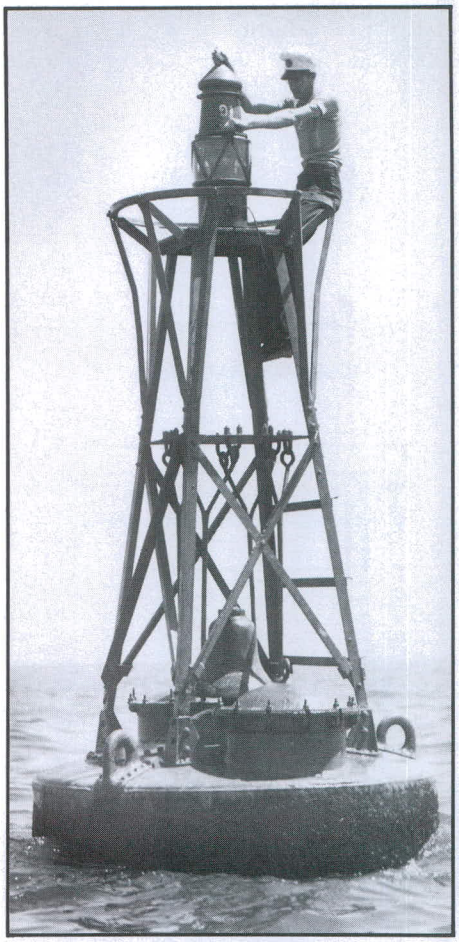


BUOYS

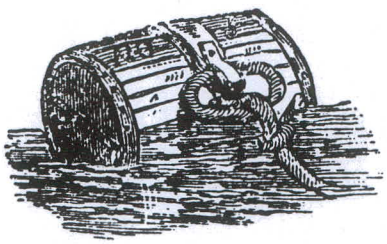
Guideposts of the Sea

by Wayne Wheeler

If lighthouses and lightships are the major pieces in the aids to navigation chess set, then buoys are the pawns.

Certainly some sort of anchored floating object was used by ancient seafarers to mark the good water in pre Roman harbors. However, no record survives. The earliest mention of buoys as navigational aids is in the medieval seaman's manual *La Compasso da Navigare* of 1295. The manual provides sailing directions for the Mediterranean and particularly the area around the Iberian Peninsula. It mentions buoys in the Guadalquivir River approaches to what is now Seville, Spain. A later medieval reference to buoys exists which speaks of buoys in the River Maas, now known as the Meuse, in Belgium. Early buoys may have been solid chucks of wood or rafts of wood anchored with rope, later chain, to heavy stones. The first mention of hollow buoys (called Tonnen) is in records dating from 1358 concerning the Maasgat near what is today Rotterdam, Holland.

Charts published at the end of the 16th century show 43 buoys in the Zuider Zee, 27 in North German rivers and 17 in England. However, the amount of buoys in England increased over the years, especially after the creation of Trinity House by Henry VIII, so that in the Thames River and approaches alone there were 73 buoys in 1818.



The simple wine or beer cask originally used soon gave way (literally) to a conical buoy called a "seetonnen" by the fassbinders, or barrel makers of the Netherlands and North Germany. Although, the English were still using horizontal barrels (keg buoys) for many years after the countries on the continent had improved buoy design. The large 10 foot high and 5 foot diameter Seetonnen buoys were made of oak staves that tapered from 6 inches at the top of the buoy to about 1 inch at the lower (bottom) end. The bottom, pointed end, contained a thick oak plug through which an iron mooring ring was secured. The conical barrel was banded with as many as ten iron hoops. The top of the cone was covered by thick oak planks and carved with the insignia of the port or organization owning the buoys. The Dutch even devised an early form of air testing using a bung hole and bellows. The completed buoys, liberally coated with tar, had a life expectancy of ten years. The buoys were moored with long loose links of wrought iron chain shackled to a stone block with a hole through the center.

The first mention of a vessel (Tonnenschiff or buoy ship) specially designed to tend buoys was in Germany in 1460. It was not until 1745 that mention is

made of a special vessel to tend the English buoys of Trinity House. This country didn't design a vessel to tend buoys until 1857 when the *SHUBRICK* was built (see KEEPER'S LOG Vol. I #1). Buoys were tended in England (prior to the Trinity House "buoy yacht") and in America (prior to the *SHUBRICK*) by contractor vessels.

