

SOUTH SHIELDS VOLUNTEER LIFE BRIGADE

# Articles taken from the publication of The Engineer of 1866

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Regarding ship to shore rescue

by

**Thomas Gray H.M.C.S.**

Articles written about development of the apparatus used for Ship to Shore Rescue as known in  
1866

## Contents

Projectiles for Saving Life from Shipwreck .....	2
Rocket Apparatus for Saving Life from Shipwreck.....	13
Acknowledgements.....	22

## Projectiles for Saving Life from Shipwreck

*By Thomas Gray, Esq., H.M.C.S.*

Much has been written and much has been said about our means and our organisations for destroying our fellow creatures- about our Congreve and Hale rockets-our Enfield rifles, and our Armstrong and Whitworth guns about the discipline and courage of our army and navy about the steadiness and drill of our 150,000 volunteers ashore, and our 20,000 naval reserve men afloat all beautifully adapted and trained for the one great purpose of destruction; but far too little is known, and far too little is said and written, about the methods by which, and the extent to which, rifles, rockets, and mortars can be converted into instruments for saving life, and about those unpretentious men who devote moments snatched from their business their leisure, or their rest to saving their fellow-creatures.

It is now proposed to invite attention to some of the methods by which this end is attained in the case of ships wrecked and stranded on our coasts. When a ship gets close on a lee shore in heavy weather amongst rocks, or in shallow water, it is obvious that her chances of safety are remote, and that if she strike and break up both property and crew will suffer loss. If, after the ship has struck, the crew attempt to save themselves by jumping overboard, they will in all human probability either be drowned or dashed to death against the rocks or amongst the floating wreck in their endeavours to reach the shore. If they attempt to lower their own boat under the circumstances, she will probably, in nine cases out of ten, be either capsized or stove, if not both. In the same way, if a boat attempt to put off from the shore, she will stand but little chance of working against a head sea, or if the coast is rocky or strewn with wreck, of escaping destruction amongst the rocks and wreck. The author is not now writing of those cases in which the boats of that noble establishment, the Royal National Lifeboat Institution, are of use, and are used with such marked success. There are cases in which a wreck happens too far from the shore for the rocket apparatus to be of use; then the lifeboat renders her services. But there are again cases in which the wreck happens close on the shore, amongst rocks, where the lifeboat is useless; and here the rocket apparatus comes into service. It is of assistance rendered in these latter cases exclusively that the author is now writing.

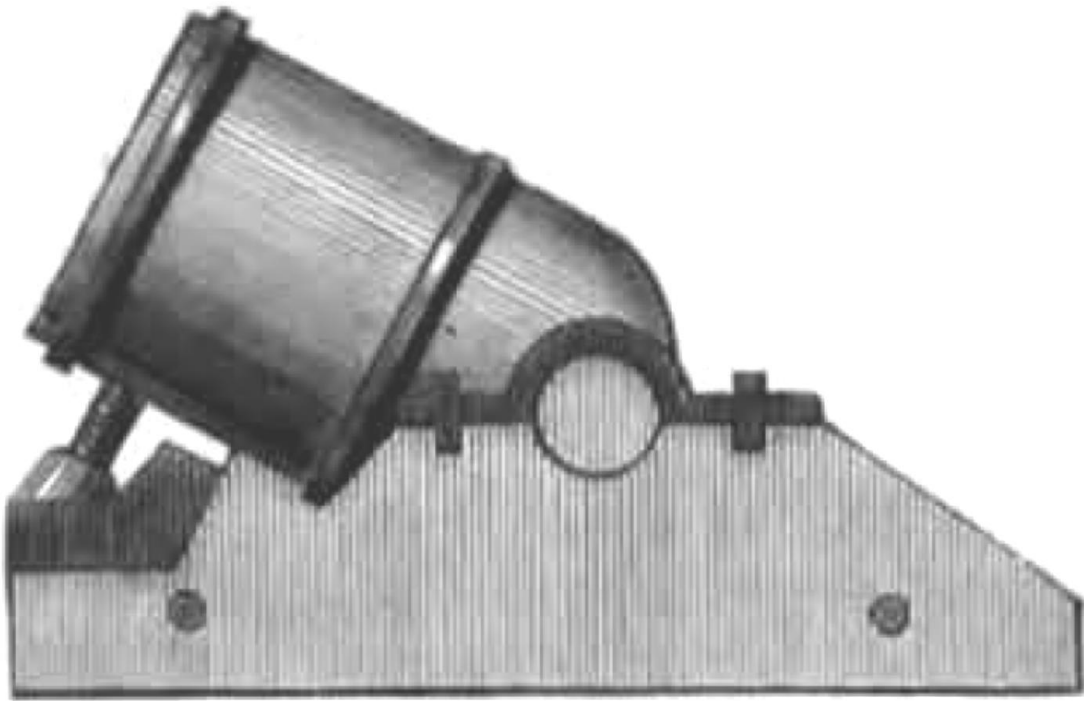
It was a consideration of the fearful loss of life happening in ships wrecked on the shore that led one Sergeant Bell, of the Royal Artillery, in 1791, to devise a plan whereby a shot, with a line attached, might be thrown from a ship in distress to the shore. (See "Transactions of the Society of Arts," vol. x.) Sergeant Bell, however, appears to have done little or nothing with his apparatus, and it was not until 1808 that anything noteworthy and practical was effected with the shotted line. It appears from the "Transactions of the Society of Arts" for the year 1808 (vol. xxvi, page 209), and from the evidence accompanying the "Report of the Select Committee on Shipwrecks, 1836 (see Parliamentary Paper 567, page 133), that in 1808 Lieutenant Manby saved the crew of a brig called the Elizabeth, of Plymouth, wrecked on the Norfolk coast, by means of a line thrown over the ship.

