CHAMBERS'S

ENCYCLOPÆDIA

A DICTIONARY

OF UNIVERSAL KNOWLEDGE FOR THE PEOPLE

ILLUSTRATED

WITH MAPS AND NUMEROUS WOOD ENGRAVINGS

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created a great sensation, and gave rise to an immense deal of writing for and against the condemned. The most important is an article by P. Merimée, *Le Procès Libri*, in the *Revue des Deux Mondes* (1852), for which the writer was imprisoned, as having, in defence of a 'book-stealer,' slandered and insulted the French judicature.

L. continued for two or three years to address letters and pamphlets to persons in France exclaiming against his condemnation in the highest tones of injured innocence. The efforts of M. Merimée in behalf of L., and a petition in his favour, addressed to the senate in 1861, only had the effect of bringing out still more damnatory facts regarding both him and his family.

LIFE MORTARS AND ROCKETS. When a lifeboat is not at hand, or a raging sea and a shoal coast render its use impracticable, a distressed ship may often receive help from shore, provided the distance be not too great for the throwing of a rope. A small rope may draw a thicker, and that a hawser, and the hawser may sustain a slinging apparatus for bringing the crew on shore. For short distances, Captain Ward's *heaving-stick* (fig. 1)

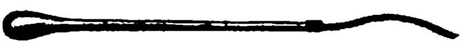

Fig. 1.—Captain Ward's Heaving-stick.

has been found useful: it is a piece of stout cane two feet long, loaded at one end with 2 lbs. of lead, and at the other attached to a thin line. It is whirled round vertically two or three times, and then let go; but it cannot be relied on for more than fifty yards. Kites of various kinds have been employed, but are not found to be certain enough in action. The firing by gunpowder of some kind of missile, with a line or rope attached to it, is the method which has been attended with most success. In 1791, Sergeant Bell, of the Royal Artillery, devised a mode of firing a shot and line from a distressed ship to the shore. It was afterwards found to be more practically useful to fire from the shore to the ship. In 1807, Captain Manby invented his *life-mortar* (see MANBY, in SUPPLEMENT). His mortar was an ordinary 5¼-inch 24-pounder cohorn, fixed at a certain angle in a thick block of wood. The missile discharged from it was a shot with curved barbs (fig. 2), something like the flukes of an

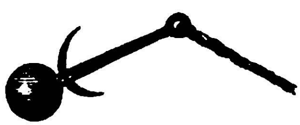

Fig. 2.—Captain Manby's Life-shot.

anchor, to catch hold of the rigging or bulwarks of a ship. How to fasten the shot to the rope was at first a difficulty: chains were not found to answer; but at length strips of raw hide were found suitable. To assist in descrying the exact position of a distressed ship on a dark night, in order to aim the mortar-rope correctly, Manby used a chemical composition as a firework, which would shine out in brilliant stars when it had risen to a certain height. A third contrivance of his, for replacing the shot by a shell filled with combustibles, in order to produce a light which would render the rope visible to the crew, was not so successful.

Many variations have been made in the line-throwing apparatus. Colonel Boxer has recently substituted a *bolt* (fig. 3), for the shot, with four holes at the end; fuses thrust into these holes shed a light which marks the passage of the bolt through the air. Trengrove's rocket-apparatus, invented in

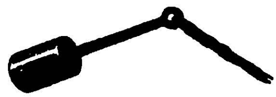

Fig. 3.—Colonel Boxer's Life-bolt.

1821, consisted of an ordinary 8-oz. sky-rocket (see ROCKET). Certain practical difficulties, however, affected it, and it did not come much into use. In 1832, Dennett's apparatus was invented. It nearly resembled the old sky-rocket, but with an iron case instead of a paper one, and a pole eight feet long instead of a mere stick: it weighed 23 lbs., was propelled by 9 lbs. of composition, and had a range of 250 yards. A ship's crew having been saved by the aid of this rocket at Bembridge in the Isle of Wight, the Board of Customs caused many of the coastguard stations to be supplied with the apparatus in 1834. Carte's apparatus, brought forward in 1842, depended on the use of a Congreve rocket (see ROCKET) instead of an ordinary sky-rocket. It does not appear that this apparatus was ever adopted by the authorities. Mr Dennett next sought to improve the power of his apparatus, by placing two rockets side by side, attached to the same stick; and it certainly did increase the range to 400 yards; but as the simultaneous and equal action of the rockets could not be always insured, the scheme was abandoned. Colonel Delvigne, of the French army, invented a *life-arrow* (fig. 4), to be fired