Early English buoys were referred to as "canns," from which we have derived the word "can buoy" to denote those green flat topped buoys which the mariner leaves to port (his left) when entering harbors today. In 1837 charts showed "nun" buoys consisting of double wooden cones moored in the English river Humber.

"Red Right Returning" is perhaps one of the first duties that the American mariner learns. I say American because in many areas of the world the rule is "Red LEFT Returning." In fact it wasn't until 1850 that our present lateral system of buoyage was adopted. Section 6 of an Act passed by Congress on September 28th of that year stated:

"And be it further enacted, that hereafter all buoys along the coast or in bays, harbors, sounds or channels, shall be colored and numbered so that passing up the coast or sound, or entering the bay, harbor or channel, red buoys with even numbers shall be passed on the starboard hand. Black buoys with uneven numbers on the port hand, and buoys with black and red (horizontal) stripes on either hand, Buoys in channel ways to be colored with alternate black and white perpendicular stripes."

Before this Act standardized buoyage in American waters the mariner encountered a vast array of "aids" in the different ports of the nation. During colonial times each colony, more often each port, established a wide variety of beacons and buoys of varying shapes and colors to assist the local mariner navigate the waters of the port. Needless to say, "local knowledge" was most beneficial in keeping a vessel off the rocks.

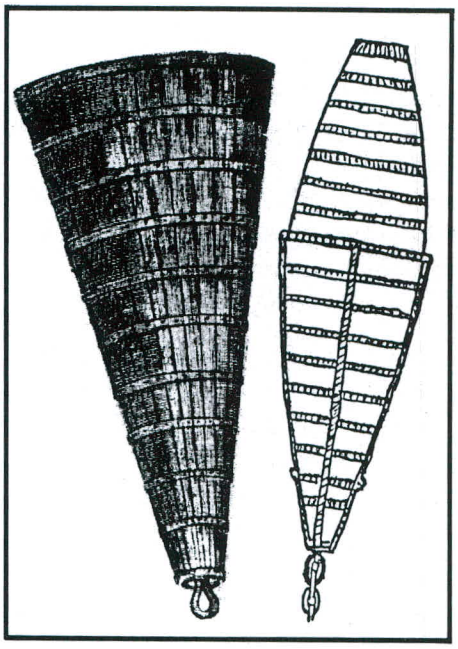
Until the federal government assumed the responsibility for aids to navigation in 1789 there were only 12 lighthouses and very few beacons or buoys in all the colonies. After the government created the Lighthouse Service (the Ninth Act pass by Congress) things began to improve. Lighthouses were constructed, beacons built and buoys established. However, it would be some sixty years before a system of buoyage was devised.

Much like Europe, early buoys consisted of wooden barrels and long (telephone pole size) wooden spars. These "aids" were heavily tarred and either unpainted or painted in a variety of colors depending on the whim of the local Collector of Customs or, perhaps, depending on the color of paint on hand. During the early years of the 19th century the color of most buoys had evolved to red, black or white. There is some indication that green or a combination of green and another color was used for buoys marking wrecks. However, for many years buoys were generally not placed in any particular system. Reports indicate that prior to the Act of 1850 some American ports began using red on the starboard (right) side of channels because that was the system used in the Port of Liverpool, England and many American merchant vessels called at Liverpool.

Although we didn't have an official system of buoyage until 1850, the federal government was authorized to establish and maintain buoys by the Ninth Act passed by the first Congress. That Act states, in part:

That..."the Treasury of the United States shall defray the cost of supporting, maintaining and repairing all lighthouses, beacons, *buoys,* and public piers that are ceded to the federal government after the 15th day of August 1789."

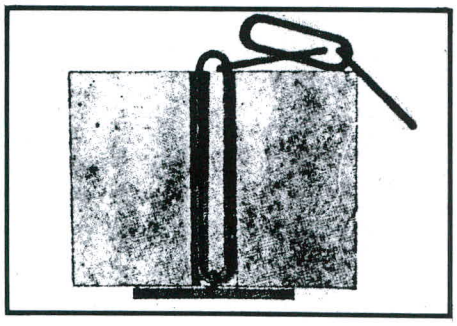
The states, reluctantly complied stating that if the federal government was remiss they would take their aids back.



