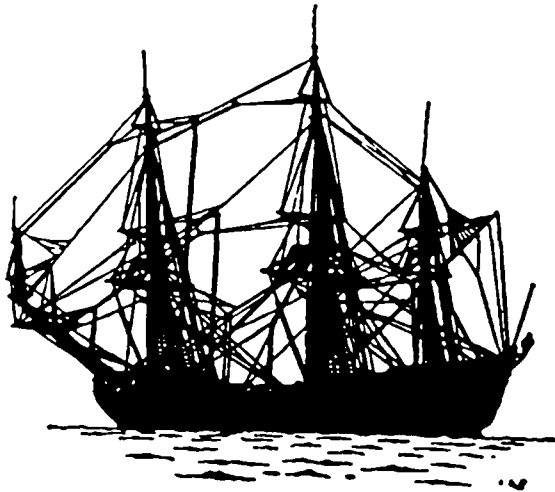


# THE MARINER'S MIRROR

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## THE EVOLUTION OF ROCKET-BASED MARITIME RESCUE SYSTEMS IN THE FIRST HALF OF THE NINETEENTH CENTURY

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One of the most frequent circumstances of shipwreck in the early nineteenth century was that of a heavily laden vessel being driven on to a lee shore. At a time when the busiest part of the English coast was along that relatively shallow and exposed stretch of the North Sea from the north-east seaports to London incidences of shipwreck by grounding were commonplace. Coincidentally, in 1807 two men were witness to such disaster in different parts of the country: on the east coast George Manby witnessed the wreck of HM Gunbrig *Snipe*, stranded within 50 yards of the beach at the back of the pier at Yarmouth, Norfolk; whilst in the west country Henry Trengrouse had witnessed the wreck of the *Anson* frigate upon a sandy beach in Mount's Bay, Cornwall. In both instances they separately vowed to produce an effective means to help alleviate suffering in such disasters.

Both men had independently soon arrived at the conclusion that a rope communication was the only effectual means of reaching the ship in order to get the stranded mariners off. Trengrouse, in giving testimony to the 1836 Shipwreck Committee, is quoted as saying:

The excitement I felt to gain all possible information respecting the nature of shipwreck, subsequently led me to read all the narratives that came my way or that I could procure, as well as to anxiously listen to verbal recitals of those that had occurred upon the coasts of Cornwall and elsewhere; and my reflections upon all these, in connection with those I have personally witnessed most clearly decided that to save lives in case of shipwreck under general circumstances, a rope communication must ever be the first thing to be accomplished; I have seen in a variety of instances the want of it, and consequent melancholy effects; and where a rope communication has been established, its utility clearly manifested itself.<sup>1</sup>

In order to open a rope communication several methods occurred to Trengrouse, but the use of a rocket stood out as the most prominent.

Since 1803 Manby, barrack-master at Yarmouth, had 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 hand against a furious wind...<sup>2</sup>

With the loss of the *Snipe* on 18 February 1807 he resolved to act. Giving testimony to the Shipwreck Committee in 1836 he stated:

On the close of that mournful scene, I vowed that 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... since the introduction of my plan for effecting communication with stranded vessels by means of projecting a rope by the force of gunpowder, from that time not a single life has been lost except in one instant.<sup>3</sup>

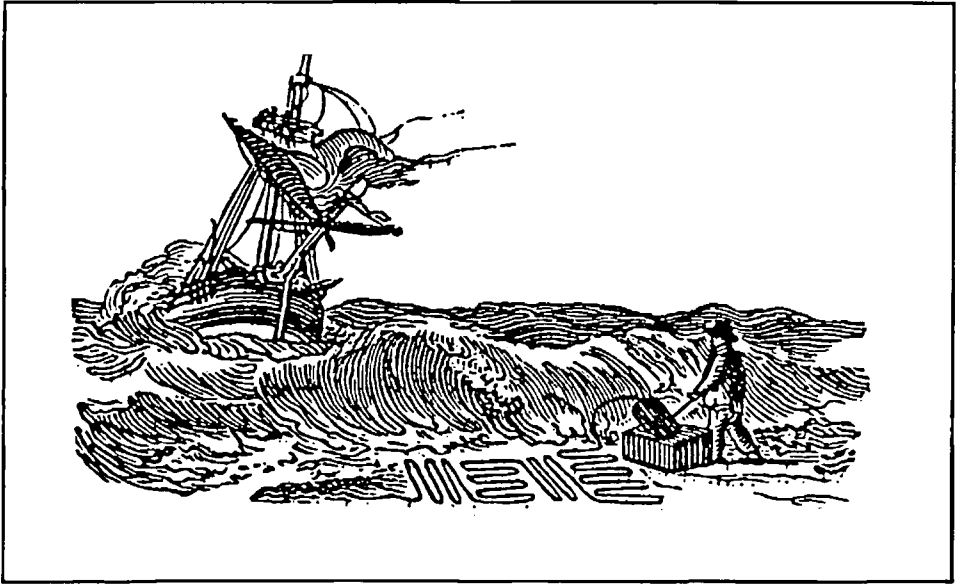


Fig. 1. Manby's Mortar – Representation of Mortar, Shot and Line, prepared for effecting a Communication. (*Gentleman's Magazine*, 1821)

Force of gunpowder for Manby meant the use of a mortar. Thus by the close of 1807 there were two separate developments of rescue apparatus, both borne out of direct experience of marine disaster. Whilst Manby had developed the use of a mortar to effect the line connection between the stricken vessel and the shore the relevance to the evolution of rocket-based systems of rescue lay in the means of adapting that line connection to the process of rescue.

