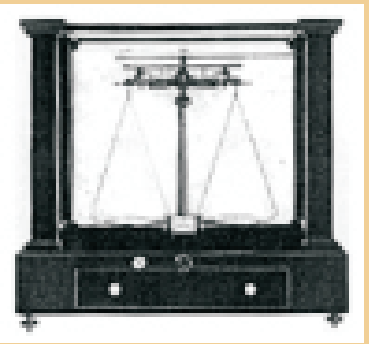
Troemner Scale

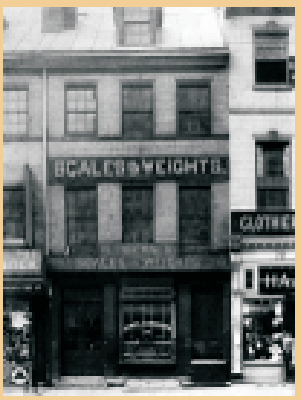


Henry Troemner

Henry Troemner founded Troemner over 160 years ago in 1838. The company started as a manufacturer of scales and weights in Philadelphia, Pennsylvania. From the beginning, Troemner earned a reputation for being a manufacturer with high quality standards. In 1856, Troemner received a contract to make scales for the U.S. Mint in Philadelphia. The success of this contract led the company to expand its product line of scales to include bankers' scales, precision weighing equipment for jewelers, prescription scales for pharmacists, and laboratory scales and balances for chemists.

Troemner Factory 1864 By the time of Henry Troemner's death in 1870s, the Troemner name had become internationally respected in the commercial world of weights and balances. The company was inherited by Henry Troemner's sons and remained a family business for three generations until 1955.

In 1955, Mr. Laird Park purchased the company from the Troemner family. At this time, the company needed to be revitalized to return to its former glory. Mr. Park brought his knowledge, experience and enthusiasm to this venture to bring Troemner into the 20th century. Under his direction, the balance and scale product line was updated to meet market demand and the production of precision weights began in earnest. In 1958 Troemner published its first comprehensive catalog of standard weights. Troemner next offered its own weight calibration service for customer weights. This important service is one that continues to this day. In addition to updating Troemner's products and services, Mr. Park rehabilitated Troemner's facilities. In 1963 Troemner moved to 6825 Greenway Avenue in Philadelphia. At this site, Mr. Park expanded and increased efficiency in a modern manufacturing facility for Troemner's products.



Factory and Office,

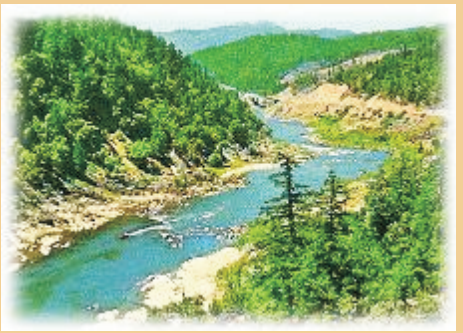
710 Market Street During this time Troemner entered into the field of manufacturing laboratory equipment. This product line started with a series of magnetic stirrers, and grew to include hotplates and combination hotplate/stirrers of various sizes. As Mr. Park continued to grow Troemner's customer base, he realized there was a need in the industry for gas cylinder safety products and he added those items to Troemner's growing product line.

In the 1990's, Troemner began the process of achieving ISO 9001 certification. Troemner was one of the first companies in the Philadelphia area to earn ISO 9001 certification in 1993. Shortly after this milestone, Troemner began the process of gaining accreditation of its mass metrology laboratories by the NIST administered National Voluntary Laboratory Accreditation Program (NVLAP) and its United Kingdom equivalent, United Kingdom Accreditation Service (UKAS, formerly known as NAMAS). By obtaining accreditation, Troemner is able to provide our customers with certificates that meet or exceed the strictest recognized standards.
Analytical Scale

In 1995 Mr. Park officially retired and Mr. Abele who joined Troemner in 1972 became Troemner’s new owner. In May 1999, Troemner moved across the Delaware River to Thorofare, New Jersey.

Gold Nuggets

Natural Placer Gold



This Bottle contains 31.2 Grams which is just over ONE OUNCE of Natural Placer Gold. This Gold came out of the Rogue River just down river from Mine Riffle. The Nuggets vary in size from very small up to little "Chunkies" and all have a unique shape and characteristic. This bottle contains One Ounce of Natural Placer Gold with Little Nuggets, just as Mother Nature made them and right out of the river!

SOsprey fish for Chinook salmon while blue heron skim majestically along the sparkling waters. The Rogue River is the embodiment of the Oregon dream lifestyle, a relaxing haven away from the strife of modern city life.

The Rogue's headwaters start at Crater Lake and twist and roar for 215 miles through the Cascade, Siskiyou and Coastal Ranges before spilling into the Pacific at Gold Beach. Numerous small towns dot its journey west, most notably the city of Rogue River, which took its name from the river itself. As the river leaves the Cascade range it winds its way through the Rogue valley.

A brief history.

The first settlers to come into the region were without exception trappers and traders seeking valuable animal pelts. Long before the arrival of white trappers, however, there were several thousand native peoples who lived along the banks. As a matter of fact, the Rogue got its name from the Indians. 'The River of the Rogues,"

Two developments triggered the flood of white settlement: the Donation Land Act, which gave 640 acres to each settling couple, and the discovery of gold along the banks of the Rogue late in 1851. Thousands of miners flooded the area in search of this precious metal.

Today gold-panning is a favorite occupation of many visitors as each year gold is washed down from the mountains in the streams and lodges in gravel and between boulders. In its heyday, over $70 million was taken from the Rogue in gold; $5 million alone from Tyee Rapids by a group of Chinese miners. Gradually, however, the gold dwindled. Since the rugged character of the Rogue prevented it from becoming a highway of commerce and most of the valuable pelts had been trapped out, agriculture became the major industry for the Rogue Valley. Although commercial salmon fishing was once popular, it was outlawed in 1962 when state legislation banned the use of gill-nets. Game fishing remains the major fishing industry today.

A Recreational Paradise

The Rogue is one of eight rivers in the United States designated as wild and scenic. Its beauty will always be protected for our visitors. It remains a bird and wildlife watchers delight. Flying overhead one can find snowy egret, blue heron, osprey Canadian geese great horned owls, grouse, partridge, pheasant, quail and the majestic bald eagle. Along its banks graze deer and elk, and one can always catch sight of an occasional river otter or beaver. In the canyon area are found bear, mink, muskrat, fox, mountain lion and bobcat. And of course, there are the fish.

Although there are two major runs for the salmon and steelhead there are fish in the Rogue all year round. You can catch Chinook and Coho salmon, steelhead, brown trout, cutthroat, golden trout, catfish and in the lower part of the river there are still sturgeon. The Chinook and steelhead run in the fall and spring to spawn upriver, and there is also a Coho run in the fall. The nest spots for steelhead are from Battle Bar to Johns Rapids and there's also a great salmon hole just below Rainey Falls - you can hike there from Graves Creek. The fall Chinook fishery in recent years has been the healthiest since fish counts were first logged; in 1989 a 60 pound salmon was recorded and in 1990 a 45 pounder was caught outside of Grants Pass. And just to show you how serious they take their fishing on the Rogue, one of the earliest bridges built, Ament Dam, was unpopular with the fishermen because they claimed the fish ladder was inadequate to allow spawning salmon upriver. When nothing was done the irate fishermen attempted to dynamite the dam in 1912! Today all the fish ladders are deemed adequate.

There are many other activities on the Rogue besides fishing. Rafting remains a favorite hobby since native Rogue Riverian Glen Woolridge blasted a channel from Hellgate Canyon to Marial to allow boat passage. The stretch of river between Gold Hill to Rogue River is an easy and safe float, while experienced rafters will want to try the advanced rapids below Graves Creek. There are also many guide trips available for the novice who wants to experience the thrill of advanced white water rafting. The Rogue River is accessible without a launching fee at a number of locations from Gold Hill to Graves Creek. Water-skiing, kayaking, canoeing, swimming, and jet-skiing can all be enjoyed on the river, especially at the lake portion just below the city of Rogue River. Jet boat excursions remain a favorite of visitors; the shallow draft and powerful engines propel the boats as fast upstream as they move downriver, in excess of 50 Mph!

For those who prefer out-of-water activities there are numerous parks and trails. Between June 1st and September 15 the wild and scenic section of the river is controlled by a permit section; only permit holders are allowed to use the river to limit the amount of people through it per day. Permits can be obtained through guide services. There are also numerous parks to enjoy; Gold Rogue Sports Park, Ben Hur Lampman State Park, Rogue State Park.. all have great picnic sites, tent sites, trailer sites and of course, great fishing All Oregon State Park campgrounds are open from mid-April to late October and more campground information is available from Oregon State Park Campsite Information Center at 1-800-452-5687.

We hope you enjoyed our brief history and we're looking forward to when you come up and experience the river life for yourself. provided by Jennifer McKinney

Come Visit Soon. dagoodstuff

Barograph

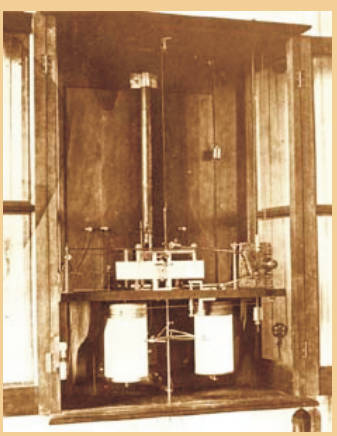
Wilson-Warden & Co. Ltd. London

Nr. 5337/45/58

G.W. Hough invented this "automatic" barometer, or barograph, in 1866 while he was the director of the Dudley Observatory in Albany, New York. Hough's barograph made a continuous record of changes in atmospheric pressure. This innovation eliminated the need for human readings, which had previously been taken several times a day at precise times. This is a historical photograph (Bentley Historical Library) of the actual instrument which was mounted in the Observatory.

