



Crewmen being rescued by breeches buoy as their ship is pounded ashore by heavy surf. Their rescue depended on a small line throwing cannon, the Lyle gun visible in the right foreground which was able to get a line to the wreck so they could haul over the heavier lines for the rescue operation.

(Photo from Nantucket Shipwreck and Lifesaving Museum,  
courtesy <http://ourmothershipadventures.blogspot.com>)

## **GUNS TO SAVE LIVES** **An Introduction to Line Throwing Guns**

by John Spangler



**“The Life Line” by Winslow Homer- 1884**

**Winslow Homer, one of America’s great marine artists captured the drama, danger and technology of rescues made possible by line throwing guns in this masterpiece, painted at a time when the U.S. Life Saving Service was earning great publicity from their saving lives. (Courtesy Philadelphia Museum of Art, Public domain.)**

### **INTRODUCTION**

“Line throwing gun” is defined here as a device intended to throw a line by attaching it to a projectile which is fired over or near a target. The projectile is not intended to strike or damage the target.

Line throwing guns come in many different sizes, ranging from handheld pistol type devices, to shoulder fired rifles, to small mortars and cannons. Line throwing “gun” is interpreted broadly to include a wide variety of “apparatus,” not just those which are purely firearms, since the different concepts are closely related and sometimes overlap. Thus we include a number of early “stick rockets” and later small rocket or CO2 powered devices.

Some famous names are associated with line throwing guns, such as Sharps, Winchester, Springfield, Smith & Wesson, Harrington & Richardson, Mossberg, and the like, although their line throwing use is unfamiliar to most arms collectors. Some of the other names connected to line throwing are almost unknown such as Lyle, Schermuly, Kilgore, Westun, Manby, Trengrouse, Coston, Frank Hall, and the Naval Company.

Aside from a handful of articles in the old Gun Report magazine some 20-30 years ago, brief mention in a couple of books on specific makers, and a single book on Lyle guns (cannons), there is almost no arms collecting literature on the subject. Most of the information found is buried in obscure maritime publications, or in annual reports of government agencies, or in accounts focused on shipwrecks and the brave men who tried to rescue mariners in distress, not just in the U.S. but in Europe as well.

The purpose of this paper is to provide an overview of the history of line throwing guns, and to identify samples of some of the types of guns which can be found. Due to the scarcity and scattered nature of previously published information, this paper is much longer than usual, but hopefully it will prove useful to collector or historians exploring line throwing guns. Many research opportunities remain to delve deeper into the specialized areas. For a collector looking for a niche with a relatively diverse selection, generally modest prices, and varied technological approaches to the challenge of throwing a line some distance, and the varied uses of line throwing devices, this is a field open for exploration.

American and British line throwing guns are the primary focus, and developments in the two nations often overlapped. The limited information available shows that European designs evolved in roughly similar fashion, but very little has been learned about the subject in other regions of the globe.

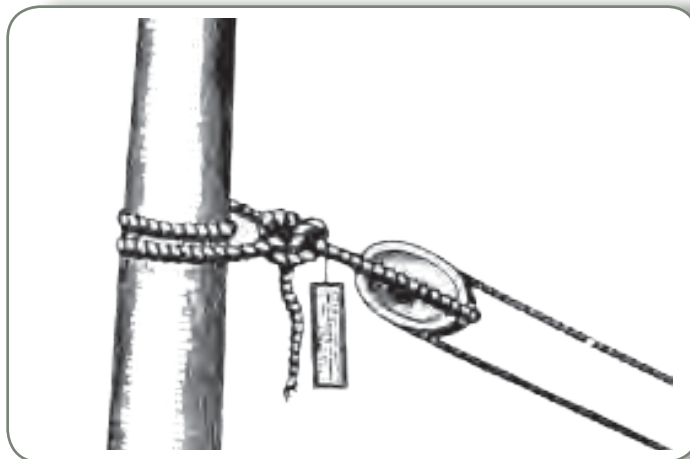
Harpoon or “whale” guns are a closely related topic, and are a distinct collecting specialty, but with a mostly separate evolutionary history. They are arbitrarily excluded from the scope of this discussion as quite a bit has already been written on that topic.<sup>1</sup>

### **BACKGROUND**

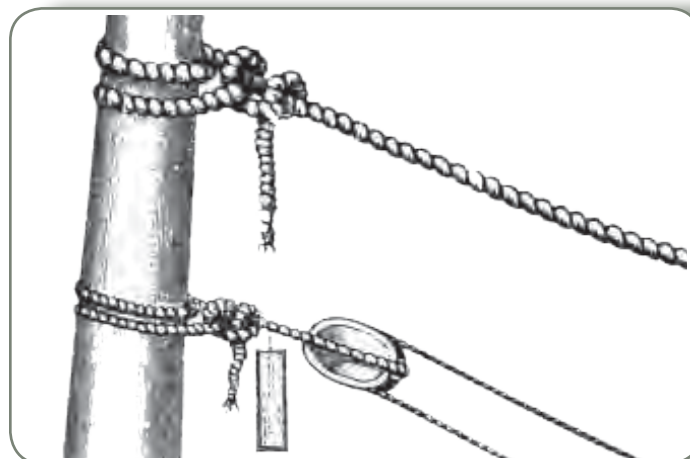
Since 1808, thousands of lives have been saved from shipwrecks thanks to an amazing variety of line throwing guns. Additional line throwing guns of many different types have been used by firemen to rescue people from burning buildings, or to deploy lines to haul up hoses or equipment. Navies have used line throwing guns as the first step for refueling or transferring of supplies while underway. Non-maritime uses include construction of bridges, or running utility lines across rivers or ravines; rigging “zip lines” through forests; and marking trees for forestry work, or even to collect foliage and insect samples from the forest canopy. Smaller line throwing devices have been used to pull electrical or communications lines inside buildings.

Rescue of shipwreck survivors close to shore usually began with getting a line from the beach to the wreck. Using the small “shot line” fired by the line throwing gun,<sup>2</sup> a larger “messenger” line would be pulled across, and a pulley (block) sent with it would be attached to a high point on the vessel, setting up a sort of continuous “clothes line” arrangement. A heavier “hawser” would then be pulled out using the messenger, and the end of the hawser tied off above the messenger.

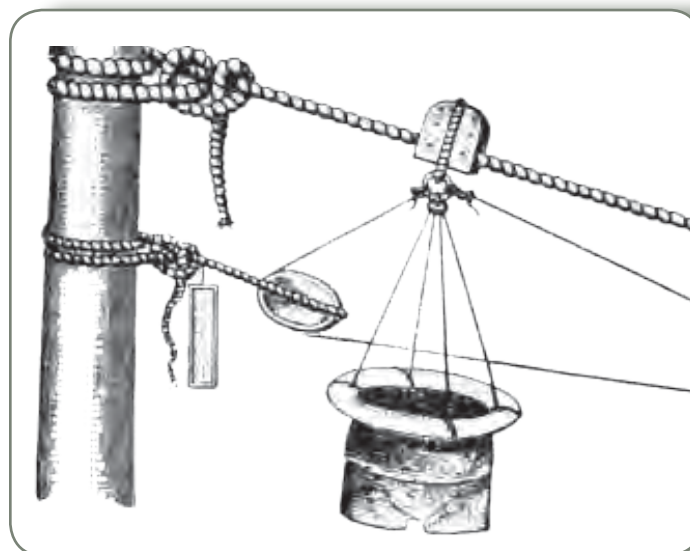
A “Breeches Buoy” (more or less a life ring with cut off pants attached to the bottom) would be pulled out to the ship riding on a pulley on the hawser, so survivors could step into the breeches buoy and be pulled to safety by rescuers working the messenger line. Then the breeches buoy would be pulled back for the next survivor. This method remained virtually unchanged from about 1808 until the 1950s when powered surfboats and helicopters replaced the breeches buoy method.



**The shot line is used to haul the “whip line” (or messenger) out to the wreck. The whip has a pulley or block which is then attached to the mast.**



**The whip line is then used like a continuous clothes line to pull the heavy hawser to the wreck, where it is attached to the mast above the whip line.**



**The breeches buoy hangs from a pulley which is attached to the hawser, and pulled back and forth with the whip line.**

**(Annual Report of the Operations of the United State Lifesaving Service, 1900)**

It is important to note that many other lives were frequently saved from shipwrecks by brave men who launched wooden surfboats into angry seas, propelled only by their oars, to successfully rescue victims without needing to use line throwing guns and the breeches buoy. That is a separate subject, truly worthy of the frequent stories and lavish praise found in contemporary popular press accounts. The United States Life-Saving Service (USLSS) which became the U.S. Coast Guard, and the British Royal National Lifeboat Institution (RNLI) both employed a full range of life-saving options including surfboats and line throwing by rockets, with mortars or guns to be used as circumstances dictated. There are scores of volumes on these agencies, their history, and daring deeds, but, almost nothing on the line throwing devices other than Paul Barnett's seminal *The Lifesaving Guns* of David Lyle.<sup>3</sup>

### ORIGINS OF LINE THROWING

Historically, shipwrecks had been an unavoidable result of thousands of ships of all nations going to sea to fish, transport people and cargo from one port to another, or wage war. Navigation was an imprecise art: charts were poor, lighthouses few, and coastlines were dark, dangerous, and mostly uninhabited. Radar and radio were not yet invented and weather was unpredictable. During a single storm, dozens of ships could be driven ashore along a few miles of coastline, with large losses of life, especially during winter storms. Most wrecks were less than 500 yards from the shore, but pounding surf-churning floating debris snarled with tangled rigging in often frigid water made any attempt to swim ashore a deadly option. Worse, most coastlines were deserted except for a few scattered settlements, and even if survivors reached the beach they were still in great peril.

A rope ("line" in sailor talk) stretched between the shore and the wreck allowed pulling survivors to shore. Later, the more secure breeches buoy discussed above, or an enclosed metal "life car" were used to carry survivors. But, the rescue always started by getting a line passed between ship and shore. A man could throw a heaving stick, monkey fist, or bolo a few dozen yards, but most of the time a line throwing mortar, or cannon, or a rocket was needed to reach a vessel stranded along a coastline to begin the rescue.

After lighter "shoulder line throwing guns" were invented towards the end of the 19th century, additional uses were

found, including firefighters rigging ropes for escape from tall buildings; passing lines between ships for refueling while underway; construction uses like utility lines, open pit mining or running jungle zip lines; clearing minefields; and for getting rescue lines to people in swift water or small boats. So, while not all line throwing guns were for saving lives, that was their first and most important use.

### EARLY ARTILLERY LINE THROWING DEVELOPMENTS — MANBY MORTARS

In 1791 British experiments attributed to either Lieutenant Bell of the Navy, or Sergeant Bell of the Royal Artillery, succeeded in launching a line from a ship to shore at 400 yards using a mortar weighing 500 pounds with a 60-pound shot. It was suggested that this might be useful if ships carried such a device to use in case of a wreck. Bell received a small award for his project, but nothing further was done. Similar French experiments followed and likewise went nowhere.<sup>4</sup>



**George Manby**

**By John Philip Davis (1784–1862) [Public domain],  
via Wikimedia Commons**

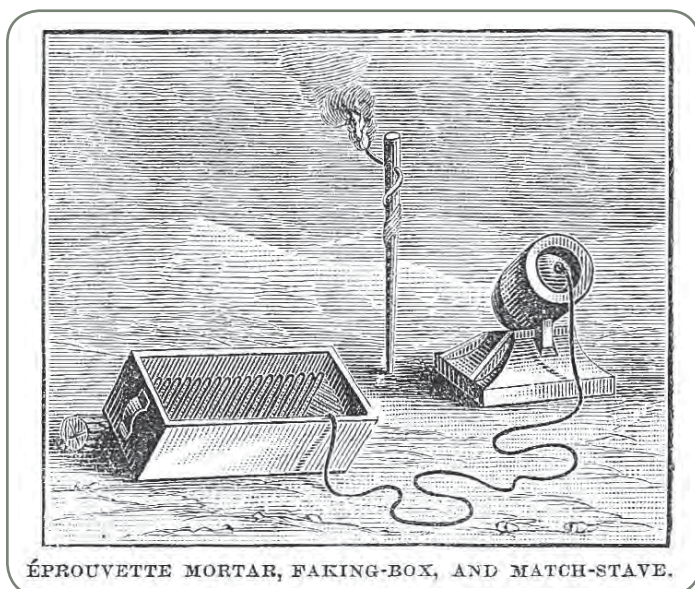
Line throwing efforts began in earnest after an eccentric British official, George W. Manby, witnessed the 1807 wreck of the gun brig *HMS Snipe* off the Falmouth harbor, where 67 lives were lost. Manby independently developed the idea of using a mortar for line throwing,

but focused on making it small enough to be transported along a beach to the wreck site, and also worked on the related problems of how to keep the line from tangling, and how to transport survivors ashore. Manby's ideas were tested within a year when the brig *Elizabeth* wrecked off Falmouth, but thanks to Manby's inventions the seven people aboard were all saved.<sup>5</sup>

Manby's mortar was a 350-pound mortar firing a 5½-inch diameter (24 pounder) shot about 250-310 yards<sup>6</sup> and similar mortars became a common type of line throwing device for rescue use, remaining in service until the 1880s. Exact design varied with the maker's and purchaser's desires, but most seem to have been 24 pounders, made as light as possible. The shot was a typical round shot, but with an iron ring or loop that would be loaded exposed at the muzzle allowing the shot line to be attached to it.

Manby's solution to the chronic problem of breaking shot lines due to the sudden strain of firing or by burning from the muzzle blast was to use a plaited (or braided) leather strip between the shot and the shot line. Lt. Bell had used a spiraled metal strip, sort of like a coil spring. Later, the shot lines were attached to wire leaders, or wet down with water, but breaking or burning of shot lines remained a chronic problem with all line throwing guns until advent of nylon lines.

Manby obsessively campaigned for adoption of his inventions, but never achieved the fame and financial rewards to which he felt entitled.<sup>7</sup> Gradually, his mortars were adopted for use along much of the English coast line by the Royal National Lifeboat Institution, along with surf boats and sometimes rockets to provide other rescue options.



ÉPROUVETTE MORTAR, FIRING-BOX, AND MATCH-STAVE.

## MANBY MORTARS IN AMERICA

The earliest American Manby mortars were those provided by the volunteer efforts of the Humane Society of Massachusetts, which had 10 mortars in use between 1855 and 1869.

“Of the 10 Mortars, 8 are of Iron, the caliber about the size of a 9-pound shot, say 3½ inches. The one at Seer Island is of Brass, about 5½ inch bore, and throws a hollow shot of 17 pounds weight over 400 yards with 6 oz. powder, carrying a light 6 thread manilla [sic] line. The one at Manomet Point is also of brass, and was given by James Davis, Esq.”<sup>8</sup>

In the United States, federal procurement of “Manby mortars” after 1848 seems to have been limited to the Army's regulation “24 Pounder Eprouvette” which had been adopted for testing gunpowder for strength at various ordnance facilities. These featured a cast iron barrel with a flange on the bottom which fit into a slot on a detachable cast iron base with a distinctive pattern of ribs. These were described by the USLSS as:

“of the eprouvette pattern; caliber, 5 ½ inches; weight, with its bed, 288 pounds. It is furnished with twelve spherical solid balls, 24 pounds each. The charge of powder is from 2 to 4 ounces, It can be relied upon to send a ball from 300 to 400 yards. For the transportation of the mortar or similar apparatus over the beaches there is a strong hand-cart 4 feet 9 inches long, by 3 feet wide, with wheels of 4 feet diameter, made of oak and iron, with rims of from 4 to 5 inches broad.”<sup>9</sup>

Most of the U.S. Life Saving Stations established prior to 1878 were issued one of these, and they overlapped in use with the later Lyle type line throwing guns. My estimate is that perhaps 300-400 were procured, and they appear on the collector market on a regular basis, usually in a heavily pitted condition, although many likely were recycled during wartime scrap drives.