Fig. 4.—Colonel Delvigne's Life-arrow.

from an ordinary musket. It is a stick of mahogany, shaped something like a billiard cue; the thicker end presses on the powder; while the thinner end, loaded with lead, is fitted with loops of string; a line or thin rope is attached to the loops, and the thin end of the stick projects beyond the barrel. The jerk, when the arrow or stick is fired, causes the loops to run down the stick to the thick end: this action has an effect like that of a spring, preventing the stick from darting forward so suddenly as to snap the line. The apparatus will send an arrow of 18 oz. to a distance of 80 yards, with a mackerel line attached. Another French contrivance, Tremblay's rocket with a barbed head, has been adopted for the Emperor's yacht; but as it is to be fired from the ship to the shore, it partakes of the same defects as Sergeant Bell's original invention.

The most effective apparatus yet invented is Colonel Boxer's. Finding that Dennett's parallel rockets on one stick do not work well, he succeeded after many trials in a mode of placing two rockets in one tube, one behind the other (fig. 5). The head is

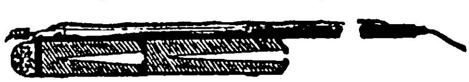

Fig. 5.—Colonel Boxer's Double Rocket (section).

of hard wood; there is a wrought-iron case, with a partition between the two rockets. When fired, the foremost rocket carries the case and the attached line to its maximum distance, and the rearmost rocket then gives these a further impetus. The effect is found to be greater than if the two rockets were placed side by side, and also greater than if the quantity of composition for the two rockets were made up into one of larger size. The rocket is fired from a triangular stand, and is lighted by fuse, port-fire, or percussion-tube; the elevation is determined by a quadrant or some similar instrument.

The lines used with these several projectiles have varied greatly; but the best is found to be Italian hemp, spun loosely. It is very elastic, and when thick enough for the purpose, 500 yards weigh 46 lbs. In Boxer's rocket, the line passes through the tail of the stick, then through the head, where it is tied in a knot, with india-rubber washers or buffers to lessen the jerk. The line is carefully wound on a reel, or coiled in a tub, or faked in a box provided with pins ranged round the interior—to enable the line to run out quickly without kinking or entangling. Dennett's faking-box for this purpose is the one now generally adopted.

Life belts, jackets, and buoys of numerous kinds are used, made of cork, inflated india-rubber, &c.; but the apparatus now employed in conjunction with the life-rockets is known by the curious name of *petticoat-breeches*, or more simply, *sling life-buoy.*

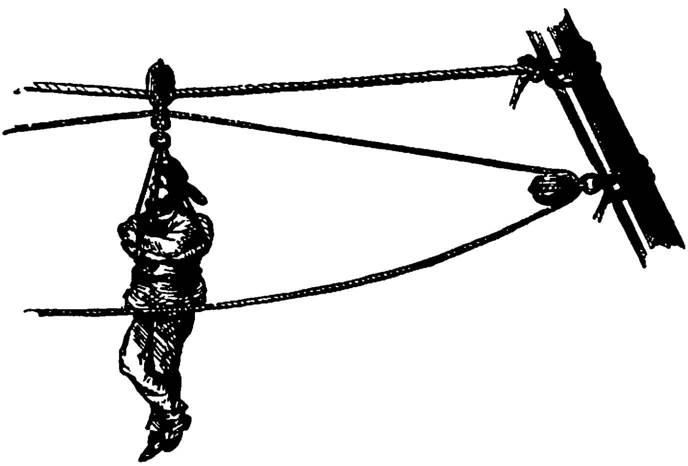

Fig. 6.—Lieutenant Kisbee's Sling Life-buoy, or Petticoat-breeches.

It is not strictly either a belt or a buoy, but a garment in which a man may be slung clear out of the water. When a rocket has been fired, and a line has reached the distressed ship, signals are exchanged between the ship and the shore; a thicker rope is pulled over to the ship by means of the line, and a hawser by means of the rope. When all is stretched taut, by fastening to the masts, &c., articles can be slung and drawn to and fro. The petticoat-breeches, invented by Lieutenant Kisbee, consists of a circular cork life-buoy forming the top ring of a pair of canvas breeches; one of these is hauled over from the shore to the ship; a man gets into it, his legs protruding below the breeches, and his arm-pits resting on the buoy; and he is hauled ashore by block-tackle. The crew of a wrecked ship can thus one by one be relieved. To prevent losing the hawser and other apparatus, when the last man has left the ship, an apparatus called a hawser-cutter is used, working *in* the ship, but worked *from* the shore.

