

**ROBERT
MICHAEL
BALLANTYNE**

THE BATTERY AND THE
BOILER: ADVENTURES IN
LAYING OF SUBMARINE
ELECTRIC CABLES

Robert Michael Ballantyne
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Adventures in Laying of
Submarine Electric Cables

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Cables:

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R. M. Ballantyne

The Battery and the Boiler: Adventures in Laying of Submarine Electric Cables

Chapter One.

In which the Hero makes his First Flash and Explosion

Somewhere about the middle of this nineteenth century, a baby boy was born on the raging sea in the midst of a howling tempest. That boy was the hero of this tale.

He was cradled in squalls, and nourished in squalor—a week of dirty weather having converted the fore-cabin of the emigrant ship into something like a pig-sty. Appreciating the situation, no doubt, the baby boy began his career with a squall that harmonised with the weather, and, as the steward remarked to the ship's cook, “continued for to squall straight on end all that day and night without so much as ever takin' breath!” It is but right to add that the steward was prone to exaggeration.

“Stooard,” said the ship's cook in reply, as he raised his eyes

from the contemplation of his bubbling coppers, “take my word for it, that there babby what has just bin launched ain’t agoin’ to shovel off his mortal coil—as the play-actor said—without makin’ his mark some’ow an’ somew’eres.”

“What makes you think so, Johnson?” asked the steward.

“What makes me think so, stooard?” replied the cook, who was a huge good-natured young man. “Well, I’ll tell ’ee. I was standin’ close to the fore hatch at the time, a-talkin’ to Jim Brag, an’ the father o’ the babby, poor feller, he was standin’ by the foretops’l halyards holdin’ on to a belayin’-pin, an’ lookin’ as white as a sheet—for I got a glance at ’im two or three times doorin’ the flashes o’ lightnin’. Well, stooard, there was lightnin’ playin’ round the mizzen truck, an’ the main truck, an’ the fore truck, an’ at the end o’ the flyin’ jib-boom, an’ the spanker boom; then there came a flash that seemed to set afire the entire univarse; then a burst o’ thunder like fifty great guns gone off all at once in a hurry. At that identical moment, stooard, there came up from the fore-cabin a yell that beat—well, I can’t rightly say what it beat, but it minded me o’ that unfortnit pig as got his tail jammed in the capstan off Cape Horn. The father gave a gasp. ‘It’s born,’ says he. ‘More like’s if it’s basted,’ growled Jim Brag. ‘You’re a unfeelin’ monster, Brag,’ says I; ‘an’ though you *are* the ship’s carpenter, I *will* say it, you ’aven’t got no more sympathy than the fluke of an anchor!’ Hows’ever the poor father didn’t hear the remark, for he went down below all of a heap—head, legs, and arms—anyhow. Then there came another yell, an’

another, an' half a dozen more, which was followed by another flash o' lightnin' an' drowned in another roar o' thunder; but the yells from below kep' on, an' came out strong between times, makin' no account whatever o' the whistlin' wind an' rattlin' ropes, which they riz above—easy.—Now, stooard, do you mean for to tell me that all that signifies nothink? Do you suppose that that babby could go through life like an or'nary babby? No, it couldn't—not even if it was to try—w'ich it *won't!*"

Having uttered this prophecy the cook resumed the contemplation of his bubbling coppers.

"Well, I suppose you're right, John Johnson," said the steward.

"Yes, I'm right, Tom Thomson," returned the cook, with the nod and air of a man who is never wrong.

And the cook *was* right, as the reader who continues to read shall find out in course of time.

The gale in which little Robin Wright was thus launched upon the sea of Time blew the sails of that emigrant ship—the Seahorse—to ribbons. It also blew the masts out of her, leaving her a helpless wreck on the breast of the palpitating sea. Then it blew a friendly sail in sight, by which passengers and crew were rescued and carried safe back to Old England. There they separated—some to re-embark in other emigrant ships; some to renew the battle of life at home—thenceforward and for ever after to vilify the sea in all its aspects, except when viewed at a safe distance from the solid land!

Little Robin's parents were among the latter. His father, a poor

gentleman, procured a situation as accountant in a mercantile house. His mother busied herself—and she was a very busy little creature—with the economics of home. She clothed Robin's body and stored his mind. Among other things, she early taught him to read from the Bible.

As Robin grew he waxed strong and bold and lively, becoming a source of much anxiety, mingled with delight, to his mother, and of considerable alarm, mixed with admiration and surprise, to his father. He possessed an inquisitive mind. He inquired into everything—including the antique barometer and the household clock, both of which were heirlooms, and were not improved by his inquiries. Strange to say, Robin's chief delight in those early days was a thunderstorm. The rolling of heaven's artillery seemed to afford inexpressible satisfaction to his little heart, but it was the lightning that affected him most. It filled him with a species of awful joy. No matter how it came—whether in the forked flashes of the storm, or the lambent gleamings of the summer sky—he would sit and gaze at it in solemn wonder. Even in his earliest years he began to make inquiries into that remarkable and mysterious agent.

“Musser,” he said one day, during a thunderstorm, raising his large eyes to his mother's face with intense gravity,—“Musser, what is lightenin'?”

Mrs Wright, who was a soft little unscientific lady with gorgeous eyes, sat before her son, perplexed.

“Well, child, it is—it—really, I don't know what it is!”

“Don’t know?” echoed Robin, with surprise, “I sought you know’d everyting.”

“No, not everything, dear,” replied Mrs Wright, with a deprecatory smile; “but here comes your father, who will tell you.”

“Does *he* know everyting?” asked the child.

“N—no, not exactly; but he knows many things—oh, *ever* so many things,” answered the cautious wife and mother.

The accountant had barely crossed his humble threshold and sat down, when Robin clambered on his knee and put the puzzling question.—“Fasser, what is lightenin’?”

“Lightning, my boy?—why, it’s—it’s—let me see—it’s fire, of course, of some sort, that comes out o’ the clouds and goes slap into the earth—there, don’t you see it?”

Robin did see it, and was so awestruck by the crash which followed the blinding flash that he forgot at the moment to push his inquiries further, much to his father’s satisfaction, who internally resolved to hunt up the *Encyclopaedia Britannica* that very evening—letter L—and study it.

In process of time Robin increased in size. As he expanded in body he developed in mind and in heart, for his little mother, although profoundly ignorant of electricity and its effects, was deeply learned in the Scriptures. But Robin did not hunger in vain after scientific knowledge. By good fortune he had a cousin—cousin Sam Shipton—who was fourteen years older than himself, and a clerk at a neighbouring railway station, where

there was a telegraphic instrument.

Now, Sam, being himself possessed of strongly scientific tendencies, took a great fancy to little Robin, and sought to enlighten his young mind on many subjects where “musser’s” knowledge failed. Of course he could not explain all that he himself knew about electricity—the child was too young for that,—but he did what he could, and introduced him one day to the interior of the station, where he filled his youthful mind with amazement and admiration by his rapid, and apparently meaningless, manipulation of the telegraph instrument.

Cousin Sam, however, did a good deal more for him than that in the course of time; but before proceeding further, we must turn aside for a few minutes to comment on that wonderful subject which is essentially connected with the development of this tale.

Chapter Two.

Refers to a Notable Character

Sparks, as a rule, are looked upon as a race of useless and disreputable fellows. Their course is usually erratic. They fly upward, downward, forward, and backward—here, there, and everywhere. You never know when you have them, or what will be their next flight. They often create a good deal of alarm, sometimes much surprise; they seldom do any good, and frequently cause irreparable damage. Only when caught and restrained, or directed, do sparks become harmless and helpful.

But there is one Spark in this world—a grand, glowing, gushing fellow—who has not his equal anywhere. He is old as the hills—perhaps older—and wide as the world—perchance wider. Similar to ordinary sparks in some respects, he differs from them in several important particulars. Like many, he is “fast,” but immeasurably faster than all other sparks put together. Unlike them, however, he submits to be led by master minds. Stronger than Hercules, he can rend the mountains. Fleeter than Mercury, he can outstrip the light. Gentler than Zephyr, he can assume the condition of a current, and enter our very marrow without causing pain. His name is Electricity. No one knows what he is. Some philosophers have said that he is a fluid, because he flows. As well might they call him a wild horse because he bolts, or a

thief because he lurks! We prefer to call him a Spark, because in that form only is he visible—at least when handled by man.

Talking of that, it was not until the last century that master minds found out how to catch and handle our Spark. In all the previous centuries he had been roaming gaily about the world in perfect freedom; sometimes gliding silently to and fro like an angel of light; sometimes leaping forth with frightful energy in the midst of raging tempest, like a destructive demon—ripping, rending, shattering all that attempted to arrest his course. Men have feared and shunned him since the beginning of time, and with good reason, for he has killed many of the human race.

But although uncaught and untamed by them, our Spark was not altogether unknown to the ancients. So far back as the year 600 before the Christian era, Thales, one of the Greek sages, discovered that he hid himself in amber, a substance which in Greek is named *electron*—hence his name Electricity; but the ancients knew little about his character, though Thales found that he could draw him from his hiding-place by rubbing him with silk and some other substances. When thus rubbed he became attractive, and drew light creatures towards him—not unlike human sparks! He also showed himself to be fickle, for, after holding these light creatures tight for a brief space, he let them go and repelled them.

It was not till the days of good Queen Bess, towards the end of the sixteenth century, that a Dr Gilbert discovered that the wild fellow lay lurking in other substances besides amber—such

as sulphur, wax, glass, etcetera. It is now known that Electricity permeates all substances more or less, and only waits to be roused in order to exhibit his amazing powers. He is fond of shocking people's feelings, and has surprised his pursuers rather frequently in that way. Some of them, indeed, he has actually shocked to death!

It would take a huge volume to give a detailed account of all the qualities, powers, and peculiarities of this wild Spark. We will just touch on a few facts which are necessary to the elucidation of our tale.

A great event in the world's history happened in the year 1745. It was nothing less than the capture and imprisonment of wild, daring, dashing Electricity. To the Dutch philosophers belongs the honour of catching him. They caught him—they even bottled him, like ordinary spirits, and called his prison a *Leyden Jar*.

From that date our Spark became the useful and obedient slave of man. Yet is he ever ready, when the smallest conceivable door, hole, or chink is left open, to dash out of the prison-house man has made for him, and escape into his native earth.

He has no hope now, however, of escaping altogether, for he cannot resist the allurements of rubbing, by which, as well as by chemical action and other means, we can summon him, like the genii of Aladdin's lamp, at any moment, from the "vast deep," and compel him to do our work.

And what sort of work, it may be asked, can this volatile fellow perform? We cannot tell all—the list is too long. Let us consider

a few of them. If we fabricate tea-pots, sugar-basins, spoons, or anything else of base metal, he can and will, at our bidding, cover the same with silver or yellow gold. If we grow dissatisfied with our candles and gas, he will, on being summoned and properly directed by the master minds to whom he owns allegiance, kindle our lamps and fill our streets and mansions with a blaze of noonday splendour. If we grow weary of steam, and give him orders, he will drive our tram-cars and locomotives with railway speed, *minus* railway smoke and fuss. He is a very giant in the chemist's laboratory, and, above all, a swift messenger to carry the world's news. Even when out and raging to and fro in a wild state, more than half-disposed to rend our mansions, and split our steeples, and wreck our ships, we have only to provide him with a tiny metal stair-case, down which he will instantly glide from the upper regions to the earth without noise or damage. Shakespeare never imagined, and Mercury never accomplished, the speed at which he travels; and he will not only carry our news or express our sentiments and wishes far and wide over the land, but he will rush with them, over rock, sand, mud, and ooze, along the bottom of the deep deep sea!

And this brings us to a point. Some of the master minds before mentioned, having conceived the idea that telegraphic communication might be carried on under water, set about experimenting. Between the years 1839 and 1851 enterprising men in the Old World and the New suggested, pondered, planned, and placed wires under water, along which our Spark

ran more or less successfully.

One of the difficulties of these experiments consisted in this, that, while the Spark runs readily along one class of substances, he cannot, or will not, run along others. Substances of the first class, comprising the metals, are called conductors; those of the second class, embracing, among other things, all resinous substances, are styled non-conductors. Now, water is a good conductor. So that although the Spark will stick to his wires when insulated on telegraph-posts on land, he will bolt from them at once and take to flight the moment he gets under water. This difficulty was overcome by coating the wires with gutta-percha, which, being a non-conductor, imprisoned the Spark, and kept him, as it were, on the line.

A copper wire covered in this manner was successfully laid between England and France in 1850. When tested, this cable did not work well. Minute imperfections, in the form of air-holes in the gutta-percha, afforded our Spark an opportunity to bolt; and he did bolt, as a matter of course—for electricity has no sense of honour, and cannot be trusted near the smallest loop-hole. The imperfections were remedied; the door was effectually locked, after which the first submarine cable of importance was actually laid down, and worked well. French and English believers turned up hands and eyes in delighted amazement, as they held converse across the sea, while unbelievers were silenced and confounded.