**U.S. Eprouvette mortar used as Manby mortar  
for line throwing.**

**“United States Life-Saving Service,”  
*Appleton's Annual Cyclopaedia and  
Register of Important Events of the Year 1878,*  
New York, 1879, p. 761.**

**STICK ROCKETS —**  
**TRENGROUSE, DENNETT, BOXER,**  
**AND LILIENDAHL**

Note that the better-known early 19th century rockets by Congreve (which provided the “rockets’ red glare” at Fort McHenry in 1814) and Hale are not included here, as they were “war rockets” with warheads intended to do damage, not to merely pull a line to a destination. Even British Ordnance officials distinguished between the war rockets and the “life-saving rockets.”

Storms frequently battered all the English coastline, and about the same time that George Manby witnessed the wreck of *HMS Snipe* off Falmouth in 1807, cabinet maker William Trengrouse watched in horror as at least 60 (some say up to 190) people perished as *HMS Anson* was battered ashore on the Cornwall coast.

Trengrouse pondered possible solutions and had the idea to use a rocket to carry a line to a ship in distress for life-saving operations. He developed a simple sheet metal device which attached to the muzzle of a common musket, much the way a socket bayonet is attached. The side of the attachment was cut away, allowing a “stick rocket” similar to a large bottle rocket to be slid into the device,



**Henry Trengrouse**  
Courtesy Helston Museum, Helston, Cornwall, UK,  
[Public domain], via Wikimedia Commons



**Trengrouse launcher**  
**attachment to adapt muskets**  
**for line throwing.**  
Courtesy Helston Museum,  
Helston, Cornwall, UK

with the stick projecting alongside the barrel. The fuze end of the rocket would be aligned with the muzzle. When the musket was fired with a powder charge (but no ball!) the flash would ignite the rocket, and the rocket would rest in the launcher until the rocket motor fully ignited. Trengrouse made these in two sizes, an 8-ounce version with a range of 180 yards, and a 1-pound version reaching 212 yards. Two different size launcher devices were made to accommodate the different diameters of the rockets. The basic design was completed in 1808, the same year as Manby’s mortar, but official recognition moved slowly. It was not until 1817 that a descriptive booklet for his invention (to be issued as a kit with the different size launchers and rockets and accessories)<sup>10</sup> was completed and another year passed before official trials were conducted. The British Ordnance Department ordered 20 sets, but decided to make them in house instead of purchasing them from Trengrouse, so he only received a token payment for his invention.<sup>11</sup>

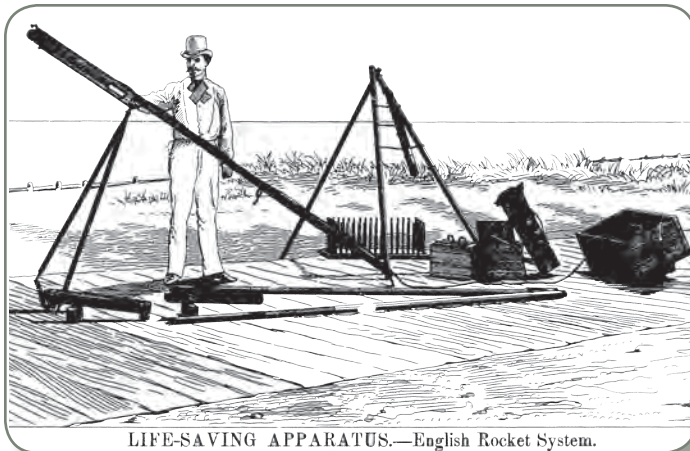
By 1826, the Trengrouse rockets were replaced by a new design by John Dennett from the Isle of Wight. His design was intended to reach longer ranges by using two rockets. These were attached side by side on a single stick. These performed well enough that they were used at some points along the British coast from circa 1826 until the mid-1860s when the Boxer rockets replaced them. In October 1832, 19 persons were saved from the wreck of the ship *Bainbridge* after being reached

by a single Dennett rocket at 500 yards range. Previously four attempts with a Manby mortar had failed.<sup>12</sup>

The final “stick rocket” design adopted by the British was one invented by Lt. Colonel Edward Mounier Boxer at the Royal Laboratory, Woolwich. Although Boxer is best known for his 1866 invention of the small arms primer bearing his name, his rocket was adopted in 1865 as the “Life Saving Racker, Boxer, 12 Pounder, Mark I.” A number of later marks were approved with various im-

applicable to line throwing uses. It was recommended for “extended trials” after tests by a board in 1866,<sup>14</sup> where it was described as:

“... consisting of a steel cased rocket with a long metallic loop to serve as a staff and an ingenious and simple way of attaching the line, the rocket is fired from a tube resting on a tripod arranged for any required elevation, the charge is ignited by a lock, the line running clear from a box.”<sup>15</sup>



LIFE-SAVING APPARATUS.—English Rocket System.

#### English Boxer line throwing rocket with related equipment.

**U.S. Army, Ordnance Department, Report on Foreign Life-Saving Apparatus by Lieutenant David A. Lyle, Washington, 1880, Plate XVIII.**

provements, and Boxer rockets remained in use through WW2. Boxer’s design featured two rockets mounted on a single stick, one behind the other. The motors fired sequentially, for a longer period of thrust with less strain on the line than if a single larger motor was used. These were launched from a rack or trough. He also invented a “floating rocket” covered with cork, the first of many different buoyant line throwing projectiles to appear.<sup>13</sup>

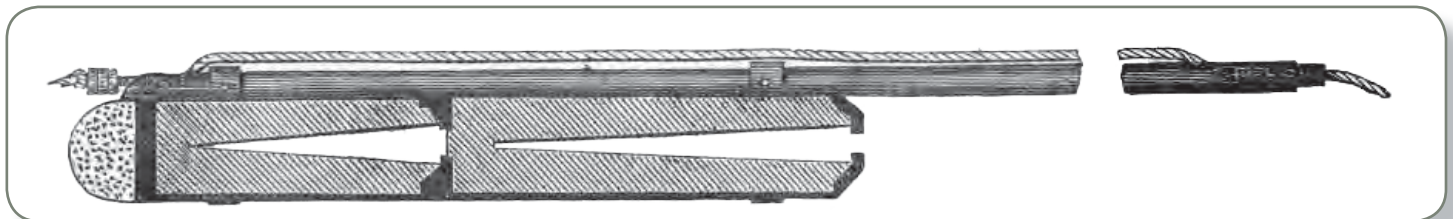
In the United States, G.A. Liliendahl patented an “Improvement in Rocket Harpoons” in 1866 which was also

Apparently the trials were favorable, as a Liliendahl line throwing rocket was included in the USLSS exhibit at the 1876 Centennial Exhibition and described as:

“... a portable contrivance for effecting communication with wrecks. It consists of a tube of iron upon a tripod for giving direction to the rocket, which is of steel and carries, instead of the stick usually attached to rockets, a loop of steel rod, to which the line is secured by a steel-wire lanyard. The rocket is capable of carrying a line 350 yards.”<sup>16</sup>

The various types of “stick rockets” all had similar advantages and weaknesses. Their light weight made them easy to move to the scene of a rescue, especially in rugged terrain, and generally their range was equal to or better than contemporary mortars or line throwing cannons. However, they were easily damaged, susceptible to deterioration in storage, and thus became unreliable. Lieutenant David A. Lyle’s 1880 Report on Foreign Life Saving Apparatus noted:

“In short it may be said that with rockets one never knows what may happen, nor where they will go when fired.”<sup>17</sup>



#### English Boxer line throwing rocket showing “two stages” and stick attachment.

**U.S. Army, Ordnance Department, Report on Foreign Life-Saving Apparatus by Lieutenant David A. Lyle, Washington, 1880, Plate IX.**



**“Missed: An Episode of the Rocket Brigade”, Scilly 1883. A common problem with all early rockets.  
by Julius Mendes Price, 1883, courtesy National Museums Liverpool, England.**

However, their biggest drawback in the minds of government bureaucrats was the high cost of rockets. In November 1889, Sumner I. Kimball explained why the United States Life-Saving Service (USLSS) chose the Lyle gun over rockets:

“The cost of the Lyle gun and all its appurtenances, exclusive of the projectiles, is \$87.33. The lowest cost of any efficient rocket with appurtenances that I know of is not much less. The only expense attending the use of the gun is the cost of the cartridge, say half a dime, except when occasionally a shot is lost, which can be replaced for \$2.00. When a rocket is fired, several dollars are expended. These facts are of consequence when considered in connection with the utility of frequent drilling.”<sup>18</sup>

Still, stick rockets had enough advantages that some remained in use concurrently with the Manby mortars and early Lyle type cannons, more so in Europe than in the United States. The use of rockets and line throwing mortars and cannons all faded as powered surfboats became

more common, limiting the need for breeches buoy rescues, and vanished when helicopters took over most of the coastal rescue operations.

### **BIRTH OF THE UNITED STATES LIFE-SAVING SERVICE**

Six weeks before the Custer massacre in 1876, the Centennial Exhibition in Philadelphia opened. This forerunner of the “World’s Fair” extravaganza included, among hundreds of other exhibits, one by the nascent U.S. Life-Saving Service, a full-size, fully equipped Life-Saving Station identical to those being built along the coasts. The line throwing devices shown there reflected an emerging service, not yet fully established, and preceded the work of Lieutenant David A. Lyle on light weight line throwing cannons. Besides the Liliendahl line throwing rockets mentioned previously, the station included three guns from a German gun maker, R.G. Cordes, a distant cousin of the Lyle gun; a Manby style mortar, and a primitive form of “sholder line throwing gun, along with a “beach cart”. Cordes’ devices included:



“... a gun of 3-inch caliber, mounted on a 4 wheeled carriage, which also carries the ammunition, implements, and lines. The extreme range of this gun is about 560 yards. The projectile used is peculiar, being a hollow, cylindrical, pointed shot, 20 pounds weight, 3 inches diameter, and 20 inches long, through which the shot-line is rove with an ingenious contrivance for preventing the line from breaking by the impulse of the discharge from the mouth of the gun. The same inventor has contributed what is called a knapsack gun, being a small brass cannon mounted so that a strong surfman can carry it strapped to his back, and which has a range of 300 yards. He has also invented a hand or shoulder gun which has a range of 150 to 200 yards. The projectiles and method of firing are the same in all his guns.”<sup>19</sup>

The guns were further described as follows, but their exact configuration remains uncertain:

— Howitzer, with following attachments: Carriage (complete) and containing shot-lines, hauling line and guide posts, wooden maul, spare article box, containing rubber springs, leather sabots and friction primers, iron shot or elongated projectiles.

— Knapsack gun, with following attachments: Carriage (complete), to be transported upon the back of a surfman; elongated projectiles (iron), rubber springs, leather sabots, shot-line, box and faking pegs.

— Shoulder gun, with following attachments: Swivel, projectiles (iron), sabots, cone key, oil-can, cleaning rod.<sup>20</sup>

The illustration of the exhibit shows a mortar or howitzer on a wooden carriage which closely resembles a “Leinenwurfmorser, Kal 80” made by Cordes circa 1856, a small piece of the general Manby mortar family.<sup>21</sup> It is possible that this is the “knapsack gun” and was intended to be broken down into loads for several men, not carried as a single unit by one man.

Finally, in 1878, the U.S. Life-Saving Service was formally established as a separate agency, and eventually merged into the U.S. Coast Guard in 1915. But, the entire 37-year history of the USLSS was mainly dominated and driven its talented, visionary, and very capable leader, Sumner Increase Kimball (1834-1923).

### S.I. KIMBALL AND DAVID A. LYLE AND THE LYLE GUNS (CANNONS)

Sumner Increase Kimball was born in Maine, graduated from Bowdoin College in 1855, became a lawyer, and was elected to the Maine Legislature in 1859. In 1862 he became a clerk in the United States Treasury Department in Washington. In 1871 he was placed in charge of the Revenue Marine Bureau and helped turn that into the Life-Saving Service. Under his direction, the Life-Saving Service was extended to the Pacific Coast and the Great Lakes.

He was the organizer and General Superintendent of the U.S. Life-Saving Service for its entire existence from 1878 until 1915 when it and several other maritime related agencies were merged into the U.S. Coast Guard. Kimball’s advocacy for Lyle guns and later for shoulder line throwing guns led to their becoming mandatory equipment for most ships. This work was the basis for later international agreements on “Safety of Life at Sea (SOLAS).”<sup>22</sup> However, Kimball’s interests and successes extended to all aspects of maritime safety, not just the narrow subject of line throwing devices for rescuing shipwreck victims discussed here.

From 1808 until the late 1870s, line throwing was focused on rescues from shipwrecks, and depended on variations of the Manby mortars and stick type rockets. Kimball had already recognized the need for a line throwing device which was better than Manby style mortars, and in 1876 convinced the Secretary of the Treasury, responsible for the Life-Saving Service, to ask for Army assistance in improving life-saving apparatus. Then-Lieutenant David A. Lyle (USMA, 1869) was assigned the task at Springfield Armory “in addition to his regular duties.” Lyle commenced with publication of a thorough study of the various apparatus used in Europe while he was also working on a scientific study of small cannon designs.<sup>23</sup>

Lyle energetically studied and developed what we now know as the “Lyle gun” for life-saving use. Different barrel materials, calibers, lengths, and projectile types were tested, and his “Type C” was finally recommended.<sup>24</sup> Lyle’s gun had relatively light weight for easy transportation, usually on a wheeled “beach cart” with all the associated lines and accessories. But, the light weight resulted in ferocious recoil, with the guns often jumping 20 feet along the beach!



**Sumner I. Kimball**  
U.S. Coast Guard image.



**Colonel David A. David Lyle**  
Springfield Armory NHS archives, US NPS.

Lyle's interest and success dealing with line throwing devices resulted in his continued service for at least 42 more years as a member of the USLSS (and later USCG) Board on Life-Saving Appliances which reviewed all manner of proposed equipment, some very clever and useful devices and others absurdly worthless.

Anyone interested in the development of Lyle's cannon, and subsequent variations and production from 1878 to 1952 by at least 23 different makers should refer to Paul Barnett's *The Life-Saving Guns of David Lyle*.<sup>25</sup> All were muzzle loading smoothbores, with 2½-inch bores for firing projectiles weighing about 17 pounds, to a range of about 700 yards and using up to 8 ounces of black powder.<sup>26</sup> But, there were many variations with either bronze or steel for the barrels, with trunnions mounted at the balance point, or at the breech, with a smooth exterior, or a "waffle" pattern to reduce weight and most were under 180 pounds total weight. Carriages also varied greatly, with the early guns having oak carriages and later guns with cast iron or bronze carriages. These would be a challenging collecting specialty, and an excellent source for physical exercise. Barnett used to rent his Lyle guns out to provide live cannon fire for orchestras performing the

1812 Overture, proof that gun collectors do support the arts!

At first, the Lyle guns were intended exclusively for use by the USLSS for firing from the shore to vessels in distress, but later regulations required privately purchased Lyle guns (cannons) to be carried aboard larger merchant ships for emergency use.