Manby's method, first demonstrated before a Committee of the Suffolk Humane Society at Lowestoft on 26 August (and 10 September) 1807<sup>4</sup> and subsequently to a Committee of Field Officers of Artillery at Woolwich on 19 January 1808<sup>5</sup> concerned the use of a mortar gun whereby a rope to the stranded vessel was conveyed (Fig. 1). The method of rescue had been developed from an earlier idea from some twenty years before by a Lieutenant Bell<sup>6</sup> whose object was to cast a shot from a mortar prepared on board, whereas Manby's method was the reverse. Captain Manby stated:

An iron mortar cast in its bed, and weighing with its bed two and a quarter hundredweight (which may be removed from place to place by two men on a hand barrow with ease) will propel a 24lb shot, with an inch and a half rope attached to it, 250 yards, or a deep-sea line, 320 yards, against the utmost power of the wind.<sup>7</sup>

There still remains some controversy as to the original inventor of this system as Dr John Carey claims to have been the original inventor as early as 1803 – although he does not seem to have been anything like the innovator that Manby was.<sup>8</sup> Manby demonstrated his apparatus again on 29 April 1809, showing its suitability at night and in cases of stormy weather to a committee of colonels and field officers.<sup>9</sup> He not only developed the use of the mortar but was instrumental in recommending those parts of

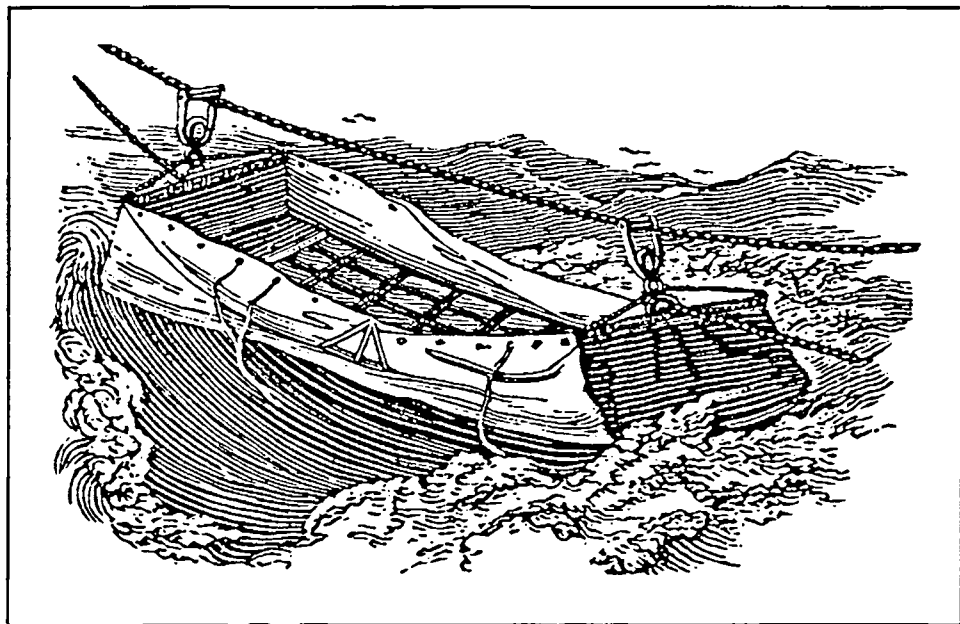


Fig. 2. Manby's Cot. (*Gentleman's Magazine*, 1821)

the coast that should be attended by such devices of rescue. He embarked upon a survey of the coasts on the basis of an agreement entered into with Lord Sidmouth, Secretary of State for the Home Department. On 5 October 1811, having surveyed and put forward recommendations concerning the provision of humanitarian aid for vessels in distress, he became too ill to continue and was advised to curtail his journeys into Devon and Cornwall as he would not be able to produce the relevant survey by the time that his agreement expired on 5 October 1812.<sup>10</sup> Manby eventually produced a plan of his rescue equipment and made contingency for all possible situations respecting its use that he could envisage.<sup>11</sup> The attributes of the system had been discussed in Parliament<sup>12</sup> and instructions were given by HM Secretary of State for the Home Department for the purpose of carrying into effect Manby's plan. A letter of direction to supply apparatus and stores to Manby's chosen stations was issued from Whitehall in September 1815<sup>13</sup> and by 28 May 1816 a list of stations was published together with proposed stores for each station for the purpose of putting Manby's plan into action – 97 stations principally along the south and east coasts essentially under the jurisdiction of the Water Guard (later the Coastguard). Manby's plan concerning rescue was published in an extensive report covering in excess of 7,000 words, with engravings designed by Captain Manby and executed 'at considerable expense by Mr Berryman'. Captain Manby covered all the technical detail of varying shot and rope techniques including methods of rescue 'once communication had been effected'. His descriptions include a basket or cot 'made buoyant by corks or kegs of air' used to transport survivors along a large rope (Fig. 2):

As soon as communication has been effected with the distressed vessel, by the rope carried out by the shot from the mortar, the crew will haul on board by it from the shore a large rope, and also a trailed block rove with a smaller rope, both ends of which are to be kept on shore. When these are made fast on board, the large rope, after it is passed through the roller at each end of the cot is to have a gun tackle purchase fast to the stakes lashed to it. The ends of the small rope are then to be made fast, one to each end of the cot, and the cot travelling by the rollers on the large rope is to be worked by the bite of it to the ship, and back by the people on the shore.<sup>14</sup>

Thus by 1816, after much development, application and consideration of actual usage along the most vulnerable areas of the coasts, Manby's extensive plan of rescue with respect to specific coastal locations was installed. Besides the great amount of detail concerning the operation of the mortar and its various attributes, Manby described the use of a travelling cot that was to run on pulleys suspended from the hawser established by the mortar line; this must have been in effect the forerunner of the Breeches buoy, made so effective later in the century by the use of rockets to establish the link from the shore to the stricken vessel in place of the less efficient and much more cumbersome mortar.