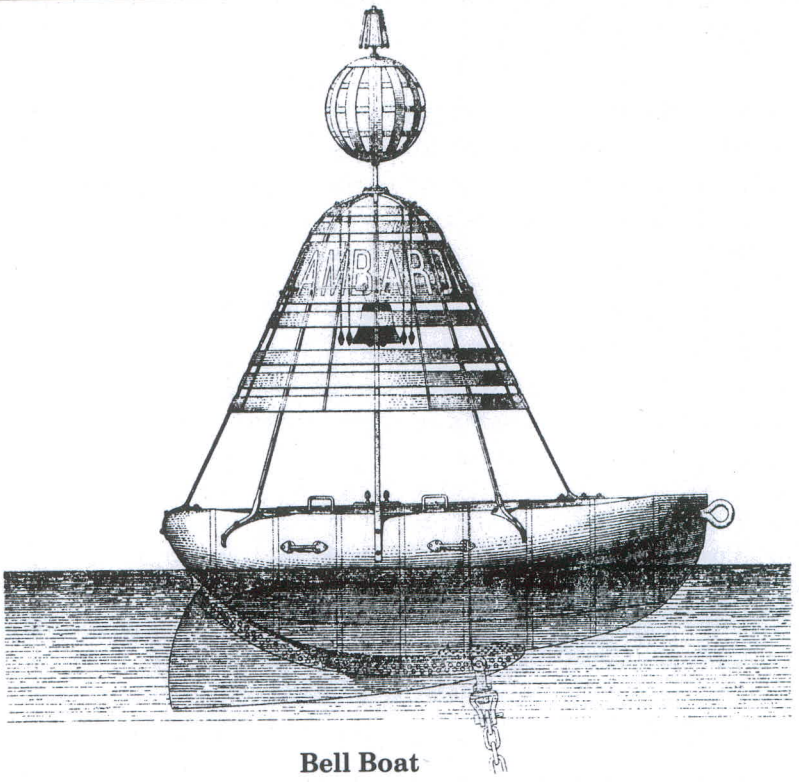
On the left is the Seetonnon or early Can buoy. On the right is a double Seetonnen (today called a Nun buoy). Below is a granite sinker with wrought iron chain.

The first three buoys authorized by the new government were for lower Chesapeake Bay in 1792. In 1793 President Washington authorized the making of mooring chain for buoys. It was certainly a slower pace of government that allowed the president to become personally involved with aids to navigation. In other correspondence of that era President Washington authorized $600 for the copper plating of buoys in Long Island Sound.

With the development of iron foundries and metal working technology, buoy design vastly improved. Riveted wrought iron or steel buoys were constructed with interior bulkheads (walls) forming water tight compartments. This increased reliability and durability and allowed new developments to occur.



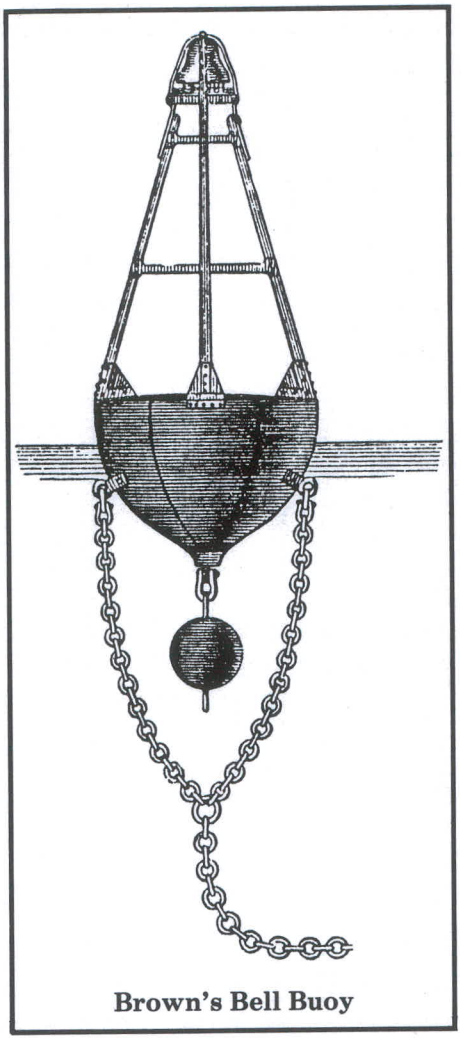
Prior to the standardization of a buoy marking system in 1850 the government experimented in providing the mariner with more than just a daymark. The first attempt to provide a sound signal was the installation of a bell on a buoy. After all, bells had been effectively installed at lighthouses and on lightships as sound or fog signals. As early as 1841 funds were authorized (an Act approved August 25, 1841) to modify a small light boat so as to be equipped "with a bell only... to be so fixed as to be rung by the motion of the sea." However, these small bell boats (boat hulls with attached bell and moored with a large anchor) were not too successful. The first was constructed in 1852. They served in Massachusetts, Chesapeake Bay and off San Francisco. But they broke loose from their moorings or capsized and were all discontinued after a period of about five years.