**Lyle "Type C" Line Throwing cannon adopted in 1878 for use by the U.S. Life Saving Service.**  
Photo courtesy of Steve Grownow,  
<http://lighthousepens.com>



**Coston made Lyle Gun**  
Photo courtesy of Amoskeag Auctions.

Part of Kimball's highly structured organization of the USLSS was a regular drill schedule for all the stations and their (usually) seven-man crews, which included weekly drills in signaling, operating the surfboat, and firing the Lyle guns. Crews were expected to unload the Lyle gun and gear from the beach cart, rig everything in place and fire a shot line, and rig the messenger and hawser and breeches buoy in less than 5 minutes. These drills were popular spectator attractions, although most stations were in remote areas of the coast, far from tourists.<sup>27</sup>

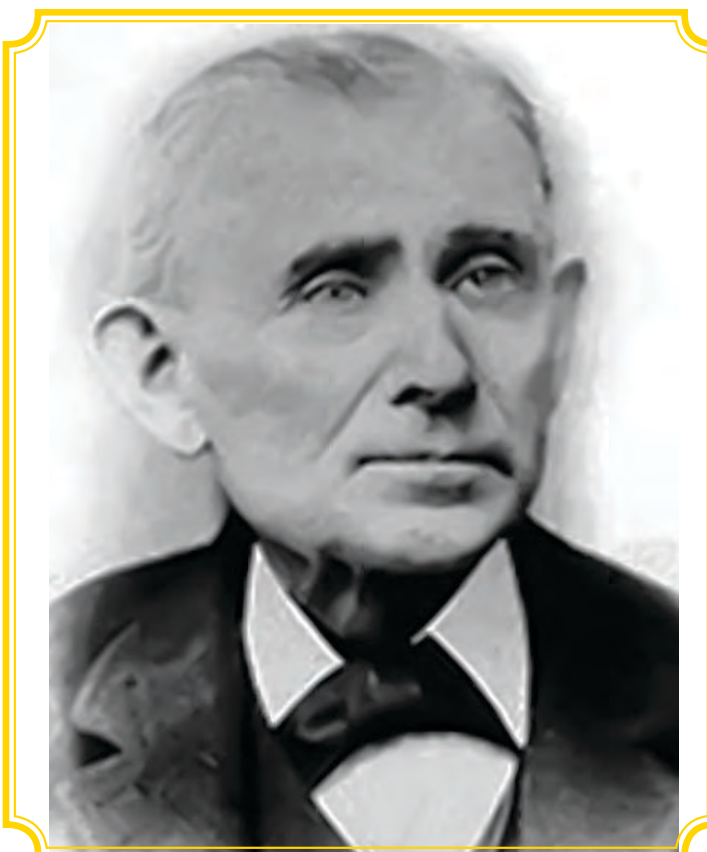
Kimball was a masterful publicist as well as organizer and disciplinarian, and his annual reports were filled with detailed statistics on every rescue attempted and the results, studying the failures and ensuring the public (and Congress) knew that their funds were effectively spent and lives were being saved. This carried over to the popular press, and Harpers Weekly and daily newspapers often carried accounts of daring rescues as well as more tragic events. Foreign publications, especially in the British Empire, likewise had vivid stories of rescues involving line throwing mortars or rockets.<sup>28</sup>

In 1900, the USLSS summarized their activities from the earliest days in 1871 when they only covered portions of the Atlantic coast until 1900. There were 11,863 disasters involving 89,947 persons. Of those, all but 961 were saved.

In 1900 alone, 158 people were rescued by breeches buoy, with Lyle guns used 18 times firing 41 shots. In addition, more than 900 people were rescued by surfboats or other types of boats, and 69 others were rescued by being pulled or carried ashore by other means.<sup>29</sup>

### SHOULDER LINE THROWING GUNS — SIMON INGERSOLL

The vaguely described Cordes “shoulder gun” or “hand pistol for rope” was mentioned in the 1876 Centennial Exhibition. However, apparently nothing more was done with shoulder line throwing guns until the mid 1880s when inventor Simon Ingersoll devised one to be used by fire departments for rescues from tall buildings.



**Simon Ingersoll**  
Photo courtesy of the  
Association of Equipment Manufacturers,  
<http://AEM.org>

Simon Ingersoll, born in Stanwich, Connecticut, was a prolific inventor with only an informal grade school education. He received his first patent in 1858 for a steam engine shaft. He developed other inventions over the next 10 years, including a scale, a friction clutch, and a latch for gates. He is best known for his pneumatic rock drill which revolutionized the mining and tunneling industries and led to formation of Ingersoll-Rand Corporation. Between 1885 and 1888 he received four patents related to line throwing guns. A brilliant inventor, he was a poor businessman and died nearly penniless in 1894.<sup>30</sup>

Ingersoll's main contribution was a new type of projectile, a heavy metal cap or sleeve which would slip over the outside of a gun barrel and had a metal swivel on the breech end for attachment of the shot line. The muzzle end of the cap was closed with a plug of some sort. Ingersoll's 1885 patent called for use of a cartridge chambered in the head of the projectile, making it more of a "spigot mortar" type arrangement. His 1886 patents covered another variation of the cartridge in the cap and one with a conventional cartridge at the breech of the gun. The advantage of the latter was claimed to be that it softened the shock of firing by compressing the column of air in the bore between the cartridge and the cap. In 1888 he patented a rubber cap to fit over the projectile, mainly to

protect the removable plug but also to minimize damage to whatever it struck. All of Ingersoll's patents contemplated their use as line throwing devices to get a line to a window in a building, for use with shipwrecks, or even as an option for harpoons.<sup>31</sup>

Advertising of Ingersoll's guns was done by F. Alden Hill & Alfred Stavers, "Sole proprietors of the Ingersoll Life Line Gun. The object of the invention is to save human life by throwing a Life-Line to people in danger by fire or shipwreck." The artwork showed a very short-barreled gun made on the New York State model Remington rolling block action. It appears that this included use of a cast metal butt stock to minimize the recoil of firing a 12- to 24-ounce projectile with line attached, through a window at 250-300 feet.<sup>32</sup>

Ingersoll promptly submitted his idea to the USLSS Board on Life-Saving Appliances for consideration, but the 1886 Board dismissed the submitted drawings for a "...small gun, to be used for fire purposes in cities" and recommended that he "...prepare a gun and apparatus just as he intends it to be used, and submit it to the Board."<sup>33</sup> It does not appear that Ingersoll ever did so, or that his guns were ever used for maritime applications, although they were widely used by firefighters.<sup>34</sup>



**New York fire fighter with  
Ingersoll type line throwing gun, 1896.**  
*Helen Campbell, **Darkness and Daylight; or Lights  
and Shadows of New York Life**, Hartford, Conn. 1896.  
p. 534.*

### **FIRE DEPARTMENTS AND LINE THROWING GUNS**

As early as 1884, the Chicago Fire Department tested a line throwing gun from a Scottish inventor with mixed results, but they saw the potential of using a light line to pull up a stronger line for heavy equipment.<sup>35</sup> The following year, the New York Fire Department staged a demonstration of four different line throwing devices, invented by department employees. These included two rocket types, a shoulder gun, and a rig run on compressed air. Although novel ideas, apparently none were adopted, but clearly there was a growing interest in line throwing devices for fire-fighting life-saving applications.<sup>36</sup> Perhaps the New York trials heightened Ingersoll's interest in the subject.

Several book and newspaper accounts between 1890 and 1905 clearly describe the cap type projectile of the Ingersoll guns, and tell of their use by fire departments in New York to shoot into windows to provide lines for fire-fighters for hauling up equipment or lowering survivors to safety.<sup>37</sup>

One of Ingersoll's patents shows a flange type flash shield around the barrel which serves to protect against powder burns when firing, but this apparently was used on only a small number of Ingersoll pattern guns, either those with a metal buttstock, or those with wooden stocks.<sup>38</sup>

Eventually, Ingersoll style guns were made on actions other than the New York State Remington rolling blocks, including Sharps, trapdoor Springfields, and top break shotgun style actions. A museum in Beaumont, Texas, has a Model 1879 Springfield converted to an Ingersoll type gun with a barrel about 21 inches long, a flash guard, and two cap type projectiles attributed to a fire department. But, the workmanship appears amateurish, and may have been a locally made copy.<sup>39</sup>

A Model 1870 trapdoor Springfield .50-70 line throwing rifle with 11.75" barrel using a "cap" style projectile, and having Ingersoll's metal "flash guard" on the barrel is described as being part of a set sold by American LaFrance Fire Engine Company. Presumably this was a very early product (circa 1890-1920?) as the only other information on American LaFrance line throwers was one of their catalogs circa 1920-1925 which showed a break action style gun. An old salesman for the company did recall "... a company in Philadelphia, PA, that had made Line guns for Fire Department usage" which was probably the Naval Company.<sup>40</sup>

Besides Ingersoll type guns using the cap type projectiles, fire departments have also used line throwing guns with metal rod type projectiles, sometimes referred to as "Lyle" style projectiles since they are so similar to the ones used on the Lyle cannons.

The San Francisco Fire Department Museum has two .50-70 line throwing guns, one a Sharps and the other a Model 1870 Springfield converted to about 12-inch barrel lengths and using the rod type projectiles, presumably dating to circa 1906-1920.<sup>41</sup>

The Springfield Armory Museum has a Naval Company "Bridger" top break single shot line throwing gun on a Winchester action, which was formerly used by the local fire department. According to Winchester experts, most of these were made in 1940-41.<sup>42</sup> New York Fire Department's Rescue 2 in Brooklyn has used "Bridger" style line throwing ("Lyle") guns since its formation in 1925, and these are still in use today by all five Rescue Companies in

the City.<sup>43</sup> The Charlestown (Cecil County), Maryland, fire department has a Bridger gun on their rescue boat.<sup>44</sup>

An example of fire department use of a line throwing gun took place in Milwaukee, Wisconsin, in 1959. A scaffolding collapse left two workers stranded on a 195-foot tall chimney being demolished.

"A life line gun from the fireboat Deluge ... was tried, but failed to carry a line to the top. Then Gunners Mate M.J. Bideaux, 33, from the Navy patrol craft Portage moored in the nearby Menomonee River arrived with a heavier caliber gun and hit the top on the first try. The chair was rigged and the rescue followed."<sup>45</sup>

Thus, fire department use of shoulder line throwing guns was pretty common for most of the 20th century, starting with Ingersoll's designs but eventually including most types.

### **SHARPS LINE THROWING GUNS**

In 1896, a modified Sharps carbine line throwing gun was submitted to the USLSS Board on Life-Saving Appliances by Mr. Dimond. The 1896 Dimond Sharps was described as:

"...an obsolete caliber of the Sharp's center-fire carbine with "swivel bar and ring" on the left side. The barrel has been cut off to proper length, and the rifling reamed out to make a smooth-bore of about .52 caliber.

A brass cylinder has been attached to the underside of the barrel to hold a coil of line.

The projectile is a reduced model of the Lyle Service projectile, with shank, and has four longitudinal grooves from the head toward the base. It is made of brass, with steel shank."<sup>47</sup>

The Board recommended the USLSS purchase some of the Dimond Sharps for trials, and one was purchased earning an unenthusiastic review before the 1899 Board.<sup>48</sup>

In 1904 William Read & Sons of Boston submitted a Sharps line throwing gun as a complete kit, and this outfit was recommended as meeting the needs of the service in the following report.<sup>49</sup>

“The line-throwing shoulder gun.

RESULTS.-This is a smoothbore, .50 caliber carbine with Sharps breech mechanism, carrying a small Lyle projectile made of steel. The braided cotton line is coiled, and the end attached to the shank of the projectile, so as to be drawn from the inside of the coil in paying out, thus tending to eliminate the danger of tangling.

The description, drawings, and data submitted by Messrs. William Read & Sons give all the information necessary in regard to this device.

DESCRIPTION.-Breech-loading, line-carrying gun, to be used from the shoulder. Device consists of a gun, projectile, and line, as submitted by drawing, all in painted arm chest, complete with cleaning rod and 25 cartridges.

Gun is opened by pushing the guard forward and down, thereby allowing the breech block to fall and the insertion of the cartridge.

The cartridge is a waterproof central fire, and contains 70 grains of powder.

The projectile, which has an eye for attaching the line, is inserted or dropped into the muzzle of the gun after the cartridge is placed in the breech.

The line is attached to the eye of the projectile and pays out readily from the coil.

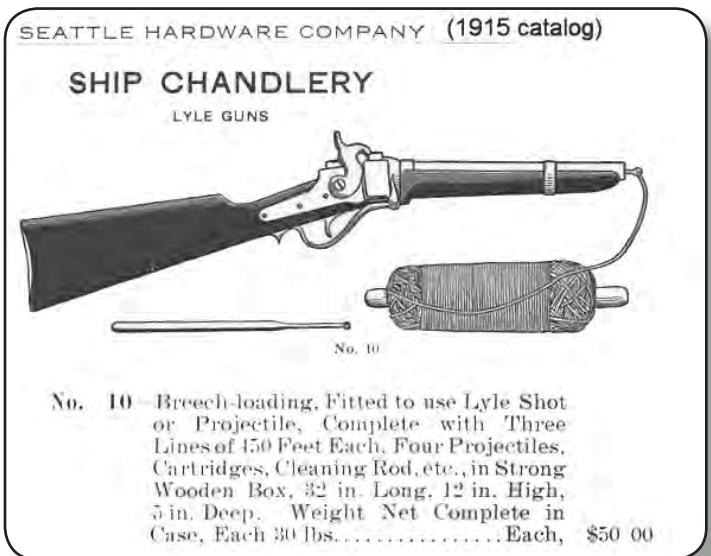
The gun has a steel barrel, lock and frame same as used in the best Government inspected work; projectile of steel, line braided cotton.

<b>Weight of gun</b>	<b>6 pounds, 14 ounces.</b>
<b>Length of gun over all</b>	<b>28½ inches</b>
<b>Length of gun barrel</b>	<b>10½ inches</b>
<b>Bore of gun</b>	<b>50-100 inches</b>
<b>Weight of projectile</b>	<b>8½ ounces</b>
<b>Length of projectile</b>	<b>10¾ inches</b>
<b>Length of line</b>	<b>450 feet</b>
<b>Size of line, diameter</b>	<b>1/8 inch</b>
<b>Breaking strain of line</b>	<b>75 pounds</b>
<b>Price for complete outfit</b>	<b>\$15.00</b>

The outfit consists of the breech-loading gun with Sharps mechanism, fitted to use the Lyle shot or projectile, three lines of 450 feet each, four projectiles, cartridges, cleaning rod, etc., all contained in a wooden case 32 inches long, 12 inches wide, and 5 inches deep. The range is given as 200 to 400 feet, depending upon the strength of the wind. The apparatus is an application of the Lyle system of line-throwing to a shoulder gun, intended to replace the heaving stick in many cases, and to effect communication from lifeboats to vessels in rough weather when the boat would be



Sharps line throwing gun in a kit with accessories.  
 Photo courtesy of Merz Antique Arms.



Sharps line throwing guns for sale in 1915.  
 Seattle Hardware Company catalog, 1915.

unable to go alongside the vessel. There are other uses which do not pertain directly to the Life-Saving Service. A similar device received favorable consideration by the board in 1896 and 1899. (See p. 484, Report of 1896, and p. 472, Report of 1899.)