George Washington Hough

HOUGH, George Washington, astronomer, born in Tribes Hill, Montgomery County, New York, 24 October, 1836. He was graduated at Union in 1856, and then directed his attention to astronomy. In 1860 he was appointed astronomer and director of the Dudley observatory, Albany, New York, where he remained until 1874, devoting his time to meridian observations of zone stars and meteorology. In 1879 he was called to the directorship of Dearborn observatory, Chicago, where he has since remained. His work in this place has included micrometrical measurements and discovery of double stars, and physical observations on the planet Jupiter. Of the double stars, 300 different ones have been discovered by him, and a catalogue of 209 prepared for publication. He has made many improvements in the apparatus used in astronomy, and his inventions include a star charting machine (1862); an automatic registering and printing barometer (1865); the same applied to the thermometer and other meteorological apparatus now used by the United States signal service and others (1866); a barograph and thermograph for recording meteorological phenomena at definite intervals, also used by the United States signal service (1869); a printing chronograph (1871), remodelled and improved (1885) (this is the only printing chronograph in the world); a recording chronograph (1879); and an observing seat for equatorial telescope (1880), now used by the principal observatories in the United States. More recently he has invented a sensitometer and an exposing base and plate-holder (1884). He is a member of several scientific societies, and, besides numerous miscellaneous contributions on astronomical and other scientific subjects to American and foreign journals, he has published "Annals of Dudley Observatory" (2 vols., Albany, 1866-;71) and "Annual Reports of Dearborn Observatory" (Chicago, 1880-'6).



An automatic registering and printing barometer, or barograph, was installed at the Observatory in 1879. The barograph, by G.W. Hough, made a continuous record of changes in atmospheric pressure mechanically, eliminating the need for an observer to monitor and record the information.

Antique Wheatstone Bridge

Leeds & Northrop Co. Philadelphia.

The Wheatstone bridge is named after Sir Charles Wheatstone (1802-1875), an English physicist and inventor. The Wheatstone bridge was first described by Samuel Christie (1784-1865) in his paper Experimental Determination of the Laws of Magneto-electric Induction (1833). The circuit was brought into general use by Wheatstone in 1843. The bridge was (and is) used chiefly to measure resistance. Substituting resistances and reactances for the reference resistance in the bridge, and driving the bridge with AC, allows it to be used to measure impedance.

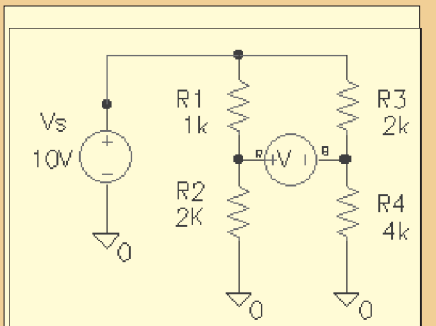
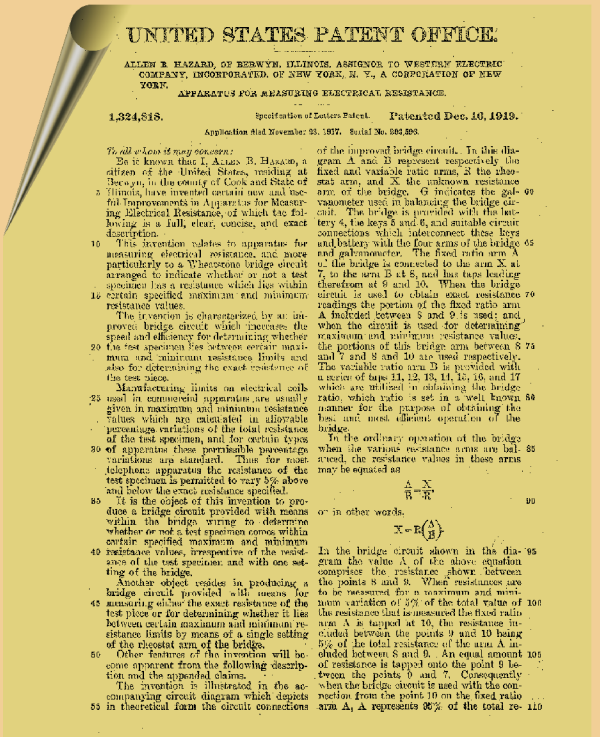


Figure 1. Balanced bridge with voltmeter as null detector.

Wheatstone was born in Gloucester, England in 1802. As a young man, he was apprenticed to a relative who made musical instruments. Wheatstone was fascinated by the physics of sound. He began inventing musical instruments at age 16, the most famous being the "concertina," which is similar to the accordion. He also built an "enchanted lyre" that appeared to play itself because its strings moved in sympathy with the vibrations of an instrument played in another room. Also related to sound, he invented a device in 1827 capable of amplifying quiet noises; he called it a "microphone."

Wheatstone's most important invention wasn't musical, it was an early telegraph. It worked quite well, although it wasn't nearly as famous as Morse's telegraph a few years later. If Wheatstone didn't get enough credit for his telegraph, he made up for it by getting his name attached to something he *didn't* build: the "Wheatstone bridge," a simple device for determining the resistance of an electrical circuit. Wheatstone popularized it, but he admitted he did not invent it. Wheatstone did important scientific research on the subjects of light, vision and electricity. He may have been the first scientist to notice that the human body can acquire a static electric charge by walking across a carpet in a dry room. Wheatstone was a college professor and a fellow of the prestigious Royal Society. In 1868, he was knighted for his work on the telegraph, and Sir Charles died on October 19, 1875.



UNITED STATES PATENT OFFICE.

ALLEN B. HAZARD, OF BERWYN, ILLINOIS, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

APPARATUS FOR MEASURING ELECTRICAL RESISTANCE.

1,324,818. Specification of Letters Patent. Patented Dec. 16, 1919.

Application filed November 23, 1917. Serial No. 203,393.

To all whom it may concern:

Be it known that I, ALLEN B. HAZARD, a citizen of the United States, residing at Berwyn, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Apparatus for Measuring Electrical Resistance, of which the following is a full, clear, concise, and exact description.

This invention relates to apparatus for measuring electrical resistance, and more particularly to a Wheatstone bridge circuit arranged to indicate whether or not a test specimen has a resistance which lies within certain specified maximum and minimum resistance values.

The invention is characterized by an improved bridge circuit which increases the speed and efficiency for determining whether the test specimen lies between certain maximum and minimum resistance limits and also for determining the exact resistance of the test piece.

Manufacturing limits on electrical coils used in commercial apparatus are usually given in maximum and minimum resistance values which are calculated to allowable percentage variations of the total resistance of the test specimen, and for certain types of apparatus these permissible percentage variations are standard. Thus for most telephone apparatus the resistance of the test specimen is permitted to vary 5% above and below the exact resistance specified.

It is the object of this invention to produce a bridge circuit provided with means within the bridge wiring to determine whether or not a test specimen comes within certain specified maximum and minimum resistance values, irrespective of the resistance of the test specimen and with one setting of the bridge.

Another object resides in producing a bridge circuit provided with means for measuring either the exact resistance of the test piece or for determining whether it lies between certain maximum and minimum resistance limits by means of a single setting of the rheostat arm of the bridge.

Other features of the invention will become apparent from the following description and the appended claims.

The invention is illustrated in the accompanying circuit diagram which depicts in theoretical form the circuit connections of the improved bridge circuit. In this diagram A and B represent respectively the fixed and variable ratio arms, S the rheostat arm, and X the unknown resistance arm of the bridge. G indicates the galvanometer used in balancing the bridge circuit. The bridge is provided with the battery 6, the keys 8 and 6, and suitable circuit connections which interconnect these keys and battery with the four arms of the bridge and galvanometer. The fixed ratio arm A of the bridge is connected to the arm X at 7, to the arm B at 8, and has taps leading therefrom at 9 and 10. When the bridge circuit is used to obtain exact resistance readings the portion of the fixed ratio arm A included between 9 and 9' is used; and when the circuit is used for determining maximum and minimum resistance values, the portions of this bridge arm between 8 and 9 and 9 and 10 are used respectively. The variable ratio arm B is provided with a series of taps 11, 12, 13, 14, 15, 16, and 17 which are utilized in obtaining the bridge ratio, which ratio is set in a well known manner for the purpose of obtaining the best and most efficient operation of the bridge.

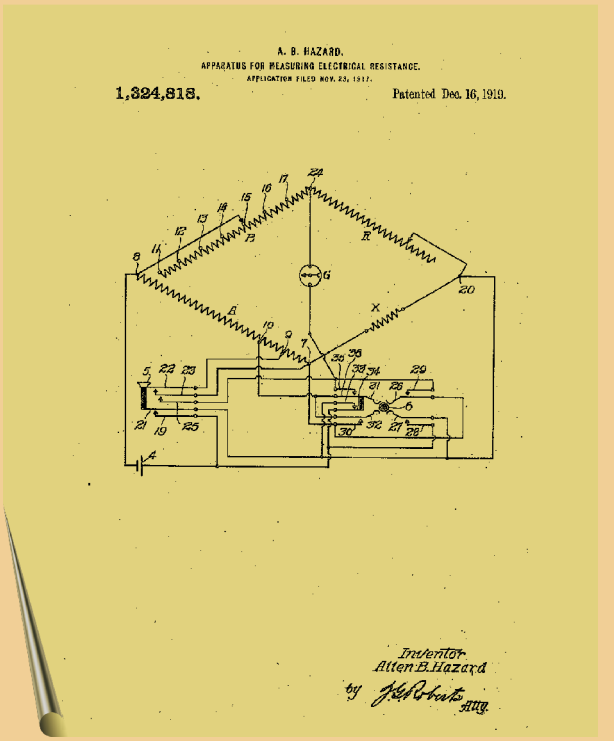
In the ordinary operation of the bridge when the various resistance arms are balanced, the resistance values in these arms may be equated as

$$\frac{A}{B}=\frac{X}{R},$$

or in other words,

$$X=R\left(\frac{A}{B}\right).$$

In the bridge circuit shown in the diagram the value A of the above equation comprises the resistance shown between the points 8 and 9. When resistances are to be measured for a maximum and minimum variation of 5% of the total value of the resistance that is measured the fixed ratio arm A is tapped at 10, the resistance included between the points 9 and 10 being 5% of the total resistance of the arm A included between 8 and 9. An equal amount of resistance is tapped onto the point 9 between the points 9 and 7. Consequently when the bridge circuit is used with the connection from the point 10 on the fixed ratio arm A, A represents 90% of the total re-



A. B. HAZARD.

APPARATUS FOR MEASURING ELECTRICAL RESISTANCE.