When the veteran Manby was in his seventy first year he was examined by the select committee. His own words will best convey the circumstances that led him to a thoughtful consideration of the subject. He says (p.133) :-"I therefore most respectfully beg leave to state that for four winters after my appointment to the charge of the barracks at the above-named place (Yarmouth, Norfolk), in the yeall'1803, I witnessed the loss of vessels with all their crews within a few yards from the shore, from the difficulty by manual exertion to throw a rope by band against a furious wind, and the impracticability of forcing a boat from a beach by the power of oars to effect their preservation; and in the dreadful gale of 18th February, 1807 (when 141 dead bodies were washed up at or near Yarmouth), I witnessed his Majesty's gun brig Snipe stranded within fifty yards of the beach at the back of the pier, having sixty-seven persons on board, who all perished after many hours' fruitless attempts, and every effort then known had been tried to save them. On the close of that mournful scene I vowed if providence blessed me with life I would apply myself to produce some effective means by which not only the sufferers might have been rescued, but similar occurrences in future be prevented. It may next be proper for me to state some authenticated facts communicated to me in reference to the coast at and near Yarmouth: that twenty years previously to the occurrence I have just mentioned 200 persons at least had perished in vessels driven on shore at that fatal spot. I should also state that in a gale upwards of thirty vessels were wrecked on the sands off and near Yarmouth, and from their peculiar situation and most dangerous character (being quicksands) they rapidly swallow up every vestige of the ship's hull"

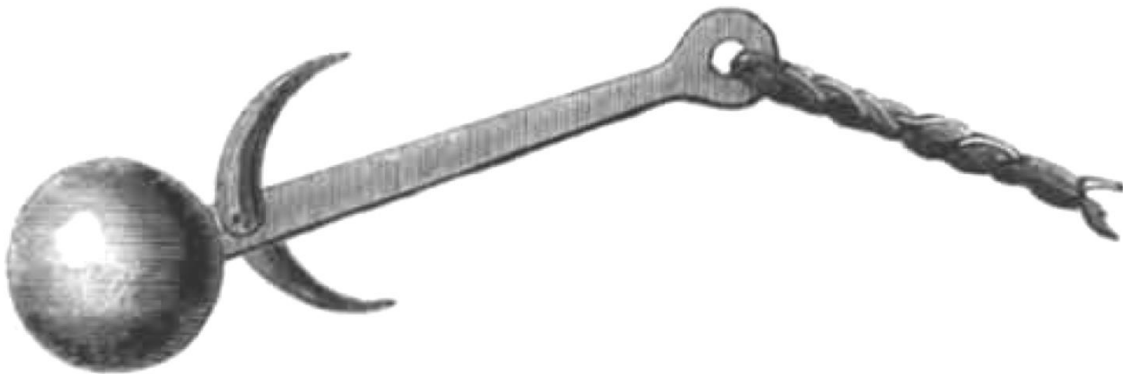
Manby, it is evident, from a perusal of the papers above referred to, made his attempts without any previous knowledge of the proposal of Sergeant Bell. It has been told of him (and this anecdote was printed in the "North British Review" some years ago) that when a youngster he had coveted a nest built by a screech owl in the walls of a church in a Norfolk village, and that after puzzling his brains how to get at it he hit upon the plan of throwing a thin line over the church, and then by that hauling over a thicker one, and so on until he got one sufficiently strong to bear his own weight. He accordingly got a quantity of pewter and cast himself a mortar. With this mortar he was quite successful.

The rude contrivance made by the young Manby to get a bird's nest is to the present time the groundwork of the whole of the apparatus for saving life from shipwreck on our coasts. It is true that the rocket has superseded the mortar, but it is nevertheless true that the principle of throwing from the shore, by means of gunpowder, a missile with a thin line attached, and by means of that getting a thicker and yet thicker line on board, is the fundamental principle of the whole apparatus.

Manby's apparatus may readily be understood by the aid of the following sketches:



Mortar



Manby's Shot

The mortar an ordinary 5½ inch 24 pounder cohorn is fixed in a thick solid block of oak, and projects a looped barbed shot, fitted with a plaited hide thong. The barns were sometimes fitted so that they worked on a pivot, and closed in the shank of the shot when it was in the mortar, and opened when it was out. They were fitted on the supposition that they would catch, like anchor, in the rigging, ropes, or wreck, and afford a better chance of securing a communication. This has, in actual practice, not proved to be the case, as the shot is thrown many yards over the ship, and the line is easily secured when once over. Another and a very serious drawback was that the

barbs caught in the rocks, and if the shot missed the ship the line and shot could not be recovered. There was also another disadvantage in the shot used by Manby, and that was that its course could not be traced at night.

These defects have recently been overcome by Colonel Boxer, R.A., and now the shot are without barbs, and are made cylindrical with one hemispherical and one flat end. In the flat end are bored four holes, and in these holes are placed fuses, which throw o. good light over the vessel at night.



Boxer's Shot

The plaited hide thong is still retained. About the same time that Manby succeeded in saving the crew of the brig referred to above, a Mr. Henry Trengrouse, on the coast of Cornwall, turned his attention to the subject (see Transactions of the Society of Arts, 1820, vol xx.viii.p. 161) and also the Parliamentary paper above referred to, p. 249. He thought of three methods: one was a kite, another was a hand lead and line, and the third was a rocket. His plans were completed in 1821. As regards his three plans, it may be remarked that Lieutenant Nares, R.N., has since invented a kite which would sometimes be of much use; but as ship stranded is a rule stranded on lee shore, and as the kite must therefore be flown from the ship to the shore, it must be carried on board, and kept in order to be of use. And, further, as the chances are much against kites being carried aboard a ship, and kept in repair if carried, they may be dismissed from notice at once.

The second proposal, the hand lead line, has been perfected by Captain Ward, R. N. of the Royal National Lifeboat Institution, and the officers of the Board of Trade in form of “heaving stick” and line as shown below.



Heaving Stick

A piece of stout cane about 2ft. long loaded at one end with 2lb. of lead, and to the other end is attached a thin line. These sticks are whirled round by the arm vertically three times and then let go. Their range by practised hand is about fifty yards. They are in fact quite effective as Trengrouse’s small rockets. The third plan proposed, viz., the rocket, has been improved by Dennett and Colonel Boxer, and is now in general use.

The ordinary sky rocket or “firework” consists of a cylindrical paper case open at one end, with a quickly and fierce burning composition of sulphur, charcoal, and saltpetre, rammed into it. After the composition is rammed in a part of it is bored out again leaving a passage longitudinally, as shown.



Sky Rocket

The shaded part shows the composition, and the dotted part at the head shows the coloured stars that are blown out of the case after the composition has carried it to its height.

Trengrouse used a very small rocket of this description (eight ounces), but without the coloured stars, and fired it by laying the stick along the barrel of a common musket, and resting the rocket itself on a small metal stage with a bayonet catch at the mouth of the musket, as shown.



TRENGROUSE'S REST

On fire being applied at the open end of the rocket it immediately runs up the part bored out and communicates with the whole interior. The fire and gases issue with immense force from the vent against the air and propel the rocket forwards through the whole of its course. In carrying a line a rocket has a great advantage over a shot. The rocket begins to move slowly, and it carries its propelling power within itself it gradually attains its maximum speed without any jerk on the line, whereas the shot starts with a jerk which is likely to snap the line attached to it.