This happy state of things, however, lasted for only a few hours. Suddenly the intercourse ceased. The telegraphists at both

ends energised with their handles and needles, but without any result. The cable was dumb. Our Spark had evidently escaped!

There is no effect without a cause. The cause of that interruption was soon discovered.

Early that morning a French fisherman had sauntered down to the port of Boulogne and embarked in his boat. A British seaman, having nothing to do but smoke and meditate, was seated on a coil of rope at the time, enjoying himself and the smells with which that port is not unfamiliar. He chanced to be a friend of that French fisherman.

“You’re early afloat, Mounseer,” he said.

“Oui, monsieur. Vill you com’? I go for feesh.”

“Well, *wee*; I go for fun.”

They went accordingly and bore away to the northward along the coast before a light breeze,—past the ruined towers which France had built to guard her port in days gone by; past the steep cliffs beyond Boulogne; past the lovely beach of Wimereux, with its cottages nestled among the sand-hills, and its silted-up harbour, whence Napoleon the First had intended to issue forth and descend on perfidious Albion—but didn’t; past cliffs, and bays, and villages further on, until they brought up off Cape Grisnez. Here the Frenchman let down his trawl, and fished up, among other curiosities of the deep, the submarine cable!

“Behold! fat is dis?” he exclaimed, with glaring eyes, uplifted brows, shoulders shrugged, hands spread out, and fingers expanded.

“The sea-sarpint grow’d thin,” suggested the Englishman.

“Non; c’est seaweed—veed de most ’strordinair in de world. Oui, donnez-moi de hache, de hax, mon ami.”

His friend handed him the axe, wherewith he cut off a small portion of the cable and let the end go. Little did that fisherman know that he had also let our Spark go free, and cruelly dashed, for a time at least, the budding hopes of two nations—but so it was. He bore his prize in triumph to Boulogne, where he exhibited it as a specimen of rare seaweed with its centre filled with gold, while the telegraph clerks at both ends sat gazing in dismay at their useless instruments.

Thus was the first submarine electric cable destroyed. And with the details of its destruction little Robin was intimately acquainted, for cousin Sam had been a member of the staff that had worked that telegraph—at least he had been a boy in the office,—and in after years he so filled his cousin’s mind with the importance of that cable, and the grandeur and difficulty of the enterprise, that Robin became powerfully sympathetic—so much so that when Sam, in telling the story, came to the point where the Frenchman accomplished its destruction, Robin used to grieve over it as though he had lost a brother, or a kitten, or his latest toy!

We need scarcely add that submarine cable telegraphy had not received its death-blow on that occasion. Its possibility had been demonstrated. The very next year (1851) Mr T.R. Crampton, with Messrs Wollaston, Küper, and others, made and laid an

improved cable between Dover and Calais, and ere long many other parts of the world were connected by means of snaky submarine electric cables.

Chapter Three.

Early Aspirations

One pleasant summer afternoon, Mr Wright, coming in from the office, seated himself beside his composed little wife, who was patching a pair of miniature pantaloons.

“Nan,” said the husband, with a perplexed look, “what *are* we to do with our Robin when he grows up?”

“George,” answered the composed wife, “don’t you think it is rather soon to trouble ourselves with that question? Robin is a mere child yet. We must first give him a good education.”

“Of course, I know that,” returned the perplexed husband, “still, I can’t help thinking about what is to be done after he has had the good education. You know I have no relation in the world except brother Richard, who is as poor as myself. We have no influential friends to help him into the Army or the Navy or the Indian Civil Service; and the Church, you know, is not suitable for an imp. Just look at him *now!*”

Mrs Wright looked through the window, over one of those sunny landscapes which are usually described as “smiling,” across a winding rivulet, and at last fixed her gorgeous eyes on a tall post, up which a small black object was seen to be struggling.

“What can he be up to?” said the father.

“He seems to be up the telegraph-post,” said the mother,

“investigating the wires, no doubt. I heard him talking about telegraphy to Madge this morning—retailing what cousin Sam tries to teach him,—and I shouldn’t wonder if he were now endeavouring to make sure that what he told her was correct, for you know he is a thorough investigator.”

“Yes, I know it,” murmured the father, with a grim pursing of his lips; “he investigated the inside of my watch last week, to find out, as he said, what made the noise in its ‘stummick,’ and it has had intermittent fever ever since. Two days ago he investigated my razor,—it is now equal to a cross-cut saw; and as to my drawers and papers, excepting those which I lock up, there is but one word which fully describes the result of his investigations, and that is—chaos.”

There was, in truth, some ground for that father’s emotions, for Master Robin displayed investigative, not to say destructive, capacities far in advance of his years.

“Never mind, George,” said Mrs Wright soothingly, “we must put up with his little ways as best we may, consoling ourselves with the reflection that Robin has genius and perseverance, with which qualities he is sure to make his way in the world.”

“He has at all events made his way up the telegraph-post,” said Mr Wright, his smile expanding and the grimness of it departing; “see! the rascal is actually stretching out his hand to grasp one of the wires. Ha! hallo!”

The composed wife became suddenly discomposed, and gave vent to a scream, for at that moment the small black object which

they had been watching with so much interest was seen to fall backward, make a wild grasp at nothing with both hands, and fall promptly to the ground.

His father threw up the window, leaped out, dashed across the four-feet-wide lawn, cleared the winding rivulet, and cut, like a hunted hare, over the smiling landscape towards the telegraph-post, at the foot of which he picked up his unconscious though not much injured son.

“What made you climb the post, Robin?” asked his cousin Madge that evening as she nursed the adventurous boy on her knee—and Madge was a very motherly nurse, although a full year younger than Robin.

“I kimed it to see if I could hear the ’trissity,” replied the injured one.

“The lek-trissity,” said Madge, correcting. “You must learn to p’onounce your words popperly, dear. You’ll never be a great man if you are so careless.”

“I don’t want to be a g’eat man,” retorted Robin. “I on’y want t’understand things whats puzzlesum.”

“Well, does the telegraph puzzle you?”

“Oh! mos’ awfully,” returned Robin, with a solemn gaze of his earnest eyes, one of which was rendered fantastic by a yellow-green ring round it and a swelling underneath. “I’s kite sure I’s stood for hours beside dat post listin’ to it hummin’ an hummin’ like our olianarp—”

“Now, Robin, *do* be careful. You know mamma calls it an

olian *harp*.”

“Yes, well, like our olian *harp*, only a deal louder, an’ far nicer. An’ I’s often said to myself, Is that the ’trissity—?”

“Lek, Robin, lek!”

“Well, yes, *lek*-trissity. So I thought I’d kime up an’ see, for, you know, papa says the ’trissity—lek, I mean—runs along the wires—”

“But papa also says,” interrupted Madge, “that the sounds you want to know about are made by the vi— the vi—”

“Bratin’,” suggested the invalid.

“Yes, vibratin’ of the wires.”

“I wonder what vi-bratin’ means,” murmured Robin, turning his lustrous though damaged eyes meditatively on the landscape.

“Don’no for sure,” said Madge, “but I think it means tremblin’.”

It will be seen from the above conversation that Robert Wright and his precocious cousin Marjory were of a decidedly philosophical turn of mind.

Chapter Four.

Extraordinary Result of an Attempt at Amateur Cable-Laying

Time continued to roll additional years off his reel, and rolled out Robin and Madge in length and breadth, though we cannot say much for thickness. Time also developed their minds, and Robin gradually began to understand a little more of the nature of that subtle fluid—if we may venture so to call it—under the influence of which he had been born.

“Come, Madge,” he said one day, throwing on his cap, “let us go and play at cables.”

Madge, ever ready to play at anything, put on her sun-bonnet and followed her ambitious leader.

“Is it to be land-telegraphs to-day, or submarine cables?” inquired Madge, with as much gravity and earnestness as if the world’s welfare depended on the decision.

“Cables, of course,” answered Robin, “why, Madge, I have done with land-telegraphs now. There’s nothing more to learn about them. Cousin Sam has put me up to everything, you know. Besides, there’s no mystery about land-lines. Why, you’ve only got to stick up a lot o’ posts with insulators screwed to ’em, fix wires to the insulators, clap on an electric battery and a telegraph instrument, and fire away.”

“Robin, what *are* insulators?” asked Madge, with a puzzled look.

“Madge,” replied Robin, with a self-satisfied expression on his pert face, “this is the three-hundred-thousandth time I have explained that to you.”

“Explain it the three-hundred-thousand-and-first time, then, dear Robin, and perhaps I’ll take it in.”

“Well,” began Robin, with a hypocritical sigh of despair, “you must know that everything in nature is more or less a conductor of electricity, but some things conduct it so well—such as copper and iron—that they are called *conductors*, and some things—such as glass and earthenware—conduct it so *very* badly that they scarcely conduct it at all, and are called *non-conductors*. D’ee see?”

“Oh yes, I see, Robin; so does a bat, but he doesn’t see well. However, go on.”

“Well, if I were to run my wire through the posts that support it, my electricity would escape down these posts into the earth, especially if the posts were wet with rain, for water is a good conductor, and Mister Electricity has an irresistible desire to bolt into the earth, like a mole.”

“Naughty fellow!” murmured Madge.

“But,” continued Robin impressively, “if I fix little lumps of glass with a hole in them to the posts, and fix my wires to these, Electricity cannot bolt, because the glass lumps are non-conductors, and won’t let him pass.”

“How good of them!” said Madge.

“Yes, isn’t it? So, you see,” continued Robin, “the glass lumps are insulators, for they cut the electricity off from the earth as an island is, or, at all events, appears to be, cut off from it by water; and Mister Electricity *must* go along the wires and do what I tell him. Of course, you know, I must make my electricity first in a battery, which, as I have often and often told you, is a trough containing a mixture of acid and water, with plates or slices of zinc and copper in it, placed one after the other, but not touching each other. Now, if I fix a piece of wire to my first copper slice or plate, and the other end of it to my last zinc slice or plate, immediately electricity will begin to be made, and will fly from the copper to the zinc, and so round and round until the plates are worn out or the wire broken. D’ee see?”

“No, Robin, I don’t see; I’m blinder than the blindest mole.”

“Oh, Madge, what a wonderful mind you must have!” said Robin, laughing. “It is *so* simple.”

“Of course,” said Madge, “I understand what you mean by troughs and plates and all that, but what I want to know is *why* that arrangement is necessary. Why would it not do just as well to tempt electricity out of its hiding-hole with plates or slices of cheese and bread, placed one after the other in a trough filled with a mixture of glue and melted butter?”

“What stuff you do talk, Madge! As well might you ask why it would not do to make a plum-pudding out of nutmegs and coal-tar. There are some things that no fellow can understand, and of

course I don't know *everything!*"

The astounding modesty of this latter remark seemed to have furnished Madge with food for reflection, for she did not reply to it. After a few minutes' walk the amateur electricians reached the scene of their intended game—a sequestered dell in a plantation, through which brawled a rather turbulent stream. At one part, where a willow overhung the water, there was a deep broad pool. The stream entered the pool with a headlong plunge, and issued from it with a riotous upheaval of wavelets and foam among jagged rocks, as if rejoicing in, and rather boastful about, the previous leap.

The game was extremely simple. The pool was to be the German Ocean, and a piece of stout cord was to serve as a submarine cable.

The boy and girl were well-matched playmates, for Madge was ignorant and receptive—in reference to science,—Robin learned and communicative, while both were intensely earnest.

"Now, this is the battery," said Robin, when he had dug a deep hole close to the pool with a spade brought for the purpose.

"Yes, and the muddy water in it will do for the mixture of acid and water," said Madge.

As she spoke, Robin's toe caught on a root, and he went headlong into the battery, out of which he emerged scarcely recognisable. It was a severe, though not an electric, shock, and at first Robin seemed inclined to whimper, but his manhood triumphed, and he burst into a compound laugh and yell, to the

intense relief of Madge, who thought at first that he had been seriously injured.

“Never mind, Madge,” said Robin, as he cleansed his muddy head; “cousin Sam has often told me that nothing great was ever done except in the face of difficulties and dangers. I wonder whether this should be counted a difficulty or a danger?”

“At first I thought it a danger,” said Madge, with a laugh, “but the trouble you now have with the mud in your hair looks like a difficulty, doesn’t it?”

“Why, then, it’s both,” cried Robin. “Come, that’s a good beginning. Now, Madge, you get away round to the opposite side of the pool, and mind you don’t slip in, it’s rather steep there.”

“This is England,” cried Robin, preparing to throw the line over to his assistant, who stood eager to aid on the other side, “and you are standing on—on—what’s on the other side of the German Ocean?”

“I’m not sure, Robin. Holland, I think, or Denmark.”