Bell Boat

The first true bell buoy was invented in 1852 by LT Brown, an army officer assigned to the Lighthouse Establishment. His design was quite similar to the bell buoy of today. He firmly affixed a 300 lb. bell inside the top of the cage of a buoy. Beneath the bell he installed a radially grooved plate and on the plate placed a cannon ball. As the buoy rolled with the motion of the sea the cannon ball rolled down a groove in the plate and struck the bell. Today's bell buoy also has a fixed bell (85 or 225 pounds) but instead of a cannon ball, hinged clappers are attached to each of the four sides of the cage.

The next sound signal to be used with buoys was the whistle. In 1876 Mr. John Courtenay of Cornwall-on-Hudson, NY patented his whistle buoy. It consisted of a pear shaped buoy hull constructed of iron plates with a long tube extending through the buoy and below the buoy body or hull. The hollow tube was open at the bottom (under water) and capped at the top with a whistle. As the buoy rose and fell with waves, air was forced up through the tube and out the whistle emitting the mournful sound of the "whistling buoy" as it was then called. Todays whistle buoy, although different in design, uses the very same principle.

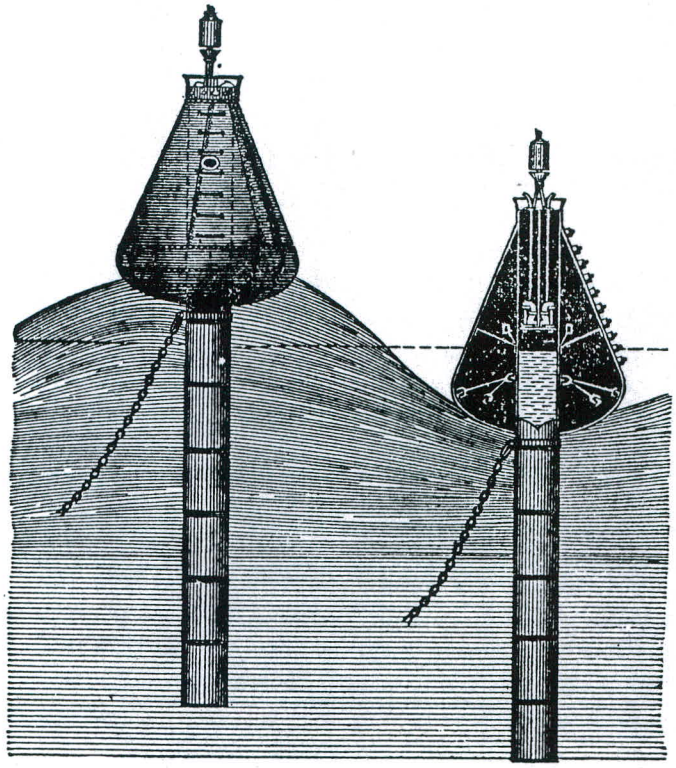


Brown's Bell Buoy

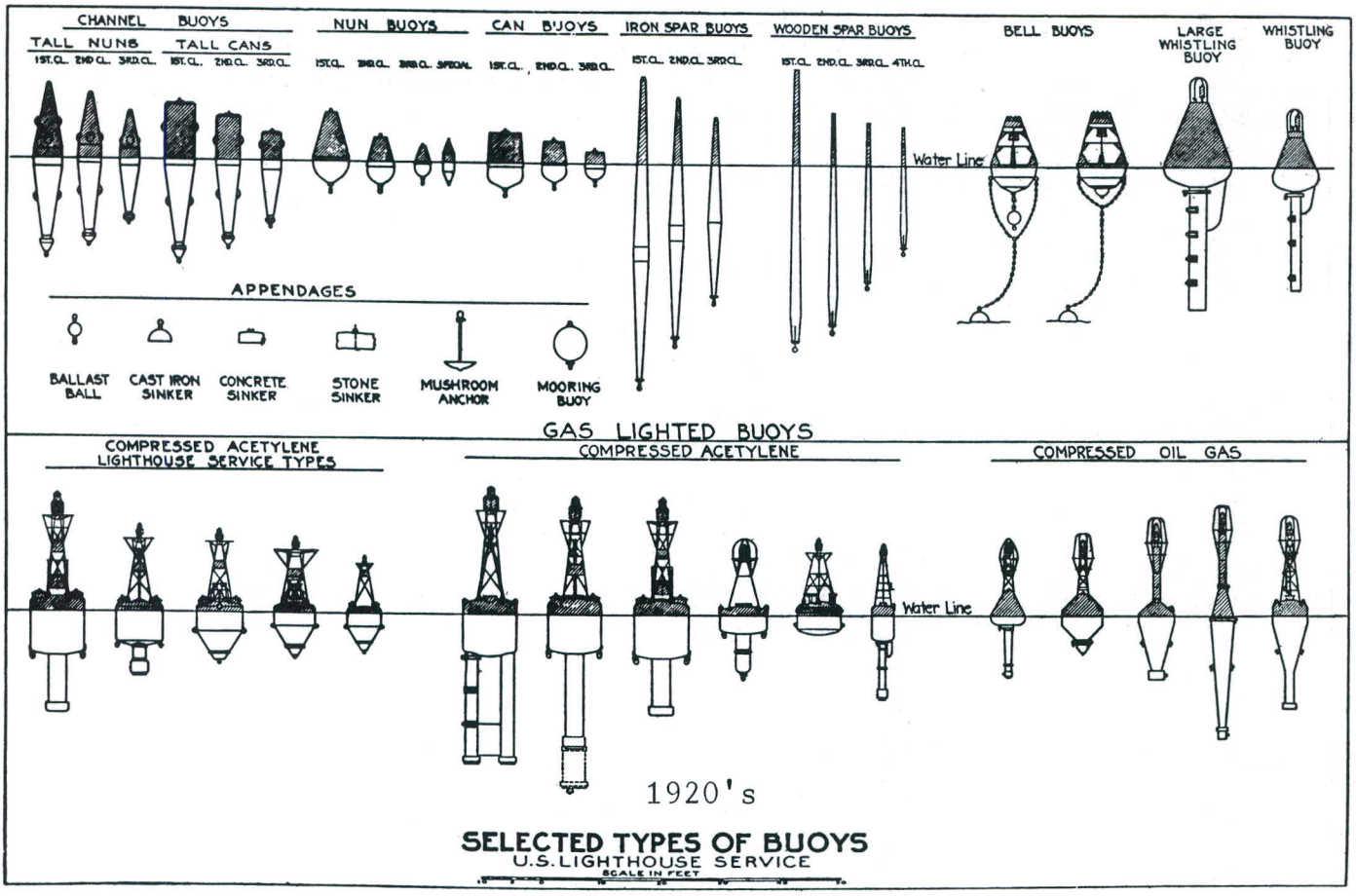
The last wave actuated sound buoy developed was the gong buoy in 1921. Actually a forerunner of the gong buoy, called a "double bell" was placed on a wreck in New York Harbor in 1889. The distinctive chime sound was very well received by the mariner. The 1921 gong buoy, essentially the same today, had a set of four gongs mounted vertically in the middle of the cage of the buoy at the same location where a bell would be mounted in a bell buoy. The gongs are of different sizes and the clappers on the four sides of the cage of different lengths. Thus, when the buoy rolls (or tilts to one side) one size gong is struck and when it rolls in a different direction another size gong is struck. Where a bell buoy provides a "ding dong" sound, a gong buoy provides a "clanging" sound.

In the 1920's the Lighthouse Service experimented with acetelene and battery powered automatic bell strikers mounted on buoy hulls. In recent years the Coast Guard has installed electronic battery powered sound signals on buoys. Both of these systems have been less than successful. The motion of the sea, at times violent, coupled with the punishing environment of ocean spray has played havoc with sensitive mechanical or electronic equipment. Additionally, in populated areas the high pure tone "beep" of the electronic horn has been very unpopular with a sleeping populace.