The first time the rocket was really used in saving life from shipwreck as at the wreck of the Bainbridge on the southern side of the Isle of Wight. This was in 1832. It appears that a Mr. John Dennett, who had been employed in making war rockets, had by this time matured his plans for saving life. He also appears, to have been working without any knowledge of Mr. Trengrouse's proposition. Dennett used a large and really efficient rocket, carrying a stoutish line, and he first showed that the flight of the rocket with a line attached could be depended on.

Having demonstrated in conclusive manner that the rocket could be used, and having produced a tolerably perfect apparatus, the Board of Customs, in 1834, took the matter in hand. At this time the coastguard under the Board of Customs was supplied with a few sets of Dennett's apparatus, and from this time the serious and effective use of the apparatus dates. But it was not until years later (1855) that the system was completed by uniform rules a uniform practice, and uniform pattern for stores. Dennett's rockets are, as nearly as possible, similar to the old sky rocket. The paper case is replaced by an iron case, and the stick of the sky rocket by a pole 8ft. long. One of Dennett's rockets with a pole attached weighs twenty three pounds, and is propelled by nine pounds of composition. The practical or working range of Dennett's nine pound rocket, with a line attached, is 250 yards; sometimes 290 yards have been reached.

The next person who turned his attention to the subject was one Mr. Carte, an ordnance storekeeper at Hull. (See Parliamentary report of 1843, 549: appendix, page 84,)

The chief difference between Carte's and Dennett's apparatus was that Carte used a Congreve rocket instead of a rocket of the ordinary pattern. Carte's apparatus was made about the year 1842. The Congreve rockets (As shown below) (differed from Dennett's in having a central stick instead of a lateral stick. The stick or pole was placed central, and the fire issued from six smaller vents placed in a circle at the base of the rocket instead of from one large vent as in the case of Dennett's and other ordinary rockets.



Congreve rocket

The Trial range of Carte's Congreve rockets were six pounders, 238 yards; twelve pounders, 344 yards. Carte's apparatus appears to have been only an unimportant modification of Dennett's and never came into general use.

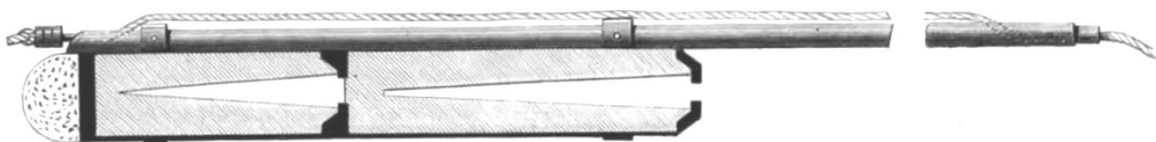
When the Government took the apparatus really in hand, in 1855, endeavours were made to improve the range of rockets, to perfect the gear, and to establish a uniform practice throughout the coasts of the United Kingdom, and their endeavours have resulted in marked success. To increase the range of the rockets Dennett hit upon the expedient of coupling two rockets together, side by side, as shown.



Dennett's coupled rockets

By this means he gets a range of 400 yards, with an elevation of 35 degrees, but as it is found in actual practice that there is an amount of uncertainty in getting both to light simultaneously, and as there is danger of the rockets parting, the practice of coupling has been discontinued.

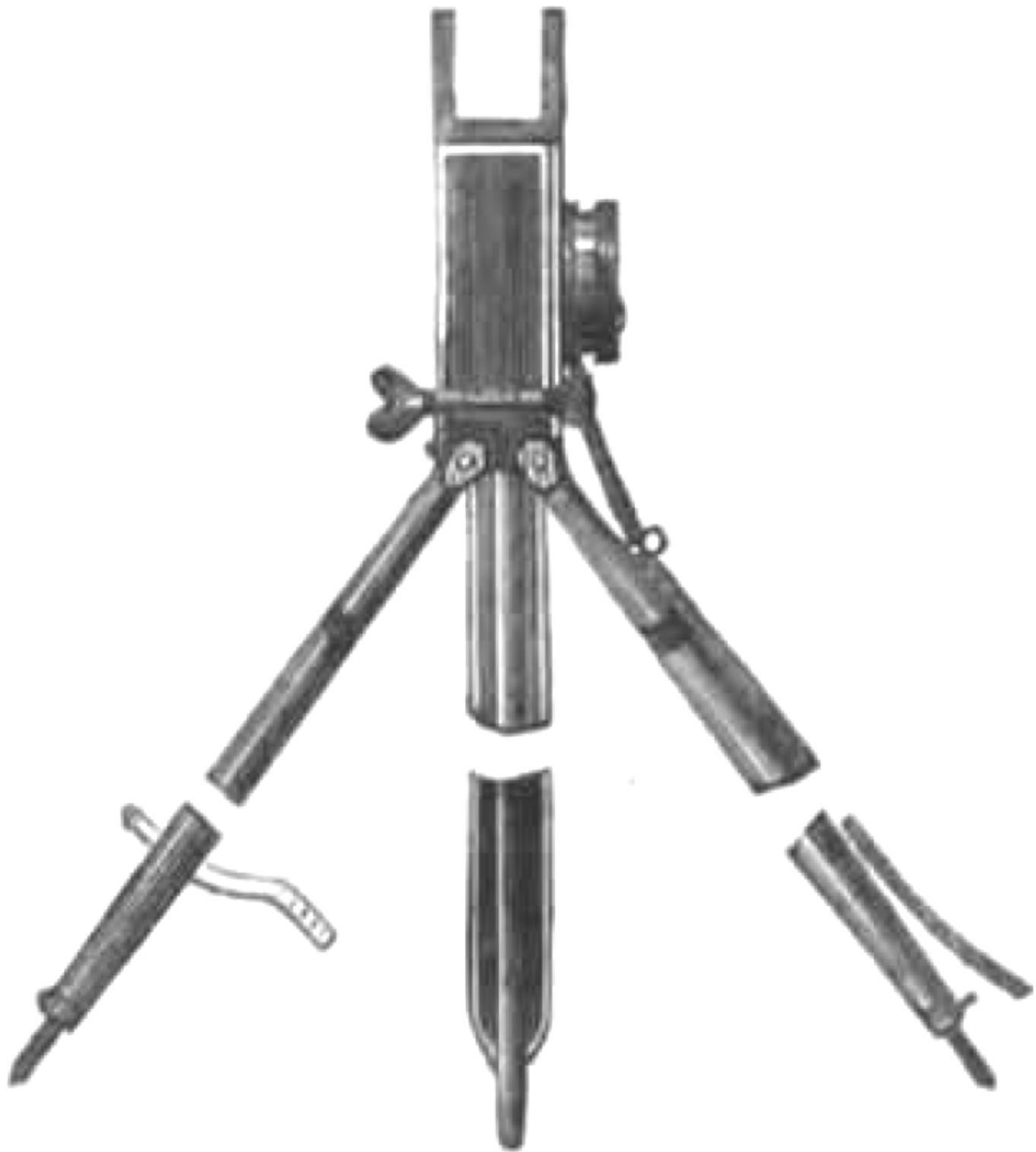
Colonel Boxer's services were called in, and after repeated experiments he hit upon the plan of putting two rockets in one case. The illustration shows a section, the dotted head being composed of hardwood, the black parts shown the wrought iron case and partitions and the shaded part shows the composition with longitudinal cavities left white.