“Well, we’ll say Denmark. Look-out now, and be ready to catch. I’m going to connect England and Denmark with a submarine cable.”

“Stay!” cried Madge, “is that the way submarine cables are laid, by throwing them over the sea?”

“N—no, not exactly. They had a steamboat, you know, to carry over the telegraph from England to France; but we haven’t got a steamer—not even a plank to make-believe one. Cousin Sam says that a good workman can do his work with almost any tools

that come to hand. As we have no tools at all, we will improve on that and go to work without them. Now, catch!”

Robin made a splendid heave—so splendid indeed that it caused him to stagger backward, and again he stumbled into his own *battery*! This time, however, only one leg was immersed.

“Another danger!” shouted Madge in great glee, “but I’ve caught the cable.”

“All right. Now make fast the shore-end to a bush, and we’ll commence telegraphing. The first must be a message from the Queen to the King of Denmark—Or is it the President?”

“King, I think, Robin, but I’m not sure.”

“Well, it won’t matter. But—I say—”

“What’s wrong now?”

“Why, the cable won’t sink. It is floating about on the top of the pool, and it can’t be a submarine cable, you know, unless it sinks.”

“Another difficulty, Robin.”

“We will face and overcome it, Madge. Cast off the shore-end and I’ll soon settle that.”

Having fastened a number of small stones to the cable, this persevering electrician would certainly have overcome the difficulty if the line had not, when thrown, unfortunately caught on a branch of the willow, where it hung suspended just out of Madge’s reach.

“How provoking!” she said, stretching out her hand to the utmost.

“Take care—you’ll—ha!”

The warning came too late. The edge of the bank gave way, and Madge went headlong into the pool with a wild shriek and a fearful plunge.

Robin stood rooted to the spot—heart, breath, blood, brain, paralysed for the moment—gazing at the spot where his playmate had disappeared.

Another moment and her head and hands appeared. She struggled bravely for life, while the circling current carried her quickly to the lower end of the pool.

Robin’s energies returned, as he afterwards said, like an electric shock, but accompanied with a terrible sinking of the heart, for he knew that he could not swim! His education in this important particular had been neglected. He sprang round to the lower end of the pool just in time to hold out his hand to the drowning girl. He almost touched her outstretched hand as she swept towards the turbulent waters below, but failed to grasp it.

For the first time in his life our little hero was called on to face death voluntarily. Another moment and Madge would have been caught in the boiling stream that rushed towards the fall below. He was equal to the occasion. He sprang right upon Madge and caught her in his arms. There was no need to hold on to her. In the agony of fear the poor child clasped the boy in a deadly embrace. They were whirled violently round and hurled against a rock. Robin caught it with one hand, but it was instantly torn from his grasp. The waters overwhelmed them, and again sent

them violently towards the bank. This time Robin caught a rock with both hands and held on. Slowly, while almost choked with the water that splashed up into his face, he worked his right knee into a crevice, then made a wild grasp with the left hand at a higher projection of the rock. At the same moment his left foot struck the bottom. Another effort and he was out of danger, but it was several minutes ere he succeeded in dragging Madge from the hissing water of the shallows to the green sward above, and after this was accomplished he found it almost impossible to tear himself from the grasp of the now unconscious girl.

At first poor Robin thought that his companion was dead, but by degrees consciousness returned, and at last she was able to rise and walk.

Drenched, dishevelled, and depressed, these unfortunate electricians returned home.

Of course they were received with mingled joy and reproof. Of course, also, they were forbidden to go near the pool again—though this prohibition was afterwards removed, and our hero ultimately became a first-rate swimmer and diver.

Thus was frustrated the laying of the first submarine cable between England and Denmark!

Chapter Five.

Prospects of Real Cable-Laying—Robin meets with his First Electrical Acquaintances

Circumstances require that we should shift the scene and the date pretty frequently in this tale. We solicit the reader's attendance at an office in London.

The office is dingy. Many offices are so. Two clerks are sitting in it making faces at each other across their desk. They are not lunatics. They are not imbeciles or idlers. On the contrary, they have frequent spells of work that might throw the toils of an Arab ass into the shade. They are fine strapping young fellows, with pent-up energies equal to anything, but afflicted with occasional periods of having nothing particular to do. These two have been sitting all morning in busy idleness. Their muscular and nervous systems rebelling, have induced much fidgeting and many wry faces. Being original, they have turned their sorrows into a game, and their little game at present is to see which can make a face so hideous that the other shall be compelled to laugh! We have deep sympathy with clerks. We have been a clerk, and know what it is to have the fires of Vesuvius raging within, while under the necessity of exhibiting the cool aspect of Spitzbergen without.

But these clerks were not utterly miserable. On the contrary, they were, to use one of their own familiar phrases, rather jolly than otherwise. Evening was before them in far-off but attainable perspective. Home, lawn-tennis, in connection with bright eyes and pretty faces, would compensate for the labours of the day and let off the steam. They were deep in their game when a rap at the door brought their faces suddenly to a state of nature.

“Come in,” said the *first* clerk.

“And wipe your feet,” murmured the second, in a low tone.

A gentleman, with an earnest countenance, entered.

“Is Mr Lowstoft in his office?”

“He is, sir,” said the first clerk, descending from his perch with an air of good-will, and requesting the visitor’s name and business.

The visitor handed his card, on which the name Cyrus Field was written, and the clerk, observing it, admitted the owner at once to the inner sanctum where Mr Lowstoft transacted business.

“There’s *something* up,” murmured the clerk, with a mysterious look at his comrade, on resuming his perch.

“Time’s up, or nearly so,” replied the comrade, with an anxious look at the clock:

“The witching hour which sets us free
To saunter home and have our tea—

“approaches.”

“D’you know that that is Cyrus Field?” said the first clerk.

“And who is Cyrus Field?” demanded the second clerk.

“O ignoramus! Thy name is Bob, and thou art not worth a ‘bob’—miserable snob! Don’t you know that Cyrus Field is the man who brought about the laying of the great Atlantic Cable in 1858?”

“No, most learned Fred, I did not know that, but I am very glad to know it now. Moreover, I know nothing whatever about cables—Atlantic or otherwise. I am as blind as a bat, as ignorant as a bigot, as empty as a soap-bubble, and as wise as Solomon, because I’m willing to be taught.”

“What a delicious subject to work upon!” said Fred.

“Well then, work away,” returned Bob; “suppose you give *me* a discourse on Cables. But, I say—be merciful. Don’t overdo it, Frederick. Remember that my capacity is feeble.”

“I’ll be careful, Bob.—Well then, you must know that from the year 1840 submarine cables had been tried and laid, and worked with more or less success, in various parts of the world. Sir W. O’Shaughnessy, I believe, began it. Irishmen are frequently at the root of mischief! Anyhow, he, being Superintendent of Electric Telegraphs in India in 1839, hauled an insulated wire across the Hooghly at Calcutta, and produced what they call ‘electrical phenomena’ at the other side of the river. In 1840 Mr Wheatstone brought before the House of Commons the project of a cable from Dover to Calais. In 1842 Professor Morse of

America laid a cable in New York harbour, and another across the canal at Washington. He also suggested the possibility of laying a cable across the Atlantic Ocean. In 1846 Colonel Colt, of revolver notoriety, and Mr Robinson, laid a wire from New York to Brooklyn, and from Long Island to Correy Island. In 1849—”

“I say, Fred,” interrupted Bob, with an anxious look, “you are a walking dictionary of dates. Haydn was nothing to you. But—couldn’t you give it me without dates? I’ve got no head for dates; never could stomach them—except when fresh off the palm-tree. Don’t you think that a lecture without dates would be pleasantly original as well as instructive?”

“No, Bob, I don’t, and I won’t be guilty of any such gross innovation on time-honoured custom. You must swallow my dates whether you like them or not. In 1849, I say, a Mr Walker —”

“Any relation to Hookey?”

“No, sir, none whatever—he laid a wire from Folkestone to a steamer two miles off the shore, and sent messages to it. At last, in 1851. Mr Brett laid down and successfully wrought the cable between Dover and Calais which had been suggested by Wheatstone eleven years before. It is true it did not work long, but this may be said to have been the beginning of submarine telegraphy, which, you see, like your own education, Bob, has been a thing of slow growth.”

“Have you done with dates, now, my learned friend?” asked Bob, attempting to balance a ruler on the point of his nose.

“Not quite, my ignorant chum, but nearly. That same year—1851, remember—a Mr Frederick N. Gisborne, an English electrician, made the first attempt to connect Newfoundland with the American continent by cable. He also started a company to facilitate intercourse between America and Ireland by means of steamers and telegraph-cables. Gisborne was very energetic and successful, but got into pecuniary difficulties, and went to New York to raise the wind. There he met with Cyrus Field, who took the matter up with tremendous enthusiasm. He expanded Gisborne’s idea, and resolved to get up a company to connect Newfoundland with Ireland by electric cable. Field was rich and influential, and ultimately successful—”

“Ah! would that you and I were rich, Fred,” interrupted Bob, as he let fall the ruler with a crash on the red-ink bottle, and overturned it; “but go on, Fred, I’m getting interested; pardon the interruption, and never mind the ink, I’ll swab it up.—He was successful, was he?”

“Yes, he was; eminently so. He first of all roused his friends in the States, and got up, in 1856, the ‘New York, Newfoundland, and London Telegraph Company,’ which carried a line of telegraph through the British Provinces, and across the Gulf of Saint Lawrence to Saint John’s, Newfoundland—more than 1000 miles—at a cost of about 500,000 pounds. Then he came over to England and roused the British Lion, with whose aid he started the ‘Atlantic Telegraph Company,’ and fairly began the work, backed by such men as Brett, Bidden, Stephenson, Brunel, Glass,

Eliot, Morse, Bright, Whitehouse, and a host of others. But all this was not done in a day. Cyrus Field laboured for years among preliminaries, and it was not until 1857 that a regular attempt was made to lay an Atlantic cable. It failed, because the cable broke and was lost. A second attempt was made in 1858, and was successful. In that year, my boy, Ireland and Newfoundland were married, and on the 5th of August the first electric message passed between the Old World and the New, through a small wire, over a distance of above 2000 miles. But the triumph of Field and his friends was short-lived, for, soon after, something went wrong with the cable, and on the 6th September it ceased to work.”

“What a pity!” exclaimed Bob; “so it all went off in smoke.”

“Not quite that, Bob. Before the cable struck work about 400 messages had been sent, which proved its value in a financial point of view, and one of these messages—sent from London in the morning and reaching Halifax the same day—directed that ‘the 62nd Regiment was not to return to England,’ and it is said that this timely warning saved the country an expenditure of 50,000 pounds. But the failure, instead of damping, has evidently stimulated the energies of Mr Field, who has been going about between America and England ever since, stirring people up far and near to raise the funds necessary for another attempt. He gives himself no rest; has embarked his own fortune in the affair, and now, at this moment, in this year of grace 1865, is doing his best, I have no doubt, to induce our governor, Mr Lowstoft, to

embark in the same boat with himself.”

It would seem as if Fred had been suddenly endowed with the gift of second-sight, for at that moment the door of his employer's room opened, and Mr Lowstoft came out, saying to his visitor, in the most friendly tones, that he had the deepest sympathy with his self-sacrificing efforts, and with the noble work to which he had devoted himself.

Bob, in a burst of sudden enthusiasm, leaped off his stool, opened the office-door, and muttered something as the distinguished visitor passed him.

“I beg pardon,” said Mr Field, checking himself, “what did you say?”

“I—I wish you good luck, sir, with—with the new cable,” stammered the clerk, blushing deeply.

“Thank you, lad—thank you,” said Mr Field, with a pleasant smile and nod, as he went away.

“Mr Sime,” said Mr Lowstoft to Bob, turning at the door of his room, “send young Wright to me.”

“Yes, sir,” replied the obedient Bob, going to a corner of the room and applying his lips to a speaking-tube.

Now young Wright was none other than our hero Robin grown up to the mature age of fifteen.

He was perched on the top of a three-legged stool, and, from the slow and intensely earnest manner in which his head turned from side to side as he wrote, it was quite evident that he dotted all his *i*'s and stroked all his *t*'s with conscientious care. As

he sat there—a sturdy little broad-shouldered fellow, so deeply engrossed with his work that he was oblivious of all around—he seemed the very *beau-idéal* of a painstaking, hard-working clerk. So deeply was he engrossed in his subject—the copying of an invoice—that he failed to hear the voice of his fellow-clerk, although the end of the speaking-tube was not far from where he sat. After listening a few seconds at the other end of the tube, Bob Sime repeated the summons with such vigour that Robin leaped from his stool as though he had received one of his favourite electric shocks. A minute later he stood in the presence of the Head of the House.