The lighting of buoys was developed between 1879 and 1894. The first power source was invented by a German named Pintsch who placed tanks of compressed oil gas in buoys. In 1881 the U.S. Lighthouse Service installed a very complex system to electrically light the buoys of Gedeney's Channel into New York (off Sandy Hook, NJ).



Courtenay's Whistling Buoy



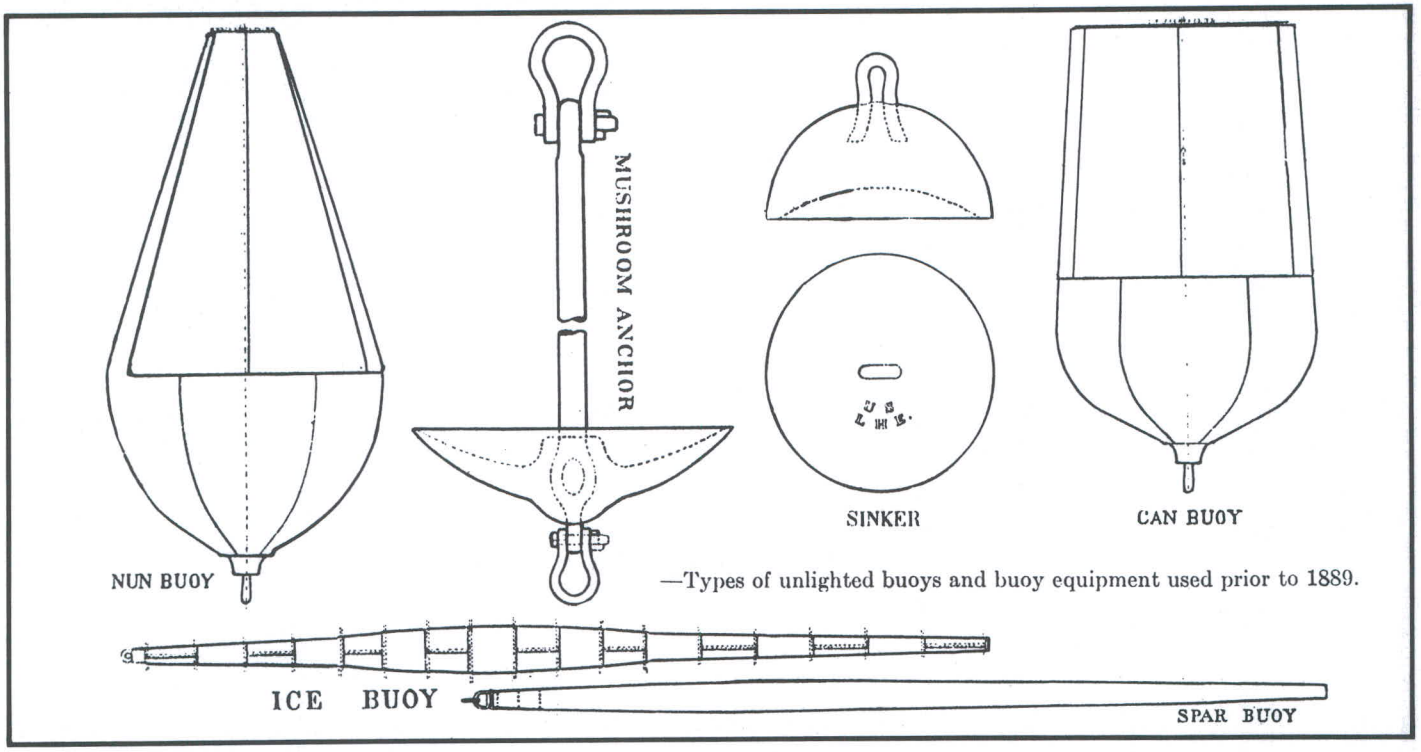
A power station was constructed on shore and electrical cables were laid along the sea bed to wooden spar buoys lining the channel. The cable branched off to each buoy, rose along side the long (telephone pole size) wooden spar buoy (which was secured to a sinker on the bottom) to the top where an electric lamp was installed. The mariner was greatly impressed with this system...when it worked. It allowed many vessels, who would normally have waited until daylight before attempting to transit the dangerous channel, to enter New York Harbor at night. However, one can imagine the problems that the lighthouse service had maintaining this system. Rough weather, heavy seas and constant shifting (chaffing) of the cables on the ocean floor lead to numerous outages. The system was finally discontinued in 1903. During that last year of operation they experienced 120 outages! However, by that date many improvements had been made with gas powered buoys.