Boxer's double rocket

The effect of this arrangement is that the first rocket carries the case and line to its maximum height, and the next rocket gives the case and line a further impetus forward. It is curious that the range when two rockets are placed end on to each other, is so much greater than when rockets of the same size and weight are placed side by side, or when the weight of composition is placed as one rocket in one case; but it is so. It is most marked, and no sooner does the second rocket ignite than its effect is noticeable in the line box carrying the line out with increased rapidity.

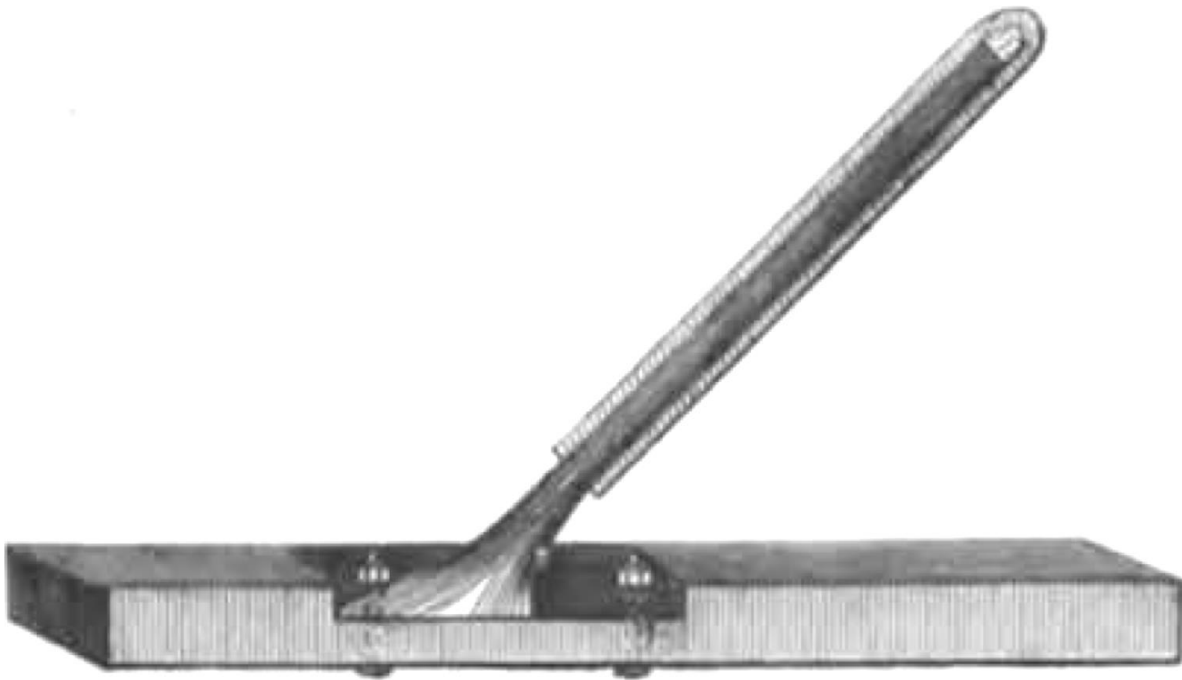
The rockets used in saving life from shipwreck are fired from a triangular stand, as shown;



Rocket stand

The fire is communicated either by a fuse and port fire, or by a percussion tube. The elevation is determined by a quadrant or pendulum. The elevation for a Dennett's rocket is  $32^{\circ}$ . It may be well to mention in this place an attempt made by Captain Brown R.N., the late Registrar General of Seamen to use a musket barrel with a line attached instead of a rocket. It occurred to him that if the ramrod was fixed and the barrel fired off, a line might be carried when it would not be carried by the shot itself.

He had already made some experiments with a musket barrel weighing two pounds, and had obtained a range of 285 yards with a charge of  $3\frac{3}{4}$  drachms of powder. Some steel cylinders were made in lieu of the musket barrels, and were arranged on their ramrods or stands as shown.



Captain Brown's Proposal

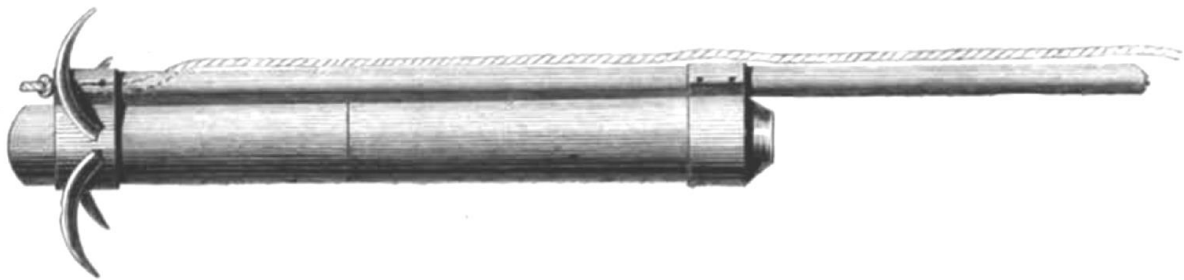
The black part shows the stand or ramrod; the shaded part the cylinder or barrel; and the dotted part the charge of powder. With a steel cylinder and a rocket line and a 2 ounce charge of powder he got a range of 150 yards; but with 3 ounce the cylinder burst. On further experiment it was ascertained that the plan was not adapted for the life-saving apparatus, and it was abandoned.