“Robert Wright,” said the Head, pushing his spectacles up on his brow, “I shall be sorry to lose your services, but—”

He paused and turned over the papers before him, as if searching for something, and Robin’s heart sank. Was he going to be dismissed? Had he done anything wrong, or had he unwittingly neglected some duty?

“Ah! here it is,” resumed Mr Lowstoft, “a letter from a friend who has come by a slight injury to his right hand, and wants a smart amanuensis and general assistant. Now I think of sending *you* to him, if you have no objection.”

As the Head again paused while glancing over the letter, Robin ventured timidly to state that he had very strong objections; that he was very much satisfied with his situation and work, and had no desire to change.

Mr Lowstoft did not appear to listen to his remarks, but said

suddenly— “You’ve studied the science of electricity, I believe?”

“Yes, sir—to some extent,” answered the lad, with a look of surprise.

“I know you have. Your father has told me about your tastes and studies. You’ve heard of Mr Cyrus Field, I presume?”

“Indeed I have,” said Robin, brightening up, “it was through his efforts that the Atlantic Cable was laid in 1858—which unfortunately went wrong.”

“Well, my boy, it is through his efforts that another cable is to be laid in this year 1865, which we all hope sincerely won’t go wrong, and my friend, who wants an assistant, is one of the electricians connected with the new expedition. Would you like to go?”

Robin’s eyes blazed, and he could scarcely find breath or words to express his willingness—if his father did not object.

“Go home at once, then, and ask leave, for the Great Eastern is almost ready for sea, and you have to hasten your preparations.”

Robin stroked no more *t*’s and dotted no more *i*’s that day. We fear, indeed, that he even left the invoice on his desk unfinished, with the last *i* imperfect.

Bursting into his father’s house, he found Madge—now become a pretty little slip of feminine thread-paper—seated at the piano agonising over a chord which her hand was too small to compass.

“Madge, Madge, cousin Madge!” he shouted, seizing both the extended little hands and kissing the musical wrinkles from her

brow, "why am I like a magnet? You'll never guess."

"Because you attract everybody to you," said Madge promptly.

"Pooh! not at all. A magnet doesn't attract *every* body. It has two poles, don't you know, and repels some bodies. No, Madge, it's because I have been electrified."

"Indeed? and what has electrified you, Robin?"

"The Atlantic Cable, Madge."

"Well, that ought to be able to do it powerfully," returned Madge, with a laugh; "but tell me all about it, and don't make more bad conundrums. I'm sure something has happened. What is it?"

Mrs Wright, entering at the moment, her son calmed himself as well as he could, and sat down to tell his tale and talk the matter over.

"Now, what think you, mother? Will father consent?"

"I think he will, Robin, but before going into the matter further, I will lay it before our Father in heaven. He must show us the way, if we are to go right."

According to invariable custom, Robin's mother retired to her own room to consider the proposal. Thereafter she had a long talk with her husband, and the result was that on the following day our hero found himself in a train with a small new portmanteau by his side, a new billy-cock hat on his head, a very small new purse in his pocket, with a remarkably small sum of money therein, and a light yet full heart in his breast. He was on his way to the Nore, where the Great Eastern lay, like an antediluvian macaroni-eater,

gorging itself with innumerable miles of Atlantic Cable.

To say truth, Robin's breast—capacious though it was for his size—could hardly contain his heart that day. The dream of his childhood was about to be realised! He had thirsted for knowledge. He had acquired all that was possible in his father's limited circumstances. He had, moreover, with the valuable assistance of Sam Shipton, become deeply learned in electrical science. He had longed with all his heart to become an electrician—quite ready, if need were, to commence as sweeper of a telegraph-office, but he had come to regard his desires as too ambitious, and, accepting his lot in life with the quiet contentment taught him by his mother, had entered on a clerkship in a mercantile house, and had perched himself, with a little sigh no doubt, yet cheerfully, on the top of a three-legged stool. To this stool he had been so long attached—physically—that he had begun to regard it almost as part and parcel of himself, and had made up his mind that he would have to stick to it through life. He even sometimes took a quaint view of the matter, and tried to imagine that through long habit it would stick to him at last, and oblige him to carry it about sticking straight out behind him; perhaps even require him to take it to bed with him, in which case he sometimes tried to imagine what would be the precise effect on the bedclothes if he were to turn from one side to the other. Thus had his life been projected in grey perspective to his mental eye.

But now—he actually was an electrician-elect on his way to

join the biggest ship in the world, to aid in laying the greatest telegraph cable in the world, in company with some of the greatest men in the universe! It was almost too much for him. He thirsted for sympathy. He wanted to let off his feelings in a cheer, but life in a lunatic asylum presented itself, and he refrained. There was a rough-looking sailor lad about his own age, but much bigger, on the seat opposite, (it was a third class). He thought of pouring out his feelings on him—but prudence prevented. There is no saying what might have been the result, figuratively speaking, to his boiler if the sailor lad had not of his own accord opened a safety-valve.

“You seems pretty bobbish this morning, young feller,” he said, after contemplating his *vis-à-vis*, for a long time in critical silence. “Bin an’ took too much, eh?”

“I beg your pardon,” said Robin, somewhat puzzled.

“You’re pritty considerable jolly, I say,” returned the lad, who had an honest, ugly face; and was somewhat blunt and gruff in manner.

“I am indeed very jolly,” said Robin, with a bland smile, “for I’m going to help to lay the great Atlantic Cable.”

“Wot’s that you say?” demanded the lad, with sudden animation.

Robin repeated his remark.

“Well, now, that *is* a go! Why, *I’m* goin’ to help lay the great Atlantic Cable too. I’m one the stooard’s boys. What may *you* be, young feller?”

“Me? Oh! I’m—I—why, I’m on the electrical staff—I’m—” he thought of the word *secretary*, but a feeling of modesty induced him to say—“assistant to one of the electricians.”

“Which ’un?” demanded the lad curtly.

“Mr Smith.”

“Mr Smith, eh? Well—it ain’t an unusual name—Smith ain’t. P’r’aps you’ll condescend on his first name, for there’s no less than three Smiths among the electricians.”

“Ebenezer Smith, I believe,” said Robin.

“Ebbysneezer Smith—eh? well, upon my word that’s a Smith-mixtur that I’ve never heerd on before. I don’t know ’im, but he’s all right, I dessay. They’re a rum lot altogether.”

Whether this compliment was meant for the great Smith family in general, or the electrical branch in particular, Robin could not guess, and did not like to ask. Having thus far opened his heart, however, he began to pour out its contents, and found that the ugly sailor lad was a much more sympathetic soul than he had been led to expect from his looks. Having told his own name, he asked that of his companion in return.

“My name—oh! it’s Slagg—Jim Slagg; James when you wants to be respectful—Slagg when familiar. I’m the son o’ Jim Slagg, senior. Who *he* was the son of is best known to them as understands the science of jinnylogy. But it don’t much matter, for we all runs back to Adam an’ Eve somehow. They called me after father, of course; but to make a distinction they calls him Jimmy—bein’ more respectful-like,—and me Jim. It ain’t a

name much to boast of, but I wouldn't change it with you, young feller, though Robert ain't a bad name neither. It's pretty well-known, you see, an' *that's* somethin'. Then, it's bin bore by great men. Let me think—wasn't there a Robert the Great once?"

"I fear not," said Robin; "he is yet in the womb of Time."

"Ah, well, no matter; but there should have bin a Robert the Great before now. Anyhow, there was Robert the Bruce—he was a king, warn't he, an' a skull-cracker? Then there was Robert Stephenson, the great engineer—he's livin' yet; an' there was Robert the—the Devil, but I raither fear he must have bin a bad 'un, *he* must, so we won't count him. Of course, they gave you another name, for short; ah, Robin! I thought so. Well, that ain't a bad name neither. There was Robin Hood, you know, what draw'd the long-bow a deal better than the worst penny-a-liner as ever mended a quill. An' there was a Robin Goodfellow, though I don't rightly remember who he was exactly."

"One of Shakespeare's characters," interposed Robin.

"Jus' so—well, he couldn't have bin a bad fellow, you know. Then, as to your other name, Wright—that's all right, you know, and might have bin writer if you'd taken to the quill or the law. Anyhow, as long as you're Wright, of course you can't be wrong—eh, young feller?"

Jim Slagg was so tickled with this sudden sally that he laughed, and in so doing shut his little eyes, and opened an enormous mouth, fully furnished with an unbroken set of splendid teeth.

Thus pleasantly did Robin while away the time with his future

shipmate until he arrived at the end of his journey, when he parted from Jim Slagg and was met by Ebenezer Smith.

That energetic electrician, instead of at once taking him on board the Great Eastern, took him to a small inn, where he gave him his tea and put him through a rather severe electrical examination, out of which our anxious hero emerged with credit.

“You’ll do, Robin,” said his examiner, who was a free-and-easy yet kindly electrician, “but you want instruction in many things.”

“Indeed I do, sir,” said Robin, “for I have had no regular education in the science, but I hope, if you direct me what to study, that I shall improve.”

“No doubt you will, my boy. Meanwhile, as the big ship won’t be ready to start for some time, I want you to go to the works of the Telegraph Construction and Maintenance Company, see the making of the cable, learn all you can, and write me a careful account of all that you see, and all that you think about it.”

Robin could not repress a smile.

“Why, boy, what are you laughing at?” demanded Mr Smith, somewhat sternly.

Robin blushed deep scarlet as he replied—

“Pardon me, sir, but you said I am to write down all that I *think* about it.”

“Well, what then?”

“I—I’m afraid, sir,” stammered Robin, “that if I write down all I *think* about the Atlantic Cable, as well as all that I see, I shall

require a very long time indeed, and a pretty large volume.”

Mr Smith gazed at our hero for some time with uplifted brows, then he shook his head slowly and frowned, then he nodded it slightly and smiled. After that he laughed, or rather chuckled, and said—

“Well, you may go now, and do what I have told you—only omitting most of what you think. A small portion of that will suffice! Don’t hurry back. Go home and make a fair copy of your observations and thoughts. I’ll write when I require you. Stay—your address? Ah! I have it in my note-book. What’s your first name, Mister Wright?”

Robin grew two inches taller, or more, on the spot; he had never been called Mister before, except in jest!

“Robert, sir,” he replied.

“Robert—ha! h’m! I’ll call you Bob. I never could stand ceremony, so you’ll accustom yourself to the new name as quickly as you can—but perhaps it’s not new to you?”

“Please, sir, I’ve been used to Robin; if you have no objection, I should—”

“No objection—of course not,” interrupted Mr Smith; “Robin will do quite as well, though a little longer; but that’s no matter. Good-bye, Robin, and—and—don’t think too hard. It sometimes hurts digestion; good-bye.”

“Well, what d’ee think of Ebbysneezer Smith, my electrical toolip?” asked Jim Slagg, whom Robin encountered again at the station. “He’s a wiry subject, I s’pose, like the rest of ’em?”

“He’s a very pleasant gentleman,” answered Robin warmly.

“Oh, of course he is. All the Smiths are so—more or less. They’re a glorious family. I knows at least half a dozen of ’em in what superfine people call the ‘slums’ of London.”

“And I know *more* than half a dozen of ’em,” retorted Robin, somewhat sharply, “in what unrefined people call the *haristocracy* of London.”

“Whew!” whistled Mister Slagg, gazing at Robin in silent surprise.

What the whistle implied was not explained at that time, because the locomotive whistle took up the tune with intense violence, causing a rush to the train, in which the two lads—like many other friends—were abruptly parted for a season.

Chapter Six.

Tells of our Hero's Visit to the Great Cable

Robin Wright returned home with a bounding heart. Since his electrical appointment he had become, figuratively speaking, an indiarubber ball—a sort of human “squash.” His heart bounded; his feet bounded; if his head had fallen off, it also would have bounded, no doubt.

On arriving he found his father's elder brother—a retired sea-captain of the merchant service—on a visit to the family.

There was not a more favourite uncle in the kingdom than uncle Rik—thus had his name of Richard been abbreviated by the Wright family. Uncle Rik was an old bachelor and as bald as a baby—more so than many babies. He was good-humoured and liberal-hearted, but a settled unbeliever in the world's progress. He idolised the “good old times,” and quite pleasantly scorned the present.

“So, so, Robin,” he said, grasping our hero by both hands (and uncle Rik's grasp was no joke), “you're goin' in for batteries—galvanic batteries an' wires, are you? Well, lad, I always thought you more or less of a fool, but I never thought you such a born idiot as that comes to.”

“Yes, uncle,” said Robin, with a pleasant laugh, for he was

used to the old captain's plain language, "I'm going to be an electrician."

"Bah! pooh!—an electrician!" exclaimed uncle Rik with vehemence, "as well set up for a magician at once."

"Indeed he won't be far short of that," said Mrs Wright, who was seated at the tea-table with her husband and Madge—"at least," she added, "if all be true that we hear of this wonderful science."

"If only half of it be true," interjected Mr Wright.