The low pressure Pintsch gas buoy with its steady flame produced by a mantle gave way to the high pressure acetylene buoy in 1910. This method was first used in a buoy at the entrance of Ambrose Channel, NY. The high pressure gas was stored in flasks or tanks in the buoy body as distinguished from the earlier "water to carbide" apparatus which provided gas under relatively low pressure.

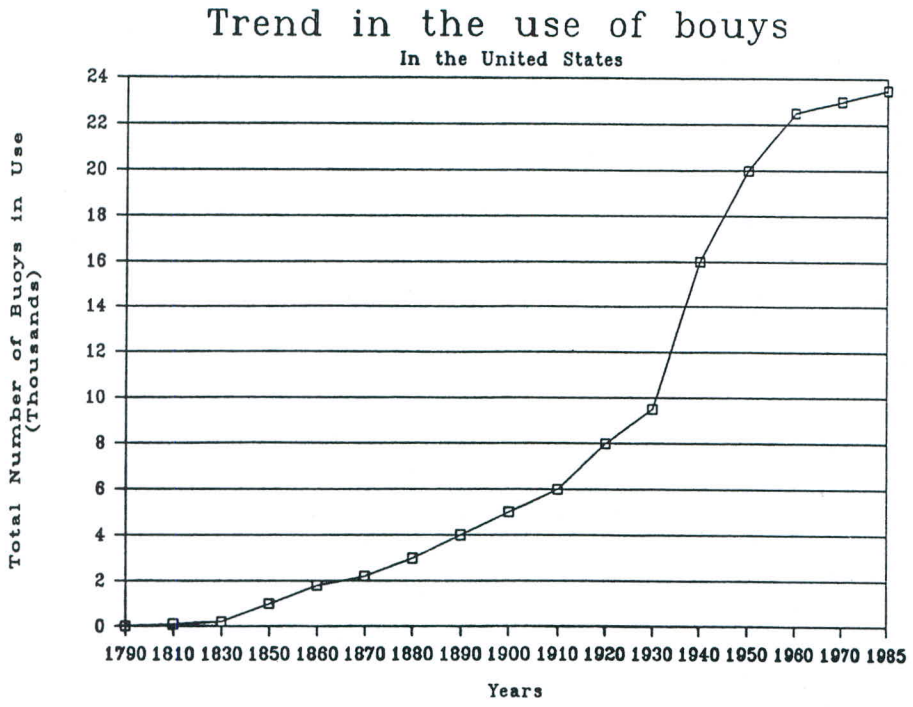
Acetylene had several distinct advantages over the low pressure apparatus and over the Pintsch buoys then in service. The high pressure tanks could supply enough gas to keep a buoy lighted for months, far in excess of the other methods. No apparatus was required to be installed in the buoy to make the gas, as in the water to carbide buoys. The acetylene gas, being burned as an open flame, could be turned on and off rapidly providing a clear cut (flashing) characteristic. This wasn't possible with the Pintsch system where the flame was burned under a mantle. Finally servicing operations were greatly simplified because a buoy tender could carry a great many acetylene tanks or bottles in a relatively small space. Where the large Pintsch gas tank took up a large amount of deck space but only provided for a few buoys. Acetylene quickly replaced other systems and provided for a very efficient system of lighting buoys and furishing different characteristics for many years. It wasn't until the early 1960's that the last of the acetylene powered buoys were phased out by electric storage batteries.

The flashing light or characteristic of a gas buoy was produced by a small pilot light igniting a burst of gas from a regulated flashing chamber. Gas pressure builds in a diaphragm chamber to a point, it is then released and ignited to produce a bright flash. The chamber may be regulated to produce different flashing characteristics; flashing every 2 seconds, 4 seconds, etc.

In the 1950's storage batteries slowly replaced acetylene. The secondary batteries could be recharged up to 10 times. These in turn were replaced by the expendable primary 12 volt battery around the mid-1960's. Depending on the size of the lamp and characteristic, primary batteries can last up to three years before requiring replacement. Today the Primary battery is giving way to solar panels and a single storage battery at a tremendous cost savings to the government and the taxpayer.