Colonel Delvigne of the French army also invented a shot to be thrown from a rifled mortar. This shot carried a copper line in it coiled the reverse way of the rifling, but in practice it parted, and was rejected in favour of the simple shot. He has however made an arrow, to be fired from ordinary musket or rifle, which is very ingenious, and may be of use in some cases. It is constructed as shown;



Delvigne's Arrow

It is an ordinary stick of mahogany, something like a billiard cue: the thick end presses in the powder, and the thin end, weighted with lead at the shaded part, and fitted with loops of string, protrudes beyond the muzzle. The line is attached to the loops, and they in their turn are fitted tightly to the thinnest part of the stick. The jerk imparted to the stick at the moment of firing causes the loops to slip down towards the thick end of the stick, and as they cannot slip easily, a gradual motion is imparted to the line, which prevents it from snapping, as it would do if it were fastened rigidly. The arrow weighs 18oz., and the range attained with it and an ordinary mackerel line is 80 yards. Mons. Tremblay has fitted a large rocket with an anchor-head, as shown; and proposes to use it in firing from the ship to the shore.



Tremblay's Anchor Rocket

It is carried by the Imperial yacht, it is to be hoped that if the yacht should come ashore the people on shore will get as far away as they possibly can. It may be the means of saving some persons on board the ship, but is more likely to be the means of killing people on the shore.

The above is a short sketch of what has been done in the way of projectiles for saving life. It will show in what respects some schemes have failed whilst others have succeeded, and may also be useful as a guide to any person hereafter designing a projectile for carrying a line.

Source Article by Thomas Gray, Esq., H.M.C.S. The Engineer July 6<sup>th</sup> 1866

## Rocket Apparatus for Saving Life from Shipwreck

*By Thomas Gray, Esq., H.M.C.S.*

Before, however, going into the subject of the gear it may not be out of place to remark that the rocket, a missile once known as the most erratic in military services, has become one of the most reliable in saving life from shipwreck. It is altogether a rare occurrence for the coast guard with the rockets to miss a ship in distress if she is but within range; rockets have also in actual use proved, on the whole, to be very safe and manageable. Although several thousands have been used they have never yet (that is to say, since 1854, when the Government took up the subject) caused the slightest injury to any person on board a ship in distress, or to any person using them at a wreck. On two occasions at exercise, when rockets have got loose from the sticks and lines, they have done damage. In the one case a rocket, which was fired too low, went out about fifty yards to sea when the stick was struck by the crest of a wave and parted, and the rocket returned to the shore. It went inland and through the roof of a cottage where an old dame was in bed. It frightened her and broke some of her plates and cups, but did no other damage. The other case was more serious. It arose out of an experimental exercise with Dennett's coupled rockets, and it showed the danger of using two rockets at



Dennett's coupled rocket

once. In the coupled rockets two rockets are fastened side by side by means of iron coupling bands; and in the case referred to, one of the rockets only ignited at first, the bands then gave way, and a rocket got loose and struck the legs of an officer of coastguard who was standing at some distance from the apparatus.

And now with regard to the lines and gear suggested by the various inventors and used at the present moment by the Board of Trade and coastguard.

Sergeant Bell with his 8 in shot used a thick line, his object being to send a shot from the ship to the shore, with a line sufficiently strong for the crew to haul themselves ashore by. Trengrouse, on the other hand, used a line neither thicker nor stronger than a mackerel line, and he coiled it in hollow balls, similar to the hollow balls of string one buys at the present day at a string shop. He attached to his rocket stick the end of the string that comes from the inside of the ball, and he found

that it ran out freely, and generally without kinking or breaking, but then his rockets (8oz.) were very small.

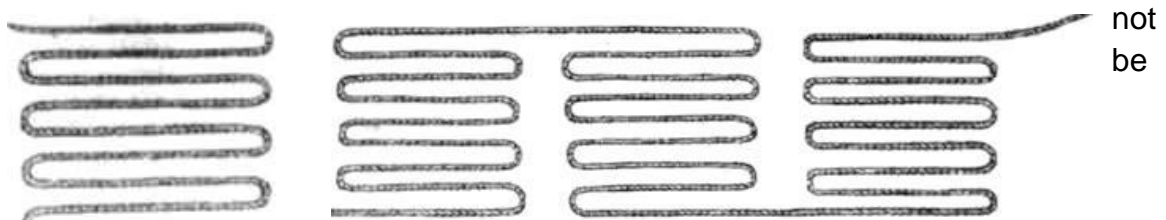
Monsieur Delvigne adopted successfully a plan somewhat similar with his arrows but failed when he tried coils with his shot. With small lines and low velocities this arrangement answers very well, and it possesses the great advantage of affording a close mode of packing, and an easy means of transit.



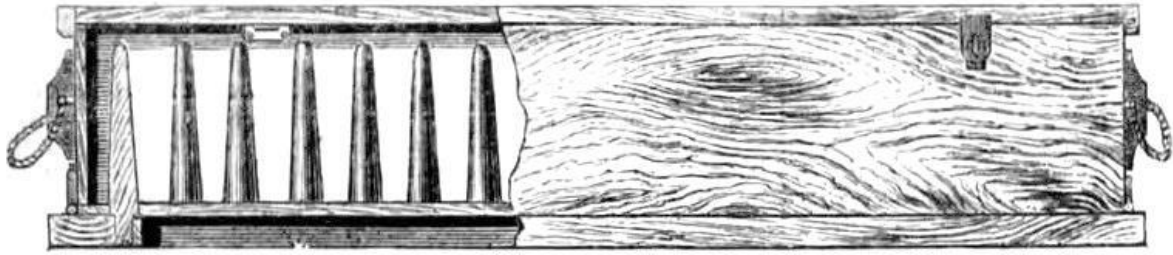
Delvigne's Arrow

Some persons suggested that the shot lines should be carried in coils in tubs, but in practice it was found that they would not run out free of kinks. Others again have suggested that the lines should be coiled on reels, but in practice it is found either that the line so coiled breaks, or that the reel is capsized and follows the shot. For extended ranges we require heavier shot, stronger rockets, and higher charges of powder, and with them stronger, and therefore thicker and heavier lines. Large lines can never be used with success if fired from a ball, a reel, or a coil.