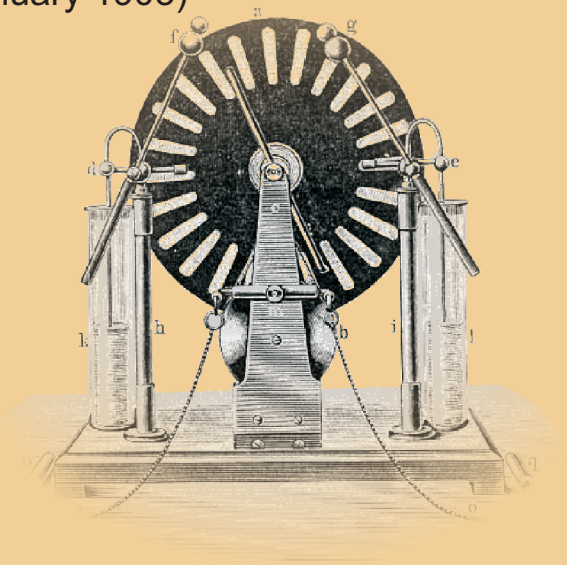
APPLICATION FILED NOV. 23, 1917.

1,324,818. Patented Dec. 16, 1919.

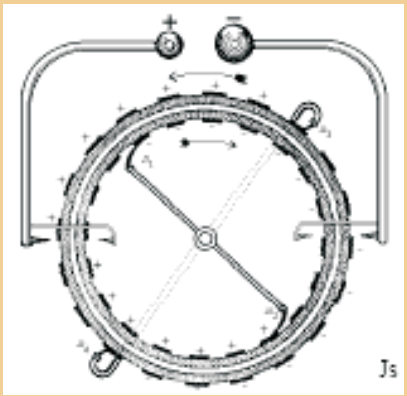
Inventor
Allen B. Hazard
by J. E. Roberts
Atty.

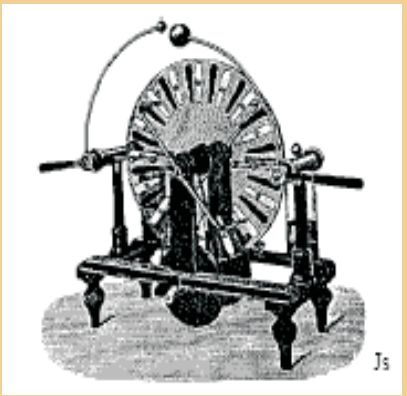
James Wimshurst

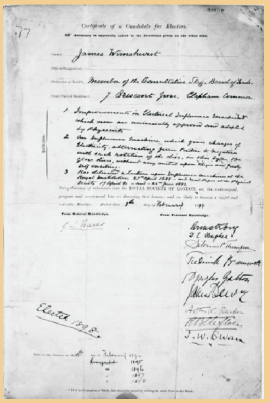
(13 April 1832 - 03 January 1903)



Member of the Consultative Staff, Board of Trade. Qualifications: - (1) Improvements in Electrical Influence Machines, which are now universally approved and adopted by Physicists; (2) An Influence Machine which gives charges of electricity, alternating from positive to negative with each rotation of the disc (in this type the glass discs, without any metal upon them, are freely self-exciting); (3) Has delivered a lecture upon Influence Machines at the Royal Institution, 27th April, 1888, and read papers at the Physical Society, 17th April, 1891, and 22nd June, 1893. Proposers Armstrong; D E Hughes; S P Thompson; Frederick Bramwell; Douglas Galton; J Dewar; A W Rucker; R B Clifton; George S Nares PersonKey Wimshurst; James (13 April 1832 - 03 January 1903)







The Wimshurst Influence Machine

This machine consists of two varnished glass-plates, placed as close to geather as possible, and geared so as to rotate inopposite directions. An even number of metal sectors is fastened on the outer surface of each plate, and these sectors serve both as *inductors* and *carriers*. A conductor with wire brushes at the ends is fixed diagonally on the base board of the machine with their knobs connected to the Js collecting-combs by movable wires. The action of the machine may be explained by the following diagram of the Wimshurst machine, in which two plates are represented as two concentric cylinders of glass rotating in opposite directions. The neutralising brushes are represented by *n*1*n*2 and *n*3*n*4. In order to start the machine it is sufficient if one of the sectors has a slightly different potential from that of the others; as a rule this is the case, and the machine is then *self-starting*. Imagine that one of the back sectors at the top of the diagram has a slight positive charge. When it comes opposite the brush *n*1 it will act inductively on the sector touching *n*1, giving to it a slight negative charge, and simultaneously giving a positive charge to the sector touching *n*2. These sectors, with their induced charges, leave the Js brushes and rotate into positions opposite the brushes *n*3 and *n*4; the sectors touching *n*3 and *n*4 will now receive induced positive and negative charges respectively,which they will retain after leaving the brushes. Thus, after one or two revolutions, all sectors approaching the left-hand comb will have a positive charge, and all sectors approaching the right-hand comb will have negative charges. The sectors will be neutralised by the combs, the knobs connected to which will acquire positive and negative charges respectively. The theory of the Wimshurst Machine , as explained, has been verified by constructing a machine with plates of thin flexible insulating material instead of glass. If the collecting combs are removed, and the plates rotated, the discs will be bent togeather at the top and bottom, and bulge apart at the sides. *The quantity of electricity generated in a given time is proportional to the speed of revolution, but the potential difference between the terminals is independent of speed.* An influence machine may be regarded as a source of electric current in which both the potential difference and the internal resistance are very high; with a machine of average size, the potential difference may amount to 50,000 volts, and the internal resistance to 109 ohms (the latter varying inversely as the speed).

Magnetically Levitating Globe

Computer Controlled Levitation

The world-wide innovation,

CCL, Computer Controlled Levitation. As the world's first magnetic levitating globe, this model isequipped with an intelligent computer control. The patented principle of this control is relatively simple. The magnetic head contains an electro magnet and a magnetic field sensor, the frame base accommodates the micro-processor and the electronic control components. The magnetic field sensor records the magnetic field generated by permanent magnets in the globe sphere, which enables it to transmit to the computer the data that defines the distance from globe sphere to the magnetic head. The computer evaluates this data and controls the electronic magnets accordingly, accurately moving the globe sphere upwards and downwards. Through approx. 16,000 control processes per second, the globe is always kept in the correct position. The computer also records any oscillation movements of globe sphere and counteracts them to allow the globe to levitate safely and steadily. And

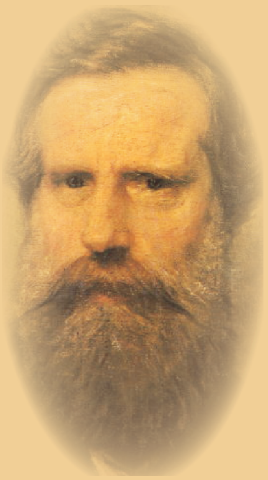
from the characteristics of the electro magnet, permanent magnet, weight of the globe sphere etc. the computer calculates the optimal levitation height, making the necessary adaptations should these characteristics change over time. You are therefore guaranteed long-term pleasure from this product.

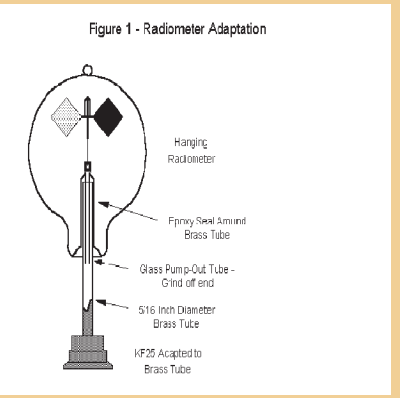
Radiometer

Sir William Crookes

The radiometer was devised by William Crookes in 1875, while investigating physical effects in a high vacuum. He thought it might be used to measure radiation but it has no serious use. With its vanes rotating without apparent cause when placed in the light, the Crookes radiometer remains a popular scientific toy.

Crookes was led to this work by anomalies he had noticed while weighing samples in a vacuum, during experiments to determine the atomic weight of the element thallium. He went on to look in great detail at electrical discharges





A radiometer consists of a set of vanes, each shiny on one side and blackened on the other, that is mounted in an evacuated vessel. When exposed to light, the vanes revolve. The first radiometer was constructed to settle the controversy regarding whether light exerts a force. The idea was that a reflecting surface would experience a greater force from the light than an absorbing one. The instrument was therefore made in the now familiar form. Unexpectedly, the opposite effect was observed. The blackened vane retreated from the light source. We now know that the black surface is warmer than the shiny one and that gas molecules will recoil faster from the hot surface. The slight difference in molecule recoil is what causes the device to spin. (Later experiments in a much better vacuum have confirmed that light does exert a very small pressure.) The action of the radiometer depends upon striking a balance between molecular drag and recoil. At higher pressures, drag will dominate and the vanes will fail to spin. At lower pressures, there are too few recoiling molecules to drive the vanes. The optimum balance occurs at a pressure of about 60 mTorr (60 microns Hg). By using a suitable tachometer (e.g. a 'Strobotach' or an electronic counter with a photocell that detects the interruption of a light beam by the vanes) it would be possible to measure the change in rotational velocity with changing pressure, given a constant light input.

While the radiometer is not a very good gauge in itself, Dushman in "The Scientific Foundations of Vacuum Technique" noted the use of the radiometer to determine when the vacuum in an incandescent lamp had reached the required level for sealing-off. At the proper pressure, the vanes would cease to rotate, even in very bright illumination (this would be on the low side of the ~60 mTorr peak). He also noted that the level of vacuum could be quantitatively determined by shaking the bulb to set the vanes in motion and then noting the rate at which the spinning ceases. This notion has been embodied in the modern spinning rotor (molecular drag) gauge.

Ready-made radiometers are available from science supply houses. Also they are increasingly popular as window ornaments and can often be obtained for about $10 from local craft shops. I've also seen radiometers in the windows of "New Age" boutiques, leading me to wonder what strange powers people might attribute to them.
For tinkerers, the disadvantage of ready-made radiometers is that they are sealed off. Fortunately, the glass pump-out tube is readily accessible. With a file, nick the end of the pump-out and break the tip off. (I'd suggest placing a piece of rubber or vinyl tubing over the glass to prevent cuts). Using epoxy cement, seal a length of 5/16" OD brass tubing (K&S Engineering, available at well stocked hobby and hardware stores) to the bulb. Be careful not to get epoxy into the original evacuation ports in the stem. The hanging style of bulb is the most convenient to use.
This tube may be attached to a blank brass KF flange. Drill a 5/16" diameter hole in the flange and solder the tube in the hole. The flanged radiometer may now be attached to a vacuum system that is capable of evacuating to a few tens of milliTorr. (See Figure 1.) Using the pressure control feature, a pressure vs. rotational speed plot may be constructed.