"But it *ain't* true," said Captain Rik firmly. "They talk a deal of stuff about it, more than nine-tenths of which is lies—pure fable. I don't believe in electricity; more than that, I don't believe in steam. Batteries and boilers are both bosh!"

"But, uncle, you can't deny that they exist," said Robin.

"Of course not," replied the captain. "I know as well as you do—maybe better—that there's a heap o' telegraph-wires rove about the world like great spiders' webs, and that there are steamboats hummin' an' buzzin'—ay, an' bu'stin' too—all over the ocean, like huge wasps, an' a pretty mess they make of it too among them! Why, there was a poor old lady the other day that was indooed by a young nephew to send a telegraphic message to her husband in Manchester—she bein' in London. She was very unwillin' to do it, bein' half inclined to regard the telegraph as a plant from the lower regions. The message sent was, 'Your lovin' wife hopes you'll be home to-morrow.' It reached the husband, 'Your lowerin' wife hopes you'll be hung to-morrow.' Bad writin'

and a useless flourish at the *e* turned *home* into *hung*. The puzzled husband telegraphs in reply, 'Mistake somewhere—all right—shall be back three o'clock—to-morrow—kind love.' And how d'ye think this reached the old lady?—'Mistake somewhere—all night—stabbed in back—through cloak—two more rows—killed, love.' Now, d'you call *that* successful telegraphing?"

"Not very," admitted Robin, with a laugh, "but of the thousands of messages that pass to and fro daily there cannot be many like these, I should think."

"But what did the poor wife do?" asked Madge anxiously.

"Do?" repeated Rik indignantly, as though the misfortune were his own—for he was a very sympathetic captain—"do? Why, she gave a yell that nigh knocked the young nephew out of his reason, and fell flat on the floor. When she came to, she bounced up, bore away for the railway station under full sail, an' shipped for Manchester, where she found her husband, alive and hearty, pitchin' into a huge beefsteak, which he very properly said, after recovering from his first surprise, was big enough for two."

"But what objection have you to steamers, uncle Rik?" asked Mrs Wright; "I'm sure they are very comfortable and fast-going."

"Comfortable and fast-goin'!" repeated the old sailor, with a look of supreme contempt, "yes, they're comfortable enough when your berth ain't near the paddles or the boilers; an' they're fast-goin', no doubt, specially when they bu'st. But ain't the nasty things made of iron—like kitchen kettles? and won't that rust? an' if you knock a hole in 'em won't they go down at once? an'

if you clap too much on the safety-valves won't they go up at once? Bah! pooh!—there's nothin' like the wooden walls of old England. You may take the word of an old salt for it,—them wooden walls will float and plough the ocean when all these new-fangled iron pots are sunk or blowed to atoms. Why, look at the Great Eastern herself, the biggest kettle of 'em all, what a precious mess *she* made of herself! At first she wouldn't move at all, when they tried to launch her; then they had to shove her off sidewise like a crab; then she lost her rudder in a gale, an' smashed all her cabin furniture like a bad boy with his toys. Bah! I only hope I may be there when she bu'sts, for it'll be a grand explosion."

"I'm sorry you have so bad an opinion of her, uncle, for I am appointed to serve in the Great Eastern while layin' the Atlantic Cable."

"Sorry to hear it, lad; very sorry to hear it. Of course I hope for your sake that she won't blow up on *this* voyage, though it's nothin' more or less than an absurd ship goin' on a wild-goose chase."

"But, uncle, submarine cables have now passed the period of experiment," said Robin, coming warmly to the defence of his favourite subject. "Just consider, from the time the first one was laid, in 1851, between Dover and Calais, till now, about fifteen years, many thousands of miles of conducting-wire have been laid along the bottom of the sea to many parts of the world, and they are in full and successful operation at this moment. Why,

even in 1858, when the first Atlantic Cable was laid, the Gutta-percha Company had made forty-four submarine cables.”

“I know it, lad, but it won’t last. It’s all sure to bu’st up in course of time.”

“Then, though the attempt to lay the last Atlantic Cable proved a failure,” continued Robin, “the first one, the 1858 one, *was* a success at the beginning, no one can deny that.”

“Ay, but how long did it last?” demanded the skipper, hitting the table with his fist.

“Oh, please, have pity on the tea-cups, uncle Rik,” cried the hostess.

“Beg pardon, sister, but I can’t help getting riled when I hear younkers talkin’ stuff. Why, do you really suppose,” said the captain, turning again to Robin, “that because they managed in ’58 to lay a cable across the Atlantic, and exchange a few messages, which refused to travel after a few days, that they’ll succeed in layin’ down a permanent speakin’ trumpet between old England and Noof’nland—2000 miles, more or less—in spite o’ gales an’ currents, an’ ships’ anchors, an’ insects, an’ icebergs an’ whales, to say nothing o’ great sea-sarpints an’ such like?”

“Uncle Rik, I do,” said Robin, with intensely earnest eyes and glowing cheeks.

“Bravo! Robin, you’ll do it, I do believe, if it is to be done at all; give us your hand, lad.”

The old sailor’s red countenance beamed with a huge smile of kindness as he shook his enthusiastic nephew’s hand.

“There,” he added, “I’ll not say another word against iron kettles or Atlantic cables. If you succeed I’ll give batteries and boilers full credit, but if you fail I’ll not forget to remind you that I *said* it would all bu’st up in course of time.”

With note-book and pencil in hand Robin went down the very next day to the works of the Telegraph Construction and Maintenance Company, where the great cable was being made.

Presenting his letter of introduction from Mr Smith, Robin was conducted over the premises by a clerk, who, under the impression that he was a very youthful and therefore unusually clever newspaper correspondent, treated him with marked respect. This was a severe trial to Robin’s modesty; nevertheless he bore up manfully, and pulling out his note-book prepared for action.

The reader need not fear that we intend to inflict on him Robin’s treatise on what he styled the “Great Atlantic Cable,” but it would be wrong to leave the subject without recording a few of those points which made a deep impression on him.

“The cable when completed, sir,” said the clerk, as he conducted his visitor to the factory, “will be 2300 nautical miles in length.”

“Indeed,” said Robin, recording the statement with solemn gravity and great accuracy; “but I thought,” he added, “that the exact distance from Ireland to Newfoundland was only 1600 miles.”

“You are right, sir, but we allow 700 miles of ‘slack’ for the

inequalities of the bottom. Its cost will be 700,000 pounds, and the whole when finished will weigh 7000 tons.”

Poor Robin’s mind had, of course, been informed about ton-weights at school, but he had not felt that he realised what they actually signified until the thought suddenly occurred that a cart-load of coals weighed one ton, whereupon 7000 carts of coals leaped suddenly into the field of his bewildered fancy. A slightly humorous tendency, inherited from his mother, induced 7000 drivers, with 7000 whips and a like number of smock-frocks, to mount the carts and drive in into the capacious hold of the Great Eastern. They turned, however, and drove instantly off his brain when he came into the august presence of the cable itself.

The central core of the cable—that part by which the electric force or fluid was to pass from the Old World to the New, and *vice versa*, was made of copper. It was not a solid, single wire, but a strand composed of seven fine wires, each about the thickness of a small pin. Six of these wires were wound spirally round the seventh. This was in order to prevent what is termed a “breach of continuity,” for it will be at once perceived that while a single wire of the core might easily break in the process of laying the cable, and thereby prevent the flow of electricity, the probability of the seven small wires all breaking at the same spot was so remote as to be almost impossible, and if even one wire out of the seven held, the continuity would remain. Nay, even all the seven might break, but, so long as they did not all break at the same place, continuity would not be lost, because copper would

still continue to touch copper all throughout the cable's length.

In the process of construction, the central wire of the copper core was first covered with a semi-liquid coating of gutta-percha, mixed with tar—known as “Chatterton's Compound.” This was laid on so thick that when the other wires were wound round it all air was excluded. Then a coating of the same compound was laid over the finished conductor, and thus the core was solidified. Next, the core was surrounded with a coating of the purest gutta-percha—a splendid non-conductor, impervious to water—which, when pressed to it, while in a plastic state, formed the first insulator or tube to the core. Over this tube was laid a thin coat of Chatterton's Compound for the purpose of closing up any small flaws or minute holes that might have escaped detection. Then came a second coating of gutta-percha, followed by another coating of compound, and so on alternately until four coats of compound and four of gutta-percha had been laid on.

This core, when completed, was wound in lengths on large reels, and was then submerged in water and subjected to a variety of severe electrical tests so as to bring it as near as possible to a state of perfection, after which every inch of it was examined by hand while being unwound from the reels and re-wound on the large drums on which it was to be forwarded to the covering works at East Greenwich, there to receive its external protecting sheath.

All this, and much more besides, did Robin Wright carefully note down, and that same evening went home and delivered a

long and luminous lecture, over which his mother wondered, Madge rejoiced, his father gloried, and uncle Rik fell asleep.

Next day he hastened to the covering works, and, presenting his credentials, was admitted.

Here he saw the important and delicate core again carefully tested as to its electrical condition, after which it received a new jacket of tanned jute yarn to protect it from the iron top coat yet to come. Its jute jacket on, it was then coiled away in tanks full of water, where it was constantly kept submerged and continuously tested for insulation. Last of all the top coat was put on. This consisted of ten wires of peculiarly fine and strong iron. Each of these ten wires had put on it a special coat of its own, made of tarred Manilla yarn, to protect it from rust as well as to lighten its specific gravity. The core being brought from its tank, and passed round several sheaves, which carried it below the factory floor, was drawn up through a hole in the centre of a circular table, around the circumference of which were ten drums of the Manilla-covered wire. A stout iron rod, fastened to the circumference of the table, rose from between each drum to the ceiling, converging in a cone which passed through to the floor above. Our core rose in the middle of all, and went through the hollow of the cone. When all was put in noisy and bewildering motion, the core which rose from the turning-table and whirling drums as a thin jute-clad line, came out in the floor above a stout iron-clad cable, with a Manilla top-dressing, possessing strength sufficient to bear eleven miles of its own length perpendicularly

suspended in water—or a margin of strength more than four and a half times that required,—and with a breaking strain of seven tons fifteen hundredweight.

When thoroughly charged and primed, Robin went off home to write his treatise.

Then he received the expected summons to repair on board the Great Eastern, and bade adieu to his early home.

It was of no use that Robin tried to say good-bye in a facetious way, and told Madge and his mother not to cry, saying that he was only going across the Atlantic, a mere fish-pond, and that he would be home again in a month or two. Ah! these little efforts at deception never avail. Himself broke down while urging Madge to behave herself, and when his mother gave him a small Bible, and said she required no promise, for she *knew* he would treasure and read it, he was obliged hastily to give her a last fervent hug, and rush from the house without saying good-bye at all.

Chapter Seven.

The Big Ship—First Night Aboard

When our hero at last reached the Great Eastern, he soon found himself in what may be termed a lost condition. At first he was disappointed, for he saw her at a distance, and it is well-known that distance lends deception as well as “enchantment to the view.” Arrived alongside, however, he felt as if he had suddenly come under the walls of a great fortress or city.

Presently he stood on the deck of the Big Ship, as its familiars called it, and, from that moment, for several days, was, as we have said, in a lost condition. He was lost in wonder, to begin with, as he gazed at the interminable length and breadth of planking styled the deck, and the forest of funnels, masts, and rigging, and the amazing perspective, which caused men at the further end from where he stood to look like dolls.

Then he was lost in reality, when he went below and had to ask his way as though he were wandering in the labyrinths of a great city. He felt—or thought he felt—like a mere mite in the mighty vessel. Soon he lost his old familiar powers of comparison and contrast, and ere long he lost his understanding altogether, for he fell down one of the hatchways into a dark abyss, where he would probably have ended his career with electric speed if he had not happily fallen into the arms of a human being, with

whom he rolled and bumped affectionately, though painfully, to the bottom of the stair.

The human being, growled intense disapprobation during the process, and Robin fancied that the voice was familiar.

“Come, I say,” said the being, remonstratively, “this is altogether too loving, you know. Don’t squeeze quite so tight, young ’un, whoever you be.”

“Oh, I *beg* your pardon,” gasped Robin, relaxing his grasp when they stopped rolling; “I’m *so* sorry. I hope I haven’t hurt you.”

“Hurt me!” laughed Jim Slagg, for it was he; “no, you small electrician, you ’aven’t got battery-power enough to do *me* much damage; but what d’ye mean by it? Is this the way to meet an old friend? Is it right for a Wright to go wrong at the wery beginnin’ of his career? But come, I forgive you. Have you been introdooed to Capting Anderson yet?”

“No! Who is he?”