Trengrouse, using rockets instead of mortars, had arrived at a similar technique. Rear-Admiral Spranger, who had successfully tried the equipment during 1821 in Yarmouth Roads, described it thus:

It consisted in throwing, by a rocket, a line from the ship to the shore, and when the communication is once established, binding to that a deep sea line, or any of the running rigging; and when these reach the shore, a larger rope, sufficiently strong to bear four men in a chair, which is pulled on shore by means of the small rope, and returned empty to the ship for a fresh cargo. The chair was on shore five minutes after firing the rocket.<sup>15</sup>

Manby had used a mortar from the shore to effect the rope communication whereas Trengrouse had adapted and developed the use of the Congreve<sup>16</sup> rocket and argued strongly in favour of ships carrying the equipment so that it would always be immediately available and with the wind blowing on-shore in the majority of cases this ought to aid the range of the rocket:

To project the rope from the ship to the shore, is assuredly the method most to be depended upon; as the vessel in that case carries the means with her, and need not rely on fortuitous assistance from the shore.<sup>17</sup>

Referring to the problem of bridging the gap between the stricken vessel and the shore a contemporary report reads:

Many inventions have already been brought into practice either very partially, or not at all, having failed of producing the benefits anticipated by too sanguine benevolence of their authors. Capt. Manby's apparatus, although resembling Mr Trengrouse's in some particulars, is both less portable and less likely to succeed in actual practice.<sup>18</sup>

Written in 1822, the fact was that Manby's system although infinitely less portable had gained favour with the government, who had directed testing and trials of it since 1808, several rescues having already been achieved,<sup>19</sup> and had awarded Manby a total of £6,000 by 1821.<sup>20</sup> Trengrouse's system was potentially by far the better method principally because of its use of the rocket and consequent portability and, as events were to prove, the greater power of the rockets in achieving their targets (Fig. 3). Trengrouse was keen to develop his system and further the aims of life-saving. In Trengrouse's correspondence to the Royal Humane Society concerning shipwreck, he states when

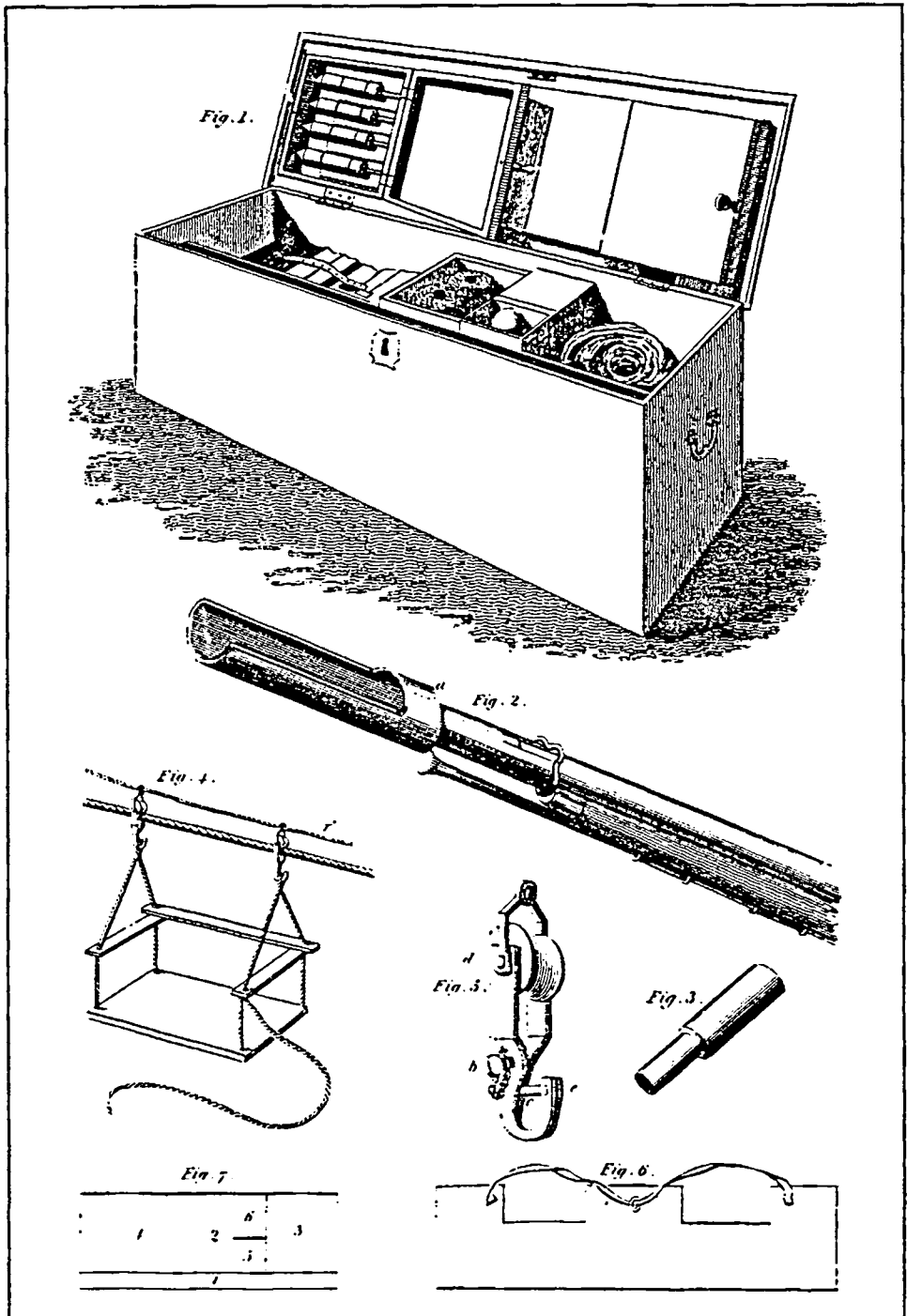


Fig. 3. Mr H. Trengrouse's apparatus for rescuing persons from shipwreck. (*Transactions of the Society of Arts*, 1820)

referring to the aims of the Society in saving the 'lives of hundreds perhaps thousands at once'.<sup>21</sup>

This would indeed be glorious work! I do assure you Sir, that I clearly feel the most heartfelt solid pleasure in anticipating the good that is about to be rendered my fellow creatures through my instrumentality in the hands of providence. To be wholly employed in prosecuting this work and in establishing a *wreck police* all along the coasts for the preservation of Lives and Property in case of shipwreck (and which may be done without any standing expense to Government) would be the highest of my ambition...<sup>22</sup>

This letter, written on 13 April 1818, expresses a sentiment that would have appeared to have been gathering pace for several years against the 'horrors of tempest and shipwreck'.<sup>23</sup> In some of its detail and certainly in its vision it would appear to pre-date the essential demand of Sir William Hillary's *Appeal ... from Shipwreck*<sup>24</sup> by six years in calling for the notion of a nationally organised body funded by public subscription rather than a government legislated service; as such it expresses the feelings and intent of many contributors to the cause of the alleviation of suffering due to shipwreck that were to make their contributions to that cause in the years to follow.