Newtonian Demonstrator

Introduction

History of the "Cradle". The apparatus familiarly and metaphorically known as "Newton's Cradle": is a modern-day outgrowth of a similar apparatus developed and employed by Newton during the late 17th century. Newton's device consisted of a pair of elastic (nondeformable) pendulums of constant dimension, mass, and length that were brought into direct contact via collision when each was in the base-level (vertical) position. Since much was known about the physics of pendulums even in Galileo's (and hence Newton's) time, particularly the ubiquitous and egalitarian force of gravity, direct control of period on length, and negligible frictional resistance, such a device was well-suited to experimentation on and demonstration of dynamic relationships. However, a Newton's Cradle is by no means a simple device. In fact, lively debate and curiosity over the physical behavior of the apparatus invariably springs up when it appears in the physics classroom.

Use and Purpose of the "Cradle". Primarily, apart from being an office desktop toy, Newton's Cradle (or Newtonian Demonstrator to which it has been alternately referred) illustrates Newton's Third Law. That is, forces always occur in pairs and that for every applied force there is an equal but oppositely directed force for a body to be in equilibrium. This is illustrated by simply raising a single pendulum to modest height on one side of the apparatus, releasing it, and observing the response of the four remaining pendulums (at rest) when the collision occurs. The apparatus is also used to demonstrate the Law of Conservation of Linear Momentum.That is, when two (or more) elastic bodies collide, the sum of the momenta of the system of pendulums before collision equals the sum of the momenta of the system of pendulums after collision. This occurs regardless of direction and how many pendulums are raised or remain in the at rest position. Similarly, the elastic nature of the collisions of the pendulums provides an exceptionally clear demonstration of the Law of Conservation of Energy. An elastic collision between two (or more) bodies is one in which the sum of the kinetic energies of the bodies (at the instant) before collision is equal to the sum of the kinetic energies of the bodies (at the instant) after collision. That is, in an elastic collision, whatever kinetic energy is lost by one body is gained by the other body. Additionally, the cyclic conversion of gravitational potential to mechanical kinetic back to gravitational potential energy is the most characteristic feature of the cradle as the pendulums rise and fall in a simple harmonic fashion. This behavior, which is identical to that of a ballistic pendulum, provides a clear demonstration of the features which characterize inelastic collisions in which the mechanical kinetic energy of the pendulums becomes converted into gravitational potential energy during a portion of the swing cycle and is therefore not conserved.

A

Sir Isaac Newton, PRS (25 December 1642 (OS) – 20 March 1727 (OS) / 4 January 1643 (NS) – 31 March 1727 (NS)) was an English physicist, mathematician, astronomer, inventor, philosopher and alchemist. A man of profound genius, he is widely regarded as one of the most influential scientists in history. He is associated with the scientific revolution and the advancement of heliocentrism.

Among his scientific accomplishments, Newton wrote the Philosophiae Naturalis Principia Mathematica, wherein he described universal gravitation and, via his laws of motion, laid the groundwork for classical mechanics. With Gottfried Wilhelm Leibniz he shares credit for the development of infinitesimal calculus. Newton was the first to promulgate a set of natural laws that could govern both terrestrial motion and celestial motion, and is credited with providing mathematical substantiation for Kepler's laws of planetary motion, which he expanded by arguing that orbits (such as those of comets) could include all conic sections (such as the ellipse, hyperbola, and parabola).

Newton was the first to realise that the spectrum of colours observed when white light passed through a prism is inherent in the white light and not added by the prism (as Roger Bacon had claimed in the 13th century), and also notably argued that light is composed of particles.

Newton also developed a law of cooling, proved the binomial theorem, and discovered the principles of conservation of momentum and angular momentum.

Newton is regarded by many as having "unrivalled mathematical genius" [see Dampier & Dampier]. The mathematician Joseph Louis Lagrange (1736-1813), Director of the Berlin Academy of Sciences, said this about Newton:

Newton was the greatest genius that ever existed and the most fortunate, for we cannot find more than once a system of the world to establish

Levitron Magnetic Anti-Gravity Top

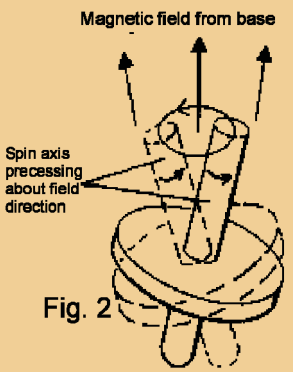


Fig. 2

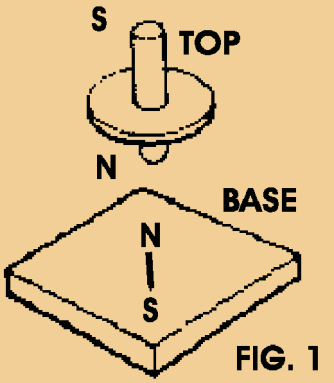


FIG. 1

Some Frequently Asked Questions About LEVITRON® Physics

Dr. Michael V. Berry

What holds the top up? The 'antigravity' force that repels the top from the base is magnetism. Both the top and the heavy slab inside the base box are magnetized, but oppositely. Think of the base magnet with its north pole pointing up, and the top as a magnet with its north pole pointing down (fig 1). The principle is that two similar poles (e.g., two north poles) repel and that two similar poles attract, with forces that are stronger when the poles are closer. There are four magnetic forces on the top: on its north pole, repulsion from the base's north and attraction from the base's south, and on its south pole, attraction from the base's north and repulsion from the base's south. Because of the way the forces depend on distance, the north-north repulsion dominates, and the top is magnetically repelled. It hangs where this upward repulsion balances the downward force of gravity, that is, at the point of equilibrium where the total force is zero.

Why does it need to spin? To prevent the top from overturning. As well as providing a force on the top as a whole, the magnetic field of the base gives a torque tending to turn its axis of spin. If the top were not spinning, this magnetic torque would turn it over. Then its south pole would point down and the force from the base would be attractive - that is, in the same direction as gravity - and the top would fall. When the top is spinning, the torque acts gyroscopically and the axis does not overturn but rotates about the (nearly vertical) direction of the magnetic field. This rotation is called precession (fig 2). With the LEVITRON®, the axis is nearly vertical and the precession is visible as a shivering that gets more pronounces as the top slows down. The effectiveness of spin in stabilizing a magnetically supported top such as that the LEVITRON® was discovered by Roy M. Harrigan (4).

Why doesn't the top slip sideways? For the top it remain suspended, equilibrium alone is not enough. The equilibrium must also be stable , so that a slight horizontal or vertical displacement produces a force pushing the top back toward the equilibrium point. For the LEVITRON®, stability is difficult to achieve. It depends on the fact that as the top moves sideways, away from the axis of the base magnet, the magnetic field of the base, about which the top's axis precessed, deviates slightly from the vertical (fig. 2). If the top precessed about the exact vertical, the physics of magnetic fields would make the equilibrium unstable. Because the field is so close to vertical, the equilibrium is stable only in a small range of heights - between about 1.25 inches and 1.75 inches above the center of the base. (between 2.5 and 3.0 inches for Fascinations' new LEVITRON® Tops). The Earnshaw theorem is not violated by the behavior of the LEVITRON®. That theorem states that no static arrangements of magnetic (or electric) charges can be stable, alone or under gravity. It does not apply to the LEVITRON® because the magnet (in the top) is spinning and so responds dynamically to the field from the base.

Why is the weight so critical, and why must it be adjusted so often? The weight of the top and the strength of magnetization of the base and the top determine the equilibrium height where magnetism balances gravity. This height must lie in the stable range. Slight changes of temperature alter the magnetization of the base and the top. (as the temperature increases, the directions of the atomic magnets randomize and the field weakens). Unless the weight is adjusted to compensate, the equilibrium will move outside the stable range and the top will fall. Because the stable range is so small, this adjustment is delicate - the lightest washer is only about 0.3% of the weight of the top.

Why does the top eventually fall? The top spins stable in the range from about 20 to 35 revolutions per second (rps). It is completely unstable above 35-40 rps and below 18 rps. After the top is spun and levitated, it slows down because of air resistance. After a few minutes it reaches the lower stability limit (18 rps) and falls. The spin lifetime of the LEVITRON® can be extended by placing it in a vacuum. In a few vacuum experiments that have been done the top fell after about 30 minutes. Why it does so is not clear; perhaps the temperature changes, pushing the equilibrium out of the stable range; perhaps there is some tiny residual long-term instability because the top is not spinning fast enough; or perhaps vibrations of the vacuum equipment jog the field and gradually drive the precession axis away from the field direction. Levitation can be greatly prolonged by blowing air against an appropriately serrated air collar placed around the top's periphery so as to maintain the spin frequency in the stable range. Recently a LEVITRON® top was kept rotating for several days in this way. But the most successful means to prolong the top's levitation is with Fascinations' new PERPETUATOR® ™, an electro-magnetic pulsed device which can keep the top levitating for many days or even weeks.

Is the LEVITRON® Principle used elsewhere? In recent decades, microscopic particles have been studies by trapping them with magnetic and/or electric fields. There are several sorts of traps. For example, neutrons can be held in a magnetic field generated by a system of coils. Neutrons are spinning magnetic particles, so the analogy of such a neutron trap with the LEVITRON® is close.

Solar System Orrey

The orrery was invented by George Graham about 1710; the first example was constructed by the London instrument maker John Rowley. It was a device of arms and balls and gears, run by clockwork, that showed how the planets and their satellites moved around the sun as time passed; the Earth typically took about ten minutes to go round once, so it could hardly have been an enthralling spectacle by the standards of today.

We ought to call it a graham, after its inventor, but John Rowley made a copy for Charles Boyle, the fourth Earl of Orrery, and ingratiatingly named it in his honour. It's really a reference to a geographic area, since the Boyles took their title from an ancient term for a part of County Cork, Ireland. (Boyle was described later that century as "one of the literary ornaments of the reign of Queen Anne"; he was a relative of the more famous Robert Boyle, he of Boyle's law.)