Knowing this, Sergeant Bell arranged his lines in layers of short "fakes" as he had formerly done with the line carried by his gun harpoon, invented for the northern whale fishery. Manby adopted the same plan, and he fitted a large basket with faking pins, in which he kept the lines ready for use; or when a basket was not or could

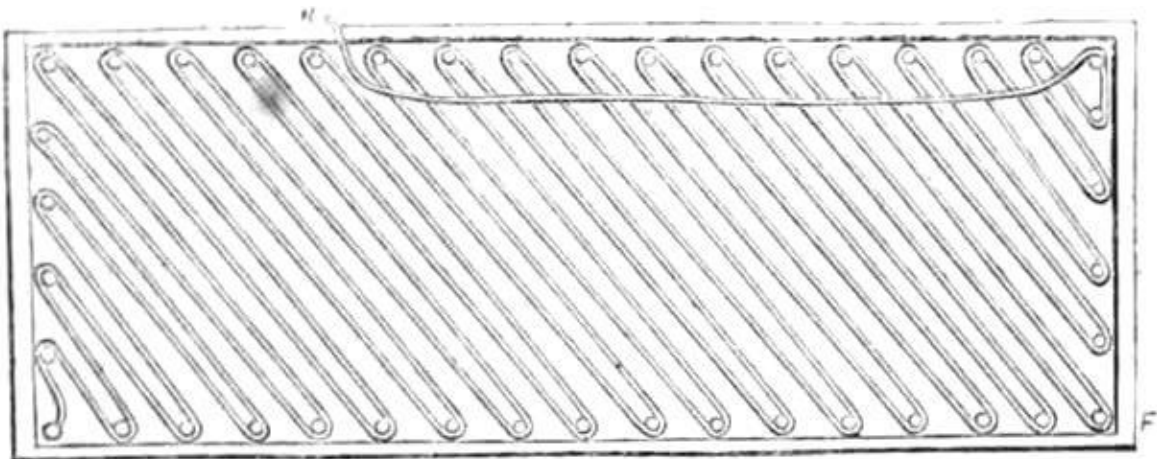


provided, the line was arranged in short fakes side by side on the beach before firing as shown



Line laid faked ready for use

Horatio Dennett, when a youth designed for his father, John Dennett, the best method yet hit upon for stowing the rocket line both for transport and for use. This appears to be one of Dennett's greatest improvements in the apparatus. He prepared a small oblong box having in it a loose frame fitted with spikes or pins, as shown and on these pins he faked his line in successive layers, as shown.



When the line is to be used the frame with the pins is drawn out of the chest bodily, and the line is left in the chest without kinks in a series of layers of diagonal fakes. By this arrangement the line can be carried out slice by slice, or layer by layer, from the box with the greatest regularity, and without causing any "wabbling" in the shot or rocket.

It is very interesting to watch the line leaving the box and hear the gentle whizzing noise that it makes as streak by streak of each layer is carried out. The line does not form a direct curve between rocket and box while it is being carried out, but flies up about 10ft. from the box in the form of a parabolic curve, then bends down again to within a foot of the ground, and then flies after the shot or rocket as shown.



Rocket fired and line leaving box

By Dennett's method of faking and stowing the lines they can always be kept on their pins in the boxes, and can be carried any distance. By withdrawing the pin they are ready for use at a moment's notice. This is the plan at present adopted for all rocket and shot lines in use on our coasts. When a rocket line has been used once and the line is wanted again immediately, it is faked down on the beach as proposed by Manby

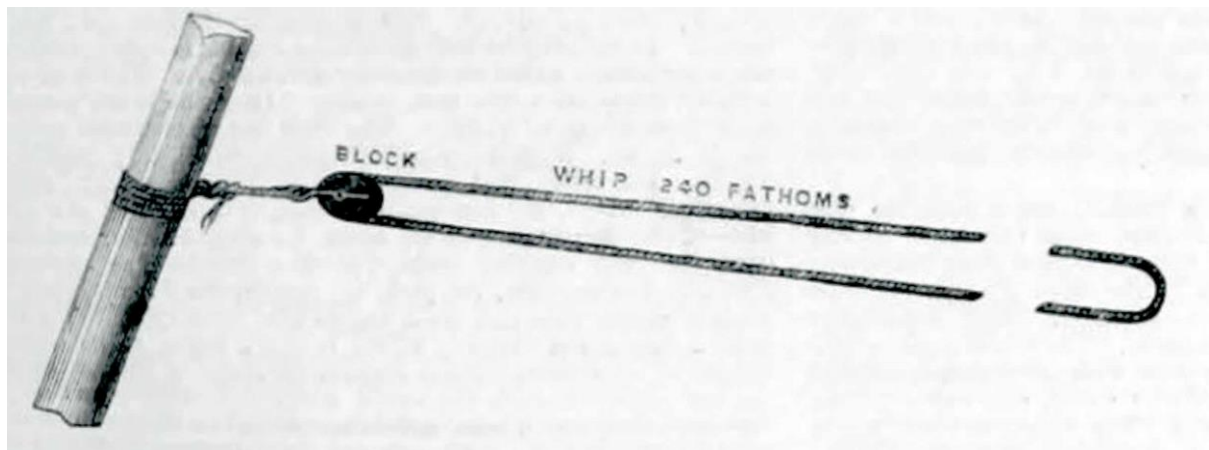
The success of the apparatus much depends on the rocket or shot line. To get a strong, thin, elastic line is, therefore, of the great importance. Deep sea lines used by Manby frequently parted; they were found to be laid up too hard, and were too stiff for the purpose.

John Dennett was the first to adopt the plan of laying up the rocket line very loosely, and he used New Zealand hemp, which is very elastic; it has, however, been set aside in favour of a stronger and more enduring material. Manila hemp has been tried, but although its lightness is in its favour it is too hard and stubborn when wet to be of use. Silk was tried by Delvigne, but his silk line was not so strong as some hempen lines, and the material is very expensive.

After trying various materials, such as common hemp, silk, Polish Rhine hemp, Manila, New Zealand, and several others, the material selected is Italian hemp. A rocket line of this hemp 500 yards long weighs 46lb. This line is very enduring, and when laid up lightly is elastic. In Dennett's arrangement the line is attached by passing it through a hole in the tail of the stick and fastening it by a loop to the head of the stick. In Boxer's arrangement the line is passed through the tail of the stick, as in Dennett's, and is then passed through the head of the stick in the same way, when knot is tied, and three washers of india-rubber take any jerk that may arise in starting the rocket.

At one time it was common for the rocket to carry away (i.e. break) the line, but latterly the writer has seen as many as thirty rockets fired without the line parting more than once, and then only through catching on a gun-carriage.