It may seem a mystery why the Trengrouse equipment was not taken up by the authorities at the time for it clearly appeared to have distinct advantages over Manby's mortars – Trengrouse continually strove for recognition and acceptance. It is all the more a mystery when one is aware of all the recommendations and favour the system won. Perhaps Manby's case can help shed light here. Manby had quickly and effectively developed his system, he had demonstrated it to government officials and by 1816 established a systematic distribution of necessary equipment at mortar stations positioned at key points along the coasts. Manby earned the recognition 'of every country and received honours from four sovereigns'.<sup>25</sup> He had refused to take out a patent and, the very opposite, tirelessly forwarded plans of his system to wherever it was required:

...in France they are now carrying my plans into effect, and they have done me the honour of appointing me president of the British section, with a request that my system be universally adopted, and I forwarded 500 of them and sent them abroad; and by this time they are in all quarters of the globe...<sup>26</sup>

Whilst this was the case abroad Manby did not receive any formal recognition from the Crown;<sup>27</sup> indeed it was his earnest wish to have the superintendence of his system, for which he was refused, and it was this apparent snub that caused him to write more than once to the First Lord of the Treasury, Lord Melbourne, who never even replied to him. Not content with this he wrote to the Secretary of State for the Home Department with a detailed list of the services he had provided for the country. Ultimately, feeling that he had been overlooked due to 'some odium in my character or conduct', he sought the reassurance of Lord John Russell who stated 'that such was not the case, and that he had not the most distant intention to cast any imputation on my character'. Manby acknowledged that the government had done everything they could to render the system universal.<sup>28</sup> The only thing missing was to give him control of it, despite the fact that the apparatus was at stations and places on the coast that he had personally pointed out.

The government had tried, tested and taken Manby's system as a proven means of effecting rescue and had done this at considerable expense and effort. It may appear

hardly surprising therefore that when Trengrouse tried to get his system operational government commitment hardly equalled that of Manby's experience, despite the fact that he had published a book on it in 1817 – he was not far behind Manby. Trengrouse had undergone heavy personal expenditure in developing his system but by the time of the 1836 Inquiry into the Causes of Shipwreck had not commenced manufacture. He had been waiting 'for the countenance of Government, to which I think I am justly entitled'. The government of the day had been extremely slow in appreciating the merits of Trengrouse's system. As early as 1819 he had approached the Shipowner's Society and exhibited his apparatus. In their report Trengrouse's system had been highly applauded and they had promised to recommend it to the merchant service.<sup>29</sup> The Elder Brethren of Trinity House had highly commended the invention and had requested to have a model set, which Trengrouse duly supplied. Their report again was very favourable; they recommended that all vessels should be equipped with the system.<sup>30</sup> *Lloyd's Register* had also been approached and left Trengrouse with the impression that they were not interested in the subject of life-saving. The topic of marine insurance had been a very contentious issue in the first half of the nineteenth century<sup>31</sup> and much had been discussed as to the true objectives of the insurance underwriters.<sup>32</sup> Trengrouse had not been optimistic of a favourable reception to his ideas:

By the public prints I have seen that many gentlemen have recently written and published their sentiments on underwriting, but which it is not now my business to repeat; however I may add, that I was certainly sanguine in my expectations of the countenance I should receive from *Lloyd's*, and my disappointment was in proportion.<sup>33</sup>

He had not received any encouragement at all at *Lloyd's*. Trengrouse's attempts to interest the Admiralty had been equally unsuccessful. He naturally felt that:

His Majesty's ministers would readily countenance it and myself, and that it would be immediately adopted in and throughout the navy, consequently on coming to London my first step was to submit it to the board of the Admiralty.<sup>34</sup>

Upon coming to London Trengrouse was directed to Woolwich where a committee of naval and field officers thoroughly examined the apparatus and witnessed a demonstration.<sup>35</sup> Mr J.W. Croker, the then Secretary of the Admiralty, soon wrote to Trengrouse on the basis of an extremely favourable report and requested to know what price per set some of His Majesty's ships could be supplied.<sup>36</sup> Before the information was obtained he received another letter from Croker telling him not to proceed<sup>37</sup> but that he should appear before a committee of inquiry, as Sir William Congreve<sup>38</sup> had disputed his claim to originality of the invention. Trengrouse faced a committee in which Congreve was not only accuser but judge – he proved to the entire satisfaction of the committee that his invention was original. Congreve had congratulated him on the invention and a member of the committee, Captain Sir John Ross, requested through official orders a set of rocket-apparatus to take with him on his imminent northern expedition. Despite Trengrouse's complete acquittal and his finding favour with Sir William Congreve, he could not again draw the interest of the Secretary of the Admiralty despite repeated efforts. Trengrouse's proposal for the apparatus and system of rescue was voted a gold medal and 50 guineas by the examining committee of the Society... for the Encouragement of Arts, Manufactures and Commerce (now Royal Society of Arts); they awarded him the large silver medal and 30 guineas in 1820 following consideration by the committee of mechanics, having witnessed experiments



in Hyde Park on 27 April.<sup>39</sup> In 1826 he applied to the Royal Humane Society to be considered for their Fothergill Medal in respect of his method of rescue.<sup>40</sup>

Given the obvious lead that Manby's system had over Trengrouse's, having been actually established some twenty years at least prior to the 1836 Inquiry – and given that Trengrouse had not even commenced manufacture by then, despite all the recommendations, sample systems he had demonstrated and supplied, the tireless devotion to the subject – it would seem as if nothing except a government acceptance of the system and its consequent deployment would enable its obvious benefits to be realised. James Silk Buckingham, the chairman of the 1836 Shipwreck Committee, put it to Trengrouse:

Considering the advantages to be so striking and the price so small, to what do you attribute the infrequency of their adoption for use?<sup>41</sup>

Trengrouse answered by quoting the words of Sir Thomas Acland:<sup>42</sup>

The apparatus having gained such strong testimonials in its favour, it is to me a great mystery why it has not been adopted and reduced to practice...<sup>43</sup>

He took this to mean, of course, why has the government refused to take it up? Trengrouse was of the opinion, against all this apparent disinterest from the government who were really his only means to which the system would gain national acceptance, that they could not easily accept change, especially in the concerns of the Navy:

At the same time I must admit, that I believe there exists too general disposition to object to new things intended for real benefit, particularly with sailors; they almost need to have things forced upon them...<sup>44</sup>

The real breakthrough as far as Congreve-based rocket-powered rescue systems such as Trengrouse's were concerned was the rescue in 1832 of the survivors from the wreck of the *Bainbridge* (upwards of 400 tons burthen) off Atherfield Ledge, Isle of Wight. This had been the first time that a rocket-carried line had been successfully used in the case of an actual shipwreck. The man behind this achievement was John Dennett who in 1832 had invented the life-saving apparatus (known as Dennett's) for conveying a rope from the shore to a shipwrecked crew.<sup>45</sup> According to Trengrouse, Dennett had been engaged in the manufacture of rockets during the Napoleonic Wars, based upon the plan of Congreve rockets, as military implements of war, and that since the war had ended:

...he thought of applying their projectile force to carry ropes for the purpose of saving lives in case of shipwreck...<sup>46</sup>

Dennett's principle was similar to Trengrouse's. Trengrouse knew of this as Dennett had produced a pamphlet, but in no way did it acknowledge his achievements. It may have been coincidental, but according to Trengrouse a copy of his publication on the subject of saving lives at a time of shipwreck, published as early as 1817, was deposited by him at the circulating library for sailors at Cowes, Isle of Wight, in about 1824:

...whether Mr Dennett ever saw it or heard of it I cannot tell; however some years elapsed before his rocket invention for communicating a line in case of shipwreck was announced...<sup>47</sup>

The two systems were comparable but Dennett had used large rockets, perhaps as much as 4 inches in diameter. At the 1836 Inquiry into the Causes of Shipwreck Trengrouse drew attention to the fact that he also had used much the same equipment – detailed in a report from the officers at Woolwich – concerning experiments with

large rockets (made under Sir William Congreve's directions) some eight or nine years previous to Mr Dennett 'appearing before the public':

I think that they were called 18 pounders reduced, they were in iron cases, having a six pound grapple at the head and were very powerful. An inch and a half line was projected full 250yds by one of them.<sup>48</sup>

Dennett's apparatus resembled a sky-rocket but instead of the paper case of the sky-rocket it had an iron case and a pole rather than a 'mere stick', it weighed 23lb, was propelled by 9lb of composition and had a range of 250yds.<sup>49</sup>

At the wreck of the *Bainbridge* the Manby mortar was brought to the shore opposite the wreck and four efforts were made with it to get a line aboard. It may have been due to the distance involved but all four attempts failed. The ship was by this time lying stern to the shore, which presented a very narrow target for the rescuers on the shore. Dennett's large rockets were brought to the spot and upon the first attempt succeeded. A line was made to reach the *Bainbridge* and subsequently a rope hauled on board, and a boat drawn through the surf by which the crew were safely landed on the beach.

Dennett's experience with the British government on the question of recognition and patronage was much the same as Manby had received, and that Trengrouse had sought after:

...hope deferred maketh the heart sick, I have experienced the most painful disappointments as well as been at a very heavy expenditure...<sup>50</sup>

Dennett received several honorary distinctions from foreign rulers, and again as Manby, his services to society were appreciated far more abroad than at home.<sup>51</sup> Two years after the wreck of the *Bainbridge* in 1834 the example of fortuitous rescue in the case of the *Bainbridge* caused many of the coastguard stations to be supplied with similar Dennett apparatus; the rocket was at last finding acceptance amongst the British authorities.

By the time of the 1843 Shipwreck Committee, Dennett's rockets had been instrumental in effecting rescues all around the coast. Many of the coastguard stations kept both Dennett's rockets and Manby's mortar,<sup>52</sup> some preferring one to the other, for there were still great advantages to be gained in the case of the mortar. Whilst much heavier (a brass mortar weighed 152lb and its bed 133lb)<sup>53</sup> and therefore much more cumbersome, it could project a grapple rather than a shot, which would have the effect of increasing its range when aimed across a rope tied to a buoy and let out from a stranded vessel (Fig. 4). Also, there were problems with the rockets that the mortar did not incur, such as rusting jackets, damp and inefficient charges, broken sticks causing directional problems etc. Against this the rocket was much lighter and at night could illuminate the wreck and therefore enable the rescuers to check its direction. In attempting to further develop his invention Dennett attempted to use two rockets side by side in order to increase the power and range of the system. The range was increased to 400yds but the simultaneous and equal action of the rockets could not be relied upon and directional problems ensued. Other inventors were now on the scene - A.G. Carte, an ordnance store-keeper from Hull, had approached the Ordnance Department to have his rocket apparatus tried against Dennett's, an exercise that Dennett had previously been party to on several occasions against Manby's mortar apparatus<sup>54</sup> under sanction of the Comptroller-General of the coastguard. In a comparison held at North Yarmouth on 2 and 5 September 1842, Commander James Pulling RN, the inspecting

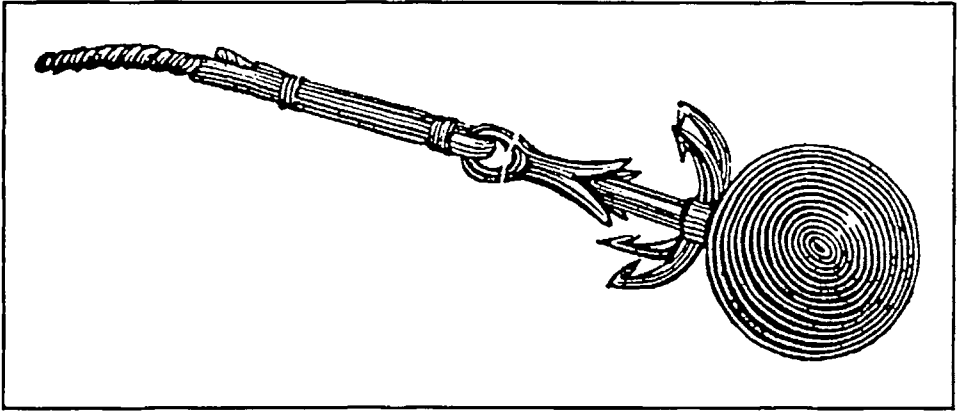


Fig. 4. Manby's Mortar-barbed Shot. (*Gentleman's Magazine*, 1821)