“Who is he, you ignorant crokidile! why, he’s the capting of the Great Eastern, the commander o’ the Big Ship, the Great Mogul o’ the quarter-deck, the king o’ the expedition. But, of course, you ’aven’t bin introdooed to him. He don’t associate much with small fry like us—more’s the pity, for it might do ’im good. But come, I’ll take you under my wing for the present, because your partikler owner, Ebbysneezer Smith, ain’t come aboard yet—ashore dissipatin’, I suppose,—an’ everybody’s so busy gettin’ ready to start that nobody will care to be bothered

with you, so come along.”

There was some truth in this eccentric youths' remarks, for in the bustle of preparation for an early start every one on board seemed to be so thoroughly engrossed with his own duty that he had no time to attend to anything else, and Robin had begun to experience, in the absence of his “partikler owner,” an uneasy sensation of being very much in people's way. As he felt strangely attracted by the off-hand good-humoured impudence of his new friend, he consented to follow him, and was led to a small apartment, somewhere in the depths of the mighty ship, in which several youths, not unlike Slagg, were romping. They had, indeed, duties to perform like the rest, but the moment chanced to be with them a brief period of relaxation, which they devoted to skylarking.

“Hallo who have you got here?” demanded a large clumsy youth, knocking off Slagg's cap as he asked the question.

“Come, Stumps, don't you be cheeky,” said Slagg, quietly picking up his cap and putting it on; “this is a friend o' mine—one o' the electricians,—so you needn't try to shock *his* feelin's, for he can give better than he gets. He's got no berth yet, so I brought 'im here to show him hospitality.”

“Oh, indeed,” said Mr Stumps, bowing with mock respect; then, turning to the comrade with whom he had been skylarking, “Here, Jeff, supply this *gentleman* with food.”

Jeff, entering into Stumps' humour, immediately brought a plate of broken ship-biscuit with a can of water, and set them

on the table before Robin. Our hero, who had never been accustomed to much jesting, took the gift in earnest, thanked Jeff heartily, and, being hungry, set to work with a will upon the simple fare, while Stumps and Jeff looked at each other and winked.

“Come, I can add something to improve that feast,” said Slagg, drawing a piece of cheese from his pocket, and setting it before his friend.

Robin thanked him, and was about to take the cheese when Stumps snatched it up, and ran out of the room with it, laughing coarsely as he went.

“The big bully,” growled Slagg; “it’s quite obvious to me that feller will have to be brought to his marrow-bones afore long.”

“Never mind,” said Jeff, who was of a more amiable spirit than Stumps, “here’s more o’ the same sort.” He took another piece of cheese from a shelf as he spoke, and gave it to Robin.

“Now, my young toolip,” said Slagg, “havin’ finished your feed, p’r’aps you’d like to see over the big ship.”

With great delight Robin said that he should like nothing better, and, being led forth, was soon lost a second time in wonderment.

Of what use was it that Slagg told him the Great Eastern was 692 feet long by 83 feet broad, and 70 feet deep? If he had said yards instead of feet it would have been equally instructive to Robin in his then mentally lost condition. Neither was it of the slightest use to be told that the weight of the big ship’s cargo,

including cable, tanks, and coals, was 21,000 tons.

But reason began to glimmer again when Slagg told him that the two largest vessels afloat could not contain, in a convenient position for passing out, the 2700 miles then coiled in the three tanks of the Great Eastern.

“This is the main tank,” said Slagg, leading his friend to a small platform that hung over a black and apparently unfathomable gulf.

“I see nothing at all,” said Robin, stretching his head cautiously forward and gazing down into darkness profound, while he held on tight to a rail. “How curious!—when I look down everything in this wonderful ship seems to have no bottom, and when I look up, nothing appears to have any top, while, if I look backward or forward things seem to have no end! Ah! I see something now. Coming in from the light prevented me at first. Why, it’s like a huge circus!”

“Yes, it on’y wants hosses an’ clowns to make it all complete,” said Slagg. “Now, that tank is 58 feet 6 inches in diameter, and 20 feet 6 inches deep, an’ holds close upon 900 miles of cable. There are two other tanks not much smaller, all choke-full. An’ the queer thing is, that they can telegraph through all its length *now*, at this moment as it lies there,—an’ they are doing so continually to make sure that all’s right.”

“Oh! I understand *that*,” said Robin quickly; “I have read all about the laying of the first cable in 1858. It is the *appearance* of things in this great ship that confounds me.”

“Come along then, and I’ll confound you a little more,” said Slagg.

He accordingly led his friend from one part of the ship to another, explaining and commenting as he went, and certainly Robin’s wonder did not decrease.

From the grand saloon—which was like a palatial drawing-room, in size as well as in gorgeous furniture—to the mighty cranks and boilers of its engines, everything in and about the ship was calculated to amaze. As Slagg justly remarked, “It was stunnin’.”

When our hero was saturated with the “Big Ship” till he could hold no more, his friend took him back to his berth, and left him there for a time to his meditations.

Returning soon after, he sat down on a looker.

“I say, Robin Wright,” he began, thrusting his hands into his trousers-pockets, “it looks a’most as if I had smuggled you aboard of this ship like a stowaway. Nobody seems to know you are here, an’ what’s more, nobody seems to care. Your partikler owner ain’t turned up yet, an’ it’s my opinion he won’t turn up to-night, so I’ve spoke to the stooard—he’s *my* owner, you know—an’ he says you’d better just turn into my berth to-night, an’ you’ll get showed into your own to-morrow.”

“But where will *you* sleep?” asked Robin, with some hesitation.

“Never you mind that, my young electrician. That’s *my* business. What you’ve got to do is to turn in.”

Jeff and another lad, who were preparing to retire for the night at the time, laughed at this, but Robin paid no attention, thanked his friend, and said that as he was rather tired he would accept his kind offer.

Thereafter, pulling out the small Bible which he had kept in his pocket since leaving home, he went into a corner, read a few verses, and then knelt down to pray.

The surprise of the other lads was expressed in their eyes, but they said nothing.

Just then the door opened, and the lad named Stumps entered. Catching sight of Robin on his knees he opened his eyes wide, pursed his mouth, and gave a low whistle. Then he went up to Robin and gave him a slight kick. Supposing that it was an accident, Robin did not move, but on receiving another and much more decided kick, he rose and turned round. At the same moment Stumps received a resounding and totally unexpected slap on the cheek from Jim Slagg, who planted himself before him with clenched fists and flashing eyes.

“What d’ye mean by interferin’ wi’ *my*, friend at his dewotions, you monkey-faced polypus?” he demanded fiercely.

The monkey-faced polypus replied not a word, but delivered a right-hander that might have felled a small horse. Jim Slagg however was prepared for that. He turned his head neatly to one side so as to let the blow pass, and at the same moment planted his knuckles on the bridge of his opponent’s nose and sent him headlong into Jeff’s bunk, which lay conveniently behind.

Jumping furiously out of that, and skinning his shins in the act, Stumps rushed at Slagg, who, leaping lightly aside, tripped him up and gave him a smack on the left ear as he passed, by way of keeping him lively.

Unsubdued by this, Stumps gathered himself up and made a blind rush at his adversary, but was abruptly stopped by what Jeff called a “dab on the nose.” Repeating the rush, Stumps was staggered by a plunging blow on the forehead, and he paused to breathe, gazing the while at his foe, who, though a smaller youth than himself, was quite as strong.

“If you’ve had enough, monkey-face,” said Slagg, with a bland smile, “don’t hesitate to say so, an’ I’ll shake hands; but if you’d prefer a little more before goin’ to bed, just let me know, and—”

Slagg here performed some neat and highly suggestive motions with his fists by way of finishing the sentence.

Evidently Stumps wanted more, for, after a brief pause, he again rushed at Slagg, who, stepping aside like a Spanish matador, allowed his foe to expend his wrath on the bulkhead of the cabin.

“You’ll go through it next time, Stumps, if you plunge like that,” said Jeff, who had watched the fight with lively interest, and had encouraged the combatants with sundry marks of applause, besides giving them much gratuitous advice.

Regardless alike of encouragement and advice, the angry youth turned round once more and received a buffet that sent him sprawling on the table, off which he fell and rolled under it.

There he lay and panted.

“Now, my sweet polypus,” said the victor, going down on one knee and patting the vanquished on his shoulder, “next time you feels tempted to kick a gentleman—specially a electrician—at his dewotions, think of Jim Slagg an’ restrain yourself. I bear you no ill-will however—so, good-night.”

Saying this, Robin’s champion left the room and Stumps retired to his berth growling.

Before passing from the subject, we may add that, the next night, Robin—whose owner was still absent—was again hospitably invited to share the cabin of his friend and protector. When about to retire to rest he considered whether it was advisable to risk the repetition of the scene of the previous, night, and, although not quite easy in his conscience about it, came to the conclusion that it would be well to say his prayers in bed. Accordingly, he crept quietly into his berth and lay down, but Jim Slagg, who was present, no sooner saw what he was about than he jumped up with a roar of indignation.

“What are you about?” he cried, “ain’t you goin’ to say your prayers, you white-livered electrician? Come, git up! If *I’m* to fight, *you* must pray! D’ye hear? Turn out, I say.”

With that he seized Robin, dragged him out of bed, thrust him on his knees, and bade him “do his dooty.”

At first Robin’s spirit rose in rebellion, but a sense of shame at his moral cowardice, and a perception of the justice of his friend’s remark, subdued him. He did pray forthwith, though

what the nature of his prayer was we have never been able to ascertain, and do not care to guess. The lesson, however, was not lost. From that date forward Robin Wright was no longer ashamed or afraid to be seen in the attitude of prayer.

Chapter Eight.

Laying The Cable—“Faults” and Fault-Finding—Anxieties, Accidents, and other Matters

Come with us now, good reader, to another and very different scene—out upon the boundless sea. The great Atlantic is asleep, but his breast heaves gently and slowly like that of a profound sleeper.

The Great Eastern looks like an island on the water—steady as a rock, obedient only to the rise and fall of the ocean swell, as she glides along at the rate of six knots an hour. All is going well. The complicated-looking paying-out machinery revolves smoothly; the thread-like cable passes over the stern, and down into the deep with the utmost regularity.

The shore-end of the cable—twenty-seven miles in length, and much thicker than the deep-sea portion—had been laid at Valentia, on the 22nd of July, amid prayer and praise, speech-making, and much enthusiasm, on the part of operators and spectators. On the 23rd, the end of the shore cable was spliced to that of the main cable, and the voyage had begun.

The first night had passed quietly, and upwards of eighty miles of the cable had gone out of the after-tank, over the big ship's

stern, and down to its ocean-bed, when Robin Wright—unable to sleep—quietly slipped into his clothes, and went on deck. It was drawing near to dawn. A knot of electricians and others were chatting in subdued tones about the one subject that filled the minds of all in the ship.

“What! unable to sleep, like the rest of us?” said Ebenezer Smith, accosting Robin as he reached the deck.

“Yes, sir,” said Robin, with a sleepy smile, “I’ve been thinking of the cable so much that I took to dreaming about it when I fell asleep, and it suddenly turned into the great sea-serpent, and choked me to such an extent that I awoke, and then thought it better to get up and have a look at it.”

“Ah! my boy, you are not the only one whom the cable won’t let sleep. It will be well looked after during the voyage, for there are two sets of electricians aboard—all of them uncommonly wide awake—one set representing the Telegraph Construction and Maintenance Company, under Monsieur de Sauty; the other set representing the Atlantic Telegraph Company, under Mr Varley and Professor Thomson. The former are to test the electrical state of the cable, and to keep up signals with the shore every hour, night and day, during the voyage, while the latter are to watch and report as to whether the cable fulfils her conditions, as specified in the contract. So you see the smallest fault or hitch will be observed at once.”

“Do you mean, sir,” asked Robin in surprise, “that telegraphing with the shore is to be kept up continually *all* the

voyage!”

“Yes, my boy, I do,” answered Smith. “The lengths of the cable in the three tanks are joined up into one length, and telegraphing—for the purpose of testing it—has been kept up with the shore without intermission from the moment we left Ireland, and began to pay out. It will be continued, if all goes well, until we land the other end in Newfoundland. The tests are threefold,—first, for insulation, which, as you know, means the soundness and perfection of the gutta-percha covering that prevents the electricity from escaping from the wires, through the sea, into the earth; secondly, for continuity, or the unbroken condition of the conductor or copper core throughout its whole length; and, thirdly, to determine the resistance of the conductor, by which is meant its objection to carry our messages without vigorous application of the spur in the form of increased electrical power in our batteries. You see, Robin, every message sent to us from the shore, as well as every message sent by us in reply, has to travel through the entire length of the cable, namely about 2400 miles, and as every mile of distance increases this unwillingness, or resistance, we have to increase the electrical power in the batteries in proportion to the distance to which we want to send our message. D’you understand?”

“I think I do, sir; but *how* is the exact amount of resistance tested?”

Mr Smith smiled as he looked at the earnest face of his young questioner.