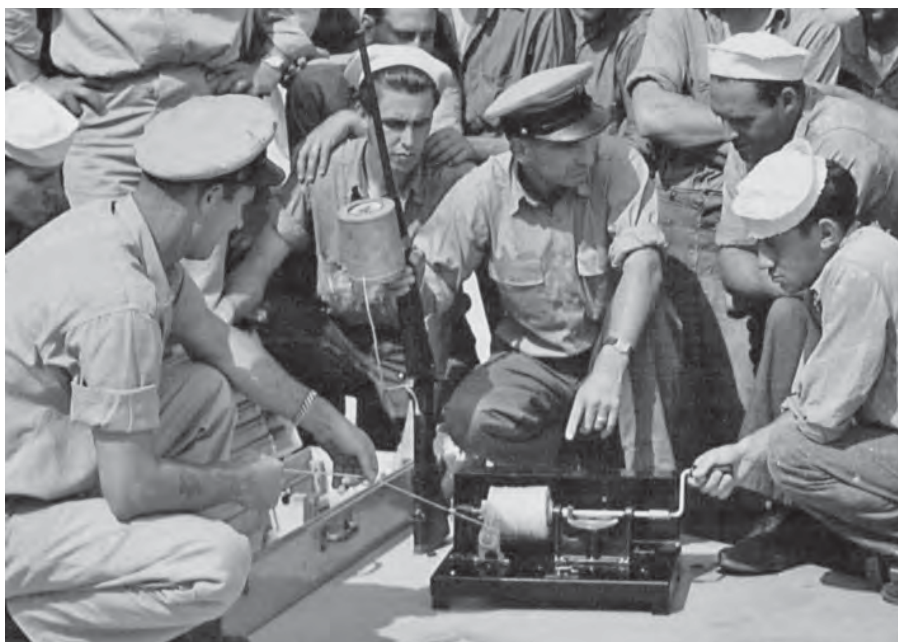
OPINION.-The board is of the opinion that this line-throwing gun with Sharps breech mechanism, together with the apparatus pertaining thereto, as exhibited to the board, is simple and direct in its action, and is adapted to the needs of the service.”

Similar Sharps line throwing outfits were sold under the Coston brand name, and possibly others, as late as 1915. The Sharps line throwing guns sold by Coston used a galvanized tin canister for the shot line, which was a 7 1/2-inch long section of 4 1/2-inch diameter pipe (similar to stove pipe). Both ends had a wooden disc closure, the front with a hole about 2 1/2-inch diameter, and the rear with a 7/8 inch diameter hole. A paper label pasted on shows an image of a Sharps line throwing gun with the line from the projectile going to a canister similar to this. Text on the label reads “Coston Shoulder Gun [... directions for loading...] Coston Supply Co., Coston Signal Co., Inc., Owners, Manufacturers of Life Saving Appliances, 24 Water Street, New York.”<sup>50</sup>

## SHOT LINE AND HOLDERS

One recurring problem with any line throwing device is how to get the shot line to feed out smoothly, avoiding snags or snarls that might increase the strain and break the line. Mariners had long used a process called “faking” (also called “flaking”) where a long line is laid out in a geometric pattern with few overlaps so that it will run smoothly. This was the practice with Manby and his mortars. Trengrouse used a hand-held spool that was cone shaped with the line wound continuously around it from the broad base up to the narrow tip. This allowed the line at the tip to slip off easily and feed the next layer. A “faking box” with a carefully arranged pattern of tapered pegs allowed a shot line to be laid out in a tight geometric pattern with no overlaps. The line would be left in the box until ready for use, and then the box turned over and the pegs removed, leaving the line carefully laid out, ready to run freely. The faking box was used from the early 19th century, with mortars, Lyle guns, and Boxer’s stick rockets. Schermuly rockets and modern copies of the Schermuly rockets used a small box with the shot line carefully laid out in a miniature imitation of a faking box style pattern at the factory, and sealed until ready for use.

Ingersoll’s shoulder guns used a metal pan similar to an angel food cake pan with line wrapped around the tapered portion in the middle so it would feed out similar to Trengrouse’s conical spool. The pan could be covered until ready for use allowing for storage aboard fire engines or the like.



Rewinding shot line with machine  
USCG photo.

Sometimes users would wrap the shot line about a wooden spindle much like they would a kite string, but feeding problems were common.

As early as the 1906 test of the William Read modified Sharps line throwing gun, use of a coiled line feeding from the center was recommended. By the 1930s, special “winding machines” were available to methodically wrap shot line around a tapered wooden spindle into neat coil. When ready for use, the wooden spindle would be removed and the end of the line in the center would be pulled out and attached to the line throwing projectile, ready to feed out smoothly from the center of the coil. Lines would be retrieved, dried, and rewound for repeated use if winding machines were available. These machines were issued to Navy and Coast Guard units, and perhaps other users. Today, the self-contained rocket devices come with the shot line packed in the container, usually around the “barrel” for the rocket and are intended to be used only once.

Winding machines no longer seem to be available, and liability issues probably make it safer for sellers of line throwing guns to sell only new, factory wound shot line.

### **SHIPBOARD USE OF LINE THROWING GUNS (LYLE CANNONS AND SHOULDER GUNS)**

Statutory and regulatory requirements for life-saving equipment aboard vessels changed repeatedly over the years. Regulations approved specific devices such as fire extinguishers, life boats, life preservers, flares, and line throwing appliances among other items. Regulations then required that specific items be used aboard vessels on lakes and bays and ocean-going vessels of various sizes. Tracking changes in approvals and requirements across many decades of bureaucratic regulations is a task left for others to enjoy, so only some highlights will be mentioned here.

Lyle type cannons were briefly required as life-saving equipment aboard some ships circa 1890-1892, but this was quickly rescinded. Before WW1, the Lyle cannon requirement was added for most ships, and remained mandatory until 1952 when Schermuly type rockets replaced the Lyle type cannons. However, use of Lyle cannons was “grandfathered” for existing installations, as long as they remained in good condition. In 1970, the Coast Guard warned of the dangers of using smokeless powder, since black powder was becoming increasingly difficult to obtain due to firearms control regulations.<sup>51</sup> In 1986, the

Code of Federal Regulations still included language on the Lyle guns.

“Lyle life-saving shoulder guns” were first approved in 1906 for use on all vessels not exceeding 300 gross tons. Although no detailed specifications have been found, it is assumed that these may have been the William Read style Sharps guns favorably reported upon by the USLSS in 1906. Shoulder line throwing guns remain an acceptable substitute aboard many types of ships to this day, and many more specific models have been approved by the Coast Guard over the years, and approvals rescinded for some. However, no evidence has been found that Ingersoll type guns with cap type projectiles were ever used aboard military or commercial ships, despite their widespread use among fire departments.

A January 1920, a list of Coast Guard–approved “line carrying guns and projectiles” included three shoulder line throwing guns and 33 Lyle cannon variants and projectiles. The list also provides the initial approval date for each item, a great help for collectors. Besides the “Lyle life-saving shoulder guns” approved in 1906, the two other shoulder guns were the “Coston Supply Co., New York, N. Y. Shoulder gun” and “Wm. Read & Sons (Inc.), Boston, Mass. shoulder gun,” both approved in 1919.<sup>52</sup> The author believes that the Coston gun was the .45-70 trapdoor Springfield type and that the William Read & Sons gun was the Winchester Model 1886 type, which will be discussed later.

Detailed specifications were issued in 1950 (probably echoing earlier regulations) as to what all was to be included with a Lyle gun (cannons) aboard ships, although they were no longer allowed for new constructions, but were “grandfathered” on existing vessels:

“Lyle gun [cannon] type on existing vessels. Six (6) service projectiles, 4 service lines (each 1,700 feet of 7/32-inch to 9/32 inch diameter flax or manila, having not less than 500 pounds breaking strength, in faking boxes or reels), 1 auxiliary line (1,500 feet of 3 inch circumference manila) , 1 approved firing attachment (with accessories consisting of lanyard, wrench, washer to fit between barrel and shoulder of firing attachment, blank plug for screwing into gun when firing attachment is not in place, cartridge extractor, and 25 primers in watertight metal box), 18 bags (21/2 ounces each) of black powder marked ‘Onehalf normal



charge for Lyle gun, 2½ ounces black powder' in nonferrous metal screw top container., 25 paper wads, 1 ram rod, 1 wire brush, 1 can light petroleum, 12 wiping patches, 1 tapered wooden plug for muzzle of gun when not in use, and 1 set of instructions furnished by the manufacturer of the gun, all in a suitable box or chest with the gun.”<sup>53</sup>

For shoulder guns, the 1950 requirements were:

“Ten (10) service projectiles, 4 service lines (each 400 feet of 3/8 inch circumference flax or cotton line. having not less than 250 pounds breaking strength in faking boxes or reels), 25 cartridges, 1 cleaning rod with brush, 1 can of oil, 12 wiping patches, and 1 set of instructions, all in a suitable case or box with the gun, with an auxiliary line (500 feet of 3 inch circumference manila) accessible for use.”<sup>54</sup>



**Coston Trapdoor line throwing gun**

Photo courtesy of Gutterman Historical Weapons, Inc

### **COSTON SHOULDER GUN** **(.45-70 TRAPDOOR SPRINGFIELD?)**

The “Coston Supply Co., New York, N. Y. Shoulder gun” was approved in 1919, but probably offered earlier than that. It is believed that these were made from obsolete .45-70 trapdoor Springfield rifles. These are fairly common on the collector market, often found in their gray painted wooden box with the brass rod projectiles, and with a bracket attached to the gun to hold a tin canister for the shot line, and one, two or all three of the canisters.

It is assumed that this style of gun was made during WW1, although not officially approved until 1919, when

18 items were added to the approved list, after 4 years without any items being approved. Circa 1947 the U.S. Coast Guard began issuing approval certifications for line throwing equipment, and this approval information was often marked on the device or its storage container. Sometimes these Coston kits are stenciled inside the lid with markings such as “Coston Shoulder Gun/ Approved U.S. Coast Guard/ 160.031/3/1.” The numbers refer to the section of the Code of Federal Regulations regarding line throwing guns, and the specific approval for this device to show that it meets USCG requirements. Unmarked boxes and other markings exist. Some kits include instruction booklets titled “*Coston Line Throwing Shoulder Gun, Approved by United States Coast Guard, Nov. 28, 1944.*”<sup>55</sup>

Trapdoor kits nearly identical to the Coston marked kits are known with Naval Company and Bridger markings. The instructions with one of the Bridger kits include reference to Naval Company and Hall products dropped long before WW2, but also state: “The Springfield Life gun is offered only as a substitute for the Bridger Gun for the Duration of the War. However, it is equally as efficient.” Dr. Harold Friedman “assumed that this refers to WW1.”<sup>56</sup> Some people believe that the Naval Company had made up the boxes and accessories to complete the kits for William Read’s Model 1886 Winchesters in 1918 (see below), and actually made the trapdoor conversions and kits for Coston.<sup>47</sup> There were a number of letters in Gun Report on the subject of trapdoor line throwers including a copy of the circa 1943 Naval Company Bridger instruction sheet, and mention that some were observed for sale in Chicago in the 1930s. In June 1945, the Coast Guard announced termination of approval for “45/70



**Winchester Model 1886 line throwing gun sold by William Read of Boston.**

Photo courtesy of Rock Island Auctions

Bridger shoulder line-throwing gun, manufactured by Naval Co., 3419 Richmond Street, Philadelphia, Pa. (Approved 1924),” which possibly refers to the trapdoors sold under the Bridger name, not the later single shot top break models.<sup>59</sup>

## WINCHESTER MODEL 1886 LINE THROWING GUNS

William Read & Sons of Boston contacted Winchester in 1918 concerning “a suitable rifle which can be used as a Lyle Line Throwing Gun.” In July, Winchester concluded experiments with a modified solid frame Model 1886 rifle (serial number 144034) bored to .458 diameter smoothbore with a 14 3/8-inch barrel, and the magazine removed.

“...Winchester Company subsequently entered into an agreement with William Read & Sons of Boston to manufacture Model 1886 Rifles modified for use as Lyle Life Line Throwing Guns. For the most part, these special Model 1886's were made in October of 1918.”<sup>60</sup>

The 261 rifles were shipped October 5, 1918, noted as “Lifeline, 14½ inch, smooth bore.”

Winchester researcher John Madl stated that about 497 guns were shipped “...mostly to William Read & Sons, Boston, Mass. Read then contracted with the Naval Company of Doylestown, PA, to case the guns and add the accessories for use onboard ships or from shore.” He believes 75 had round barrels and the remaining 422 were made with octagon barrels.<sup>61</sup>

Apparently the Model 1886 line throwing guns were used by the U.S. Navy, perhaps even exclusively by them. They are mentioned and illustrated in the 1941 *Knight's Modern Seamanship*.<sup>62</sup> Winchester filled five orders for Model 86 line throwing parts from the Boston Navy Yard between October 1942 and May 1944.<sup>63</sup> As late as 1943, the Navy's Bluejacket's Manual (11th edition) described line throwing equipment as follows:

“The .45-caliber line-throwing gun consists of a sawed-off .45-caliber Winchester repeating rifle. It has a lever action and fires a special blank cartridge which is supplied with the outfit. The projectiles are short steel rods with an eye in the outer end to which the line is secured.”

Also noted was that it was issued in a box with 10 projectiles, 4 lines, and other accessories.<sup>64</sup>

While research shows some 497 were likely made, the BATF issued a letter on September 19, 1985, (LE:F:TE:CHH 7450) declaring 261 Winchester Model 1886 line throw-

ing rifles to be curios and relics and removed from the provisions of the NFA. Specific serial numbers are listed (in 154, xxx range), and these numbers are listed in the BATF Curio & Relic publications. The legal status of the other 236 guns remains in limbo.<sup>65</sup> Note that these were originally made and delivered without any attached canister for holding the shot line, as confirmed by photos and descriptions in period manuals.

## FRANCIS HALL AND NAVAL COMPANY HISTORY AND PRODUCTS

One man and company was involved in nearly every aspect of 20th century line throwing guns in the United States, and is worthy of a more detailed review. Francis (Frank) Granger Hall was born in Elmira, New York, in 1877, the son of a banker. He graduated from Yale University in 1899 and quickly set up his own business, the B&H Electric company with classmate I.E. Burdick. This became the Naval Electric Company in 1900, and while they emphasized electrical lighting and other shipboard electrical services, they also were very interested in gun mounts aboard vessels, and electrical firing circuits for them which were “...made after the style of the Hotchkiss gun... meeting with popular favor among owners of fine yachts.”<sup>66</sup>

Hall was also involved with gas and diesel engines and was briefly associated with the Holland submarine project. He had several business addresses, usually 95 or 126 Liberty Street in New York.<sup>67</sup> B&H Bronze interchangeable mount yacht guns were sold from the latter address as early as 1908, although these were salute guns rather than line throwing devices.<sup>68</sup>

During WW1, Hall worked as a mechanical engineer for Midvale Steel and Ordnance at their flagship Nicetown, Pennsylvania, works which specialized in metallurgy and high-quality castings and ordnance items. This was in Philadelphia, about 5 miles from Hall's comfortable Mount Airy residence, and only 11 miles from his ultimate home in Roslyn, Pennsylvania.<sup>69</sup>

In 1919, the Naval Company was incorporated in Pennsylvania, and Naval Company products began using Roslyn and/or Philadelphia as an address. A 1922 Marine Supply catalog listed Hall's home address of 7420 Boyer Street, Mt. Airy, Pennsylvania, as the address of the Naval Company.<sup>70</sup> Yacht or signal guns have been observed with data plates with the Roslyn address, indicating



**A Hall-Naval Company Model F cannon (right rear). Part of a great collection of line throwing artillery. Left to right Lyle Model C cannon for the U.S. Life Saving Service, a U.S. 24 Pounder Eprouvette “Manby mortar” and early Hunt line throwing cannon.**

**Photo courtesy R.H.A. Collection, <http://cannoncollector.com>**

“B&H Yacht & Hall-Lyle Cannons, Bridger Line Throwing Shoulder Guns, & Marine Torches for Life Saving — Harpoons.” At least one “Naval Company, Roslyn, PA” – marked Ingersoll type shoulder line throwing gun is known.<sup>71</sup> A location at 3419 Richmond Street, Philadelphia, Pennsylvania, was probably the business address used between 1924 and 1945.<sup>72</sup> The various addresses may help sort out the sequence and dates of manufacture of various Naval Company items in the Hall era.