The rocket line being thrown over the ship the crew make a signal by waving anything in the day time, or showing any sort of light at night, to let those on shore know that they have got hold of it on the ship. The people on shore then "bend" on ("tie" on) to the rocket line an endless whip, fitted with a tailed block. When this is "bent on" a signal is made on shore, and the wrecked crew haul on the rocket line until they set the tail block on board. The "tailed block" is an ordinary 8inch block with a long tail fitted to it. This tail is to be fastened round the mast, or if the masts are gone to the highest part of the wreck.



Having got the tail of the block fast, and having now got manageable communication between the wreck and the shore, the people on the wreck again make a signal and the people on shore "bend" a hawser on to the whip and haul it off. This hawser is made fast on board above the tailed block, and a signal is again made on the ship as before. The hawser is then pulled tight from the shore to the ship by men holding on to it, or if there are not sufficient men to hold it taut then a double block tackle purchase is used. If the soil is stiff or rocky, an anchor carried with the apparatus for the purpose, is placed in position, and one of the blocks of the purchase is made fast to the ring of the anchor, and the tail of the other to the end of the hawser, which is brought over a triangle to raise it from the ground. If the soil is sandy or loose the anchor is not used with the double block tackle purchase, but a piece of thick plank, about 4ft. long and 10in. wide, with a chain round it, is buried 3ft. or 4ft. in the soil. The end of the chain is led to the surface and is provided with a ring, to which one of the blocks of the tackle purchase is made fast as to the ring of the anchor. It will now be seen that there is communication with the ship both by means of a movable endless whip and by a hawser stretched taut above it. The next thing is to send along the hawser what is commonly called a "chair." The name is borrowed from what is known on board ship as a Bosn's chair. But to a landsman Bosn's chair is little better than a perch. The writer believes that Trengrouse first proposed to use a chair with the rocket apparatus. His chair was like the seat of a child's swing, and

was a perfect luxury compared with a Bosn's perch. The writer recollects seeing Miss Swanborough landed safely from a wreck on to the stage of one of our favourite theatres, in a fine, good specimen of an old Winsor armchair.

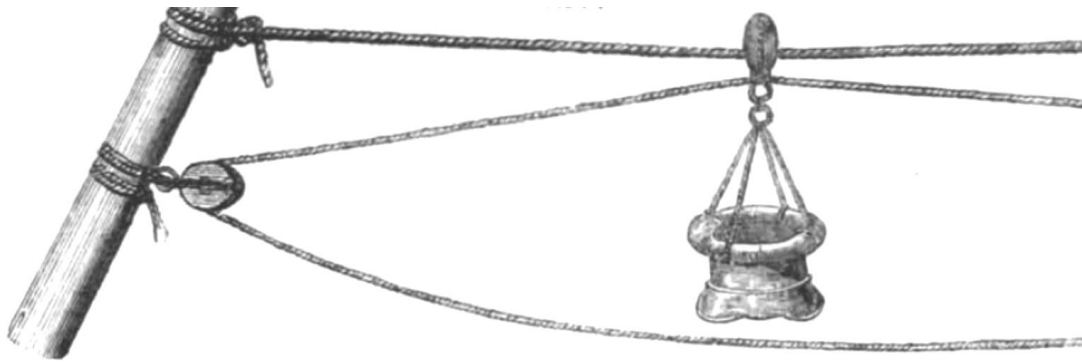
This was in Mr. Wilkie Collins's drama of the "Lighthouse." But the "chair" now used, with the rocket apparatus is very different both from Trengrouse's and Miss Swanborough's, and is known as the "petticoat breeches".

These "petticoat breaches" were invented by Lieutenant Kisbee, R.N. They consist of a circular cork life-buoy, fitted with a pair of canvas inexpressible, very large under the arms, and very abort in the legs, in fact. legless, as shown.

Perhaps it is on the whole, as well that Mr. Wilkie Collins's interpreter availed himself of a poetical license, but for safety the "breeches" are preferable. The only discomfort the writer has felt in being hauled along in them arises from the jerks occasioned by the swing of the hawser. The "petticoat breeches" are suspended from an inverted block or traveller, and are hauled backwards and forwards along the hawser by the endless whip. This is done by the people on shore. The person being saved sits with his legs through the "breeches" and with the buoy under his armpits. He thus has the free use both of his arms and legs in cases of emergency.



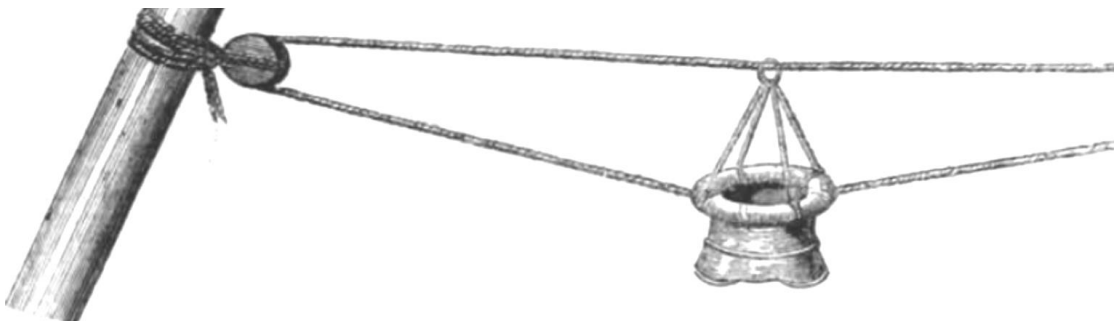
Petticoat Breeches later renamed Breeches Buoy



Hawser used to suspend the Breeches buoy from

The reader will doubtless think that to arrange and fire the rocket, to haul off the whip, and secure the tailed block to haul off and secure the hawser, and then to haul the people one by one along the hawser seems a long process by which to save a shipwrecked crew: but when the coastguard and volunteers are proficient the use of the apparatus, cases are known in which a crew of fifteen persons has been saved in six minutes after firing the first rocket.

There is also an arrangement by which, when a ship is fast breaking up, or is on a very flat shore, the whip is made to serve the purpose of both hawser and whip, and the setting up of the hawser is saved altogether, as shown.