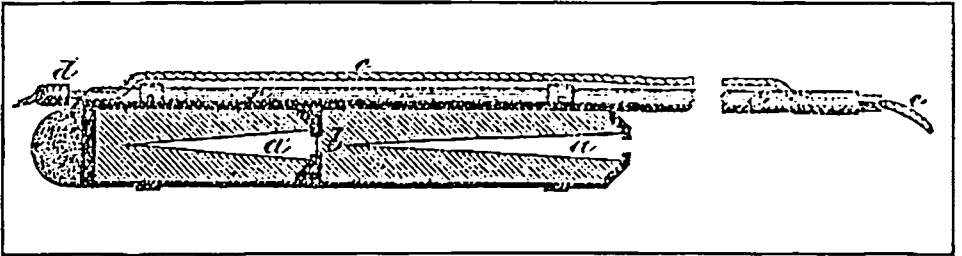


Fig. 5. Boxer's Rocket – section showing two distinct cavities in line separated by a solid portion of composition. (*Cornhill Magazine*, 1873)

commissioner, reported having estimated averages against Dennett and Carte's rockets, for Dennett's were 9-pounders and Carte's were 6- and 12-pounders, that

...taking all these things into consideration, the superiority of Carte's rockets seems so very trifling, that it would not in my opinion be advisable to incur any additional expense in placing them at these stations, where Dennett's rockets are already established; but if a station (not furnished with either) were to be supplied, I should certainly, on the whole prefer Carte's...<sup>55</sup>

Thus by 1842 competition to gain the interests of the authorities was enabling the further development of the rocket. In France, Tremblay's rocket fitted with a barbed head to incorporate some of the best features of both Manby and Dennett was to be adopted for the Emperor's yacht as a safety measure designed to be fired from the ship to the shore to enable rescue.<sup>56</sup> Most successful of all these later developments, and destined to replace Dennett's rockets by 1865, was Colonel Boxer's device, developed after many trials and consisting of placing two rockets in one tube, one behind the other. The head was made of hardwood and there was a wrought-iron case, within which were two separate internally coned rockets, the cavities of which were separated by a solid portion of composition which, when the first stage had expired, burned through and ignited the second stage, giving a fresh impulse to the rocket (Fig. 5). The overall length of the 12-pounder rocket section was 24 inches, which was fixed to a stick of 9½ feet



Fig. 6. Lieutenant Kisbee's Sling Life Buoy or Petticoat-breeches – Breeches Buoy in action. (*The Illustrated London News*, 1886)

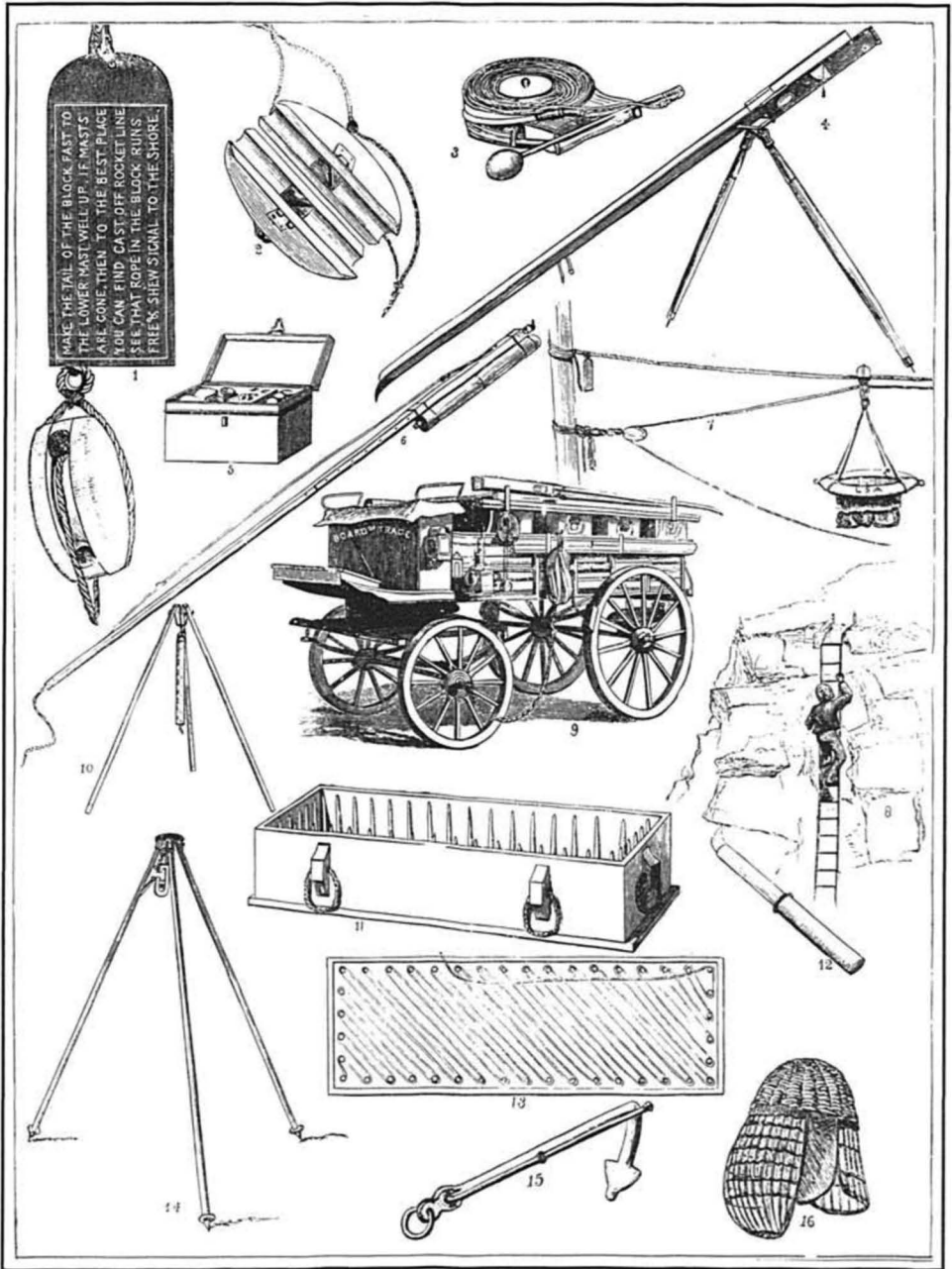


Fig. 7. Rocket Apparatus of the Board of Trade. (*The Illustrated London News*, 1886)