Hall only received two patents, both in 1924. One was for a complex deck mounted breech loading line throwing cannon that probably never reached production.<sup>73</sup>

This may or may not be the ultimate form of a “breech loading life line gun” submitted by Hall to the Coast Guard for approval in 1916 in drawing form only, without a sample.<sup>74</sup> That one may or may not have been derived from a concept first presented by Hall to the USLSS in 1904, without any details.<sup>75</sup>

Hall’s other 1924 patent was for Lyle type cannons with the trunnions at the breech and some carriages for those, intended to shift the recoil forces lower to reduce the notorious jumping of Lyle guns when fired. The rear trunnion design ultimately proved very popular and most WW2 era Lyle guns by the various makers were made with rear trunnions. Hall’s patent application had been filed in 1920, and the next year he was busy promoting his new designs with articles in trade journals<sup>76</sup> and submis-

sion for tests by the Coast Guard’s Board on Life-Saving Appliances, where now-retired Colonel David Lyle still ran things.<sup>77</sup> Hall’s design was made with a long barrel as the Model F, and a shorter barrel Model F-B. Some had smooth exteriors, and some had “waffle” type reinforcing ribs on the exterior of the barrel to reduce the weight. In 1924, the Naval Company received Coast Guard approval for a .45-70 caliber “Bridger” shoulder line throwing gun, possibly one based on trapdoor Springfields, but this approval was terminated in June 1945 as an item no longer being produced.<sup>78</sup>



**Naval Company Bridger .45-70 line throwing gun in typical wood case with accessories. Private collection.**

## NAVAL COMPANY 1939 TO PRESENT

The Naval Company was sold to Renton W. Meininger, Sr., in 1939, and Frank Hall died April 14, 1941. The Naval Company is still owned by the Meininger family, having passed to Renton W. Meininger, Jr., in 1964, and his daughter, Mary Elizabeth Meininger, was running things in late 2014. Unfortunately, no records from the Naval Company under Hall's ownership have survived, and the present owners are reluctant to share subsequent production information which would be of interest to collectors.

The "Bridger" single shot top break line throwing guns are mostly from the Meininger era of the Naval Company.<sup>79</sup> The Bridger name has been used with slight variations to distinguish the different actions used. Bridger was used on the Winchester 37 type actions, and Bridger X, Bridger 7094, and Bridger 85 used on others.

As an aid to dating these, the earlier guns had no labels on the canisters; then the company name was added. Later Coast Guard regulations required "operating instructions" to be attached to the guns, and after briefly using a metal plate attached to the buttstock, the instructions were added to the name plate on the canister. Brass rod projectiles were originally unmarked, but later regulations required them to be marked with the maker name.

The Naval Company still makes shoulder line throwing guns on the single shot top break type, available in the traditional wooden boxes introduced circa 1918, as well as modern Pelican brand plastic cases.<sup>80</sup> However, with the declining number of merchant ships, increased restrictions on any type of firearms, and simplicity of pistol type or self-contained rocket type line throwing devices (to be discussed later), this seems to be a shrinking market niche.

## POST-WW1 MARITIME MARKET FOR LINE THROWING GUNS

In February 1918, requirements were passed to be effective in 1919 requiring U.S. vessels to carry line throwing devices, either Lyle cannon types or shoulder line throwing devices for smaller vessels. Ongoing efforts worldwide eventually resulted in the Schermuly Pistol Rocket Apparatus (to be discussed later) added as an acceptable line throwing device by the International Convention for Safety of Life at Sea (SOLAS) treaty in 1929. This



**Naval Company Bridger .45-70 line throwing gun in typical wood case with accessories. Private collection.**

resulted in a wide variety of line throwing guns and other devices appearing on the market in the years between WW1 and WW2 when the number of ships increased dramatically.

The 1918 requirements inspired Winchester to investigate the desirability of entering that market, having already made the Model 1886 line throwers discussed previously. On June 23, 1919, Winchester's New York agent, H.F. Keys, did some sleuthing about the current makers, products, and future demand for a report sent to Henry Brewer, Winchester's Vice President, adding, "The manufacturers are extremely reticent with information and probably would have been more so had they known whom I represented."<sup>81</sup>

He noted that the demand for Lyle guns would probably not exceed 3,500, and that probably 2,500 were already supplied or in the works, and "When this demand had been filled, I doubt that there would be a demand for 50 guns per year." He also noted that the real problem was not the guns, but the shot line, which frequently broke, was expensive, and could only be obtained from two sources. And, manufacture of Lyle type cannons required a 1,400 foot range to demonstrate them for proof firing before a government inspector.

"Regarding the shoulder gun, I did not find much demand or sale for this type, possibly the law as regards the equipment of small coastwise vessels is not being enforced yet; at any rate, the demand is practically nil.

Coston, Kahnweiler and Hayward all make guns of this type but they are able to [b]uy old Remingtons, Sharps or even Spencer [sic- probably meaning to say Springfield] single shot carbines

cut off and smooth bore them, then sell them complete with lines, projectiles and carrying case for \$50.00, which price would not seem attractive in the case of our single shot rifle. However, I would be glad to submit a model to the firms in question as they might be interested provided the price was not too high. I understand the guns they alter stand them in less than \$10.00”

Winchester promptly decided “conditions do not warrant our going further with either type of gun” and discontinued any further work in this matter.<sup>82</sup>

### MID-20TH CENTURY LINE THROWING GUNS

One of the most commonly seen line throwing guns is the single shot top break style gun with a heavy barrel about 14 inches long, usually made by Harrington & Richardson, but sometimes by other makers such as Stevens, Winchester, or perhaps even others. These were sold under various brand names, and the Harrington & Richardson guns have been found sold under their name, as well as by Coston Supply Company and the Naval Company. Such a gun is illustrated in seamanship manuals dated 1921, clearly the top break type, but exact maker or model cannot be determined.<sup>83</sup> Certainly several brands were on the commercial market in the 1930s or perhaps even earlier. Some are found in the Naval Company style wooden boxes, or in a smaller and lighter fiber type container, probably for both the fire department and maritime markets. While the civilian market demand was being met this way, the U.S. Coast Guard was working on its own ideas.



**USCG Model 1903 .30 caliber shoulder line throwing gun. Photo Courtesy of James D. Julia, Inc.**

### U.S. COAST GUARD .30 CALIBER SHOULDER LINE THROWING GUNS (M1903 SPRINGFIELD OR M1917 ENFIELD)

In 1935, the U.S. Coast Guard adopted modified M1903 Springfield rifles for line throwing use, and they are still in use today, using a unique 13- or 15-ounce projectile. Only the Coast Guard used these rifles, issuing one set to each large USCG vessel and shore station, along with a rewinding machine to reuse shot lines.



**USCG .30 caliber shoulder line throwing gun in use in 2013. USCG photo**

“The new type of shoulder line-throwing equipment now being issued to the service is a Coast Guard development, and is the result of several years of experimental tests. Several officers and men have contributed ideas that have been incorporated in the equipment as issued.”<sup>84</sup>

“The bore has been rebored and the lands removed, making the rifle a smooth bore gun. The front sight movable stud assembly and fixed stud, as well as the rear sight assembly, have been removed. The stock has been cut down, and a can-

ister has been attached to the gun. Two pounds of lead [some sources say 2 pounds 8 ounces] have been placed in the butt stock, and a recoil pad has been placed on the butt in lieu of the butt plate. The barrel of the gun has been Parkerized.”<sup>85</sup>

The 1935 and 1942 manuals specifically (and only) refer to modified Model 1903 Springfield rifles. However, the Coast Guard also modified some Model 1917 rifles in the same way, reducing the overall length to match the M1903 rifles to use the same wooden chests. A 1980-dated Coast Guard publication specifically states “[The] shoulder line-throwing rifle may be either a modified Springfield M1903 or a Lee [sic] Enfield model 1917.”<sup>86</sup>

The Coast Guard projectiles of 1935 were a major improvement over the old “Lyle” type rods inserted into the barrels with the shot line attached to the portion left sticking out the muzzle, forcing the projectile to tumble in flight. The new projectiles are clearly described, along with drawings of the modified M1903 rifle, in an application filed in May 1935, with U.S. Patent 2069276 issued February 2, 1937, to M.J. Ryan.<sup>87</sup> The new Coast Guard design had a long wire loop extending back from the projectile head. The loop fit around the outside the barrel for attaching the shot line which delivered much better accuracy and reduced the stresses on the shot line. The 13-ounce projectile could be fired with the rifle against the shoulder, but the 15-ounce (red) projectiles were to be used only in an emergency when the 13-ounce failed to reach the target. Then, the rifle had to be rested against a life jacket against something solid, not fired from the shoulder. Range was about 350 feet using the standard .30 caliber Grenade launching cartridge M3.<sup>88</sup>

The Coast Guard adopted buoyant projectiles similar to those used by the U.S. Navy, except for the smaller diameter shaft needed for the .30 caliber instead of .45 caliber barrel, possibly as early as the 1960s. However, the old solid head design projectiles were being procured con-



**Winchester Model 37 Naval Company line throwing gun. Private collection.**

currently with the buoyant type as recently as 2012, and additional bids for buoyant projectiles were solicited in February 2015 for the latest design dated August 2013.<sup>90</sup>

The projectiles, modified M1903 rifles, and the chest with accessories are described in detail with excellent photographs in Brophy’s 1903 Springfield book.<sup>91</sup> The Springfield Research Service database lists 80 M1903 rifles as “Line Throwing” associated with various Coast Guard vessels or stations mainly 1937-1939. All but two have serial numbers above 800,000 and would be considered “high number” rifles and the two exceptions may have been made at Rock Island, not Springfield, and therefore also high number guns.<sup>91</sup> The number of M1917 rifles converted is also unknown, but estimated as only a small fraction of the number of M1903 rifles, and these are rare items to encounter.

The M1903 Springfield .30 caliber line throwing rifles are uncommon on the collectors market, and total number converted is unknown, but an estimate would be between 500 and 1,000 units, with a large number remaining in use and some of those disposed of in the past likely have been converted into hunting rifles.

### **WINCHESTER AND MODEL 37 LINE THROWING GUNS**

Winchester was always interested in what other makers were doing and potential new products or markets. Having considered and rejected entry into the line throwing business in 1919, the subject reappeared in 1936 after the Coast Guard adopted the modified M1903 Springfields at their .30 caliber Shoulder Line Throwing Gun.

In 1936, a Coast Guard officer sent a letter to Winchester Vice President Edwin Pugsley with a copy of the latest regulations on line throwing guns, and also a print showing the new Coast Guard line throwing projectile. He added

“We had an inquiry the other day from ...Melbourne, Florida, requesting information regarding the new Coast Guard shoulder line throwing equipment... ‘for life saving at our beach’ So here is another possible commercial use of the shoulder gun.”<sup>93</sup>

Winchester had to have been aware of the H&R single shot shotgun based line throwing guns being made, and

to have considered the costs and benefits of competing with them, especially as the Model 37 single shot shotgun was being introduced in 1936.

Apparently they decided against direct entry into that market, but agreed to make a limited number for the Naval Company probably during 1940 and 1941.<sup>94</sup>

These have factory barrel markings: “WINCHESTER REPEATING ARMS CO./ NEW HAVEN, CONN. LINE-GUN-45-70 BLANKS ONLY. BRIDGER, NAVAL CO. and Winchester proof in oval.” The very heavy barrel is 14 inches long, and the guns have a commercial blue finish. Production figures have not been found, and none of the Model 37s were serial numbered or date stamped, but my rough estimate would be no more than a few hundred. It is likely all of the Winchester Model 37 line throwing guns went to the civilian market, probably more for fire department than maritime use.

Examples have been reported in either the fiber or wooden boxes, some marked to indicate using agency, such as [Fire Department] Truck 1 of Springfield, Massachusetts,<sup>95</sup> and by the Old Orchard Beach, Maine, Lifeguard Service.<sup>96</sup>

### UNDERWAY REPLENISHMENT AND SHOULDER LINE THROWING GUNS

The U.S. Navy’s main use for line throwing guns after about 1940 was to pass lines between ships for underway replenishment or refueling at sea, allowing ships to operate more or less continuously without returning to port. This capability was a major factor in allied success winning WW2, especially in the Pacific. A secondary use was to pass rescue or tow lines to other ships. Underway



**Navy ships refueling underway, after line throwing guns to get shot lines across to pass the heavier lines and hoses. U.S. Navy photo.**

replenishment remains a standard practice in the Navy today. While the details of the rigs used to pass fuel and cargo have evolved, sending a shot line from one ship to the other is still the first step, although the types of line throwing guns have also evolved. While the Winchester Model 86 line throwing guns procured in 1918 were still mentioned in a manual in 1943, there were probably only a few in service then, and most in service were the single shot top break type made by Harrington & Richardson, and the latter are the only types mentioned in manuals between 1944 and 1970. The only difference between the Navy-use guns and those sold on the civilian market is that the Navy guns were marked with an ink stamped US/anchor inspection mark, but this was eventually worn off on most of them, making it hard to distinguish a Navy issue gun from a commercial sale item.

The Harrington & Richardson line throwing guns used by the U.S. Navy were officially the “Caliber .45 Line Throwing Gun” in the 1944 dated manual.<sup>97</sup> By 1955 the nomenclature became “Caliber .45 Line Throwing Gun Mark 1 Mod 1” reflecting an unidentified minor change or just a change to conform to policy on equipment naming formats.<sup>98</sup>

In 1944, these were described as being issued “assembled in a wood shipping box with 10 projectiles, four shot lines, four spindles for rewinding, 40 cartridges, and cleaning rod, cleaning brush and solvent.” The shot line was twisted cotton, either 350 or 450 feet long, with a breaking strain of 90 pounds. Optionally, 550 feet of nylon line with a breaking strain of 125 pounds was used. The ammunition used was the “.45-70 Caliber Blank Cartridge Mark 1” and these cartridges in a white box with black lettering are quite common.<sup>99</sup>



**USN .45 caliber line throwing gun Mark I in use circa 1978. Photo courtesy Don Vansant.**

By 1955, the solid brass “Lyle” type projectiles were replaced by the caliber .45 Buoyant, Illuminated, Line-Throwing Projectile.

“This projectile is basically a watertight plastic cylinder with a sponge rubber nose at the forward end and a rod, protruding aft, which fits into the muzzle of the gun. The shot line is fastened to a ring on the rod....

The projectile has three distinct advantages over the cylindrical-rod type projectile which it replaces.

1. The buoyancy feature holds the shot line afloat when the projectile is used for rescue at sea.
2. The illumination of the projectile can be seen at night and it may be located more readily at the receiving end of the flight.
3. The soft rubber nose minimizes possibility of serious injury to personnel who accidentally may be struck by the projectile.

The shot line is a sized nylon line 550 feet long and has a minimum breaking strength of 125 pounds. The line is colored international orange and will float for at least 24 hours.