The orrery became a popular amusement and teaching device; no progressive educational establishment was without one. But not everybody was enthralled by it; in 1833 the Astronomer Royal, John Herschel, called it a "childish toy", and Charles Dickens wrote an unflattering description of a public lecture that featured one in The Uncommercial Traveller: "My memory presents a birthday when Olympia and I were taken by an unfeeling relative—some cruel uncle, or the like—to a slow torture called an Orrery ... It was a venerable and a shabby Orrery, at least one thousand stars and twenty-five comets behind the age. Nevertheless, it was awful".

George Graham[1] (1673-1751) was one of the most renowned horologists of the eighteenth century. Born in Hethersgill, Cumberland, George was the son of a peasant farmer, and, as such, received no formal schooling. At the age of fifteen, he was apprenticed to Henry Aske, a clockmaker in London, for roughly seven years. George's family members were Quakers, and although he did not seem to take up the religion, George did adhere to some of the Quaker's basic beliefs. Later in life, after amassing some wealth, George was generous with his money, lending it to friends without interest (and, apparently, he did not bother to collect on most of loans), and those who knew him best dubbed him "Honest" George Graham.

One of the most influential and prosperous parts of George's life occurred when he worked with another well-known horologist, Thomas Tompion in 1695. This eighteen-year friendship and partnership (Tompion died in 1713), resulted in a substantial number of watches[2] and clocks, but also several innovations and improvements to escapements, and not long after their meeting, George married Tompion's niece Elizabeth. After Tompion died, Graham inherited the business and expanded his interests to include astronomy and physics. He became a member of the Royal Society in 1721, and many of his astronomical observations were published in the Philosophical Transactions. In 1722 he also became Master of the Clockmakers' Company.

The list of innovations that bear Graham's name is extensive, and, as is apparent from the list, Graham was well-known throughout the European world. With Tompion, he built an orrery (a mechanical model of the solar system) in the early part of the eighteenth century for the Earl of Orrery. Graham developed the deadbeat escapement around 1715. Seven years later he perfected the mercury compensated pendulum. Three years after that he developed the cylinder escapement for watches. Next came an eight-foot quadrant with vernier,[3] attaining a new level of accuracy, for Edmund Halley. For the Royal Observatory he built a 24 ¼-foot zenith sector with a micrometer screw. He designed and built an apparatus used for the measurement of a degree of the meridian for the Académie des Science. And finally he improved the micrometer screw for a reflecting telescope and invented a beam caliper with a micrometer screw.

Graham was just as generous after his death as he was when living. Half of his estate was left to his wife, and the remainder divided among the various societies and friends. Among his personal papers were found many debts he never bothered to collect.

Green Sea Turtle

Cheloniidae Chelonia

Green Sea Turtles are considered a threatened species in the United States. They are endangered in the state of Florida (U.S. Fish and Wildlife Service 2001). The IUCN (World Conservation Union) lists them as endangered (Crite 2001). The CITES (Convention on International Trade in Endangered Species) list classifies them as endangered (CITES 2001).
This photo courtesy of Turtle Trax
Conservation Issues
There are a plethora of conservation issues surrounding the Green Sea Turtle. Coastal areas, the Green Sea Turtle's nesting habitat, are very sensitive and must be managed carefully if the species is to recover. Both the over-development and erosion of beaches that may be caused in part by the planting of non-native plant species reduce the turtles' available nesting habitat (Biological Resource Division 2001)(U.S. Dept. of Commerce 2001). A large amount of artificial lighting near beaches disturbs female turtles and prevents them from laying eggs. It also causes hatchlings to move in the wrong direction (away from the ocean) after they hatch since they are attracted to light sources (ORF 2000). Since the sex of turtle hatchlings is determined by incubation temperature, the sex ratio of hatchlings may be changed when trees are planted to provide shade on beaches. The development of marinas and docks causes a loss of the turtles' feeding habitat. The heavy use of beaches by humans and offroad vehicles compacts the sand, which makes it more difficult for baby turtles to dig their way out of the nest. And the heavy use of Green Sea Turtle habitat by recreational boats causes eventual collisions between boat propellers and turtles (U.S. Dept. of Commerce 2001).
In addition to the various activities and practices that affect Green Sea Turtles' nesting habitat are several more direct activities in which people engage that affect the well-being of the species. People capture turtles for a variety of reasons that include the human consumption of eggs (considered by some to be an aphrodisiac) and meat (used in turtle soup) as well as the sale of turtle leather and shells (Biological Resource Division 2001)(CRESLI 2001). While the illegal capture of Green Sea Turtles is uncommon in the U.S., it is rather common in the Caribbean and is a large problem (ORF 2000). Also, a wide array of current fishing practices result in the accidental capture and possible death of turtles. They may get trapped or tangled in nets or traps and drown.. (Biological Resources Division 2001). Marine pollution also affects Green Sea Turtles chances for survival. Feeding turtles often eat ocean garbage which affects their metabolism and the functioning of thier digestive system. Oil spills will have an effect on their respiratory system, skin, and blood chemistry (U.S. Dept. of Commerce 2001).
Green Sea Turtles, which are currently an endangered species, are protected in the United States under the Endangered Species Act (ESA) of 1973, and under international standards, like those of CITES, which protects green sea turtles in over 150 countries (CITES 2001). The ESA, in cooperation with the U.S. Fish and Wildlife Service (USFWS), prohibits capture, possession, sale, and hunting of the green sea turtle, gives money and land to states to aid conservation efforts, and imposes civil and criminal punishment on violators of these mandates. The Office of Protected Resources is given government responsibility for implementing the ESA for sea turtles (U.S. Department of Commerce 2001).
Despite federal protection of the Green Sea Turtle in the U.S., the Green Sea Turtle continues to be threatened by humans. The public can help to protect them by avoiding nests and nesting areas, keeping bright lights from shining on the beach, keeping litter (especially plastic bags that are often mistaken as jellyfish by turtles) off the beach, and reporting poachers to authorities (Biological Resource Division 2001). There are also local education and protection organizations that often appreciate recieving information about observations of sea turtles. These organizations offer several ways to get involved in Green Sea Turtle conservation, and the help of individuals is welcome and needed.

Blue Manta Ray

Manta birostris

Description & Fascinating Facts
The Manta ray, Manta birostris, Giant manta, Atlantic manta, and the Pacific manta, are the largest rays and are closely related to sharks. These harmless amazing rays have short tails and no stinging spines. They are very acrobatic; even leaping high from the water. Remoras (Echeneida sp.) are frequently seen with mantas, staying near the manta's mouth (even inside the gill cavities). The remoras probably feed on parasites on the manta's body and bits of the manta's food.

The Manta genus is what is commonly thought of as Manta rays. There is also a Mobula genus that are smaller bottom-dwelling rays. To confuse things, one of the Mobula species, Mobula hypostoma.
Manta birostris - Atlantic Manta ray
Manta hamiltoni - Pacific Manta ray
Manta alfredi - Prince Alfred's Manta ray

Recent studies of genetic samples show that they are all the same species though - Manta birostris.
These graceful swimmers swim by moving their wing-like pectoral fins, which grow up to 9 m wide, but average about 6.7 m wide. The largest weigh about 1,350 kg. Mantas are dark brown to black on top with paler margins; they are mostly white underneath.

World Range & Habitat
Manta rays are found in temperate and tropical waters near continents and islands of all oceans. Usually they migrate around the world in search of plankton-rich waters.

Feeding Behavior
Manta rays are primarily planktivores - plankton feeders. They use the unfurled cephalic (head) fins on the head (which look like horns when they are not feeding) to funnel plankton-rich water into the mouth where gill rakers filter out the plankton. Some small crustaceans and fish might complement the diet, but like other filter feeders, Manta rays have reduced, nonfunctional teeth and are no threat to larger ocean animals unless threatened themselves. Unlike many other rays, Mantas don't a spine on the tail. Their only defense is their size and powerful wings. According to Yapese myth, the Mantas might wrap their wings around a person and squeeze him to death. This is not true, but a blow from a wing of a full grown manta carries a very powerful punch.

Reproduction
Mantas reproduces via aplacental viviparity - (which used to be called ovoviviparity) is when animals hatch from eggs, but the eggs hatch and the babies develop inside the female's body. There is no placenta to nourish the pups. Females give birth to a 1-2 pups which are about 1.2 m wide and weigh roughly 45 kg. Young mantas grow very rapidly.

During the mating season (December to late April in Yap), the mantas gather in large numbers and several males can bee seen courting single females. The actual mating is done belly-to-belly. A few months later, 1-2 manta "pups" less than 1 m wide are born alive rolled up like tubes. They become active as soon as they have rolled out their wings. The actual birth of a manta is something rarely seen by humans and it has only been captured on film once.

On Yap, the young mantas are sometimes seen in the waters surrounding the mangrove system where they take shelter in their infancy.

Warnings & Comments
Minimal danger unless attacked (especially harpooned) or otherwise startled, but the enormous size and power of this ray should invite respect; Still Fishing.