in length. The line itself (of Italian hemp) was carried along the back of the stick, having been thoroughly wetted for 2 fathoms. The front of the stick was protected by a sheet of tinned iron tacked over it for a length of 14 inches. The method of releasing a continuous length of unbroken line relied upon Dennett's technique of using a faking-box to coil the line systematically over a series of pins which are finally removed – itself a development of Manby's apparatus.<sup>57</sup> (See box with pins and rope layout in Fig. 7.) The line, some 500yds in length, weighed only 46lb and as in previous systems was used primarily as a means of passing a heavier line, which in Boxer's case was used in conjunction with Lieutenant Kisbee's Sling Life-buoy or Petticoat-breeches. This was not strictly a belt or a buoy but a garment in which a person was slung clear of the water and consisting of a circular cork life-buoy forming the top ring of a pair of canvas breeches (Fig. 6).<sup>58</sup>

The development in the first half of the nineteenth century regarding the use of rocket and mortar apparatus came to a head with the setting up of the 'Life Rocket department' or rather that branch of the Marine Department of the Board of Trade which supervised the management of life-rockets, mortars, lines, buoys, and belts, and divided with the National Life-boat Institution the labours connected with the prevention of shipwreck, and the rescue of shipwrecked persons.<sup>59</sup> This came about as a result of the 'Great' Merchant Shipping Act of 1854 – the Act that was ultimately borne out of years of heavy shipwreck and loss of life discussed by the 1836 Shipwreck Committee, the 1839 Inquiry into the Loss of Timber Laden Ships and the 1843 Shipwreck Committee – and coalesced their hitherto piecemeal reforms.

The resultant equipment (Fig. 7) supplied to 300 seaside stations of the coastguard divisions by 1874 had been a development of Manby, Trengrouse, Dennett, Carte, and Boxer (based upon Congreve's original rocket, itself further developed for use in war).<sup>60</sup> The coasts of the United Kingdom were classified into 59 coastguard divisions or wreck-register districts and a coastguard inspector of each division had control over the various rockets, mortars, buoys, belts and lines kept at the various seaside stations within the district:

Most of the mortars are Boxer's improvement on Manby's; and most of the rockets are Boxer's improvement on Dennett's. Boxer's rockets, found more effective than mortars are made at the Royal Laboratory at Woolwich and are supplied by the War Department to the stations on the requisition of the Board of Trade... At each station is kept a cart, expressly made to contain all the requisites for the rocket apparatus ready packed. 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 depots on the coast, and from these depots to the station by the coastguard cruisers...<sup>61</sup>

As well as the coastguard and customs having the apparatus it was also used by the 150 Volunteer Life Brigades along the coast who originated in 1864 at Tynemouth following the wreck of the passenger steamship *Stanley*. Thus by the 1870s – fifty years on – Trengrouse's notion of a 'wreck police all over England' was realised.

#### *Acknowledgements*

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- 6 See attribute to Lieutenant Bell in *Report of Committee of Artillery Officers at Woolwich on Capt. Manby's Invention for Saving the Lives of Shipwrecked Mariners*, BPP 1810-11 (215) XI, 111. Also, petition of Bell's daughter in *Papers relating to Capt. Manby's Plan for Saving the Lives of Shipwrecked Mariners*, BPP 1813-14 (309) III, 347.
- 7 *Gentleman's Magazine*, pt. II, vol. XCI (1821), 162. See also *Papers relating to Capt. Manby's Plan for Relief in Cases of Shipwreck*, BPP 1816 (409) XIX, 193.
- 8 In *Gentleman's Magazine*, pt. II, vol. XCI (1821), 360: Dr J. Carey has extracts published from *Monthly Magazine* of Nov. 1803 describing a system of mortar cannon with wooden coloured balls and line – much as Manby's later equipment.
- 9 See copy of letter from Lieutenant General Lloyd dated 3 May 1809 containing the Report of the Committee of Field Officers of Artillery on Capt. Manby's Experiments for effecting Communication with a Stranded Ship in *Papers relating to Capt. Manby's Experiments for effecting Communication with Stranded Ships* 1809, (255), X, 384, p.10.
- 10 *Papers relating to Capt. Manby's Plan for Saving Lives of Shipwrecked Mariners*, BPP 1813-14 (48) XI, 415, p.451 (See letter No. 11).
- 11 *Papers relating to Capt. Manby's Plan for Relief in Cases of Shipwreck*, BPP 1816 (409) XIX, 193.
- 12 PD *Hansard* (Commons), 1st Series vol. XXVIII: Friday 10 June 1814, cols 44-50; Monday 20 June 1814, col 104; Wednesday 22 June cols 121-2.
- 13 *Papers relating to Capt. Manby's Plan* (1816), XIX, 213.
- 14 *Ibid*. See also *Gentleman's Magazine*, pt. II, vol. XCI (1821).
- 15 *Gentleman's Magazine*, pt. II, vol. XCI (1821), 361.
- 16 For a contemporary summary of the work of Sir William Congreve concerning rocket development see *Penny Magazine*, vol. VIII, 28 September 1839, 374. Also: 'A Concise Account of the Origin and Progress of the Rocket System' (London, 1807) & 'Details of the Rocket System' (London, 1814).
- 17 *S.C. Shipwrecks* (1836), Q.3856, p.252. See also Q.3865, p.253: Henry Trengrouse.
- 18 From *Transactions of the Society... for the Encouragement of Arts*, vol. XXXVIII, London (1822). Quoted in *For Those in Peril*, National Maritime Museum (HMSO, 1963).
- 19 See letter of John Prout, late master of Brigantine vessel *Elizabeth*, stranded on the beach at Gr Yarmouth, Friday 12 Feb. 1808, explaining that a rope communication was made from the shore and that in this particular circumstance nothing else could have got them off. *Papers* (1809), X, 376.
- 20 Although he claims to have only actually received £4,000 from the government – see *Gentleman's Magazine*, pt. II, vol. XCI (1821), 360.
- 21 Archives of the Royal Humane Society - letter from Henry Trengrouse at No. 2, Villiers Street, Strand, 13 April 1818, to T.J. Pettigrew, Secretary to the Royal Humane Society, p.3.
- 22 *Ibid*.
- 23 *Ibid*, p.2.
- 24 Sir W. Hillary, *An Appeal to the British Nation on the Humanity and Policy of Forming a National Institution for the Preservation of Lives and Property from Shipwreck*. published in various papers ie. *Pamphleteer* (London, 1824), 484. (Also by Whittaker et al.)
- 25 *S.C. Shipwrecks* (1836), Q.2174, p.138: Capt. George Manby.
- 26 *Ibid*, Q.2174, p.138.