“My boy,” said he, “you would require a more fully educated mind to understand the answer to that question. The subtleties of electrical science cannot be explained in a brief conversation. You’ll have to study and apply to books for full light on that subject. Nevertheless, although I cannot carry you *into* the subject just now, I can tell you something *about* it. You remember the testing-room which I showed you yesterday—the darkened room between the captain’s state-room and the entrance to the grand saloon?”

“Yes, sir, I remember it well,” responded Robin,—“the room into which the conducting-wires from the ends of the cable are led to the testing-tables, on which are the curious-looking galvanometers and other testing machines.”

“Just so,” returned Smith, pleased with his pupil’s aptitude. “Well, on that table stands Professor Thomson’s delicate and wonderful galvanometer. On that instrument a ray of light, reflected from a tiny mirror suspended to a magnet, travels along a scale and indicates the resistance to the passage of the current along the cable by the deflection of the magnet, which is marked by the course of this speck of light. Now, d’you understand that, Robin?”

“I—I’m afraid not quite, sir.”

“Well, no matter,” rejoined Smith, with a laugh.

“At all events you can understand that if that speck of light keeps within bounds—on its index—all is going well, but if it travels beyond the index—bolts out of bounds—an escape of the

electric current is taking place somewhere in the cable, or what we call a *fault* has occurred.”

“Ah, indeed,” exclaimed Robin, casting a serious look at the cable as it rose from the after-tank, ran smoothly over its line of conducting wheels, dropped over the stern of the ship and glided into the sea like an an endless snake of stealthy habits. “And what,” he added, with a sudden look of awe, “if the cable should break?”

“Why, it would go to the bottom, of course,” replied Smith, “and several hearts would break along with it. You see these two gentlemen conversing near the companion-hatch?”

“Yes.”

“One is the chief of the electricians; the other the chief of the engineers. Their hearts would probably break, for their position is awfully responsible. Then my heart would break, I know, for I feel it swelling at the horrible suggestion; and your heart would break, Robin, I think, for you are a sympathetic donkey, and couldn’t help yourself. Then you see that stout man on the bridge—that’s Captain Anderson—well, *his* heart would—no—perhaps it wouldn’t, for he’s a sailor, and you know a sailor’s heart is too tough to break, but it would get a pretty stiff wrench. And you see that gentleman looking at the paying-out gear so earnestly?”

“What—Cyrus Field?” said Robin.

“Yes; well, his heart and the Atlantic Cable are united, so as a matter of course the two would snap together.”

Now, while Smith and his young assistant were conversing thus facetio-scientifically, the electricians on duty in the testing-room were watching with silent intensity the indications on their instruments. Suddenly, at 3:15 a.m., when exactly eighty-four miles of cable had been laid out, he who observed the galvanometer saw the speck of light glide to the end of the scale, and vanish!

If a speck of fire had been seen to glide through the key-hole of the powder-magazine it could scarcely have created greater consternation than did the disappearance of that light! The commotion in the testing-room spread instantly to every part of the ship; the whole staff of electricians was at once roused, and soon afterwards the engines of the Great Eastern were slowed and stopped, while, with bated breath and anxious looks, men whispered to each other that there was "a fault in the cable."

A fault! If the cable had committed a mortal sin they could scarcely have looked more horrified. Nevertheless there was ground for anxiety, for this fault, as in moral faults, indicated something that *might* end in destruction.

After testing the cable for some time by signalling to the shore, Monsieur de Sauty concluded that the fault was of a serious character, and orders were at once given to prepare the picking-up apparatus at the bow for the purpose of drawing the cable back into the ship until the defective portion should be reached and cut out.

"O *what* a pity!" sighed Robin, when he understood what

was going to be done, and the feeling, if not the words, was shared by every one on board with more or less intelligence and intensity; but there were veterans of submarine telegraphy who spoke encouragingly and treated the incident as a comparatively small matter.

Two men-of-war, the *Terrible* and the *Sphinx*, had been appointed to accompany and aid the *Great Eastern* on her important mission. A gun was fired and signals were made to acquaint these with what had occurred while the fires were being got up in the boilers of the picking-up machinery.

Electricians as well as doctors differ, it would seem, among themselves, for despite their skill and experience there was great difference of opinion in the minds of those on board the big ship as to the place where the fault lay. Some thought it was near the shore, and probably at the splice of the shore-end with the main cable. Others calculated, from the indications given by the tests, that it was perhaps twenty or forty or sixty miles astern. One of the scientific gentlemen held that it was not very far from the ship, while another gentleman, who was said to be much experienced in "fault"-finding, asserted that it was not more than nine or ten miles astern.

While the doctors were thus differing, the practical engineers were busy making the needful preparations for picking-up—an operation involving great risk of breaking the cable, and requiring the utmost delicacy of treatment, as may be easily understood, for, while the cable is being payed out the strain on it

is comparatively small, whereas when it is being picked up, there is not only the extra strain caused by stoppage, and afterwards by hauling in, but there is the risk of sudden risings of the ship's stern on the ocean swell, which might at any moment snap the thin line like a piece of packthread.

The first difficulty and the great danger was to pass the cable from the stern to the bow, and to turn the ship round, so as to enable them to steam up to the cable while hauling it in. Iron chains were lashed firmly to the cable at the stern, and secured to a wire-rope carried round the outside of the ship to the picking-up apparatus at the bows. The cable was down in 400 fathoms of water when the paying-out ceased, and nice management was required to keep the ship steady, as she had now no steerage-way; and oh! with what intense interest and curiosity and wonder did Robin Wright regard the varied and wonderful mechanical appliances with which the whole affair was accomplished!

Then the cable was cut, and, with its shackles and chains, allowed to go plump into the sea. Robin's heart and soul seemed to go along with it, for, not expecting the event, he fancied it was lost for ever.

"Gone!" he exclaimed, with a look of horror.

"Not quite," said Jim Slagg, who stood at Robin's elbow regarding the operations with a quiet look of intelligence. "Don't you see, Robin, that a wire-rope fit a'most to hold the big ship herself is holdin' on to it."

"Of course; how stupid I am!" said Robin, with a great sigh

of relief; "I see it now, going round to the bows."

At first the rope was let run, to ease the strain while the ship swung round; then it was brought in over the pulley at the bow, the paddles moved, and the return towards Ireland was begun. The strain, although great, was far from the breaking-point, but the speed was very slow—not more than a mile an hour being considered safe in the process of picking-up.

"Patience, Robin," observed Mr Smith, as he passed on his way to the cabin, "is a virtue much needed in the laying of cables. We have now commenced a voyage at the rate of one mile an hour, which will not terminate till we get back to Owld Ireland, unless we find the fault."

Patience, however, was not destined to be so severely tried. All that day and all night the slow process went on. Meanwhile—as the cable was not absolutely unworkable, despite the fault—the chief engineer, Mr Canning, sent a message to Mr Glass in Ireland, asking him to send out the Hawk steamer, in order that he might return in her to search for the defect in the shore-end of the cable, for if that were found he purposed sacrificing the eighty odd miles already laid down, making a new splice with the shore-end, and starting afresh. A reply was received from Mr Glass, saying that the Hawk would be sent out immediately.

Accordingly, about daybreak of the 25th the Hawk appeared, but her services were not required, for, about nine that morning, when the cable was coming slowly in and being carefully examined foot by foot—nay, inch by inch—the fault was

discovered, and joy took the place of anxiety. Ten and a quarter miles of cable had been picked up when the fault came inboard, and a strange unaccountable fault it turned out to be—namely, a small piece of wire which had been forced through the covering of the cable into the gutta-percha so as to injure, but not quite to destroy, the insulation. How such a piece of wire could have got into the tank was a mystery, but the general impression was that it had been carried there by accident and forced into the coil by the pressure of the paying-out machinery as the cable flew through the jockey-wheels.

Signals were at once made to the fleet that the enemy had been discovered. Congratulatory signals were returned. The fault was cut out and a new splice made. The Hawk was sent home again. The big ship's bow was turned once more to the west, and the rattling of the machinery, as the restored and revived cable passed over the stern, went merrily as a marriage bell.

The detention had been only about twelve hours; the great work was going on again as favourably as before the mishap occurred, and about half a mile had been payed out, when—blackness of despair—the electric current suddenly ceased, and communication with the shore was ended altogether.

Chapter Nine.

In which Joys, Hopes, Alarms, Ghosts, and Leviathans Take Part

That man who can appreciate the feelings of one who has become suddenly bankrupt may understand the mental condition of those on board the Great Eastern when they were thus tossed from the pinnacle of joyous hope to the depths of dark despair. It was not, however, absolute despair. The cable was utterly useless indeed—insensate—but it was not broken. There was still the blessed possibility of picking it up and bringing it to life again.

That, however, was scarcely an appreciable comfort at the moment, and little could be seen or heard on board the Great Eastern save elongated faces and gloomy forebodings.

Ebenezer Smith and his *confrères* worked in the testing-room like Trojans. They connected and disconnected; they put in stops and took them out; they intensified currents to the extent of their anxieties they reduced them to the measure of their despair—nothing would do. The cable was apparently dead. In these circumstances picking-up was the only resource, and the apparatus for that purpose was again rigged up in the bows.

In the meantime the splice which had been made to connect the tanks was cut and examined, and the portions coiled in the fore and main tanks were found to be perfect—alive and well—

but the part between ship and shore was speechless.

So was poor Robin Wright! After Mr Field—whose life-hope seemed to be doomed to disappointment—the blow was probably felt most severely by Robin. But Fortune seemed to be playfully testing the endurance of these cable-layers at that time, for, when the despair was at its worst, the tell-tale light reappeared on the index of the galvanometer, without rhyme or reason, calling forth a shout of joyful surprise, and putting an abrupt stoppage to the labours of the pickers-up!

They never found out what was the cause of that fault; but that was a small matter, for, with restored sensation in the cable-nerve, renewed communication with the shore, and resumed progress of the ship towards her goal, they could afford to smile at former troubles.

Joy and sorrow, shower and sunshine, fair weather and foul, was at first the alternating portion of the cable-layers.

“I can’t believe my eyes!” said Robin to Jim Slagg, as they stood next day, during a leisure hour, close to the whirling wheels and never-ending cable, about 160 miles of which had been laid by that time. “Just look at the Terrible and Sphinx; the sea is now so heavy that they are thumping into the waves, burying their bows in foam, while we are slipping along as steadily as a Thames steamer.”

“That’s true, sir,” answered Slagg, whose admiration for our hero’s enthusiastic and simple character increased as their intimacy was prolonged, and whose manner of address became

proportionally more respectful, "She's a steady little duck is the Great Eastern! she has got the advantage of length, you see, over other ships, an' rides on two waves at a time, instead of wobblin' in between 'em; but I raither think she'd roll a bit if she was to go along in the trough of the seas. Don't the cable go out beautiful, too—just like a long-drawn eel with the consumption! Did you hear how deep the captain said it was hereabouts?"

"Yes, I heard him say it was a little short of two miles deep, so it has got a long way to sink before it reaches its oozy bed."

"How d'ee know what sort o' bed it's got to lie on?" asked Slagg.

"Because," said Robin, "the whole Atlantic where the cable is to lie has been carefully sounded long ago, and it is found that the ocean-bed here, which looks so like mud, is composed of millions of beautiful shells, so small that they cannot be distinguished by the naked eye. Of course, they have no creatures in them. It would seem that these shell-fish go about the ocean till they die, and then fall to the bottom like rain." See note one.

"You *don't* say so!" returned Slagg, who, being utterly uneducated, received suchlike information with charming surprise, and regarded Robin as a very mine of knowledge. "Well now, that beats cock-fighting. But, I say, how is it that the electricity works through the cable? I heerd one o' your electrical fellers explaining to a landlubber t'other evenin' that electricity could only run along wires when the *circuit was closed*, by which he meant to say that it would fly from a battery and travel along

a wire ever so far, if only that wire was to turn right round and run back to the same battery again. Now, if that's so, seems to me that when you've got your cable to Newfoundland you'll have to run another one back again to Ireland before it'll work."

"Ah, Slagg, that would indeed be the case," returned Robin, "were it not that we have discovered the important fact that the earth—the round globe on which we stand—itself acts the part of a grand conductor. So we have only to send down *earth-wires* at the two ends—one into the earth of Ireland, the other into the earth of Newfoundland, and straightway the circuit is closed, and the electricity generated in our batteries passes through the cable from earth to earth."

"Robin," said Slagg doubtingly, "d'you expect me for to believe *that?*"

"Indeed I do," said Robin simply.

"Then you're greener than I took you for. No offence meant, but it's my opinion some o' these 'cute electricians has bin tryin' the width of your swallow."

"No, you are mistaken," returned Robin earnestly; "I have read the fact in many books. The books differ in their opinions as to the causes and nature of the fact, but not as to the fact itself."

It was evident that Robin looked upon this as an unanswerable argument, and his friend seemed perplexed.