The ammunition used is Cartridge, Blank, Line-Throwing, Caliber .45, M32.

The maximum of this projectile is approximately 300 feet with a dry line.”<sup>100</sup>

### **COAST GUARD SEEKS OTHER LINE THROWING OPTIONS**

During 1945, the Coast Guard tested a variety of options for improved line throwing, including use of nylon shot line which gave greater range than the standard flax or cotton shot lines then in use. A 2.36-inch rocket launcher (“bazooka”) was modified by addition of a canister for the shot line and successfully reached 850-foot ranges. A British pistol rocket (presumably the Schermuly type) was deemed to be too erratic in flight. An unidentified American device to be attached to a flare gun along with a canister was used with a cartridge for impulse and ignition of a rocket, with good accuracy. The report concluded, “...it

is expected that there will be a bigger field of selection of line throwing devices for use in merchant vessels with no curtailment in the use of presently approved devices.”<sup>101</sup>

In 1972 tests were conducted to compare the M1903 line thrower against the M16 rifle using a line attached to an inert MECAR rifle grenade. The results were less range and greater recoil with the M16 MECAR rig, and it was not recommended for adoption.<sup>102</sup>

In August 1990, the U.S. Coast Guard completed tests on four alternate line throwing gun options. One was simply to use 7.62-mm M64 Grenade Launching cartridges in existing .30 caliber line throwing guns. Another was to use a chamber insert sleeve to modify the rifle’s chamber for the 7.62-mm M64 cartridge. The third option was to replace the barrel with a new one in 7.62 mm. The fourth option was to use the M14 rifle with the flash hider removed and the line throwing projectile modified to .295-inch shaft diameter for use with the barrel retaining the rifled bore, unlike the .30 caliber rifles which had been smoothbored.<sup>103</sup> None of these options were adopted, and the .30 caliber shoulder line throwing equipment remains in use with the Coast Guard today.



**M14 Rifle with Mark 87 line throwing adapter in use  
US Navy photo.**

### **THE M1, M14 AND M16 RIFLES AS LINE THROWERS**

The M1 Garand was standard for use aboard Navy ships following WW2, and in 1951 the Frankford Arsenal proposed using them to replace the .45 caliber Mark 1 line throwing guns. The concept was to attach a shot line canister to the rifle, and use a rifle grenade launcher, rifle grenade cartridge, and a rifle grenade fin assembly with a steel head in lieu of the explosive charge. The Army





**Canadian sailor using M16 (C7) rifle with Mark 87 line throwing adapter. Photo courtesy Canadian Maritime Forces Atlantic (MARLANT), CFB Halifax.**

used at least three different approaches to adapting rifle grenades for line throwing use during and after WW2. Apparently tests at Dahlgren Proving Ground were unfavorable as the .45 caliber guns remained in use.<sup>104</sup>

The U.S. Navy issued M14 rifles for shipboard security and landing party use in the early 1970s, and by the mid-1980s they were being used for line throwing purposes in lieu of the Caliber .45 Line Throwing Gun Mark 1 Mod 1.

While the Coast Guard had tried a turned down (.29-inch diameter) shaft for a rod type buoyant projectile, the Navy ended up going with a cup type launcher attachment for the M14 rifle which slips over the flash hider and latches onto the bayonet lug. The first prototypes were made by modifying the M76 Grenade Launcher for the M14 with a cup but the final version was an entirely new design. This was designated as "Line Throwing Rifle Adapter Kit, Mark 87 Mod 1." This attaches to the M14 rifle and fires a butyl rubber projectile that is about 2¾ inches in diameter by 6 inches long. The projectile has several holes for attaching chemical lights for visibility at night. The kit includes a launcher, six projectiles, 18 chem lights, a recoil pad, and a canister made of polyethylene to hold the shot line.<sup>105</sup> In practice, the canister is almost never used, and instead an assistant gunner holds the coil of shot line, as had been the Navy practice since the 1940s. These only use the 7.62-mm Grenade Launching cartridge M64.

Nothing has been found identifying the difference between the Mark 87 Mod 0 and Mark 87 Mod 1 kits, but it may be the addition of the threading for use with the M16 rifle instead of just with the M14.

The Mark 87 Mod 1 Line Throwing Rifle Adapter Kit can also be used on the M16 rifle with the 5.56-mm Grenade Launching cartridge M195. The flash hider has to be removed from the barrel and the launcher is then screwed onto the muzzle threads. However, M16 use for line throwing does not appear to be widespread with the U.S. Navy or Coast Guard. There are photos showing Canadian Navy personnel using a Mark 87 type launcher on the Canadian version of the M16 rifle.

### **SCHERMULY ROCKETS FOR LINE THROWING**

While line throwing designs focused mainly on the Lyle type cannons, various shoulder guns, and the enduring legacy of the Boxer rockets, one man persisted in advocating for use of another rocket design for line throwing. William Schermuly (1857-1929) was a British seaman who was obsessed with the fact that "Lost ships can be re-



**William Schermuly and his grandson demonstrate that his Rocket Pistol Apparatus is simple enough for a child to use. Thompson, C.R., From Ship to Shore: The Biography of William Schermuly and The History of the Schermuly Pistol Rocket Apparatus, Ltd., London, 1946**

placed but lives lost are gone forever.” He also recognized the perverse nature of attempting to throw a line from a very large beach to hit a very small ship, when it would be much easier to launch from the ship to the shore.<sup>106</sup>

As a hard working, blue collar mechanic with limited education, Schermuly had good ideas, but scant means for perfecting them, and few of the skills or contacts needed to navigate the bureaucratic inertia to get a new idea adopted. In 1897 he introduced his first rocket design, basically a small metal cased “stick rocket” launched from a trough type arrangement, with a small box of carefully faked shot line. But, despite the light weight and obvious usefulness, it met with no success. A decade later he began to sell a few of these, but the start of WW1 pushed aside any interest in such items.

In 1920, Schermuly and his son were struck with the idea of combining a gun with a rocket. (An idea which had struck Henry Trengrouse more than a century earlier!) “Instantaneous firing — minimum recoil — no breaking of lines — increased distance — visibility during flight — a projectile little affected by wind — weather proof!”<sup>107</sup>

Discarding the idea of using a long arm, Schermuly decided on a pistol, eventually settling on a flare gun type modified with a long tubular barrel, into which the lightweight seamless tubular steel body of a small rocket would fit. A blank cartridge would be chambered in the pistol. A pair of metal arms attached to the nose of the rocket extended back along the outside of the barrel, with a bridle or bail at the rear and steel wire leader to which the shot line was attached.

“The action is as follows: The cartridge is loaded into the breech of the pistol and the rocket is inserted into the muzzle. On pulling the trigger, the gasses generated by the fired cartridge eject the rocket on its correct line of flight and, at the same time, burst through the waterproof disc [at the rear of the rocket] and ignite the propellant mixture, which carries the rocket and line for the remainder of its flight. So small is the recoil or “kick” that the pistol can be fired, as has happened on many occasions, by a child.”<sup>108</sup>

In 1922 tests of various line throwing devices were conducted in the Netherlands. Thus “Schermuly’s Pistol Rocket Apparatus” (SPRA) competed head-to-head against a Lyle type cannon (made by Steward) which

broke the shot line each time; a Coehorn or Manby type mortar which performed adequately but was too cumbersome for shipboard use; a B.S.A. (shoulder?) gun which only reached 40 yards after its line holder broke; a Cordes gun (not otherwise identified) which performed well; and a Behr<sup>109</sup> gun of unspecified nature which only reached 50 yards. Schermuly’s device was described as

“... a most clever and neat contrivance ... convenient to handle, easy to aim and, indeed, particularly good. Fires thin, medium and heavy lines always with wonderful and satisfactory results. The first shot carried about 255 meters, and the second shot, against the wind, carried about 200 meters.”

One report ends with the laconic note: “A very instructive day and a success for Schermuly.”<sup>110</sup>

Some time later, the Royal Navy conducted trials of the Schermuly against the “Coston Line Throwing Gun, then standard equipment in H.M. Navy.” It is not clear if this was a Coston made Lyle type cannon, or a Coston shoulder gun, but likely the latter. In all six shots, the Coston went from just overboard to a maximum of 50 yards, mainly due to problems with the shot line fouling. Schermuly, however, placed all five of the rockets fired close to or over the objective some 150 yards away. Schermuly’s Pistol Rocket Apparatus emerged according to British Admiral Sir Edward Evans, “...as great an advance on all other types of line throwers as is the modern battle ship to the old *Victory*.” Shortly afterward, the SPRA “began to be adopted as part of the standard equipment of ships in H.M. Navy.” Later trials against the venerable Boxer rockets showed the SPRA with greater accuracy, albeit with slightly less range, and H.M. Coastguards began to replace some of their Boxer rockets with the Schermuly.<sup>111</sup>

As a result of successful tests, the SPRA sales began to pick up and the relatively light weight and compactness of a SPRA kit made it popular with vessel owners and crews, even though their use was not mandatory.

Finally, in 1929, only 2 weeks before Schermuly’s death, the International Convention on the Safety of Life at Sea (SOLAS) was signed, and his invention was approved as one of several types of required line throwing equipment.<sup>112</sup> The U.S. Coast Guard followed suit, and set up approval standards under 46 CFR 160.040 for “Impulse

Projected Rocket Type Line Throwing Appliances” similar to those for “Shoulder Gun Type Line Throwing Appliances” under 46 CFR 160.031.

The SPRA was made in several sizes, the “International” being a larger version to comply with SOLAS requirements for larger vessels, and slightly smaller versions being offered to meet lesser requirements set for coastal vessels and yacht use. The basic flare gun which is at the heart of the SPRA is usually one of the handsome brass frame Webley and Scott types, but sometimes with the later crude laminated steel type construction. These can have a round or square butt. Most featured a large hand grip strap on the top of the barrel, and some had a bubble level there for getting exactly the right elevation for maximum range. There was also a simplified straight line signal launcher/line thrower with the hand grip an extension of the barrel, and a spring loaded plunger at the rear which is pulled back and held ready to fire until a stubby trigger is pulled. These were all sold as a kit in a sturdy wooden box, with the gun, four rockets, four sealed packages of faked shot line, and five of the cartridges. With this many variations, Schermuly line throwers could be a highly specialized collecting niche.

The SPRA cartridges are generally 25 × 30-mm rimmed with a very thick rim, made with single or two-piece brass or aluminum construction, or sometimes with a metal head and paper walls like a shotshell. Headstamps sometimes include Schermuly or SPRA to indicate their use, or there may be no headstamp at all. The mouth is usually sealed with a thick, opaque wax or celluloid-type substance. Sometimes they will be dated, as these are only approved as life-saving equipment for a certain number of years (usually 4) after manufacture.<sup>113</sup>

In 1950, the U.S. Coast Guard mandated that Schermuly type “impulse projected rocket type line throwers” be used aboard larger vessels instead of the Lyle type cannons, although the latter would be allowed on existing vessels as long as in good condition.

The rocket kit was to consist of:

“Four (4) rockets (2 of which shall be of the buoyant type), 4 primer-ejector cartridges, 4 service lines (each 1,000 feet of 7/32 -inch to 9/32-inch diameter flax or manila, having not less than 500 pounds breaking strength, in faking boxes or reels), 1 can of oil, 1 cleaning brush, 12 wiping patches, and 1 set of instructions furnished by the

manufacturer, all in a suitable case or box with the appliance, with the auxiliary line (1,500 feet of 3-inch circumference manila) accessible for use either in the case or nearby.”<sup>114</sup>

Schermuly’s concept was simple, and relatively inexpensive, in addition to being reliable and light weight. This led to it being adapted for other line throwing uses. Large Schermuly type rockets were used at the Normandy invasion to launch climbing ropes onto Ponte du Hoc.<sup>115</sup>

An even more innovative idea was the emplacement of dozens of super-sized Schermuly type rockets pointed upward around the perimeter of British airfields and defense plants, known as the “Parachute and Cable system” or PAC. The launchers were placed

“...at 60-foot intervals; Fired vertically upwards. In salvos of nine or more as enemy aircraft came in at low altitude, this device comprised a 480-foot length of steel cable carried 600 feet high by a rocket; at the top of the trajectory the cable was released, a parachute opened and suspended the cable hopefully in the path of the enemy aircraft. If the latter struck the cable a second parachute opened at the bottom of the line and the unfortunate aircraft was left towing away the contraption. If the cable was picked up on one or other wing, there was a good chance that the aircraft would go down out of control.”



**Kilgore GR-52 launcher**  
**Private collection.**

The system actually worked, bringing down two attacking German Do-17 bombers on August 18, 1940. However, despite being installed at 31 locations, the PAC systems were only fired twice, and only successful on the one occasion. Thus, line throwing guns served as one of the least known of all WW2 anti-aircraft weapons.<sup>116</sup>

### IMITATIONS OF THE SCHERMULY PISTOL ROCKET APPARATUS

The success of the Schermuly Pistol Rocket Apparatus did not go unnoticed. In fact, they were so successful in 1950 that the Coast Guard mandated use of Schermuly style rockets instead of Lyle line throwing cannons; these likely inspired new makers to come up with imitations of the basic Schermuly system.



**Smith & Wesson Model 270 International Launcher showing kit and all accessories. Private collection.**

As of 1972, there were only two approved U.S. made “impulse projected rocket type launchers” as the SRPA was officially described. These were the ones made by the Kilgore Corporation, and by the Smith & Wesson Chemical Company.<sup>117</sup> No information has been found showing USCG approval of any other similar devices.

### KILGORE GR-52 LAUNCHER

The Kilgore Towline Rocket Appliance Model GR-52 CK was initially approved as 160.040/1/0 on November 11, 1950. It was approved again as 160.040/1/1 sometime between March and May 1952, while being made by Kilgore, Inc., International Flare-Signal Division, Westerville, Ohio.<sup>118</sup> As an aid to dating these guns, the name was changed from “Kilgore Manufacturing company” to “Kilgore, Inc.” around September 1951.<sup>119</sup> Subsequent approvals include as approval 160.040/1/4 on December 11, 1963, and as 160.040/1/5 in 1965 when made by Harvell-Kilgore Corp., Toone, Tennessee, described at the Model GR-52.<sup>120</sup>

The rockets, and presumably the guns, were still being made in 1986. It should be possible for an obsessive collector to find examples of these launchers with each of the different approval numbers, a necessity which your spouse will surely understand.

The GR-52 launcher is a longer barrel version of the Kilgore Model B 37-mm flare gun. The chambers have four studs protruding into the chamber to prevent chambering of a full length flare cartridge, and only allowing a special purpose impulse-ignition cartridge to be used. The cartridges are aluminum cased 37 × 32-mm rimmed, similar to a short version of the ubiquitous military 37-mm signal cartridges.

### S&W MODEL 270 INTERNATIONAL LAUNCHER

This uses a specially made single shot variation of the large “N-Frame” revolver frame which is shared with the Model 209 gas or flare gun which used 37-mm ammunition. These were made in Springfield, but marked with S&W Chemical Company, Rock Creek, OH. The Model 270 functions like the Schermuly guns, but uses a special 12 gauge 2¾-inch shotshell size ignition/impulse cartridge. These were sold in a wooden chest or similar metal chest with neat compartments for all the required items in the kit.

The USCG approval number is 160.040/2/0 on the gun itself, apparently in 1972.

Subsequent approvals include 160.040/2/1 and finally 160.040/2/2 which was issued on December 30, 1980, and terminated on November 21, 1984.<sup>121</sup> Documentation related to these is all dated from 1974 to 1980. Apparently production ceased around 1980 when S&W got out of the chemical business, but since the rocket service life did not expire for 4 years, they remained in use until 1984 when approval was terminated.