Fuller details, with numerous illustrations, will be found in the *Engineer* for 1866, in two papers written by Mr Gray, of the Marine Department of the Board of Trade.

LIFE-ROCKET DEPARTMENT, or rather, that branch of the Marine Department of the Board of Trade which has the management of life-rockets, mortars, lines, buoys, and belts, divides with the National Life-boat Institution the labours connected with the prevention of shipwreck, and the rescue of shipwrecked persons. This has been the arrangement since 1855. Until that year, the life-mortars in use were partly under the control of the Admiralty, partly under the Board of Customs, partly under the institution just named, and partly belonging to private individuals. The Merchant Shipping Act, passed in 1854, and put in force in the following year, placed the whole under a different organisation. Leaving the life-boats (see LIFE-BOAT) under the able management of the admirable institution to which most of them belonged, the other matters were intrusted to the Board of Trade, under rules laid down in a general way in the act.

To work out properly the rocket and life-saving system, a topographical organisation is in the first instance adopted. The coasts of the United Kingdom are classified into 59 coastguard divisions or wreck-registrars' districts; and the coastguard inspector of each division or district has control over all the rockets, mortars, buoys, belts, and lines kept at the various seaside stations in his district. There were at the beginning of 1867 about 265 of these stations; of which 40 were provided with mortars only, 175 with rockets only, and the rest with both mortars and rockets. Most of the mortars are Boxer's improvement on Manby's; and most of the rockets are Boxer's improvement on Dennett's. There are to be no more mortars introduced, as Boxer's rockets are found more effective. The rockets are made at the Royal Laborratory at Woolwich, and are supplied by the War Department to the stations, on requisition from the Board of Trade; as are likewise mortar-shot and shells, fuses, portfires, signal-lights, gunpowder, &c. At each station is kept a cart, expressly made to contain all the requisites for the rocket-apparatus. The cart is always kept ready packed, to be drawn to any part of the coast most wanted. Eighteen rockets are supplied with each apparatus; and a new supply is obtained before these are exhausted. The main store of apparatus is kept at Woolwich, whence it is sent to 12 dépôts on the coast, and from these dépôts to the stations, by the coastguard cruisers. The rockets saved 3072 lives between 1855 and 1865 inclusive. Simpler apparatus, consisting of life-belts and life-lines, is kept at a much greater number of stations: at the beginning of 1867, these stations were nearly 600 in number, provided with more than 2000 belts, and nearly 2000 lines.

The system is worked by the coastguard, the men being paid so much for periodical drilling, and so much for regular service. There are also Volunteer Rocket Corps established on certain parts of the coast. Special services are rewarded by the Board of Trade with gifts of money, gold and silver and

bronze medals, gold watches and chronometers, telescopes, binocular glasses, sextants and quadrants: these are paid for partly by annual parliamentary grants, and partly out of the Mercantile Marine Fund.

LIGHTING OF BEACONS AND BUOYS AT SEA. Some interesting experiments have recently been made under the direction of Messrs Stevenson of Edinburgh, the engineers to the Commissioners of Northern Light-houses, 'in order to test the practicability of illuminating beacons and buoys by electricity,' the success of which warrants a practical trial, and it is understood this is about to be proceeded with. At various times since the discovery of the electric light by Sir H. Davy in 1813, suggestions have been made pointing out the advantages which might be derived from its use upon light-houses. It has long been plain, indeed, that for a purpose of this kind it had properties which placed it far in advance of all other lights—such as its near approach to sunlight in brightness, its great power of penetrating fogs, and its total independence of atmospheric air, which enables it to be produced in a vacuum or under water. Unfortunately, its production is attended with great trouble; it also requires rare skill to keep it in perfect order, and even where this is at hand, we cannot yet place absolute reliance upon its steadiness. It has nevertheless been in use at Dungeness, in the south of England, since 1862, and at La Heve in France since 1863, and at both places the light may be said to be practically successful. But there are differences of opinion respecting it among light-house authorities, as the reader will find by consulting an interesting parliamentary paper on the subject, dated May 30, 1866. Whether or not the electric light is to be ultimately adopted for properly constructed light-houses, there can be little doubt that for the illumination of beacons, where no light-keeper is to be constantly on the spot, electricity must in some way be employed as the agent to produce the light. As far as can be at present seen, the ordinary Electric Light (q. v.) may be dismissed as unsuitable for beacons. It will at least require to be greatly simplified before it can be used for such a purpose. In the article INDUCTION OF ELECTRIC CURRENTS will be found a description of the method of producing sparks by means of an induction coil. These sparks can be made to follow each other so quickly as to appear like a flash surrounded by a luminous haze. This, then, is the kind of light with which, when placed inside some convenient form of optical apparatus (see LIGHT-HOUSE), it is now intended to illuminate beacons.