"Well, I don' know how it is," he said, after a pause, "but I do believe that this here wonderful electricity is fit for a'most anything, an' that we'll have it revoloosionising everything afore

long—I do indeed.”

The intelligent reader who has noted the gigantic strides which we have recently made in electric lighting of late will observe that Slagg, unwittingly, had become almost prophetic at this time.

“We’re going along splendidly now,” said Mr Smith, coming up to Robin that evening while he was conversing with Slagg, who immediately retired.—“Who is that youth? He seems very fond of you; I’ve observed that he makes up to you whenever you chance to be on deck together.”

“He is one of the steward’s lads, sir; I met him accidentally in the train; but I suspect the fondness is chiefly on my side. He was very kind to me when I first came on board, and I really think he is an intelligent, good fellow—a strange mixture of self-confidence and humility. Sometimes, to hear him speak, you would think he knew everything; but at the same time he is always willing—indeed anxious—to listen and learn. He is a capital fighter too.”

Here Robin related the battle in the boys’ berth, when Slagg thrashed Stumps, whereat Mr Smith was much amused.

“So he seems a peculiar lad—modest, impudent, teachable, kindly, and warlike! Come below now, Robin, I have some work for you. Did you make the calculations I gave you yesterday?”

“Yes, sir, and they corresponded exactly with your own.”

“Good. Go fetch my little note-book: I left it in the grand saloon on the furthest aft seat, port side.”

Robin found the magnificent saloon of the big ship ringing

with music and conversation. Joy over the recent restoration to health of the ailing cable, the comfortable stability of the ship in rough weather, and the satisfactory progress then being made, all contributed to raise the spirits of every one connected with the great work, so that, while some were amusing themselves at the piano, others were scattered about in little groups, discussing the profounder mysteries of electric science, or prophesying the speedy completion of the enterprise, while a few were speculating on the probability of sport in Newfoundland, or planning out journeys through the United States.

“There’s lots of game, I’m told, in Newfoundland,” said one of the youthful electricians, whose ruling passion—next to the subtle fluid—was the gun.

“So I’ve been told,” replied an elder and graver comrade. “Polar bears are quite common in the woods, and it is said that walrus are fond of roosting in the trees.”

“Yes, I have heard so,” returned the youthful sportsman, who, although young, was not to be caught with chaff, “and the fishing, I hear, is also splendid. Salmon and cod are found swarming in the rivers by those who care for mild occupation, while really exciting sport is to be had in the great lakes of the interior, where there are plenty of fresh-water whales that take the fly.”

“The swan, you mean,” said another comrade. “The fly that is most killing among Newfoundland whales is a swan fastened whole to a shark hook—though a small boat’s anchor will do if you haven’t the right tackle.”

“Come, don’t talk nonsense, but let’s have a song!” said a brother electrician to the sporting youth.

“I never sing,” he replied, “except when hurt, and then I sing out. But see, our best musician has just seated himself at the instrument.”

“I don’t talk shop, Nimrod; call it the piano.”

Most of those present drew towards the musical corner, where Ebenezer Smith, having just entered the saloon in search of Robin, had been prevailed on to sit down and enliven the company. Robin, who had been delayed by difficulty in finding the note-book, stopped to listen.

Smith had a fair average voice and a vigorous manner.

“You wouldn’t object to hear the cook’s last?” asked Smith, running his fingers lightly over the keys.

“Of course not—go on,” chorused several voices.

“I had no idea,” lisped a simple youth, who was one of a small party of young gentlemen interested in engineering and science, who had been accommodated with a passage,—“I had no idea that our cook was a poet as well as an admirable *chef de cuisine*.”

“Oh, it’s not *our* cook he means,” explained the sporting electrician; “Mr Smith *refers* to a certain sea-cook—or his son, I’m not sure which—who is *chef des horse-marines*.”

“Is there a chorus?” asked one.

“Of course there is,” replied Smith; “a sea-song without a chorus is like a kite without a tail—it is sure to fall flat, but the chorus is an old and well-known one—it is only the song that is

new. Now then, clear your throats, gentlemen.”

Song—The Loss of the Nancy Lee

I

'Twas on a Friday morning that I went off,
An' shipped in the Nancy Lee,
But that ship caught a cold and with one tremendous cough
Went slap to the bottom of the sea, the sea, the sea,
Went slap to the bottom of the sea.

Chorus.—Then the raging sea may roar,
An' the stormy winds may blow,
While we jolly sailor boys rattle up aloft,
And the landlubbers lie down below, below, below
And the landlubbers lie down below.

II

For wery nigh a century I lived with the crabs,
An' danced wi' the Mermaids too,
An' drove about the Ocean in mother o' pearl cabs,

An' dwelt in a cavern so blue, so blue, so blue,
An' dwelt in a cavern so blue.
Chorus.—Then the raging sea, etcetera.

III

I soon forgot the sorrows o' the world above
In the pleasures o' the life below;
Queer fish they made up to me the want o' human love,
As through the world o' waters I did go, did go, did go;
As through the world o' waters I did go.
Chorus.—Then the raging sea, etcetera.

IV

One day a horrid grampus caught me all by the nose,
An' swung me up to the land,
An' I never went to sea again, as everybody knows,
And as everybody well may understand, 'derstand,
'derstand,
And as everybody well may understand.
Chorus.—Then the raging sea, etcetera.

The plaudits with which this song was received were, it need

scarcely be remarked, due more to the vigour of the chorus and the enthusiasm of the audience than to intrinsic merit. Even Robin Wright was carried off his legs for the moment, and, modest though he was, broke in at the chorus with such effect—his voice being shrill and clear—that, he unintentionally outyelled all the rest, and would have fled in consternation from the saloon if he had not been caught and forcibly detained by the sporting electrician, who demanded what right he had to raise his steam-whistle in that fashion.

“But I say, young Wright,” he added in a lower tone, leading our hero aside, “what’s this rumour I hear about a ghost in the steward’s cabin?”

“Oh! it is nothing to speak of,” replied Robin, with a laugh. “The lad they call Stumps got a fright—that’s all.”

“But that’s enough. Let us hear about it.”

“Well, I suppose you know,” said Robin, “that there’s a ghost in the Great Eastern.”

“No, I don’t know it from personal experience, but I have heard a report to that effect.”

“Well, I was down in Jim Slagg’s berth, having a chat with him about the nature of electric currents—for he has a very inquiring mind,—and somehow we diverged to ghosts, and began to talk of the ghost of the Great Eastern.

“I don’t believe in the Great Eastern ghost—no, nor in ghosts of any kind,” said Stumps, who was sitting near us eating a bit of cheese.

“But I believe in ’em,” said the boy Jeff, who was seated on the other side of the table, and looked at us so earnestly that we could scarce help smiling—though we didn’t feel in a smiling humour at the time, for it was getting dark, and we had got to talking in low tones and looking anxiously over our shoulders, you know—

“Oh yes, I know,” replied the sportsman, with a laugh; ‘I have shuddered and grue-oo-ed many a time over ghost-stories. Well?’

“I don’t believe in ’em, Jeff. Why do *you*?” asked Stumps, in a scoffing tone.

“Because I hear one every night a’most when I go down into the dark places below to fetch things. There’s one particular spot where the ghost goes tap-tap-tapping continually.’

“Fiddlededee,” said Stumps.

“Come down, and you shall hear it for yourself,” said Jeff.

“Now, they say that Stumps is a coward, though he boasts a good deal—”

“You may say,” interrupted the sportsman, “that Stumps is a coward *because* he boasts a good deal. Boasting is often a sign of cowardice—though not always.”

“Well,” continued Robin, “being ashamed to draw back, I suppose, he agreed to accompany Jeff.

“Won’t you come too, Slagg?” said Stumps.

“No; I don’t care a button for ghosts. Besides, I’m too busy, but Wright will go. There, don’t bother me!” said Jim.

“I noticed, as I went last out of the room, that Slagg rose quickly and pulled a sheet off one of the beds. Afterwards,

looking back, I saw him slip out and run down the passage in the opposite direction. I suspected he was about some mischief, but said nothing.

“It was getting dark, as I have said, though not dark enough for lighting the lamps, and in some corners below it was as dark as midnight. To one of these places Jeff led us.

“‘Mind how you go now,’ whispered Jeff; ‘it’s here somewhere, and there’s a hole too—look-out—there it is!’

“‘What! the ghost?’ whispered Stumps, beginning to feel uneasy. To say truth, I began to feel uneasy myself without well knowing why. At that moment I fell over something, and came down with a crash that shook Stumps’s nerves completely out of order.

“‘I say, let’s go back,’ he muttered in a tremulous voice.

“‘No, no,’ whispered Jeff seizing Stumps by the arm with a sudden grip that made him give a short yelp, ‘we are at the place now. It’s in this dark passage. Listen!’

“‘We all held our breath and listened. For a few seconds we heard nothing, but presently a slight tapping was heard.

“‘I’ve heard,’ whispered Jeff in a low tone, ‘that when the big ship was buildin’, one o’ the plate-riveters disappeared in some hole between the two skins o’ the ship hereabouts, and his comrades, not bein’ able to find him, were obliged at last to rivet him in, which they did so tight that even his ghost could not get out, so it goes on tappin’, as you hear, an’ is likely to go on tappin’ for ever.’

“Bosh!” whispered Stumps; thus politely intimating his disbelief, but I felt him trembling all over notwithstanding.

“At that moment we saw a dim shadowy whitish object at the other end of the dark passage. ‘Wha’—wha’—what’s that?’ said I.

“Stumps gasped. I heard his teeth chattering, and I think his knees were knocking together. Jeff made no sound, and it was too dark to see his face. Suddenly the object rushed at us. There was no noise of footsteps—only a muffled sound and a faint hissing. I stood still, unable to move. So did Jeff. I felt the hair of my head rising. Stumps gasped again—then turned and fled. The creature, whatever it was, brushed past us with a hideous laugh. I guessed at once that it was Jim Slagg, but evidently Stumps didn’t, for he uttered an awful yell that would have roused the whole ship if she had been of an ordinary size; at the same moment he tripped and fell on the thing that had upset me, and the ghost, leaping over him, vanished from our sight.

“To my surprise, on returning to our cabin, we found Slagg as we had left him, with both hands on his forehead poring over his book. I was almost as much surprised to see Jeff sit down and laugh heartily.—Now, what *do* you think it could have been?”

“It was Slagg, of course,” answered the sporting electrician.

“Yes, but what causes the tapping?”

“Oh, that is no doubt some little trifle—a chip of wood, or bit of wire left hanging loose, which shakes about when the ship heaves.”

A sudden tramping of feet overhead brought this ghostly

discussion to an abrupt close, and caused every man in the saloon to rush on deck with a terrible feeling in his heart that something had gone wrong.

“Not broken?” asked an electrician with a pale face on reaching the deck.

“Oh no, sir,” replied an engineer, with an anxious look, “not quite so bad as that, but a whale has taken a fancy to inspect us, and he is almost *too* attentive.”

So it was. A large Greenland whale was playing about the big ship, apparently under the impression that she was a giant of his own species, and it had passed perilously close to the cable.

A second time it came up, rolling high above the waves. It went close past the stern—rose again and dived with a gentle flop of its great tail, which, if it had touched the cable, would have cut it like a thread. At that trying moment, as they saw its huge back glittering in the moonlight, the hearts of the helpless spectators appeared absolutely to stand still. When the monster dived its side even touched the cable, but did not damage it. Being apparently satisfied by that time that the ship was not a friend, the whale finally disappeared in the depths of its ocean home.

Those who visited the Crystal Palace at Sydenham during the recent Electrical Exhibition had an opportunity of seeing the shells here referred to under a powerful microscope.

Chapter Ten.

Tells of Great Efforts and Failures and Grand Success

Thus happily and smoothly all things went, with little bursts of anxiety and little touches of alarm, just sufficient, as it were, to keep up the spirits of all, till the morning of the 30th July. But on that morning an appearance of excitement in the testing-room told that something had again gone wrong. Soon the order was given to slow the engines, then to stop them!

The bursting of a thunder-clap, the explosion of a powder-magazine, could not have more effectually awakened the slumberers than this abrupt stoppage of the ship's engines. Instantly all the hatchways poured forth anxious inquirers.

“Another fault,” was the reply to such.

“O dear!” said some.

“Horrible!” said others.

“Not so bad as a break,” sighed the hopeful spirits.

“It is bad enough,” said the chief electrician, “for we have found dead earth.”

By this the chief meant to say that insulation had been completely destroyed, and that the whole current of electricity was escaping into the sea.

About 716 miles had been payed out at the time, and as

signals had till then been regularly received from the shore, it was naturally concluded that the fault lay near to the ship.

“Now then, get along,” said an engineer to one of the cablemen; “you’ll have to cut, and splice, and test, while we are getting ready the tackle to pick up.”

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