Golden Sting Ray

Dasyatis sabina

Common Names: Atlantic stingray
Latin Name: Dasyatis sabina
Family: Dasyatidae
Identification: Rhomboid disc, sometimes appearing teardrop shaped. Anterior disc margin concave. Posterior margin and outer margins rounded. Pointed snout on a broad based triangle. Tubercles on centre line of dorsum and first part of tail. Two short parallel rows of tubercles behind eyes, roughly half way between eyes and posterior disc margin. Tail thin, and long. Low dorsal and ventral finfolds present on tail, especially thin in juveniles. Dorsum Brown or tan paling towards margins where it may have a pinkish hue.
Size: Maximum disc width 49cm.
Habitat: Sand and mud bottoms from intertidal to 20m. Inhabits coastal areas, estuaries, and rivers. Capable of existing year round in freshwater environments.
Biology: The Atlantic stingray is unique in North America in its ability to thrive in a fresh water environment. In general, elasmobranches are considered to be stenohaline (salinity restricted) marine species. The bull shark has been reported many miles up rivers, but these forays eventually end with its return to a saline environment. Although some populations of the Atlantic stingrays are believed to remain year round in freshwater systems, they have not lost their ability to return to the sea, as have their freshwater cousins of South America. Rays of the family Potamotrygonidae which inhabit the Amazon Basin have lost the ability to retain urea in their body fluids. This minimizes the osmotic gradient related to a freshwater existence. The trade off for the Atlantic stingray is that even in fresh water their kidneys reabsorb urea. In fresh water, they still retain about 50% of their urea leading to a total osmotic pressure that is 15 times greater than their environment. So these animals face a very large osmotic uptake of water. To compensate for the influx of water, these stingrays have a considerable urine flow rate which is almost 10 times higher than those found in marine individuals.
Abundance and distribution: From Chesapeake Bay to the Gulf of Mexico. Most common in coastal habitats. St Johns River system in Florida and adjacent springs has the only fresh water population of any elasmobranch in North America. This ray has been found up the Mississippi River as far as 320km.
Behavior: Digs holes in sand in search of Tube anemones, polychaete worms, crustaceans, clams, and serpent stars. Faces into current to feed allowing sediment to be washed away.
Reproduction: Ovoviviparous. Male often follows female with his snout close to her cloaca and nibbles and bites her disc. Breading period from October to March. Gestation period April to August. Gives birth from mid to late summer in Florida.
Observations:
Photographs: St Andrews State Recreation Area, Panama City, Florida.
Similar species: Southern stingray, Bluntnose stingray.
Reaction to divers: Easily approached with non threatening movements.
Diving logistics: These rays can be found at the Jetty at St. Andrews State Recreation Area at Panama City. It is possible to snorkel with them or dive but I found them mainly in the 8 to 15ft range, so tanks are not really necessary. Air fills can be obtained from Panama City Dive Centre near the entrance to the park. Two options are to dive the beach on the right side of the rock jetty or swim through the sheltered swimming area and drop into the channel. Make sure you have an incoming tide for clarity and to avoid being swept out into the bay. This is a great area to find rays. On the same dives and snorkels I found Southern stingrays and Bluntnose Stingrays. I also saw a school of around 25 Devil rays but sadly I didn't have my camera when they showed up.

Red Grouper

Family Serranidae, SEA BASSES AND GROUPER *Epinephelus morio*

Description
The red grouper can be easily confused with the Nassau grouper. The most distinguishable trait is the dorsal fin. The top of a Nassau grouper's fin is notched, but the red's is smooth. Also the tips of the Nassau grouper's fins can be yellow whereas a red's are black. With dark brown/red patterns resembling those of the Nassau, a red grouper's color intensity can vary depending on the environment.

Typical Habitat
Red grouper are found in various habitats. They will hold near sea grass, muddy bottoms, limestone reefs, and rocky areas. Young grouper will stay in shallow waters and move deeper as they age. Throughout their lifespan, red groupers will range from 6 to 400 feet of water.

Feeding Habits
They will eat a variety of reef dwellers, including fish, lobster, crustaceans, squid and octopus.

Age and Growth
Like grouper, reds are an easy target for spearfishermen. This has significantly decreased their numbers (and average size) over the years. The red grouper that are commonly caught are about 2 feet long and weigh about 15 pounds. They can grow up to 3 1/2 feet and 25 pounds. Their normal lifespan can last 25 years.

Sporting Qualities
Like other grouper, reds are best targeted by dropping bottom rigs over structure. Adult reds will hold between 40 and 400 feet deep.

Food Quality
This fish has firm, white meat that can be served fresh or frozen. Like many other reef fish, grouper may contain high levels of toxins that may lead to a disease called ciguatera. There is no way to tell if a fish is potentially dangerous and no way to remove the toxins from the meat. Only small portions of grouper should be consumed at a time.

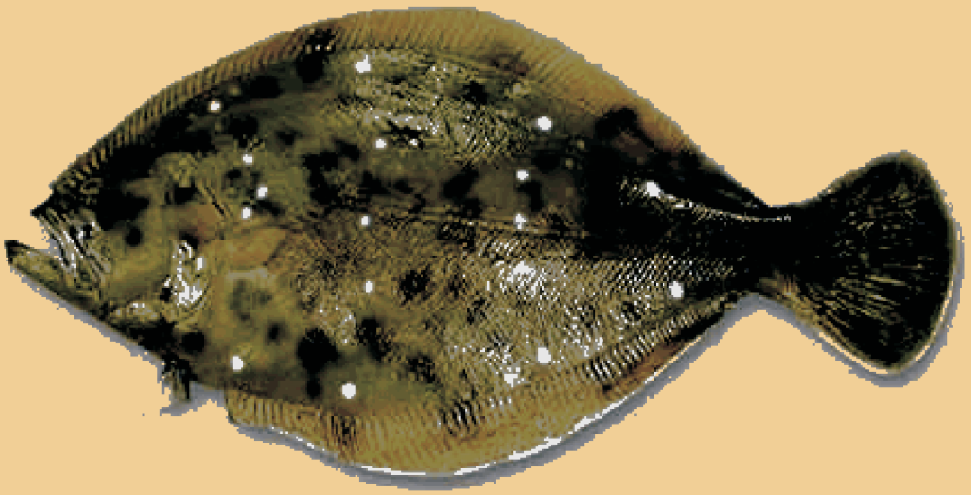
World Record
42 lbs. 4 ounces St. Augustine, Florida

Preferred Temps
63 to 77

Preferred Temps
70 to 89

Flounder

Paralichthys lethostigma



RANGE: Occurs statewide, except in extreme South Florida and Keys. The Southern is the common Flounder of virtually the entire Florida Atlantic Coast.

HABITAT: Most of the year, this fish is found in relatively shallow areas, preferring soft bottom near such cover as bars or rubble. Also holes in grass beds and edges of channels.

DESCRIPTION: Brown or olive background, liberally marked with both dark blotches and white spots; however, the prominent eye-like spots of the Gulf Flounder are missing.

SIZE: This is the larger of Florida's two widely caught Flounders. It averages 2-4 pounds, but fish running 8-12 pounds are caught each year mostly in the fall around major inlets from the Georgia line to Sebastian. World record 20 pounds, 9 ounces.

FLORIDA RECORD: 20 pounds, 9 ounces.

FOOD VALUE: One of the best.

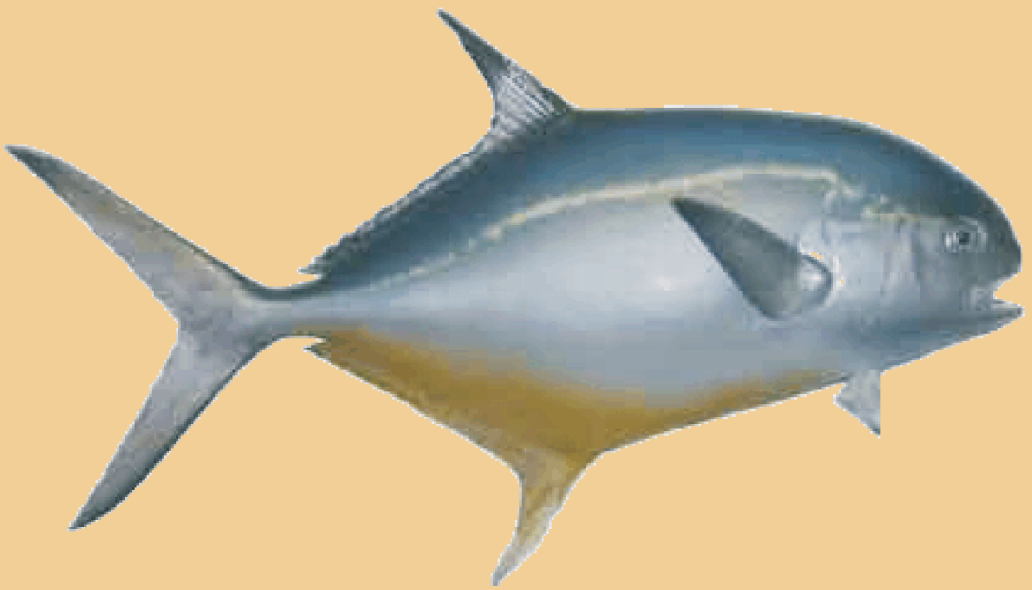
GAME QUALITIES: Large fish get off some fair runs, but they give up after a few minutes of fight.

TACKLE AND BAITS: For most Flounder fishing, ordinary light spinning or bait casting tackle is more than adequate. When targeting doormats around the inlets with live bait, the same types of gear, but with stouter rods and perhaps stronger lines should be used. Light saltwater boat tackle also does the job. Big Flounder are taken mostly with live fish as bait. Finger Mullet are favorites everywhere. Smaller fish and big ones at times will also hit live or dead shrimp and cut baits. While most fish-imitating lures will take Flounder, jigs are the most productive.

FISHING TECHNIQUES: Casting; Drifting; Still Fishing.

Permit

Scomberomorous cavalla



32 inch Permit
Scomberomorous cavalla
This is a fiberglass replica of a stunning Permit caught in the Florida Keys measuring 32" in length. This beautiful, nautical sculpture looks wonderful in any setting and will be the topic of many discussions. This replica will not peel, fade, or crack and is designed for indoors, outdoors or dockside.

Description: Color gray, dark or iridescent blue above, shading to silvery sides, in dark waters showing golden tints around breasts. Small permit have teeth on tongue. Dorsal fin insertion directly above that of the anal fin with 17 to 21 soft dorsal rays and 16 to 19 soft anal rays.

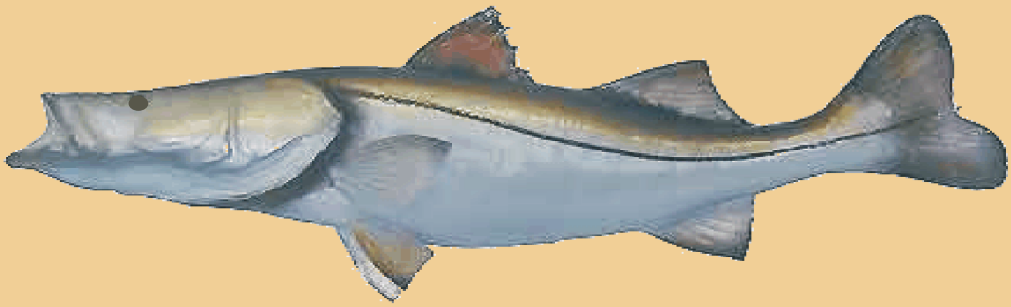
Size: Common to 25 pounds, but can weigh over 40 pounds. Florida holds the world record at 56 pounds, 2 ounces.
Where found: Offshore on south Florida reefs and wrecks Inshore on grass flats, sand flats, and in channels. Most abundant in south Florida, with smaller specimens in every coastal county.