It is probable that several different arrangements of electrical apparatus—all, however, producing the same kind of light—will be tried; but it will suffice to give an idea of their general plan if we explain one of the methods proposed by Mr Thomas Stevenson, by which, with the aid of instruments constructed by Mr Hart of Edinburgh, this flashing light was successfully produced at Newhaven pier in 1866. In this particular experiment, the electric current passed through a wire 800 feet long. Suppose a beacon to be situated at some distance from the shore, as shewn upon the annexed diagram (fig. 1). A galvanic battery, consisting of, say, six Bunsen cells, is placed at B in a house upon the shore. From this, the electrical current is conveyed along a submarine cable to the beacon, and returns by earth-plates at E, E, in the usual manner, to complete the circuit; its course being indicated on the diagram by arrows. The induction coil is placed upon the beacon at C, and properly connected with the conducting wire of the cable, so as to make the current generated by the battery traverse its primary coil. A wire from each end of its secondary coil is then conveyed to the focus of the optical apparatus, the ends of the two wires being here brought within half-an-inch of each other, and furnished with indestructible points of platinum.

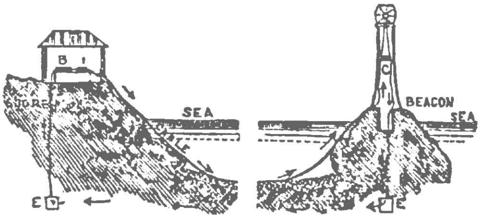

Fig. 1.

The induced or secondary current, in crossing this narrow space, produces the succession of sparks which constitute the light, but as explained under the head INDUCTION OF ELECTRIC CURRENTS, it only does so at the moment the current is interrupted or broken. It is consequently necessary to have some means of completing and breaking the galvanic circuit in rapid alternations, so as to produce the flashes in quick succession. The break for this purpose is placed at I, near the battery.

In the experiments already tried, a great deal was found to depend upon the peculiar way the current was broken. None of the breaks in use giving a successful result, Mr Hart devised a new one of an ingenious construction, which produced a more constant and powerful light. Fig. 2 shews

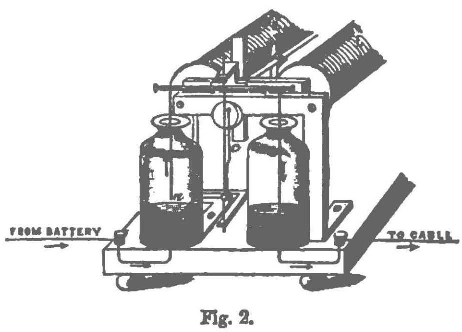

Fig. 2.

this instrument. The difference between it and other mercury or spring breaks lies in the fact, that with them the current is off and on for nearly equal spaces of time; but this one is so contrived that the wire at *a* is three times longer in the mercury, *b*, than it is out of it; consequently, the current is three times longer on than it is off, and so allows the soft iron core of the induction coil to be more fully magnetised. The result of this is a secondary current of comparatively high intensity, and of course the production of more brilliant sparks between its two terminals. We may explain, that the moment the wire at *a* touches the mercury, the current passes, and the moment it is removed the current stops—the direction it takes being indicated in the figure by the arrows. The wire at *a* alternately dips and rises by the action of an ordinary electro-magnet, EE, turning the crank *c*; the second bottle of mercury is not used to break contact, but only to continue the current, for which a spring would answer as well.

By the use of more than one induction coil, the light can be materially increased, so that there is