is indebted for that command of the sea which has given her such pronounced advantage in the present series of operations. The crippling of the Port Arthur fleet was essentially the character of work for which the torpedo-boat destroyer was designed, namely, a swift dash under the cover of darkness among the ships of the enemy, the discharge of torpedoes at a range sufficiently close to make their finding the mark a practical certainty, and an instant retreat at full speed beyond the range of the searchlight and the rapid-fire gun. The terrible blow that was struck proves that the torpedo-boat destroyer is about the right kind of craft for such work; although it could be wished that the test had been rendered more severe by the ships being guarded by torpedo nets, the guns shotted, and the gun detachments fully prepared to repel attack, conditions which, it seems probable from the evidence at hand, did not exist.

The war has proved the wisdom of building torpedo-boat destroyers of the dimensions and power that characterize the latest models. With their length of 220 feet, beam of over 20 feet and draft of between 9 and 10 feet, giving a displacement of between 300 and 400 tons, the modern destroyer is a very serviceable sea boat, which was more than could be said for the torpedo boat of an earlier decade. The high freeboard and the provision of a raised turtle-back forward, render these boats able to maintain their high speed in fairly rough water, and in the present operations the flotillas of Japanese destroyers seem to have been perfectly well able to keep the sea in all weather. Evidently the lessons taught by the disasters that happened to some of the high-powered British torpedo-boat destroyers, when they were badly wrenched, and in one case actually broken in two in a heavy seaway, have been laid to heart, and the Japanese destroyers which are now doing such good work around Port Arthur are evidently seaworthy vessels.

A surprising feature of torpedo-boat service in the present struggle is the wide range of duties which are assigned to the destroyers. Scouting work which ordinarily would be given to cruisers from 3,000 to 6,000 tons displacement seems to be satisfactorily carried out by these little 400-ton craft. Moreover, their small size and swift movement apparently render it safe for them to steam saucily right in under the heavy batteries of Port Arthur; for on every occasion in which "fire-ships" and stone-laden steamers have been sent in for the purpose of corking up the harbor entrance, they have been escorted by a certain number of destroyers.

We think it is likely that one result of the experience gained in the present conflict will be an increase in the armament of the destroyer, for the rapid-fire guns carried by both the Russian and Japanese vessels have decided the fate of more than one hard-fought battle between these craft and have sent several of them to the bottom. In each case the defeat of the Russians was attributed to the inferiority of their armament, the Russian craft carrying one 12-pounder and five 3-pounders as against one 12-pounder and five 6-pounders mounted on the Japanese destroyers. It will not be surprising if there is a tendency to increase the armament of future destroyers, and if this is done it will introduce a problem that will tax the ingenuity of designers severely, for the extra guns added will mean an increase in the size of the vessel, and fine lines and great engine power are elements that can never be sacrificed. On the other hand, the British have made a striking departure by cutting the speed down from 30 and 31 knots to 25 and 26 knots an hour, and increasing the displacement from 350 to 550 tons. On boats of this size it would be possible to carry a much heavier armament, if desired, and it is not unlikely that we shall see destroyers of 600 tons displacement carrying four 12-pounders and half a dozen 6-pounders.

By reference to the sectional diagram on our front page the reader can obtain a very complete idea of a torpedo-boat interior. Forward in the bow is a collision compartment formed by a bulkhead located several feet from the bow. Aft of that is the chain locker, and then the torpedoes, of which half a dozen are carried on a vessel of this character. Since the torpedo boat carries no armor whatever, the torpedoes, the war-heads, and the magazines are placed below the waterline, where they are safe from any except a plunging shot. The torpedoes are stowed with their war-heads containing the gun-cotton charge unscrewed, the latter being stowed separately, as shown in the engraving. Aft of the war-heads is the forward magazine and a compartment given up to the general ship's stores. On the deck above are the quarters for the crew, which will number between fifty and sixty men in the larger boats.