Remarks: Feed on bottom-dwelling crabs, shrimp, small clams, and small fish.
Fishing: If fishing for Permit is your goal the best way is to site fish for them on the flats. You can spot then tailing while they forage for food on the flats. Small crabs or shrimp are your best natural baits with small jigs also working well.

Permit have bright silver sides and bluish-green or brown backs. The belly will sometimes show yellow or an occasional black splotch. The fins appear dark gray or black. The deeply forked tail and elongated anterior dorsal fin provide the more distinct characteristics of the permit. Our 32-inch half mount replica is a beautiful example of our dedication to craftsmanship

Snook

, Centropomus undecimalis



Snook may be the perfect gamefish. It is a tremendous fighter, requires skill to land and is one of the best eating fish you'll ever taste. Primarily inshore fish, snook don't travel the vast distance that other species are noted for. Most snook, often referred to as linesiders, spawn from April to October in the offshore waters near passes and inlets. The juvenile fish that survive those first few weeks of life in the open water eventually move into the estuaries where the fish most their lives. The fish can tolerate fresh water for extended periods of time and it is not unheard of for anglers fishing in fresh water areas that eventually connect to the coastal waters to catch snook when fishing for largemouth bass.

There are four species of snook but anglers don't need to worry about distinguishing one species from another. Three species, the fat snook, swordspine snook, and tarpon snook, never get larger than 18 inches so if caught, would have to be immediately released due to their size. Angler are after the common snook, a fish that can grow to the size of a small log and weigh over 30 pounds.

Distribution

Snook are warm water fish This limits their distribution to the waters south of Tampa Bay along the west coast and south of Cape Canaveral along the east coast. When the water temperatures drop below about 60 degrees, snook head for warmer waters. This is the reason for the December and January closed seasons. The fish become very lethargic when the water is cold and can easily be exploited by unethical anglers. At the northern range of the fish, some individuals die if they cannot find a warm water refuge. Snook are most commonly caught in protected waters and passes. They prefer to hang around overhanging mangroves, dock pilings, and any submerged structure. Some fish are caught in the nearshore waters over reefs and other structure.

Tackle and Techniques

A medium weight spinning or bait-casting rod and reel with 8 to 20 pound test line is a good idea. Snook are strong fighters. When fishing in areas where there is an abundance of cover, stick to tackle at the heavier end of this range. This fish is noted for its ability to run towards submerged structures and cut you off. It is also essential that you use a heavy monofilament leader, in the 40 to 80 pound range, to reduce break-offs caused by the fish cutting the line with their sharp gill covers.

Snook like to rest in an eddy and wait for the moving water to bring them food. For this reason, you will find anglers fishing for snook where the tidal flow is strong and there are eddies for the fish to use.

Bait

Snook will eat anything that looks good to them and is in range when they are hungry. Their favorite food is a small live fish, but live shrimp and small crabs are seldom turned down. Anglers should learn to use cast nets if they don't already know so that they can net their own bait. Usually you can freeline a bait fish and let it drift with the current. Occasionally a split shot is added to the line in areas where the current is especially strong.

Artificial lures are also popular baits for snook. Both soft and hard bodied lures shaped like baitfish, jigs tipped with shrimp and gold or silver spoons are traditional favorites. MirrOlures and Zara Spooks are two of the more popular brand names that you hear many when talking about catching snook. Ask at a local bait and tackle store which size, style and colors combination is working best at the moment.

When fishing for snook, cast your bait as close to the structure or shoreline as possible. Snook often will pass up a good looking meal if it doesn't pass right in front of its nose. Top snook anglers have good casting skills and can skip a bait underneath an overhanging mangrove branch without getting hung up.

Secrets to Success

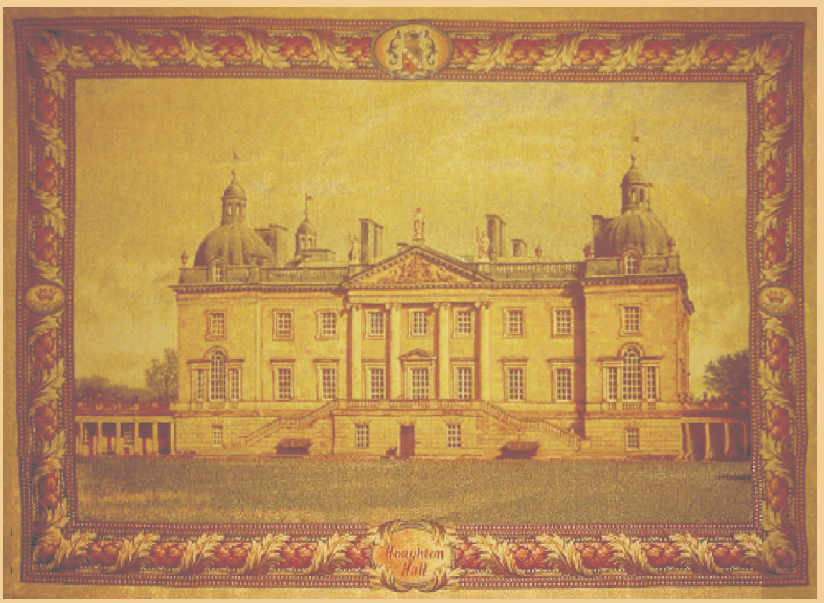
* Fish at night for snook. Look for lights on docks and along seawalls that are close to the water. Snook will lurk in the shadows and dart out into the light when they see a meal swim by. Since small bait fish are attracted to the light and they are the snook's favorite meal your chances of finding snook around any light are pretty good.

* Anglers fishing from a seawall, dock or bridge that don't have a light, can dangle a Coleman lantern just above the water's surface. Once the light attracts the baitfish, the snook won't be far behind.

* When the water temperature drops into the 60s snook may move far up small tidal creeks and canals. Tolerant of freshwater they will move into these regions for brief periods. Look for them to be in the deepest holes you can find and hope they are hungry.

Houghton Hall

Norfolk England 1721



This chenille tapestry depicts Houghton Hall in Norfolk England, conceived in 1721 by Sir Robert Walpole (1676 - 1745), the 1st Earl of Orford and the first Prime Minister of Great Britain. Intended from the start as a great mansion to fill with treasures, Houghton was designed by James Gibbs and Colen Campbell. Reflecting Walpole's importance in British life the mansion is large and imposing, matched only by its 5 acre gardens. The current owner, Walpole's direct descendant the 6th Marquess of Cholmondeley, has restored Houghton to its original glory, despite many years of decline. The tapestry above shows the impressive classical architecture of the facade, and captures some of the grandeur of a building that played such a central role in Britain's meteoric rise as a world power from the 18th century onwards. This tapestry is unlined and has a rod sleeve for ease of hanging.

Chenille is a popular fabric and has many uses. As a soft and supple material it can be used for a variety of purposes, including; tapestries and wall-hangings, throws, bed covers, upholstery and curtains. Chenille can be difficult to manufacture and takes a great deal of care in its production. The thread is produced by weaving fabric into tightly twisted yarns which are then combined with shorter yarns to provide a pile that protrudes in all directions, giving the final material its distinctive chenille feel and flexibility. These are then used in the normal way to produce the finished fabric. Many fabrics can be used in this process although these are typically: cotton, silk, wool, viscose, polypropylene or acrylic.

An introduction by Lord Cholmondeley:

I have always felt that Houghton has a very special, unspoilt atmosphere with its herd of white deer in the park, and peacocks strutting on the west front. The house itself has changed little since the 18th-century, and it is easy to imagine Sir Robert Walpole entertaining his guests after a hard day's hunting.

Yet it should be remembered that the house retains so much of that character thanks to the Cholmondeleys, particularly to the 1st Marquess, who inherited the house in 1797 and saved the furniture from sale; to my grandfather, the 5th Marquess, who died in 1968.

(Lady Cholmondeley - The late Marchioness of Cholmondeley)

A great deal has been happening at Houghton over the last few years. In the house we have continued an extensive program of repair and restoration begun by my grandparents in the 1920's. Outside there are new developments in the Walled Garden, which was planted in memory of my grandmother; while a long-vanished ha-ha has been put back on the west side of the house, separating the lawn from recently laid-out parkland. My father's model soldier collection now has its home in the vaulted stable block, as does the new tea room and gift shop.

There are also plans to introduce works by contemporary artists into the grounds and the south wing of the house. Just recently, an agreement was reached whereby the Victoria and Albert Museum will take on the ownership of several important items in the State Rooms in lieu of tax, thereby helping to ensure the future of the house and its contents.

Houghton today is the center of a thriving estate, reflecting the ups and downs of nearly 300 years of

Size: 76" x 56”

weight: 14 lbs

Material: Cotton & viscose blend

Country: Belgium

Http://houghtonhall.com/htmlfiles/1024index.htm

USS Constellation (1854)

The USS Constellation constructed in 1854 is a sloop-of-war and the second United States Navy ship to carry this famous name. Her keel was laid on 25 June 1853, in Gosport Navy Yard in Norfolk, Virginia, at the same time as the original 1797 frigate Constellation was being broken up.

For some time, there was controversy over whether or not the 1854 sloop was a new ship, or a rebuilt version of the 1797 frigate. Much of the controversy was created when the city of Baltimore promoted the ship and even rebuilt sections of the ship to resemble the 1797 frigate. Additionally, when the ship was to be rebuilt in the 1990s, naval historians that favored the theory that the ship was indeed the 1797 original, relied on three main points:

Some of the funds used to build the sloop were originally allocated to rebuild the frigate

Some timbers from the broken-up frigate were used in the construction of the sloop

The frigate was never formally stricken from the Naval Vessel Register—a wooden, sailing man-of-war called Constellation was continuously listed from 1797 until 1955

Supporting the position that they are different ships are the facts that the sloop was designed anew from the keel up (without reference to the frigate), and was planned to have been built even if the frigate had not arrived in the yard at that moment. The paper "Fouled Anchors: The Constellation Question Answered", by Dana M. Wegner, et al., published by the Navy's David Taylor Research Center in 1991, concludes that they are different ships. The conclusive proof came during the renovation concluding in 1999 in which all evidence pointed to the construction of an entirely new sloop-of-war from the 1850s era.

In any case, the sloop was launched 26 August 1854, and commissioned 28 July 1855, with Captain Charles H. Bell in command.