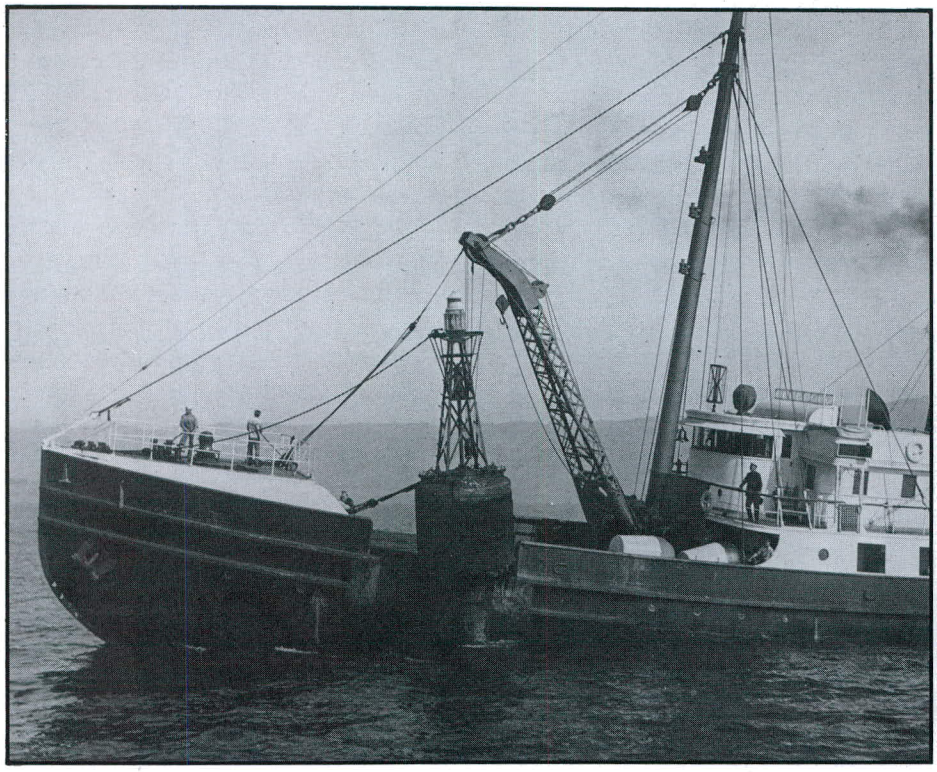
—Types of unlighted buoys and buoy equipment used prior to 1889.



Above Right: A buoy tender is about to set a renovated 8 x 26 lighted buoy on station. This acetylene powered buoy weighs 9 tons exclusive of the mooring.

Below Right: A "wickie" in a small boat holds a lighted bell buoy away from the tender while his shipmate lights the acetylene lantern. The boatman also serves as a "safety net" ready to rescue the man on the buoy should he fall off.

Below: The USLH Tender SEQUOIA has just hooked onto a giant 10 x 39 lighted whistle buoy. The buoy is 10 feet in diameter, 39 feet long and weighs 23,360 pounds. The whistle is wave actuated and the 375 mm lantern powered by acetylene. Because there is no replacement buoy on deck the Captain (on the bridge wing) is bringing the buoy aboard to check the mooring and, probably, place new acetylene bottles in the pockets of the buoy hull. Note the metal lighthouse on the bow of the tender.



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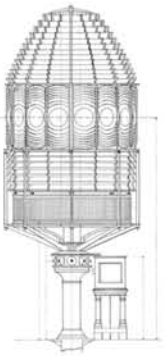

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Thomas Point Shoal Lighthouse, MD

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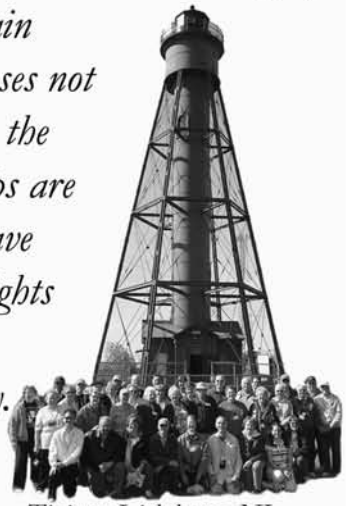
The Society organizes domestic and international lighthouse tours. Many of our excursions gain access to lighthouses not normally open to the public. These trips are a great way to have fun, see lots of lights and learn about lighthouse history.



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