Fully one-half of the boat is taken up by the motive power, which, of course, is out of all proportion to the size of the craft, these little vessels, which are not much over 200 feet in length, having, some of them, as much horse-power as a large ocean-going steamer. The average horse-power of a first-class torpedo boat is 7,500, and to secure this, high steam pressures and great speed of revolution are, of course, necessary. In our illustration there is shown an athwartship coal bunker, and other coal bunkers extend on each side of the vessel in the wake of the boiler space, the coal serving to give some measure of protection to the vitals. The boilers are of the water-tube type and are capable of delivering enormous volumes of steam on a minimum of weight. Aft of the boiler space is the engine room, where the twin engines are arranged, one forward of the other, each on its own shaft. Then follow the space devoted to auxiliary engines, the gangway beneath which is another magazine, and aft of this the officers' wardroom, below which is a space devoted to general stores. The extreme after end of the boat is taken up by the warrant officers' messroom, back of which may be the bread room or apartments given up to ship's stores.

Two torpedo tubes are shown mounted on the main deck. These are capable of discharging torpedoes through a wide arc of training on either beam. The torpedoes are brought up from the racks in which they are carried by means of slings which roll up the sloping table shown in the engraving. When they reach the deck the war-heads are screwed on, and they are placed on a little trolley which travels upon rails laid on the main deck, by which they are run to the torpedo tubes and loaded through the breech, in much the same way as a projectile is loaded into a breech-loading rifle. The firing is done by means of a small charge of powder, the gases of which serve to compress a certain volume of air which expels the torpedo, the air acting as a cushion to give the torpedo a more gradual acceleration and avoid the shock which would occur if the powder acted directly upon it. The maximum firing range that it is considered desirable to use to-day with the latest improved torpedoes is about 800 yards. Of course, good shooting could be made at longer ranges; but ordinarily the captain of the destroyer will prefer to get into a range of 800 yards or less, being willing to take the greater risk for the sake of the greater certainty of hitting the mark.

Greth's Eight-Mile Airship Trip.

Dr. August Greth's airship, which has been fully described and illustrated in these columns, made a fairly successful trip on May 2, near San Francisco.

The breaking of a small valve prevented Dr. August Greth sailing from San Francisco to San José, a distance of fifty-two miles. As it was he crossed the San Mateo County line, 8 miles south of San Francisco, and anchored on a hill, ready to renew the attempt. He went up at 8.30 A. M., accompanied by an engineer.

Dr. Greth made a circular turn about a quarter of a mile in circumference. Everything went well until the airship arrived over the Five Mile House, on the San Bruno Road. The inventor and the engineer were seen trying to adjust the machinery, and then, after a pause, the fans were started going and the ship began to descend.

To all appearances the fans were able to control the ship, though it was conceded that they were not quite large and powerful enough to meet the resistance of strong winds. The airship came down gradually and touched the ground gently, allowing the men in the car to step out. Nothing was injured either in the car or about the great gas bag.

The Current Supplement.

One of the greatest attractions at the last Parisian automobile show was undoubtedly the Renard continuously-propelled automobile train. Mr. Emile Guarini opens the current Supplement, No. 1480, with a well-illustrated and complete account of this new departure in automobile engineering. Thomas A. Edison tells something of the beginnings of the incandescent lamp and shows what a vast amount of labor this invention of his involved. Mr. H. W. Harmon describes an electrically-registering wind-vane and anemometer for school use. An excellent article on thermit by Prof. C. V. Boys thoroughly discusses Dr. Goldschmidt's important invention. Striking pictures of the sunken vessels "Korietz" and "Variag," lost by the Russians in the battle off Chemulpo, are published. Elizabeth Mills-Stetson tells something of the skill and inventive ability of the aborigines of Southern California.

A World's Fair feature of general interest is the Japanese exhibit of diminutive trees, only two or three feet high although several hundred years old. This forest of little trees is a part of the attractive display of many interesting exhibits which Japan shows at the Fair.

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