From 1855 to 1858, Constellation performed largely diplomatic duties as part of the US Mediterranean Squadron. She was flagship of the US African Squadron from 1859 to 1861. In this period, she disrupted the African slave trade by interdicting three slave ships and releasing the imprisoned slaves. The last of these was captured at the outbreak of the US Civil War: Constellation overpowered the slaver brig Triton in African coastal waters, effecting one of the first Union Navy captures of a Confederate ship.

After the Civil War, Constellation saw various duties such as carrying famine relief stores to Ireland and exhibits to the Paris, France Exposition Universelle (1878). She also spent a number of years as a receiving ship (floating naval barracks).

After being used as a practice ship for Naval Academy midshipmen, Constellation became a training ship in 1894 for the Naval Training Center in Newport, Rhode Island, where she helped train more than 60,000 recruits during World War I.

Decommissioned in 1933, Constellation was recommissioned as a national symbol in 1940 by President Franklin Roosevelt. She spent much of the Second World War as relief (i.e. reserve) flagship for the US Altlantic Fleet, but spent the first 6 months of 1942 as the flagship for Admiral Ernest J. King and Vice Admiral Royal Ingersoll.

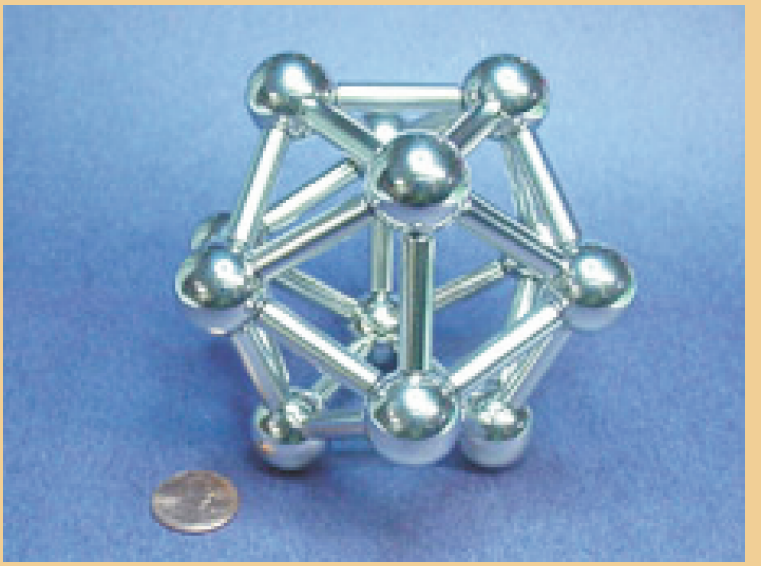
Constellation was again decommissioned on 4 February 1955, and stricken from the Naval Vessel Register on 15 August 1955—about two weeks and one hundred years from her first commissioning. She was taken to her permanent berth—Constellation Dock, Inner Harbor at Pier 1, 301 East Pratt Street, Baltimore, Maryland—and designated a National Historic Landmark (reference number 66000918) on 23 May 1963. She is the last existing American Civil War-era naval vessel and the last sail-powered warship built by the US Navy. She has been assigned the hull classification symbol IX-20.

In 1994, Constellation was condemned as an unsafe vessel. She was towed to drydock at Fort McHenry in 1996, and a $9-million restoration project was completed in July 1999.

On 26 October 2004, Constellation made her first trip out of Baltimore's Inner Harbor since 1955. The trip to the US Naval Academy in Annapolis, lasting 6 days, marked the ships first trip to the city in 111 years.

Tours are regularly available, self-guided or with the assistance of staff. Nearly all of the ship is accessible, and about half the lines are present (amounting to several miles). A cannon is demonstrated daily, and tour groups can also participate in demonstrations such as turning the yards.

Neodymium Rare Earth Magnets



Large Icosahedron Kit
30 - D4X0 Rod Magnets
12 - 3/4" Nickel plated steel balls

This is a magnetic sculpture kit that includes enough parts to build the large icosahedron (20-sided ball) shown here. The icosahedron is about the size of a softball, but weighs a lot more. This sculpture is fairly straightforward to build and is pretty sturdy, so it can be handled with ease. This interesting magnetic artwork can be hung from a magnet or used as a tabletop or bookshelf decoration. The parts in all of our kits are fully interchangeable and can be used to build a wide variety of geometric sculptures. This sculpture makes a great gift for any science- or math-oriented person.

In 1983 General Motors, Sumitomo Special Metals and the Chinese Academy of Sciences develop a high energy product Neodymium-Iron-Boron ($Nd_2Fe_{14}B$) compound.

The strongest available permanent magnets consist largely of neodymium, a rare earth metal with atomic number of 60 and symbol of Nd. Since Nd is a brittle, slightly toxic metal that easily corrodes in air, the commercial magnets often are coated with nickel, another familiar magnetic metal, which is less likely to chip or corrode. These magnets are actually made of an alloy of neodymium, iron, and boron. Alloys of different elements make stronger, longer-lasting magnets because pure magnetic materials usually demagnetize quickly. The reason is that the magnetic forces favor breaking up the into domains whose magnetizations point different ways and cancel out. When there are enough impurities in the material, the boundaries between the domains get stuck, keeping most of the domains from losing their alignment. That's why good permanent magnets are often made of alloys, like Alnico, in which one of the components (like aluminum) isn't even magnetic.

Iron Nickel Meteorite

Campo del Cielo

Basic Information · Location: Campo del Cielo, Gran Chaco Gualamba, Argentina, about 500 miles north-northwest of Buenos Aries. Latitude 27 degrees 39 minutes South, Longitude 61 degrees 44 minutes West. · Structural Class: Coarse octahedrite, Og, Widmanstatten bandwidth 3.0 ±0.6 mm. · Chemical Class: Group I, 6.68% Ni, 0.43% Co, 0.25% P, 87 ppm Ga, 407 ppm Ge, 3.6 ppm Ir. · Time of Fall: 4,000 to 6,000 years ago

The first record of the Campo was in 1576. A Spanish governor learned of the iron from the Indians who reportedly believed that it had fallen from heaven. The governor sent an expedition under the command of one Captain de Miraval who brought back a few pieces of a huge iron mass he called Meson de Fierro (large table of iron). The location of the find was the Campo del Cielo (field of the sky or heaven), a fitting name for the location of a meteorite. Since the Indians believed that the irons fell from heaven the name may have come from the meteorites. The area is an open brush-covered plain that has little water and no other rocks--very good country in which to locate meteorites. Structure of the Campo del Cielo

The Campo del Cielo is described as a polycrystalline coarse octahedrite. At 3 mm the Widmanstatten bands are thicker than those at Canyon Odessa, but still thin enough to have the same coarse octahedrite classification. The mass was composed of large austenite crystals from 5 to 50 cm in size. On break-up the fragments were cold worked like those at Sikhote-Alin and Gibeon. It has been hypothesized that the original body was tabular in shape and broke up on entry into the atmosphere.

Chemistry of the Campo del Cielo The Campo del Cielo is classified in Group I, , 6.68% Ni, 0.43% Co, 0.25% P, 87 ppm Ga, 407 ppm Ge, 3.6 ppm Ir. Of course, almost all of the remaining portion of the meteorite is iron. The important minerals are: · Kamacite--this iron nickel alloy makes about 90 percent of specimens in finger size and width crystals. Neumann bands are common. · Taenite and plessite, the other iron-nickel alloy constituents are found at grain boundaries. · Schreibersite is uncommon. · Troilite is found aggregates with graphite and silicates.

Trilobite From The Ohio Area

A nice little trilobite from the Ohio area. He is Gravicalymene celebra, springfield dolomite, lower silurian. The bug measures 1 1/4 by 1 inch. It sits on a piece of matrix measuring 2 1/2 by 1 1/2 inches and is 1 inch high.
No animal better captures the drama of evolution and extinction. Long before the fish inhabited the seas and the Dinosaurs roamed the land, Trilobites appeared some 600 million years ago during the Cambrian period. They belonged the phylum Arthropodal (joint-footed), a phylum which to this day represents the most successful (78%) of all animal life forms, including crabs, centipedes, spiders, shrimps and insects.The Trilobites, living in shallow seas, flourished as swimmers, crawlers and burrowers for some 350 million years. They evolved rapidly into many beautiful, bizarre and, even by today's standards, futuristic forms.

The name Trilobite--meaning three lobed one--is in reference to the three longitudinal lobes across their heads (cephalon), consisting of a slightly raised central lobe (the axis) and two flatter pleural lobes on either side. The entire bodies were also divided into three: the head (cephalon), thorax (chest) made up to a group of up to 30 segments and the tail (pygidium). Underneath and rarely preserved are three pairs of legs for the head and paired legs for each pleural groove. Trilobites are the earliest known animal to possess vision. Some possessed eyes and some seem to have no eyes at all, while others possessed beautiful compound eyes capable of 360 degree vision.
First capturing man's eye some 25,000 years ago in France where two specimens were found is association with a Cro-magnon settlement, at a site called "La Grotte du Trilobite", one was found with a hole drilled into it and worn as an adornment. Others have been found in the tombs of Egypt, Greece and Rome. Sold on the street of 15th Century Europe and collected by Thomas Jefferson and Benjamin Franklin, today they are collected, studied and enjoyed by people from all walks of life.

Evidence of these extraordinary marine creatures are found on all continents, entrapped in the hardened sediments of Ancient Seas. The following Trilobites have been prepared by a Master of his Art, Jeffrey Hammer, who spends countless hours under a microscope to open one of these time capsules and to unveil one of Nature's Frozen Masterpieces allowing a view back in time to the Dawn of Life.

Steam Co. Steam Engine

This beautiful Steam engine is a great collectors piece or a working model for your Meccano/Erector Set or similar. Mounted on a base with a pulley on the flywheel for drive belts.
The 'Black Label' Model is finished very nicely in black and brass and has the flywheel mounted on the boiler.
The used steam is exhausted up the chimney for a realistic look!
The design of the engine makes it perfect for either educational purposes or for the steam enthusiast.

Specifications:
Engine Single Acting Oscillating type
Brass Boiler Silver Soldered
Cylinder Bore 5/16"
Cylinder Stroke 3/4"
Flywheel Diameter 2 1/4"
The Fuel is Dry Spirit Tablets available from camping stores
Height 9 1/4"
Length 6 3/4"
Width 4 3/4"

STEAMCO ENGINES AUSTRALIA