27 Despite having been said to have gained the attention of the Prince Regent. See letter from Lord Sidmouth, Secretary of State for the Home Department to the Master General and Board of Ordnance '...and I am at the same time to signify to you the Prince Regent's pleasure...'; Whitehall, 14 Dec. 1815. *Papers* (1816) XIX.2, 7.

28 *Ibid.*, QQ.2175-2178.

29 *S.C. Shipwrecks* (1836), QQ.3871-3872, p.255: Henry Trengrouse.

30 *Report of the Committee of Pilotage and Examination on Invention of Henry Trengrouse*, BPP 1825 (489) XXI, 363: Trinity House, 6 Aug. 1818.

31 See James Ballingall, *Sea Insurance the Cause of Shipwreck*, 8 vols (London, 1834).

32 See *Edinburgh Review*, 'On the Frequency of Shipwrecks', vol. LX, 1834-5, pp.339-41.

33 *S.C. Shipwrecks* (1836), Q.3875, p.255: Henry Trengrouse.

34 *Ibid.*, Q.3869, p.254.

35 *Letter reporting Result of Inspection of H. Trengrouse's Invention (for preserving Life in cases of Shipwreck, by Rocket)*, BPP 1825 (415) XXI, 361.

36 *Ibid.*, see letter from J.W. Croker to Trengrouse.

37 *Ibid.*

38 Sir William Congreve (1772-1871), see Vol. XII, DNB, 9.

39 See *Transactions of the Society... for the encouragement of Arts, Manufactures and Commerce*, Vol. XXXVIII, p. 161. and Minutes of Committee of Mechanics, 27 April 1820.

40 Archives of the Royal Humane Society - list of applicants for the Fothergill Medal. Trengrouse submitted an essay entitled 'Prevention of Shipwreck'.

41 *S.C. Shipwrecks* (1836), Q.3868, p.254.

42 Sir Thomas Acland (1787-1871), see DNB, vol. I, 62.

43 *S.C. Shipwrecks* (1836), Q.3868, p.254: Henry Trengrouse.

44 *Ibid.*

45 John Dennett (1790-1852), see DNB, vol. XIV, 367-8. There appears to be some controversy according to *Encyclopedia Britannica* about the actual date of Dennett's invention - they claim it to be 1826.

46 *S.C. Shipwrecks* (1836), Q.3866, p.254.

47 *Ibid.*

48 *Ibid.*

49 See *Chamber's Encyclopedia* (1874), 605, 'Life Mortars and Rockets'.

50 *S.C. Shipwrecks* (1836), Q.3877, p.256: Trengrouse.

51 See *Gentleman's Magazine*, No. XXXVIII (1852), 319. (taken from *London Weekly Paper*).

52 *Select Committee appointed to Inquire into Shipwreck of British Vessels, and the Means of Preserving the Lives and Property of Shipwrecked Persons*, BPP 1843, (549) IX, 1, Q.3308, p.219 & Q.3311, p.270: Evidence of Captain Samuel Sparshott; Commander of the Navy and Deputy Comptroller of the Coastguard.

53 *S.C. Shipwrecks* (1843), QQ.4885-4886, p.306: Commander James Pulling RN: employed by the coastguard to try the rockets and mortars.

54 Dennett's rockets and Manby's mortars had been regularly compared on occasions of instruction in usage at for instance: Yarmouth, 24 Jan. 1835; Blyth, 20 Aug. 1835; Beadnall 24 Aug. 1835; Holy Island, 25 Aug. 1835; Howick, Sea Houses, 26 Aug. 1835; Tynemouth, 29 Aug. 1835; Atherfield, 20 Oct. 1837; St Catherine's Down, 19 July 1841; Chilton Brook Station, 18 Oct. 1842. See *S.C. Shipwrecks* (1843), App.14, *Papers respecting Rockets*.

55 *S.C. Shipwrecks* (1843), App. No. 14, p.86: Letter from Inspecting Commissioner Commander James Pulling to Comptroller-General of Coastguard.

56 See *Chamber's Encyclopedia* (1874), 605.

57 Faking Box - described and illustrated in: *Papers relating to Capt. Manby's Plan for Relief in Cases of Shipwreck*, BPP 1816 (409) XIX, 193, pp.216-7. See also *Cornhill Magazine*, vol. XXVIII July-Dec. 1873, 73, fig. 2.

58 See *Cornhill Magazine*, vol. XXVII, July-Dec. 1873, 72-87, for a clear exposé on Colonel Boxer's rocket system.

59 See *Chamber's Encyclopedia* (1874), 606, 'Life Rocket Department'.

60 Since Congreve's invention in 1804 the use of rockets as weapons of war gradually became commonplace. They were used in the attack on Boulogne in 1806, Copenhagen 1807, Walcheren expedition of 1809, where His Majesty's Ship *Galgo*, sloop of war was fitted out as a Rocket Ship. See David Yarrow, 'A Journal of the Walcheren Expedition 1809', *M.M.*, Vol. 61 (1975), 183-9, extracted from a manuscript entitled 'A Journal of the Proceedings of His Majesty's Sloop of War the *Galgo* during the Siege



of Flushing in the Year 1809 under the command of John Gardene McBride Esq. and Especially Genl. Sir William Congreve, Bart'.

61 *Chamber's* (1874), 606.

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