**Pains-Wessex Schermuly Speedline 250 self contained line throwing rocket device. Private collection.**

### SELF-CONTAINED ROCKET LINE THROWING APPARATUS

Schermuly's success was built on the use of the simple and cheap flare gun adapted for use as the launcher for his rockets. However, as synthetic materials improved and bureaucratic impediments increased against anything resembling a "gun," the Schermuly rocket was adapted into a self-contained unit combining the launcher, rocket, and line in a single weatherproof plastic casing, a bit larger than a gallon jug, with a handle for carrying and aiming, a trigger for firing, and a safety pin to prevent accidental firing. The weight of the complete unit is about 10 pounds, and the rockets have a service life of 3 years, while the rest of the unit has a life of 9 years. These were approved under Coast Guard approval 160.040/12/0. Several very similar designs from other makers were approved under separate numbers.

The first version, introduced circa 1972, was the "Pains Wessex-Schermuly Speedline 250" which uses a spring-loaded firing pin activated by a trigger on the handle. Later production dropped the Schermuly name. A newer version marketed as the "Pains Wessex Linethrower 250" (introduced circa 2002?) is a similar concept but with a redesigned plastic case, and using a twist type firing mechanism instead of the handle mounted trigger, with some are sold under the "Comet" brand name, differing only in cosmetic details.<sup>122</sup>

### MISCELLANEOUS LINE THROWERS MOSSBERG LINE LAUNCHER

There is another maritime line throwing gun, the Mossberg Line Launcher sold assembled in a complete kit as item number 50298, or as a conversion kit with everything except the basic Model 590 or 500 shotgun as item number 90298. These were introduced about 1994, and were discontinued after just a few years. Basically, these used a special 12 gauge barrel with a canister attached to hold the shot line. Several projectiles were included featuring an aluminum shaft with 12 gauge piston at the rear, and a threaded tip to accept either a buoyant plastic head, or a heavier metal "distance head," reminiscent of the USCG .30 caliber projectiles. A special 12 gauge 2¾-inch cartridge is used for launching, and the stated range is about 250 feet with the buoyant head.<sup>123</sup>



**Mossberg Line Launcher  
Private collection.**



**Hammond Bulldog Line throwing pistol kit  
Photo courtesy of Brent Wilburn, Antique Arms, Inc.**

## HAMMOND BULL DOG LINE THROWER

From 1866 to the late 1880s, the Connecticut Arms and Manufacturing Company in Naubuc, Connecticut, made the Hammond patent single shot .44 rimfire Deringer, better known as the “Hammond Bulldog.” Included were an unknown number made (or just assembled into kits) for use in line throwing. These used the typical rod in the bore type projectile, similar to Lyle guns, but with a long slot milled on opposing sides with a leaf spring inserted, presumably to hold the rod in position when getting ready to fire. The recoil must have been ferocious. Their date of manufacture and intended use is not clear, but possibly late 1880s and likely intended for fire or police department use, as the gentleman shown firing one on the instruction sheet pasted in the wooden box seems to fit in those professions.<sup>124</sup>

## AND A FEW MORE ...

Beyond all the types discussed in some detail above, there are many other line throwing guns and devices. Since this is only an “Introduction to Line Throwing Guns,” these are only briefly mentioned to note that they exist and could be added to a collection. There are also many recently developed line throwing devices for maritime use which are not mentioned. More research will turn up many more not listed here.

M1 Garand using rifle grenade for line throwing-communications wires.

U.S. WW2 rifle grenade field modified for use as a grappling hook.

Launched Grapnel hook fired from M16 rifle for clearing minefields or trip wires.

British Lee Enfield line throwing rifles, No 1 Mark III and No. 4 Mark I — with sights and other parts removed to reduce snagging of line and firing a rod type projectile.

Greener Line Throwing (and Harpoon) Guns on Martini action.

CBC (Brazil) copy of Naval Company Bridger guns circa 1987.

Tabb Rescue “Immediate Deployment Rescue

Rope System” (similar to Bridger).

Westun “Negotiator” — a CO2-powered device for law enforcement use, derived from MBA Gyrojet projects.

Crosman Jet Line 101 conduit gun — CO2-powered device for running cable fish lines.

Greenlee Cable Caster — spring-powered for running cable fish lines.

Laser Line Gun (for cable pulling) — for running cable fish lines.

Hall Safety Liner — .22 rimfire powered for ski lift rescue and other uses.

Cascade Toboggan Launcher — .22 rimfire powered for ski lift rescue and other uses.

Russian (?) copy of Schermuly Pistol Rocket Apparatus.

German Sander Leinen Pistole — line throwing gun for U-boat use.

Sedgley line throwing gun made from 37-mm flare gun with canister attached.

U.S. Navy 3- and 6-Pounder saluting guns used for line throwing.

## CONCLUSION

Line throwing guns of various types have indeed saved thousands of lives since 1808 when George Manby and William Trengrouse first provided solutions on how to reach shipwrecks with rescue lines. Many other people and companies have also contributed their own innovative ideas on how to make better line throwing guns, and many other uses have been discovered. However, the significance of line throwing guns has been largely overlooked both by historians and arms collectors. Partly this is due to the specialized markets for such devices, the limited involvement of major gun makers, and the fact that much of the limited advertising was in obscure nautical trade publications, and government approvals are likewise buried in mountains of bureaucratic paperwork. Further research is needed in this field.

Collectors looking for a specialty with plenty of variation, relatively modest prices, and little competition may find this paper, "Guns to save lives: An Introduction to Line Throwing Guns" to be helpful, and if so, my work is done.

### References and Notes

- <sup>1</sup> Flayderman's *Guide to Antique American Firearms and their Values* has excellent descriptions and historical information on many whaling and darting guns in Chapter XVIII. "Whaling Guns." *Arms Heritage Magazine* Volume 3, No. 4 has exceptional examples and photos. Thomas G. Lytle, *Harpoons and Other Whalecraft*, New Bedford, MA, 1984, is another excellent source.
- <sup>2</sup> The type of line used as a "shot line" has varied greatly. Until 2 braided nylon line was adopted for Navy in the 1940s, descriptions of shot line were often in archaic or locally used terms used for various type of cordage. Often it was some sort of fishing line, such as cod or mackerel, and variously described as being twisted or braided, made of cotton, flax or linen. The size specifications were sometimes numbers based on a manufacturer's listing, and sometimes by actual measurements. Measurements are complicated by being in inches or metric, and the custom of noting nautical line by its circumference, not the diameter. Based on descriptions and surviving pieces of line found with various line throwing devices, it appears that shoulder fired line throwing guns mostly used line in the range of 3 /32- to 3 /16-inch diameter. Lyle type cannons more often used 5 /32- to 9 /32-inch diameter lines.
- <sup>3</sup> J.P. Barnett, *The Lifesaving Guns of David Lyle*, South Bend, IN, 1976. This has great coverage of the many varied Lyle type line throwing cannons, but very little on any mortars, rockets or shoulder line throwing guns. Hereafter cited as Barnett, Lyle Guns.
- <sup>4</sup> Robert F. Bennett, *Surfboats, Rockets, and Carronades*, Washington, DC, 1976, 42-43
- <sup>5</sup> "EARLY 19TH CENTURY LIFE SAVING APPARATUS." EARLY 19TH CENTURY LIFE SAVING APPARATUS. Web. 20 Apr. 2015. <<http://members.iinet.net.au/~dodd/gail/publications/trengrouse/Essay.html>>.
- <sup>6</sup> *The Edinburgh Encyclopaedia*, Volume 16 page 145.
- <sup>7</sup> Walthew, Kenneth, *From Rock and Tempest: The Life of Captain George William Manby*, London, 1971. George Manby was a very creative, but pathetic individual. Some of his eccentricities may have been the result of being shot in the head by his wife's lover. He persistently petitioned royalty for audiences, adoption of his plans, financial rewards, and hopefully a title of some sort, but always without success. Eventually there was a statue erected to honor Manby's mortar invention, in the yard of his home, paid for by himself, along with a portrait showing himself next to his monument, which he also paid for. He was a prolific inventor, and besides the Manby mortar, deserves credit for an early form of the "breeches buoy" and the "life car." He also invented the soda acid fire extinguisher and was as concerned about fire fighting apparatus as for maritime life-saving devices and their utilization. Although sometimes described as a merchant marine or naval officer or a "Captain," he was actually the "barracks master" at Falmouth, a lowly sinecure position accounting for supplies.
- <sup>8</sup> Mark Anthony DeWolfe Howe, *The Humane Society of the Commonwealth of Massachusetts: An Historical Review, 1785-1916*, Boston, 1916, p. 233. "Humane Society" pertained to humane treatment of distressed mariners, and has no relation to later "Humane Societies" dealing with stray animals.
- <sup>9</sup> U.S. Centennial Commission, *Report of the Board on behalf of the United States Executive Departments at the International Exhibition held at Philadelphia, Pa., 1876*, Volume II, Washington, 1884, pp. 134-135. Hereafter cited as *1876 Centennial Exhibition*.
- <sup>10</sup> Richard Larn and Bridget Larn, *Henry Trengrouse: The Cornish Inventor of the Rocket Life-Saving Apparatus*, Truro, Cornwall, UK, 2006, pp. 24-38. A photo is shown of the cover page for Trengrouse's pamphlet (*A Brief Description of and Direction for Using Trengrouse's Apparatus for the Preservation of Lives and Property in cases of General Shipwreck and for Assisting Vessels in Distress at Sea, &c.*, London, n.d. [circa 1818]), but I was unable to locate a copy, which would be most interesting. The Larns' book is probably the best single overall history of the near simultaneous developments with mortars by Manby, and the rocket work of Trengrouse and Dennett, although a few details seem to be at odds with other published sources.
- <sup>11</sup> The Helston Museum, Cornwall, UK, has a set of Trengrouse rockets and launchers on display, perhaps the only surviving examples. They graciously provided photographs of these for this paper.

- <sup>12</sup> "EARLY 19TH CENTURY LIFE SAVING APPARATUS." EARLY 19TH CENTURY LIFE SAVING APPARATUS. Web. 25 Apr. 2015. <<http://members.iinet.net.au/~dodd/gail/publications/tren-grouse/Essay.html>>.
- <sup>13</sup> Great Britain, *Secretary of War, Treatise on Ammunition, Cor 13 rect-ed up to December 1877*, HMSO, London, 1878, pp. 279-289. This chapter includes extensive coverage of various "war rockets" as well.
- <sup>14</sup> Thomas Roys and G.A. Liliendahl "Improvement in Rocket Harpoons." Patent 54,211. April 24, 1866.
- <sup>15</sup> Robert Bennett Forbes, *Life-Boats, Projectiles and Other Means for Saving Life*, Boston, 1872, p. 100.
- <sup>16</sup> *1876 Centennial Exhibition*. p. 135.
- <sup>17</sup> U.S. Army, Ordnance Department, *Report on Foreign Life-Saving Apparatus by Lieutenant David A. Lyle*, Washington, 1880, p. 320. Hereafter cited as Lyle, *Foreign Life Saving Apparatus*.
- <sup>18</sup> *Norfolk Virginian*, November 1, 1889, quoted in Richard A. Pouliot and Julie J. Pouliot, *Shipwrecks on the Virginia Coast and the Men of the Life-Saving Service*, Centreville, MD, 1986. Hereafter cited as Pouliot, *Virginia Coast*.
- <sup>19</sup> *1876 Centennial Exhibition* pp. 135-136.
- <sup>20</sup> Ibid. "Swivel Guns and Irons." *Swivel Guns and Irons*. Web. 20 Apr. 2015. <[http://www.whalecraft.net/Swivel\\_Guns.html](http://www.whalecraft.net/Swivel_Guns.html)> notes that Cordes was associated with John Phillip Rechten of Bremen, Germany, who made several different whaling swivel guns. It is likely that the knapsack and shoulder guns mentioned are variations of those.
- <sup>21</sup> Norton, Frank H. *Frank Leslie's Historical Register of the United States Centennial Exposition, 1876*. New York, 1877. The Cordes Leinenwurfmorser Kal 80 is described as having a 31/8-inch bore (about 80mm) with the barrel 261/2 inches long and the wooden carriage about 29 inches long. Photos and further information found at "H.G. Cordes Life Saving Cannon circa 1860--SOLD." - *Frank's Fisherman*. Web. 20 Apr. 2015. <<http://www.franksfisherman.com/products/h-g-cordes-cannon-circa-1850>>.
- <sup>22</sup> "USCG: Frequently Asked Questions." USCG: Frequently Asked Questions . Web. 20 Apr. 2015. <[http://www.uscg.mil/history/people/Sumner\\_Kimball.asp](http://www.uscg.mil/history/people/Sumner_Kimball.asp)>.
- <sup>23</sup> Lyle, *Foreign Life Saving Apparatus*. This documents design details and actual firing tests under controlled conditions of virtually every foreign type of rocket and related devices. It is an important reference on the subject.
- <sup>24</sup> U.S. Army, Ordnance Department, *Report on Life-Saving Ordnance and Appurtenances by Lieutenant David A. Lyle*, Washington, 1878.
- <sup>25</sup> Barnett, *Lyle Gun*, passim.
- <sup>26</sup> For later shipboard Lyle guns, the powder charge was prepacked in cloth bags with 2.5 ounces of black powder with the bags marked "Onehalf normal charge for Lyle gun, 2. ounces black powder". Two packs were used for a normal charge of 5 ounces, but three bags totaling 7. ounces could be used in an emergency. U.S. Coast Guard, *Proceedings of the Marine Safety Council*, February, 1950, p.24.
- <sup>27</sup> Pouliot, *Virginia Coast*, p. 21.
- <sup>28</sup> Captain C. Gray Jones, RN, "The Rocket Apparatus and its work," *The Leisure Hour: A Family Journal of Instruction and Recreation*, No. 1263, March 1,1876, pp. 164-168. W.D. O'Connor, "The United States Life-Saving Service," *Popular Science Monthly*, 15, June 1879. "United States Life-Saving Service," *Appleton's Annual Cyclopedic and Register of Important Events of the Year 1878*, New York, 1879. (pp 749-768.)
- <sup>29</sup> U.S. Life Saving Service, *Annual Report of the U.S. Life Saving Service for the Fiscal Year Ending June 30, 1900*, Washington, 1901, pp 17-18.
- <sup>30</sup> "Spotlight | National Inventors Hall of Fame." National Inventors Hall of Fame Inductee Detail Comments. Web. 16 Apr. 2015.
- <sup>31</sup> U.S. Patents by Simon Ingersoll:  
"Gun and projectile for throwing life lines." Patent 331,972. December 8, 1885.  
"Projectile for throwing life lines." Patent 348,848. September 7, 1886.  
"Gun and projectile for throwing life lines." Patent 348,849. September 7, 1886.  
"Hood for life line projectiles." Patent 394,926. December 18, 1888.
- <sup>32</sup> Dr. Harold Friedman, "The Life-Saving, Line Throwing Gun: Simon Ingersoll's Marvelous Invention," *Remington Society of America Journal*, 4th Quarter, 2003, pp 42-45.
- <sup>33</sup> U.S. Life Saving Service, *Annual Report of the Operations of the U.S. Life Saving Service for the Fiscal Year Ending June 30, 1886*, Washington, 1887, p. 481.
- <sup>34</sup> One account claims that about 25 Ingersoll guns with metal butts were made by Remington for use aboard ships, but I believe this to be inaccurate. Dick Salzer, "Accoutrement Corner [Remington Line Throwing Gun]," *Gun Report*, August, 2006, p. 44.
- <sup>35</sup> A Life Line Gun. *Chicago Tribune*, January 17, 1884, p. 8.
- <sup>36</sup> "New York Fire Department testing devices for throwing life lines over buildings," *Scientific American*, May 23, 1885.
- <sup>37</sup> Advertising flyer quoting 1890 Western Union Building fire shown in Dr. Harold Friedman, "Shoulder Line Gun Inventor: Simon Ingersoll," *Gun Report*, January, 2001, pp. 52-54. John R. Spears, "Modern Fire Apparatus." *Scribner's Magazine*, XI, January, 1891, pp. 54-64. Helen Campbell, *Darkness and Daylight; or Lights and Shadows of New York Life, Hartford, Conn. 1896*, pp. 533-534. "Firemen Whose Business is Saving Lives," *Syracuse [NY] Herald*, May 30, 1905, p. 33.