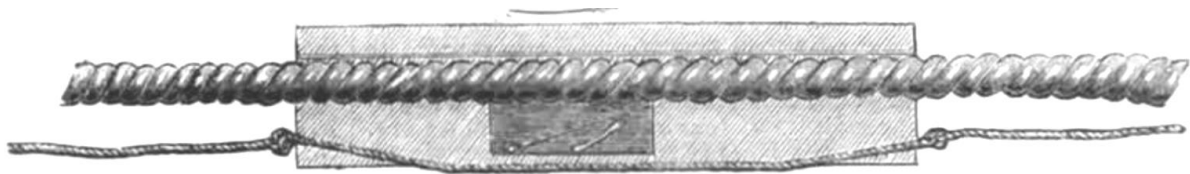
The whip used only to haul the Breeches Buoy back and forth

During the last ten years this rocket apparatus alone has saved no less than 3,072 lives. This result is the best proof of its efficiency.

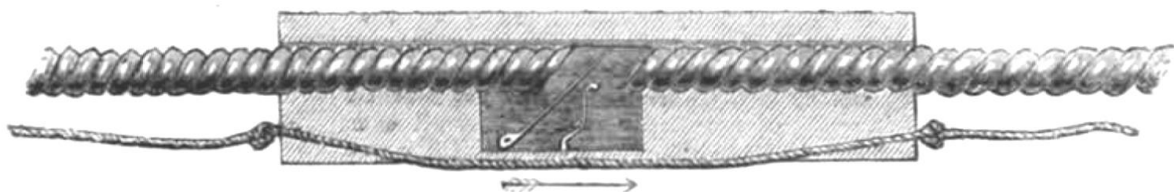
Having landed the last person from the wreck, the next thing to be done is to recover the hawser and whip line, for as they may be and often are required at another wreck the next moment, they must be got ready as soon as possible.

To recover the hawser a hawser cutter is used. The first suggestion for a hawser cutter was made by James Pengelley, a. commissioned boatman at Penzance. It was a box fitted with a plane iron, working on a pivot and pressed upwards by a spring. An improvement has been made on this hawser cutter by the writer of this paper.

The principle of Pengelley's cutter is retained, but the defects in it are overcome. A spring is bad wherever it can be done without; it is likely to spoil with rust and damp and to fail in frosty weather. If the spring in Pengelley's arrangement failed, the cutter was at once useless. In the second place, the iron cutter in that arrangement was always pressing on the hawser, and when the hawser was covered with sand and mud this iron would become rough, and would in its turn roughen chafe, and spoil the hawser and in Pengelley's arrangement there were no means of letting out the sand and mud that worked in. The action of the cutters will be understood on reference to the diagrams.



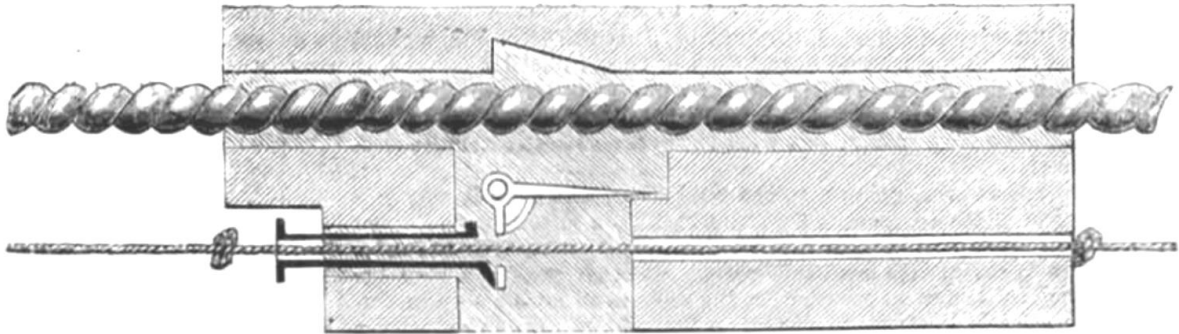
The first diagram shows Pengelley's cutter being hauled off, and shown below how the cutter acts.



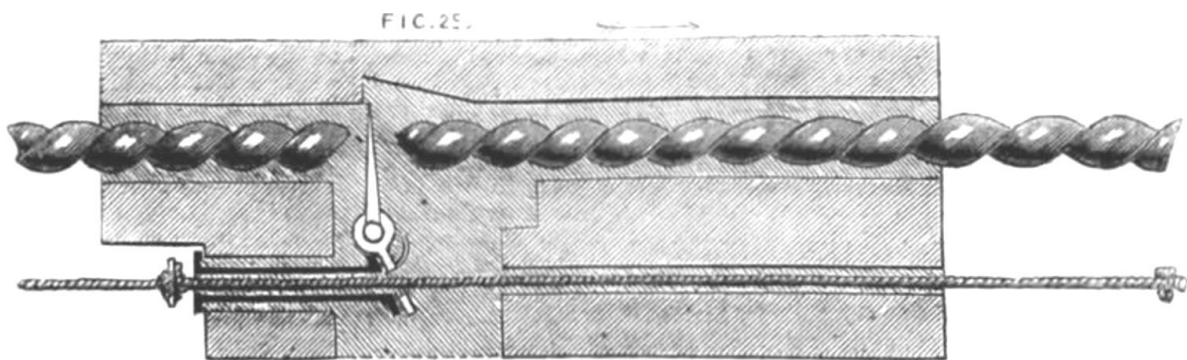
A very ingenious cutter, and one likely to prove very successful, has also been invented by the Rev. Herbert Hicks, M.A. Mr. Hicks is an indefatigable member of the Tynemouth Volunteer Life Brigade (of which notice will be taken in a subsequent paper), and his cutter is by many thought to be superior to the other two.

When the cutter is to be used the "breeches" buoy is taken off the hawser and the box containing the cutter is slipped on the hawser in its place. So long as the box is pulled forwards the cutter does not act. When the box gets close to the tailed block it is hauled backwards with a jerk. The spring in Pengelley's arrangement, or the lever under the iron in the improved cutter, or a simple lanyard in Mr. Hicks's cutter, then presses the iron against the hawser, which is severed close to the mast. The cutter is hauled ashore, and the whip is unrove, so that all that need be lost each time is the tailed block and a few feet of the hawser left on the mast.

Having safely used the apparatus, having landed the crew, and having got back the gear, we will in another number look into the organisations for using the apparatus on the coasts, and the results obtained



Mr Hicks Cutter



Mr Hicks Cutter

Source: The Engineer November 16<sup>th</sup> 1866 wrote by Thomas Gray, Esq., H.M.C.S.

## **Acknowledgements**

We would like to thank Graces Guide for use of the illustrations and articles used in this brochure.

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<http://www.gracesguide.co.uk>