- <sup>38</sup> The author has observed flash guards only on a Model 1868 line throwing conversion and a Naval Company, Roslyn, PA, line thrower.
- <sup>39</sup> Tyrrell Historical Library, Beaumont, TX.
- <sup>40</sup> Dr. Harold Friedman, "Springfield Trapdoor Life and Line Guns," *Gun Report*, September, 1970, pp. 26-31.
- <sup>41</sup> "Water Grenades and Bed Keys: The San Francisco Fire Department Museum." *Untapped Cities RSS*. 25 July 2012. Web. 16 Apr. 2015. <<http://untappedcities.com/2012/07/25/water-grenades-and-bed-keys-thesan-francisco-fire-department-museum/>>.
- <sup>42</sup> "Springfield Armory Museum - Collection Record." *Springfield Armory Museum - Collection Record*. Web. 18 Apr. 2015. <<http://ww2.rediscov.com/spring/VFPCGI.exe?IDCFile=/springDETAILS.IDC,SPECIFIC=17601,DATABASE=objects>>. Herbert G. Houze, "Notes Regarding Winchester Life Line Throwing Guns," *Gun Report*, May, 1996, pp. 50-53.
- <sup>43</sup> Personal communication from retired FDNY Battalion Chief John Salka, February 28, 2015.
- <sup>44</sup> "Charlestown Fire Company - Apparatus." *Charlestown Fire Company - Apparatus*. Web. 24 Apr. 2015. <<http://cfc5.net/apparatus.html#9674>>.
- <sup>45</sup> "Sailor Triggers Chimney Rescue," Victoria, Texas, *Advocate*, January 30, 1959.
- <sup>46</sup> This was a substitute for Dimond's previous submission described as 46 "... a Remington pistol with a folding shoulder-piece so as to be fired from the shoulder" but no further information has been found on Mr. Dimond or his devices. U.S. Life Saving Service, *Annual Report of the U.S. Life Saving Service for the Fiscal Year Ending June 30, 1896*, Washington, 1897 p. 484.
- <sup>47</sup> Ibid.
- <sup>48</sup> U.S. Life Saving Service, *Annual Report of the U.S. Life Saving Service for the Fiscal Year Ending June 30, 1899*, Washington, 1900, p. 472.
- <sup>49</sup> U.S. Life Saving Service, *Annual Report of the U.S. Life Saving Service for the Fiscal Year Ending June 30, 1904*, Washington, 1905.
- <sup>50</sup> Example in private collection, Boulder, CO.
- <sup>51</sup> U.S. Coast Guard, *Proceedings of the Merchant Marine Council*, September, 1970, p. 176.
- <sup>52</sup> U.S. Department of Commerce, Steamboat Inspection Service, *Bays, Sounds, and Lakes other than the Great Lakes, General Rules & Regulations, 1920*, p. 129.
- <sup>53</sup> U.S. Coast Guard, *Proceedings of the Marine Safety Council*, February, 1950, pp. 24-25.
- <sup>54</sup> Ibid.
- <sup>55</sup> Requests to get a complete listing of all items approved by the Coast Guard under 46 CFR 160.031 have not been successful. A partial list is posted at "USCG CGMIX EQList Search Page." USCG CGMIX EQList Search Page. Web. 26 May 2015.
- <sup>56</sup> Dr. Harold Friedman, "Springfield Trapdoor Life and Line Guns," *Gun Report*, September, 1970, p. 30.
- <sup>57</sup> Ibid.
- <sup>58</sup> "Powder Flask", *Gun Report*, April 1998, pp 42-43.
- <sup>59</sup> U.S. Coast Guard, *Proceedings of the Marine Safety Council*, NAVCG-129, June, 1945, p. 92. Hereafter cited as *Marine Safety Council*, June, 1945.
- <sup>60</sup> McCracken Research Library, Buffalo Bill Center of the West, Herbert Houze Collection MS 070, Series 2: Firearms Research Files Box 4 Folder 72: Line throwing guns. Hereafter cited as McCracken, Houze Line Throwing notes.
- <sup>61</sup> Edward Scott Meadows, "U.S. Ordnance Dispatch, [Winchester Line Throwing Guns]," *Gun Report*, August, 2005, pp 14-15.
- <sup>62</sup> Dr. Harold Friedman, "Winchester M1886 Navy Line Gun," *Gun Report*, April, 1998, p. 40.
- <sup>63</sup> McCracken, Houze Line Throwing notes.
- <sup>64</sup> U.S. Naval Institute, *The Bluejacket's Manual*, 11th edition, Annapolis, MD, 1943. p. 404.
- <sup>65</sup> The February 2010 Little John Auction lot number 1,000 was a Model 1886 Winchester .50 caliber smoothbore "Line Gun" serial number 149115, with 17- inch barrel slightly turned down for about 3 inches with an Ingersoll style cap projectile. This was definitely not part of the William Read order and no mention is made of a factory letter to document when, why, or where this was made into a line gun. However, with a barrel over 18 inches it is not subject to any NFA restrictions.
- <sup>66</sup> "Trade Notes," *Modern Machinery*, September 1900, p. 117.
- <sup>67</sup> U.S. Coast Guard, *Annual Report of the United States Coast Guard for the Fiscal Year ending June 30, 1921*, Washington, 1922, pp. 37-40. Hereafter cited as *Coast Guard Annual Report for 1921*.
- <sup>68</sup> "Quarter-Deck Talk," *The Rudder*, April 1908, p. 392
- <sup>69</sup> Ancestry.com. U.S., *World War I Draft Registration Cards, 1917-1918* [database on-line].
- <sup>70</sup> Sterling Cooper Corporation, *Sterling's Marine Catalog*, 1922 Edition, New York, 1922, p233. WW1 Draft card, Francis Granger Hall, ancestry.com.

<sup>71</sup> Pennsylvania corporate business records indicate that Naval Company was registered May 27, 1919, with Philadelphia as the principle place of business.

<sup>72</sup> *Marine Safety Council*, June, 1945, p. 92.

<sup>73</sup> Hall, F.G., "Mortar for throwing line carrying projectiles," U.S. Patent 1491855, April 29, 1924. Hall, F.G., "Line throwing gun," U.S. Patent 1487778, March 25, 1924.

<sup>74</sup> U.S. Coast Guard, *Annual Report of the United States Coast Guard for the Fiscal Year ending June 30, 1916*, Washington, 1916, p. 291.

<sup>75</sup> U.S. Life Saving Service, *Annual Report of the U.S. Life Saving Service for the Fiscal Year Ending June 30, 1904*, Washington, 1905, pp. 432-433.

<sup>76</sup> "New Hall Line Carrying Gun can be Handled by One Man," *Nautical Gazette*, April 16, 1921, p. 508. "New Line Carrying gun," *Pacific Marine Review*, number 18, June, 1921, p.50.

<sup>77</sup> *Coast Guard Annual Report for 1921*, pp. 37-40.

<sup>78</sup> *Marine Safety Council*, June, 1945. p. 92.

<sup>79</sup> Two top break single shot line throwing guns marked "Naval Company, Roslyn, PA." from the Hall era have been observed. One in a private collection has the metal buttstock and turned down muzzle for an Ingersoll type projectile. The other, sold at the Rock Island Auction in December 2009, has wood stocks and smooth bore for brass rod type projectile; neither was ever set up for a shot line canister, so they were intended to use a separate canister or hand held coil of line.

<sup>80</sup> The Naval Company website is <http://www.navalcompany.com>.

<sup>81</sup> McCracken, Houze Line Throwing notes.

<sup>82</sup> Ibid.

<sup>83</sup> Knight, Austin M., *Modern Seamanship*, Eighth Edition, New York, 1921, pp. 755-757.

<sup>84</sup> U.S. Coast Guard, *.30 Caliber Shoulder Line Throwing Equipment, 10 October 1935*, Washington, DC, 1935, p. 1.

<sup>85</sup> Ibid., p. 2.

<sup>86</sup> U.S. Coast Guard, Pamphlet No. D30911-0, *Line Throwing Guns and Pyrotechnics*, Yorktown, VA, January, 1980, p. 2-1. The March 2013 Poulin Auction lot number 1418A was an Eddystone Model 1917 rifle serial number 597755 converted to a line thrower, with box and accessories. There are no M1917 rifles identified as line throwers in the Springfield Research Service database.

<sup>87</sup> Ryan, M.J., "Life Line Projectile," U.S. Patent 2069276, February 2, 1937.

<sup>88</sup> Ibid.

<sup>89</sup> USCG Solicitation Number: HSCG40-12-Q 89 -B830100045 dated 2 Feb 2012; USCG Solicitation Number: HSCG40-15-Q-60200 dated 19 Feb 2015.

<sup>90</sup> USCG Drawing number FL-583-001 dated August 16, 2013.

<sup>91</sup> Brophy, William S., *The Springfield 1903 Rifles*, Mechanicsburg, PA, 1985, pp. 150-153. Brophy claims that these have been used by both the Navy and Coast Guard, but I have found no evidence of Navy use. He also states that the conversions were done by three firms, W.H. Reisner Mfg. Co., Hagerstown, MD; Van Karner Chemical Arms Corp., New York (USN); and Price Bros. Inc., Frederick, MD.

<sup>92</sup> Mallory, Frank, *Springfield Research Service Serial Numbers of U.S. Martial Arms*, 4 volumes, Silver Spring, MD 1995.

<sup>93</sup> CDR J.E. Stika, USCG, letter to Edwin Pugsley, February 12, 1936.

<sup>94</sup> Houze, Herbert G., "Notes Regarding Winchester Life Line Throwing Guns," *Gun Report*, May, 1996, pp. 50-53, citing George Watrous "Miscellaneous Notes, Model 37," "Winchester Repeating Arms Company Archives.

<sup>95</sup> "Springfield Armory Museum - Collection Record." *Springfield Armory Museum - Collection Record*. Web. 18 Apr. 2015. <<http://ww2.rediscov.com/spring/VFPCGI.exe?IDCFile=/spring/DETAILS.ID-C,SPECIFIC=17601,DATABASE=objects>>.

<sup>96</sup> Joe Salter online catalog listing, no longer active.

<sup>97</sup> U.S. Navy, Bureau of Ordnance, *Ordnance Pamphlet 546 (First Revision), Caliber .45 Line Throwing Gun: Description and Instructions for Use*, Washington, 29 December 1944. Hereafter cited as OP546 First Revision. Note that this is a "first revision" of OP546 but a copy of the previous edition has not been located, but it is probably circa 1942.

<sup>98</sup> U.S. Navy, Bureau of Ordnance, *Ordnance Pamphlet 546 (Second Revision), Caliber .45 Line Throwing Gun Mark 1 Mod 1 and Associated Equipment: Description and Instructions for Use and Maintenance*, Washington, 7 June 1955. Hereafter cited as *OP546 Second Revision*.

<sup>99</sup> *OP546 First Revision*, pp. 1-2.

<sup>100</sup> *OP546 Second Revision* pp. 1-4.

<sup>101</sup> "Improvements in Line-Throwing Devices," Proceedings of the Merchant Marine Council, January, 1946, pp 5-6.

<sup>102</sup> U.S. Coast Guard, *Evaluation of the M-16 Rifle as a Line Throwing Gun*, Washington, 1972.

<sup>103</sup> Web. 18 Apr. 2015. <<http://ammtiac.alionscience.com/ammt/iacdocs.do?PA60960-02>>

- <sup>104</sup> U.S. Navy, Bureau of Ordnance, Dahlgren Proving Ground, Document NPG-713, *Test of .30 caliber Line Throwing Equipment developed by Frankford Arsenal for Naval Use*, January 15, 1951.
- <sup>105</sup> Web. 18 Apr. 2015. <[http://www.globalsecurity.org/military/library/policy/navy/nrtc/14160\\_ch2.pdf](http://www.globalsecurity.org/military/library/policy/navy/nrtc/14160_ch2.pdf)>.
- <sup>106</sup> Thompson, C.R., *From Ship to Shore: The Biography of William Schermuly and The History of the Schermuly Pistol Rocket Apparatus, Ltd.*, London, 1946, p. 3. Hereafter cited as Thompson, *Schermuly*.
- <sup>107</sup> *Ibid*, p p. 27-34 .
- <sup>108</sup> *Ibid*, p. 30.
- <sup>109</sup> The Behr gun is likely the same as reported on by the USLSS Board in 1909. It was a hefty 8- pound affair with 35- mm bore diameter, rubber recoil pad, and hydro pneumatic brake firing a projectile emitting some sort of driving gas from the base. Cost was \$182.50 and ammunition cost \$3 per round. U.S. Life Saving Service, *Annual Report of the U.S. Life Saving Service for the Fiscal Year Ending June 30, 1909*, Washington, 1910, p. 421.
- <sup>110</sup> Thompson, *Schermuly*, p. 34.
- <sup>111</sup> *Ibid*, pp. 32-34.
- <sup>112</sup> *Ibid* pp. 34-36.
- <sup>113</sup> Based on examination of specimens in the Woodin Laboratory, Tucson, AZ.
- <sup>114</sup> U.S. Coast Guard, *Proceedings of the Marine Safety Council*, February, 1950, pp. 24-25.
- <sup>115</sup> "Schermuly." *And His Rockets* . Web. 22 Apr. 2015. <<http://www.cyber-heritage.co.uk/schermuly/>>.
- <sup>116</sup> Alfred Price, *The Hardest Day: The Battle of Britain 18 August 1940*, London, 1979, pp. 46, 71-72.
- <sup>117</sup> U.S. Department of Transportation, U.S. Coast Guard, "A Coast Guard Comment on Line-Throwing Appliances," *Proceedings of the Marine Safety Council*, CG-129, December 1972, p. 249.
- <sup>118</sup> *Federal Register*, April 2, 1952, p. 629.
- <sup>119</sup> U.S. Coast Guard, *Proceedings of the Merchant Marine Safety Council*, January, 1952, p.23.
- <sup>120</sup> *Federal Register*, October 27, 1965, p. 13656.
- <sup>121</sup> *Federal Register*, September 26, 1985, p. 39062
- <sup>122</sup> Pains Wessex "Linethrower 250" data sheet dated January 2015.
- <sup>123</sup> Mossberg 50298 Line Launcher Owners Manual.
- <sup>124</sup> "Antique Arms, Inc. - Lyle Line Throwing Pistol in Original Case." *Antique Arms, Inc. - Lyle Line Throwing Pistol in Original Case*. Web. 23 Apr. 2015. <<http://www.antiqearmsinc.com/lyle-line-pistoloriginal-case.htm>>.

